

# E-Star End Mill

High Hardness HRc 50~63

## Characteristics

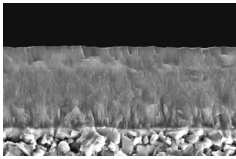
- Suitable for High Hardness HRc 50 ~ 63
- Excellent Coating in high temperature hardness and heat resistance
- High precision Tolerance for precision machining

## Features

- HRc50~63 Carbide endmill for high hardness steel
- Appropriate for precision machining by applying high precision tolerance on Cutting Diameter and radius

### Adopt a high hardness coating

- Improved wear resistance
- Improved heat resistance



### Treatment of Cutting Edge

- Improved chipping resistance
- Improved wear resistance, induce to stable work

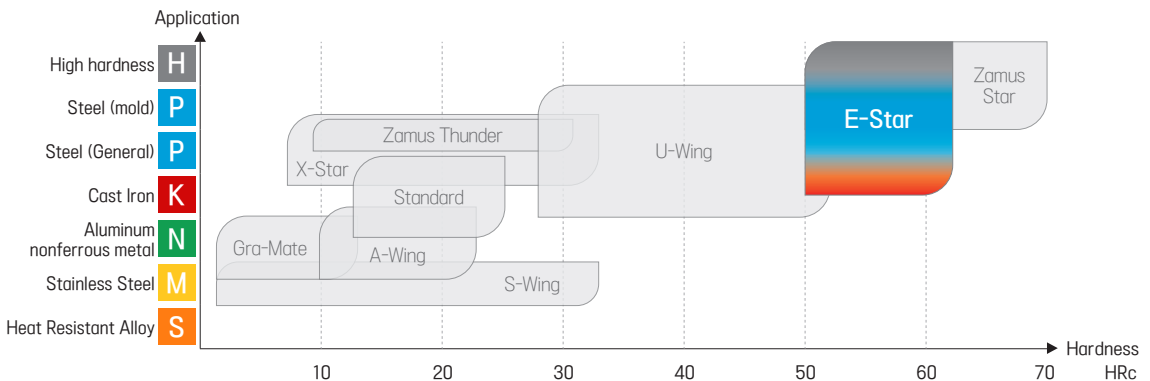


### Adopt a high hardness raw-material

- Expansion of versatility by special toughness

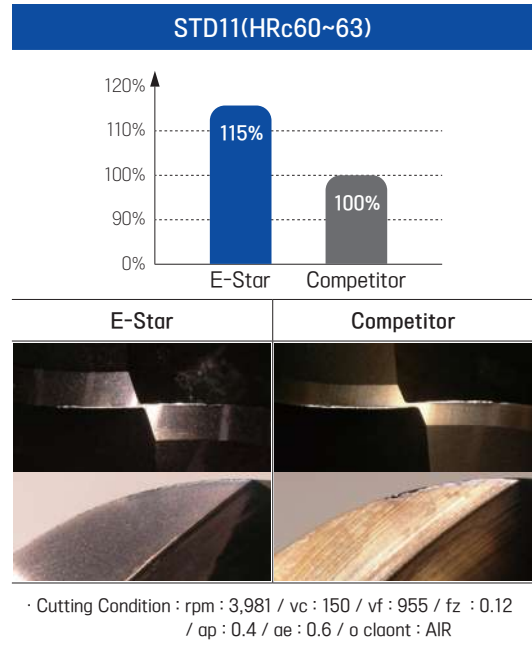
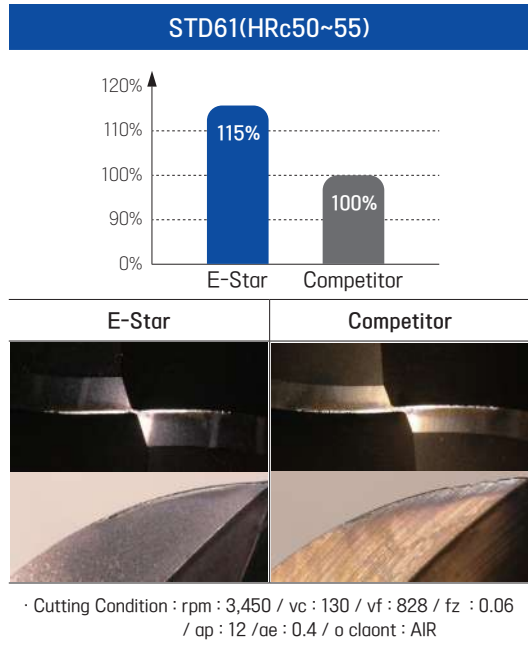


## Applications

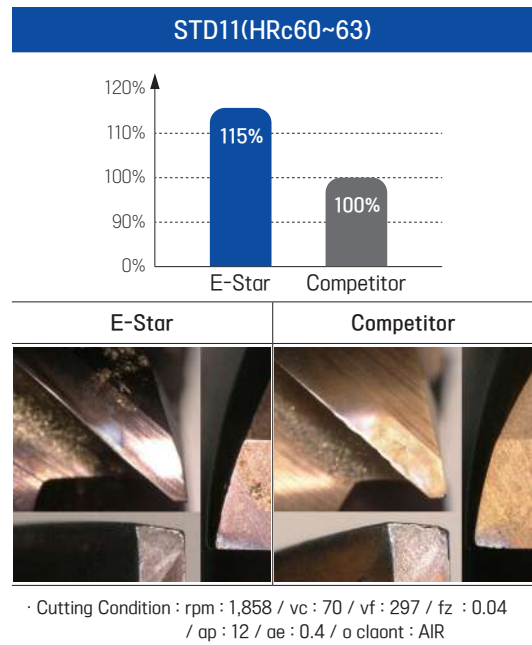
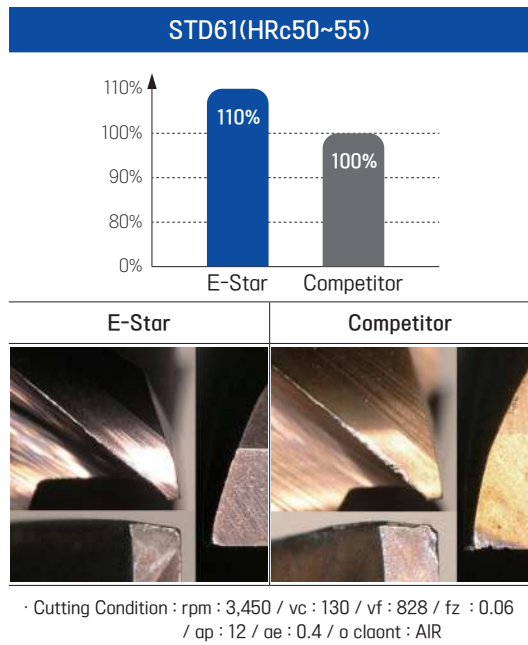


## Case Study

### ► 2F D12.0 Ball End Mill












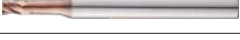







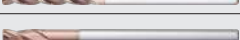
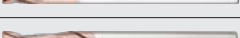
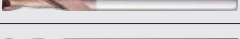
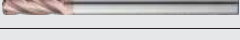
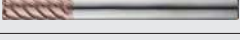
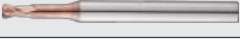
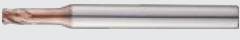

### ► 4F D12.0 Square End Mill



# E-Star Endmill

High Hardness HRc 50~63

## Contents

| Section | Shape  | Flute | EDP No    | Geometry  | Product   | Diameter(DC)                  |     | Page |
|---------|--------|-------|-----------|---|---|-------------------------------|-----|------|
|         |        |       |           |   |   | Min                           | Max |      |
| Square  | 2F     |       | ESE702    |    | 2 Flutes Neck Square End Mill   | 0.1                           | 20  | 93   |
|         | 4F     |       | ESE704    |    | 4 Flutes Neck Square End Mill   | 1                             | 20  | 94   |
|         | 2F     |       | ESE712    |    | 2 Flutes Square End Mill  | 1                             | 12  | 95   |
|         | 4F     |       | ESE714    |    | 4 Flutes High Helix Square End Mill   | 1                             | 12  | 96   |
|         | 6F     |       | ESE716    |    | 6 Flutes High Helix Square End Mill   | 6                             | 20  | 97   |
|         | 4F&6F  |       | ESE724(6) |    | 4&6 Flutes Neck Square End Mill   | 1                             | 12  | 98   |
|         | 4F     |       | ESE744    |    | 4 Flutes High Helix Square End Mill   | 1                             | 12  | 99   |
|         | 2F     |       | ESRE712   |    | 2 Flutes Rib Square End Mill  | 0.1                           | 12  | 100  |
|         | 4F     |       | ESRE714   |    | 4 Flutes Rib Square End Mill  | 0.5                           | 12  | 104  |
|         | 4F     |       | ESXE704   |    | 4 Flutes Neck Square End Mill   | 1                             | 12  | 107  |
|         | 4F     |       | ESXE714   |    | 4 Flutes Square End Mill  | 2                             | 12  | 108  |
|         | 2F     |       | ESLNS20   |   | 2 Flutes Long Neck Square End Mill  | 0.1                           | 5   | 109  |
|         | 4F     |       | ESLNS40   |  | 4 Flutes Long Neck Square End Mill  | 1                             | 5   | 114  |
|         | Radius | 2F    |           | ESR702  |  | 2 Flutes Neck Radius End Mill | 1   | 12   |
| 4F      |        |       | ESR704    |  | 4 Flutes Neck Radius End Mill   | 1                             | 12  | 120  |
| 6F      |        |       | ESR706    |  | 6 Flutes Neck Radius End Mill   | 6                             | 12  | 122  |
| 4F      |        |       | ESR714    |  | 4 Flutes Radius End Mill  | 3                             | 12  | 123  |
| 4F      |        |       | ESR724    |  | 4 Flutes Neck Radius End Mill   | 6                             | 12  | 124  |
| 2F      |        |       | ESR732    |  | 2 Flutes Long Shank Radius End Mill   | 1                             | 12  | 125  |
| 4F      |        |       | ESR734    |  | 4 Flutes Long Shank Radius End Mill   | 1                             | 12  | 127  |
| 6F      |        |       | ESR736    |  | 6 Flutes Radius End Mill  | 6                             | 12  | 129  |
| 2F      |        |       | ESRR712   |  | 2 Flutes Rib Radius End Mill  | 0.2                           | 16  | 130  |
| 4F      |        |       | ESRR714   |  | 4 Flutes Rib Radius End Mill  | 0.5                           | 20  | 137  |
| 4F      |        |       | ESXR704   |  | 4 Flutes Neck Radius End Mill   | 1                             | 12  | 145  |
| 2F      |        |       | ESLNR20   |  | 2 Flutes Long Neck Radius End Mill  | 0.2                           | 3   | 147  |

| Section |       | EDP No  | Geometry  | Product  | Diameter(DC) |     | Page |
|---------|-------|---------|---|--|--------------|-----|------|
| Shape   | Flute |         |   |  | Min          | Max |      |
| Radius  | 2F    | ESTNR20 |  | 2 Flutes Tapered Neck Radius End Mill                  | 0.2          | 3   | 151  |
|         | 4F    | ESPM4   |  | 4 Flutes Neck Radius End Mill For High Speed Machining | 3            | 12  | 154  |
| Ball    | 2F    | ESB702  |  | 2 Flutes Neck Ball End Mill                            | 0.1          | 12  | 155  |
|         | 3F    | ESB703  |  | 3 Flutes Neck Ball End Mill                            | 2            | 12  | 156  |
|         | 2F    | ESB712  |  | 2 Flutes Ball End Mill                                 | 1            | 12  | 157  |
|         | 4F    | ESB734  |  | 4 Flutes 15° Helix Ball End Mill                       | 2            | 10  | 158  |
|         | 2F    | ESRB712 |  | 2 Flutes Rib Ball End Mill                             | 0.1          | 12  | 159  |
|         | 2F    | ESLNB20 |  | 2 Flutes Long Neck Ball End Mill                       | 0.1          | 5   | 164  |
|         | 2F    | ESTNB20 |  | 2 Flutes Tapered Neck Ball End Mill                    | 0.2          | 10  | 169  |
|         | 3F    | ESTNB30 |  | 3 Flutes Tapered Neck Ball End Mill                    | 2            | 5   | 174  |

# E-Star Endmill

High Hardness HRc 50~63

## EDP No. System

\*If expressed as an integer, the decimal point is omitted.

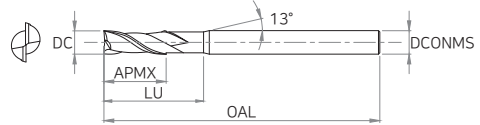
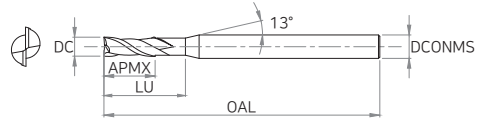


| ①           | ②                      | ③         | ④                   | ⑤           | ⑥           | ⑦         | ⑧                | ⑨          |
|-------------|------------------------|-----------|---------------------|-------------|-------------|-----------|------------------|------------|
| Section     | Appearance             | Grade     | Length, Shank Type  | Flutes      | Cutting Dia | Corner R  | Effective length | Shank Dia  |
| ES : E-Star | E : Square             | 7 : Grade | 0 : Neck            | 2 : 2Flutes | 010 : Ø1.0  | 05 : R0.5 | 10 : 10mm        | 06 : Ø6.0  |
|             | R : Radius             |           | 1 : Straight, Neck  | 3 : 3Flutes | 060 : Ø6.0  | 15 : R1.5 | 12 : 12mm        | 10 : Ø10.0 |
|             | B : Ball               |           | 2 : Long Shank Neck | 4 : 4Flutes | 065 : Ø6.5  | 20 : R2.0 | 32 : 32mm        | 12 : Ø12.0 |
|             | XE : Square (Unequal)  |           | 3 : Long Shank      | 6 : 6Flutes | 100 : Ø10.0 |           |                  |            |
|             | XR : Radius (Unequal)  |           | 4 : High Helix      |             |             |           |                  |            |
|             | PM : Power Mill        |           |                     |             |             |           |                  |            |
|             | RE : Rib Square        |           |                     |             |             |           |                  |            |
|             | RR : Rib Radius        |           |                     |             |             |           |                  |            |
|             | RB : Rib Ball          |           |                     |             |             |           |                  |            |
|             | LNB : Long Neck Ball   |           |                     |             |             |           |                  |            |
|             | TNB : Taper Neck Ball  |           |                     |             |             |           |                  |            |
|             | LNS : Long Neck Square |           |                     |             |             |           |                  |            |
|             | LNR : Long Neck Radius |           |                     |             |             |           |                  |            |

EX) 4 Flute / Cutting Dia Ø2 / Corner R 0.3 / Neck Length 6mm / Shank Dia 10 / 70Grade / Corner Radius Neck Type E-Star End Mill

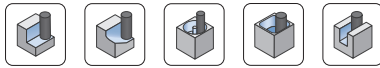
# ESE702 2 Flutes Neck Square End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø20 | 0 ~ -0.015 | h5        |



Zamus Star

E-Star

U-Wing

| EDP No       | DC  | APMX | LU | OAL | DCON MS |
|--------------|-----|------|----|-----|---------|
| ESE702 001   | 0.1 | 0.2  | -  | 40  | 4       |
| ESE702 002   | 0.2 | 0.4  | -  | 40  | 4       |
| ESE702 003   | 0.3 | 0.5  | -  | 40  | 4       |
| ESE702 004   | 0.4 | 0.7  | -  | 40  | 4       |
| ESE702 005   | 0.5 | 1    | -  | 40  | 4       |
| ESE702 006   | 0.6 | 1.2  | -  | 40  | 4       |
| ESE702 007   | 0.7 | 1.4  | -  | 40  | 4       |
| ESE702 008   | 0.8 | 1.6  | -  | 40  | 4       |
| ESE702 009   | 0.9 | 2    | -  | 40  | 4       |
| ESE702 010   | 1   | 1.5  | -  | 40  | 6       |
| ESE702 010S4 | 1   | 1.5  | -  | 40  | 4       |
| ESE702 015   | 1.5 | 2.2  | -  | 40  | 6       |
| ESE702 020   | 2   | 3    | 6  | 40  | 6       |

| EDP No       | DC  | APMX | LU | OAL | DCON MS |
|--------------|-----|------|----|-----|---------|
| ESE702 020S4 | 2   | 3    | 6  | 40  | 4       |
| ESE702 025   | 2.5 | 4    | 6  | 40  | 6       |
| ESE702 030   | 3   | 4    | 7  | 45  | 6       |
| ESE702 035   | 3.5 | 6    | 9  | 45  | 6       |
| ESE702 040   | 4   | 6    | 9  | 45  | 6       |
| ESE702 045   | 4.5 | 6    | 10 | 45  | 6       |
| ESE702 050   | 5   | 6    | 11 | 50  | 6       |
| ESE702 060   | 6   | 7    | 14 | 50  | 6       |
| ESE702 080   | 8   | 9    | 18 | 60  | 8       |
| ESE702 100   | 10  | 12   | 25 | 75  | 10      |
| ESE702 120   | 12  | 15   | 30 | 75  | 12      |
| ESE702 160   | 16  | 18   | 38 | 90  | 16      |
| ESE702 200   | 20  | 24   | 45 | 100 | 20      |

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gr-Mate

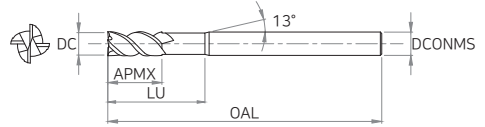
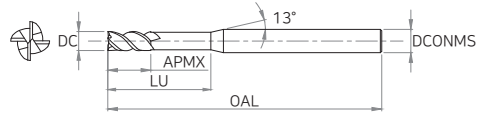
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

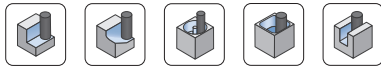
# ESE704 4 Flutes Neck Square End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø20 | 0 ~ -0.015 |           |



CARBIDE AITIN 4 30° HELIX DATA P.623

| EDP No       | DC  | APMX | LU | OAL | DCONMS |
|--------------|-----|------|----|-----|--------|
| ESE704 010   | 1   | 1.5  | -  | 40  | 6      |
| ESE704 010S4 | 1   | 1.5  | -  | 40  | 4      |
| ESE704 015   | 1.5 | 2.2  | -  | 40  | 6      |
| ESE704 015S4 | 1.5 | 2.2  | -  | 40  | 4      |
| ESE704 020   | 2   | 3    | 6  | 40  | 6      |
| ESE704 020S4 | 2   | 3    | 6  | 40  | 4      |
| ESE704 025   | 2.5 | 4    | 6  | 40  | 6      |
| ESE704 025S4 | 2.5 | 4    | 6  | 40  | 4      |
| ESE704 030   | 3   | 4    | 7  | 45  | 6      |
| ESE704 030S4 | 3   | 4    | 7  | 45  | 4      |
| ESE704 035   | 3.5 | 5    | 9  | 45  | 6      |
| ESE704 040   | 4   | 5    | 9  | 45  | 6      |
| ESE704 040S4 | 4   | 5    | 9  | 45  | 4      |
| ESE704 045   | 4.5 | 6    | 10 | 45  | 6      |
| ESE704 050   | 5   | 6    | 11 | 50  | 6      |
| ESE704 060   | 6   | 7    | 14 | 50  | 6      |
| ESE704 080   | 8   | 9    | 18 | 60  | 8      |
| ESE704 100   | 10  | 12   | 25 | 75  | 10     |
| ESE704 120   | 12  | 15   | 30 | 75  | 12     |
| ESE704 160   | 16  | 18   | 38 | 90  | 16     |
| ESE704 200   | 20  | 24   | 45 | 100 | 20     |

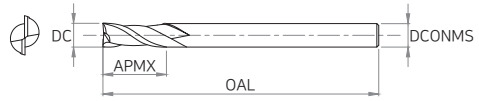
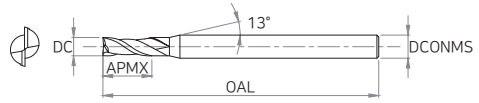
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P                   |                        |                            | K                 | N      |          |          | M               | S                    |
|----------------|--------------|---------------------|------------------------|----------------------------|-------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel        | Alloy Steel            | Prehardened Steel          | Cast Iron         | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | Carbon Steel ~HB225 | Alloy Steel HB225 ~325 | Prehardened Steel HRC30~50 | Cast Iron ~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎              | ○            |                     | ○                      | ◎                          |                   |        |          |          |                 |                      |

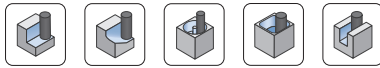
# ESE712 2 Flutes Square End Mill

Endmill



► Tolerance

| DC         |            | Shank Dia |
|------------|------------|-----------|
| ~ Ø6       | 0 ~ -0.012 |           |
| Ø6.5 ~ Ø12 | 0 ~ -0.015 | h5        |



CARBIDE AITIN 2 35° HELIX DATA P.622

| EDP No          | DC  | APMX | OAL | DCON MS | EDP No        | DC  | APMX | OAL | DCON MS |
|-----------------|-----|------|-----|---------|---------------|-----|------|-----|---------|
| ESE712 010      | 1   | 3    | 40  | 6       | ESE712 030-12 | 3   | 12   | 50  | 6       |
| ESE712 010-02   | 1   | 2    | 40  | 6       | ESE712 035    | 3.5 | 10   | 45  | 6       |
| ESE712 010-02S4 | 1   | 2    | 40  | 4       | ESE712 040    | 4   | 10   | 45  | 6       |
| ESE712 010-04   | 1   | 4    | 40  | 6       | ESE712 040S4  | 4   | 10   | 45  | 4       |
| ESE712 012      | 1.2 | 3    | 40  | 6       | ESE712 040-12 | 4   | 12   | 50  | 6       |
| ESE712 015      | 1.5 | 4    | 40  | 6       | ESE712 040-16 | 4   | 16   | 60  | 6       |
| ESE712 015S4    | 1.5 | 4    | 40  | 4       | ESE712 045    | 4.5 | 11   | 45  | 6       |
| ESE712 015-06   | 1.5 | 6    | 40  | 6       | ESE712 050    | 5   | 13   | 50  | 6       |
| ESE712 015-08   | 1.5 | 8    | 40  | 6       | ESE712 055    | 5.5 | 13   | 50  | 6       |
| ESE712 020      | 2   | 5    | 40  | 6       | ESE712 060    | 6   | 13   | 50  | 6       |
| ESE712 020S4    | 2   | 5    | 40  | 4       | ESE712 060-15 | 6   | 15   | 60  | 6       |
| ESE712 020-08   | 2   | 8    | 40  | 6       | ESE712 065    | 6.5 | 16   | 60  | 8       |
| ESE712 020-10   | 2   | 10   | 50  | 6       | ESE712 070    | 7   | 18   | 60  | 8       |
| ESE712 025      | 2.5 | 6    | 40  | 6       | ESE712 080    | 8   | 19   | 60  | 8       |
| ESE712 025S4    | 2.5 | 6    | 40  | 4       | ESE712 100    | 10  | 22   | 70  | 10      |
| ESE712 030      | 3   | 8    | 45  | 6       | ESE712 100-25 | 10  | 25   | 70  | 10      |
| ESE712 030S4    | 3   | 8    | 45  | 4       | ESE712 120    | 12  | 26   | 75  | 12      |
| ESE712 030-10   | 3   | 10   | 50  | 6       | ESE712 120-30 | 12  | 30   | 75  | 12      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

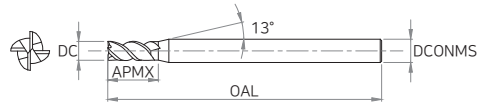
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

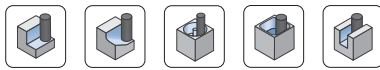
# ESE714 4 Flutes High Helix Square End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



| EDP No       | DC  | APMX | OAL | DCON MS | EDP No         | DC | APMX | OAL | DCON MS |
|--------------|-----|------|-----|---------|----------------|----|------|-----|---------|
| ESE714 010   | 1   | 2.5  | 40  | 6       | ESE714 040S4   | 4  | 10   | 45  | 4       |
| ESE714 010S4 | 1   | 2.5  | 40  | 4       | ESE714 050     | 5  | 13   | 50  | 6       |
| ESE714 012   | 1.2 | 3    | 40  | 6       | ESE714 060     | 6  | 13   | 50  | 6       |
| ESE714 015   | 1.5 | 4    | 40  | 6       | ESE714 060-15  | 6  | 15   | 60  | 6       |
| ESE714 015S4 | 1.5 | 4    | 40  | 4       | ESE714 060-15L | 6  | 15   | 90  | 6       |
| ESE714 020   | 2   | 5    | 40  | 6       | ESE714 080     | 8  | 19   | 60  | 8       |
| ESE714 020S4 | 2   | 5    | 40  | 4       | ESE714 080L    | 8  | 19   | 100 | 8       |
| ESE714 025   | 2.5 | 6    | 40  | 6       | ESE714 100     | 10 | 22   | 70  | 10      |
| ESE714 025S4 | 2.5 | 6    | 40  | 4       | ESE714 100-25  | 10 | 25   | 70  | 10      |
| ESE714 030   | 3   | 8    | 45  | 6       | ESE714 100-25L | 10 | 25   | 100 | 10      |
| ESE714 030S4 | 3   | 8    | 45  | 4       | ESE714 120     | 12 | 26   | 75  | 12      |
| ESE714 035   | 3.5 | 9    | 45  | 6       | ESE714 120-30  | 12 | 30   | 80  | 12      |
| ESE714 040   | 4   | 10   | 45  | 6       | ESE714 120-30L | 12 | 30   | 100 | 12      |

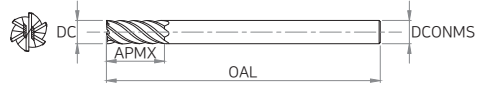
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                   | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|---------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron           | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30-50 | Cast Iron<br>~FC500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                     |        |          |          |                 |                      |

# ESE716

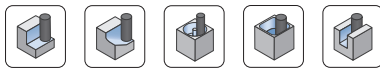
## 6 Flutes High Helix Square End Mill



Endmill

► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø20 | 0 ~ -0.015 | h5        |



CARBIDE
AlTiN
6
45° HELIX
DATA P.623

| EDP No     | DC | APMX | OAL | DCONMS |
|------------|----|------|-----|--------|
| ESE716 060 | 6  | 13   | 50  | 6      |
| ESE716 080 | 8  | 18   | 60  | 8      |
| ESE716 100 | 10 | 22   | 70  | 10     |
| ESE716 120 | 12 | 26   | 75  | 12     |
| ESE716 160 | 16 | 35   | 90  | 16     |
| ESE716 200 | 20 | 44   | 100 | 20     |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

► Applicable Working Material

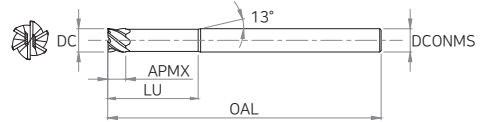
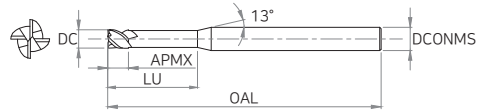
○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESE724(6)

## 4&6 Flutes Neck Square End Mill

Endmill



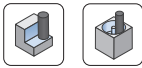
► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |

Zamus Star

E-Star

U-Wing



Zamus Thunder

X-Star

S-Wing

A-Wing

| EDP No        | DC  | APMX | LU | OAL | DCONMS | NOF |
|---------------|-----|------|----|-----|--------|-----|
| ESE724 010    | 1   | 1.5  | 5  | 45  | 6      | 4   |
| ESE724 015    | 1.5 | 2.2  | 6  | 45  | 6      | 4   |
| ESE724 020    | 2   | 3    | 8  | 45  | 6      | 4   |
| ESE724 030    | 3   | 4    | 9  | 50  | 6      | 4   |
| ESE724 040    | 4   | 5    | 12 | 50  | 6      | 4   |
| ESE724 040S4L | 4   | 5    | 12 | 75  | 4      | 4   |
| ESE724 050    | 5   | 6    | 15 | 50  | 6      | 4   |
| ESE726 060    | 6   | 7    | 20 | 60  | 6      | 6   |
| ESE726 080    | 8   | 9    | 25 | 70  | 8      | 6   |
| ESE726 100    | 10  | 12   | 32 | 75  | 10     | 6   |
| ESE726 120    | 12  | 15   | 38 | 80  | 12     | 6   |

Standard

Copper-Mate

Gra-Mate

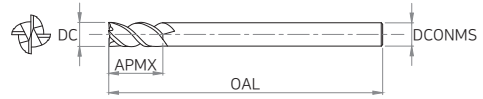
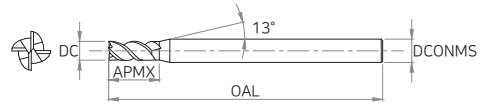
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                               | K                   | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------------------|---------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel             | Cast Iron           | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | ~HB225       | HB225<br>~325 | Prehardened Steel<br>HRC30~50 | Cast Iron<br>~FC500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |              | ○             | ◎                             |                     |        |          |          |                 |                      |

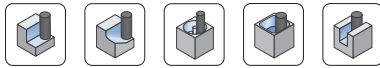
# ESE744 4 Flutes High Helix Square End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



CARBIDE AITIN 4 45° HELIX DATA P.623

| EDP No       | DC  | APMX | OAL | DCON MS | EDP No       | DC  | APMX | OAL | DCON MS |
|--------------|-----|------|-----|---------|--------------|-----|------|-----|---------|
| ESE744 010S3 | 1   | 2.5  | 40  | 3       | ESE744 030S3 | 3   | 8    | 50  | 3       |
| ESE744 010S4 | 1   | 2.5  | 40  | 4       | ESE744 030S4 | 3   | 8    | 45  | 4       |
| ESE744 010   | 1   | 2.5  | 40  | 6       | ESE744 030   | 3   | 8    | 45  | 6       |
| ESE744 012S3 | 1.2 | 3    | 40  | 3       | ESE744 035   | 3.5 | 10   | 45  | 6       |
| ESE744 012S4 | 1.2 | 3    | 40  | 4       | ESE744 040S4 | 4   | 11   | 45  | 4       |
| ESE744 015S3 | 1.5 | 4    | 40  | 3       | ESE744 040   | 4   | 11   | 45  | 6       |
| ESE744 015S4 | 1.5 | 4    | 40  | 4       | ESE744 045   | 4.5 | 11   | 45  | 6       |
| ESE744 015   | 1.5 | 4    | 40  | 6       | ESE744 050   | 5   | 13   | 50  | 6       |
| ESE744 020S3 | 2   | 6    | 40  | 3       | ESE744 055   | 5.5 | 13   | 50  | 6       |
| ESE744 020S4 | 2   | 6    | 40  | 4       | ESE744 060   | 6   | 13   | 50  | 6       |
| ESE744 020   | 2   | 6    | 40  | 6       | ESE744 080   | 8   | 19   | 60  | 8       |
| ESE744 025S3 | 2.5 | 8    | 45  | 3       | ESE744 100   | 10  | 22   | 70  | 10      |
| ESE744 025S4 | 2.5 | 8    | 45  | 4       | ESE744 120   | 12  | 26   | 75  | 12      |
| ESE744 025   | 2.5 | 8    | 45  | 6       |              |     |      |     |         |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

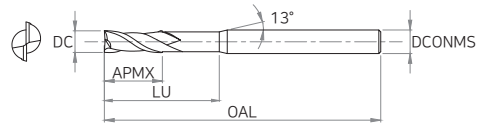
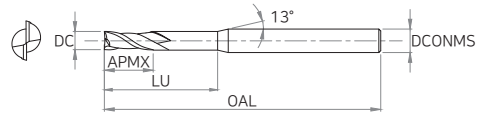
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

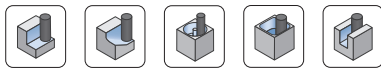
# ESRE712 2 Flutes Rib Square End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



CARBIDE
AITIN
2
30° HELIX
DATA P.625

| EDP No         | DC  | APMX | LU  | OAL | DCON MS | EDP No         | DC  | APMX | LU  | OAL | DCON MS |
|----------------|-----|------|-----|-----|---------|----------------|-----|------|-----|-----|---------|
| ESRE712 001003 | 0.1 | 0.15 | 0.3 | 40  | 4       | ESRE712 00405  | 0.4 | 0.6  | 5   | 40  | 4       |
| ESRE712 001005 | 0.1 | 0.15 | 0.5 | 40  | 4       | ESRE712 00406  | 0.4 | 0.6  | 6   | 40  | 4       |
| ESRE712 00101  | 0.1 | 0.15 | 1   | 40  | 4       | ESRE712 00408  | 0.4 | 0.6  | 8   | 40  | 4       |
| ESRE712 002005 | 0.2 | 0.3  | 0.5 | 40  | 4       | ESRE712 00410  | 0.4 | 0.6  | 10  | 40  | 4       |
| ESRE712 002015 | 0.2 | 0.3  | 1.5 | 40  | 4       | ESRE712 005015 | 0.5 | 0.7  | 1.5 | 45  | 4       |
| ESRE712 00201  | 0.2 | 0.3  | 1   | 40  | 4       | ESRE712 00501  | 0.5 | 0.7  | 1   | 45  | 4       |
| ESRE712 00202  | 0.2 | 0.3  | 2   | 40  | 4       | ESRE712 005025 | 0.5 | 0.7  | 2.5 | 45  | 4       |
| ESRE712 003015 | 0.3 | 0.5  | 1.5 | 40  | 4       | ESRE712 00502  | 0.5 | 0.7  | 2   | 45  | 4       |
| ESRE712 00301  | 0.3 | 0.5  | 1   | 40  | 4       | ESRE712 00503  | 0.5 | 0.7  | 3   | 45  | 4       |
| ESRE712 003025 | 0.3 | 0.5  | 2.5 | 40  | 4       | ESRE712 00504  | 0.5 | 0.7  | 4   | 45  | 4       |
| ESRE712 00302  | 0.3 | 0.5  | 2   | 40  | 4       | ESRE712 00505  | 0.5 | 0.7  | 5   | 45  | 4       |
| ESRE712 00303  | 0.3 | 0.5  | 3   | 40  | 4       | ESRE712 00506  | 0.5 | 0.7  | 6   | 45  | 4       |
| ESRE712 00304  | 0.3 | 0.5  | 4   | 40  | 4       | ESRE712 00508  | 0.5 | 0.7  | 8   | 45  | 4       |
| ESRE712 00305  | 0.3 | 0.5  | 5   | 40  | 4       | ESRE712 00510  | 0.5 | 0.7  | 10  | 45  | 4       |
| ESRE712 004015 | 0.4 | 0.6  | 1.5 | 40  | 4       | ESRE712 00512  | 0.5 | 0.7  | 12  | 45  | 4       |
| ESRE712 00401  | 0.4 | 0.6  | 1   | 40  | 4       | ESRE712 00514  | 0.5 | 0.7  | 14  | 45  | 4       |
| ESRE712 004025 | 0.4 | 0.6  | 2.5 | 40  | 4       | ESRE712 00516  | 0.5 | 0.7  | 16  | 45  | 4       |
| ESRE712 00402  | 0.4 | 0.6  | 2   | 40  | 4       | ESRE712 00602  | 0.6 | 0.9  | 2   | 45  | 4       |
| ESRE712 00403  | 0.4 | 0.6  | 3   | 40  | 4       | ESRE712 00603  | 0.6 | 0.9  | 3   | 45  | 4       |
| ESRE712 00404  | 0.4 | 0.6  | 4   | 40  | 4       | ESRE712 00604  | 0.6 | 0.9  | 4   | 45  | 4       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K         | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | ~HB225       | HB225 ~325  | HRC30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |           |        |          |          |                 |                      |

# ESRE712 2 Flutes Rib Square End Mill

Endmill

| EDP No        | DC  | APMX | LU | OAL | DCON MS | EDP No        | DC  | APMX | LU | OAL | DCON MS |
|---------------|-----|------|----|-----|---------|---------------|-----|------|----|-----|---------|
| ESRE712 00605 | 0.6 | 0.9  | 5  | 45  | 4       | ESRE712 01010 | 1   | 1.5  | 10 | 50  | 4       |
| ESRE712 00606 | 0.6 | 0.9  | 6  | 45  | 4       | ESRE712 01012 | 1   | 1.5  | 12 | 50  | 4       |
| ESRE712 00608 | 0.6 | 0.9  | 8  | 45  | 4       | ESRE712 01014 | 1   | 1.5  | 14 | 50  | 4       |
| ESRE712 00610 | 0.6 | 0.9  | 10 | 45  | 4       | ESRE712 01016 | 1   | 1.5  | 16 | 50  | 4       |
| ESRE712 00612 | 0.6 | 0.9  | 12 | 45  | 4       | ESRE712 01018 | 1   | 1.5  | 18 | 50  | 4       |
| ESRE712 00614 | 0.6 | 0.9  | 14 | 45  | 4       | ESRE712 01020 | 1   | 1.5  | 20 | 50  | 4       |
| ESRE712 00616 | 0.6 | 0.9  | 16 | 45  | 4       | ESRE712 01022 | 1   | 1.5  | 22 | 60  | 4       |
| ESRE712 00702 | 0.7 | 1.2  | 2  | 45  | 4       | ESRE712 01026 | 1   | 1.5  | 26 | 60  | 4       |
| ESRE712 00704 | 0.7 | 1.2  | 4  | 45  | 4       | ESRE712 01030 | 1   | 1.5  | 30 | 70  | 4       |
| ESRE712 00706 | 0.7 | 1.2  | 6  | 45  | 4       | ESRE712 01040 | 1   | 1.5  | 40 | 80  | 4       |
| ESRE712 00708 | 0.7 | 1.2  | 8  | 45  | 4       | ESRE712 01050 | 1   | 1.5  | 50 | 100 | 4       |
| ESRE712 00710 | 0.7 | 1.2  | 10 | 45  | 4       | ESRE712 01204 | 1.2 | 1.8  | 4  | 50  | 4       |
| ESRE712 00712 | 0.7 | 1.2  | 12 | 45  | 4       | ESRE712 01206 | 1.2 | 1.8  | 6  | 50  | 4       |
| ESRE712 00802 | 0.8 | 1.2  | 2  | 45  | 4       | ESRE712 01208 | 1.2 | 1.8  | 8  | 50  | 4       |
| ESRE712 00803 | 0.8 | 1.2  | 3  | 45  | 4       | ESRE712 01210 | 1.2 | 1.8  | 10 | 50  | 4       |
| ESRE712 00804 | 0.8 | 1.2  | 4  | 45  | 4       | ESRE712 01212 | 1.2 | 1.8  | 12 | 50  | 4       |
| ESRE712 00805 | 0.8 | 1.2  | 5  | 45  | 4       | ESRE712 01214 | 1.2 | 1.8  | 14 | 50  | 4       |
| ESRE712 00806 | 0.8 | 1.2  | 6  | 45  | 4       | ESRE712 01216 | 1.2 | 1.8  | 16 | 50  | 4       |
| ESRE712 00808 | 0.8 | 1.2  | 8  | 45  | 4       | ESRE712 01220 | 1.2 | 1.8  | 20 | 50  | 4       |
| ESRE712 00810 | 0.8 | 1.2  | 10 | 45  | 4       | ESRE712 01226 | 1.2 | 1.8  | 26 | 60  | 4       |
| ESRE712 00812 | 0.8 | 1.2  | 12 | 45  | 4       | ESRE712 01230 | 1.2 | 1.8  | 30 | 70  | 4       |
| ESRE712 00814 | 0.8 | 1.2  | 14 | 45  | 4       | ESRE712 01406 | 1.4 | 2.1  | 6  | 50  | 4       |
| ESRE712 00816 | 0.8 | 1.2  | 16 | 45  | 4       | ESRE712 01408 | 1.4 | 2.1  | 8  | 50  | 4       |
| ESRE712 00820 | 0.8 | 1.2  | 20 | 50  | 4       | ESRE712 01410 | 1.4 | 2.1  | 10 | 50  | 4       |
| ESRE712 00906 | 0.9 | 1.3  | 6  | 45  | 4       | ESRE712 01414 | 1.4 | 2.1  | 14 | 50  | 4       |
| ESRE712 00908 | 0.9 | 1.3  | 8  | 45  | 4       | ESRE712 01416 | 1.4 | 2.1  | 16 | 50  | 4       |
| ESRE712 00910 | 0.9 | 1.3  | 10 | 45  | 4       | ESRE712 01420 | 1.4 | 2.1  | 20 | 50  | 4       |
| ESRE712 01002 | 1   | 1.5  | 2  | 50  | 4       | ESRE712 01504 | 1.5 | 2.3  | 4  | 50  | 4       |
| ESRE712 01003 | 1   | 1.5  | 3  | 50  | 4       | ESRE712 01505 | 1.5 | 2.3  | 5  | 50  | 4       |
| ESRE712 01004 | 1   | 1.5  | 4  | 50  | 4       | ESRE712 01506 | 1.5 | 2.3  | 6  | 50  | 4       |
| ESRE712 01005 | 1   | 1.5  | 5  | 50  | 4       | ESRE712 01507 | 1.5 | 2.3  | 7  | 50  | 4       |
| ESRE712 01006 | 1   | 1.5  | 6  | 50  | 4       | ESRE712 01508 | 1.5 | 2.3  | 8  | 50  | 4       |
| ESRE712 01007 | 1   | 1.5  | 7  | 50  | 4       | ESRE712 01510 | 1.5 | 2.3  | 10 | 50  | 4       |
| ESRE712 01008 | 1   | 1.5  | 8  | 50  | 4       | ESRE712 01512 | 1.5 | 2.3  | 12 | 50  | 4       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRE712

## 2 Flutes Rib Square End Mill

Endmill

|               | EDP No        | DC  | APMX | LU | OAL | DCON MS | EDP No        | DC  | APMX | LU | OAL | DCON MS |
|---------------|---------------|-----|------|----|-----|---------|---------------|-----|------|----|-----|---------|
| Zamus Star    | ESRE712 01514 | 1.5 | 2.3  | 14 | 50  | 4       | ESRE712 02510 | 2.5 | 4    | 10 | 50  | 4       |
|               | ESRE712 01516 | 1.5 | 2.3  | 16 | 50  | 4       | ESRE712 02512 | 2.5 | 4    | 12 | 50  | 4       |
|               | ESRE712 01518 | 1.5 | 2.3  | 18 | 50  | 4       | ESRE712 02514 | 2.5 | 4    | 14 | 50  | 4       |
|               | ESRE712 01520 | 1.5 | 2.3  | 20 | 50  | 4       | ESRE712 02516 | 2.5 | 4    | 16 | 50  | 4       |
|               | ESRE712 01522 | 1.5 | 2.3  | 22 | 60  | 4       | ESRE712 02518 | 2.5 | 4    | 18 | 50  | 4       |
| E-Star        | ESRE712 01526 | 1.5 | 2.3  | 26 | 60  | 4       | ESRE712 02520 | 2.5 | 4    | 20 | 50  | 4       |
|               | ESRE712 01530 | 1.5 | 2.3  | 30 | 70  | 4       | ESRE712 02522 | 2.5 | 4    | 22 | 60  | 4       |
|               | ESRE712 01608 | 1.6 | 2.3  | 8  | 50  | 4       | ESRE712 02526 | 2.5 | 4    | 26 | 60  | 4       |
| U-Wing        | ESRE712 01610 | 1.6 | 2.3  | 10 | 50  | 4       | ESRE712 02530 | 2.5 | 4    | 30 | 70  | 4       |
|               | ESRE712 01612 | 1.6 | 2.3  | 12 | 50  | 4       | ESRE712 02535 | 2.5 | 4    | 35 | 70  | 4       |
|               | ESRE712 01616 | 1.6 | 2.3  | 16 | 50  | 4       | ESRE712 02540 | 2.5 | 4    | 40 | 80  | 4       |
| Zamus Thunder | ESRE712 01620 | 1.6 | 2.3  | 20 | 50  | 4       | ESRE712 02545 | 2.5 | 4    | 45 | 90  | 4       |
|               | ESRE712 01808 | 1.8 | 2.7  | 8  | 50  | 4       | ESRE712 02550 | 2.5 | 4    | 50 | 100 | 4       |
|               | ESRE712 01810 | 1.8 | 2.7  | 10 | 50  | 4       | ESRE712 03006 | 3   | 4.5  | 6  | 50  | 6       |
| X-Star        | ESRE712 01812 | 1.8 | 2.7  | 12 | 50  | 4       | ESRE712 03008 | 3   | 4.5  | 8  | 50  | 6       |
|               | ESRE712 01816 | 1.8 | 2.7  | 16 | 50  | 4       | ESRE712 03010 | 3   | 4.5  | 10 | 50  | 6       |
|               | ESRE712 01820 | 1.8 | 2.7  | 20 | 50  | 4       | ESRE712 03012 | 3   | 4.5  | 12 | 50  | 6       |
| S-Wing        | ESRE712 02006 | 2   | 3    | 6  | 50  | 4       | ESRE712 03014 | 3   | 4.5  | 14 | 60  | 6       |
|               | ESRE712 02008 | 2   | 3    | 8  | 50  | 4       | ESRE712 03016 | 3   | 4.5  | 16 | 60  | 6       |
|               | ESRE712 02010 | 2   | 3    | 10 | 50  | 4       | ESRE712 03018 | 3   | 4.5  | 18 | 60  | 6       |
| A-Wing        | ESRE712 02012 | 2   | 3    | 12 | 50  | 4       | ESRE712 03020 | 3   | 4.5  | 20 | 60  | 6       |
|               | ESRE712 02014 | 2   | 3    | 14 | 50  | 4       | ESRE712 03022 | 3   | 4.5  | 22 | 65  | 6       |
|               | ESRE712 02016 | 2   | 3    | 16 | 50  | 4       | ESRE712 03026 | 3   | 4.5  | 26 | 65  | 6       |
| Standard      | ESRE712 02018 | 2   | 3    | 18 | 50  | 4       | ESRE712 03030 | 3   | 4.5  | 30 | 70  | 6       |
|               | ESRE712 02020 | 2   | 3    | 20 | 50  | 4       | ESRE712 03035 | 3   | 4.5  | 35 | 70  | 6       |
|               | ESRE712 02022 | 2   | 3    | 22 | 60  | 4       | ESRE712 03040 | 3   | 4.5  | 40 | 80  | 6       |
| Copper-Mate   | ESRE712 02026 | 2   | 3    | 26 | 60  | 4       | ESRE712 03045 | 3   | 4.5  | 45 | 90  | 6       |
|               | ESRE712 02030 | 2   | 3    | 30 | 70  | 4       | ESRE712 03050 | 3   | 4.5  | 50 | 100 | 6       |
|               | ESRE712 02035 | 2   | 3    | 35 | 70  | 4       | ESRE712 03060 | 3   | 4.5  | 60 | 100 | 6       |
| Gra-Mate      | ESRE712 02040 | 2   | 3    | 40 | 80  | 4       | ESRE712 04008 | 4   | 6    | 8  | 50  | 6       |
|               | ESRE712 02045 | 2   | 3    | 45 | 90  | 4       | ESRE712 04010 | 4   | 6    | 10 | 50  | 6       |
|               | ESRE712 02050 | 2   | 3    | 50 | 100 | 4       | ESRE712 04012 | 4   | 6    | 12 | 50  | 6       |
|               | ESRE712 02060 | 2   | 3    | 60 | 110 | 4       | ESRE712 04014 | 4   | 6    | 14 | 60  | 6       |
|               | ESRE712 02508 | 2.5 | 4    | 8  | 50  | 4       | ESRE712 04016 | 4   | 6    | 16 | 60  | 6       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |                        |                            | K                 | N      |          |          | M               | S                    |
|----------------|--------------|--------------|------------------------|----------------------------|-------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel            | Prehardened Steel          | Cast Iron ~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | Steel ~HB225 | Alloy Steel HB225 ~325 | Prehardened Steel HRC30~50 |                   |        |          |          |                 |                      |
| ◎              | ○            |              | ○                      | ◎                          |                   |        |          |          |                 |                      |

# ESRE712 2 Flutes Rib Square End Mill

Endmill

| EDP No        | DC | APMX | LU | OAL | DCON MS | EDP No        | DC | APMX | LU | OAL | DCON MS |
|---------------|----|------|----|-----|---------|---------------|----|------|----|-----|---------|
| ESRE712 04018 | 4  | 6    | 18 | 60  | 6       | ESRE712 05050 | 5  | 8    | 50 | 90  | 6       |
| ESRE712 04020 | 4  | 6    | 20 | 60  | 6       | ESRE712 05060 | 5  | 8    | 60 | 100 | 6       |
| ESRE712 04022 | 4  | 6    | 22 | 65  | 6       | ESRE712 06015 | 6  | 9    | 15 | 60  | 6       |
| ESRE712 04026 | 4  | 6    | 26 | 65  | 6       | ESRE712 06020 | 6  | 9    | 20 | 60  | 6       |
| ESRE712 04030 | 4  | 6    | 30 | 70  | 6       | ESRE712 06030 | 6  | 9    | 30 | 70  | 6       |
| ESRE712 04035 | 4  | 6    | 35 | 70  | 6       | ESRE712 06032 | 6  | 9    | 32 | 90  | 6       |
| ESRE712 04040 | 4  | 6    | 40 | 80  | 6       | ESRE712 08025 | 8  | 12   | 25 | 70  | 8       |
| ESRE712 04045 | 4  | 6    | 45 | 90  | 6       | ESRE712 08030 | 8  | 12   | 30 | 80  | 8       |
| ESRE712 04050 | 4  | 6    | 50 | 100 | 6       | ESRE712 08042 | 8  | 12   | 42 | 100 | 8       |
| ESRE712 04060 | 4  | 6    | 60 | 100 | 6       | ESRE712 10030 | 10 | 15   | 30 | 75  | 10      |
| ESRE712 05016 | 5  | 8    | 16 | 60  | 6       | ESRE712 10035 | 10 | 15   | 35 | 80  | 10      |
| ESRE712 05020 | 5  | 8    | 20 | 60  | 6       | ESRE712 10045 | 10 | 15   | 45 | 100 | 10      |
| ESRE712 05026 | 5  | 8    | 26 | 65  | 6       | ESRE712 12035 | 12 | 20   | 35 | 80  | 12      |
| ESRE712 05030 | 5  | 8    | 30 | 70  | 6       | ESRE712 12040 | 12 | 20   | 40 | 90  | 12      |
| ESRE712 05035 | 5  | 8    | 35 | 75  | 6       | ESRE712 12050 | 12 | 20   | 50 | 110 | 12      |
| ESRE712 05040 | 5  | 8    | 40 | 80  | 6       |               |    |      |    |     |         |

- Zamus Star
- E-Star
- U-Wing
- Zamus Thunder
- X-Star
- S-Wing
- A-Wing
- Standard
- Copper-Mate
- Gra-Mate

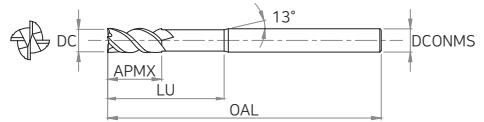
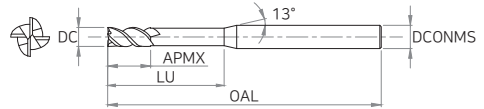
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

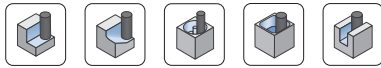
# ESRE714 4 Flutes Rib Square End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



| EDP No        | DC  | APMX | LU | OAL | DCON MS | EDP No        | DC  | APMX | LU | OAL | DCON MS |
|---------------|-----|------|----|-----|---------|---------------|-----|------|----|-----|---------|
| ESRE714 00501 | 0.5 | 0.5  | 1  | 40  | 4       | ESRE714 00708 | 0.7 | 0.7  | 8  | 45  | 4       |
| ESRE714 00502 | 0.5 | 0.5  | 2  | 40  | 4       | ESRE714 00710 | 0.7 | 0.7  | 10 | 50  | 4       |
| ESRE714 00503 | 0.5 | 0.5  | 3  | 45  | 4       | ESRE714 00801 | 0.8 | 0.8  | 1  | 40  | 4       |
| ESRE714 00504 | 0.5 | 0.5  | 4  | 45  | 4       | ESRE714 00802 | 0.8 | 0.8  | 2  | 40  | 4       |
| ESRE714 00505 | 0.5 | 0.5  | 5  | 45  | 4       | ESRE714 00803 | 0.8 | 0.8  | 3  | 40  | 4       |
| ESRE714 00506 | 0.5 | 0.5  | 6  | 45  | 4       | ESRE714 00804 | 0.8 | 0.8  | 4  | 40  | 4       |
| ESRE714 00508 | 0.5 | 0.5  | 8  | 45  | 4       | ESRE714 00805 | 0.8 | 0.8  | 5  | 40  | 4       |
| ESRE714 00510 | 0.5 | 0.5  | 10 | 50  | 4       | ESRE714 00806 | 0.8 | 0.8  | 6  | 40  | 4       |
| ESRE714 00601 | 0.6 | 0.6  | 1  | 45  | 4       | ESRE714 00808 | 0.8 | 0.8  | 8  | 40  | 4       |
| ESRE714 00602 | 0.6 | 0.6  | 2  | 45  | 4       | ESRE714 00810 | 0.8 | 0.8  | 10 | 50  | 4       |
| ESRE714 00603 | 0.6 | 0.6  | 3  | 45  | 4       | ESRE714 00812 | 0.8 | 0.8  | 12 | 50  | 4       |
| ESRE714 00604 | 0.6 | 0.6  | 4  | 45  | 4       | ESRE714 00816 | 0.8 | 0.8  | 16 | 50  | 4       |
| ESRE714 00605 | 0.6 | 0.6  | 5  | 45  | 4       | ESRE714 01002 | 1   | 1    | 2  | 45  | 4       |
| ESRE714 00606 | 0.6 | 0.6  | 6  | 45  | 4       | ESRE714 01003 | 1   | 1    | 3  | 45  | 4       |
| ESRE714 00608 | 0.6 | 0.6  | 8  | 45  | 4       | ESRE714 01004 | 1   | 1    | 4  | 45  | 4       |
| ESRE714 00610 | 0.6 | 0.6  | 10 | 50  | 4       | ESRE714 01006 | 1   | 1    | 6  | 45  | 4       |
| ESRE714 00612 | 0.6 | 0.6  | 12 | 50  | 4       | ESRE714 01008 | 1   | 1    | 8  | 45  | 4       |
| ESRE714 00702 | 0.7 | 0.7  | 2  | 45  | 4       | ESRE714 01010 | 1   | 1    | 10 | 50  | 4       |
| ESRE714 00704 | 0.7 | 0.7  | 4  | 45  | 4       | ESRE714 01012 | 1   | 1    | 12 | 50  | 4       |
| ESRE714 00706 | 0.7 | 0.7  | 6  | 45  | 4       | ESRE714 01014 | 1   | 1    | 14 | 50  | 4       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K         | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | ~HB225       | HB225 ~325  | HRC30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |           |        |          |          |                 |                      |

# ESRE714 4 Flutes Rib Square End Mill

Endmill

| EDP No        | DC  | APMX | LU | OAL | DCON MS | EDP No        | DC  | APMX | LU | OAL | DCON MS |
|---------------|-----|------|----|-----|---------|---------------|-----|------|----|-----|---------|
| ESRE714 01016 | 1   | 1    | 16 | 50  | 4       | ESRE714 01620 | 1.6 | 1.6  | 20 | 60  | 4       |
| ESRE714 01018 | 1   | 1    | 18 | 60  | 4       | ESRE714 01625 | 1.6 | 1.6  | 25 | 70  | 4       |
| ESRE714 01020 | 1   | 1    | 20 | 60  | 4       | ESRE714 01806 | 1.8 | 1.8  | 6  | 45  | 4       |
| ESRE714 01204 | 1.2 | 1.2  | 4  | 45  | 4       | ESRE714 01808 | 1.8 | 1.8  | 8  | 45  | 4       |
| ESRE714 01206 | 1.2 | 1.2  | 6  | 45  | 4       | ESRE714 01810 | 1.8 | 1.8  | 10 | 50  | 4       |
| ESRE714 01208 | 1.2 | 1.2  | 8  | 45  | 4       | ESRE714 01812 | 1.8 | 1.8  | 12 | 50  | 4       |
| ESRE714 01210 | 1.2 | 1.2  | 10 | 50  | 4       | ESRE714 01816 | 1.8 | 1.8  | 16 | 50  | 4       |
| ESRE714 01212 | 1.2 | 1.2  | 12 | 50  | 4       | ESRE714 01820 | 1.8 | 1.8  | 20 | 60  | 4       |
| ESRE714 01216 | 1.2 | 1.2  | 16 | 50  | 4       | ESRE714 01825 | 1.8 | 1.8  | 25 | 70  | 4       |
| ESRE714 01218 | 1.2 | 1.2  | 18 | 60  | 4       | ESRE714 02004 | 2   | 2    | 4  | 45  | 4       |
| ESRE714 01220 | 1.2 | 1.2  | 20 | 60  | 4       | ESRE714 02006 | 2   | 2    | 6  | 45  | 4       |
| ESRE714 01406 | 1.4 | 1.4  | 6  | 45  | 4       | ESRE714 02008 | 2   | 2    | 8  | 45  | 4       |
| ESRE714 01408 | 1.4 | 1.4  | 8  | 45  | 4       | ESRE714 02010 | 2   | 2    | 10 | 50  | 4       |
| ESRE714 01410 | 1.4 | 1.4  | 10 | 50  | 4       | ESRE714 02012 | 2   | 2    | 12 | 50  | 4       |
| ESRE714 01412 | 1.4 | 1.4  | 12 | 50  | 4       | ESRE714 02014 | 2   | 2    | 14 | 50  | 4       |
| ESRE714 01414 | 1.4 | 1.4  | 14 | 50  | 4       | ESRE714 02016 | 2   | 2    | 16 | 50  | 4       |
| ESRE714 01416 | 1.4 | 1.4  | 16 | 50  | 4       | ESRE714 02018 | 2   | 2    | 18 | 50  | 4       |
| ESRE714 01504 | 1.5 | 1.5  | 4  | 45  | 4       | ESRE714 02020 | 2   | 2    | 20 | 50  | 4       |
| ESRE714 01506 | 1.5 | 1.5  | 6  | 45  | 4       | ESRE714 02022 | 2   | 2    | 22 | 60  | 4       |
| ESRE714 01508 | 1.5 | 1.5  | 8  | 45  | 4       | ESRE714 02025 | 2   | 2    | 25 | 60  | 4       |
| ESRE714 01510 | 1.5 | 1.5  | 10 | 50  | 4       | ESRE714 02030 | 2   | 2    | 30 | 70  | 4       |
| ESRE714 01512 | 1.5 | 1.5  | 12 | 50  | 4       | ESRE714 02510 | 2.5 | 2.5  | 10 | 50  | 4       |
| ESRE714 01516 | 1.5 | 1.5  | 16 | 50  | 4       | ESRE714 02512 | 2.5 | 2.5  | 12 | 50  | 4       |
| ESRE714 01518 | 1.5 | 1.5  | 18 | 60  | 4       | ESRE714 02516 | 2.5 | 2.5  | 16 | 50  | 4       |
| ESRE714 01520 | 1.5 | 1.5  | 20 | 60  | 4       | ESRE714 02520 | 2.5 | 2.5  | 20 | 50  | 4       |
| ESRE714 01525 | 1.5 | 1.5  | 25 | 60  | 4       | ESRE714 02525 | 2.5 | 2.5  | 25 | 60  | 4       |
| ESRE714 01530 | 1.5 | 1.5  | 30 | 70  | 4       | ESRE714 02530 | 2.5 | 2.5  | 30 | 70  | 4       |
| ESRE714 01606 | 1.6 | 1.6  | 6  | 45  | 4       | ESRE714 03006 | 3   | 3    | 6  | 45  | 6       |
| ESRE714 01608 | 1.6 | 1.6  | 8  | 45  | 4       | ESRE714 03008 | 3   | 3    | 8  | 45  | 6       |
| ESRE714 01610 | 1.6 | 1.6  | 10 | 50  | 4       | ESRE714 03010 | 3   | 3    | 10 | 50  | 6       |
| ESRE714 01612 | 1.6 | 1.6  | 12 | 50  | 4       | ESRE714 03012 | 3   | 3    | 12 | 50  | 6       |
| ESRE714 01614 | 1.6 | 1.6  | 14 | 50  | 4       | ESRE714 03016 | 3   | 3    | 16 | 55  | 6       |
| ESRE714 01616 | 1.6 | 1.6  | 16 | 50  | 4       | ESRE714 03020 | 3   | 3    | 20 | 60  | 6       |
| ESRE714 01618 | 1.6 | 1.6  | 18 | 60  | 4       | ESRE714 03025 | 3   | 3    | 25 | 65  | 6       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRE714 4 Flutes Rib Square End Mill

Endmill

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper -Mate

Gra -Mate

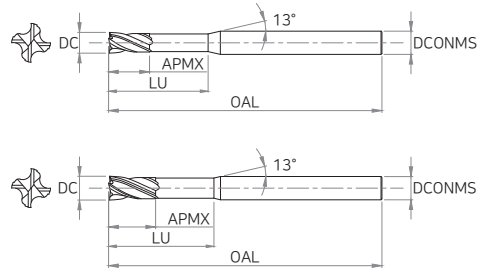
| EDP No        | DC  | APMX | LU | OAL | D CON MS | EDP No        | DC  | APMX | LU | OAL | D CON MS |
|---------------|-----|------|----|-----|----------|---------------|-----|------|----|-----|----------|
| ESRE714 03030 | 3   | 3    | 30 | 70  | 6        | ESRE714 04516 | 4.5 | 4.5  | 16 | 55  | 6        |
| ESRE714 03035 | 3   | 3    | 35 | 75  | 6        | ESRE714 04520 | 4.5 | 4.5  | 20 | 60  | 6        |
| ESRE714 03040 | 3   | 3    | 40 | 80  | 6        | ESRE714 04525 | 4.5 | 4.5  | 25 | 65  | 6        |
| ESRE714 03045 | 3   | 3    | 45 | 90  | 6        | ESRE714 04530 | 4.5 | 4.5  | 30 | 70  | 6        |
| ESRE714 03050 | 3   | 3    | 50 | 100 | 6        | ESRE714 04540 | 4.5 | 4.5  | 40 | 80  | 6        |
| ESRE714 03060 | 3   | 3    | 60 | 110 | 6        | ESRE714 05016 | 5   | 5    | 16 | 60  | 6        |
| ESRE714 03512 | 3.5 | 3.5  | 12 | 50  | 6        | ESRE714 05020 | 5   | 5    | 20 | 60  | 6        |
| ESRE714 03516 | 3.5 | 3.5  | 16 | 55  | 6        | ESRE714 05025 | 5   | 5    | 25 | 65  | 6        |
| ESRE714 03520 | 3.5 | 3.5  | 20 | 60  | 6        | ESRE714 05030 | 5   | 5    | 30 | 70  | 6        |
| ESRE714 03525 | 3.5 | 3.5  | 25 | 65  | 6        | ESRE714 05040 | 5   | 5    | 40 | 80  | 6        |
| ESRE714 03530 | 3.5 | 3.5  | 30 | 70  | 6        | ESRE714 05050 | 5   | 5    | 50 | 100 | 6        |
| ESRE714 03535 | 3.5 | 3.5  | 35 | 75  | 6        | ESRE714 05060 | 5   | 5    | 60 | 110 | 6        |
| ESRE714 03540 | 3.5 | 3.5  | 40 | 80  | 6        | ESRE714 06020 | 6   | 6    | 20 | 60  | 6        |
| ESRE714 04006 | 4   | 4    | 6  | 50  | 6        | ESRE714 06030 | 6   | 6    | 30 | 75  | 6        |
| ESRE714 04008 | 4   | 4    | 8  | 50  | 6        | ESRE714 06040 | 6   | 6    | 40 | 80  | 6        |
| ESRE714 04010 | 4   | 4    | 10 | 50  | 6        | ESRE714 06050 | 6   | 6    | 50 | 90  | 6        |
| ESRE714 04012 | 4   | 4    | 12 | 50  | 6        | ESRE714 06060 | 6   | 6    | 60 | 100 | 6        |
| ESRE714 04016 | 4   | 4    | 16 | 55  | 6        | ESRE714 08025 | 8   | 12   | 25 | 65  | 8        |
| ESRE714 04020 | 4   | 4    | 20 | 60  | 6        | ESRE714 08040 | 8   | 12   | 40 | 100 | 8        |
| ESRE714 04025 | 4   | 4    | 25 | 65  | 6        | ESRE714 08050 | 8   | 12   | 50 | 110 | 8        |
| ESRE714 04030 | 4   | 4    | 30 | 70  | 6        | ESRE714 10030 | 10  | 15   | 30 | 70  | 10       |
| ESRE714 04040 | 4   | 4    | 40 | 80  | 6        | ESRE714 10050 | 10  | 15   | 50 | 100 | 10       |
| ESRE714 04045 | 4   | 4    | 45 | 90  | 6        | ESRE714 10060 | 10  | 15   | 60 | 120 | 10       |
| ESRE714 04050 | 4   | 4    | 50 | 100 | 6        | ESRE714 12040 | 12  | 18   | 40 | 80  | 12       |
| ESRE714 04060 | 4   | 4    | 60 | 110 | 6        | ESRE714 12060 | 12  | 18   | 60 | 110 | 12       |
| ESRE714 04512 | 4.5 | 4.5  | 12 | 50  | 6        | ESRE714 12070 | 12  | 18   | 70 | 130 | 12       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

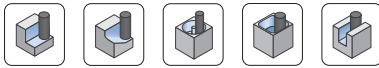
| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | ~HB225       | HB225<br>~325 | HRC30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESXE704 4 Flutes Neck Square End Mill



► Tolerance

| DC        |           | Shank Dia |
|-----------|-----------|-----------|
| All Sizes | 0 ~ -0.02 | h5        |



| EDP No      | DC | APMX | LU | OAL | DCONMS |
|-------------|----|------|----|-----|--------|
| ESXE704 010 | 1  | 1.5  | 4  | 45  | 4      |
| ESXE704 020 | 2  | 3    | 6  | 45  | 4      |
| ESXE704 030 | 3  | 4    | 7  | 45  | 6      |
| ESXE704 040 | 4  | 5    | 9  | 45  | 6      |
| ESXE704 060 | 6  | 7    | 14 | 50  | 6      |
| ESXE704 080 | 8  | 9    | 18 | 60  | 8      |
| ESXE704 100 | 10 | 12   | 25 | 75  | 10     |
| ESXE704 120 | 12 | 15   | 30 | 75  | 12     |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

Endmill

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

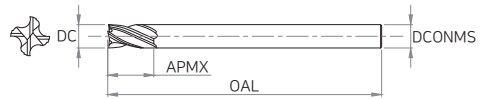
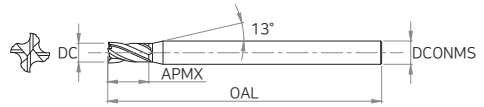
Standard

Copper-Mate

Gra-Mate

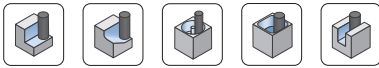
# ESXE714 4 Flutes Square End Mill

Endmill



► Tolerance

| DC        |           | Shank Dia |
|-----------|-----------|-----------|
| All Sizes | 0 ~ -0.02 | h5        |



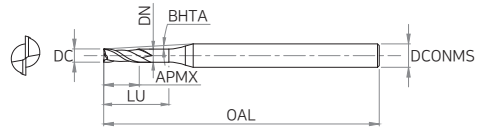
| EDP No        | DC | APMX | OAL | DCONMS |
|---------------|----|------|-----|--------|
| ESXE714 020   | 2  | 5    | 45  | 4      |
| ESXE714 030   | 3  | 8    | 45  | 6      |
| ESXE714 040   | 4  | 10   | 45  | 6      |
| ESXE714 040S4 | 4  | 10   | 45  | 4      |
| ESXE714 060   | 6  | 16   | 50  | 6      |
| ESXE714 080   | 8  | 20   | 60  | 8      |
| ESXE714 100   | 10 | 25   | 75  | 10     |
| ESXE714 120   | 12 | 35   | 85  | 12     |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

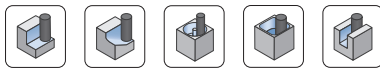
# ESLNS20 2 Flutes Long Neck Square End Mill



Endmill

► Tolerance

| DC        |            | Shank Dia |
|-----------|------------|-----------|
| All Sizes | 0 ~ -0.012 | h5        |



| EDP No         | DC  | APMX | LU  | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |     |      |     |     |
|----------------|-----|------|-----|------|-----|---------|------|---------------------------------------|-----|------|-----|-----|
|                |     |      |     |      |     |         |      | 0.5°                                  | 1°  | 1.5° | 2°  | 3°  |
| ESLNS20 01-0.3 | 0.1 | 0.15 | 0.3 | 0.08 | 45  | 4       | 11.6 | 0.4                                   | 0.4 | 0.5  | 0.5 | 0.5 |
| ESLNS20 01-0.5 | 0.1 | 0.15 | 0.5 | 0.08 | 45  | 4       | 11.4 | 0.6                                   | 0.7 | 0.7  | 0.7 | 0.8 |
| ESLNS20 01-1   | 0.1 | 0.15 | 1   | 0.08 | 45  | 4       | 10.9 | 1.2                                   | 1.2 | 1.2  | 1.3 | 1.4 |
| ESLNS20 02-0.5 | 0.2 | 0.3  | 0.5 | 0.17 | 50  | 4       | 11.3 | 1.2                                   | 1.3 | 1.5  | 1.7 | 2   |
| ESLNS20 02-1   | 0.2 | 0.3  | 1   | 0.17 | 50  | 4       | 10.8 | 1.7                                   | 1.9 | 2.2  | 2.4 | 2.7 |
| ESLNS20 02-1.5 | 0.2 | 0.3  | 1.5 | 0.17 | 50  | 4       | 10.3 | 2.3                                   | 2.5 | 2.8  | 3   | 3.4 |
| ESLNS20 03-1   | 0.3 | 0.45 | 1   | 0.27 | 50  | 4       | 10.8 | 1.7                                   | 1.9 | 2.2  | 2.4 | 2.7 |
| ESLNS20 03-1.5 | 0.3 | 0.45 | 1.5 | 0.27 | 50  | 4       | 10.3 | 2.3                                   | 2.5 | 2.8  | 3   | 3.4 |
| ESLNS20 03-2   | 0.3 | 0.45 | 2   | 0.27 | 50  | 4       | 9.8  | 2.8                                   | 3.1 | 3.4  | 3.6 | 4.1 |
| ESLNS20 03-2.5 | 0.3 | 0.45 | 2.5 | 0.27 | 50  | 4       | 9.4  | 3.4                                   | 3.7 | 4    | 4.3 | 4.7 |
| ESLNS20 03-3   | 0.3 | 0.45 | 3   | 0.27 | 50  | 4       | 9    | 3.9                                   | 4.3 | 4.6  | 4.9 | 5.4 |
| ESLNS20 04-1   | 0.4 | 0.6  | 1   | 0.37 | 50  | 4       | 10.7 | 1.7                                   | 1.9 | 2.2  | 2.4 | 2.7 |
| ESLNS20 04-1.5 | 0.4 | 0.6  | 1.5 | 0.37 | 50  | 4       | 10.2 | 2.3                                   | 2.5 | 2.8  | 3   | 3.4 |
| ESLNS20 04-2   | 0.4 | 0.6  | 2   | 0.37 | 50  | 4       | 9.7  | 2.8                                   | 3.1 | 3.4  | 3.6 | 4.1 |
| ESLNS20 04-2.5 | 0.4 | 0.6  | 2.5 | 0.37 | 50  | 4       | 9.3  | 3.4                                   | 3.7 | 4    | 4.3 | 4.7 |
| ESLNS20 04-3   | 0.4 | 0.6  | 3   | 0.37 | 50  | 4       | 8.9  | 3.9                                   | 4.3 | 4.6  | 4.9 | 5.4 |
| ESLNS20 04-3.5 | 0.4 | 0.6  | 3.5 | 0.37 | 50  | 4       | 8.6  | 4.5                                   | 4.9 | 5.2  | 5.5 | 6   |
| ESLNS20 04-4   | 0.4 | 0.6  | 4   | 0.37 | 50  | 4       | 8.2  | 5                                     | 5.4 | 5.8  | 6.1 | 6.6 |
| ESLNS20 04-5   | 0.4 | 0.6  | 5   | 0.37 | 50  | 4       | 7.6  | 6.1                                   | 6.6 | 6.9  | 7.3 | 7.8 |
| ESLNS20 04-6   | 0.4 | 0.6  | 6   | 0.37 | 50  | 4       | 7.1  | 7.2                                   | 7.7 | 8.1  | 8.4 | 9   |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

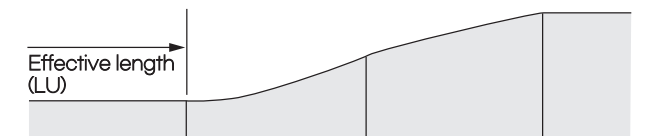
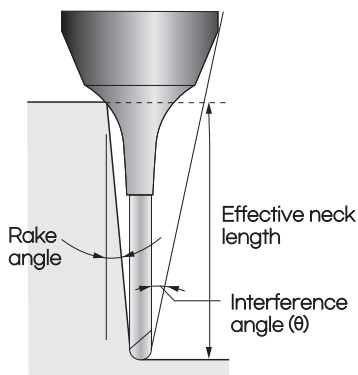
| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

# ESLNS20

## 2 Flutes Long Neck Square End Mill

Endmill



※ The marked effective neck length is the default value to prevent interference with the workpiece.

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

| EDP No         | DC  | APMX | LU  | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|----------------|-----|------|-----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|                |     |      |     |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNS20 05-1   | 0.5 | 0.75 | 1   | 0.47 | 50  | 4       | 10.7 | 1.7                                   | 1.9  | 2.2  | 2.4  | 2.7  |
| ESLNS20 05-1.5 | 0.5 | 0.75 | 1.5 | 0.47 | 50  | 4       | 10.2 | 2.3                                   | 2.5  | 2.8  | 3    | 3.4  |
| ESLNS20 05-2   | 0.5 | 0.75 | 2   | 0.47 | 50  | 4       | 9.7  | 2.8                                   | 3.1  | 3.4  | 3.6  | 4.1  |
| ESLNS20 05-2.5 | 0.5 | 0.75 | 2.5 | 0.47 | 50  | 4       | 9.3  | 3.4                                   | 3.7  | 4    | 4.3  | 4.7  |
| ESLNS20 05-3   | 0.5 | 0.75 | 3   | 0.47 | 50  | 4       | 8.9  | 3.9                                   | 4.3  | 4.6  | 4.9  | 5.4  |
| ESLNS20 05-4   | 0.5 | 0.75 | 4   | 0.47 | 50  | 4       | 8.1  | 5                                     | 5.4  | 5.8  | 6.1  | 6.6  |
| ESLNS20 05-5   | 0.5 | 0.75 | 5   | 0.47 | 50  | 4       | 7.5  | 6.1                                   | 6.6  | 6.9  | 7.3  | 7.8  |
| ESLNS20 05-6   | 0.5 | 0.75 | 6   | 0.47 | 50  | 4       | 7    | 7.2                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNS20 05-8   | 0.5 | 0.75 | 8   | 0.47 | 50  | 4       | 6.2  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.4 |
| ESLNS20 06-2   | 0.6 | 0.9  | 2   | 0.57 | 50  | 4       | 9.6  | 2.8                                   | 3.1  | 3.4  | 3.6  | 4.1  |
| ESLNS20 06-4   | 0.6 | 0.9  | 4   | 0.57 | 50  | 4       | 8.1  | 5                                     | 5.4  | 5.8  | 6.1  | 6.6  |
| ESLNS20 06-6   | 0.6 | 0.9  | 6   | 0.57 | 50  | 4       | 6.9  | 7.2                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNS20 06-8   | 0.6 | 0.9  | 8   | 0.57 | 50  | 4       | 6.1  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.4 |
| ESLNS20 06-10  | 0.6 | 0.9  | 10  | 0.57 | 50  | 4       | 5.4  | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNS20 07-2   | 0.7 | 1.05 | 2   | 0.67 | 50  | 4       | 9.6  | 2.8                                   | 3.1  | 3.4  | 3.6  | 4.1  |
| ESLNS20 07-4   | 0.7 | 1.05 | 4   | 0.67 | 50  | 4       | 8    | 5                                     | 5.4  | 5.8  | 6.1  | 6.6  |
| ESLNS20 07-6   | 0.7 | 1.05 | 6   | 0.67 | 50  | 4       | 6.9  | 7.2                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNS20 07-8   | 0.7 | 1.05 | 8   | 0.67 | 50  | 4       | 6    | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.4 |
| ESLNS20 07-10  | 0.7 | 1.2  | 10  | 0.77 | 50  | 4       | 5.3  | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNS20 08-4   | 0.8 | 1.2  | 4   | 0.77 | 50  | 4       | 7.9  | 5                                     | 5.4  | 5.8  | 6.1  | 6.6  |

### ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30-50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                 | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESLNS20 2 Flutes Long Neck Square End Mill

Endmill

| EDP No        | DC  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNS20 08-6  | 0.8 | 1.2  | 6  | 0.77 | 50  | 4       | 6.8  | 7.2                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNS20 08-8  | 0.8 | 1.2  | 8  | 0.77 | 50  | 4       | 5.9  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.4 |
| ESLNS20 08-10 | 0.8 | 1.2  | 10 | 0.77 | 55  | 4       | 5.2  | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNS20 08-12 | 0.8 | 1.2  | 12 | 0.77 | 55  | 4       | 4.7  | 13.6                                  | 14.2 | 14.8 | 15.2 | 16   |
| ESLNS20 09-6  | 0.9 | 1.35 | 6  | 0.86 | 50  | 4       | 6.7  | 7.2                                   | 7.7  | 8.1  | 8.4  | 9.1  |
| ESLNS20 09-8  | 0.9 | 1.35 | 8  | 0.86 | 50  | 4       | 5.8  | 9.4                                   | 9.9  | 10.4 | 10.7 | 11.4 |
| ESLNS20 09-10 | 0.9 | 1.35 | 10 | 0.86 | 55  | 4       | 5.1  | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNS20 09-12 | 0.9 | 1.35 | 12 | 0.86 | 55  | 4       | 4.6  | 13.6                                  | 14.3 | 14.8 | 15.2 | 16   |
| ESLNS20 10-2  | 1   | 1.5  | 2  | 0.96 | 50  | 4       | 9.4  | 2.9                                   | 3.2  | 3.4  | 3.7  | 4.1  |
| ESLNS20 10-4  | 1   | 1.5  | 4  | 0.96 | 50  | 4       | 7.7  | 5.1                                   | 5.5  | 5.8  | 6.1  | 6.6  |
| ESLNS20 10-6  | 1   | 1.5  | 6  | 0.96 | 50  | 4       | 6.6  | 7.2                                   | 7.7  | 8.1  | 8.4  | 9.1  |
| ESLNS20 10-8  | 1   | 1.5  | 8  | 0.96 | 50  | 4       | 5.7  | 9.4                                   | 9.9  | 10.4 | 10.7 | 11.4 |
| ESLNS20 10-10 | 1   | 1.5  | 10 | 0.96 | 55  | 4       | 5    | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNS20 10-12 | 1   | 1.5  | 12 | 0.96 | 55  | 4       | 4.5  | 13.6                                  | 14.3 | 14.8 | 15.2 | 16   |
| ESLNS20 10-14 | 1   | 1.5  | 14 | 0.96 | 60  | 4       | 4.1  | 15.7                                  | 16.4 | 17   | 17.4 | 18.7 |
| ESLNS20 10-16 | 1   | 1.5  | 16 | 0.96 | 60  | 4       | 3.8  | 17.8                                  | 18.6 | 19.1 | 19.6 | 21.3 |
| ESLNS20 10-20 | 1   | 1.5  | 20 | 0.96 | 60  | 4       | 3.2  | 22                                    | 22.8 | 23.5 | 24   | 26.6 |
| ESLNS20 12-6  | 1.2 | 1.8  | 6  | 1.15 | 50  | 4       | 6.3  | 7.3                                   | 7.7  | 8.1  | 8.5  | 9.1  |
| ESLNS20 12-8  | 1.2 | 1.8  | 8  | 1.15 | 50  | 4       | 5.5  | 9.4                                   | 9.9  | 10.4 | 10.8 | 11.4 |
| ESLNS20 12-10 | 1.2 | 1.8  | 10 | 1.15 | 50  | 4       | 4.8  | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNS20 12-12 | 1.2 | 1.8  | 12 | 1.15 | 55  | 4       | 4.3  | 13.6                                  | 14.3 | 14.8 | 15.2 | 16   |
| ESLNS20 12-16 | 1.2 | 1.8  | 16 | 1.15 | 55  | 4       | 3.6  | 17.8                                  | 18.6 | 19.2 | 19.7 | 21.3 |
| ESLNS20 14-6  | 1.4 | 2.1  | 6  | 1.34 | 50  | 4       | 6.1  | 7.3                                   | 7.8  | 8.1  | 8.5  | 9.1  |
| ESLNS20 14-8  | 1.4 | 2.1  | 8  | 1.34 | 50  | 4       | 5.3  | 9.4                                   | 10   | 10.4 | 10.8 | 11.5 |
| ESLNS20 14-10 | 1.4 | 2.1  | 10 | 1.34 | 50  | 4       | 4.6  | 11.6                                  | 12.1 | 12.6 | 13   | 13.8 |
| ESLNS20 14-12 | 1.4 | 2.1  | 12 | 1.34 | 55  | 4       | 4.1  | 13.7                                  | 14.3 | 14.8 | 15.3 | 16.1 |
| ESLNS20 14-14 | 1.4 | 2.1  | 14 | 1.34 | 55  | 4       | 3.7  | 15.8                                  | 16.5 | 17   | 17.5 | 18.7 |
| ESLNS20 14-16 | 1.4 | 2.1  | 16 | 1.34 | 55  | 4       | 3.4  | 17.9                                  | 18.6 | 19.2 | 19.7 | 21.4 |
| ESLNS20 15-4  | 1.5 | 2.25 | 4  | 1.44 | 50  | 4       | 7.2  | 5.2                                   | 5.5  | 5.9  | 6.2  | 6.7  |
| ESLNS20 15-6  | 1.5 | 2.25 | 6  | 1.44 | 50  | 4       | 6    | 7.3                                   | 7.8  | 8.1  | 8.5  | 9.1  |
| ESLNS20 15-8  | 1.5 | 2.25 | 8  | 1.44 | 50  | 4       | 5.1  | 9.4                                   | 10   | 10.4 | 10.8 | 11.5 |
| ESLNS20 15-10 | 1.5 | 2.25 | 10 | 1.44 | 50  | 4       | 4.5  | 11.6                                  | 12.1 | 12.6 | 13   | 13.8 |
| ESLNS20 15-12 | 1.5 | 2.25 | 12 | 1.44 | 55  | 4       | 4    | 13.7                                  | 14.3 | 14.8 | 15.3 | 16.1 |
| ESLNS20 15-14 | 1.5 | 2.25 | 14 | 1.44 | 55  | 4       | 3.6  | 15.8                                  | 16.5 | 17   | 17.5 | 18.7 |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESLNS20 2 Flutes Long Neck Square End Mill

Endmill

|               | EDP No        | DC  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|---------------|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |               |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| Zamus Star    | ESLNS20 15-16 | 1.5 | 2.25 | 16 | 1.44 | 55  | 4       | 3.3  | 17.9                                  | 18.6 | 19.2 | 19.7 | -    |
|               | ESLNS20 15-18 | 1.5 | 2.25 | 18 | 1.44 | 60  | 4       | 3    | 20                                    | 20.7 | 21.3 | 21.9 | -    |
|               | ESLNS20 15-20 | 1.5 | 2.25 | 20 | 1.44 | 60  | 4       | 2.8  | 22                                    | 22.9 | 23.5 | 24.1 | -    |
|               | ESLNS20 15-25 | 1.5 | 2.25 | 25 | 1.44 | 65  | 4       | 2.4  | 27.3                                  | 28.1 | 28.8 | 30   | -    |
|               | ESLNS20 16-6  | 1.6 | 2.4  | 6  | 1.54 | 50  | 4       | 5.9  | 7.3                                   | 7.8  | 8.1  | 8.5  | 9.1  |
| E-Star        | ESLNS20 16-8  | 1.6 | 2.4  | 8  | 1.54 | 50  | 4       | 5    | 9.4                                   | 10   | 10.4 | 10.8 | 11.5 |
|               | ESLNS20 16-10 | 1.6 | 2.4  | 10 | 1.54 | 50  | 4       | 4.4  | 11.6                                  | 12.1 | 12.6 | 13   | 13.8 |
|               | ESLNS20 16-12 | 1.6 | 2.4  | 12 | 1.54 | 55  | 4       | 3.9  | 13.7                                  | 14.3 | 14.8 | 15.3 | 16.1 |
|               | ESLNS20 16-14 | 1.6 | 2.4  | 14 | 1.54 | 55  | 4       | 3.5  | 15.8                                  | 16.5 | 17   | 17.5 | 18.7 |
| U-Wing        | ESLNS20 16-16 | 1.6 | 2.4  | 16 | 1.54 | 55  | 4       | 3.2  | 17.9                                  | 18.6 | 19.2 | 19.7 | 21.4 |
|               | ESLNS20 16-18 | 1.6 | 2.4  | 18 | 1.54 | 60  | 4       | 2.9  | 20                                    | 20.7 | 21.3 | 21.9 | -    |
|               | ESLNS20 16-20 | 1.6 | 2.4  | 20 | 1.54 | 60  | 4       | 2.7  | 22                                    | 22.9 | 23.5 | 24.1 | -    |
| Zamus Thunder | ESLNS20 18-6  | 1.8 | 2.7  | 6  | 1.73 | 50  | 4       | 5.6  | 7.4                                   | 7.8  | 8.2  | 8.5  | 9.1  |
|               | ESLNS20 18-8  | 1.8 | 2.7  | 8  | 1.73 | 50  | 4       | 4.8  | 9.5                                   | 10   | 10.4 | 10.8 | 11.5 |
|               | ESLNS20 18-10 | 1.8 | 2.7  | 10 | 1.73 | 50  | 4       | 4.2  | 11.6                                  | 12.2 | 12.6 | 13   | 13.8 |
|               | ESLNS20 18-12 | 1.8 | 2.7  | 12 | 1.73 | 55  | 4       | 3.7  | 13.7                                  | 14.3 | 14.8 | 15.3 | 16.1 |
| X-Star        | ESLNS20 18-14 | 1.8 | 2.7  | 14 | 1.73 | 55  | 4       | 3.3  | 15.8                                  | 16.5 | 17   | 17.5 | 18.8 |
|               | ESLNS20 18-16 | 1.8 | 2.7  | 16 | 1.73 | 55  | 4       | 3    | 17.9                                  | 18.6 | 19.2 | 19.7 | -    |
|               | ESLNS20 18-18 | 1.8 | 2.7  | 18 | 1.73 | 60  | 4       | 2.7  | 20                                    | 20.7 | 21.3 | 21.9 | -    |
| S-Wing        | ESLNS20 18-20 | 1.8 | 2.7  | 20 | 1.73 | 60  | 4       | 2.5  | 22.1                                  | 22.9 | 23.5 | 24.1 | -    |
|               | ESLNS20 20-4  | 2   | 3    | 4  | 1.92 | 50  | 4       | 6.5  | 5.3                                   | 5.6  | 5.9  | 6.2  | 6.7  |
| A-Wing        | ESLNS20 20-6  | 2   | 3    | 6  | 1.92 | 50  | 4       | 5.3  | 7.4                                   | 7.8  | 8.2  | 8.5  | 9.1  |
|               | ESLNS20 20-8  | 2   | 3    | 8  | 1.92 | 50  | 4       | 4.5  | 9.5                                   | 10   | 10.4 | 10.8 | 11.5 |
|               | ESLNS20 20-10 | 2   | 3    | 10 | 1.92 | 50  | 4       | 3.9  | 11.6                                  | 12.2 | 12.7 | 13.1 | 13.8 |
|               | ESLNS20 20-12 | 2   | 3    | 12 | 1.92 | 55  | 4       | 3.4  | 13.7                                  | 14.3 | 14.9 | 15.3 | 16.1 |
|               | ESLNS20 20-14 | 2   | 3    | 14 | 1.92 | 55  | 4       | 3.1  | 15.8                                  | 16.5 | 17   | 17.5 | 18.8 |
| Standard      | ESLNS20 20-16 | 2   | 3    | 16 | 1.92 | 55  | 4       | 2.8  | 17.9                                  | 18.6 | 19.2 | 19.7 | -    |
|               | ESLNS20 20-18 | 2   | 3    | 18 | 1.92 | 60  | 4       | 2.6  | 20                                    | 20.8 | 21.4 | 21.9 | -    |
|               | ESLNS20 20-20 | 2   | 3    | 20 | 1.92 | 60  | 4       | 2.4  | 22.1                                  | 22.9 | 23.5 | 24.1 | -    |
|               | ESLNS20 20-25 | 2   | 3    | 25 | 1.92 | 65  | 4       | 2    | 27.3                                  | 28.2 | 28.9 | -    | -    |
| Copper-Mate   | ESLNS20 20-30 | 2   | 3    | 30 | 1.92 | 70  | 4       | 1.7  | 32.5                                  | 33.4 | 34.4 | -    | -    |
|               | ESLNS20 25-8  | 2.5 | 3.75 | 8  | 2.4  | 50  | 4       | 3.7  | 9.6                                   | 10.1 | 10.5 | 10.9 | 11.5 |
| Gra-Mate      | ESLNS20 25-10 | 2.5 | 3.75 | 10 | 2.4  | 50  | 4       | 3.1  | 11.7                                  | 12.2 | 12.7 | 13.1 | 13.8 |
|               | ESLNS20 25-12 | 2.5 | 3.75 | 12 | 2.4  | 55  | 4       | 2.7  | 13.8                                  | 14.4 | 14.9 | 15.3 | -    |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K                 | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron ~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | ~HB225       | ~325        | HRC30~50          |                   |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |                   |        |          |          |                 |                      |

# ESLNS20 2 Flutes Long Neck Square End Mill

Endmill

| EDP No        | DC  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNS20 25-14 | 2.5 | 3.75 | 14 | 2.4  | 55  | 4       | 2.4  | 15.9                                  | 16.5 | 17.1 | 17.5 | -    |
| ESLNS20 25-16 | 2.5 | 3.75 | 16 | 2.4  | 55  | 4       | 2.2  | 18                                    | 18.7 | 19.2 | 19.7 | -    |
| ESLNS20 25-18 | 2.5 | 3.75 | 18 | 2.4  | 55  | 4       | 2    | 20.1                                  | 20.8 | 21.4 | -    | -    |
| ESLNS20 25-20 | 2.5 | 3.75 | 20 | 2.4  | 60  | 4       | 1.8  | 22.1                                  | 22.9 | 23.5 | -    | -    |
| ESLNS20 25-25 | 2.5 | 3.75 | 25 | 2.4  | 60  | 4       | 1.5  | 27.3                                  | 28.2 | -    | -    | -    |
| ESLNS20 25-30 | 2.5 | 3.75 | 30 | 2.4  | 70  | 4       | 1.3  | 32.6                                  | 33.5 | -    | -    | -    |
| ESLNS20 30-8  | 3   | 4.5  | 8  | 2.88 | 55  | 6       | 5.6  | 9.6                                   | 10.1 | 10.5 | 10.9 | 11.5 |
| ESLNS20 30-10 | 3   | 4.5  | 10 | 2.88 | 55  | 6       | 5    | 11.7                                  | 12.3 | 12.7 | 13.1 | 13.8 |
| ESLNS20 30-12 | 3   | 4.5  | 12 | 2.88 | 60  | 6       | 4.5  | 13.8                                  | 14.4 | 14.9 | 15.4 | 16.3 |
| ESLNS20 30-14 | 3   | 4.5  | 14 | 2.88 | 60  | 6       | 4.1  | 15.9                                  | 16.6 | 17.1 | 17.6 | 18.9 |
| ESLNS20 30-16 | 3   | 4.5  | 16 | 2.88 | 60  | 6       | 3.7  | 18                                    | 18.7 | 19.3 | 19.8 | 21.6 |
| ESLNS20 30-18 | 3   | 4.5  | 18 | 2.88 | 60  | 6       | 3.4  | 20.1                                  | 20.8 | 21.4 | 21.9 | 24.2 |
| ESLNS20 30-20 | 3   | 4.5  | 20 | 2.88 | 65  | 6       | 3.2  | 22.2                                  | 23   | 23.6 | 24.2 | 26.9 |
| ESLNS20 30-25 | 3   | 4.5  | 25 | 2.88 | 70  | 6       | 2.7  | 27.4                                  | 28.2 | 28.9 | 30.2 | -    |
| ESLNS20 30-30 | 3   | 4.5  | 30 | 2.88 | 75  | 6       | 2.4  | 32.6                                  | 33.5 | 34.5 | 36.2 | -    |
| ESLNS20 30-35 | 3   | 4.5  | 35 | 2.88 | 80  | 6       | 2.1  | 37.7                                  | 38.7 | 40.2 | 42.2 | -    |
| ESLNS20 30-40 | 3   | 4.5  | 40 | 2.88 | 90  | 6       | 1.9  | 42.9                                  | 43.9 | 45.9 | -    | -    |
| ESLNS20 40-12 | 4   | 6    | 12 | 3.85 | 60  | 6       | 3.4  | 13.9                                  | 14.5 | 15   | 15.4 | 16.3 |
| ESLNS20 40-16 | 4   | 6    | 16 | 3.85 | 60  | 6       | 2.8  | 18.1                                  | 18.8 | 19.3 | 19.8 | -    |
| ESLNS20 40-20 | 4   | 6    | 20 | 3.85 | 70  | 6       | 2.3  | 22.3                                  | 23   | 23.6 | 24.3 | -    |
| ESLNS20 40-25 | 4   | 6    | 25 | 3.85 | 70  | 6       | 2    | 27.4                                  | 28.3 | 28.9 | -    | -    |
| ESLNS20 40-30 | 4   | 6    | 30 | 3.85 | 80  | 6       | 1.7  | 32.6                                  | 33.5 | 34.6 | -    | -    |
| ESLNS20 40-35 | 4   | 6    | 35 | 3.85 | 80  | 6       | 1.5  | 37.8                                  | 38.8 | -    | -    | -    |
| ESLNS20 40-40 | 4   | 6    | 40 | 3.85 | 90  | 6       | 1.3  | 42.9                                  | 44   | -    | -    | -    |
| ESLNS20 40-45 | 4   | 6    | 45 | 3.85 | 90  | 6       | 1.2  | 48.1                                  | 49.4 | -    | -    | -    |
| ESLNS20 40-50 | 4   | 6    | 50 | 3.85 | 100 | 6       | 1.1  | 53.2                                  | 54.8 | -    | -    | -    |
| ESLNS20 50-16 | 5   | 7.5  | 16 | 4.85 | 60  | 6       | 1.5  | 18.1                                  | 18.8 | -    | -    | -    |
| ESLNS20 50-20 | 5   | 7.5  | 20 | 4.85 | 60  | 6       | 1.3  | 22.3                                  | 23   | -    | -    | -    |
| ESLNS20 50-25 | 5   | 7.5  | 25 | 4.85 | 70  | 6       | 1.1  | 27.4                                  | 28.3 | -    | -    | -    |
| ESLNS20 50-30 | 5   | 7.5  | 30 | 4.85 | 70  | 6       | 0.9  | 32.6                                  | -    | -    | -    | -    |
| ESLNS20 50-35 | 5   | 7.5  | 35 | 4.85 | 80  | 6       | 0.8  | 37.8                                  | -    | -    | -    | -    |
| ESLNS20 50-40 | 5   | 7.5  | 40 | 4.85 | 90  | 6       | 0.7  | 42.9                                  | -    | -    | -    | -    |
| ESLNS20 50-50 | 5   | 7.5  | 50 | 4.85 | 100 | 6       | 0.6  | 53.2                                  | -    | -    | -    | -    |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

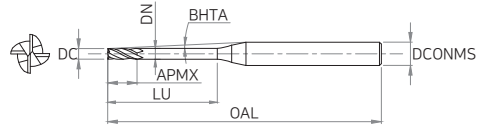
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

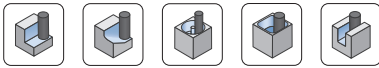
# ESLNS40

## 4 Flutes Long Neck Square End Mill



### ► Tolerance

| DC        |            | Shank Dia |
|-----------|------------|-----------|
| All Sizes | 0 ~ -0.012 | h5        |



| EDP No        | DC  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNS40 10-4  | 1   | 1.5  | 4  | 0.96 | 50  | 4       | 7.7  | 5.1                                   | 5.5  | 5.8  | 6.1  | 6.6  |
| ESLNS40 10-6  | 1   | 1.5  | 6  | 0.96 | 50  | 4       | 6.6  | 7.2                                   | 7.7  | 8.1  | 8.4  | 9.1  |
| ESLNS40 10-8  | 1   | 1.5  | 8  | 0.96 | 50  | 4       | 5.7  | 9.4                                   | 9.9  | 10.4 | 10.7 | 11.4 |
| ESLNS40 10-10 | 1   | 1.5  | 10 | 0.96 | 50  | 4       | 5    | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNS40 15-4  | 1.5 | 2.25 | 4  | 1.44 | 50  | 4       | 7.2  | 5.2                                   | 5.5  | 5.9  | 6.2  | 6.7  |
| ESLNS40 15-6  | 1.5 | 2.25 | 6  | 1.44 | 50  | 4       | 6    | 7.3                                   | 7.8  | 8.1  | 8.5  | 9.1  |
| ESLNS40 15-8  | 1.5 | 2.25 | 8  | 1.44 | 50  | 4       | 5.1  | 9.4                                   | 10   | 10.4 | 10.8 | 11.5 |
| ESLNS40 15-10 | 1.5 | 2.25 | 10 | 1.44 | 50  | 4       | 4.5  | 11.6                                  | 12.1 | 12.6 | 13   | 13.8 |
| ESLNS40 15-12 | 1.5 | 2.25 | 12 | 1.44 | 55  | 4       | 4    | 13.7                                  | 14.3 | 14.8 | 15.3 | 16.1 |
| ESLNS40 15-14 | 1.5 | 2.25 | 14 | 1.44 | 55  | 4       | 3.6  | 15.8                                  | 16.5 | 17   | 17.5 | 18.7 |
| ESLNS40 15-16 | 1.5 | 2.25 | 16 | 1.44 | 55  | 4       | 3.3  | 17.9                                  | 18.6 | 19.2 | 19.7 | -    |
| ESLNS40 15-18 | 1.5 | 2.25 | 18 | 1.44 | 60  | 4       | 3    | 20                                    | 20.7 | 21.3 | 21.9 | -    |
| ESLNS40 15-20 | 1.5 | 2.25 | 20 | 1.44 | 60  | 4       | 2.8  | 22                                    | 22.9 | 23.5 | 24.1 | -    |
| ESLNS40 15-25 | 1.5 | 2.25 | 25 | 1.44 | 65  | 4       | 2.4  | 27.3                                  | 28.1 | 28.8 | 30   | -    |
| ESLNS40 20-4  | 2   | 3    | 4  | 1.92 | 50  | 4       | 6.5  | 5.3                                   | 5.6  | 5.9  | 6.2  | 6.7  |
| ESLNS40 20-6  | 2   | 3    | 6  | 1.92 | 50  | 4       | 5.3  | 7.4                                   | 7.8  | 8.2  | 8.5  | 9.1  |
| ESLNS40 20-8  | 2   | 3    | 8  | 1.92 | 50  | 4       | 4.5  | 9.5                                   | 10   | 10.4 | 10.8 | 11.5 |
| ESLNS40 20-10 | 2   | 3    | 10 | 1.92 | 50  | 4       | 3.9  | 11.6                                  | 12.2 | 12.7 | 13.1 | 13.8 |
| ESLNS40 20-12 | 2   | 3    | 12 | 1.92 | 55  | 4       | 3.4  | 13.7                                  | 14.3 | 14.9 | 15.3 | 16.1 |
| ESLNS40 20-14 | 2   | 3    | 14 | 1.92 | 55  | 4       | 3.1  | 15.8                                  | 16.5 | 17   | 17.5 | 18.8 |

### ► Applicable Working Material

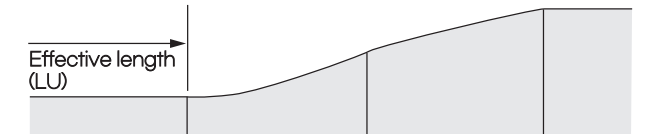
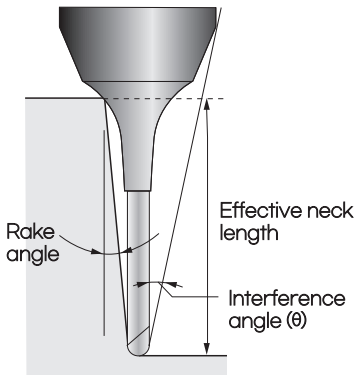
○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |               |                   | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|---------------|-------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel   | Prehardened Steel | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | HB225<br>~325 | Steel<br>HRC30-50 |                      |        |          |          |                 |                      |
| ◎               | ○               |                 | ○             | ◎                 |                      |        |          |          |                 |                      |

# ESLNS40

## 4 Flutes Long Neck Square End Mill

Endmill



※ The marked effective neck length is the default value to prevent interference with the workpiece.

| EDP No        | DC  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNS40 20-16 | 2   | 3    | 16 | 1.92 | 55  | 4       | 2.8  | 17.9                                  | 18.6 | 19.2 | 19.7 | -    |
| ESLNS40 20-18 | 2   | 3    | 18 | 1.92 | 60  | 4       | 2.6  | 20                                    | 20.8 | 21.4 | 21.9 | -    |
| ESLNS40 20-20 | 2   | 3    | 20 | 1.92 | 60  | 4       | 2.4  | 22.1                                  | 22.9 | 23.5 | 24.1 | -    |
| ESLNS40 20-25 | 2   | 3    | 25 | 1.92 | 65  | 4       | 2    | 27.3                                  | 28.2 | 28.9 | -    | -    |
| ESLNS40 20-30 | 2   | 3    | 30 | 1.92 | 70  | 4       | 1.7  | 32.5                                  | 33.4 | 34.4 | -    | -    |
| ESLNS40 25-8  | 2.5 | 3.75 | 8  | 2.4  | 50  | 4       | 3.7  | 9.6                                   | 10.1 | 10.5 | 10.9 | 11.5 |
| ESLNS40 25-10 | 2.5 | 3.75 | 10 | 2.4  | 50  | 4       | 3.1  | 11.7                                  | 12.2 | 12.7 | 13.1 | 13.8 |
| ESLNS40 25-12 | 2.5 | 3.75 | 12 | 2.4  | 55  | 4       | 2.7  | 13.8                                  | 14.4 | 14.9 | 15.3 | -    |
| ESLNS40 25-14 | 2.5 | 3.75 | 14 | 2.4  | 55  | 4       | 2.4  | 15.9                                  | 16.5 | 17.1 | 17.5 | -    |
| ESLNS40 25-16 | 2.5 | 3.75 | 16 | 2.4  | 55  | 4       | 2.2  | 18                                    | 18.7 | 19.2 | 19.7 | -    |
| ESLNS40 25-18 | 2.5 | 3.75 | 18 | 2.4  | 60  | 4       | 2    | 20.1                                  | 20.8 | 21.4 | -    | -    |
| ESLNS40 25-20 | 2.5 | 3.75 | 20 | 2.4  | 60  | 4       | 1.8  | 22.1                                  | 22.9 | 23.5 | -    | -    |
| ESLNS40 25-25 | 2.5 | 3.75 | 25 | 2.4  | 65  | 4       | 1.5  | 27.3                                  | 28.2 | -    | -    | -    |
| ESLNS40 25-30 | 2.5 | 3.75 | 30 | 2.4  | 70  | 4       | 1.3  | 32.6                                  | 33.5 | -    | -    | -    |
| ESLNS40 30-8  | 3   | 4.5  | 8  | 2.88 | 55  | 6       | 5.6  | 9.6                                   | 10.1 | 10.5 | 10.9 | 11.5 |
| ESLNS40 30-10 | 3   | 4.5  | 10 | 2.88 | 55  | 6       | 5    | 11.7                                  | 12.3 | 12.7 | 13.1 | 13.8 |
| ESLNS40 30-12 | 3   | 4.5  | 12 | 2.88 | 60  | 6       | 4.5  | 13.8                                  | 14.4 | 14.9 | 15.4 | 16.3 |
| ESLNS40 30-14 | 3   | 4.5  | 14 | 2.88 | 60  | 6       | 4.1  | 15.9                                  | 16.6 | 17.1 | 17.6 | 18.9 |
| ESLNS40 30-16 | 3   | 4.5  | 16 | 2.88 | 60  | 6       | 3.7  | 18                                    | 18.7 | 19.3 | 19.8 | 21.6 |
| ESLNS40 30-18 | 3   | 4.5  | 18 | 2.88 | 60  | 6       | 3.4  | 20.1                                  | 20.8 | 21.4 | 21.9 | 24.2 |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

# ESLNS40

## 4 Flutes Long Neck Square End Mill

Endmill

| EDP No        | DC | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |    |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNS40 30-20 | 3  | 4.5  | 20 | 2.88 | 65  | 6       | 3.2  | 22.2                                  | 23   | 23.6 | 24.2 | 26.9 |
| ESLNS40 30-25 | 3  | 4.5  | 25 | 2.88 | 70  | 6       | 2.7  | 27.4                                  | 28.2 | 28.9 | 30.2 | -    |
| ESLNS40 30-30 | 3  | 4.5  | 30 | 2.88 | 75  | 6       | 2.4  | 32.6                                  | 33.5 | 34.5 | 36.2 | -    |
| ESLNS40 30-35 | 3  | 4.5  | 35 | 2.88 | 80  | 6       | 2.1  | 37.7                                  | 38.7 | 40.2 | 42.2 | -    |
| ESLNS40 30-40 | 3  | 4.5  | 40 | 2.88 | 90  | 6       | 1.9  | 42.9                                  | 43.9 | 45.9 | -    | -    |
| ESLNS40 40-12 | 4  | 6    | 12 | 3.85 | 60  | 6       | 3.4  | 13.9                                  | 14.5 | 15   | 15.4 | 16.3 |
| ESLNS40 40-16 | 4  | 6    | 16 | 3.85 | 60  | 6       | 2.8  | 18.1                                  | 18.8 | 19.3 | 19.8 | -    |
| ESLNS40 40-20 | 4  | 6    | 20 | 3.85 | 70  | 6       | 2.3  | 22.3                                  | 23   | 23.6 | 24.3 | -    |
| ESLNS40 40-25 | 4  | 6    | 25 | 3.85 | 70  | 6       | 2    | 27.4                                  | 28.3 | 28.9 | -    | -    |
| ESLNS40 40-30 | 4  | 6    | 30 | 3.85 | 80  | 6       | 1.7  | 32.6                                  | 33.5 | 34.6 | -    | -    |
| ESLNS40 40-35 | 4  | 6    | 35 | 3.85 | 80  | 6       | 1.5  | 37.8                                  | 38.8 | -    | -    | -    |
| ESLNS40 40-40 | 4  | 6    | 40 | 3.85 | 90  | 6       | 1.3  | 42.9                                  | 44   | -    | -    | -    |
| ESLNS40 40-45 | 4  | 6    | 45 | 3.85 | 90  | 6       | 1.2  | 48.1                                  | 49.4 | -    | -    | -    |
| ESLNS40 40-50 | 4  | 6    | 50 | 3.85 | 100 | 6       | 1.1  | 53.2                                  | 54.8 | -    | -    | -    |
| ESLNS40 50-16 | 5  | 7.5  | 16 | 4.85 | 60  | 6       | 1.5  | 18.1                                  | 18.8 | -    | -    | -    |
| ESLNS40 50-20 | 5  | 7.5  | 20 | 4.85 | 60  | 6       | 1.3  | 22.3                                  | 23   | -    | -    | -    |
| ESLNS40 50-25 | 5  | 7.5  | 25 | 4.85 | 70  | 6       | 1.1  | 27.4                                  | 28.3 | -    | -    | -    |
| ESLNS40 50-30 | 5  | 7.5  | 30 | 4.85 | 70  | 6       | 0.9  | 32.6                                  | -    | -    | -    | -    |
| ESLNS40 50-35 | 5  | 7.5  | 35 | 4.85 | 80  | 6       | 0.8  | 37.8                                  | -    | -    | -    | -    |
| ESLNS40 50-40 | 5  | 7.5  | 40 | 4.85 | 90  | 6       | 0.7  | 42.9                                  | -    | -    | -    | -    |
| ESLNS40 50-50 | 5  | 7.5  | 50 | 4.85 | 100 | 6       | 0.6  | 53.2                                  | -    | -    | -    | -    |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

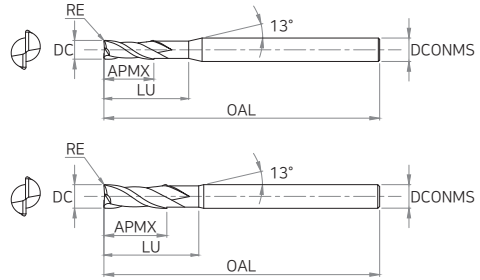
### ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K         | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | ~HB225       | HB225 ~325  | HRC30~50          | ~FC500    |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |           |        |          |          |                 |                      |

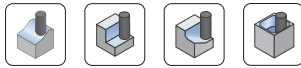
# ESR702 2 Flutes Neck Radius End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



| EDP No            | DC | RE   | APMX | LU | OAL | DCON MS | EDP No            | DC  | RE   | APMX | LU | OAL | DCON MS |
|-------------------|----|------|------|----|-----|---------|-------------------|-----|------|------|----|-----|---------|
| ESR702 01000503S4 | 1  | 0.05 | 1.5  | 3  | 50  | 4       | ESR702 0100212    | 1   | 0.2  | 1.5  | 12 | 50  | 6       |
| ESR702 01000504S4 | 1  | 0.05 | 1.5  | 4  | 50  | 4       | ESR702 0100303S4  | 1   | 0.3  | 1.5  | 3  | 50  | 4       |
| ESR702 01000506S4 | 1  | 0.05 | 1.5  | 6  | 50  | 4       | ESR702 0100304S4  | 1   | 0.3  | 1.5  | 4  | 50  | 4       |
| ESR702 01000508S4 | 1  | 0.05 | 1.5  | 8  | 50  | 4       | ESR702 0100306S4  | 1   | 0.3  | 1.5  | 6  | 50  | 4       |
| ESR702 01000510S4 | 1  | 0.05 | 1.5  | 10 | 50  | 4       | ESR702 0100308S4  | 1   | 0.3  | 1.5  | 8  | 50  | 4       |
| ESR702 0100103S4  | 1  | 0.1  | 1.5  | 3  | 50  | 4       | ESR702 0100310S4  | 1   | 0.3  | 1.5  | 10 | 50  | 4       |
| ESR702 0100104    | 1  | 0.1  | 1.5  | 4  | 50  | 6       | ESR702 0120208    | 1.2 | 0.2  | 2    | 8  | 50  | 6       |
| ESR702 0100104S4  | 1  | 0.1  | 1.5  | 4  | 50  | 4       | ESR702 0120212    | 1.2 | 0.2  | 2    | 12 | 50  | 6       |
| ESR702 0100106    | 1  | 0.1  | 1.5  | 6  | 50  | 6       | ESR702 01500504S4 | 1.5 | 0.05 | 2.5  | 4  | 50  | 4       |
| ESR702 0100106S4  | 1  | 0.1  | 1.5  | 6  | 50  | 4       | ESR702 01500506S4 | 1.5 | 0.05 | 2.5  | 6  | 50  | 4       |
| ESR702 0100108S4  | 1  | 0.1  | 1.5  | 8  | 50  | 4       | ESR702 01500508S4 | 1.5 | 0.05 | 2.5  | 8  | 50  | 4       |
| ESR702 0100110S4  | 1  | 0.1  | 1.5  | 10 | 50  | 4       | ESR702 01500510S4 | 1.5 | 0.05 | 2.5  | 10 | 50  | 4       |
| ESR702 0100203S4  | 1  | 0.2  | 1.5  | 3  | 50  | 4       | ESR702 01500512S4 | 1.5 | 0.05 | 2.5  | 12 | 50  | 4       |
| ESR702 0100204    | 1  | 0.2  | 1.5  | 4  | 50  | 6       | ESR702 0150104S4  | 1.5 | 0.1  | 2.5  | 4  | 50  | 4       |
| ESR702 0100204S4  | 1  | 0.2  | 1.5  | 4  | 50  | 4       | ESR702 0150106S4  | 1.5 | 0.1  | 2.5  | 6  | 50  | 4       |
| ESR702 0100206    | 1  | 0.2  | 1.5  | 6  | 50  | 6       | ESR702 0150108S4  | 1.5 | 0.1  | 2.5  | 8  | 50  | 4       |
| ESR702 0100206S4  | 1  | 0.2  | 1.5  | 6  | 50  | 4       | ESR702 0150110S4  | 1.5 | 0.1  | 2.5  | 10 | 50  | 4       |
| ESR702 0100208S4  | 1  | 0.2  | 1.5  | 8  | 50  | 4       | ESR702 0150112S4  | 1.5 | 0.1  | 2.5  | 12 | 50  | 4       |
| ESR702 0100210    | 1  | 0.2  | 1.5  | 10 | 50  | 6       | ESR702 0150204    | 1.5 | 0.2  | 2.5  | 4  | 50  | 6       |
| ESR702 0100210S4  | 1  | 0.2  | 1.5  | 10 | 50  | 4       | ESR702 0150204S4  | 1.5 | 0.2  | 2.5  | 4  | 50  | 4       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

# ESR702 2 Flutes Neck Radius End Mill

Endmill

|               | EDP No           | DC  | RE  | APMX | LU | OAL | DCON MS | EDP No           | DC  | RE  | APMX | LU | OAL | DCON MS |
|---------------|------------------|-----|-----|------|----|-----|---------|------------------|-----|-----|------|----|-----|---------|
|               | ESR702 0150206   | 1.5 | 0.2 | 2.5  | 6  | 50  | 6       | ESR702 0200306S4 | 2   | 0.3 | 3    | 6  | 50  | 4       |
|               | ESR702 0150206S4 | 1.5 | 0.2 | 2.5  | 6  | 50  | 4       | ESR702 0200308S4 | 2   | 0.3 | 3    | 8  | 50  | 4       |
|               | ESR702 0150208   | 1.5 | 0.2 | 2.5  | 8  | 50  | 6       | ESR702 0200310S4 | 2   | 0.3 | 3    | 10 | 50  | 4       |
| Zamus Star    | ESR702 0150208S4 | 1.5 | 0.2 | 2.5  | 8  | 50  | 4       | ESR702 0200312S4 | 2   | 0.3 | 3    | 12 | 50  | 4       |
|               | ESR702 0150210   | 1.5 | 0.2 | 2.5  | 10 | 50  | 6       | ESR702 0200316S4 | 2   | 0.3 | 3    | 16 | 50  | 4       |
|               | ESR702 0150210S4 | 1.5 | 0.2 | 2.5  | 10 | 50  | 4       | ESR702 0200320S4 | 2   | 0.3 | 3    | 20 | 50  | 4       |
| E-Star        | ESR702 0150212S4 | 1.5 | 0.2 | 2.5  | 12 | 50  | 4       | ESR702 0200506   | 2   | 0.5 | 3    | 6  | 50  | 6       |
|               | ESR702 0150215   | 1.5 | 0.2 | 2.5  | 15 | 50  | 6       | ESR702 0200506S4 | 2   | 0.5 | 3    | 6  | 50  | 4       |
|               | ESR702 0150304S4 | 1.5 | 0.3 | 2.5  | 4  | 50  | 4       | ESR702 0200508S4 | 2   | 0.5 | 3    | 8  | 50  | 4       |
|               | ESR702 0150306S4 | 1.5 | 0.3 | 2.5  | 6  | 50  | 4       | ESR702 0200509   | 2   | 0.5 | 3    | 9  | 50  | 6       |
| U-Wing        | ESR702 0150308S4 | 1.5 | 0.3 | 2.5  | 8  | 50  | 4       | ESR702 0200510S4 | 2   | 0.5 | 3    | 10 | 50  | 4       |
|               | ESR702 0150310S4 | 1.5 | 0.3 | 2.5  | 10 | 50  | 4       | ESR702 0200512   | 2   | 0.5 | 3    | 12 | 50  | 6       |
|               | ESR702 0150312S4 | 1.5 | 0.3 | 2.5  | 12 | 50  | 4       | ESR702 0200512S4 | 2   | 0.5 | 3    | 12 | 50  | 4       |
| Zamus Thunder | ESR702 0150504S4 | 1.5 | 0.5 | 2.5  | 4  | 50  | 4       | ESR702 0200516   | 2   | 0.5 | 3    | 16 | 50  | 6       |
|               | ESR702 0150506S4 | 1.5 | 0.5 | 2.5  | 6  | 50  | 4       | ESR702 0200516S4 | 2   | 0.5 | 3    | 16 | 50  | 4       |
|               | ESR702 0150508S4 | 1.5 | 0.5 | 2.5  | 8  | 50  | 4       | ESR702 0200520S4 | 2   | 0.5 | 3    | 20 | 50  | 4       |
|               | ESR702 0150510S4 | 1.5 | 0.5 | 2.5  | 10 | 50  | 4       | ESR702 0250208S4 | 2.5 | 0.2 | 3.5  | 8  | 50  | 4       |
| X-Star        | ESR702 0150512S4 | 1.5 | 0.5 | 2.5  | 12 | 50  | 4       | ESR702 0250210S4 | 2.5 | 0.2 | 3.5  | 10 | 50  | 4       |
|               | ESR702 0200106S4 | 2   | 0.1 | 3    | 6  | 50  | 4       | ESR702 0250212S4 | 2.5 | 0.2 | 3.5  | 12 | 50  | 4       |
|               | ESR702 0200108   | 2   | 0.1 | 3    | 8  | 50  | 6       | ESR702 0250216S4 | 2.5 | 0.2 | 3.5  | 16 | 50  | 4       |
|               | ESR702 0200108S4 | 2   | 0.1 | 3    | 8  | 50  | 4       | ESR702 0250308S4 | 2.5 | 0.3 | 3.5  | 8  | 50  | 4       |
| S-Wing        | ESR702 0200110S4 | 2   | 0.1 | 3    | 10 | 50  | 4       | ESR702 0250310S4 | 2.5 | 0.3 | 3.5  | 10 | 50  | 4       |
|               | ESR702 0200112   | 2   | 0.1 | 3    | 12 | 50  | 6       | ESR702 0250312S4 | 2.5 | 0.3 | 3.5  | 12 | 50  | 4       |
|               | ESR702 0200112S4 | 2   | 0.1 | 3    | 12 | 50  | 4       | ESR702 0250316S4 | 2.5 | 0.3 | 3.5  | 16 | 50  | 4       |
| A-Wing        | ESR702 0200116S4 | 2   | 0.1 | 3    | 16 | 50  | 4       | ESR702 0250508S4 | 2.5 | 0.5 | 3.5  | 8  | 50  | 4       |
|               | ESR702 0200120S4 | 2   | 0.1 | 3    | 20 | 50  | 4       | ESR702 0250510S4 | 2.5 | 0.5 | 3.5  | 10 | 50  | 4       |
|               | ESR702 0200206   | 2   | 0.2 | 3    | 6  | 50  | 6       | ESR702 0250512S4 | 2.5 | 0.5 | 3.5  | 12 | 50  | 4       |
|               | ESR702 0200206S4 | 2   | 0.2 | 3    | 6  | 50  | 4       | ESR702 0250516S4 | 2.5 | 0.5 | 3.5  | 16 | 50  | 4       |
| Standard      | ESR702 0200208S4 | 2   | 0.2 | 3    | 8  | 50  | 4       | ESR702 0300108   | 3   | 0.1 | 4.5  | 8  | 55  | 6       |
|               | ESR702 0200209   | 2   | 0.2 | 3    | 9  | 50  | 6       | ESR702 0300110   | 3   | 0.1 | 4.5  | 10 | 55  | 6       |
|               | ESR702 0200210S4 | 2   | 0.2 | 3    | 10 | 50  | 4       | ESR702 0300112   | 3   | 0.1 | 4.5  | 12 | 55  | 6       |
| Copper -Mate  | ESR702 0200212S4 | 2   | 0.2 | 3    | 12 | 50  | 4       | ESR702 0300116   | 3   | 0.1 | 4.5  | 16 | 55  | 6       |
|               | ESR702 0200216   | 2   | 0.2 | 3    | 16 | 50  | 6       | ESR702 0300120   | 3   | 0.1 | 4.5  | 20 | 60  | 6       |
|               | ESR702 0200216S4 | 2   | 0.2 | 3    | 16 | 50  | 4       | ESR702 0300208   | 3   | 0.2 | 4.5  | 8  | 55  | 6       |
|               | ESR702 0200220S4 | 2   | 0.2 | 3    | 20 | 50  | 4       | ESR702 0300209   | 3   | 0.2 | 4.5  | 9  | 55  | 6       |
| Gra -Mate     | ESR702 0200306   | 2   | 0.3 | 3    | 6  | 50  | 6       | ESR702 0300210   | 3   | 0.2 | 4.5  | 10 | 55  | 6       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |                        |                            | K                 | N      |          |          | M               | S                    |
|----------------|--------------|--------------|------------------------|----------------------------|-------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel            | Prehardened Steel          | Cast Iron ~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | Steel ~HB225 | Alloy Steel HB225 ~325 | Prehardened Steel HRC30~50 |                   |        |          |          |                 |                      |
| ◎              | ○            |              | ○                      | ◎                          |                   |        |          |          |                 |                      |

# ESR702 2 Flutes Neck Radius End Mill

Endmill

| EDP No         | DC | RE  | APMX | LU | OAL | DCON MS | EDP No         | DC | RE  | APMX | LU | OAL | DCON MS |
|----------------|----|-----|------|----|-----|---------|----------------|----|-----|------|----|-----|---------|
| ESR702 0300212 | 3  | 0.2 | 4.5  | 12 | 55  | 6       | ESR702 0400325 | 4  | 0.3 | 6    | 25 | 60  | 6       |
| ESR702 0300216 | 3  | 0.2 | 4.5  | 16 | 55  | 6       | ESR702 0400510 | 4  | 0.5 | 6    | 10 | 55  | 6       |
| ESR702 0300220 | 3  | 0.2 | 4.5  | 20 | 60  | 6       | ESR702 0400512 | 4  | 0.5 | 6    | 12 | 55  | 6       |
| ESR702 0300308 | 3  | 0.3 | 4.5  | 8  | 55  | 6       | ESR702 0400516 | 4  | 0.5 | 6    | 16 | 55  | 6       |
| ESR702 0300309 | 3  | 0.3 | 4.5  | 9  | 55  | 6       | ESR702 0400520 | 4  | 0.5 | 6    | 20 | 60  | 6       |
| ESR702 0300310 | 3  | 0.3 | 4.5  | 10 | 55  | 6       | ESR702 0400525 | 4  | 0.5 | 6    | 25 | 60  | 6       |
| ESR702 0300312 | 3  | 0.3 | 4.5  | 12 | 55  | 6       | ESR702 0400530 | 4  | 0.5 | 6    | 30 | 70  | 6       |
| ESR702 0300314 | 3  | 0.3 | 4.5  | 14 | 55  | 6       | ESR702 0401010 | 4  | 1   | 6    | 10 | 55  | 6       |
| ESR702 0300316 | 3  | 0.3 | 4.5  | 16 | 55  | 6       | ESR702 0401012 | 4  | 1   | 6    | 12 | 55  | 6       |
| ESR702 0300320 | 3  | 0.3 | 4.5  | 20 | 60  | 6       | ESR702 0401016 | 4  | 1   | 6    | 16 | 55  | 6       |
| ESR702 0300508 | 3  | 0.5 | 4.5  | 8  | 55  | 6       | ESR702 0401020 | 4  | 1   | 6    | 20 | 60  | 6       |
| ESR702 0300509 | 3  | 0.5 | 4.5  | 9  | 55  | 6       | ESR702 0401025 | 4  | 1   | 6    | 25 | 60  | 6       |
| ESR702 0300510 | 3  | 0.5 | 4.5  | 10 | 55  | 6       | ESR702 0401030 | 4  | 1   | 6    | 30 | 70  | 6       |
| ESR702 0300512 | 3  | 0.5 | 4.5  | 12 | 55  | 6       | ESR702 0500318 | 5  | 0.3 | 8    | 18 | 60  | 6       |
| ESR702 0300516 | 3  | 0.5 | 4.5  | 16 | 55  | 6       | ESR702 0600220 | 6  | 0.2 | 9    | 20 | 60  | 6       |
| ESR702 0300520 | 3  | 0.5 | 4.5  | 20 | 60  | 6       | ESR702 0600320 | 6  | 0.3 | 9    | 20 | 60  | 6       |
| ESR702 0301008 | 3  | 1   | 4.5  | 8  | 55  | 6       | ESR702 0600520 | 6  | 0.5 | 9    | 20 | 60  | 6       |
| ESR702 0301010 | 3  | 1   | 4.5  | 10 | 55  | 6       | ESR702 0601020 | 6  | 1   | 9    | 20 | 60  | 6       |
| ESR702 0301012 | 3  | 1   | 4.5  | 12 | 55  | 6       | ESR702 0601520 | 6  | 1.5 | 9    | 20 | 60  | 6       |
| ESR702 0301016 | 3  | 1   | 4.5  | 16 | 55  | 6       | ESR702 0602020 | 6  | 2   | 9    | 20 | 60  | 6       |
| ESR702 0301020 | 3  | 1   | 4.5  | 20 | 60  | 6       | ESR702 0800225 | 8  | 0.2 | 12   | 25 | 60  | 8       |
| ESR702 0301025 | 3  | 1   | 4.5  | 25 | 60  | 6       | ESR702 0800325 | 8  | 0.3 | 12   | 25 | 60  | 8       |
| ESR702 0400110 | 4  | 0.1 | 6    | 10 | 55  | 6       | ESR702 0800525 | 8  | 0.5 | 12   | 25 | 60  | 8       |
| ESR702 0400112 | 4  | 0.1 | 6    | 12 | 55  | 6       | ESR702 0801025 | 8  | 1   | 12   | 25 | 60  | 8       |
| ESR702 0400116 | 4  | 0.1 | 6    | 16 | 55  | 6       | ESR702 0801525 | 8  | 1.5 | 12   | 25 | 60  | 8       |
| ESR702 0400120 | 4  | 0.1 | 6    | 20 | 60  | 6       | ESR702 1000232 | 10 | 0.2 | 15   | 32 | 70  | 10      |
| ESR702 0400125 | 4  | 0.1 | 6    | 25 | 60  | 6       | ESR702 1000332 | 10 | 0.3 | 15   | 32 | 70  | 10      |
| ESR702 0400210 | 4  | 0.2 | 6    | 10 | 55  | 6       | ESR702 1000532 | 10 | 0.5 | 15   | 32 | 70  | 10      |
| ESR702 0400212 | 4  | 0.2 | 6    | 12 | 55  | 6       | ESR702 1001032 | 10 | 1   | 15   | 32 | 70  | 10      |
| ESR702 0400216 | 4  | 0.2 | 6    | 16 | 55  | 6       | ESR702 1001532 | 10 | 1.5 | 15   | 32 | 70  | 10      |
| ESR702 0400220 | 4  | 0.2 | 6    | 20 | 60  | 6       | ESR702 1002032 | 10 | 2   | 15   | 32 | 70  | 10      |
| ESR702 0400225 | 4  | 0.2 | 6    | 25 | 60  | 6       | ESR702 1200338 | 12 | 0.3 | 18   | 38 | 80  | 12      |
| ESR702 0400310 | 4  | 0.3 | 6    | 10 | 55  | 6       | ESR702 1200538 | 12 | 0.5 | 18   | 38 | 80  | 12      |
| ESR702 0400312 | 4  | 0.3 | 6    | 12 | 55  | 6       | ESR702 1201038 | 12 | 1   | 18   | 38 | 80  | 12      |
| ESR702 0400316 | 4  | 0.3 | 6    | 16 | 55  | 6       | ESR702 1201538 | 12 | 1.5 | 18   | 38 | 80  | 12      |
| ESR702 0400320 | 4  | 0.3 | 6    | 20 | 60  | 6       | ESR702 1202038 | 12 | 2   | 18   | 38 | 80  | 12      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

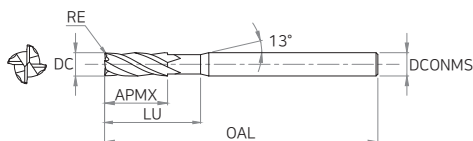
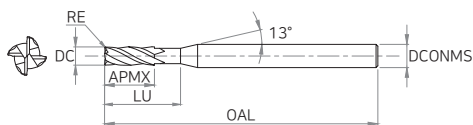
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESR704 4 Flutes Neck Radius End Mill

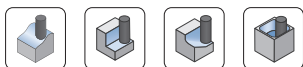
Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |

U-Wing



Ø6 OR UNDER ABOVE Ø6

Zamus Thunder

| EDP No           | DC  | RE  | APMX | LU | OAL | DCONMS | EDP No           | DC  | RE  | APMX | LU | OAL | DCONMS |
|------------------|-----|-----|------|----|-----|--------|------------------|-----|-----|------|----|-----|--------|
| ESR704 0100103S4 | 1   | 0.1 | 2    | 3  | 50  | 4      | ESR704 0200210   | 2   | 0.2 | 3    | 10 | 50  | 6      |
| ESR704 0100104S4 | 1   | 0.1 | 2    | 4  | 50  | 4      | ESR704 0200212   | 2   | 0.2 | 3    | 12 | 50  | 6      |
| ESR704 0100106S4 | 1   | 0.1 | 2    | 6  | 50  | 4      | ESR704 0200306S4 | 2   | 0.3 | 3    | 6  | 50  | 4      |
| ESR704 0100203S4 | 1   | 0.2 | 2    | 3  | 50  | 4      | ESR704 0200308S4 | 2   | 0.3 | 3    | 8  | 50  | 4      |
| ESR704 0100204S4 | 1   | 0.2 | 2    | 4  | 50  | 4      | ESR704 0200506S4 | 2   | 0.5 | 3    | 6  | 50  | 4      |
| ESR704 0100206S4 | 1   | 0.2 | 2    | 6  | 50  | 4      | ESR704 0200508S4 | 2   | 0.5 | 3    | 8  | 50  | 4      |
| ESR704 0100303S4 | 1   | 0.3 | 2    | 3  | 50  | 4      | ESR704 0250106S4 | 2.5 | 0.1 | 3.5  | 6  | 50  | 4      |
| ESR704 0100304S4 | 1   | 0.3 | 2    | 4  | 50  | 4      | ESR704 0300108   | 3   | 0.1 | 4    | 8  | 55  | 6      |
| ESR704 0100306S4 | 1   | 0.3 | 2    | 6  | 50  | 4      | ESR704 0300110   | 3   | 0.1 | 4    | 10 | 55  | 6      |
| ESR704 0150104S4 | 1.5 | 0.1 | 2.5  | 4  | 50  | 4      | ESR704 0300112   | 3   | 0.1 | 4    | 12 | 55  | 6      |
| ESR704 0150106S4 | 1.5 | 0.1 | 2.5  | 6  | 50  | 4      | ESR704 0300116   | 3   | 0.1 | 4    | 16 | 55  | 6      |
| ESR704 0150204S4 | 1.5 | 0.2 | 2.5  | 4  | 50  | 4      | ESR704 0300120   | 3   | 0.1 | 4    | 20 | 60  | 6      |
| ESR704 0150206S4 | 1.5 | 0.2 | 2.5  | 6  | 50  | 4      | ESR704 0300208   | 3   | 0.2 | 4    | 8  | 55  | 6      |
| ESR704 0150304S4 | 1.5 | 0.3 | 2.5  | 4  | 50  | 4      | ESR704 0300210   | 3   | 0.2 | 4    | 10 | 55  | 6      |
| ESR704 0150306S4 | 1.5 | 0.3 | 2.5  | 6  | 50  | 4      | ESR704 0300212   | 3   | 0.2 | 4    | 12 | 55  | 6      |
| ESR704 0200106S4 | 2   | 0.1 | 3    | 6  | 50  | 4      | ESR704 0300216   | 3   | 0.2 | 4    | 16 | 55  | 6      |
| ESR704 0200108S4 | 2   | 0.1 | 3    | 8  | 50  | 4      | ESR704 0300220   | 3   | 0.2 | 4    | 20 | 60  | 6      |
| ESR704 0200206S4 | 2   | 0.2 | 3    | 6  | 50  | 4      | ESR704 0300308   | 3   | 0.3 | 4    | 8  | 55  | 6      |
| ESR704 0200208   | 2   | 0.2 | 3    | 8  | 50  | 6      | ESR704 0300309   | 3   | 0.3 | 4    | 9  | 55  | 6      |
| ESR704 0200208S4 | 2   | 0.2 | 3    | 8  | 50  | 4      | ESR704 0300310   | 3   | 0.3 | 4    | 10 | 55  | 6      |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESR704 4 Flutes Neck Radius End Mill

Endmill

| EDP No         | DC | RE  | APMX | LU | OAL | DCON MS | EDP No         | DC | RE  | APMX | LU | OAL | DCON MS |
|----------------|----|-----|------|----|-----|---------|----------------|----|-----|------|----|-----|---------|
| ESR704 0300312 | 3  | 0.3 | 4    | 12 | 55  | 6       | ESR704 0400516 | 4  | 0.5 | 6    | 16 | 55  | 6       |
| ESR704 0300316 | 3  | 0.3 | 4    | 16 | 55  | 6       | ESR704 0400520 | 4  | 0.5 | 6    | 20 | 60  | 6       |
| ESR704 0300320 | 3  | 0.3 | 4    | 20 | 60  | 6       | ESR704 0400525 | 4  | 0.5 | 6    | 25 | 60  | 6       |
| ESR704 0300508 | 3  | 0.5 | 4    | 8  | 55  | 6       | ESR704 0401010 | 4  | 1   | 6    | 10 | 55  | 6       |
| ESR704 0300509 | 3  | 0.5 | 4    | 9  | 55  | 6       | ESR704 0401012 | 4  | 1   | 6    | 12 | 55  | 6       |
| ESR704 0300510 | 3  | 0.5 | 4    | 10 | 55  | 6       | ESR704 0401016 | 4  | 1   | 6    | 16 | 55  | 6       |
| ESR704 0300512 | 3  | 0.5 | 4    | 12 | 55  | 6       | ESR704 0401020 | 4  | 1   | 6    | 20 | 60  | 6       |
| ESR704 0300516 | 3  | 0.5 | 4    | 16 | 55  | 6       | ESR704 0401025 | 4  | 1   | 6    | 25 | 60  | 6       |
| ESR704 0300520 | 3  | 0.5 | 4    | 20 | 60  | 6       | ESR704 0600220 | 6  | 0.2 | 9    | 20 | 60  | 6       |
| ESR704 0301008 | 3  | 1   | 4    | 8  | 55  | 6       | ESR704 0600320 | 6  | 0.3 | 9    | 20 | 60  | 6       |
| ESR704 0301010 | 3  | 1   | 4    | 10 | 55  | 6       | ESR704 0600520 | 6  | 0.5 | 9    | 20 | 60  | 6       |
| ESR704 0301012 | 3  | 1   | 4    | 12 | 55  | 6       | ESR704 0601020 | 6  | 1   | 9    | 20 | 60  | 6       |
| ESR704 0301016 | 3  | 1   | 4    | 16 | 55  | 6       | ESR704 0601520 | 6  | 1.5 | 9    | 20 | 60  | 6       |
| ESR704 0301020 | 3  | 1   | 4    | 20 | 60  | 6       | ESR704 0602020 | 6  | 2   | 9    | 20 | 60  | 6       |
| ESR704 0400110 | 4  | 0.1 | 6    | 10 | 55  | 6       | ESR704 0800225 | 8  | 0.2 | 12   | 25 | 60  | 8       |
| ESR704 0400112 | 4  | 0.1 | 6    | 12 | 55  | 6       | ESR704 0800325 | 8  | 0.3 | 12   | 25 | 60  | 8       |
| ESR704 0400116 | 4  | 0.1 | 6    | 16 | 55  | 6       | ESR704 0800525 | 8  | 0.5 | 12   | 25 | 60  | 8       |
| ESR704 0400120 | 4  | 0.1 | 6    | 20 | 60  | 6       | ESR704 0801025 | 8  | 1   | 12   | 25 | 60  | 8       |
| ESR704 0400125 | 4  | 0.1 | 6    | 25 | 60  | 6       | ESR704 0801525 | 8  | 1.5 | 12   | 25 | 60  | 8       |
| ESR704 0400210 | 4  | 0.2 | 6    | 10 | 55  | 6       | ESR704 0802025 | 8  | 2   | 12   | 25 | 60  | 8       |
| ESR704 0400212 | 4  | 0.2 | 6    | 12 | 55  | 6       | ESR704 1000232 | 10 | 0.2 | 15   | 32 | 70  | 10      |
| ESR704 0400216 | 4  | 0.2 | 6    | 16 | 55  | 6       | ESR704 1000332 | 10 | 0.3 | 15   | 32 | 70  | 10      |
| ESR704 0400220 | 4  | 0.2 | 6    | 20 | 60  | 6       | ESR704 1000532 | 10 | 0.5 | 15   | 32 | 70  | 10      |
| ESR704 0400225 | 4  | 0.2 | 6    | 25 | 60  | 6       | ESR704 1001032 | 10 | 1   | 15   | 32 | 70  | 10      |
| ESR704 0400310 | 4  | 0.3 | 6    | 10 | 55  | 6       | ESR704 1001532 | 10 | 1.5 | 15   | 32 | 70  | 10      |
| ESR704 0400312 | 4  | 0.3 | 6    | 12 | 55  | 6       | ESR704 1002032 | 10 | 2   | 15   | 32 | 70  | 10      |
| ESR704 0400316 | 4  | 0.3 | 6    | 16 | 55  | 6       | ESR704 1200338 | 12 | 0.3 | 18   | 38 | 80  | 12      |
| ESR704 0400320 | 4  | 0.3 | 6    | 20 | 60  | 6       | ESR704 1200538 | 12 | 0.5 | 18   | 38 | 80  | 12      |
| ESR704 0400325 | 4  | 0.3 | 6    | 25 | 60  | 6       | ESR704 1201038 | 12 | 1   | 18   | 38 | 80  | 12      |
| ESR704 0400510 | 4  | 0.5 | 6    | 10 | 55  | 6       | ESR704 1201538 | 12 | 1.5 | 18   | 38 | 80  | 12      |
| ESR704 0400512 | 4  | 0.5 | 6    | 12 | 55  | 6       | ESR704 1202038 | 12 | 2   | 18   | 38 | 80  | 12      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

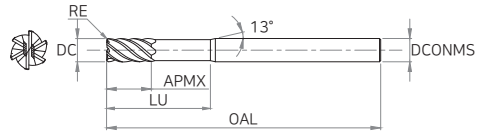
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESR706 6 Flutes Neck Radius End Mill

Endmill

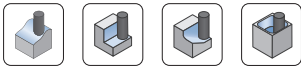


Zamus Star

► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |

U-Wing



Zamus Thunder

| EDP No         | DC | RE  | APMX | LU | OAL | DCONMS |
|----------------|----|-----|------|----|-----|--------|
| ESR706 0600314 | 6  | 0.3 | 6    | 14 | 50  | 6      |
| ESR706 0600514 | 6  | 0.5 | 6    | 14 | 50  | 6      |
| ESR706 0800524 | 8  | 0.5 | 8    | 24 | 60  | 8      |
| ESR706 0801024 | 8  | 1   | 8    | 24 | 60  | 8      |
| ESR706 1000530 | 10 | 0.5 | 10   | 30 | 70  | 10     |
| ESR706 1001030 | 10 | 1   | 10   | 30 | 70  | 10     |
| ESR706 1200530 | 12 | 0.5 | 12   | 30 | 75  | 12     |
| ESR706 1201030 | 12 | 1   | 12   | 30 | 75  | 12     |

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

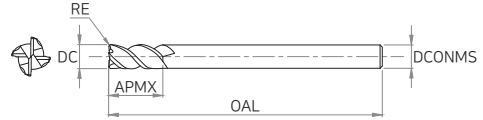
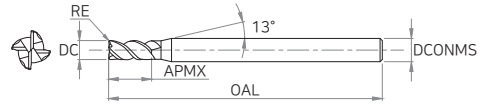
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

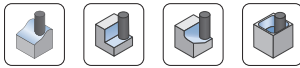
| H               |                 | P               |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | HB225<br>~325 | Steel<br>HRC30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |                 | ○             | ◎                 |           |        |          |          |                 |                      |

# ESR714 4 Flutes Radius End Mill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



| EDP No        | DC | RE  | APMX | OAL | DCON MS | EDP No      | DC | RE  | APMX | OAL | DCON MS |
|---------------|----|-----|------|-----|---------|-------------|----|-----|------|-----|---------|
| ESR714 0303   | 3  | 0.3 | 8    | 50  | 6       | ESR714 1003 | 10 | 0.3 | 25   | 70  | 10      |
| ESR714 0305S4 | 3  | 0.5 | 8    | 50  | 4       | ESR714 1005 | 10 | 0.5 | 25   | 70  | 10      |
| ESR714 0305   | 3  | 0.5 | 8    | 50  | 6       | ESR714 1010 | 10 | 1   | 25   | 70  | 10      |
| ESR714 0403   | 4  | 0.3 | 11   | 50  | 6       | ESR714 1015 | 10 | 1.5 | 25   | 70  | 10      |
| ESR714 0405   | 4  | 0.5 | 11   | 50  | 6       | ESR714 1020 | 10 | 2   | 25   | 70  | 10      |
| ESR714 0405S4 | 4  | 0.5 | 11   | 50  | 4       | ESR714 1025 | 10 | 2.5 | 25   | 70  | 10      |
| ESR714 0410   | 4  | 1   | 11   | 50  | 6       | ESR714 1030 | 10 | 3   | 25   | 70  | 10      |
| ESR714 0603   | 6  | 0.3 | 15   | 60  | 6       | ESR714 1203 | 12 | 0.3 | 30   | 80  | 12      |
| ESR714 0605   | 6  | 0.5 | 15   | 60  | 6       | ESR714 1205 | 12 | 0.5 | 30   | 80  | 12      |
| ESR714 0610   | 6  | 1   | 15   | 60  | 6       | ESR714 1210 | 12 | 1   | 30   | 80  | 12      |
| ESR714 0803   | 8  | 0.3 | 20   | 60  | 8       | ESR714 1215 | 12 | 1.5 | 30   | 80  | 12      |
| ESR714 0805   | 8  | 0.5 | 20   | 60  | 8       | ESR714 1220 | 12 | 2   | 30   | 80  | 12      |
| ESR714 0810   | 8  | 1   | 20   | 60  | 8       | ESR714 1225 | 12 | 2.5 | 30   | 80  | 12      |
| ESR714 0815   | 8  | 1.5 | 20   | 60  | 8       | ESR714 1230 | 12 | 3   | 30   | 80  | 12      |
| ESR714 0820   | 8  | 2   | 20   | 60  | 8       |             |    |     |      |     |         |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

Endmill

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

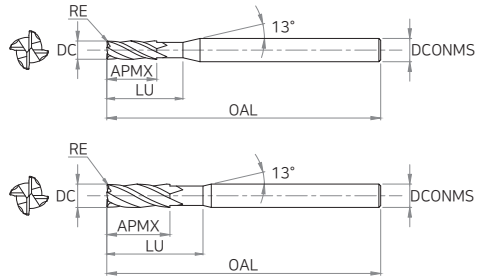
Standard

Copper-Mate

Gra-Mate

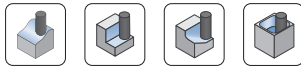
# ESR724 4 Flutes Neck Radius End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



| EDP No         | DC | RE  | APMX | LU | OAL | DCONMS |
|----------------|----|-----|------|----|-----|--------|
| ESR724 0600520 | 6  | 0.5 | 9    | 20 | 90  | 6      |
| ESR724 0601020 | 6  | 1   | 9    | 20 | 90  | 6      |
| ESR724 0800525 | 8  | 0.5 | 12   | 25 | 100 | 8      |
| ESR724 0801025 | 8  | 1   | 12   | 25 | 100 | 8      |
| ESR724 1000532 | 10 | 0.5 | 15   | 32 | 100 | 10     |
| ESR724 1001032 | 10 | 1   | 15   | 32 | 100 | 10     |
| ESR724 1002032 | 10 | 2   | 15   | 32 | 100 | 10     |
| ESR724 1200538 | 12 | 0.5 | 18   | 38 | 110 | 12     |
| ESR724 1201038 | 12 | 1   | 18   | 38 | 110 | 12     |
| ESR724 1202038 | 12 | 2   | 18   | 38 | 110 | 12     |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

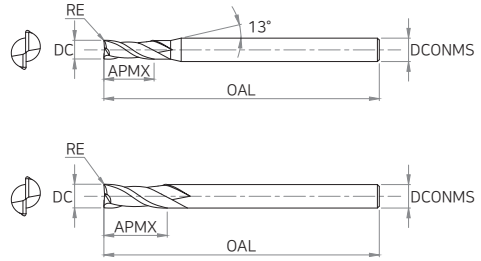
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Steel<br>~HB225 | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |                 | ○             | ◎                 |           |        |          |          |                 |                      |

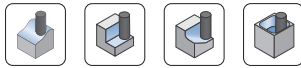
# ESR732 2 Flutes Long Shank Radius End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



CARBIDE AITIN 2 45° HELIX R ±0.01 R ±0.015 DATA P.635  
Ø6 OR UNDER ABOVE Ø6

| EDP No       | DC  | RE  | APMX | OAL | DCON MS | EDP No       | DC | RE  | APMX | OAL | DCON MS |
|--------------|-----|-----|------|-----|---------|--------------|----|-----|------|-----|---------|
| ERS732 01001 | 1   | 0.1 | 2    | 50  | 6       | ERS732 04002 | 4  | 0.2 | 10   | 70  | 6       |
| ERS732 01002 | 1   | 0.2 | 2    | 50  | 6       | ERS732 04003 | 4  | 0.3 | 10   | 70  | 6       |
| ERS732 01003 | 1   | 0.3 | 2    | 50  | 6       | ERS732 04005 | 4  | 0.5 | 10   | 70  | 6       |
| ERS732 01501 | 1.5 | 0.1 | 3    | 50  | 6       | ERS732 04010 | 4  | 1   | 10   | 70  | 6       |
| ERS732 01502 | 1.5 | 0.2 | 3    | 50  | 6       | ERS732 05001 | 5  | 0.1 | 13   | 80  | 6       |
| ERS732 01503 | 1.5 | 0.3 | 3    | 50  | 6       | ERS732 05002 | 5  | 0.2 | 13   | 80  | 6       |
| ERS732 01505 | 1.5 | 0.5 | 3    | 50  | 6       | ERS732 05003 | 5  | 0.3 | 13   | 80  | 6       |
| ERS732 02001 | 2   | 0.1 | 5    | 50  | 6       | ERS732 05005 | 5  | 0.5 | 13   | 80  | 6       |
| ERS732 02002 | 2   | 0.2 | 5    | 50  | 6       | ERS732 05010 | 5  | 1   | 13   | 80  | 6       |
| ERS732 02003 | 2   | 0.3 | 5    | 50  | 6       | ERS732 06001 | 6  | 0.1 | 15   | 90  | 6       |
| ERS732 02005 | 2   | 0.5 | 5    | 50  | 6       | ERS732 06002 | 6  | 0.2 | 15   | 90  | 6       |
| ERS732 02501 | 2.5 | 0.1 | 7    | 60  | 6       | ERS732 06003 | 6  | 0.3 | 15   | 90  | 6       |
| ERS732 02502 | 2.5 | 0.2 | 7    | 60  | 6       | ERS732 06005 | 6  | 0.5 | 15   | 90  | 6       |
| ERS732 02503 | 2.5 | 0.3 | 7    | 60  | 6       | ERS732 06010 | 6  | 1   | 15   | 90  | 6       |
| ERS732 02505 | 2.5 | 0.5 | 7    | 60  | 6       | ERS732 08001 | 8  | 0.1 | 20   | 100 | 8       |
| ERS732 03001 | 3   | 0.1 | 8    | 60  | 6       | ERS732 08002 | 8  | 0.2 | 20   | 100 | 8       |
| ERS732 03002 | 3   | 0.2 | 8    | 60  | 6       | ERS732 08003 | 8  | 0.3 | 20   | 100 | 8       |
| ERS732 03003 | 3   | 0.3 | 8    | 60  | 6       | ERS732 08005 | 8  | 0.5 | 20   | 100 | 8       |
| ERS732 03005 | 3   | 0.5 | 8    | 60  | 6       | ERS732 08010 | 8  | 1   | 20   | 100 | 8       |
| ERS732 04001 | 4   | 0.1 | 10   | 70  | 6       | ERS732 08020 | 8  | 2   | 20   | 100 | 8       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

# ESR732 2 Flutes Long Shank Radius End Mill

Endmill

| EDP No       | DC | RE  | APMX | OAL | DCON MS | EDP No       | DC | RE  | APMX | OAL | DCON MS |
|--------------|----|-----|------|-----|---------|--------------|----|-----|------|-----|---------|
| ERS732 10002 | 10 | 0.2 | 25   | 100 | 10      | ERS732 12002 | 12 | 0.2 | 30   | 110 | 12      |
| ERS732 10003 | 10 | 0.3 | 25   | 100 | 10      | ERS732 12003 | 12 | 0.3 | 30   | 110 | 12      |
| ERS732 10005 | 10 | 0.5 | 25   | 100 | 10      | ERS732 12005 | 12 | 0.5 | 30   | 110 | 12      |
| ERS732 10010 | 10 | 1   | 25   | 100 | 10      | ERS732 12010 | 12 | 1   | 30   | 110 | 12      |
| ERS732 10020 | 10 | 2   | 25   | 100 | 10      | ERS732 12020 | 12 | 2   | 30   | 110 | 12      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper -Mate

Gra -Mate

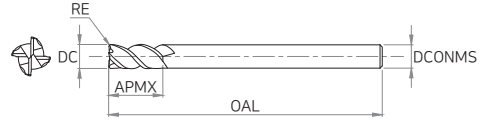
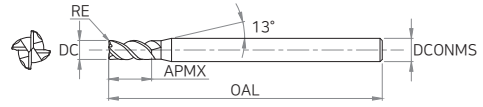
## ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

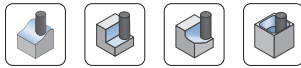
# ESR734 4 Flutes Long Shank Radius End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



CARBIDE
AITIN
4
45° HELIX
R ±0.01
R ±0.015
DATA P.636

0% OR UNDER      ABOVE 0%

| EDP No       | DC  | RE  | APMX | OAL | DCON MS | EDP No         | DC | RE  | APMX | OAL | DCON MS |
|--------------|-----|-----|------|-----|---------|----------------|----|-----|------|-----|---------|
| ESR734 01001 | 1   | 0.1 | 2    | 50  | 6       | ESR734 04002   | 4  | 0.2 | 10   | 70  | 6       |
| ESR734 01002 | 1   | 0.2 | 2    | 50  | 6       | ESR734 04002S4 | 4  | 0.2 | 10   | 70  | 4       |
| ESR734 01003 | 1   | 0.3 | 2    | 50  | 6       | ESR734 04003   | 4  | 0.3 | 10   | 70  | 6       |
| ESR734 01501 | 1.5 | 0.1 | 3    | 50  | 6       | ESR734 04005   | 4  | 0.5 | 10   | 70  | 6       |
| ESR734 01502 | 1.5 | 0.2 | 3    | 50  | 6       | ESR734 04005S4 | 4  | 0.5 | 10   | 70  | 4       |
| ESR734 01503 | 1.5 | 0.3 | 3    | 50  | 6       | ESR734 04010   | 4  | 1   | 10   | 70  | 6       |
| ESR734 01505 | 1.5 | 0.5 | 3    | 50  | 6       | ESR734 05001   | 5  | 0.1 | 13   | 80  | 6       |
| ESR734 02001 | 2   | 0.1 | 5    | 50  | 6       | ESR734 05002   | 5  | 0.2 | 13   | 80  | 6       |
| ESR734 02002 | 2   | 0.2 | 5    | 50  | 6       | ESR734 05003   | 5  | 0.3 | 13   | 80  | 6       |
| ESR734 02003 | 2   | 0.3 | 5    | 50  | 6       | ESR734 05005   | 5  | 0.5 | 13   | 80  | 6       |
| ESR734 02005 | 2   | 0.5 | 5    | 50  | 6       | ESR734 05010   | 5  | 1   | 13   | 80  | 6       |
| ESR734 02501 | 2.5 | 0.1 | 7    | 60  | 6       | ESR734 06001   | 6  | 0.1 | 15   | 90  | 6       |
| ESR734 02502 | 2.5 | 0.2 | 7    | 60  | 6       | ESR734 06002   | 6  | 0.2 | 15   | 90  | 6       |
| ESR734 02503 | 2.5 | 0.3 | 7    | 60  | 6       | ESR734 06003   | 6  | 0.3 | 15   | 90  | 6       |
| ESR734 02505 | 2.5 | 0.5 | 7    | 60  | 6       | ESR734 06005   | 6  | 0.5 | 15   | 90  | 6       |
| ESR734 03001 | 3   | 0.1 | 8    | 60  | 6       | ESR734 06010   | 6  | 1   | 15   | 90  | 6       |
| ESR734 03002 | 3   | 0.2 | 8    | 60  | 6       | ESR734 08001   | 8  | 0.1 | 20   | 100 | 8       |
| ESR734 03003 | 3   | 0.3 | 8    | 60  | 6       | ESR734 08002   | 8  | 0.2 | 20   | 100 | 8       |
| ESR734 03005 | 3   | 0.5 | 8    | 60  | 6       | ESR734 08003   | 8  | 0.3 | 20   | 100 | 8       |
| ESR734 04001 | 4   | 0.1 | 10   | 70  | 6       | ESR734 08005   | 8  | 0.5 | 20   | 100 | 8       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

# ESR734 4 Flutes Long Shank Radius End Mil

Endmill

| EDP No       | DC | RE  | APMX | OAL | DCON MS | EDP No        | DC | RE  | APMX | OAL | DCON MS |
|--------------|----|-----|------|-----|---------|---------------|----|-----|------|-----|---------|
| ESR734 08010 | 8  | 1   | 20   | 100 | 8       | ESR734 12002  | 12 | 0.2 | 30   | 110 | 12      |
| ESR734 08020 | 8  | 2   | 20   | 100 | 8       | ESR734 12003  | 12 | 0.3 | 30   | 110 | 12      |
| ESR734 10002 | 10 | 0.2 | 25   | 100 | 10      | ESR734 12005  | 12 | 0.5 | 30   | 110 | 12      |
| ESR734 10003 | 10 | 0.3 | 25   | 100 | 10      | ESR734 12010  | 12 | 1   | 30   | 110 | 12      |
| ESR734 10005 | 10 | 0.5 | 25   | 100 | 10      | ESR734 12010L | 12 | 1   | 30   | 150 | 12      |
| ESR734 10010 | 10 | 1   | 25   | 100 | 10      | ESR734 12020  | 12 | 2   | 30   | 110 | 12      |
| ESR734 10020 | 10 | 2   | 25   | 100 | 10      |               |    |     |      |     |         |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper -Mate

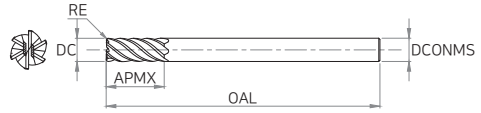
Gra -Mate

## ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

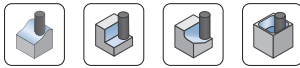
| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESR736 6 Flutes Radius End Mill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



| EDP No       | DC | RE  | APMX | OAL | DCONMS |
|--------------|----|-----|------|-----|--------|
| ESR736 06005 | 6  | 0.5 | 15   | 90  | 6      |
| ESR736 06010 | 6  | 1   | 15   | 90  | 6      |
| ESR736 08005 | 8  | 0.5 | 20   | 100 | 8      |
| ESR736 08010 | 8  | 1   | 20   | 100 | 8      |
| ESR736 10005 | 10 | 0.5 | 25   | 100 | 10     |
| ESR736 10010 | 10 | 1   | 25   | 100 | 10     |
| ESR736 12005 | 12 | 0.5 | 30   | 110 | 12     |
| ESR736 12010 | 12 | 1   | 30   | 110 | 12     |

► Applicable Working Material

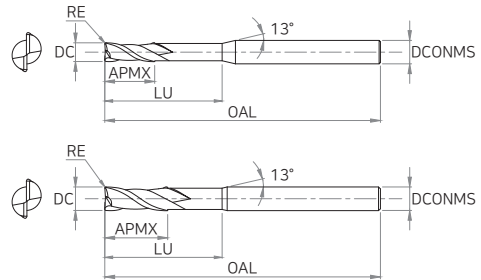
○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

- Endmill
- Zamus Star
- E-Star
- U-Wing
- Zamus Thunder
- X-Star
- S-Wing
- A-Wing
- Standard
- Copper-Mate
- Gra-Mate

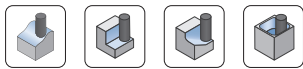
# ESRR712 2 Flutes Rib Radius End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø16 | 0 ~ -0.015 |           |



| EDP No            | DC  | RE   | APMX | LU  | OAL | DCON MS | EDP No            | DC  | RE   | APMX | LU  | OAL | DCON MS |
|-------------------|-----|------|------|-----|-----|---------|-------------------|-----|------|------|-----|-----|---------|
| ESRR712 002002005 | 0.2 | 0.02 | 0.2  | 0.5 | 40  | 4       | ESRR712 00401001  | 0.4 | 0.1  | 0.4  | 1   | 40  | 4       |
| ESRR712 00200201  | 0.2 | 0.02 | 0.2  | 1   | 40  | 4       | ESRR712 004010015 | 0.4 | 0.1  | 0.4  | 1.5 | 40  | 4       |
| ESRR712 002002015 | 0.2 | 0.02 | 0.2  | 1.5 | 40  | 4       | ESRR712 00401002  | 0.4 | 0.1  | 0.4  | 2   | 40  | 4       |
| ESRR712 002005005 | 0.2 | 0.05 | 0.2  | 0.5 | 40  | 4       | ESRR712 00401003  | 0.4 | 0.1  | 0.4  | 3   | 40  | 4       |
| ESRR712 00200501  | 0.2 | 0.05 | 0.2  | 1   | 40  | 4       | ESRR712 00401004  | 0.4 | 0.1  | 0.4  | 4   | 40  | 4       |
| ESRR712 002005015 | 0.2 | 0.05 | 0.2  | 1.5 | 40  | 4       | ESRR712 00500201  | 0.5 | 0.02 | 0.5  | 1   | 45  | 4       |
| ESRR712 00300201  | 0.3 | 0.02 | 0.3  | 1   | 40  | 4       | ESRR712 005002015 | 0.5 | 0.02 | 0.5  | 1.5 | 45  | 4       |
| ESRR712 00300202  | 0.3 | 0.02 | 0.3  | 2   | 40  | 4       | ESRR712 00500202  | 0.5 | 0.02 | 0.5  | 2   | 45  | 4       |
| ESRR712 00300203  | 0.3 | 0.02 | 0.3  | 3   | 40  | 4       | ESRR712 005002025 | 0.5 | 0.02 | 0.5  | 2.5 | 45  | 4       |
| ESRR712 00300501  | 0.3 | 0.05 | 0.3  | 1   | 40  | 4       | ESRR712 00500203  | 0.5 | 0.02 | 0.5  | 3   | 45  | 4       |
| ESRR712 00300502  | 0.3 | 0.05 | 0.3  | 2   | 40  | 4       | ESRR712 00500204  | 0.5 | 0.02 | 0.5  | 4   | 45  | 4       |
| ESRR712 00300503  | 0.3 | 0.05 | 0.3  | 3   | 40  | 4       | ESRR712 00500205  | 0.5 | 0.02 | 0.5  | 5   | 45  | 4       |
| ESRR712 00400201  | 0.4 | 0.02 | 0.4  | 1   | 40  | 4       | ESRR712 00500206  | 0.5 | 0.02 | 0.5  | 6   | 45  | 4       |
| ESRR712 00400202  | 0.4 | 0.02 | 0.4  | 2   | 40  | 4       | ESRR712 00500208  | 0.5 | 0.02 | 0.5  | 8   | 45  | 4       |
| ESRR712 00400203  | 0.4 | 0.02 | 0.4  | 3   | 40  | 4       | ESRR712 00500210  | 0.5 | 0.02 | 0.5  | 10  | 45  | 4       |
| ESRR712 00400204  | 0.4 | 0.02 | 0.4  | 4   | 40  | 4       | ESRR712 00500501  | 0.5 | 0.05 | 0.5  | 1   | 45  | 4       |
| ESRR712 00400501  | 0.4 | 0.05 | 0.4  | 1   | 40  | 4       | ESRR712 005005015 | 0.5 | 0.05 | 0.5  | 1.5 | 45  | 4       |
| ESRR712 00400502  | 0.4 | 0.05 | 0.4  | 2   | 40  | 4       | ESRR712 00500502  | 0.5 | 0.05 | 0.5  | 2   | 45  | 4       |
| ESRR712 00400503  | 0.4 | 0.05 | 0.4  | 3   | 40  | 4       | ESRR712 005005025 | 0.5 | 0.05 | 0.5  | 2.5 | 45  | 4       |
| ESRR712 00400504  | 0.4 | 0.05 | 0.4  | 4   | 40  | 4       | ESRR712 00500503  | 0.5 | 0.05 | 0.5  | 3   | 45  | 4       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESRR712 2 Flutes Rib Radius End Mill

Endmill

| EDP No            | DC  | RE   | APMX | LU  | OAL | DCON MS | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS |
|-------------------|-----|------|------|-----|-----|---------|------------------|-----|------|------|----|-----|---------|
| ESRR712 00500504  | 0.5 | 0.05 | 0.5  | 4   | 45  | 4       | ESRR712 00601010 | 0.6 | 0.1  | 0.6  | 10 | 45  | 4       |
| ESRR712 00500505  | 0.5 | 0.05 | 0.5  | 5   | 45  | 4       | ESRR712 00601012 | 0.6 | 0.1  | 0.6  | 12 | 50  | 4       |
| ESRR712 00500506  | 0.5 | 0.05 | 0.5  | 6   | 45  | 4       | ESRR712 00701002 | 0.7 | 0.1  | 0.7  | 2  | 45  | 4       |
| ESRR712 00500508  | 0.5 | 0.05 | 0.5  | 8   | 45  | 4       | ESRR712 00701004 | 0.7 | 0.1  | 0.7  | 4  | 45  | 4       |
| ESRR712 00500510  | 0.5 | 0.05 | 0.5  | 10  | 45  | 4       | ESRR712 00701008 | 0.7 | 0.1  | 0.7  | 8  | 45  | 4       |
| ESRR712 00501001  | 0.5 | 0.1  | 0.5  | 1   | 45  | 4       | ESRR712 00701010 | 0.7 | 0.1  | 0.7  | 10 | 45  | 4       |
| ESRR712 005010015 | 0.5 | 0.1  | 0.5  | 1.5 | 45  | 4       | ESRR712 00800202 | 0.8 | 0.02 | 0.8  | 2  | 45  | 4       |
| ESRR712 00501002  | 0.5 | 0.1  | 0.5  | 2   | 45  | 4       | ESRR712 00800204 | 0.8 | 0.02 | 0.8  | 4  | 45  | 4       |
| ESRR712 005010025 | 0.5 | 0.1  | 0.5  | 2.5 | 45  | 4       | ESRR712 00800206 | 0.8 | 0.02 | 0.8  | 6  | 45  | 4       |
| ESRR712 00501003  | 0.5 | 0.1  | 0.5  | 3   | 45  | 4       | ESRR712 00800208 | 0.8 | 0.02 | 0.8  | 8  | 45  | 4       |
| ESRR712 00501004  | 0.5 | 0.1  | 0.5  | 4   | 45  | 4       | ESRR712 00800210 | 0.8 | 0.02 | 0.8  | 10 | 45  | 4       |
| ESRR712 00501005  | 0.5 | 0.1  | 0.5  | 5   | 45  | 4       | ESRR712 00800212 | 0.8 | 0.02 | 0.8  | 12 | 50  | 4       |
| ESRR712 00501006  | 0.5 | 0.1  | 0.5  | 6   | 45  | 4       | ESRR712 00800502 | 0.8 | 0.05 | 0.8  | 2  | 45  | 4       |
| ESRR712 00501008  | 0.5 | 0.1  | 0.5  | 8   | 45  | 4       | ESRR712 00800504 | 0.8 | 0.05 | 0.8  | 4  | 45  | 4       |
| ESRR712 00501010  | 0.5 | 0.1  | 0.5  | 10  | 45  | 4       | ESRR712 00800506 | 0.8 | 0.05 | 0.8  | 6  | 45  | 4       |
| ESRR712 00600202  | 0.6 | 0.02 | 0.6  | 2   | 45  | 4       | ESRR712 00800508 | 0.8 | 0.05 | 0.8  | 8  | 45  | 4       |
| ESRR712 00600203  | 0.6 | 0.02 | 0.6  | 3   | 45  | 4       | ESRR712 00800510 | 0.8 | 0.05 | 0.8  | 10 | 45  | 4       |
| ESRR712 00600204  | 0.6 | 0.02 | 0.6  | 4   | 45  | 4       | ESRR712 00800512 | 0.8 | 0.05 | 0.8  | 12 | 50  | 4       |
| ESRR712 00600206  | 0.6 | 0.02 | 0.6  | 6   | 45  | 4       | ESRR712 00801002 | 0.8 | 0.1  | 0.8  | 2  | 45  | 4       |
| ESRR712 00600208  | 0.6 | 0.02 | 0.6  | 8   | 45  | 4       | ESRR712 00801004 | 0.8 | 0.1  | 0.8  | 4  | 45  | 4       |
| ESRR712 00600210  | 0.6 | 0.02 | 0.6  | 10  | 45  | 4       | ESRR712 00801006 | 0.8 | 0.1  | 0.8  | 6  | 45  | 4       |
| ESRR712 00600212  | 0.6 | 0.02 | 0.6  | 12  | 50  | 4       | ESRR712 00801008 | 0.8 | 0.1  | 0.8  | 8  | 45  | 4       |
| ESRR712 00600502  | 0.6 | 0.05 | 0.6  | 2   | 45  | 4       | ESRR712 00801010 | 0.8 | 0.1  | 0.8  | 10 | 45  | 4       |
| ESRR712 00600503  | 0.6 | 0.05 | 0.6  | 3   | 45  | 4       | ESRR712 00801012 | 0.8 | 0.1  | 0.8  | 12 | 50  | 4       |
| ESRR712 00600504  | 0.6 | 0.05 | 0.6  | 4   | 45  | 4       | ESRR712 00802002 | 0.8 | 0.2  | 0.8  | 2  | 45  | 4       |
| ESRR712 00600506  | 0.6 | 0.05 | 0.6  | 6   | 45  | 4       | ESRR712 00802004 | 0.8 | 0.2  | 0.8  | 4  | 45  | 4       |
| ESRR712 00600508  | 0.6 | 0.05 | 0.6  | 8   | 45  | 4       | ESRR712 00802006 | 0.8 | 0.2  | 0.8  | 6  | 45  | 4       |
| ESRR712 00600510  | 0.6 | 0.05 | 0.6  | 10  | 45  | 4       | ESRR712 00802008 | 0.8 | 0.2  | 0.8  | 8  | 45  | 4       |
| ESRR712 00600512  | 0.6 | 0.05 | 0.6  | 12  | 50  | 4       | ESRR712 00802010 | 0.8 | 0.2  | 0.8  | 10 | 45  | 4       |
| ESRR712 00601002  | 0.6 | 0.1  | 0.6  | 2   | 45  | 4       | ESRR712 00802012 | 0.8 | 0.2  | 0.8  | 12 | 50  | 4       |
| ESRR712 00601003  | 0.6 | 0.1  | 0.6  | 3   | 45  | 4       | ESRR712 01000204 | 1   | 0.02 | 1    | 4  | 45  | 4       |
| ESRR712 00601004  | 0.6 | 0.1  | 0.6  | 4   | 45  | 4       | ESRR712 01000206 | 1   | 0.02 | 1    | 6  | 45  | 4       |
| ESRR712 00601006  | 0.6 | 0.1  | 0.6  | 6   | 45  | 4       | ESRR712 01000208 | 1   | 0.02 | 1    | 8  | 45  | 4       |
| ESRR712 00601008  | 0.6 | 0.1  | 0.6  | 8   | 45  | 4       | ESRR712 01000210 | 1   | 0.02 | 1    | 10 | 50  | 4       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRR712 2 Flutes Rib Radius End Mill

Endmill

|               | EDP No           | DC | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS |
|---------------|------------------|----|------|------|----|-----|---------|------------------|-----|------|------|----|-----|---------|
|               | ESRR712 01000212 | 1  | 0.02 | 1    | 12 | 50  | 4       | ESRR712 01003016 | 1   | 0.3  | 1    | 16 | 50  | 4       |
|               | ESRR712 01000214 | 1  | 0.02 | 1    | 14 | 50  | 4       | ESRR712 01003020 | 1   | 0.3  | 1    | 20 | 50  | 4       |
| Zamus Star    | ESRR712 01000216 | 1  | 0.02 | 1    | 16 | 50  | 4       | ESRR712 01200204 | 1.2 | 0.02 | 1.2  | 4  | 45  | 4       |
|               | ESRR712 01000220 | 1  | 0.02 | 1    | 20 | 50  | 4       | ESRR712 01200206 | 1.2 | 0.02 | 1.2  | 6  | 45  | 4       |
| E-Star        | ESRR712 01000504 | 1  | 0.05 | 1    | 4  | 45  | 4       | ESRR712 01200208 | 1.2 | 0.02 | 1.2  | 8  | 45  | 4       |
|               | ESRR712 01000506 | 1  | 0.05 | 1    | 6  | 45  | 4       | ESRR712 01200210 | 1.2 | 0.02 | 1.2  | 10 | 50  | 4       |
| U-Wing        | ESRR712 01000508 | 1  | 0.05 | 1    | 8  | 45  | 4       | ESRR712 01200212 | 1.2 | 0.02 | 1.2  | 12 | 50  | 4       |
|               | ESRR712 01000510 | 1  | 0.05 | 1    | 10 | 50  | 4       | ESRR712 01200214 | 1.2 | 0.02 | 1.2  | 14 | 50  | 4       |
| Zamus Thunder | ESRR712 01000512 | 1  | 0.05 | 1    | 12 | 50  | 4       | ESRR712 01200216 | 1.2 | 0.02 | 1.2  | 16 | 50  | 4       |
|               | ESRR712 01000514 | 1  | 0.05 | 1    | 14 | 50  | 4       | ESRR712 01200220 | 1.2 | 0.02 | 1.2  | 20 | 50  | 4       |
| X-Star        | ESRR712 01000516 | 1  | 0.05 | 1    | 16 | 50  | 4       | ESRR712 01200504 | 1.2 | 0.05 | 1.2  | 4  | 45  | 4       |
|               | ESRR712 01000520 | 1  | 0.05 | 1    | 20 | 50  | 4       | ESRR712 01200506 | 1.2 | 0.05 | 1.2  | 6  | 45  | 4       |
| S-Wing        | ESRR712 01001004 | 1  | 0.1  | 1    | 4  | 45  | 4       | ESRR712 01200508 | 1.2 | 0.05 | 1.2  | 8  | 45  | 4       |
|               | ESRR712 01001006 | 1  | 0.1  | 1    | 6  | 45  | 4       | ESRR712 01200510 | 1.2 | 0.05 | 1.2  | 10 | 50  | 4       |
| A-Wing        | ESRR712 01001008 | 1  | 0.1  | 1    | 8  | 45  | 4       | ESRR712 01200512 | 1.2 | 0.05 | 1.2  | 12 | 50  | 4       |
|               | ESRR712 01001010 | 1  | 0.1  | 1    | 10 | 50  | 4       | ESRR712 01200514 | 1.2 | 0.05 | 1.2  | 14 | 50  | 4       |
| Standard      | ESRR712 01001012 | 1  | 0.1  | 1    | 12 | 50  | 4       | ESRR712 01200516 | 1.2 | 0.05 | 1.2  | 16 | 50  | 4       |
|               | ESRR712 01001014 | 1  | 0.1  | 1    | 14 | 50  | 4       | ESRR712 01200520 | 1.2 | 0.05 | 1.2  | 20 | 50  | 4       |
| Copper-Mate   | ESRR712 01001016 | 1  | 0.1  | 1    | 16 | 50  | 4       | ESRR712 01201004 | 1.2 | 0.1  | 1.2  | 4  | 45  | 4       |
|               | ESRR712 01001020 | 1  | 0.1  | 1    | 20 | 50  | 4       | ESRR712 01201006 | 1.2 | 0.1  | 1.2  | 6  | 45  | 4       |
| Gra-Mate      | ESRR712 01002004 | 1  | 0.2  | 1    | 4  | 45  | 4       | ESRR712 01201008 | 1.2 | 0.1  | 1.2  | 8  | 45  | 4       |
|               | ESRR712 01002006 | 1  | 0.2  | 1    | 6  | 45  | 4       | ESRR712 01201010 | 1.2 | 0.1  | 1.2  | 10 | 50  | 4       |
|               | ESRR712 01002008 | 1  | 0.2  | 1    | 8  | 45  | 4       | ESRR712 01201012 | 1.2 | 0.1  | 1.2  | 12 | 50  | 4       |
|               | ESRR712 01002010 | 1  | 0.2  | 1    | 10 | 50  | 4       | ESRR712 01201014 | 1.2 | 0.1  | 1.2  | 14 | 50  | 4       |
|               | ESRR712 01002012 | 1  | 0.2  | 1    | 12 | 50  | 4       | ESRR712 01201016 | 1.2 | 0.1  | 1.2  | 16 | 50  | 4       |
|               | ESRR712 01002014 | 1  | 0.2  | 1    | 14 | 50  | 4       | ESRR712 01201020 | 1.2 | 0.1  | 1.2  | 20 | 50  | 4       |
|               | ESRR712 01002016 | 1  | 0.2  | 1    | 16 | 50  | 4       | ESRR712 01202004 | 1.2 | 0.2  | 1.2  | 4  | 45  | 4       |
|               | ESRR712 01002020 | 1  | 0.2  | 1    | 20 | 50  | 4       | ESRR712 01202006 | 1.2 | 0.2  | 1.2  | 6  | 45  | 4       |
|               | ESRR712 01003004 | 1  | 0.3  | 1    | 4  | 45  | 4       | ESRR712 01202008 | 1.2 | 0.2  | 1.2  | 8  | 45  | 4       |
|               | ESRR712 01003006 | 1  | 0.3  | 1    | 6  | 45  | 4       | ESRR712 01202010 | 1.2 | 0.2  | 1.2  | 10 | 50  | 4       |
|               | ESRR712 01003008 | 1  | 0.3  | 1    | 8  | 45  | 4       | ESRR712 01202012 | 1.2 | 0.2  | 1.2  | 12 | 50  | 4       |
|               | ESRR712 01003010 | 1  | 0.3  | 1    | 10 | 50  | 4       | ESRR712 01202014 | 1.2 | 0.2  | 1.2  | 14 | 50  | 4       |
|               | ESRR712 01003012 | 1  | 0.3  | 1    | 12 | 50  | 4       | ESRR712 01202016 | 1.2 | 0.2  | 1.2  | 16 | 50  | 4       |
|               | ESRR712 01003014 | 1  | 0.3  | 1    | 14 | 50  | 4       | ESRR712 01202020 | 1.2 | 0.2  | 1.2  | 20 | 50  | 4       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P                 |                        |                            | K                 | N      |          |          | M               | S                    |
|----------------|--------------|-------------------|------------------------|----------------------------|-------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel      | Alloy Steel            | Prehardened Steel          | Cast Iron ~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | Steel ~HB225 ~325 | Alloy Steel HB225 ~325 | Prehardened Steel HRC30~50 |                   |        |          |          |                 |                      |
| ◎              | ○            |                   | ○                      | ◎                          |                   |        |          |          |                 |                      |

# ESRR712 2 Flutes Rib Radius End Mill

Endmill

| EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS |
|------------------|-----|------|------|----|-----|---------|------------------|-----|------|------|----|-----|---------|
| ESRR712 01203004 | 1.2 | 0.3  | 1.2  | 4  | 45  | 4       | ESRR712 01502008 | 1.5 | 0.2  | 1.5  | 8  | 45  | 4       |
| ESRR712 01203006 | 1.2 | 0.3  | 1.2  | 6  | 45  | 4       | ESRR712 01502010 | 1.5 | 0.2  | 1.5  | 10 | 50  | 4       |
| ESRR712 01203008 | 1.2 | 0.3  | 1.2  | 8  | 45  | 4       | ESRR712 01502012 | 1.5 | 0.2  | 1.5  | 12 | 50  | 4       |
| ESRR712 01203010 | 1.2 | 0.3  | 1.2  | 10 | 50  | 4       | ESRR712 01502014 | 1.5 | 0.2  | 1.5  | 14 | 50  | 4       |
| ESRR712 01203012 | 1.2 | 0.3  | 1.2  | 12 | 50  | 4       | ESRR712 01502016 | 1.5 | 0.2  | 1.5  | 16 | 50  | 4       |
| ESRR712 01203014 | 1.2 | 0.3  | 1.2  | 14 | 50  | 4       | ESRR712 01502020 | 1.5 | 0.2  | 1.5  | 20 | 50  | 4       |
| ESRR712 01203016 | 1.2 | 0.3  | 1.2  | 16 | 50  | 4       | ESRR712 01503004 | 1.5 | 0.3  | 1.5  | 4  | 45  | 4       |
| ESRR712 01203020 | 1.2 | 0.3  | 1.2  | 20 | 50  | 4       | ESRR712 01503006 | 1.5 | 0.3  | 1.5  | 6  | 45  | 4       |
| ESRR712 01500204 | 1.5 | 0.02 | 1.5  | 4  | 45  | 4       | ESRR712 01503008 | 1.5 | 0.3  | 1.5  | 8  | 45  | 4       |
| ESRR712 01500206 | 1.5 | 0.02 | 1.5  | 6  | 45  | 4       | ESRR712 01503010 | 1.5 | 0.3  | 1.5  | 10 | 50  | 4       |
| ESRR712 01500208 | 1.5 | 0.02 | 1.5  | 8  | 45  | 4       | ESRR712 01503012 | 1.5 | 0.3  | 1.5  | 12 | 50  | 4       |
| ESRR712 01500210 | 1.5 | 0.02 | 1.5  | 10 | 50  | 4       | ESRR712 01503014 | 1.5 | 0.3  | 1.5  | 14 | 50  | 4       |
| ESRR712 01500212 | 1.5 | 0.02 | 1.5  | 12 | 50  | 4       | ESRR712 01503016 | 1.5 | 0.3  | 1.5  | 16 | 50  | 4       |
| ESRR712 01500214 | 1.5 | 0.02 | 1.5  | 14 | 50  | 4       | ESRR712 01503020 | 1.5 | 0.3  | 1.5  | 20 | 50  | 4       |
| ESRR712 01500216 | 1.5 | 0.02 | 1.5  | 16 | 50  | 4       | ESRR712 01505004 | 1.5 | 0.5  | 1.5  | 4  | 45  | 4       |
| ESRR712 01500220 | 1.5 | 0.02 | 1.5  | 20 | 50  | 4       | ESRR712 01505006 | 1.5 | 0.5  | 1.5  | 6  | 45  | 4       |
| ESRR712 01500504 | 1.5 | 0.05 | 1.5  | 4  | 45  | 4       | ESRR712 01505008 | 1.5 | 0.5  | 1.5  | 8  | 45  | 4       |
| ESRR712 01500506 | 1.5 | 0.05 | 1.5  | 6  | 45  | 4       | ESRR712 01505010 | 1.5 | 0.5  | 1.5  | 10 | 50  | 4       |
| ESRR712 01500508 | 1.5 | 0.05 | 1.5  | 8  | 45  | 4       | ESRR712 01505012 | 1.5 | 0.5  | 1.5  | 12 | 50  | 4       |
| ESRR712 01500510 | 1.5 | 0.05 | 1.5  | 10 | 50  | 4       | ESRR712 01505014 | 1.5 | 0.5  | 1.5  | 14 | 50  | 4       |
| ESRR712 01500512 | 1.5 | 0.05 | 1.5  | 12 | 50  | 4       | ESRR712 01505016 | 1.5 | 0.5  | 1.5  | 16 | 50  | 4       |
| ESRR712 01500514 | 1.5 | 0.05 | 1.5  | 14 | 50  | 4       | ESRR712 01505020 | 1.5 | 0.5  | 1.5  | 20 | 50  | 4       |
| ESRR712 01500516 | 1.5 | 0.05 | 1.5  | 16 | 50  | 4       | ESRR712 02000206 | 2   | 0.02 | 2    | 6  | 45  | 4       |
| ESRR712 01500520 | 1.5 | 0.05 | 1.5  | 20 | 50  | 4       | ESRR712 02000208 | 2   | 0.02 | 2    | 8  | 45  | 4       |
| ESRR712 01501004 | 1.5 | 0.1  | 1.5  | 4  | 45  | 4       | ESRR712 02000210 | 2   | 0.02 | 2    | 10 | 50  | 4       |
| ESRR712 01501006 | 1.5 | 0.1  | 1.5  | 6  | 45  | 4       | ESRR712 02000212 | 2   | 0.02 | 2    | 12 | 50  | 4       |
| ESRR712 01501008 | 1.5 | 0.1  | 1.5  | 8  | 45  | 4       | ESRR712 02000214 | 2   | 0.02 | 2    | 14 | 50  | 4       |
| ESRR712 01501010 | 1.5 | 0.1  | 1.5  | 10 | 50  | 4       | ESRR712 02000216 | 2   | 0.02 | 2    | 16 | 50  | 4       |
| ESRR712 01501012 | 1.5 | 0.1  | 1.5  | 12 | 50  | 4       | ESRR712 02000220 | 2   | 0.02 | 2    | 20 | 50  | 4       |
| ESRR712 01501014 | 1.5 | 0.1  | 1.5  | 14 | 50  | 4       | ESRR712 02000225 | 2   | 0.02 | 2    | 25 | 60  | 4       |
| ESRR712 01501016 | 1.5 | 0.1  | 1.5  | 16 | 50  | 4       | ESRR712 02000506 | 2   | 0.05 | 2    | 6  | 45  | 4       |
| ESRR712 01501020 | 1.5 | 0.1  | 1.5  | 20 | 50  | 4       | ESRR712 02000508 | 2   | 0.05 | 2    | 8  | 45  | 4       |
| ESRR712 01502004 | 1.5 | 0.2  | 1.5  | 4  | 45  | 4       | ESRR712 02000510 | 2   | 0.05 | 2    | 10 | 50  | 4       |
| ESRR712 01502006 | 1.5 | 0.2  | 1.5  | 6  | 45  | 4       | ESRR712 02000512 | 2   | 0.05 | 2    | 12 | 50  | 4       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRR712 2 Flutes Rib Radius End Mill

Endmill

|               | EDP No           | DC | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC  | RE  | APMX | LU | OAL | DCON MS |
|---------------|------------------|----|------|------|----|-----|---------|------------------|-----|-----|------|----|-----|---------|
|               | ESRR712 02000514 | 2  | 0.05 | 2    | 14 | 50  | 4       | ESRR712 02005012 | 2   | 0.5 | 2    | 12 | 50  | 4       |
|               | ESRR712 02000516 | 2  | 0.05 | 2    | 16 | 50  | 4       | ESRR712 02005014 | 2   | 0.5 | 2    | 14 | 50  | 4       |
| Zamus Star    | ESRR712 02000520 | 2  | 0.05 | 2    | 20 | 50  | 4       | ESRR712 02005016 | 2   | 0.5 | 2    | 16 | 50  | 4       |
|               | ESRR712 02000525 | 2  | 0.05 | 2    | 25 | 60  | 4       | ESRR712 02005020 | 2   | 0.5 | 2    | 20 | 50  | 4       |
|               | ESRR712 02001006 | 2  | 0.1  | 2    | 6  | 45  | 4       | ESRR712 02005025 | 2   | 0.5 | 2    | 25 | 60  | 4       |
| E-Star        | ESRR712 02001008 | 2  | 0.1  | 2    | 8  | 45  | 4       | ESRR712 02005030 | 2   | 0.5 | 2    | 30 | 70  | 4       |
|               | ESRR712 02001010 | 2  | 0.1  | 2    | 10 | 50  | 4       | ESRR712 02501010 | 2.5 | 0.1 | 2.5  | 10 | 50  | 4       |
|               | ESRR712 02001012 | 2  | 0.1  | 2    | 12 | 50  | 4       | ESRR712 02501016 | 2.5 | 0.1 | 2.5  | 16 | 50  | 4       |
|               | ESRR712 02001014 | 2  | 0.1  | 2    | 14 | 50  | 4       | ESRR712 02501020 | 2.5 | 0.1 | 2.5  | 20 | 50  | 4       |
| U-Wing        | ESRR712 02001016 | 2  | 0.1  | 2    | 16 | 50  | 4       | ESRR712 02501025 | 2.5 | 0.1 | 2.5  | 25 | 60  | 4       |
|               | ESRR712 02001020 | 2  | 0.1  | 2    | 20 | 50  | 4       | ESRR712 02501030 | 2.5 | 0.1 | 2.5  | 30 | 70  | 4       |
|               | ESRR712 02001025 | 2  | 0.1  | 2    | 25 | 60  | 4       | ESRR712 02502010 | 2.5 | 0.2 | 2.5  | 10 | 50  | 4       |
|               | ESRR712 02001030 | 2  | 0.1  | 2    | 30 | 70  | 4       | ESRR712 02502016 | 2.5 | 0.2 | 2.5  | 16 | 50  | 4       |
| Zamus Thunder | ESRR712 02002006 | 2  | 0.2  | 2    | 6  | 45  | 4       | ESRR712 02502020 | 2.5 | 0.2 | 2.5  | 20 | 50  | 4       |
|               | ESRR712 02002008 | 2  | 0.2  | 2    | 8  | 45  | 4       | ESRR712 02503010 | 2.5 | 0.3 | 2.5  | 10 | 50  | 4       |
|               | ESRR712 02002010 | 2  | 0.2  | 2    | 10 | 50  | 4       | ESRR712 02503016 | 2.5 | 0.3 | 2.5  | 16 | 50  | 4       |
| X-Star        | ESRR712 02002012 | 2  | 0.2  | 2    | 12 | 50  | 4       | ESRR712 02503020 | 2.5 | 0.3 | 2.5  | 20 | 50  | 4       |
|               | ESRR712 02002014 | 2  | 0.2  | 2    | 14 | 50  | 4       | ESRR712 02505010 | 2.5 | 0.5 | 2.5  | 10 | 50  | 4       |
|               | ESRR712 02002016 | 2  | 0.2  | 2    | 16 | 50  | 4       | ESRR712 02505016 | 2.5 | 0.5 | 2.5  | 16 | 50  | 4       |
| S-Wing        | ESRR712 02002020 | 2  | 0.2  | 2    | 20 | 50  | 4       | ESRR712 02505020 | 2.5 | 0.5 | 2.5  | 20 | 50  | 4       |
|               | ESRR712 02002025 | 2  | 0.2  | 2    | 25 | 60  | 4       | ESRR712 03001010 | 3   | 0.1 | 3    | 10 | 50  | 6       |
|               | ESRR712 02002030 | 2  | 0.2  | 2    | 30 | 70  | 4       | ESRR712 03001012 | 3   | 0.1 | 3    | 12 | 50  | 6       |
| A-Wing        | ESRR712 02003006 | 2  | 0.3  | 2    | 6  | 45  | 4       | ESRR712 03001016 | 3   | 0.1 | 3    | 16 | 55  | 6       |
|               | ESRR712 02003008 | 2  | 0.3  | 2    | 8  | 45  | 4       | ESRR712 03001020 | 3   | 0.1 | 3    | 20 | 60  | 6       |
|               | ESRR712 02003010 | 2  | 0.3  | 2    | 10 | 50  | 4       | ESRR712 03001025 | 3   | 0.1 | 3    | 25 | 65  | 6       |
|               | ESRR712 02003012 | 2  | 0.3  | 2    | 12 | 50  | 4       | ESRR712 03001030 | 3   | 0.1 | 3    | 30 | 70  | 6       |
| Standard      | ESRR712 02003014 | 2  | 0.3  | 2    | 14 | 50  | 4       | ESRR712 03001035 | 3   | 0.1 | 3    | 35 | 75  | 6       |
|               | ESRR712 02003016 | 2  | 0.3  | 2    | 16 | 50  | 4       | ESRR712 03001040 | 3   | 0.1 | 3    | 40 | 80  | 6       |
|               | ESRR712 02003020 | 2  | 0.3  | 2    | 20 | 50  | 4       | ESRR712 03002010 | 3   | 0.2 | 3    | 10 | 50  | 6       |
| Copper-Mate   | ESRR712 02003025 | 2  | 0.3  | 2    | 25 | 60  | 4       | ESRR712 03002012 | 3   | 0.2 | 3    | 12 | 50  | 6       |
|               | ESRR712 02003030 | 2  | 0.3  | 2    | 30 | 70  | 4       | ESRR712 03002016 | 3   | 0.2 | 3    | 16 | 55  | 6       |
|               | ESRR712 02005006 | 2  | 0.5  | 2    | 6  | 45  | 4       | ESRR712 03002020 | 3   | 0.2 | 3    | 20 | 60  | 6       |
| Gra-Mate      | ESRR712 02005008 | 2  | 0.5  | 2    | 8  | 45  | 4       | ESRR712 03002025 | 3   | 0.2 | 3    | 25 | 65  | 6       |
|               | ESRR712 02005010 | 2  | 0.5  | 2    | 10 | 50  | 4       | ESRR712 03002030 | 3   | 0.2 | 3    | 30 | 70  | 6       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |                              |                                  | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|------------------------------|----------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel                  | Prehardened Steel                | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened<br>Steel<br>HRc30~50 |                      |        |          |          |                 |                      |
| ◎               | ○               |                 | ○                            | ◎                                |                      |        |          |          |                 |                      |

# ESRR712 2 Flutes Rib Radius End Mill

Endmill

| EDP No           | DC | RE  | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|------------------|----|-----|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
| ESRR712 03002035 | 3  | 0.2 | 3    | 35 | 75  | 6       | ESRR712 04002016 | 4  | 0.2 | 4    | 16 | 55  | 6       |
| ESRR712 03002040 | 3  | 0.2 | 3    | 40 | 80  | 6       | ESRR712 04002020 | 4  | 0.2 | 4    | 20 | 60  | 6       |
| ESRR712 03003010 | 3  | 0.3 | 3    | 10 | 50  | 6       | ESRR712 04002025 | 4  | 0.2 | 4    | 25 | 65  | 6       |
| ESRR712 03003012 | 3  | 0.3 | 3    | 12 | 50  | 6       | ESRR712 04002030 | 4  | 0.2 | 4    | 30 | 70  | 6       |
| ESRR712 03003016 | 3  | 0.3 | 3    | 16 | 55  | 6       | ESRR712 04002035 | 4  | 0.2 | 4    | 35 | 75  | 6       |
| ESRR712 03003020 | 3  | 0.3 | 3    | 20 | 60  | 6       | ESRR712 04002040 | 4  | 0.2 | 4    | 40 | 80  | 6       |
| ESRR712 03003025 | 3  | 0.3 | 3    | 25 | 65  | 6       | ESRR712 04003012 | 4  | 0.3 | 4    | 12 | 50  | 6       |
| ESRR712 03003030 | 3  | 0.3 | 3    | 30 | 70  | 6       | ESRR712 04003016 | 4  | 0.3 | 4    | 16 | 55  | 6       |
| ESRR712 03003035 | 3  | 0.3 | 3    | 35 | 75  | 6       | ESRR712 04003020 | 4  | 0.3 | 4    | 20 | 60  | 6       |
| ESRR712 03003040 | 3  | 0.3 | 3    | 40 | 80  | 6       | ESRR712 04003025 | 4  | 0.3 | 4    | 25 | 65  | 6       |
| ESRR712 03005010 | 3  | 0.5 | 3    | 10 | 50  | 6       | ESRR712 04003030 | 4  | 0.3 | 4    | 30 | 70  | 6       |
| ESRR712 03005012 | 3  | 0.5 | 3    | 12 | 50  | 6       | ESRR712 04003035 | 4  | 0.3 | 4    | 35 | 75  | 6       |
| ESRR712 03005016 | 3  | 0.5 | 3    | 16 | 55  | 6       | ESRR712 04003040 | 4  | 0.3 | 4    | 40 | 80  | 6       |
| ESRR712 03005020 | 3  | 0.5 | 3    | 20 | 60  | 6       | ESRR712 04005012 | 4  | 0.5 | 4    | 12 | 50  | 6       |
| ESRR712 03005025 | 3  | 0.5 | 3    | 25 | 65  | 6       | ESRR712 04005016 | 4  | 0.5 | 4    | 16 | 55  | 6       |
| ESRR712 03005030 | 3  | 0.5 | 3    | 30 | 70  | 6       | ESRR712 04005020 | 4  | 0.5 | 4    | 20 | 60  | 6       |
| ESRR712 03005035 | 3  | 0.5 | 3    | 35 | 75  | 6       | ESRR712 04005025 | 4  | 0.5 | 4    | 25 | 65  | 6       |
| ESRR712 03005040 | 3  | 0.5 | 3    | 40 | 80  | 6       | ESRR712 04005030 | 4  | 0.5 | 4    | 30 | 70  | 6       |
| ESRR712 03010010 | 3  | 1   | 3    | 10 | 50  | 6       | ESRR712 04005035 | 4  | 0.5 | 4    | 35 | 75  | 6       |
| ESRR712 03010012 | 3  | 1   | 3    | 12 | 50  | 6       | ESRR712 04005040 | 4  | 0.5 | 4    | 40 | 80  | 6       |
| ESRR712 03010016 | 3  | 1   | 3    | 16 | 55  | 6       | ESRR712 04010012 | 4  | 1   | 4    | 12 | 50  | 6       |
| ESRR712 03010020 | 3  | 1   | 3    | 20 | 60  | 6       | ESRR712 04010016 | 4  | 1   | 4    | 16 | 55  | 6       |
| ESRR712 03010025 | 3  | 1   | 3    | 25 | 65  | 6       | ESRR712 04010020 | 4  | 1   | 4    | 20 | 60  | 6       |
| ESRR712 03010030 | 3  | 1   | 3    | 30 | 70  | 6       | ESRR712 04010025 | 4  | 1   | 4    | 25 | 65  | 6       |
| ESRR712 03010035 | 3  | 1   | 3    | 35 | 75  | 6       | ESRR712 04010030 | 4  | 1   | 4    | 30 | 70  | 6       |
| ESRR712 03010040 | 3  | 1   | 3    | 40 | 80  | 6       | ESRR712 04010035 | 4  | 1   | 4    | 35 | 75  | 6       |
| ESRR712 04001012 | 4  | 0.1 | 4    | 12 | 50  | 6       | ESRR712 04010040 | 4  | 1   | 4    | 40 | 80  | 6       |
| ESRR712 04001016 | 4  | 0.1 | 4    | 16 | 55  | 6       | ESRR712 05002015 | 5  | 0.2 | 6    | 15 | 60  | 6       |
| ESRR712 04001020 | 4  | 0.1 | 4    | 20 | 60  | 6       | ESRR712 05002025 | 5  | 0.2 | 6    | 25 | 70  | 6       |
| ESRR712 04001025 | 4  | 0.1 | 4    | 25 | 65  | 6       | ESRR712 05002030 | 5  | 0.2 | 6    | 30 | 70  | 6       |
| ESRR712 04001030 | 4  | 0.1 | 4    | 30 | 70  | 6       | ESRR712 05002040 | 5  | 0.2 | 6    | 40 | 80  | 6       |
| ESRR712 04001035 | 4  | 0.1 | 4    | 35 | 75  | 6       | ESRR712 05005015 | 5  | 0.5 | 6    | 15 | 60  | 6       |
| ESRR712 04001040 | 4  | 0.1 | 4    | 40 | 80  | 6       | ESRR712 05005025 | 5  | 0.5 | 6    | 25 | 70  | 6       |
| ESRR712 04002012 | 4  | 0.2 | 4    | 12 | 50  | 6       | ESRR712 05005030 | 5  | 0.5 | 6    | 30 | 70  | 6       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRR712 2 Flutes Rib Radius End Mill

Endmill

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

| EDP No           | DC | RE  | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|------------------|----|-----|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
| ESRR712 05005040 | 5  | 0.5 | 6    | 40 | 80  | 6       | ESRR712 08005022 | 8  | 0.5 | 9    | 22 | 65  | 8       |
| ESRR712 05010015 | 5  | 1   | 6    | 15 | 60  | 6       | ESRR712 08010022 | 8  | 1   | 9    | 22 | 65  | 8       |
| ESRR712 05010025 | 5  | 1   | 6    | 25 | 70  | 6       | ESRR712 08015022 | 8  | 1.5 | 9    | 22 | 65  | 8       |
| ESRR712 05010030 | 5  | 1   | 6    | 30 | 70  | 6       | ESRR712 10002024 | 10 | 0.2 | 11   | 24 | 70  | 10      |
| ESRR712 05010040 | 5  | 1   | 6    | 40 | 80  | 6       | ESRR712 10003024 | 10 | 0.3 | 11   | 24 | 70  | 10      |
| ESRR712 06001020 | 6  | 0.1 | 7    | 20 | 60  | 6       | ESRR712 10005024 | 10 | 0.5 | 11   | 24 | 70  | 10      |
| ESRR712 06001040 | 6  | 0.1 | 7    | 40 | 80  | 6       | ESRR712 10010024 | 10 | 1   | 11   | 24 | 70  | 10      |
| ESRR712 06002020 | 6  | 0.2 | 7    | 20 | 60  | 6       | ESRR712 10015024 | 10 | 1.5 | 11   | 24 | 70  | 10      |
| ESRR712 06002040 | 6  | 0.2 | 7    | 40 | 80  | 6       | ESRR712 10020024 | 10 | 2   | 11   | 24 | 70  | 10      |
| ESRR712 06003020 | 6  | 0.3 | 7    | 20 | 60  | 6       | ESRR712 12002026 | 12 | 0.2 | 13   | 26 | 80  | 12      |
| ESRR712 06003040 | 6  | 0.3 | 7    | 40 | 80  | 6       | ESRR712 12003026 | 12 | 0.3 | 13   | 26 | 80  | 12      |
| ESRR712 06005020 | 6  | 0.5 | 7    | 20 | 60  | 6       | ESRR712 12005026 | 12 | 0.5 | 13   | 26 | 80  | 12      |
| ESRR712 06005040 | 6  | 0.5 | 7    | 40 | 80  | 6       | ESRR712 12010026 | 12 | 1   | 13   | 26 | 80  | 12      |
| ESRR712 06010020 | 6  | 1   | 7    | 20 | 60  | 6       | ESRR712 12015026 | 12 | 1.5 | 13   | 26 | 80  | 12      |
| ESRR712 06010040 | 6  | 1   | 7    | 40 | 80  | 6       | ESRR712 12020026 | 12 | 2   | 13   | 26 | 80  | 12      |
| ESRR712 06015020 | 6  | 1.5 | 7    | 20 | 60  | 6       | ESRR712 12030026 | 12 | 3   | 13   | 26 | 80  | 12      |
| ESRR712 06015040 | 6  | 1.5 | 7    | 40 | 80  | 6       | ESRR712 16005035 | 16 | 0.5 | 20   | 35 | 110 | 16      |
| ESRR712 08002022 | 8  | 0.2 | 9    | 22 | 65  | 8       | ESRR712 16010035 | 16 | 1   | 20   | 35 | 110 | 16      |
| ESRR712 08003022 | 8  | 0.3 | 9    | 22 | 65  | 8       |                  |    |     |      |    |     |         |

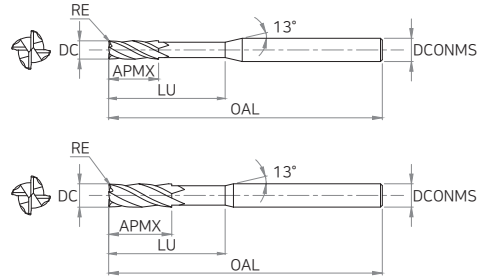
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K         | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRc55   | SKD11 HRc55~ | ~HB225       | HB225 ~325  | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |           |        |          |          |                 |                      |

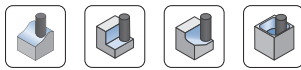
# ESRR714 4 Flutes Rib Radius End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø20 | 0 ~ -0.015 | h5        |



CARBIDE
AITIN
4
30° HELIX
R ±0.01
R ±0.015
DATA P.647

Ø6 OR UNDER      ABOVE Ø6

| EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS |
|------------------|-----|------|------|----|-----|---------|------------------|-----|------|------|----|-----|---------|
| ESRR714 00500502 | 0.5 | 0.05 | 0.5  | 2  | 45  | 4       | ESRR714 00701002 | 0.7 | 0.1  | 0.7  | 2  | 45  | 4       |
| ESRR714 00500504 | 0.5 | 0.05 | 0.5  | 4  | 45  | 4       | ESRR714 00701004 | 0.7 | 0.1  | 0.7  | 4  | 45  | 4       |
| ESRR714 00500506 | 0.5 | 0.05 | 0.5  | 6  | 45  | 4       | ESRR714 00701006 | 0.7 | 0.1  | 0.7  | 6  | 45  | 4       |
| ESRR714 00500508 | 0.5 | 0.05 | 0.5  | 8  | 45  | 4       | ESRR714 00701008 | 0.7 | 0.1  | 0.7  | 8  | 45  | 4       |
| ESRR714 00501002 | 0.5 | 0.1  | 0.5  | 2  | 45  | 4       | ESRR714 00800202 | 0.8 | 0.02 | 0.8  | 2  | 45  | 4       |
| ESRR714 00501004 | 0.5 | 0.1  | 0.5  | 4  | 45  | 4       | ESRR714 00800204 | 0.8 | 0.02 | 0.8  | 4  | 45  | 4       |
| ESRR714 00501006 | 0.5 | 0.1  | 0.5  | 6  | 45  | 4       | ESRR714 00800206 | 0.8 | 0.02 | 0.8  | 6  | 45  | 4       |
| ESRR714 00501008 | 0.5 | 0.1  | 0.5  | 8  | 45  | 4       | ESRR714 00800208 | 0.8 | 0.02 | 0.8  | 8  | 45  | 4       |
| ESRR714 00600502 | 0.6 | 0.05 | 0.6  | 2  | 45  | 4       | ESRR714 00800210 | 0.8 | 0.02 | 0.8  | 10 | 45  | 4       |
| ESRR714 00600504 | 0.6 | 0.05 | 0.6  | 4  | 45  | 4       | ESRR714 00800212 | 0.8 | 0.02 | 0.8  | 12 | 50  | 4       |
| ESRR714 00600506 | 0.6 | 0.05 | 0.6  | 6  | 45  | 4       | ESRR714 00800502 | 0.8 | 0.05 | 0.8  | 2  | 45  | 4       |
| ESRR714 00600508 | 0.6 | 0.05 | 0.6  | 8  | 45  | 4       | ESRR714 00800504 | 0.8 | 0.05 | 0.8  | 4  | 45  | 4       |
| ESRR714 00601002 | 0.6 | 0.1  | 0.6  | 2  | 45  | 4       | ESRR714 00800506 | 0.8 | 0.05 | 0.8  | 6  | 45  | 4       |
| ESRR714 00601004 | 0.6 | 0.1  | 0.6  | 4  | 45  | 4       | ESRR714 00800508 | 0.8 | 0.05 | 0.8  | 8  | 45  | 4       |
| ESRR714 00601006 | 0.6 | 0.1  | 0.6  | 6  | 45  | 4       | ESRR714 00800510 | 0.8 | 0.05 | 0.8  | 10 | 45  | 4       |
| ESRR714 00601008 | 0.6 | 0.1  | 0.6  | 8  | 45  | 4       | ESRR714 00800512 | 0.8 | 0.05 | 0.8  | 12 | 50  | 4       |
| ESRR714 00700502 | 0.7 | 0.05 | 0.7  | 2  | 45  | 4       | ESRR714 00801002 | 0.8 | 0.1  | 0.8  | 2  | 45  | 4       |
| ESRR714 00700504 | 0.7 | 0.05 | 0.7  | 4  | 45  | 4       | ESRR714 00801004 | 0.8 | 0.1  | 0.8  | 4  | 45  | 4       |
| ESRR714 00700506 | 0.7 | 0.05 | 0.7  | 6  | 45  | 4       | ESRR714 00801006 | 0.8 | 0.1  | 0.8  | 6  | 45  | 4       |
| ESRR714 00700508 | 0.7 | 0.05 | 0.7  | 8  | 45  | 4       | ESRR714 00801008 | 0.8 | 0.1  | 0.8  | 8  | 45  | 4       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

# ESRR714 4 Flutes Rib Radius End Mill

Endmill

|               | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS |
|---------------|------------------|-----|------|------|----|-----|---------|------------------|-----|------|------|----|-----|---------|
| Zamus Star    | ESRR714 00801010 | 0.8 | 0.1  | 0.8  | 10 | 45  | 4       | ESRR714 01002014 | 1   | 0.2  | 1    | 14 | 50  | 4       |
|               | ESRR714 00801012 | 0.8 | 0.1  | 0.8  | 12 | 50  | 4       | ESRR714 01002016 | 1   | 0.2  | 1    | 16 | 50  | 4       |
|               | ESRR714 01000204 | 1   | 0.02 | 1    | 4  | 45  | 4       | ESRR714 01002020 | 1   | 0.2  | 1    | 20 | 50  | 4       |
|               | ESRR714 01000206 | 1   | 0.02 | 1    | 6  | 45  | 4       | ESRR714 01003003 | 1   | 0.3  | 1    | 3  | 45  | 4       |
| E-Star        | ESRR714 01000208 | 1   | 0.02 | 1    | 8  | 45  | 4       | ESRR714 01003004 | 1   | 0.3  | 1    | 4  | 45  | 4       |
|               | ESRR714 01000210 | 1   | 0.02 | 1    | 10 | 50  | 4       | ESRR714 01003006 | 1   | 0.3  | 1    | 6  | 45  | 4       |
|               | ESRR714 01000212 | 1   | 0.02 | 1    | 12 | 50  | 4       | ESRR714 01003008 | 1   | 0.3  | 1    | 8  | 45  | 4       |
|               | ESRR714 01000214 | 1   | 0.02 | 1    | 14 | 50  | 4       | ESRR714 01003010 | 1   | 0.3  | 1    | 10 | 50  | 4       |
| U-Wing        | ESRR714 01000216 | 1   | 0.02 | 1    | 16 | 50  | 4       | ESRR714 01003012 | 1   | 0.3  | 1    | 12 | 50  | 4       |
|               | ESRR714 01000220 | 1   | 0.02 | 1    | 20 | 50  | 4       | ESRR714 01003014 | 1   | 0.3  | 1    | 14 | 50  | 4       |
|               | ESRR714 01000503 | 1   | 0.05 | 1    | 3  | 45  | 4       | ESRR714 01003016 | 1   | 0.3  | 1    | 16 | 50  | 4       |
|               | ESRR714 01000504 | 1   | 0.05 | 1    | 4  | 45  | 4       | ESRR714 01003020 | 1   | 0.3  | 1    | 20 | 50  | 4       |
| Zamus Thunder | ESRR714 01000506 | 1   | 0.05 | 1    | 6  | 45  | 4       | ESRR714 01200204 | 1.2 | 0.02 | 1.2  | 4  | 45  | 4       |
|               | ESRR714 01000508 | 1   | 0.05 | 1    | 8  | 45  | 4       | ESRR714 01200206 | 1.2 | 0.02 | 1.2  | 6  | 45  | 4       |
|               | ESRR714 01000510 | 1   | 0.05 | 1    | 10 | 50  | 4       | ESRR714 01200208 | 1.2 | 0.02 | 1.2  | 8  | 45  | 4       |
|               | ESRR714 01000512 | 1   | 0.05 | 1    | 12 | 50  | 4       | ESRR714 01200210 | 1.2 | 0.02 | 1.2  | 10 | 50  | 4       |
| X-Star        | ESRR714 01000514 | 1   | 0.05 | 1    | 14 | 50  | 4       | ESRR714 01200212 | 1.2 | 0.02 | 1.2  | 12 | 50  | 4       |
|               | ESRR714 01000516 | 1   | 0.05 | 1    | 16 | 50  | 4       | ESRR714 01200214 | 1.2 | 0.02 | 1.2  | 14 | 50  | 4       |
|               | ESRR714 01000520 | 1   | 0.05 | 1    | 20 | 50  | 4       | ESRR714 01200216 | 1.2 | 0.02 | 1.2  | 16 | 50  | 4       |
|               | ESRR714 01001003 | 1   | 0.1  | 1    | 3  | 45  | 4       | ESRR714 01200220 | 1.2 | 0.02 | 1.2  | 20 | 50  | 4       |
| S-Wing        | ESRR714 01001004 | 1   | 0.1  | 1    | 4  | 45  | 4       | ESRR714 01200503 | 1.2 | 0.05 | 1.2  | 3  | 45  | 4       |
|               | ESRR714 01001006 | 1   | 0.1  | 1    | 6  | 45  | 4       | ESRR714 01200504 | 1.2 | 0.05 | 1.2  | 4  | 45  | 4       |
|               | ESRR714 01001008 | 1   | 0.1  | 1    | 8  | 45  | 4       | ESRR714 01200506 | 1.2 | 0.05 | 1.2  | 6  | 45  | 4       |
|               | ESRR714 01001010 | 1   | 0.1  | 1    | 10 | 50  | 4       | ESRR714 01200508 | 1.2 | 0.05 | 1.2  | 8  | 45  | 4       |
| A-Wing        | ESRR714 01001012 | 1   | 0.1  | 1    | 12 | 50  | 4       | ESRR714 01200510 | 1.2 | 0.05 | 1.2  | 10 | 50  | 4       |
|               | ESRR714 01001014 | 1   | 0.1  | 1    | 14 | 50  | 4       | ESRR714 01200512 | 1.2 | 0.05 | 1.2  | 12 | 50  | 4       |
|               | ESRR714 01001016 | 1   | 0.1  | 1    | 16 | 50  | 4       | ESRR714 01200514 | 1.2 | 0.05 | 1.2  | 14 | 50  | 4       |
|               | ESRR714 01001020 | 1   | 0.1  | 1    | 20 | 50  | 4       | ESRR714 01200516 | 1.2 | 0.05 | 1.2  | 16 | 50  | 4       |
| Standard      | ESRR714 01002003 | 1   | 0.2  | 1    | 3  | 45  | 4       | ESRR714 01200520 | 1.2 | 0.05 | 1.2  | 20 | 50  | 4       |
|               | ESRR714 01002004 | 1   | 0.2  | 1    | 4  | 45  | 4       | ESRR714 01201003 | 1.2 | 0.1  | 1.2  | 3  | 45  | 4       |
|               | ESRR714 01002006 | 1   | 0.2  | 1    | 6  | 45  | 4       | ESRR714 01201004 | 1.2 | 0.1  | 1.2  | 4  | 45  | 4       |
|               | ESRR714 01002008 | 1   | 0.2  | 1    | 8  | 45  | 4       | ESRR714 01201006 | 1.2 | 0.1  | 1.2  | 6  | 45  | 4       |
| Copper-Mate   | ESRR714 01002010 | 1   | 0.2  | 1    | 10 | 50  | 4       | ESRR714 01201008 | 1.2 | 0.1  | 1.2  | 8  | 45  | 4       |
|               | ESRR714 01002012 | 1   | 0.2  | 1    | 12 | 50  | 4       | ESRR714 01201010 | 1.2 | 0.1  | 1.2  | 10 | 50  | 4       |
|               |                  |     |      |      |    |     |         |                  |     |      |      |    |     |         |
|               |                  |     |      |      |    |     |         |                  |     |      |      |    |     |         |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |                              |                                  | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|------------------------------|----------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel                  | Prehardened Steel                | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened<br>Steel<br>HRC30~50 |                      |        |          |          |                 |                      |
| ◎               | ○               |                 | ○                            | ◎                                |                      |        |          |          |                 |                      |

# ESRR714 4 Flutes Rib Radius End Mill

Endmill

| EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS |
|------------------|-----|------|------|----|-----|---------|------------------|-----|------|------|----|-----|---------|
| ESRR714 01201012 | 1.2 | 0.1  | 1.2  | 12 | 50  | 4       | ESRR714 01500514 | 1.5 | 0.05 | 1.5  | 14 | 50  | 4       |
| ESRR714 01201014 | 1.2 | 0.1  | 1.2  | 14 | 50  | 4       | ESRR714 01500516 | 1.5 | 0.05 | 1.5  | 16 | 50  | 4       |
| ESRR714 01201016 | 1.2 | 0.1  | 1.2  | 16 | 50  | 4       | ESRR714 01500520 | 1.5 | 0.05 | 1.5  | 20 | 50  | 4       |
| ESRR714 01201020 | 1.2 | 0.1  | 1.2  | 20 | 50  | 4       | ESRR714 01500522 | 1.5 | 0.05 | 1.5  | 22 | 60  | 4       |
| ESRR714 01202003 | 1.2 | 0.2  | 1.2  | 3  | 45  | 4       | ESRR714 01500526 | 1.5 | 0.05 | 1.5  | 26 | 60  | 4       |
| ESRR714 01202004 | 1.2 | 0.2  | 1.2  | 4  | 45  | 4       | ESRR714 01501004 | 1.5 | 0.1  | 1.5  | 4  | 45  | 4       |
| ESRR714 01202006 | 1.2 | 0.2  | 1.2  | 6  | 45  | 4       | ESRR714 01501006 | 1.5 | 0.1  | 1.5  | 6  | 45  | 4       |
| ESRR714 01202008 | 1.2 | 0.2  | 1.2  | 8  | 45  | 4       | ESRR714 01501008 | 1.5 | 0.1  | 1.5  | 8  | 45  | 4       |
| ESRR714 01202010 | 1.2 | 0.2  | 1.2  | 10 | 50  | 4       | ESRR714 01501010 | 1.5 | 0.1  | 1.5  | 10 | 50  | 4       |
| ESRR714 01202012 | 1.2 | 0.2  | 1.2  | 12 | 50  | 4       | ESRR714 01501012 | 1.5 | 0.1  | 1.5  | 12 | 50  | 4       |
| ESRR714 01202014 | 1.2 | 0.2  | 1.2  | 14 | 50  | 4       | ESRR714 01501014 | 1.5 | 0.1  | 1.5  | 14 | 50  | 4       |
| ESRR714 01202016 | 1.2 | 0.2  | 1.2  | 16 | 50  | 4       | ESRR714 01501016 | 1.5 | 0.1  | 1.5  | 16 | 50  | 4       |
| ESRR714 01202020 | 1.2 | 0.2  | 1.2  | 20 | 50  | 4       | ESRR714 01501020 | 1.5 | 0.1  | 1.5  | 20 | 50  | 4       |
| ESRR714 01203003 | 1.2 | 0.3  | 1.2  | 3  | 45  | 4       | ESRR714 01501022 | 1.5 | 0.1  | 1.5  | 22 | 60  | 4       |
| ESRR714 01203004 | 1.2 | 0.3  | 1.2  | 4  | 45  | 4       | ESRR714 01501026 | 1.5 | 0.1  | 1.5  | 26 | 60  | 4       |
| ESRR714 01203006 | 1.2 | 0.3  | 1.2  | 6  | 45  | 4       | ESRR714 01502004 | 1.5 | 0.2  | 1.5  | 4  | 45  | 4       |
| ESRR714 01203008 | 1.2 | 0.3  | 1.2  | 8  | 45  | 4       | ESRR714 01502006 | 1.5 | 0.2  | 1.5  | 6  | 45  | 4       |
| ESRR714 01203010 | 1.2 | 0.3  | 1.2  | 10 | 50  | 4       | ESRR714 01502008 | 1.5 | 0.2  | 1.5  | 8  | 45  | 4       |
| ESRR714 01203012 | 1.2 | 0.3  | 1.2  | 12 | 50  | 4       | ESRR714 01502010 | 1.5 | 0.2  | 1.5  | 10 | 50  | 4       |
| ESRR714 01203016 | 1.2 | 0.3  | 1.2  | 16 | 50  | 4       | ESRR714 01502012 | 1.5 | 0.2  | 1.5  | 12 | 50  | 4       |
| ESRR714 01203020 | 1.2 | 0.3  | 1.2  | 20 | 50  | 4       | ESRR714 01502014 | 1.5 | 0.2  | 1.5  | 14 | 50  | 4       |
| ESRR714 01500206 | 1.5 | 0.02 | 1.5  | 6  | 45  | 4       | ESRR714 01502016 | 1.5 | 0.2  | 1.5  | 16 | 50  | 4       |
| ESRR714 01500208 | 1.5 | 0.02 | 1.5  | 8  | 45  | 4       | ESRR714 01502020 | 1.5 | 0.2  | 1.5  | 20 | 50  | 4       |
| ESRR714 01500210 | 1.5 | 0.02 | 1.5  | 10 | 50  | 4       | ESRR714 01502022 | 1.5 | 0.2  | 1.5  | 22 | 60  | 4       |
| ESRR714 01500212 | 1.5 | 0.02 | 1.5  | 12 | 50  | 4       | ESRR714 01502025 | 1.5 | 0.2  | 1.5  | 25 | 60  | 4       |
| ESRR714 01500214 | 1.5 | 0.02 | 1.5  | 14 | 50  | 4       | ESRR714 01503004 | 1.5 | 0.3  | 1.5  | 4  | 45  | 4       |
| ESRR714 01500216 | 1.5 | 0.02 | 1.5  | 16 | 50  | 4       | ESRR714 01503006 | 1.5 | 0.3  | 1.5  | 6  | 45  | 4       |
| ESRR714 01500220 | 1.5 | 0.02 | 1.5  | 20 | 50  | 4       | ESRR714 01503008 | 1.5 | 0.3  | 1.5  | 8  | 45  | 4       |
| ESRR714 01500222 | 1.5 | 0.02 | 1.5  | 22 | 60  | 4       | ESRR714 01503010 | 1.5 | 0.3  | 1.5  | 10 | 50  | 4       |
| ESRR714 01500504 | 1.5 | 0.05 | 1.5  | 4  | 45  | 4       | ESRR714 01503012 | 1.5 | 0.3  | 1.5  | 12 | 50  | 4       |
| ESRR714 01500506 | 1.5 | 0.05 | 1.5  | 6  | 45  | 4       | ESRR714 01503014 | 1.5 | 0.3  | 1.5  | 14 | 50  | 4       |
| ESRR714 01500508 | 1.5 | 0.05 | 1.5  | 8  | 45  | 4       | ESRR714 01503016 | 1.5 | 0.3  | 1.5  | 16 | 50  | 4       |
| ESRR714 01500510 | 1.5 | 0.05 | 1.5  | 10 | 50  | 4       | ESRR714 01503020 | 1.5 | 0.3  | 1.5  | 20 | 50  | 4       |
| ESRR714 01500512 | 1.5 | 0.05 | 1.5  | 12 | 50  | 4       | ESRR714 01503022 | 1.5 | 0.3  | 1.5  | 22 | 60  | 4       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRR714 4 Flutes Rib Radius End Mill

Endmill

|               | EDP No           | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|---------------|------------------|-----|------|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
| Zamus Star    | ESRR714 01503025 | 1.5 | 0.3  | 1.5  | 25 | 60  | 4       | ESRR714 02001016 | 2  | 0.1 | 2    | 16 | 50  | 4       |
|               | ESRR714 01505004 | 1.5 | 0.5  | 1.5  | 4  | 45  | 4       | ESRR714 02001020 | 2  | 0.1 | 2    | 20 | 50  | 4       |
|               | ESRR714 01505006 | 1.5 | 0.5  | 1.5  | 6  | 45  | 4       | ESRR714 02001022 | 2  | 0.1 | 2    | 22 | 60  | 4       |
|               | ESRR714 01505008 | 1.5 | 0.5  | 1.5  | 8  | 45  | 4       | ESRR714 02001025 | 2  | 0.1 | 2    | 25 | 60  | 4       |
|               | ESRR714 01505010 | 1.5 | 0.5  | 1.5  | 10 | 50  | 4       | ESRR714 02001030 | 2  | 0.1 | 2    | 30 | 70  | 4       |
| E-Star        | ESRR714 01505012 | 1.5 | 0.5  | 1.5  | 12 | 50  | 4       | ESRR714 02002006 | 2  | 0.2 | 2    | 6  | 45  | 4       |
|               | ESRR714 01505014 | 1.5 | 0.5  | 1.5  | 14 | 50  | 4       | ESRR714 02002008 | 2  | 0.2 | 2    | 8  | 45  | 4       |
|               | ESRR714 01505016 | 1.5 | 0.5  | 1.5  | 16 | 50  | 4       | ESRR714 02002010 | 2  | 0.2 | 2    | 10 | 50  | 4       |
|               | ESRR714 01505020 | 1.5 | 0.5  | 1.5  | 20 | 50  | 4       | ESRR714 02002012 | 2  | 0.2 | 2    | 12 | 50  | 4       |
| U-Wing        | ESRR714 01505022 | 1.5 | 0.5  | 1.5  | 22 | 60  | 4       | ESRR714 02002014 | 2  | 0.2 | 2    | 14 | 50  | 4       |
|               | ESRR714 01505025 | 1.5 | 0.5  | 1.5  | 25 | 60  | 4       | ESRR714 02002016 | 2  | 0.2 | 2    | 16 | 50  | 4       |
| Zamus Thunder | ESRR714 02000206 | 2   | 0.02 | 2    | 6  | 45  | 4       | ESRR714 02002020 | 2  | 0.2 | 2    | 20 | 50  | 4       |
|               | ESRR714 02000208 | 2   | 0.02 | 2    | 8  | 45  | 4       | ESRR714 02002022 | 2  | 0.2 | 2    | 22 | 60  | 4       |
|               | ESRR714 02000210 | 2   | 0.02 | 2    | 10 | 50  | 4       | ESRR714 02002025 | 2  | 0.2 | 2    | 25 | 60  | 4       |
|               | ESRR714 02000212 | 2   | 0.02 | 2    | 12 | 50  | 4       | ESRR714 02002030 | 2  | 0.2 | 2    | 30 | 70  | 4       |
|               | ESRR714 02000214 | 2   | 0.02 | 2    | 14 | 50  | 4       | ESRR714 02003006 | 2  | 0.3 | 2    | 6  | 45  | 4       |
| X-Star        | ESRR714 02000216 | 2   | 0.02 | 2    | 16 | 50  | 4       | ESRR714 02003008 | 2  | 0.3 | 2    | 8  | 45  | 4       |
|               | ESRR714 02000220 | 2   | 0.02 | 2    | 20 | 50  | 4       | ESRR714 02003010 | 2  | 0.3 | 2    | 10 | 50  | 4       |
|               | ESRR714 02000225 | 2   | 0.02 | 2    | 25 | 60  | 4       | ESRR714 02003012 | 2  | 0.3 | 2    | 12 | 50  | 4       |
| S-Wing        | ESRR714 02000230 | 2   | 0.02 | 2    | 30 | 70  | 4       | ESRR714 02003014 | 2  | 0.3 | 2    | 14 | 50  | 4       |
|               | ESRR714 02000506 | 2   | 0.05 | 2    | 6  | 45  | 4       | ESRR714 02003016 | 2  | 0.3 | 2    | 16 | 50  | 4       |
|               | ESRR714 02000508 | 2   | 0.05 | 2    | 8  | 45  | 4       | ESRR714 02003020 | 2  | 0.3 | 2    | 20 | 50  | 4       |
| A-Wing        | ESRR714 02000510 | 2   | 0.05 | 2    | 10 | 50  | 4       | ESRR714 02003022 | 2  | 0.3 | 2    | 22 | 60  | 4       |
|               | ESRR714 02000512 | 2   | 0.05 | 2    | 12 | 50  | 4       | ESRR714 02003025 | 2  | 0.3 | 2    | 25 | 60  | 4       |
|               | ESRR714 02000514 | 2   | 0.05 | 2    | 14 | 50  | 4       | ESRR714 02003030 | 2  | 0.3 | 2    | 30 | 70  | 4       |
|               | ESRR714 02000516 | 2   | 0.05 | 2    | 16 | 50  | 4       | ESRR714 02005006 | 2  | 0.5 | 3    | 6  | 45  | 4       |
|               | ESRR714 02000520 | 2   | 0.05 | 2    | 20 | 50  | 4       | ESRR714 02005008 | 2  | 0.5 | 2    | 8  | 45  | 4       |
| Standard      | ESRR714 02000525 | 2   | 0.05 | 2    | 25 | 60  | 4       | ESRR714 02005010 | 2  | 0.5 | 2    | 10 | 50  | 4       |
|               | ESRR714 02000530 | 2   | 0.05 | 2    | 30 | 70  | 4       | ESRR714 02005012 | 2  | 0.5 | 2    | 12 | 50  | 4       |
|               | ESRR714 02001006 | 2   | 0.1  | 2    | 6  | 45  | 4       | ESRR714 02005014 | 2  | 0.5 | 2    | 14 | 50  | 4       |
|               | ESRR714 02001008 | 2   | 0.1  | 2    | 8  | 45  | 4       | ESRR714 02005016 | 2  | 0.5 | 2    | 16 | 50  | 4       |
|               | ESRR714 02001010 | 2   | 0.1  | 2    | 10 | 50  | 4       | ESRR714 02005020 | 2  | 0.5 | 2    | 20 | 50  | 4       |
| Copper-Mate   | ESRR714 02001012 | 2   | 0.1  | 2    | 12 | 50  | 4       | ESRR714 02005022 | 2  | 0.5 | 2    | 22 | 60  | 4       |
|               | ESRR714 02001014 | 2   | 0.1  | 2    | 14 | 50  | 4       | ESRR714 02005025 | 2  | 0.5 | 2    | 25 | 60  | 4       |
|               |                  |     |      |      |    |     |         |                  |    |     |      |    |     |         |
|               |                  |     |      |      |    |     |         |                  |    |     |      |    |     |         |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |                        |                            | K                 | N      |          |          | M               | S                    |
|----------------|--------------|--------------|------------------------|----------------------------|-------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel            | Prehardened Steel          | Cast Iron ~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | Steel ~HB225 | Alloy Steel HB225 ~325 | Prehardened Steel HRC30~50 |                   |        |          |          |                 |                      |
| ◎              | ○            |              | ○                      | ◎                          |                   |        |          |          |                 |                      |

# ESRR714 4 Flutes Rib Radius End Mill

Endmill

| EDP No           | DC  | RE  | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|------------------|-----|-----|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
| ESRR714 02005030 | 2   | 0.5 | 2    | 30 | 70  | 4       | ESRR714 03001010 | 3  | 0.1 | 3    | 10 | 50  | 6       |
| ESRR714 02501008 | 2.5 | 0.1 | 2.5  | 8  | 45  | 4       | ESRR714 03001012 | 3  | 0.1 | 3    | 12 | 50  | 6       |
| ESRR714 02501010 | 2.5 | 0.1 | 2.5  | 10 | 50  | 4       | ESRR714 03001014 | 3  | 0.1 | 3    | 14 | 50  | 6       |
| ESRR714 02501012 | 2.5 | 0.1 | 2.5  | 12 | 50  | 4       | ESRR714 03001016 | 3  | 0.1 | 3    | 16 | 55  | 6       |
| ESRR714 02501014 | 2.5 | 0.1 | 2.5  | 14 | 50  | 4       | ESRR714 03001020 | 3  | 0.1 | 3    | 20 | 60  | 6       |
| ESRR714 02501016 | 2.5 | 0.1 | 2.5  | 16 | 50  | 4       | ESRR714 03001025 | 3  | 0.1 | 3    | 25 | 65  | 6       |
| ESRR714 02501020 | 2.5 | 0.1 | 2.5  | 20 | 50  | 4       | ESRR714 03001030 | 3  | 0.1 | 3    | 30 | 70  | 6       |
| ESRR714 02501025 | 2.5 | 0.1 | 2.5  | 25 | 60  | 4       | ESRR714 03001035 | 3  | 0.1 | 3    | 35 | 75  | 6       |
| ESRR714 02501030 | 2.5 | 0.1 | 2.5  | 30 | 70  | 4       | ESRR714 03001040 | 3  | 0.1 | 3    | 40 | 80  | 6       |
| ESRR714 02502008 | 2.5 | 0.2 | 2.5  | 8  | 45  | 4       | ESRR714 03001045 | 3  | 0.1 | 3    | 45 | 90  | 6       |
| ESRR714 02502010 | 2.5 | 0.2 | 2.5  | 10 | 50  | 4       | ESRR714 03002008 | 3  | 0.2 | 3    | 8  | 45  | 6       |
| ESRR714 02502012 | 2.5 | 0.2 | 2.5  | 12 | 50  | 4       | ESRR714 03002010 | 3  | 0.2 | 3    | 10 | 50  | 6       |
| ESRR714 02502014 | 2.5 | 0.2 | 2.5  | 14 | 50  | 4       | ESRR714 03002012 | 3  | 0.2 | 3    | 12 | 50  | 6       |
| ESRR714 02502016 | 2.5 | 0.2 | 2.5  | 16 | 50  | 4       | ESRR714 03002014 | 3  | 0.2 | 3    | 14 | 50  | 6       |
| ESRR714 02502020 | 2.5 | 0.2 | 2.5  | 20 | 50  | 4       | ESRR714 03002016 | 3  | 0.2 | 3    | 16 | 55  | 6       |
| ESRR714 02502025 | 2.5 | 0.2 | 2.5  | 25 | 60  | 4       | ESRR714 03002020 | 3  | 0.2 | 3    | 20 | 60  | 6       |
| ESRR714 02502030 | 2.5 | 0.2 | 2.5  | 30 | 70  | 4       | ESRR714 03002025 | 3  | 0.2 | 3    | 25 | 65  | 6       |
| ESRR714 02503008 | 2.5 | 0.3 | 2.5  | 8  | 45  | 4       | ESRR714 03002030 | 3  | 0.2 | 3    | 30 | 70  | 6       |
| ESRR714 02503010 | 2.5 | 0.3 | 2.5  | 10 | 50  | 4       | ESRR714 03002035 | 3  | 0.2 | 3    | 35 | 75  | 6       |
| ESRR714 02503012 | 2.5 | 0.3 | 2.5  | 12 | 50  | 4       | ESRR714 03002040 | 3  | 0.2 | 3    | 40 | 80  | 6       |
| ESRR714 02503014 | 2.5 | 0.3 | 2.5  | 14 | 50  | 4       | ESRR714 03002045 | 3  | 0.2 | 3    | 45 | 90  | 6       |
| ESRR714 02503016 | 2.5 | 0.3 | 2.5  | 16 | 50  | 4       | ESRR714 03003008 | 3  | 0.3 | 3    | 8  | 45  | 6       |
| ESRR714 02503020 | 2.5 | 0.3 | 2.5  | 20 | 50  | 4       | ESRR714 03003010 | 3  | 0.3 | 3    | 10 | 50  | 6       |
| ESRR714 02503025 | 2.5 | 0.3 | 2.5  | 25 | 60  | 4       | ESRR714 03003012 | 3  | 0.3 | 3    | 12 | 50  | 6       |
| ESRR714 02503030 | 2.5 | 0.3 | 2.5  | 30 | 70  | 4       | ESRR714 03003014 | 3  | 0.3 | 3    | 14 | 50  | 6       |
| ESRR714 02505008 | 2.5 | 0.5 | 2.5  | 8  | 45  | 4       | ESRR714 03003016 | 3  | 0.3 | 3    | 16 | 55  | 6       |
| ESRR714 02505010 | 2.5 | 0.5 | 2.5  | 10 | 50  | 4       | ESRR714 03003020 | 3  | 0.3 | 3    | 20 | 60  | 6       |
| ESRR714 02505012 | 2.5 | 0.5 | 2.5  | 12 | 50  | 4       | ESRR714 03003025 | 3  | 0.3 | 3    | 25 | 65  | 6       |
| ESRR714 02505014 | 2.5 | 0.5 | 2.5  | 14 | 50  | 4       | ESRR714 03003030 | 3  | 0.3 | 3    | 30 | 70  | 6       |
| ESRR714 02505016 | 2.5 | 0.5 | 2.5  | 16 | 50  | 4       | ESRR714 03003035 | 3  | 0.3 | 3    | 35 | 75  | 6       |
| ESRR714 02505020 | 2.5 | 0.5 | 2.5  | 20 | 50  | 4       | ESRR714 03003040 | 3  | 0.3 | 3    | 40 | 80  | 6       |
| ESRR714 02505025 | 2.5 | 0.5 | 2.5  | 25 | 60  | 4       | ESRR714 03003045 | 3  | 0.3 | 3    | 45 | 90  | 6       |
| ESRR714 02505030 | 2.5 | 0.5 | 2.5  | 30 | 70  | 4       | ESRR714 03005008 | 3  | 0.5 | 3    | 8  | 45  | 6       |
| ESRR714 03001008 | 3   | 0.1 | 3    | 8  | 45  | 6       | ESRR714 03005010 | 3  | 0.5 | 3    | 10 | 50  | 6       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRR714 4 Flutes Rib Radius End Mill

Endmill

|               | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|---------------|------------------|----|-----|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
|               | ESRR714 03005012 | 3  | 0.5 | 3    | 12 | 50  | 6       | ESRR714 04002012 | 4  | 0.2 | 4    | 12 | 50  | 6       |
|               | ESRR714 03005014 | 3  | 0.5 | 3    | 14 | 50  | 6       | ESRR714 04002013 | 4  | 0.2 | 4    | 13 | 55  | 6       |
|               | ESRR714 03005016 | 3  | 0.5 | 3    | 16 | 55  | 6       | ESRR714 04002016 | 4  | 0.2 | 4    | 16 | 55  | 6       |
| Zamus Star    | ESRR714 03005020 | 3  | 0.5 | 3    | 20 | 60  | 6       | ESRR714 04002020 | 4  | 0.2 | 4    | 20 | 60  | 6       |
|               | ESRR714 03005025 | 3  | 0.5 | 3    | 25 | 65  | 6       | ESRR714 04002025 | 4  | 0.2 | 4    | 25 | 65  | 6       |
|               | ESRR714 03005030 | 3  | 0.5 | 3    | 30 | 70  | 6       | ESRR714 04002030 | 4  | 0.2 | 4    | 30 | 70  | 6       |
| E-Star        | ESRR714 03005035 | 3  | 0.5 | 3    | 35 | 75  | 6       | ESRR714 04002035 | 4  | 0.2 | 4    | 35 | 75  | 6       |
|               | ESRR714 03005040 | 3  | 0.5 | 3    | 40 | 80  | 6       | ESRR714 04002040 | 4  | 0.2 | 4    | 40 | 80  | 6       |
|               | ESRR714 03005045 | 3  | 0.5 | 3    | 45 | 90  | 6       | ESRR714 04002045 | 4  | 0.2 | 4    | 45 | 90  | 6       |
|               | ESRR714 03005050 | 3  | 0.5 | 3    | 50 | 100 | 6       | ESRR714 04002050 | 4  | 0.2 | 4    | 50 | 100 | 6       |
| U-Wing        | ESRR714 03010008 | 3  | 1   | 3    | 8  | 45  | 6       | ESRR714 04003010 | 4  | 0.3 | 4    | 10 | 50  | 6       |
|               | ESRR714 03010010 | 3  | 1   | 3    | 10 | 50  | 6       | ESRR714 04003012 | 4  | 0.3 | 4    | 12 | 50  | 6       |
|               | ESRR714 03010012 | 3  | 1   | 3    | 12 | 50  | 6       | ESRR714 04003013 | 4  | 0.3 | 4    | 13 | 55  | 6       |
| Zamus Thunder | ESRR714 03010014 | 3  | 1   | 3    | 14 | 50  | 6       | ESRR714 04003016 | 4  | 0.3 | 4    | 16 | 55  | 6       |
|               | ESRR714 03010016 | 3  | 1   | 3    | 16 | 55  | 6       | ESRR714 04003020 | 4  | 0.3 | 4    | 20 | 60  | 6       |
|               | ESRR714 03010020 | 3  | 1   | 3    | 20 | 60  | 6       | ESRR714 04003025 | 4  | 0.3 | 4    | 25 | 65  | 6       |
|               | ESRR714 03010025 | 3  | 1   | 3    | 25 | 65  | 6       | ESRR714 04003030 | 4  | 0.3 | 4    | 30 | 70  | 6       |
| X-Star        | ESRR714 03010030 | 3  | 1   | 3    | 30 | 70  | 6       | ESRR714 04003035 | 4  | 0.3 | 4    | 35 | 75  | 6       |
|               | ESRR714 03010035 | 3  | 1   | 3    | 35 | 75  | 6       | ESRR714 04003040 | 4  | 0.3 | 4    | 40 | 80  | 6       |
|               | ESRR714 03010040 | 3  | 1   | 3    | 40 | 80  | 6       | ESRR714 04003045 | 4  | 0.3 | 4    | 45 | 90  | 6       |
| S-Wing        | ESRR714 03010045 | 3  | 1   | 3    | 45 | 90  | 6       | ESRR714 04003050 | 4  | 0.3 | 4    | 50 | 100 | 6       |
|               | ESRR714 03010050 | 3  | 1   | 3    | 50 | 100 | 6       | ESRR714 04005010 | 4  | 0.5 | 4    | 10 | 50  | 6       |
|               | ESRR714 04001010 | 4  | 0.1 | 4    | 10 | 50  | 6       | ESRR714 04005012 | 4  | 0.5 | 4    | 12 | 50  | 6       |
| A-Wing        | ESRR714 04001012 | 4  | 0.1 | 4    | 12 | 50  | 6       | ESRR714 04005013 | 4  | 0.5 | 4    | 13 | 55  | 6       |
|               | ESRR714 04001013 | 4  | 0.1 | 4    | 13 | 55  | 6       | ESRR714 04005016 | 4  | 0.5 | 4    | 16 | 55  | 6       |
|               | ESRR714 04001016 | 4  | 0.1 | 4    | 16 | 55  | 6       | ESRR714 04005020 | 4  | 0.5 | 4    | 20 | 60  | 6       |
|               | ESRR714 04001020 | 4  | 0.1 | 4    | 20 | 60  | 6       | ESRR714 04005025 | 4  | 0.5 | 4    | 25 | 65  | 6       |
| Standard      | ESRR714 04001025 | 4  | 0.1 | 4    | 25 | 65  | 6       | ESRR714 04005030 | 4  | 0.5 | 4    | 30 | 70  | 6       |
|               | ESRR714 04001030 | 4  | 0.1 | 4    | 30 | 70  | 6       | ESRR714 04005035 | 4  | 0.5 | 4    | 35 | 75  | 6       |
|               | ESRR714 04001035 | 4  | 0.1 | 4    | 35 | 75  | 6       | ESRR714 04005040 | 4  | 0.5 | 4    | 40 | 80  | 6       |
| Copper-Mate   | ESRR714 04001040 | 4  | 0.1 | 4    | 40 | 80  | 6       | ESRR714 04005045 | 4  | 0.5 | 4    | 45 | 90  | 6       |
|               | ESRR714 04001045 | 4  | 0.1 | 4    | 45 | 90  | 6       | ESRR714 04005050 | 4  | 0.5 | 4    | 50 | 100 | 6       |
|               | ESRR714 04001050 | 4  | 0.1 | 4    | 50 | 100 | 6       | ESRR714 04005055 | 4  | 0.5 | 4    | 55 | 100 | 6       |
| Gra-Mate      | ESRR714 04002010 | 4  | 0.2 | 4    | 10 | 50  | 6       | ESRR714 04010010 | 4  | 1   | 4    | 10 | 50  | 6       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ |                        |                              |                               |                      |        |          |          |                 |                      |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESRR714 4 Flutes Rib Radius End Mill

Endmill

| EDP No           | DC | RE  | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|------------------|----|-----|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
| ESRR714 04010012 | 4  | 1   | 4    | 12 | 50  | 6       | ESRR714 06001050 | 6  | 0.1 | 7    | 50 | 100 | 6       |
| ESRR714 04010013 | 4  | 1   | 4    | 13 | 55  | 6       | ESRR714 06002020 | 6  | 0.2 | 7    | 20 | 60  | 6       |
| ESRR714 04010016 | 4  | 1   | 4    | 16 | 55  | 6       | ESRR714 06002040 | 6  | 0.2 | 7    | 40 | 80  | 6       |
| ESRR714 04010020 | 4  | 1   | 4    | 20 | 60  | 6       | ESRR714 06002050 | 6  | 0.2 | 7    | 50 | 100 | 6       |
| ESRR714 04010025 | 4  | 1   | 4    | 25 | 65  | 6       | ESRR714 06003020 | 6  | 0.3 | 7    | 20 | 60  | 6       |
| ESRR714 04010030 | 4  | 1   | 4    | 30 | 70  | 6       | ESRR714 06003030 | 6  | 0.3 | 7    | 30 | 70  | 6       |
| ESRR714 04010035 | 4  | 1   | 4    | 35 | 75  | 6       | ESRR714 06003040 | 6  | 0.3 | 7    | 40 | 80  | 6       |
| ESRR714 04010040 | 4  | 1   | 4    | 40 | 80  | 6       | ESRR714 06003050 | 6  | 0.3 | 7    | 50 | 100 | 6       |
| ESRR714 04010045 | 4  | 1   | 4    | 45 | 90  | 6       | ESRR714 06005020 | 6  | 0.5 | 7    | 20 | 60  | 6       |
| ESRR714 04010050 | 4  | 1   | 4    | 50 | 100 | 6       | ESRR714 06005030 | 6  | 0.5 | 7    | 30 | 70  | 6       |
| ESRR714 04010055 | 4  | 1   | 4    | 55 | 100 | 6       | ESRR714 06005040 | 6  | 0.5 | 7    | 40 | 80  | 6       |
| ESRR714 05001016 | 5  | 0.1 | 5    | 16 | 60  | 6       | ESRR714 06005050 | 6  | 0.5 | 7    | 50 | 100 | 6       |
| ESRR714 05001030 | 5  | 0.1 | 5    | 30 | 70  | 6       | ESRR714 06005060 | 6  | 0.5 | 7    | 60 | 110 | 6       |
| ESRR714 05001040 | 5  | 0.1 | 5    | 40 | 80  | 6       | ESRR714 06010020 | 6  | 1   | 7    | 20 | 60  | 6       |
| ESRR714 05002016 | 5  | 0.2 | 5    | 16 | 60  | 6       | ESRR714 06010030 | 6  | 1   | 7    | 30 | 70  | 6       |
| ESRR714 05002030 | 5  | 0.2 | 5    | 30 | 70  | 6       | ESRR714 06010040 | 6  | 1   | 7    | 40 | 80  | 6       |
| ESRR714 05002040 | 5  | 0.2 | 5    | 40 | 80  | 6       | ESRR714 06010050 | 6  | 1   | 7    | 50 | 100 | 6       |
| ESRR714 05003016 | 5  | 0.3 | 5    | 16 | 60  | 6       | ESRR714 06010060 | 6  | 1   | 7    | 60 | 110 | 6       |
| ESRR714 05003030 | 5  | 0.3 | 5    | 30 | 70  | 6       | ESRR714 06015020 | 6  | 1.5 | 7    | 20 | 60  | 6       |
| ESRR714 05003040 | 5  | 0.3 | 5    | 40 | 80  | 6       | ESRR714 06015040 | 6  | 1.5 | 7    | 40 | 80  | 6       |
| ESRR714 05005016 | 5  | 0.5 | 5    | 16 | 60  | 6       | ESRR714 06015050 | 6  | 1.5 | 7    | 50 | 100 | 6       |
| ESRR714 05005030 | 5  | 0.5 | 5    | 30 | 70  | 6       | ESRR714 06020020 | 6  | 2   | 7    | 20 | 60  | 6       |
| ESRR714 05005040 | 5  | 0.5 | 5    | 40 | 80  | 6       | ESRR714 06020030 | 6  | 2   | 7    | 30 | 70  | 6       |
| ESRR714 05005050 | 5  | 0.5 | 5    | 50 | 100 | 6       | ESRR714 06020040 | 6  | 2   | 7    | 40 | 80  | 6       |
| ESRR714 05005060 | 5  | 0.5 | 5    | 60 | 110 | 6       | ESRR714 06020050 | 6  | 2   | 7    | 50 | 100 | 6       |
| ESRR714 05010016 | 5  | 1   | 5    | 16 | 60  | 6       | ESRR714 08001025 | 8  | 0.1 | 9    | 25 | 70  | 8       |
| ESRR714 05010030 | 5  | 1   | 5    | 30 | 70  | 6       | ESRR714 08002022 | 8  | 0.2 | 9    | 22 | 65  | 8       |
| ESRR714 05010040 | 5  | 1   | 5    | 40 | 80  | 6       | ESRR714 08002040 | 8  | 0.2 | 9    | 40 | 100 | 8       |
| ESRR714 05010050 | 5  | 1   | 5    | 50 | 100 | 6       | ESRR714 08003022 | 8  | 0.3 | 9    | 22 | 65  | 8       |
| ESRR714 05010060 | 5  | 1   | 5    | 60 | 110 | 6       | ESRR714 08003040 | 8  | 0.3 | 9    | 40 | 100 | 8       |
| ESRR714 05015015 | 5  | 1.5 | 5    | 15 | 60  | 6       | ESRR714 08005022 | 8  | 0.5 | 9    | 22 | 65  | 8       |
| ESRR714 05020015 | 5  | 2   | 5    | 15 | 60  | 6       | ESRR714 08005035 | 8  | 0.5 | 9    | 35 | 100 | 8       |
| ESRR714 06001020 | 6  | 0.1 | 7    | 20 | 60  | 6       | ESRR714 08005040 | 8  | 0.5 | 9    | 40 | 100 | 8       |
| ESRR714 06001040 | 6  | 0.1 | 7    | 40 | 80  | 6       | ESRR714 08005050 | 8  | 0.5 | 9    | 50 | 120 | 8       |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESRR714 4 Flutes Rib Radius End Mill

Endmill

| EDP No           | DC | RE  | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|------------------|----|-----|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
| ESRR714 08005060 | 8  | 0.5 | 9    | 60 | 120 | 8       | ESRR714 10020024 | 10 | 2   | 11   | 24 | 70  | 10      |
| ESRR714 08010022 | 8  | 1   | 9    | 22 | 65  | 8       | ESRR714 10020040 | 10 | 2   | 11   | 40 | 100 | 10      |
| ESRR714 08010035 | 8  | 1   | 9    | 35 | 100 | 8       | ESRR714 10020050 | 10 | 2   | 11   | 50 | 120 | 10      |
| ESRR714 08010040 | 8  | 1   | 9    | 40 | 100 | 8       | ESRR714 10025024 | 10 | 2.5 | 11   | 24 | 70  | 10      |
| ESRR714 08010050 | 8  | 1   | 9    | 50 | 120 | 8       | ESRR714 12002032 | 12 | 0.2 | 13   | 32 | 80  | 12      |
| ESRR714 08010060 | 8  | 1   | 9    | 60 | 120 | 8       | ESRR714 12003026 | 12 | 0.3 | 13   | 26 | 80  | 12      |
| ESRR714 08015022 | 8  | 1.5 | 9    | 22 | 65  | 8       | ESRR714 12003045 | 12 | 0.3 | 13   | 45 | 110 | 12      |
| ESRR714 08015040 | 8  | 1.5 | 9    | 40 | 100 | 8       | ESRR714 12005026 | 12 | 0.5 | 13   | 26 | 80  | 12      |
| ESRR714 08020022 | 8  | 2   | 9    | 22 | 65  | 8       | ESRR714 12005040 | 12 | 0.5 | 13   | 40 | 110 | 12      |
| ESRR714 08020040 | 8  | 2   | 9    | 40 | 100 | 8       | ESRR714 12005060 | 12 | 0.5 | 13   | 60 | 130 | 12      |
| ESRR714 08020050 | 8  | 2   | 9    | 50 | 120 | 8       | ESRR714 12010026 | 12 | 1   | 13   | 26 | 80  | 12      |
| ESRR714 10001030 | 10 | 0.1 | 11   | 30 | 75  | 10      | ESRR714 12010040 | 12 | 1   | 13   | 40 | 110 | 12      |
| ESRR714 10002024 | 10 | 0.2 | 11   | 24 | 70  | 10      | ESRR714 12010060 | 12 | 1   | 13   | 60 | 130 | 12      |
| ESRR714 10002040 | 10 | 0.2 | 11   | 40 | 100 | 10      | ESRR714 12015026 | 12 | 1.5 | 13   | 26 | 80  | 12      |
| ESRR714 10003024 | 10 | 0.3 | 11   | 24 | 70  | 10      | ESRR714 12020026 | 12 | 2   | 13   | 26 | 80  | 12      |
| ESRR714 10003040 | 10 | 0.3 | 11   | 40 | 100 | 10      | ESRR714 12020040 | 12 | 2   | 13   | 40 | 110 | 12      |
| ESRR714 10005024 | 10 | 0.5 | 11   | 24 | 70  | 10      | ESRR714 12030026 | 12 | 3   | 13   | 26 | 80  | 12      |
| ESRR714 10005040 | 10 | 0.5 | 11   | 40 | 100 | 10      | ESRR714 16005035 | 16 | 0.5 | 20   | 35 | 100 | 16      |
| ESRR714 10005050 | 10 | 0.5 | 11   | 50 | 120 | 10      | ESRR714 16005050 | 16 | 0.5 | 35   | 50 | 150 | 16      |
| ESRR714 10005060 | 10 | 0.5 | 11   | 60 | 120 | 10      | ESRR714 16010035 | 16 | 1   | 20   | 35 | 100 | 16      |
| ESRR714 10010024 | 10 | 1   | 11   | 24 | 70  | 10      | ESRR714 16010050 | 16 | 1   | 35   | 50 | 150 | 16      |
| ESRR714 10010040 | 10 | 1   | 11   | 40 | 100 | 10      | ESRR714 20005040 | 20 | 0.5 | 25   | 40 | 100 | 20      |
| ESRR714 10010050 | 10 | 1   | 11   | 50 | 120 | 10      | ESRR714 20005055 | 20 | 0.5 | 40   | 55 | 150 | 20      |
| ESRR714 10010060 | 10 | 1   | 11   | 60 | 120 | 10      | ESRR714 20010040 | 20 | 1   | 25   | 40 | 100 | 20      |
| ESRR714 10015024 | 10 | 1.5 | 11   | 24 | 70  | 10      | ESRR714 20010055 | 20 | 1   | 40   | 55 | 150 | 20      |
| ESRR714 10015040 | 10 | 1.5 | 11   | 40 | 100 | 10      |                  |    |     |      |    |     |         |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

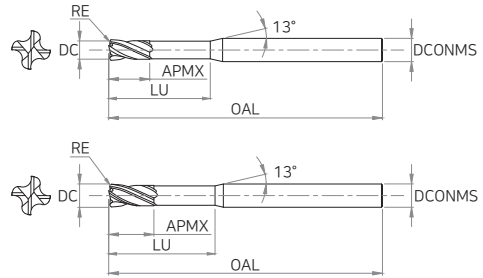
## ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

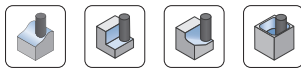
# ESXR704 4 Flutes Neck Radius End Mill

Endmill



► Tolerance

| DC        |           | Shank Dia |
|-----------|-----------|-----------|
| All Sizes | 0 ~ -0.02 | h5        |



CARBIDE
AITIN
4
38° HELIX
R ±0.01
R ±0.015
DATA P.634

Ø6 OR UNDER      ABOVE Ø6

| EDP No            | DC | RE   | APMX | LU | OAL | DCON MS | EDP No          | DC | RE  | APMX | LU | OAL | DCON MS |
|-------------------|----|------|------|----|-----|---------|-----------------|----|-----|------|----|-----|---------|
| ESXR704 01000504  | 1  | 0.05 | 1.5  | 4  | 45  | 4       | ESXR704 0401012 | 4  | 1   | 5    | 12 | 55  | 6       |
| ESXR704 02000506  | 2  | 0.05 | 3    | 6  | 45  | 4       | ESXR704 0500116 | 5  | 0.1 | 6    | 16 | 60  | 6       |
| ESXR704 02000507  | 2  | 0.05 | 2.5  | 7  | 50  | 4       | ESXR704 0500216 | 5  | 0.2 | 6    | 16 | 60  | 6       |
| ESXR704 0200107   | 2  | 0.1  | 2.5  | 7  | 50  | 4       | ESXR704 0500316 | 5  | 0.3 | 6    | 16 | 60  | 6       |
| ESXR704 0300107   | 3  | 0.1  | 4    | 7  | 45  | 6       | ESXR704 0500516 | 5  | 0.5 | 6    | 16 | 60  | 6       |
| ESXR704 0300109   | 3  | 0.1  | 4    | 9  | 55  | 6       | ESXR704 0501016 | 5  | 1   | 6    | 16 | 60  | 6       |
| ESXR704 0300209   | 3  | 0.2  | 4    | 9  | 55  | 6       | ESXR704 0600120 | 6  | 0.1 | 7    | 20 | 60  | 6       |
| ESXR704 0300309   | 3  | 0.3  | 4    | 9  | 55  | 6       | ESXR704 0600214 | 6  | 0.2 | 7    | 14 | 50  | 6       |
| ESXR704 0300312   | 3  | 0.3  | 4    | 12 | 55  | 6       | ESXR704 0600220 | 6  | 0.2 | 7    | 20 | 60  | 6       |
| ESXR704 0300316   | 3  | 0.3  | 4    | 16 | 55  | 6       | ESXR704 0600320 | 6  | 0.3 | 7    | 20 | 60  | 6       |
| ESXR704 0400109   | 4  | 0.1  | 5    | 9  | 45  | 6       | ESXR704 0600520 | 6  | 0.5 | 7    | 20 | 60  | 6       |
| ESXR704 0400212   | 4  | 0.2  | 5    | 12 | 55  | 6       | ESXR704 0601020 | 6  | 1   | 7    | 20 | 60  | 6       |
| ESXR704 0400212S4 | 4  | 0.2  | 5    | 12 | 55  | 4       | ESXR704 0601520 | 6  | 1.5 | 7    | 20 | 60  | 6       |
| ESXR704 0400312   | 4  | 0.3  | 5    | 12 | 55  | 6       | ESXR704 0800125 | 8  | 0.1 | 9    | 25 | 60  | 8       |
| ESXR704 0400316   | 4  | 0.3  | 5    | 16 | 55  | 6       | ESXR704 0800218 | 8  | 0.2 | 9    | 18 | 60  | 8       |
| ESXR704 0400320   | 4  | 0.3  | 5    | 20 | 55  | 6       | ESXR704 0800225 | 8  | 0.2 | 9    | 25 | 60  | 8       |
| ESXR704 0400512   | 4  | 0.5  | 5    | 12 | 55  | 6       | ESXR704 0800325 | 8  | 0.3 | 9    | 25 | 60  | 8       |
| ESXR704 0400516   | 4  | 0.5  | 5    | 16 | 55  | 6       | ESXR704 0800525 | 8  | 0.5 | 9    | 25 | 60  | 8       |
| ESXR704 0400516S4 | 4  | 0.5  | 5    | 16 | 55  | 4       | ESXR704 0801025 | 8  | 1   | 9    | 25 | 60  | 8       |
| ESXR704 0400520   | 4  | 0.5  | 5    | 20 | 55  | 6       | ESXR704 0801525 | 8  | 1.5 | 9    | 25 | 60  | 8       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

# ESXR704 4 Flutes Neck Radius End Mill

Endmill

| EDP No          | DC | RE  | APMX | LU | OAL | DCON MS | EDP No          | DC | RE  | APMX | LU | OAL | DCON MS |
|-----------------|----|-----|------|----|-----|---------|-----------------|----|-----|------|----|-----|---------|
| ESXR704 0802025 | 8  | 2   | 9    | 25 | 60  | 8       | ESXR704 1200238 | 12 | 0.2 | 12   | 38 | 75  | 12      |
| ESXR704 1000225 | 10 | 0.2 | 12   | 25 | 75  | 10      | ESXR704 1200330 | 12 | 0.3 | 15   | 30 | 75  | 12      |
| ESXR704 1000232 | 10 | 0.2 | 11   | 32 | 75  | 10      | ESXR704 1200338 | 12 | 0.3 | 12   | 38 | 75  | 12      |
| ESXR704 1000332 | 10 | 0.3 | 11   | 32 | 75  | 10      | ESXR704 1200538 | 12 | 0.5 | 12   | 38 | 75  | 12      |
| ESXR704 1000532 | 10 | 0.5 | 11   | 32 | 75  | 10      | ESXR704 1201038 | 12 | 1   | 12   | 38 | 75  | 12      |
| ESXR704 1001032 | 10 | 1   | 11   | 32 | 75  | 10      | ESXR704 1201538 | 12 | 1.5 | 12   | 38 | 75  | 12      |
| ESXR704 1001532 | 10 | 1.5 | 11   | 32 | 75  | 10      | ESXR704 1202038 | 12 | 2   | 12   | 38 | 75  | 12      |
| ESXR704 1002032 | 10 | 2   | 11   | 32 | 75  | 10      |                 |    |     |      |    |     |         |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper -Mate

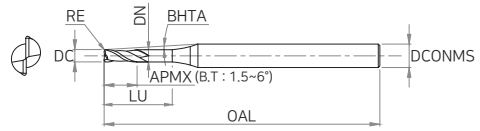
Gra -Mate

## ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

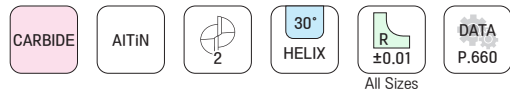
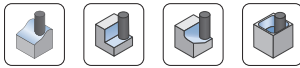
| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESLNR20 2 Flutes Long Neck Radius End Mill



### ► Tolerance

| DC        |            | Shank Dia |
|-----------|------------|-----------|
| All Sizes | 0 ~ -0.012 | h5        |



| EDP No             | DC  | RE   | APMX | LU  | DN   | OAL | DCONMS | BHTA | Effective length by inclination angle |     |      |     |     |
|--------------------|-----|------|------|-----|------|-----|--------|------|---------------------------------------|-----|------|-----|-----|
|                    |     |      |      |     |      |     |        |      | 0.5°                                  | 1°  | 1.5° | 2°  | 3°  |
| ESLNR20 02-0.5-005 | 0.2 | 0.05 | 0.15 | 0.5 | 0.17 | 50  | 4      | 11.4 | 0.9                                   | 1   | 1    | 1.1 | 12  |
| ESLNR20 02-1-005   | 0.2 | 0.05 | 0.15 | 1   | 0.17 | 50  | 4      | 10.9 | 1.6                                   | 1.7 | 1.9  | 2   | 2.3 |
| ESLNR20 02-1.5-005 | 0.2 | 0.05 | 0.15 | 1.5 | 0.17 | 50  | 4      | 10.3 | 2.1                                   | 2.3 | 2.5  | 2.7 | 3   |
| ESLNR20 02-2-005   | 0.2 | 0.05 | 0.15 | 2   | 0.17 | 50  | 4      | 9.9  | 2.8                                   | 3.1 | 3.4  | 3.6 | 4.1 |
| ESLNR20 03-1-005   | 0.3 | 0.05 | 0.25 | 1   | 0.27 | 50  | 4      | 10.8 | 1.4                                   | 1.5 | 1.6  | 1.7 | 1.9 |
| ESLNR20 03-1.5-005 | 0.3 | 0.05 | 0.25 | 1.5 | 0.27 | 50  | 4      | 10.3 | 2.1                                   | 2.3 | 2.5  | 2.7 | 3   |
| ESLNR20 03-2.5-005 | 0.3 | 0.05 | 0.25 | 2.5 | 0.27 | 50  | 4      | 9.8  | 2.7                                   | 2.9 | 3.1  | 3.3 | 3.6 |
| ESLNR20 03-2-005   | 0.3 | 0.05 | 0.25 | 2   | 0.27 | 50  | 4      | 9.4  | 3.2                                   | 3.5 | 3.7  | 3.9 | 4.3 |
| ESLNR20 03-3-005   | 0.3 | 0.05 | 0.25 | 3   | 0.27 | 50  | 4      | 9    | 3.9                                   | 4.3 | 4.6  | 4.9 | 5.4 |
| ESLNR20 04-1-005   | 0.4 | 0.05 | 0.3  | 1   | 0.37 | 50  | 4      | 10.8 | 1.4                                   | 1.5 | 1.6  | 1.7 | 1.9 |
| ESLNR20 04-1.5-005 | 0.4 | 0.05 | 0.3  | 1.5 | 0.37 | 50  | 4      | 10.3 | 2                                     | 2.1 | 2.2  | 2.3 | 2.5 |
| ESLNR20 04-2-005   | 0.4 | 0.05 | 0.3  | 2   | 0.37 | 50  | 4      | 9.8  | 2.7                                   | 2.9 | 3.1  | 3.3 | 3.6 |
| ESLNR20 04-2.5-005 | 0.4 | 0.05 | 0.3  | 2.5 | 0.37 | 50  | 4      | 9.4  | 3.2                                   | 3.5 | 3.7  | 3.9 | 4.3 |
| ESLNR20 04-3-005   | 0.4 | 0.05 | 0.3  | 3   | 0.37 | 50  | 4      | 9    | 3.8                                   | 4   | 4.3  | 4.5 | 4.9 |
| ESLNR20 04-3.5-005 | 0.4 | 0.05 | 0.3  | 3.5 | 0.37 | 50  | 4      | 8.6  | 4.3                                   | 4.6 | 4.9  | 5.1 | 5.5 |
| ESLNR20 04-4-005   | 0.4 | 0.05 | 0.3  | 4   | 0.37 | 50  | 4      | 8.3  | 5                                     | 5.4 | 5.8  | 6.1 | 6.6 |
| ESLNR20 04-2-01    | 0.4 | 0.1  | 0.3  | 2   | 0.37 | 50  | 4      | 9.8  | 2.7                                   | 2.9 | 3.1  | 3.3 | 3.6 |
| ESLNR20 04-3-01    | 0.4 | 0.1  | 0.3  | 3   | 0.37 | 50  | 4      | 9    | 3.8                                   | 4   | 4.3  | 4.5 | 4.9 |
| ESLNR20 04-4-01    | 0.4 | 0.1  | 0.3  | 4   | 0.37 | 50  | 4      | 8.3  | 5                                     | 5.4 | 5.8  | 6.1 | 6.6 |
| ESLNR20 05-1-005   | 0.5 | 0.05 | 0.35 | 1   | 0.47 | 50  | 4      | 10.8 | 1.4                                   | 1.5 | 1.6  | 1.7 | 1.9 |

### ► Applicable Working Material

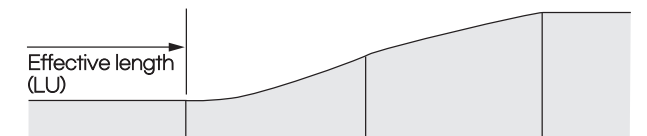
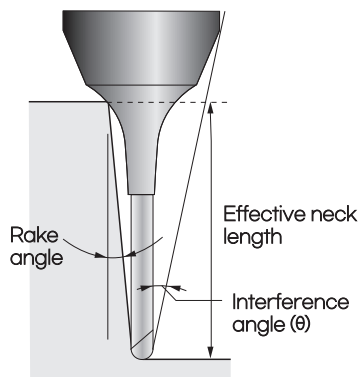
○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESLNR20

## 2 Flutes Long Neck Radius End Mill

Endmill



※ The marked effective neck length is the default value to prevent interference with the workpiece.

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

| EDP No           | DC  | RE   | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|------------------|-----|------|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|                  |     |      |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNR20 05-2-005 | 0.5 | 0.05 | 0.35 | 2  | 0.47 | 50  | 4       | 9.7  | 2.5                                   | 2.6  | 2.8  | 2.9  | 3.1  |
| ESLNR20 05-3-005 | 0.5 | 0.05 | 0.35 | 3  | 0.47 | 50  | 4       | 8.9  | 3.8                                   | 4    | 4.3  | 4.5  | 4.9  |
| ESLNR20 05-4-005 | 0.5 | 0.05 | 0.35 | 4  | 0.47 | 50  | 4       | 8.2  | 4.8                                   | 5.2  | 5.4  | 5.7  | 6.1  |
| ESLNR20 05-5-005 | 0.5 | 0.05 | 0.35 | 5  | 0.47 | 50  | 4       | 7.6  | 6.1                                   | 6.6  | 6.9  | 7.3  | 7.8  |
| ESLNR20 05-6-005 | 0.5 | 0.05 | 0.35 | 6  | 0.47 | 50  | 4       | 7    | 7.2                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNR20 05-1-01  | 0.5 | 0.1  | 0.35 | 1  | 0.47 | 50  | 4       | 10.8 | 1.4                                   | 1.5  | 1.6  | 1.7  | 1.9  |
| ESLNR20 05-2-01  | 0.5 | 0.1  | 0.35 | 2  | 0.47 | 50  | 4       | 9.8  | 2.5                                   | 2.6  | 2.8  | 2.9  | 3.1  |
| ESLNR20 05-3-01  | 0.5 | 0.1  | 0.35 | 3  | 0.47 | 50  | 4       | 8.9  | 3.8                                   | 4    | 4.3  | 4.5  | 4.9  |
| ESLNR20 05-4-01  | 0.5 | 0.1  | 0.35 | 4  | 0.47 | 50  | 4       | 8.2  | 4.8                                   | 5.2  | 5.4  | 5.7  | 6.1  |
| ESLNR20 05-5-01  | 0.5 | 0.1  | 0.35 | 5  | 0.47 | 50  | 4       | 7.6  | 6.1                                   | 6.5  | 6.9  | 7.2  | 7.8  |
| ESLNR20 05-6-01  | 0.5 | 0.1  | 0.35 | 6  | 0.47 | 50  | 4       | 7.1  | 7.2                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNR20 06-2-01  | 0.6 | 0.1  | 0.4  | 2  | 0.57 | 50  | 4       | 9.7  | 2.5                                   | 2.6  | 2.8  | 2.9  | 3.1  |
| ESLNR20 06-4-01  | 0.6 | 0.1  | 0.4  | 4  | 0.57 | 50  | 4       | 8.1  | 4.8                                   | 5.2  | 5.4  | 5.7  | 6.1  |
| ESLNR20 06-6-01  | 0.6 | 0.1  | 0.4  | 6  | 0.57 | 50  | 4       | 7    | 7.2                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNR20 06-8-01  | 0.6 | 0.1  | 0.4  | 8  | 0.57 | 50  | 4       | 6.1  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11   |
| ESLNR20 06-10-01 | 0.6 | 0.1  | 0.4  | 10 | 0.57 | 50  | 4       | 5.5  | 11.5                                  | 12.1 | 12.5 | 13   | 13.7 |
| ESLNR20 08-4-01  | 0.8 | 0.1  | 0.5  | 4  | 0.77 | 50  | 4       | 8    | 4.8                                   | 5.2  | 5.4  | 5.7  | 6.1  |
| ESLNR20 08-6-01  | 0.8 | 0.1  | 0.5  | 6  | 0.77 | 50  | 4       | 6.8  | 7                                     | 7.4  | 7.7  | 7.9  | 8.4  |
| ESLNR20 08-8-01  | 0.8 | 0.1  | 0.5  | 8  | 0.77 | 50  | 4       | 5.9  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.4 |
| ESLNR20 08-12-01 | 0.8 | 0.1  | 0.5  | 12 | 0.77 | 50  | 4       | 4.7  | 13.6                                  | 14.2 | 14.7 | 15.2 | 16   |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESLNR20 2 Flutes Long Neck Radius End Mill

Endmill

| EDP No           | DC  | RE  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|------------------|-----|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|                  |     |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNR20 08-4-02  | 0.8 | 0.2 | 0.5  | 4  | 0.77 | 50  | 4       | 8    | 4.8                                   | 5.1  | 5.4  | 5.6  | 6.1  |
| ESLNR20 08-6-02  | 0.8 | 0.2 | 0.5  | 6  | 0.77 | 50  | 4       | 6.9  | 7                                     | 7.3  | 7.7  | 7.9  | 8.4  |
| ESLNR20 10-4-01  | 1   | 0.1 | 0.8  | 4  | 0.94 | 50  | 4       | 7.7  | 4.7                                   | 4.9  | 5.1  | 5.2  | 5.5  |
| ESLNR20 10-6-01  | 1   | 0.1 | 0.8  | 6  | 0.94 | 50  | 4       | 6.6  | 7.1                                   | 7.4  | 7.7  | 8    | 8.5  |
| ESLNR20 10-8-01  | 1   | 0.1 | 0.8  | 8  | 0.94 | 50  | 4       | 5.7  | 9.2                                   | 9.6  | 9.9  | 10.2 | 10.8 |
| ESLNR20 10-10-01 | 1   | 0.1 | 0.8  | 10 | 0.94 | 50  | 4       | 5.1  | 11.6                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNR20 10-12-01 | 1   | 0.1 | 0.8  | 12 | 0.94 | 55  | 4       | 4.5  | 13.7                                  | 14.3 | 14.8 | 15.3 | 16   |
| ESLNR20 10-16-01 | 1   | 0.1 | 0.8  | 16 | 0.94 | 60  | 4       | 3.8  | 17.9                                  | 18.6 | 19.2 | 19.7 | 21.3 |
| ESLNR20 10-20-01 | 1   | 0.1 | 0.8  | 20 | 0.94 | 60  | 4       | 3.2  | 22                                    | 22.8 | 23.5 | 24   | 26.7 |
| ESLNR20 10-4-02  | 1   | 0.2 | 0.8  | 4  | 0.94 | 50  | 4       | 7.8  | 4.7                                   | 4.9  | 5.1  | 5.2  | 5.5  |
| ESLNR20 10-6-02  | 1   | 0.2 | 0.8  | 6  | 0.94 | 50  | 4       | 6.6  | 7.1                                   | 7.4  | 7.7  | 8    | 8.5  |
| ESLNR20 10-8-02  | 1   | 0.2 | 0.8  | 8  | 0.94 | 50  | 4       | 5.8  | 9.2                                   | 9.6  | 9.9  | 10.2 | 10.8 |
| ESLNR20 10-10-02 | 1   | 0.2 | 0.8  | 10 | 0.94 | 50  | 4       | 5.1  | 11.6                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNR20 10-12-02 | 1   | 0.2 | 0.8  | 12 | 0.94 | 55  | 4       | 4.6  | 13.7                                  | 14.3 | 14.8 | 15.2 | 16   |
| ESLNR20 10-16-02 | 1   | 0.2 | 0.8  | 16 | 0.94 | 60  | 4       | 3.8  | 17.9                                  | 18.6 | 19.2 | 19.7 | 21.3 |
| ESLNR20 10-20-02 | 1   | 0.2 | 0.8  | 20 | 0.94 | 60  | 4       | 3.2  | 22                                    | 22.8 | 23.5 | 24   | 26.6 |
| ESLNR20 10-6-03  | 1   | 0.3 | 0.8  | 6  | 0.94 | 50  | 4       | 6.7  | 7.1                                   | 7.4  | 7.7  | 8    | 8.4  |
| ESLNR20 10-10-03 | 1   | 0.3 | 0.8  | 10 | 0.94 | 50  | 4       | 5.1  | 11.5                                  | 12.1 | 12.6 | 13   | 13.7 |
| ESLNR20 10-16-03 | 1   | 0.3 | 0.8  | 16 | 0.94 | 60  | 4       | 3.8  | 17.9                                  | 18.6 | 19.1 | 19.6 | 21.3 |
| ESLNR20 10-20-03 | 1   | 0.3 | 0.8  | 20 | 0.94 | 60  | 4       | 3.2  | 22                                    | 22.8 | 23.5 | 24   | 26.6 |
| ESLNR20 15-4-01  | 1.5 | 0.1 | 1.35 | 4  | 1.42 | 50  | 4       | 7.2  | 4.8                                   | 4.9  | 5.1  | 5.3  | 5.5  |
| ESLNR20 15-8-01  | 1.5 | 0.1 | 1.35 | 8  | 1.42 | 50  | 4       | 5.2  | 9.2                                   | 9.6  | 10   | 10.3 | 10.8 |
| ESLNR20 15-12-01 | 1.5 | 0.1 | 1.35 | 12 | 1.42 | 55  | 4       | 4    | 13.4                                  | 13.9 | 14.3 | 14.7 | 16.1 |
| ESLNR20 15-15-01 | 1.5 | 0.1 | 1.35 | 15 | 1.42 | 55  | 4       | 3.5  | 16.9                                  | 17.6 | 18.1 | 18.6 | 20.1 |
| ESLNR20 15-20-01 | 1.5 | 0.1 | 1.35 | 20 | 1.42 | 60  | 4       | 2.8  | 22.1                                  | 22.9 | 23.5 | 24.1 | -    |
| ESLNR20 15-4-02  | 1.5 | 0.2 | 1.35 | 4  | 1.42 | 50  | 4       | 7.3  | 4.7                                   | 4.9  | 5.1  | 5.3  | 5.5  |
| ESLNR20 15-8-02  | 1.5 | 0.2 | 1.35 | 8  | 1.42 | 50  | 4       | 5.2  | 9.2                                   | 9.6  | 10   | 10.3 | 10.8 |
| ESLNR20 15-12-02 | 1.5 | 0.2 | 1.35 | 12 | 1.42 | 55  | 4       | 4.1  | 13.4                                  | 13.9 | 14.3 | 14.7 | 16.1 |
| ESLNR20 15-15-02 | 1.5 | 0.2 | 1.35 | 15 | 1.42 | 55  | 4       | 3.5  | 16.9                                  | 17.5 | 18.1 | 18.6 | 20   |
| ESLNR20 15-20-02 | 1.5 | 0.2 | 1.35 | 20 | 1.42 | 60  | 4       | 2.8  | 22.1                                  | 22.9 | 23.5 | 24.1 | -    |
| ESLNR20 15-8-03  | 1.5 | 0.3 | 1.35 | 8  | 1.42 | 50  | 4       | 5.2  | 9.2                                   | 9.6  | 10   | 10.3 | 10.8 |
| ESLNR20 15-15-03 | 1.5 | 0.3 | 1.35 | 15 | 1.42 | 55  | 4       | 3.5  | 16.9                                  | 17.5 | 18.1 | 18.6 | 20   |
| ESLNR20 15-20-03 | 1.5 | 0.3 | 1.35 | 20 | 1.42 | 60  | 4       | 2.8  | 22.1                                  | 22.9 | 23.5 | 24   | -    |
| ESLNR20 20-6-02  | 2   | 0.2 | 1.7  | 6  | 1.92 | 50  | 4       | 5.4  | 6.8                                   | 7.1  | 7.3  | 7.5  | 8.1  |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 |        |          |          |                 |                      |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESLNR20

## 2 Flutes Long Neck Radius End Mill

Endmill

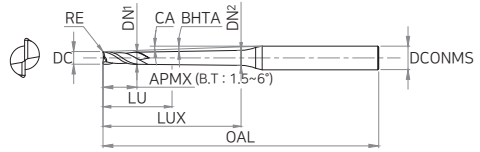
| EDP No                            | DC | RE  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|-----------------------------------|----|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|                                   |    |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNR20 20-8-02                   | 2  | 0.2 | 1.7  | 8  | 1.92 | 50  | 4       | 4.6  | 8.9                                   | 9.2  | 9.4  | 9.7  | 10.8 |
| ESLNR20 20-12-02                  | 2  | 0.2 | 1.7  | 12 | 1.92 | 55  | 4       | 3.5  | 13.4                                  | 13.9 | 14.3 | 14.7 | 16.1 |
| ESLNR20 20-16-02                  | 2  | 0.2 | 1.7  | 16 | 1.92 | 55  | 4       | 2.8  | 17.6                                  | 18.1 | 18.6 | 19.3 | -    |
| Zamus Star<br>ESLNR20 20-20-02    | 2  | 0.2 | 1.7  | 20 | 1.92 | 60  | 4       | 2.4  | 22.1                                  | 22.9 | 23.5 | 24.1 | -    |
| ESLNR20 20-25-02                  | 2  | 0.2 | 1.7  | 25 | 1.92 | 65  | 4       | 2    | 27.3                                  | 28.2 | 28.8 | -    | -    |
| ESLNR20 20-30-02                  | 2  | 0.2 | 1.7  | 30 | 1.92 | 70  | 4       | 1.7  | 32.5                                  | 33.4 | 34.4 | -    | -    |
| E-Star<br>ESLNR20 20-8-03         | 2  | 0.3 | 1.7  | 8  | 1.92 | 50  | 4       | 4.6  | 8.9                                   | 9.2  | 9.4  | 9.7  | 10.7 |
| ESLNR20 20-16-03                  | 2  | 0.3 | 1.7  | 16 | 1.92 | 55  | 4       | 2.8  | 17.6                                  | 18.1 | 18.6 | 19.3 | -    |
| ESLNR20 20-20-03                  | 2  | 0.3 | 1.7  | 20 | 1.92 | 60  | 4       | 2.4  | 22.1                                  | 22.9 | 23.5 | 24   | -    |
| ESLNR20 20-6-05                   | 2  | 0.5 | 1.7  | 6  | 1.92 | 50  | 4       | 5.5  | 6.8                                   | 7.1  | 7.3  | 7.4  | 8    |
| U-Wing<br>ESLNR20 20-8-05         | 2  | 0.5 | 1.7  | 8  | 1.92 | 50  | 4       | 4.7  | 8.9                                   | 9.2  | 9.4  | 9.6  | 10.7 |
| ESLNR20 20-12-05                  | 2  | 0.5 | 1.7  | 12 | 1.92 | 55  | 4       | 3.5  | 13.4                                  | 13.9 | 14.3 | 14.6 | 16   |
| ESLNR20 20-16-05                  | 2  | 0.5 | 1.7  | 16 | 1.92 | 55  | 4       | 2.9  | 17.6                                  | 18.1 | 18.6 | 19.2 | -    |
| Zamus Thunder<br>ESLNR20 20-20-05 | 2  | 0.5 | 1.7  | 20 | 1.92 | 60  | 4       | 2.4  | 22.1                                  | 22.9 | 23.5 | 24   | -    |
| ESLNR20 20-25-05                  | 2  | 0.5 | 1.7  | 25 | 1.92 | 65  | 4       | 2    | 27.3                                  | 28.1 | 28.8 | -    | -    |
| ESLNR20 20-30-05                  | 2  | 0.5 | 1.7  | 30 | 1.92 | 70  | 4       | 1.7  | 32.5                                  | 33.4 | 34.3 | -    | -    |
| ESLNR20 20-8-08                   | 2  | 0.8 | 1.7  | 8  | 1.92 | 50  | 4       | 4.8  | 8.9                                   | 9.2  | 9.4  | 9.6  | 10.6 |
| X-Star<br>ESLNR20 20-16-08        | 2  | 0.8 | 1.7  | 16 | 1.92 | 55  | 4       | 2.9  | 17.6                                  | 18.1 | 18.6 | 19.2 | -    |
| ESLNR20 20-20-08                  | 2  | 0.8 | 1.7  | 20 | 1.92 | 60  | 4       | 2.4  | 22.1                                  | 22.8 | 23.5 | 24   | -    |
| ESLNR20 30-8-02                   | 3  | 0.2 | 2.5  | 8  | 2.86 | 55  | 6       | 5.7  | 9                                     | 9.3  | 9.5  | 9.9  | 10.9 |
| S-Wing<br>ESLNR20 30-12-02        | 3  | 0.2 | 2.5  | 12 | 2.86 | 60  | 6       | 4.5  | 13.1                                  | 13.5 | 14   | 14.7 | 16.2 |
| ESLNR20 30-16-02                  | 3  | 0.2 | 2.5  | 16 | 2.86 | 60  | 6       | 3.8  | 17.7                                  | 18.2 | 18.7 | 19.5 | 21.6 |
| ESLNR20 30-20-02                  | 3  | 0.2 | 2.5  | 20 | 2.86 | 65  | 6       | 3.2  | 21.8                                  | 22.4 | 23.1 | 24.2 | 26.9 |
| ESLNR20 30-30-02                  | 3  | 0.2 | 2.5  | 30 | 2.86 | 75  | 6       | 2.4  | 32.6                                  | 33.5 | 34.5 | 36.2 | -    |
| A-Wing<br>ESLNR20 30-35-02        | 3  | 0.2 | 2.5  | 35 | 2.86 | 80  | 6       | 2.1  | 37.7                                  | 38.7 | 40.2 | 42.2 | -    |
| ESLNR20 30-8-03                   | 3  | 0.3 | 2.5  | 8  | 2.86 | 55  | 6       | 5.7  | 9                                     | 9.3  | 9.5  | 9.9  | 10.9 |
| ESLNR20 30-16-03                  | 3  | 0.3 | 2.5  | 16 | 2.86 | 60  | 6       | 3.8  | 17.7                                  | 18.2 | 18.7 | 19.4 | 21.5 |
| Standard<br>ESLNR20 30-20-03      | 3  | 0.3 | 2.5  | 20 | 2.86 | 65  | 6       | 3.2  | 21.8                                  | 22.4 | 23.1 | 24.2 | 26.8 |
| ESLNR20 30-30-03                  | 3  | 0.3 | 2.5  | 30 | 2.86 | 75  | 6       | 2.4  | 32.6                                  | 33.5 | 34.5 | 36.2 | -    |
| ESLNR20 30-8-05                   | 3  | 0.5 | 2.5  | 8  | 2.86 | 55  | 6       | 5.8  | 9                                     | 9.3  | 9.5  | 9.8  | 10.8 |
| Copper-Mate<br>ESLNR20 30-12-05   | 3  | 0.5 | 2.5  | 12 | 2.86 | 60  | 6       | 4.6  | 13.1                                  | 13.5 | 13.9 | 14.6 | 16.2 |
| ESLNR20 30-16-05                  | 3  | 0.5 | 2.5  | 16 | 2.86 | 60  | 6       | 3.8  | 17.7                                  | 18.2 | 18.7 | 19.4 | 21.5 |
| ESLNR20 30-20-05                  | 3  | 0.5 | 2.5  | 20 | 2.86 | 65  | 6       | 3.2  | 21.8                                  | 22.4 | 23.1 | 24.2 | 26.8 |
| ESLNR20 30-30-05                  | 3  | 0.5 | 2.5  | 30 | 2.86 | 75  | 6       | 2.4  | 32.6                                  | 33.5 | 34.5 | 36.1 | -    |
| Gra-Mate<br>ESLNR20 30-35-05      | 3  | 0.5 | 2.5  | 35 | 2.86 | 80  | 6       | 2.1  | 37.7                                  | 38.7 | 40.2 | 42.1 | -    |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

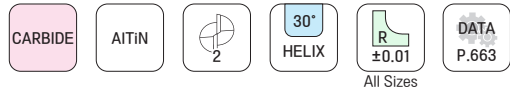
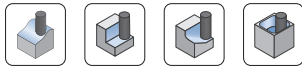
| H               |                 | P               |               |                   | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|---------------|-------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel   | Prehardened Steel | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | HB225<br>~325 | Steel<br>HRc30~50 |                      |        |          |          |                 |                      |
| ◎               | ○               |                 | ○             | ◎                 |                      |        |          |          |                 |                      |

# ESTNR20 2 Flutes Tapered Neck Radius End Mill



► Tolerance

| DC        |            | Shank Dia |
|-----------|------------|-----------|
| All Sizes | 0 ~ -0.012 | h5        |



| EDP No             | DC  | RE   | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCONMS | LU   | BHTA | Effective length by inclination angle |      |      |      |      |
|--------------------|-----|------|------|-----|-----|-----------------|-----------------|-----|--------|------|------|---------------------------------------|------|------|------|------|
|                    |     |      |      |     |     |                 |                 |     |        |      |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESTNR20 02-2-09005 | 0.2 | 0.05 | 0.15 | 2   | 0.9 | 0.17            | 0.23            | 50  | 4      | 1.1  | 10   | -                                     | 2.8  | 3.1  | 3.4  | 3.9  |
| ESTNR20 04-4-09005 | 0.4 | 0.05 | 0.3  | 4   | 0.9 | 0.37            | 0.49            | 50  | 4      | 1.25 | 8.4  | -                                     | 4.9  | 5.3  | 5.7  | 6.3  |
| ESTNR20 04-5-09005 | 0.4 | 0.05 | 0.3  | 5   | 0.9 | 0.37            | 0.52            | 50  | 4      | 1.25 | 7.8  | -                                     | 5.9  | 6.4  | 6.8  | 7.5  |
| ESTNR20 04-4-0901  | 0.4 | 0.1  | 0.3  | 4   | 0.9 | 0.37            | 0.49            | 50  | 4      | 1.25 | 8.5  | -                                     | 4.9  | 5.3  | 5.7  | 6.3  |
| ESTNR20 04-5-0901  | 0.4 | 0.1  | 0.3  | 5   | 0.9 | 0.37            | 0.52            | 50  | 4      | 1.25 | 7.9  | -                                     | 5.9  | 6.4  | 6.8  | 7.5  |
| ESTNR20 05-5-0901  | 0.5 | 0.1  | 0.35 | 5   | 0.9 | 0.47            | 0.62            | 50  | 4      | 1.3  | 7.8  | -                                     | 5.9  | 6.4  | 6.8  | 7.5  |
| ESTNR20 05-8-0901  | 0.5 | 0.1  | 0.35 | 8   | 0.9 | 0.47            | 0.71            | 50  | 4      | 1.3  | 6.4  | -                                     | 9    | 9.7  | 10.2 | 11   |
| ESTNR20 05-10-0901 | 0.5 | 0.1  | 0.35 | 10  | 0.9 | 0.47            | 0.77            | 55  | 4      | 1.3  | 5.8  | -                                     | 11   | 11.8 | 12.4 | 13.2 |
| ESTNR20 06-12-0901 | 0.6 | 0.1  | 0.4  | 12  | 0.9 | 0.57            | 0.93            | 55  | 4      | 1.35 | 5.1  | -                                     | 13   | 13.9 | 14.5 | 15.5 |
| ESTNR20 06-15-0901 | 0.6 | 0.1  | 0.4  | 15  | 0.9 | 0.57            | 1.3             | 55  | 4      | 1.35 | 4.5  | -                                     | 16.1 | 17.1 | 17.8 | 18.8 |
| ESTNR20 08-6-0402  | 0.8 | 0.2  | 0.5  | 6   | 0.4 | 0.77            | 0.85            | 50  | 4      | 2.64 | 7    | 6.6                                   | 7.1  | 7.5  | 7.8  | 8.3  |
| ESTNR20 08-12-0902 | 0.8 | 0.2  | 0.5  | 12  | 0.9 | 0.77            | 1.13            | 55  | 4      | 1.45 | 5    | -                                     | 13   | 13.9 | 14.5 | 15.5 |
| ESTNR20 10-8-0402  | 1   | 0.2  | 0.8  | 8   | 0.4 | 0.94            | 1.4             | 55  | 6      | 5.09 | 7.4  | 8.8                                   | 9.3  | 9.7  | 10.1 | 10.6 |
| ESTNR20 10-10-0902 | 1   | 0.2  | 0.8  | 10  | 0.9 | 0.94            | 1.23            | 55  | 6      | 5.09 | 6.8  | -                                     | 11.2 | 11.9 | 12.4 | 13.3 |
| ESTNR20 10-15-0902 | 1   | 0.2  | 0.8  | 15  | 0.9 | 0.94            | 1.39            | 60  | 6      | 2.7  | 5.6  | -                                     | 16.3 | 17.2 | 17.8 | 18.8 |
| ESTNR20 10-20-0902 | 1   | 0.2  | 0.8  | 20  | 0.9 | 0.94            | 1.54            | 65  | 6      | 2.7  | 4.8  | -                                     | 21.3 | 22.4 | 23.2 | 24.7 |
| ESTNR20 10-25-0902 | 1   | 0.2  | 0.8  | 25  | 0.9 | 0.94            | 1.7             | 70  | 6      | 2.7  | 4.1  | -                                     | 26.4 | 27.6 | 28.5 | 30.9 |
| ESTNR20 10-30-0902 | 1   | 0.2  | 0.8  | 30  | 0.9 | 0.94            | 1.86            | 75  | 6      | 2.7  | 3.7  | -                                     | 31.5 | 32.8 | 33.7 | 37   |
| ESTNR20 10-35-0902 | 1   | 0.2  | 0.8  | 35  | 0.9 | 0.94            | 2.2             | 80  | 6      | 2.7  | 3.3  | -                                     | 36.5 | 38   | 39   | 43.2 |
| ESTNR20 10-8-0403  | 1   | 0.3  | 0.8  | 8   | 0.4 | 0.94            | 1.4             | 55  | 6      | 2.7  | 7.4  | 8.8                                   | 9.3  | 9.7  | 10   | 10.6 |

► Applicable Working Material

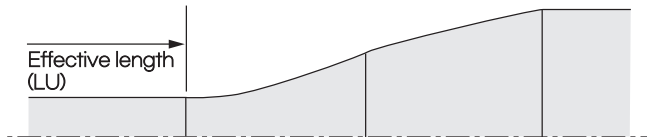
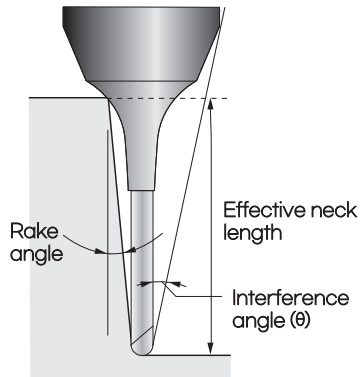
○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESTNR20

## 2 Flutes Tapered Neck Radius End Mill

Endmill



※ The marked effective neck length is the default value to prevent interference with the workpiece.

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

| EDP No             | DC  | RE  | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU   | BHTA | Effective length by inclination angle |      |      |      |      |
|--------------------|-----|-----|------|-----|-----|-----------------|-----------------|-----|---------|------|------|---------------------------------------|------|------|------|------|
|                    |     |     |      |     |     |                 |                 |     |         |      |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESTNR20 10-15-0903 | 1   | 0.3 | 0.8  | 15  | 0.9 | 0.94            | 1.39            | 60  | 6       | 2.7  | 5.6  | -                                     | 16.3 | 17.2 | 17.8 | 18.8 |
| ESTNR20 10-25-0903 | 1   | 0.3 | 0.8  | 25  | 0.9 | 0.94            | 1.7             | 70  | 6       | 2.7  | 4.2  | -                                     | 26.4 | 27.6 | 28.5 | 30.8 |
| ESTNR20 10-30-0903 | 1   | 0.3 | 0.8  | 30  | 0.9 | 0.94            | 1.86            | 75  | 6       | 2.7  | 3.7  | -                                     | 31.5 | 32.8 | 33.7 | 37   |
| ESTNR20 15-10-0402 | 1.5 | 0.2 | 1.35 | 10  | 0.4 | 1.42            | 1.54            | 55  | 6       | 7.07 | 6.4  | 11                                    | 11.5 | 11.9 | 12.3 | 13   |
| ESTNR20 15-15-0902 | 1.5 | 0.2 | 1.35 | 15  | 0.9 | 1.42            | 1.85            | 60  | 6       | 7.07 | 5.3  | -                                     | 16.4 | 17.3 | 17.9 | 18.9 |
| ESTNR20 15-20-0902 | 1.5 | 0.2 | 1.35 | 20  | 0.9 | 1.42            | 2.1             | 65  | 6       | 3.89 | 4.5  | -                                     | 21.5 | 22.5 | 23.2 | 24.9 |
| ESTNR20 15-25-0902 | 1.5 | 0.2 | 1.35 | 25  | 0.9 | 1.42            | 2.16            | 70  | 6       | 3.89 | 3.9  | -                                     | 26.6 | 27.7 | 28.5 | 31   |
| ESTNR20 15-30-0902 | 1.5 | 0.2 | 1.35 | 30  | 0.9 | 1.42            | 2.32            | 75  | 6       | 3.89 | 3.4  | -                                     | 31.6 | 32.9 | 33.8 | 37.1 |
| ESTNR20 15-10-0403 | 1.5 | 0.3 | 1.35 | 10  | 0.4 | 1.42            | 1.54            | 55  | 6       | 3.89 | 6.4  | 11                                    | 11.5 | 11.9 | 12.3 | 13   |
| ESTNR20 15-20-0903 | 1.5 | 0.3 | 1.35 | 20  | 0.9 | 1.42            | 2.1             | 65  | 6       | 3.89 | 4.5  | -                                     | 21.5 | 22.5 | 23.2 | 24.8 |
| ESTNR20 15-25-0903 | 1.5 | 0.3 | 1.35 | 25  | 0.9 | 1.42            | 2.16            | 70  | 6       | 3.89 | 3.9  | -                                     | 26.5 | 27.7 | 28.5 | 31   |
| ESTNR20 15-30-0903 | 1.5 | 0.3 | 1.35 | 30  | 0.9 | 1.42            | 2.32            | 75  | 6       | 3.89 | 3.4  | -                                     | 31.6 | 32.9 | 33.8 | 37.1 |
| ESTNR20 20-30-0902 | 2   | 0.2 | 1.7  | 30  | 0.9 | 1.92            | 2.81            | 70  | 6       | 7.42 | 3.1  | -                                     | 31.6 | 32.9 | 33.8 | 37.2 |
| ESTNR20 20-40-0902 | 2   | 0.2 | 1.7  | 40  | 0.9 | 1.92            | 3.12            | 80  | 6       | 7.42 | 2.5  | -                                     | 41.8 | 43.3 | 44.6 | -    |
| ESTNR20 20-50-0902 | 2   | 0.2 | 1.7  | 50  | 0.9 | 1.92            | 3.44            | 90  | 6       | 7.42 | 2.1  | -                                     | 51.9 | 53.6 | 55.7 | -    |
| ESTNR20 20-12-0403 | 2   | 0.3 | 1.7  | 12  | 0.4 | 1.92            | 2.06            | 55  | 6       | 7.42 | 5.5  | 13                                    | 13.6 | 14.1 | 14.5 | 15.6 |
| ESTNR20 20-20-0903 | 2   | 0.3 | 1.7  | 20  | 0.9 | 1.92            | 2.5             | 65  | 6       | 4.24 | 4.1  | -                                     | 21.5 | 22.5 | 23.2 | 24.9 |
| ESTNR20 20-30-0903 | 2   | 0.3 | 1.7  | 30  | 0.9 | 1.92            | 2.81            | 70  | 6       | 4.24 | 3.1  | -                                     | 31.6 | 32.9 | 33.8 | 37.1 |
| ESTNR20 20-40-0903 | 2   | 0.3 | 1.7  | 40  | 0.9 | 1.92            | 3.12            | 80  | 6       | 4.24 | 2.5  | -                                     | 41.7 | 43.3 | 44.6 | -    |
| ESTNR20 20-50-0903 | 2   | 0.3 | 1.7  | 50  | 0.9 | 1.92            | 3.44            | 90  | 6       | 4.24 | 2.1  | -                                     | 51.8 | 53.6 | 55.7 | -    |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESTNR20

## 2 Flutes Tapered Neck Radius End Mill

Endmill

| EDP No             | DC | RE  | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU   | BHTA | Effective length by inclination angle |      |      |      |      |
|--------------------|----|-----|------|-----|-----|-----------------|-----------------|-----|---------|------|------|---------------------------------------|------|------|------|------|
|                    |    |     |      |     |     |                 |                 |     |         |      |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESTNR20 20-8-0405  | 2  | 0.5 | 1.7  | 8   | 0.4 | 1.92            | 2.01            | 50  | 6       | 4.24 | 6.8  | 8.7                                   | 9    | 9.3  | 9.5  | 10.4 |
| ESTNR20 20-12-0405 | 2  | 0.5 | 1.7  | 12  | 0.4 | 1.92            | 2.06            | 55  | 6       | 4.24 | 5.6  | 13                                    | 13.6 | 14.1 | 14.4 | 15.5 |
| ESTNR20 20-16-0405 | 2  | 0.5 | 1.7  | 16  | 0.4 | 1.92            | 2.12            | 60  | 6       | 4.24 | 4.7  | 17                                    | 17.8 | 18.3 | 18.7 | 20.7 |
| ESTNR20 20-20-0905 | 2  | 0.5 | 1.7  | 20  | 0.9 | 1.92            | 2.5             | 65  | 6       | 4.24 | 4.2  | -                                     | 21.5 | 22.5 | 23.2 | 24.8 |
| ESTNR20 20-25-0905 | 2  | 0.5 | 1.7  | 25  | 0.9 | 1.92            | 2.65            | 65  | 6       | 4.24 | 3.6  | -                                     | 26.6 | 27.7 | 28.5 | 30.9 |
| ESTNR20 20-30-0905 | 2  | 0.5 | 1.7  | 30  | 0.9 | 1.92            | 2.81            | 70  | 6       | 4.24 | 3.1  | -                                     | 31.6 | 32.9 | 33.8 | 37.1 |
| ESTNR20 20-40-0905 | 2  | 0.5 | 1.7  | 40  | 0.9 | 1.92            | 3.12            | 80  | 6       | 4.24 | 2.5  | -                                     | 41.7 | 43.2 | 44.6 | -    |
| ESTNR20 20-50-0905 | 2  | 0.5 | 1.7  | 50  | 0.9 | 1.92            | 3.44            | 90  | 6       | 4.24 | 2.1  | -                                     | 51.8 | 53.6 | 55.6 | -    |
| ESTNR20 30-40-0902 | 3  | 0.2 | 2.5  | 40  | 0.9 | 2.86            | 4.04            | 80  | 6       | 6.95 | 2    | -                                     | 42   | 43.4 | -    | -    |
| ESTNR20 30-50-0902 | 3  | 0.2 | 2.5  | 50  | 0.9 | 2.86            | 4.35            | 90  | 6       | 6.95 | 1.6  | -                                     | 52.1 | 53.7 | -    | -    |
| ESTNR20 30-60-0902 | 3  | 0.2 | 2.5  | 60  | 0.9 | 2.86            | 4.67            | 100 | 6       | 6.95 | 1.4  | -                                     | 62.2 | -    | -    | -    |
| ESTNR20 30-40-0903 | 3  | 0.3 | 2.5  | 40  | 0.9 | 2.86            | 4.04            | 80  | 6       | 6.95 | 2    | -                                     | 42   | 43.4 | -    | -    |
| ESTNR20 30-50-0903 | 3  | 0.3 | 2.5  | 50  | 0.9 | 2.86            | 4.35            | 90  | 6       | 6.95 | 1.7  | -                                     | 52.1 | 53.7 | -    | -    |
| ESTNR20 30-60-0903 | 3  | 0.3 | 2.5  | 60  | 0.9 | 2.86            | 4.67            | 100 | 6       | 6.95 | 1.4  | -                                     | 62.2 | -    | -    | -    |
| ESTNR20 30-40-0905 | 3  | 0.5 | 2.5  | 40  | 0.9 | 2.86            | 4.04            | 80  | 6       | 6.95 | 2    | -                                     | 42   | 43.4 | -    | -    |
| ESTNR20 30-50-0905 | 3  | 0.5 | 2.5  | 50  | 0.9 | 2.86            | 4.35            | 90  | 6       | 6.95 | 1.7  | -                                     | 52.1 | 53.7 | -    | -    |
| ESTNR20 30-60-0905 | 3  | 0.5 | 2.5  | 60  | 0.9 | 2.86            | 4.67            | 100 | 6       | 6.95 | 1.4  | -                                     | 62.1 | -    | -    | -    |

- Zamus Star
- E-Star
- U-Wing
- Zamus Thunder
- X-Star
- S-Wing
- A-Wing
- Standard
- Copper-Mate
- Gra-Mate

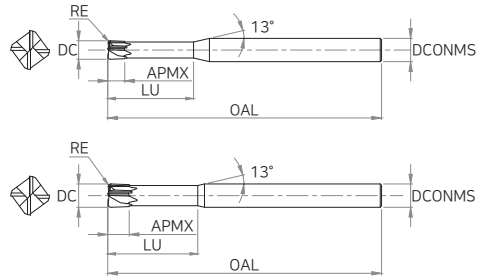
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

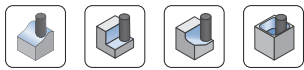
# ESPM4 4 Flutes Neck Radius End Mill For High Speed Machining

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



| EDP No        | DC | RE  | APMX | LU | OAL | DCONMS |
|---------------|----|-----|------|----|-----|--------|
| ESPM4 030-05  | 3  | 0.5 | 1.2  | 8  | 50  | 6      |
| ESPM4 040-05  | 4  | 0.5 | 1.5  | 10 | 50  | 6      |
| ESPM4 060-05  | 6  | 0.5 | 2.5  | 12 | 60  | 6      |
| ESPM4 060-10  | 6  | 1   | 2.5  | 12 | 60  | 6      |
| ESPM4 060-15  | 6  | 1.5 | 2.5  | 12 | 60  | 6      |
| ESPM4 060-15L | 6  | 1.5 | 2.5  | 12 | 90  | 6      |
| ESPM4 080-10  | 8  | 1   | 3.5  | 16 | 60  | 8      |
| ESPM4 080-20  | 8  | 2   | 3.5  | 16 | 60  | 8      |
| ESPM4 080-20L | 8  | 2   | 3.5  | 16 | 100 | 8      |
| ESPM4 100-10  | 10 | 1   | 4    | 20 | 70  | 10     |
| ESPM4 100-20  | 10 | 2   | 4    | 20 | 70  | 10     |
| ESPM4 100-20L | 10 | 2   | 4    | 20 | 100 | 10     |
| ESPM4 120-20  | 12 | 2   | 5    | 25 | 80  | 12     |
| ESPM4 120-30  | 12 | 3   | 5    | 25 | 80  | 12     |
| ESPM4 120-30L | 12 | 3   | 5    | 25 | 110 | 12     |

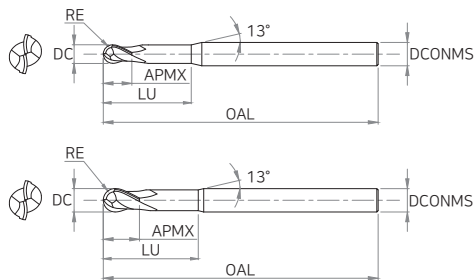
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | ~HB225       | HB225<br>~325 | HRc30-50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESB702 2 Flutes Neck Ball End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



CARBIDE
AITiN
2
30° HELIX
R ±0.005 R3 OR UNDER
R ±0.008 ABOVE R3
DATA P.666

| EDP No       | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No       | DC | RE  | APMX | LU | OAL | DCON MS |
|--------------|-----|------|------|----|-----|---------|--------------|----|-----|------|----|-----|---------|
| ESB702 001   | 0.1 | 0.05 | 0.15 | -  | 40  | 4       | ESB702 030S  | 3  | 1.5 | 4    | 10 | 50  | 6       |
| ESB702 002   | 0.2 | 0.1  | 0.3  | -  | 40  | 4       | ESB702 030S4 | 3  | 1.5 | 4    | -  | 45  | 4       |
| ESB702 003   | 0.3 | 0.15 | 0.5  | -  | 40  | 4       | ESB702 031   | 3  | 1.5 | 4    | 10 | 70  | 6       |
| ESB702 004   | 0.4 | 0.2  | 0.6  | -  | 40  | 4       | ESB702 040   | 4  | 2   | 5    | 10 | 60  | 6       |
| ESB702 005   | 0.5 | 0.25 | 0.7  | -  | 40  | 4       | ESB702 040S  | 4  | 2   | 5    | 10 | 50  | 6       |
| ESB702 006   | 0.6 | 0.3  | 0.9  | -  | 40  | 4       | ESB702 040S4 | 4  | 2   | 5    | -  | 45  | 4       |
| ESB702 007   | 0.7 | 0.35 | 1.1  | -  | 40  | 4       | ESB702 041   | 4  | 2   | 5    | 10 | 70  | 6       |
| ESB702 008   | 0.8 | 0.4  | 1.2  | -  | 40  | 4       | ESB702 050   | 5  | 2.5 | 6    | 12 | 60  | 6       |
| ESB702 009   | 0.9 | 0.45 | 1.4  | -  | 40  | 4       | ESB702 060   | 6  | 3   | 7    | 12 | 60  | 6       |
| ESB702 010   | 1   | 0.5  | 1.5  | 3  | 50  | 6       | ESB702 061   | 6  | 3   | 7    | 12 | 90  | 6       |
| ESB702 010S4 | 1   | 0.5  | 1.5  | -  | 45  | 4       | ESB702 080   | 8  | 4   | 9    | 15 | 70  | 8       |
| ESB702 015   | 1.5 | 0.75 | 2    | 4  | 50  | 6       | ESB702 081   | 8  | 4   | 9    | 15 | 100 | 8       |
| ESB702 015S4 | 1.5 | 0.75 | 2    | -  | 45  | 4       | ESB702 100   | 10 | 5   | 11   | 25 | 75  | 10      |
| ESB702 020   | 2   | 1    | 2.5  | 5  | 50  | 6       | ESB702 101   | 10 | 5   | 11   | 25 | 100 | 10      |
| ESB702 020S4 | 2   | 1    | 2.5  | -  | 45  | 4       | ESB702 120   | 12 | 6   | 12   | 25 | 80  | 12      |
| ESB702 025   | 2.5 | 1.25 | 3    | 7  | 50  | 6       | ESB702 121   | 12 | 6   | 12   | 25 | 110 | 12      |
| ESB702 030   | 3   | 1.5  | 4    | 10 | 60  | 6       |              |    |     |      |    |     |         |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

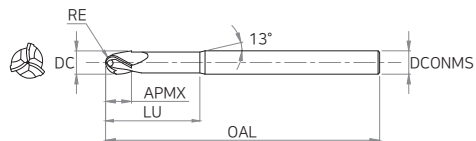
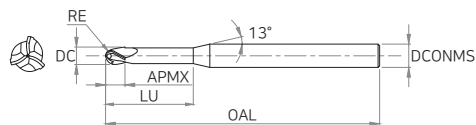
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESB703 3 Flutes Neck Ball End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 | h5        |
| Ø8 ~ Ø12 | 0 ~ -0.015 |           |



CARBIDE
AITIN
3
30° HELIX
R ±0.005 R3 OR UNDER
R ±0.008 ABOVE R3
DATA P.667

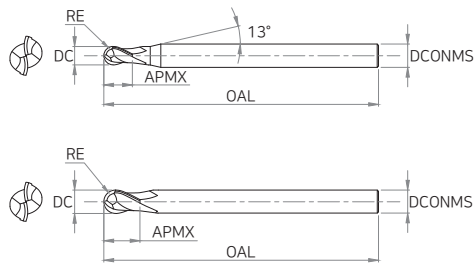
| EDP No      | DC  | RE   | APMX | LU | OAL | DCONMS |
|-------------|-----|------|------|----|-----|--------|
| ESB703 020  | 2   | 1    | 2.5  | 5  | 50  | 6      |
| ESB703 025  | 2.5 | 1.25 | 3    | 7  | 50  | 6      |
| ESB703 030  | 3   | 1.5  | 4    | 10 | 60  | 6      |
| ESB703 030S | 3   | 1.5  | 4    | 10 | 50  | 6      |
| ESB703 031  | 3   | 1.5  | 4    | 10 | 70  | 6      |
| ESB703 040  | 4   | 2    | 5    | 10 | 60  | 6      |
| ESB703 040S | 4   | 2    | 5    | 10 | 50  | 6      |
| ESB703 041  | 4   | 2    | 5    | 10 | 70  | 6      |
| ESB703 050  | 5   | 2.5  | 6    | 12 | 60  | 6      |
| ESB703 060  | 6   | 3    | 7    | 12 | 60  | 6      |
| ESB703 061  | 6   | 3    | 7    | 12 | 90  | 6      |
| ESB703 080  | 8   | 4    | 9    | 15 | 70  | 8      |
| ESB703 081  | 8   | 4    | 9    | 15 | 100 | 8      |
| ESB703 100  | 10  | 5    | 11   | 25 | 75  | 10     |
| ESB703 101  | 10  | 5    | 11   | 25 | 100 | 10     |
| ESB703 120  | 12  | 6    | 12   | 25 | 80  | 12     |
| ESB703 121  | 12  | 6    | 12   | 25 | 110 | 12     |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

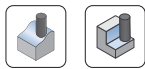
| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESB712 2 Flutes Ball End Mill



### ► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~Ø6      | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



| EDP No       | DC  | RE   | APMX | OAL | DCON MS | EDP No       | DC | RE  | APMX | OAL | DCON MS |
|--------------|-----|------|------|-----|---------|--------------|----|-----|------|-----|---------|
| ESB712 010   | 1   | 0.5  | 2.5  | 50  | 6       | ESB712 030S4 | 3  | 1.5 | 8    | 60  | 4       |
| ESB712 010S  | 1   | 0.5  | 1.5  | 40  | 6       | ESB712 040   | 4  | 2   | 8    | 70  | 6       |
| ESB712 010S4 | 1   | 0.5  | 2.5  | 50  | 4       | ESB712 040S  | 4  | 2   | 6    | 50  | 6       |
| ESB712 012   | 1.2 | 0.6  | 3    | 50  | 6       | ESB712 050   | 5  | 2.5 | 10   | 80  | 6       |
| ESB712 015   | 1.5 | 0.75 | 4    | 50  | 6       | ESB712 050S  | 5  | 2.5 | 7.5  | 50  | 6       |
| ESB712 015S  | 1.5 | 0.75 | 2.5  | 40  | 6       | ESB712 060   | 6  | 3   | 12   | 90  | 6       |
| ESB712 015S4 | 1.5 | 0.75 | 4    | 50  | 4       | ESB712 060S  | 6  | 3   | 9    | 50  | 6       |
| ESB712 020   | 2   | 1    | 5    | 50  | 6       | ESB712 080S  | 8  | 4   | 12   | 50  | 8       |
| ESB712 020S  | 2   | 1    | 3    | 40  | 6       | ESB712 081   | 8  | 4   | 14   | 100 | 8       |
| ESB712 020S4 | 2   | 1    | 5    | 50  | 4       | ESB712 100   | 10 | 5   | 18   | 100 | 10      |
| ESB712 025   | 2.5 | 1.25 | 7    | 60  | 6       | ESB712 100S  | 10 | 5   | 15   | 60  | 10      |
| ESB712 030   | 3   | 1.5  | 8    | 60  | 6       | ESB712 120   | 12 | 6   | 22   | 110 | 12      |
| ESB712 030S  | 3   | 1.5  | 4.5  | 50  | 6       | ESB712 120S  | 12 | 6   | 18   | 60  | 12      |

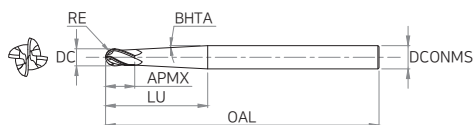
### ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESB734 4 Flutes 15° Helix Ball End Mill

Endmill



Zamus Star

E-Star

► Tolerance

| DC        |            | Shank Dia |
|-----------|------------|-----------|
| All Sizes | 0 ~ -0.012 | h5        |

U-Wing



CARBIDE
AITIN
4
15° HELIX
R ±0.005 R3 OR UNDER
R ±0.008 ABOVE R3
DATA P.667

Zamus Thunder

| EDP No         | DC  | RE   | BHTA | APMX | LU | OAL | DCONMS |
|----------------|-----|------|------|------|----|-----|--------|
| ESB734 020-2.5 | 2   | 1    | 2.5  | 2    | 25 | 60  | 4      |
| ESB734 020-3.5 | 2   | 1    | 3.5  | 2    | 18 | 60  | 4      |
| ESB734 025-2.5 | 2.5 | 1.25 | 2.5  | 3    | 20 | 60  | 4      |
| ESB734 025-3.0 | 2.5 | 1.25 | 3    | 3    | 17 | 60  | 4      |
| ESB734 030-2.0 | 3   | 1.5  | 2    | 3    | 46 | 70  | 6      |
| ESB734 030-2.5 | 3   | 1.5  | 2.5  | 3    | 37 | 70  | 6      |
| ESB734 040-2.0 | 4   | 2    | 2    | 4    | 33 | 70  | 6      |
| ESB734 040-2.5 | 4   | 2    | 2.5  | 4    | 27 | 70  | 6      |
| ESB734 050-2.5 | 5   | 2.5  | 2.5  | 5    | 16 | 70  | 6      |
| ESB734 060-1.5 | 6   | 3    | 1.5  | 6    | 44 | 100 | 8      |
| ESB734 060-2.5 | 6   | 3    | 2.5  | 6    | 29 | 100 | 8      |
| ESB734 080-1.5 | 8   | 4    | 1.5  | 8    | 46 | 100 | 10     |
| ESB734 080-2.5 | 8   | 4    | 2.5  | 8    | 31 | 100 | 10     |
| ESB734 100-1.5 | 10  | 5    | 1.5  | 10   | 48 | 110 | 12     |
| ESB734 100-2.5 | 10  | 5    | 2.5  | 10   | 33 | 110 | 12     |

Copper -Mate

Gra -Mate

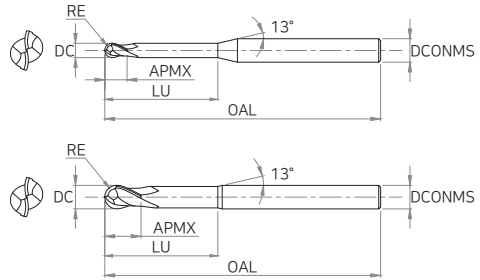
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K         | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | ~HB225       | HB225 ~325  | HRC30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |           |        |          |          |                 |                      |

# ESRB712 2 Flutes Rib Ball End Mill

Endmill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



CARBIDE
AITIN
2
30° HELIX
R ±0.005 R3 OR UNDER
R ±0.008 ABOVE R3
DATA P.668

| EDP No         | DC  | RE   | APMX | LU  | OAL | DCON MS | EDP No          | DC  | RE   | APMX | LU  | OAL | DCON MS |
|----------------|-----|------|------|-----|-----|---------|-----------------|-----|------|------|-----|-----|---------|
| ESRB712 001002 | 0.1 | 0.05 | 0.1  | 0.2 | 40  | 4       | ESRB712 00403   | 0.4 | 0.2  | 0.4  | 3   | 40  | 4       |
| ESRB712 001003 | 0.1 | 0.05 | 0.1  | 0.3 | 40  | 4       | ESRB712 00404   | 0.4 | 0.2  | 0.4  | 4   | 40  | 4       |
| ESRB712 001005 | 0.1 | 0.05 | 0.1  | 0.5 | 40  | 4       | ESRB712 00405   | 0.4 | 0.2  | 0.4  | 5   | 40  | 4       |
| ESRB712 00101  | 0.1 | 0.05 | 0.1  | 1   | 40  | 4       | ESRB712 00406   | 0.4 | 0.2  | 0.4  | 6   | 40  | 4       |
| ESRB712 002005 | 0.2 | 0.1  | 0.2  | 0.5 | 40  | 4       | ESRB712 00408   | 0.4 | 0.2  | 0.4  | 8   | 40  | 4       |
| ESRB712 002015 | 0.2 | 0.1  | 0.2  | 1.5 | 40  | 4       | ESRB712 00410   | 0.4 | 0.2  | 0.4  | 10  | 40  | 4       |
| ESRB712 00201  | 0.2 | 0.1  | 0.2  | 1   | 40  | 4       | ESRB712 005015  | 0.5 | 0.25 | 0.5  | 1.5 | 45  | 4       |
| ESRB712 00202  | 0.2 | 0.1  | 0.2  | 2   | 40  | 4       | ESRB712 00501   | 0.5 | 0.25 | 0.5  | 1   | 45  | 4       |
| ESRB712 00203  | 0.2 | 0.1  | 0.2  | 3   | 40  | 4       | ESRB712 00501S6 | 0.5 | 0.25 | 0.5  | 1   | 45  | 6       |
| ESRB712 003015 | 0.3 | 0.15 | 0.3  | 1.5 | 40  | 4       | ESRB712 005025  | 0.5 | 0.25 | 0.5  | 2.5 | 45  | 4       |
| ESRB712 00301  | 0.3 | 0.15 | 0.3  | 1   | 40  | 4       | ESRB712 00502   | 0.5 | 0.25 | 0.5  | 2   | 45  | 4       |
| ESRB712 003025 | 0.3 | 0.15 | 0.3  | 2.5 | 40  | 4       | ESRB712 00502S6 | 0.5 | 0.25 | 0.5  | 2   | 45  | 6       |
| ESRB712 00302  | 0.3 | 0.15 | 0.3  | 2   | 40  | 4       | ESRB712 00503   | 0.5 | 0.25 | 0.5  | 3   | 45  | 4       |
| ESRB712 00303  | 0.3 | 0.15 | 0.3  | 3   | 40  | 4       | ESRB712 00504   | 0.5 | 0.25 | 0.5  | 4   | 45  | 4       |
| ESRB712 00304  | 0.3 | 0.15 | 0.3  | 4   | 40  | 4       | ESRB712 00504S6 | 0.5 | 0.25 | 0.5  | 4   | 45  | 6       |
| ESRB712 00305  | 0.3 | 0.15 | 0.3  | 5   | 40  | 4       | ESRB712 00505   | 0.5 | 0.25 | 0.5  | 5   | 45  | 4       |
| ESRB712 004015 | 0.4 | 0.2  | 0.4  | 1.5 | 40  | 4       | ESRB712 00506   | 0.5 | 0.25 | 0.5  | 6   | 45  | 4       |
| ESRB712 00401  | 0.4 | 0.2  | 0.4  | 1   | 40  | 4       | ESRB712 00508   | 0.5 | 0.25 | 0.5  | 8   | 45  | 4       |
| ESRB712 004025 | 0.4 | 0.2  | 0.4  | 2.5 | 40  | 4       | ESRB712 00510   | 0.5 | 0.25 | 0.5  | 10  | 45  | 4       |
| ESRB712 00402  | 0.4 | 0.2  | 0.4  | 2   | 40  | 4       | ESRB712 00512   | 0.5 | 0.25 | 0.5  | 12  | 45  | 4       |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

# ESRB712 2 Flutes Rib Ball End Mill

Endmill

|               | EDP No          | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No          | DC  | RE   | APMX | LU | OAL | DCON MS |
|---------------|-----------------|-----|------|------|----|-----|---------|-----------------|-----|------|------|----|-----|---------|
| Zamus Star    | ESRB712 00514   | 0.5 | 0.25 | 0.5  | 14 | 45  | 4       | ESRB712 00803   | 0.8 | 0.4  | 0.8  | 3  | 45  | 4       |
|               | ESRB712 00516   | 0.5 | 0.25 | 0.5  | 16 | 45  | 4       | ESRB712 00803S6 | 0.8 | 0.4  | 0.8  | 3  | 45  | 6       |
|               | ESRB712 00601   | 0.6 | 0.3  | 0.6  | 1  | 45  | 4       | ESRB712 00804   | 0.8 | 0.4  | 0.8  | 4  | 45  | 4       |
|               | ESRB712 00601S6 | 0.6 | 0.3  | 0.6  | 1  | 45  | 6       | ESRB712 00804S6 | 0.8 | 0.4  | 0.8  | 4  | 45  | 6       |
| E-Star        | ESRB712 00602   | 0.6 | 0.3  | 0.6  | 2  | 45  | 4       | ESRB712 00805   | 0.8 | 0.4  | 0.8  | 5  | 45  | 4       |
|               | ESRB712 00602S6 | 0.6 | 0.3  | 0.6  | 2  | 45  | 6       | ESRB712 00805S6 | 0.8 | 0.4  | 0.8  | 5  | 45  | 6       |
|               | ESRB712 00603   | 0.6 | 0.3  | 0.6  | 3  | 45  | 4       | ESRB712 00806   | 0.8 | 0.4  | 0.8  | 6  | 45  | 4       |
|               | ESRB712 00603S6 | 0.6 | 0.3  | 0.6  | 3  | 45  | 6       | ESRB712 00806S6 | 0.8 | 0.4  | 0.8  | 6  | 45  | 6       |
| U-Wing        | ESRB712 00604   | 0.6 | 0.3  | 0.6  | 4  | 45  | 4       | ESRB712 00808   | 0.8 | 0.4  | 0.8  | 8  | 45  | 4       |
|               | ESRB712 00604S6 | 0.6 | 0.3  | 0.6  | 4  | 45  | 6       | ESRB712 00808S6 | 0.8 | 0.4  | 0.8  | 8  | 45  | 6       |
|               | ESRB712 00605   | 0.6 | 0.3  | 0.6  | 5  | 45  | 4       | ESRB712 00810   | 0.8 | 0.4  | 0.8  | 10 | 45  | 4       |
|               | ESRB712 00605S6 | 0.6 | 0.3  | 0.6  | 5  | 45  | 6       | ESRB712 00810S6 | 0.8 | 0.4  | 0.8  | 10 | 45  | 6       |
| Zamus Thunder | ESRB712 00606   | 0.6 | 0.3  | 0.6  | 6  | 45  | 4       | ESRB712 00812   | 0.8 | 0.4  | 0.8  | 12 | 45  | 4       |
|               | ESRB712 00606S6 | 0.6 | 0.3  | 0.6  | 6  | 45  | 6       | ESRB712 00812S6 | 0.8 | 0.4  | 0.8  | 12 | 45  | 6       |
|               | ESRB712 00608   | 0.6 | 0.3  | 0.6  | 8  | 45  | 4       | ESRB712 00814   | 0.8 | 0.4  | 0.8  | 14 | 45  | 4       |
|               | ESRB712 00608S6 | 0.6 | 0.3  | 0.6  | 8  | 45  | 6       | ESRB712 00814S6 | 0.8 | 0.4  | 0.8  | 14 | 45  | 6       |
| X-Star        | ESRB712 00610   | 0.6 | 0.3  | 0.6  | 10 | 45  | 4       | ESRB712 00816   | 0.8 | 0.4  | 0.8  | 16 | 45  | 4       |
|               | ESRB712 00610S6 | 0.6 | 0.3  | 0.6  | 10 | 45  | 6       | ESRB712 00816S6 | 0.8 | 0.4  | 0.8  | 16 | 50  | 6       |
|               | ESRB712 00612   | 0.6 | 0.3  | 0.6  | 12 | 45  | 4       | ESRB712 00820   | 0.8 | 0.4  | 0.8  | 20 | 50  | 4       |
|               | ESRB712 00612S6 | 0.6 | 0.3  | 0.6  | 12 | 45  | 6       | ESRB712 00820S6 | 0.8 | 0.4  | 0.8  | 20 | 55  | 6       |
| S-Wing        | ESRB712 00614   | 0.6 | 0.3  | 0.6  | 14 | 45  | 4       | ESRB712 00904   | 0.9 | 0.45 | 0.9  | 4  | 45  | 4       |
|               | ESRB712 00614S6 | 0.6 | 0.3  | 0.6  | 14 | 45  | 6       | ESRB712 00906   | 0.9 | 0.45 | 0.9  | 6  | 45  | 4       |
|               | ESRB712 00616   | 0.6 | 0.3  | 0.6  | 16 | 45  | 4       | ESRB712 00908   | 0.9 | 0.45 | 0.9  | 8  | 45  | 4       |
|               | ESRB712 00616S6 | 0.6 | 0.3  | 0.6  | 16 | 50  | 6       | ESRB712 00910   | 0.9 | 0.45 | 0.9  | 10 | 45  | 4       |
| A-Wing        | ESRB712 00702   | 0.7 | 0.35 | 0.7  | 2  | 45  | 4       | ESRB712 01002   | 1   | 0.5  | 1    | 2  | 50  | 4       |
|               | ESRB712 00704   | 0.7 | 0.35 | 0.7  | 4  | 45  | 4       | ESRB712 01002S6 | 1   | 0.5  | 1    | 2  | 50  | 6       |
|               | ESRB712 00706   | 0.7 | 0.35 | 0.7  | 6  | 45  | 4       | ESRB712 01003   | 1   | 0.5  | 1    | 3  | 50  | 4       |
|               | ESRB712 00708   | 0.7 | 0.35 | 0.7  | 8  | 45  | 4       | ESRB712 01003S6 | 1   | 0.5  | 1    | 3  | 50  | 6       |
| Standard      | ESRB712 00710   | 0.7 | 0.35 | 0.7  | 10 | 45  | 4       | ESRB712 01004   | 1   | 0.5  | 1    | 4  | 50  | 4       |
|               | ESRB712 00712   | 0.7 | 0.35 | 0.7  | 12 | 45  | 4       | ESRB712 01004S6 | 1   | 0.5  | 1    | 4  | 50  | 6       |
|               | ESRB712 00801   | 0.8 | 0.4  | 0.8  | 1  | 45  | 4       | ESRB712 01005   | 1   | 0.5  | 1    | 5  | 50  | 4       |
|               | ESRB712 00801S6 | 0.8 | 0.4  | 0.8  | 1  | 45  | 6       | ESRB712 01005S6 | 1   | 0.5  | 1    | 5  | 50  | 6       |
| Copper-Mate   | ESRB712 00802   | 0.8 | 0.4  | 0.8  | 2  | 45  | 4       | ESRB712 01006   | 1   | 0.5  | 1    | 6  | 50  | 4       |
|               | ESRB712 00802S6 | 0.8 | 0.4  | 0.8  | 2  | 45  | 6       | ESRB712 01006S6 | 1   | 0.5  | 1    | 6  | 50  | 6       |
|               |                 |     |      |      |    |     |         |                 |     |      |      |    |     |         |
|               |                 |     |      |      |    |     |         |                 |     |      |      |    |     |         |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |                              |                                  | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|------------------------------|----------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel                  | Prehardened Steel                | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened<br>Steel<br>HRC30~50 |                      |        |          |          |                 |                      |
| ◎               | ○               |                 | ○                            | ◎                                |                      |        |          |          |                 |                      |

# ESRB712 2 Flutes Rib Ball End Mill

Endmill

| EDP No          | DC  | RE  | APMX | LU | OAL | DCON MS | EDP No          | DC  | RE   | APMX | LU | OAL | DCON MS |
|-----------------|-----|-----|------|----|-----|---------|-----------------|-----|------|------|----|-----|---------|
| ESRB712 01007   | 1   | 0.5 | 1    | 7  | 50  | 4       | ESRB712 01406   | 1.4 | 0.7  | 1.4  | 6  | 50  | 4       |
| ESRB712 01007S6 | 1   | 0.5 | 1    | 7  | 50  | 6       | ESRB712 01408   | 1.4 | 0.7  | 1.4  | 8  | 50  | 4       |
| ESRB712 01008   | 1   | 0.5 | 1    | 8  | 50  | 4       | ESRB712 01410   | 1.4 | 0.7  | 1.4  | 10 | 50  | 4       |
| ESRB712 01008S6 | 1   | 0.5 | 1    | 8  | 50  | 6       | ESRB712 01412   | 1.4 | 0.7  | 1.4  | 12 | 50  | 4       |
| ESRB712 01009   | 1   | 0.5 | 1    | 9  | 50  | 4       | ESRB712 01416   | 1.4 | 0.7  | 1.4  | 16 | 50  | 4       |
| ESRB712 01009S6 | 1   | 0.5 | 1    | 9  | 50  | 6       | ESRB712 01503   | 1.5 | 0.75 | 1.5  | 3  | 50  | 4       |
| ESRB712 01010   | 1   | 0.5 | 1    | 10 | 50  | 4       | ESRB712 01503S6 | 1.5 | 0.75 | 1.5  | 3  | 50  | 6       |
| ESRB712 01010S6 | 1   | 0.5 | 1    | 10 | 50  | 6       | ESRB712 01504   | 1.5 | 0.75 | 1.5  | 4  | 50  | 4       |
| ESRB712 01012   | 1   | 0.5 | 1    | 12 | 50  | 4       | ESRB712 01504S6 | 1.5 | 0.75 | 1.5  | 4  | 50  | 6       |
| ESRB712 01012S6 | 1   | 0.5 | 1    | 12 | 50  | 6       | ESRB712 01505   | 1.5 | 0.75 | 1.5  | 5  | 50  | 4       |
| ESRB712 01014   | 1   | 0.5 | 1    | 14 | 50  | 4       | ESRB712 01506   | 1.5 | 0.75 | 1.5  | 6  | 50  | 4       |
| ESRB712 01014S6 | 1   | 0.5 | 1    | 14 | 50  | 6       | ESRB712 01506S6 | 1.5 | 0.75 | 1.5  | 6  | 50  | 6       |
| ESRB712 01016   | 1   | 0.5 | 1    | 16 | 50  | 4       | ESRB712 01507   | 1.5 | 0.75 | 1.5  | 7  | 50  | 4       |
| ESRB712 01016S6 | 1   | 0.5 | 1    | 16 | 50  | 6       | ESRB712 01508   | 1.5 | 0.75 | 1.5  | 8  | 50  | 4       |
| ESRB712 01018   | 1   | 0.5 | 1    | 18 | 50  | 4       | ESRB712 01508S6 | 1.5 | 0.75 | 1.5  | 8  | 50  | 6       |
| ESRB712 01018S6 | 1   | 0.5 | 1    | 18 | 50  | 6       | ESRB712 01510   | 1.5 | 0.75 | 1.5  | 10 | 50  | 4       |
| ESRB712 01020   | 1   | 0.5 | 1    | 20 | 55  | 4       | ESRB712 01510S6 | 1.5 | 0.75 | 1.5  | 10 | 50  | 6       |
| ESRB712 01020S6 | 1   | 0.5 | 1    | 20 | 55  | 6       | ESRB712 01512   | 1.5 | 0.75 | 1.5  | 12 | 50  | 4       |
| ESRB712 01022   | 1   | 0.5 | 1    | 22 | 60  | 4       | ESRB712 01512S6 | 1.5 | 0.75 | 1.5  | 12 | 50  | 6       |
| ESRB712 01022S6 | 1   | 0.5 | 1    | 22 | 60  | 6       | ESRB712 01514   | 1.5 | 0.75 | 1.5  | 14 | 50  | 4       |
| ESRB712 01026   | 1   | 0.5 | 1    | 26 | 60  | 4       | ESRB712 01514S6 | 1.5 | 0.75 | 1.5  | 14 | 50  | 6       |
| ESRB712 01026S6 | 1   | 0.5 | 1    | 26 | 60  | 6       | ESRB712 01516   | 1.5 | 0.75 | 1.5  | 16 | 50  | 4       |
| ESRB712 01030   | 1   | 0.5 | 1    | 30 | 70  | 4       | ESRB712 01516S6 | 1.5 | 0.75 | 1.5  | 16 | 50  | 6       |
| ESRB712 01030S6 | 1   | 0.5 | 1    | 30 | 70  | 6       | ESRB712 01518   | 1.5 | 0.75 | 1.5  | 18 | 50  | 4       |
| ESRB712 01040   | 1   | 0.5 | 1    | 40 | 80  | 4       | ESRB712 01518S6 | 1.5 | 0.75 | 1.5  | 18 | 50  | 6       |
| ESRB712 01050   | 1   | 0.5 | 1    | 50 | 100 | 4       | ESRB712 01520   | 1.5 | 0.75 | 1.5  | 20 | 55  | 4       |
| ESRB712 01204   | 1.2 | 0.6 | 1.2  | 4  | 50  | 4       | ESRB712 01520S6 | 1.5 | 0.75 | 1.5  | 20 | 55  | 6       |
| ESRB712 01206   | 1.2 | 0.6 | 1.2  | 6  | 50  | 4       | ESRB712 01522   | 1.5 | 0.75 | 1.5  | 22 | 60  | 4       |
| ESRB712 01208   | 1.2 | 0.6 | 1.2  | 8  | 50  | 4       | ESRB712 01522S6 | 1.5 | 0.75 | 1.5  | 22 | 60  | 6       |
| ESRB712 01210   | 1.2 | 0.6 | 1.2  | 10 | 50  | 4       | ESRB712 01526   | 1.5 | 0.75 | 1.5  | 26 | 60  | 4       |
| ESRB712 01212   | 1.2 | 0.6 | 1.2  | 12 | 50  | 4       | ESRB712 01526S6 | 1.5 | 0.75 | 1.5  | 26 | 60  | 6       |
| ESRB712 01216   | 1.2 | 0.6 | 1.2  | 16 | 50  | 4       | ESRB712 01530   | 1.5 | 0.75 | 1.5  | 30 | 70  | 4       |
| ESRB712 01220   | 1.2 | 0.6 | 1.2  | 20 | 50  | 4       | ESRB712 01530S6 | 1.5 | 0.75 | 1.5  | 30 | 70  | 6       |
| ESRB712 01226   | 1.2 | 0.6 | 1.2  | 26 | 60  | 4       | ESRB712 01535   | 1.5 | 0.75 | 1.5  | 35 | 70  | 4       |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESRB712 2 Flutes Rib Ball End Mill

Endmill

|               | EDP No          | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No          | DC  | RE   | APMX | LU | OAL | DCON MS |
|---------------|-----------------|-----|------|------|----|-----|---------|-----------------|-----|------|------|----|-----|---------|
| Zamus Star    | ESRB712 01535S6 | 1.5 | 0.75 | 1.5  | 35 | 70  | 6       | ESRB712 02020S6 | 2   | 1    | 2    | 20 | 55  | 6       |
|               | ESRB712 01540   | 1.5 | 0.75 | 1.5  | 40 | 80  | 4       | ESRB712 02022   | 2   | 1    | 2    | 22 | 60  | 4       |
|               | ESRB712 01540S6 | 1.5 | 0.75 | 1.5  | 40 | 80  | 6       | ESRB712 02022S6 | 2   | 1    | 2    | 22 | 60  | 6       |
|               | ESRB712 01604   | 1.6 | 0.8  | 1.6  | 4  | 50  | 4       | ESRB712 02026   | 2   | 1    | 2    | 26 | 60  | 4       |
| E-Star        | ESRB712 01606   | 1.6 | 0.8  | 1.6  | 6  | 50  | 4       | ESRB712 02026S6 | 2   | 1    | 2    | 26 | 60  | 6       |
|               | ESRB712 01608   | 1.6 | 0.8  | 1.6  | 8  | 50  | 4       | ESRB712 02030   | 2   | 1    | 2    | 30 | 70  | 4       |
|               | ESRB712 01610   | 1.6 | 0.8  | 1.6  | 10 | 50  | 4       | ESRB712 02030S6 | 2   | 1    | 2    | 30 | 70  | 6       |
|               | ESRB712 01612   | 1.6 | 0.8  | 1.6  | 12 | 50  | 4       | ESRB712 02035   | 2   | 1    | 2    | 35 | 70  | 4       |
| U-Wing        | ESRB712 01616   | 1.6 | 0.8  | 1.6  | 16 | 50  | 4       | ESRB712 02035S6 | 2   | 1    | 2    | 35 | 70  | 6       |
|               | ESRB712 01620   | 1.6 | 0.8  | 1.6  | 20 | 50  | 4       | ESRB712 02040   | 2   | 1    | 2    | 40 | 80  | 4       |
|               | ESRB712 01804   | 1.8 | 0.9  | 1.8  | 4  | 50  | 4       | ESRB712 02040S6 | 2   | 1    | 2    | 40 | 80  | 6       |
|               | ESRB712 01806   | 1.8 | 0.9  | 1.8  | 6  | 50  | 4       | ESRB712 02045   | 2   | 1    | 2    | 45 | 90  | 4       |
| Zamus Thunder | ESRB712 01808   | 1.8 | 0.9  | 1.8  | 8  | 50  | 4       | ESRB712 02045S6 | 2   | 1    | 2    | 45 | 90  | 6       |
|               | ESRB712 01810   | 1.8 | 0.9  | 1.8  | 10 | 50  | 4       | ESRB712 02050   | 2   | 1    | 2    | 50 | 100 | 4       |
|               | ESRB712 01812   | 1.8 | 0.9  | 1.8  | 12 | 50  | 4       | ESRB712 02050S6 | 2   | 1    | 2    | 50 | 100 | 6       |
|               | ESRB712 01816   | 1.8 | 0.9  | 1.8  | 16 | 50  | 4       | ESRB712 02060   | 2   | 1    | 2    | 60 | 110 | 4       |
| X-Star        | ESRB712 01820   | 1.8 | 0.9  | 1.8  | 20 | 50  | 4       | ESRB712 02508   | 2.5 | 1.25 | 2.5  | 8  | 50  | 4       |
|               | ESRB712 02004   | 2   | 1    | 2    | 4  | 50  | 4       | ESRB712 02510   | 2.5 | 1.25 | 2.5  | 10 | 50  | 4       |
|               | ESRB712 02004S6 | 2   | 1    | 2    | 4  | 50  | 6       | ESRB712 02512   | 2.5 | 1.25 | 2.5  | 12 | 50  | 4       |
|               | ESRB712 02006   | 2   | 1    | 2    | 6  | 50  | 4       | ESRB712 02516   | 2.5 | 1.25 | 2.5  | 16 | 50  | 4       |
| S-Wing        | ESRB712 02006S6 | 2   | 1    | 2    | 6  | 50  | 6       | ESRB712 02520   | 2.5 | 1.25 | 2.5  | 20 | 50  | 4       |
|               | ESRB712 02008   | 2   | 1    | 2    | 8  | 50  | 4       | ESRB712 02522   | 2.5 | 1.25 | 2.5  | 22 | 60  | 4       |
|               | ESRB712 02008S6 | 2   | 1    | 2    | 8  | 50  | 6       | ESRB712 02526   | 2.5 | 1.25 | 2.5  | 26 | 60  | 4       |
|               | ESRB712 02010   | 2   | 1    | 2    | 10 | 50  | 4       | ESRB712 02530   | 2.5 | 1.25 | 2.5  | 30 | 70  | 4       |
| A-Wing        | ESRB712 02010S6 | 2   | 1    | 2    | 10 | 50  | 6       | ESRB712 02535   | 2.5 | 1.25 | 2.5  | 35 | 70  | 4       |
|               | ESRB712 02012   | 2   | 1    | 2    | 12 | 50  | 4       | ESRB712 02540   | 2.5 | 1.25 | 2.5  | 40 | 80  | 4       |
|               | ESRB712 02012S6 | 2   | 1    | 2    | 12 | 50  | 6       | ESRB712 02545   | 2.5 | 1.25 | 2.5  | 45 | 90  | 4       |
|               | ESRB712 02014   | 2   | 1    | 2    | 14 | 50  | 4       | ESRB712 02550   | 2.5 | 1.25 | 2.5  | 50 | 100 | 4       |
| Standard      | ESRB712 02014S6 | 2   | 1    | 2    | 14 | 50  | 6       | ESRB712 03006   | 3   | 1.5  | 3    | 6  | 50  | 6       |
|               | ESRB712 02016   | 2   | 1    | 2    | 16 | 50  | 4       | ESRB712 03008   | 3   | 1.5  | 3    | 8  | 50  | 6       |
|               | ESRB712 02016S6 | 2   | 1    | 2    | 16 | 50  | 6       | ESRB712 03010   | 3   | 1.5  | 3    | 10 | 50  | 6       |
|               | ESRB712 02018   | 2   | 1    | 2    | 18 | 55  | 4       | ESRB712 03012   | 3   | 1.5  | 3    | 12 | 50  | 6       |
| Copper-Mate   | ESRB712 02018S6 | 2   | 1    | 2    | 18 | 55  | 6       | ESRB712 03014   | 3   | 1.5  | 3    | 14 | 60  | 6       |
|               | ESRB712 02020   | 2   | 1    | 2    | 20 | 55  | 4       | ESRB712 03016   | 3   | 1.5  | 3    | 16 | 60  | 6       |
|               |                 |     |      |      |    |     |         |                 |     |      |      |    |     |         |
|               |                 |     |      |      |    |     |         |                 |     |      |      |    |     |         |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                 | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESRB712 2 Flutes Rib Ball End Mill

Endmill

| EDP No        | DC  | RE   | APMX | LU | OAL | DCON MS | EDP No           | DC | RE  | APMX | LU | OAL | DCON MS |
|---------------|-----|------|------|----|-----|---------|------------------|----|-----|------|----|-----|---------|
| ESRB712 03018 | 3   | 1.5  | 3    | 18 | 60  | 6       | ESRB712 04055    | 4  | 2   | 4    | 55 | 100 | 6       |
| ESRB712 03020 | 3   | 1.5  | 3    | 20 | 60  | 6       | ESRB712 04060    | 4  | 2   | 4    | 60 | 100 | 6       |
| ESRB712 03022 | 3   | 1.5  | 3    | 22 | 65  | 6       | ESRB712 05015    | 5  | 2.5 | 6    | 15 | 60  | 6       |
| ESRB712 03026 | 3   | 1.5  | 3    | 26 | 65  | 6       | ESRB712 05020    | 5  | 2.5 | 6    | 20 | 60  | 6       |
| ESRB712 03030 | 3   | 1.5  | 3    | 30 | 70  | 6       | ESRB712 05026    | 5  | 2.5 | 6    | 26 | 65  | 6       |
| ESRB712 03035 | 3   | 1.5  | 3    | 35 | 70  | 6       | ESRB712 05030    | 5  | 2.5 | 6    | 30 | 70  | 6       |
| ESRB712 03040 | 3   | 1.5  | 3    | 40 | 80  | 6       | ESRB712 05035    | 5  | 2.5 | 6    | 35 | 70  | 6       |
| ESRB712 03045 | 3   | 1.5  | 3    | 45 | 90  | 6       | ESRB712 05040    | 5  | 2.5 | 6    | 40 | 80  | 6       |
| ESRB712 03050 | 3   | 1.5  | 3    | 50 | 100 | 6       | ESRB712 05045    | 5  | 2.5 | 6    | 45 | 90  | 6       |
| ESRB712 03060 | 3   | 1.5  | 3    | 60 | 100 | 6       | ESRB712 05050    | 5  | 2.5 | 6    | 50 | 100 | 6       |
| ESRB712 03510 | 3.5 | 1.75 | 3    | 10 | 50  | 6       | ESRB712 05055    | 5  | 2.5 | 6    | 55 | 100 | 6       |
| ESRB712 03516 | 3.5 | 1.75 | 3    | 16 | 60  | 6       | ESRB712 05060    | 5  | 2.5 | 6    | 60 | 100 | 6       |
| ESRB712 03520 | 3.5 | 1.75 | 3    | 20 | 60  | 6       | ESRB712 0602090  | 6  | 3   | 12   | 20 | 90  | 6       |
| ESRB712 03526 | 3.5 | 1.75 | 3    | 26 | 65  | 6       | ESRB712 06020    | 6  | 3   | 8    | 20 | 60  | 6       |
| ESRB712 03530 | 3.5 | 1.75 | 3    | 30 | 70  | 6       | ESRB712 0603090  | 6  | 3   | 12   | 30 | 90  | 6       |
| ESRB712 04008 | 4   | 2    | 4    | 8  | 50  | 6       | ESRB712 06030    | 6  | 3   | 8    | 30 | 60  | 6       |
| ESRB712 04010 | 4   | 2    | 4    | 10 | 50  | 6       | ESRB712 08025100 | 8  | 4   | 14   | 25 | 100 | 8       |
| ESRB712 04012 | 4   | 2    | 4    | 12 | 50  | 6       | ESRB712 08025    | 8  | 4   | 10   | 25 | 70  | 8       |
| ESRB712 04014 | 4   | 2    | 4    | 14 | 60  | 6       | ESRB712 08035100 | 8  | 4   | 14   | 35 | 100 | 8       |
| ESRB712 04016 | 4   | 2    | 4    | 16 | 60  | 6       | ESRB712 08035    | 8  | 4   | 10   | 35 | 70  | 8       |
| ESRB712 04018 | 4   | 2    | 4    | 18 | 60  | 6       | ESRB712 10030100 | 10 | 5   | 18   | 30 | 100 | 10      |
| ESRB712 04020 | 4   | 2    | 4    | 20 | 60  | 6       | ESRB712 10030    | 10 | 5   | 12   | 30 | 75  | 10      |
| ESRB712 04022 | 4   | 2    | 4    | 22 | 65  | 6       | ESRB712 10040100 | 10 | 5   | 18   | 40 | 100 | 10      |
| ESRB712 04026 | 4   | 2    | 4    | 26 | 65  | 6       | ESRB712 10040    | 10 | 5   | 12   | 40 | 75  | 10      |
| ESRB712 04030 | 4   | 2    | 4    | 30 | 70  | 6       | ESRB712 12032110 | 12 | 6   | 22   | 32 | 110 | 12      |
| ESRB712 04035 | 4   | 2    | 4    | 35 | 70  | 6       | ESRB712 12032    | 12 | 6   | 14   | 32 | 80  | 12      |
| ESRB712 04040 | 4   | 2    | 4    | 40 | 80  | 6       | ESRB712 12045110 | 12 | 6   | 22   | 45 | 110 | 12      |
| ESRB712 04045 | 4   | 2    | 4    | 45 | 90  | 6       | ESRB712 12045    | 12 | 6   | 14   | 45 | 80  | 12      |
| ESRB712 04050 | 4   | 2    | 4    | 50 | 100 | 6       |                  |    |     |      |    |     |         |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

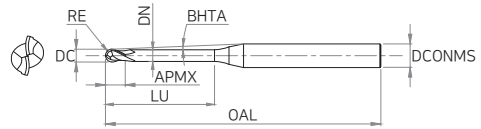
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRc30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

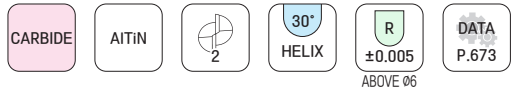
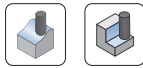
# ESLNB20

## 2 Flutes Long Neck Ball End Mill



### ► Tolerance

| DC        |            | Shank Dia |
|-----------|------------|-----------|
| All Sizes | 0 ~ -0.012 | h5        |



| EDP No         | DC  | RE   | APMX | LU  | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |     |      |     |     |
|----------------|-----|------|------|-----|------|-----|---------|------|---------------------------------------|-----|------|-----|-----|
|                |     |      |      |     |      |     |         |      | 0.5°                                  | 1°  | 1.5° | 2°  | 3°  |
| ESLNB20 01-0.2 | 0.1 | 0.05 | 0.08 | 0.2 | 0.08 | 45  | 4       | 11.8 | 0.3                                   | 0.3 | 0.3  | 0.4 | 0.4 |
| ESLNB20 01-0.3 | 0.1 | 0.05 | 0.08 | 0.3 | 0.08 | 45  | 4       | 11.7 | 0.4                                   | 0.4 | 0.5  | 0.5 | 0.5 |
| ESLNB20 01-0.5 | 0.1 | 0.05 | 0.08 | 0.5 | 0.08 | 45  | 4       | 11.4 | 0.6                                   | 0.7 | 0.7  | 0.7 | 0.8 |
| ESLNB20 02-0.5 | 0.2 | 0.1  | 0.15 | 0.5 | 0.17 | 50  | 4       | 11.5 | 1.2                                   | 1.3 | 1.5  | 1.6 | 2   |
| ESLNB20 02-1   | 0.2 | 0.1  | 0.15 | 1   | 0.17 | 50  | 4       | 10.9 | 1.7                                   | 1.9 | 2.1  | 2.3 | 2.7 |
| ESLNB20 02-1.5 | 0.2 | 0.1  | 0.15 | 1.5 | 0.17 | 50  | 4       | 10.4 | 2.3                                   | 2.5 | 2.8  | 3   | 3.4 |
| ESLNB20 02-2   | 0.2 | 0.1  | 0.15 | 2   | 0.17 | 50  | 4       | 9.9  | 2.8                                   | 3.1 | 3.4  | 3.6 | 4.1 |
| ESLNB20 02-2.5 | 0.2 | 0.1  | 0.15 | 2.5 | 0.17 | 50  | 4       | 9.5  | 3.4                                   | 3.7 | 4    | 4.2 | 4.7 |
| ESLNB20 02-3.0 | 0.2 | 0.1  | 0.15 | 3   | 0.17 | 50  | 4       | 9.1  | 3.9                                   | 4.3 | 4.6  | 4.9 | 5.4 |
| ESLNB20 03-1   | 0.3 | 0.15 | 0.25 | 1   | 0.27 | 50  | 4       | 10.9 | 1.7                                   | 1.9 | 2.1  | 2.3 | 2.7 |
| ESLNB20 03-1.5 | 0.3 | 0.15 | 0.25 | 1.5 | 0.27 | 50  | 4       | 10.4 | 2.3                                   | 2.5 | 2.7  | 3   | 3.4 |
| ESLNB20 03-2   | 0.3 | 0.15 | 0.25 | 2   | 0.27 | 50  | 4       | 9.9  | 2.8                                   | 3.1 | 3.4  | 3.6 | 4   |
| ESLNB20 03-2.5 | 0.3 | 0.15 | 0.25 | 2.5 | 0.27 | 50  | 4       | 9.5  | 3.4                                   | 3.7 | 4    | 4.2 | 4.7 |
| ESLNB20 03-3   | 0.3 | 0.15 | 0.25 | 3   | 0.27 | 50  | 4       | 9.1  | 3.9                                   | 4.3 | 4.6  | 4.8 | 5.3 |
| ESLNB20 04-1   | 0.4 | 0.2  | 0.3  | 1   | 0.37 | 50  | 4       | 11   | 1.7                                   | 1.9 | 2.1  | 2.3 | 2.7 |
| ESLNB20 04-1.5 | 0.4 | 0.2  | 0.3  | 1.5 | 0.37 | 50  | 4       | 10.4 | 2.3                                   | 2.5 | 2.7  | 2.9 | 3.4 |
| ESLNB20 04-2   | 0.4 | 0.2  | 0.3  | 2   | 0.37 | 50  | 4       | 9.9  | 2.8                                   | 3.1 | 3.4  | 3.6 | 4   |
| ESLNB20 04-2.5 | 0.4 | 0.2  | 0.3  | 2.5 | 0.37 | 50  | 4       | 9.5  | 3.4                                   | 3.7 | 4    | 4.2 | 4.7 |
| ESLNB20 04-3   | 0.4 | 0.2  | 0.3  | 3   | 0.37 | 50  | 4       | 9.1  | 3.9                                   | 4.3 | 4.6  | 4.8 | 5.3 |
| ESLNB20 04-3.5 | 0.4 | 0.2  | 0.3  | 3.5 | 0.37 | 50  | 4       | 8.7  | 4.5                                   | 4.8 | 5.2  | 5.4 | 6   |

### ► Applicable Working Material

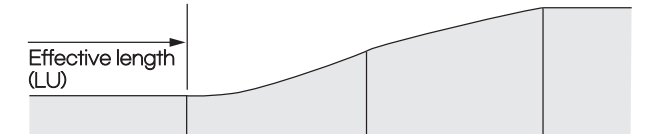
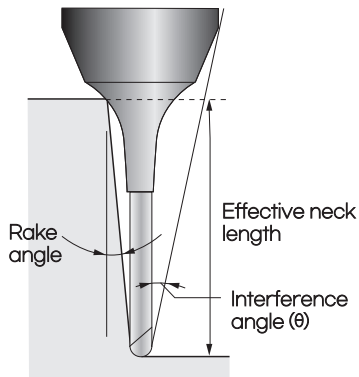
○ : GOOD ◎ : EXCELLENT

| H               |                 | P                      |                              |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|------------------------|------------------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel           | Alloy Steel                  | Prehardened Steel             | Cast Iron            | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Carbon Steel<br>~HB225 | Alloy Steel<br>HB225<br>~325 | Prehardened Steel<br>HRC30~50 | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| ◎               | ○               |                        | ○                            | ◎                             |                      |        |          |          |                 |                      |

# ESLNB20

## 2 Flutes Long Neck Ball End Mill

Endmill



※ The marked effective neck length is the default value to prevent interference with the workpiece.

| EDP No         | DC  | RE   | APMX | LU  | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|----------------|-----|------|------|-----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|                |     |      |      |     |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNB20 04-4   | 0.4 | 0.2  | 0.3  | 4   | 0.37 | 50  | 4       | 8.3  | 5                                     | 5.4  | 5.7  | 6    | 6.6  |
| ESLNB20 04-4.5 | 0.4 | 0.2  | 0.3  | 4.5 | 0.37 | 50  | 4       | 8    | 5.6                                   | 6    | 6.3  | 6.6  | 7.2  |
| ESLNB20 05-1   | 0.5 | 0.25 | 0.35 | 1   | 0.47 | 50  | 4       | 11   | 1.7                                   | 1.9  | 2.1  | 2.3  | 2.6  |
| ESLNB20 05-2   | 0.5 | 0.25 | 0.35 | 2   | 0.47 | 50  | 4       | 9.9  | 2.8                                   | 3.1  | 3.3  | 3.6  | 4    |
| ESLNB20 05-3   | 0.5 | 0.25 | 0.35 | 3   | 0.47 | 50  | 4       | 9    | 3.9                                   | 4.3  | 4.6  | 4.8  | 5.3  |
| ESLNB20 05-4   | 0.5 | 0.25 | 0.35 | 4   | 0.47 | 50  | 4       | 8.3  | 5                                     | 5.4  | 5.7  | 6    | 6.6  |
| ESLNB20 05-5   | 0.5 | 0.25 | 0.35 | 5   | 0.47 | 50  | 4       | 7.7  | 6.1                                   | 6.5  | 6.9  | 7.2  | 7.8  |
| ESLNB20 05-6   | 0.5 | 0.25 | 0.35 | 6   | 0.47 | 50  | 4       | 7.1  | 7.2                                   | 7.6  | 8    | 8.4  | 9    |
| ESLNB20 05-8   | 0.5 | 0.25 | 0.35 | 8   | 0.47 | 50  | 4       | 6.3  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.4 |
| ESLNB20 06-1   | 0.6 | 0.3  | 0.4  | 1   | 0.57 | 50  | 4       | 11   | 1.7                                   | 1.9  | 2.1  | 2.3  | 2.6  |
| ESLNB20 06-2   | 0.6 | 0.3  | 0.4  | 2   | 0.57 | 50  | 4       | 9.9  | 2.8                                   | 3.1  | 3.3  | 3.6  | 4    |
| ESLNB20 06-3   | 0.6 | 0.3  | 0.4  | 3   | 0.57 | 50  | 4       | 9    | 3.9                                   | 4.3  | 4.5  | 4.8  | 5.3  |
| ESLNB20 06-4   | 0.6 | 0.3  | 0.4  | 4   | 0.57 | 50  | 4       | 8.3  | 5                                     | 5.4  | 5.7  | 6    | 6.6  |
| ESLNB20 06-5   | 0.6 | 0.3  | 0.4  | 5   | 0.57 | 50  | 4       | 7.6  | 6.1                                   | 6.5  | 6.9  | 7.2  | 7.8  |
| ESLNB20 06-6   | 0.6 | 0.3  | 0.4  | 6   | 0.57 | 50  | 4       | 7.1  | 7.2                                   | 7.6  | 8    | 8.4  | 9    |
| ESLNB20 06-7   | 0.6 | 0.3  | 0.4  | 7   | 0.57 | 50  | 4       | 6.6  | 8.3                                   | 8.8  | 9.2  | 9.5  | 10.2 |
| ESLNB20 06-8   | 0.6 | 0.3  | 0.4  | 8   | 0.57 | 50  | 4       | 6.2  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.4 |
| ESLNB20 06-9   | 0.6 | 0.3  | 0.4  | 9   | 0.57 | 50  | 4       | 5.8  | 10.4                                  | 10.9 | 11.4 | 11.8 | 12.5 |
| ESLNB20 06-10  | 0.6 | 0.3  | 0.4  | 10  | 0.57 | 50  | 4       | 5.5  | 11.4                                  | 12   | 12.5 | 12.9 | 13.7 |
| ESLNB20 06-12  | 0.6 | 0.3  | 0.4  | 12  | 0.57 | 50  | 4       | 5    | 13.6                                  | 14.2 | 14.7 | 15.2 | 16   |

### ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |             |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | ~325        | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○           | ◎                 |           |        |          |          |                 |                      |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

# ESLNB20

## 2 Flutes Long Neck Ball End Mill

Endmill

|               | EDP No        | DC  | RE   | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|---------------|-----|------|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |               |     |      |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| Zamus Star    | ESLNB20 08-2  | 0.8 | 0.4  | 0.5  | 2  | 0.77 | 50  | 4       | 9.9  | 2.8                                   | 3.1  | 3.3  | 3.5  | 4    |
|               | ESLNB20 08-4  | 0.8 | 0.4  | 0.5  | 4  | 0.77 | 50  | 4       | 8.2  | 5                                     | 5.4  | 5.7  | 6    | 6.5  |
|               | ESLNB20 08-5  | 0.8 | 0.4  | 0.5  | 5  | 0.77 | 50  | 4       | 7.5  | 6.1                                   | 6.5  | 6.9  | 7.2  | 7.8  |
|               | ESLNB20 08-6  | 0.8 | 0.4  | 0.5  | 6  | 0.77 | 50  | 4       | 7    | 7.2                                   | 7.6  | 8    | 8.4  | 9    |
|               | ESLNB20 08-8  | 0.8 | 0.4  | 0.5  | 8  | 0.77 | 50  | 4       | 6.1  | 9.3                                   | 9.8  | 10.3 | 10.7 | 11.3 |
| E-Star        | ESLNB20 08-10 | 0.8 | 0.4  | 0.5  | 10 | 0.77 | 50  | 4       | 5.4  | 11.4                                  | 12   | 12.5 | 12.9 | 13.7 |
|               | ESLNB20 10-2  | 1   | 0.5  | 0.8  | 2  | 0.96 | 50  | 4       | 9.9  | 2.9                                   | 3.1  | 3.3  | 3.5  | 4    |
|               | ESLNB20 10-3  | 1   | 0.5  | 0.8  | 3  | 0.96 | 50  | 4       | 8.9  | 4                                     | 4.3  | 4.5  | 4.8  | 5.3  |
| U-Wing        | ESLNB20 10-4  | 1   | 0.5  | 0.8  | 4  | 0.96 | 50  | 4       | 8.1  | 5                                     | 5.4  | 5.7  | 6    | 6.5  |
|               | ESLNB20 10-5  | 1   | 0.5  | 0.8  | 5  | 0.96 | 50  | 4       | 7.4  | 6.1                                   | 6.5  | 6.9  | 7.2  | 7.8  |
|               | ESLNB20 10-6  | 1   | 0.5  | 0.8  | 6  | 0.96 | 50  | 4       | 6.8  | 7.2                                   | 7.7  | 8    | 8.4  | 9    |
| Zamus Thunder | ESLNB20 10-7  | 1   | 0.5  | 0.8  | 7  | 0.96 | 50  | 4       | 6.3  | 8.3                                   | 8.8  | 9.2  | 9.5  | 10.2 |
|               | ESLNB20 10-8  | 1   | 0.5  | 0.8  | 8  | 0.96 | 50  | 4       | 5.9  | 9.3                                   | 9.9  | 10.3 | 10.7 | 11.3 |
|               | ESLNB20 10-9  | 1   | 0.5  | 0.8  | 9  | 0.96 | 50  | 4       | 5.5  | 10.4                                  | 11   | 11.4 | 11.8 | 12.5 |
| X-Star        | ESLNB20 10-10 | 1   | 0.5  | 0.8  | 10 | 0.96 | 50  | 4       | 5.2  | 11.5                                  | 12   | 12.5 | 12.9 | 13.7 |
|               | ESLNB20 10-12 | 1   | 0.5  | 0.8  | 12 | 0.96 | 55  | 4       | 4.6  | 13.6                                  | 14.2 | 14.7 | 15.2 | 15.9 |
|               | ESLNB20 10-14 | 1   | 0.5  | 0.8  | 14 | 0.96 | 55  | 4       | 4.2  | 15.7                                  | 16.4 | 16.9 | 17.4 | 18.5 |
| S-Wing        | ESLNB20 10-16 | 1   | 0.5  | 0.8  | 16 | 0.96 | 55  | 4       | 3.8  | 17.8                                  | 18.5 | 19.1 | 19.6 | 21.2 |
|               | ESLNB20 10-18 | 1   | 0.5  | 0.8  | 18 | 0.96 | 60  | 4       | 3.5  | 19.9                                  | 20.7 | 21.3 | 21.8 | 23.8 |
|               | ESLNB20 10-20 | 1   | 0.5  | 0.8  | 20 | 0.96 | 60  | 4       | 3.3  | 22                                    | 22.8 | 23.4 | 24   | 26.5 |
| A-Wing        | ESLNB20 12-4  | 1.2 | 0.6  | 1.1  | 4  | 1.15 | 50  | 4       | 7.9  | 5.1                                   | 5.4  | 5.7  | 6    | 6.5  |
|               | ESLNB20 12-6  | 1.2 | 0.6  | 1.1  | 6  | 1.15 | 50  | 4       | 6.6  | 7.2                                   | 7.7  | 8    | 8.4  | 9    |
|               | ESLNB20 12-8  | 1.2 | 0.6  | 1.1  | 8  | 1.15 | 50  | 4       | 5.7  | 9.4                                   | 9.9  | 10.3 | 10.7 | 11.3 |
| Standard      | ESLNB20 12-10 | 1.2 | 0.6  | 1.1  | 10 | 1.15 | 50  | 4       | 5    | 11.5                                  | 12.1 | 12.5 | 12.9 | 13.7 |
|               | ESLNB20 12-12 | 1.2 | 0.6  | 1.1  | 12 | 1.15 | 55  | 4       | 4.5  | 13.6                                  | 14.2 | 14.7 | 15.2 | 15.9 |
|               | ESLNB20 14-8  | 1.4 | 0.7  | 1.3  | 8  | 1.34 | 50  | 4       | 5.5  | 9.4                                   | 9.9  | 10.3 | 10.7 | 11.3 |
| Copper-Mate   | ESLNB20 14-12 | 1.4 | 0.7  | 1.3  | 12 | 1.34 | 55  | 4       | 4.3  | 13.6                                  | 14.2 | 14.7 | 15.2 | 15.9 |
|               | ESLNB20 14-16 | 1.4 | 0.7  | 1.3  | 16 | 1.34 | 55  | 4       | 3.5  | 17.8                                  | 18.5 | 19.1 | 19.6 | 21.2 |
|               | ESLNB20 15-4  | 1.5 | 0.75 | 1.35 | 4  | 1.44 | 50  | 4       | 7.7  | 5.1                                   | 5.4  | 5.7  | 6    | 6.5  |
| Gra-Mate      | ESLNB20 15-6  | 1.5 | 0.75 | 1.35 | 6  | 1.44 | 50  | 4       | 6.4  | 7.3                                   | 7.7  | 8    | 8.4  | 9    |
|               | ESLNB20 15-8  | 1.5 | 0.75 | 1.35 | 8  | 1.44 | 50  | 4       | 5.4  | 9.4                                   | 9.9  | 10.3 | 10.7 | 11.3 |
|               | ESLNB20 15-10 | 1.5 | 0.75 | 1.35 | 10 | 1.44 | 50  | 4       | 4.7  | 11.5                                  | 12.1 | 12.5 | 12.9 | 13.7 |
|               | ESLNB20 15-12 | 1.5 | 0.75 | 1.35 | 12 | 1.44 | 55  | 4       | 4.2  | 13.6                                  | 14.2 | 14.7 | 15.2 | 15.9 |
|               | ESLNB20 15-14 | 1.5 | 0.75 | 1.35 | 14 | 1.44 | 55  | 4       | 3.8  | 15.7                                  | 16.4 | 16.9 | 17.4 | 18.5 |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K         | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | ~HB225       | HB225 ~325  | HRC30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |           |        |          |          |                 |                      |

# ESLNB20

## 2 Flutes Long Neck Ball End Mill

Endmill

| EDP No        | DC  | RE   | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|-----|------|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |     |      |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNB20 15-16 | 1.5 | 0.75 | 1.35 | 16 | 1.44 | 55  | 4       | 3.4  | 17.8                                  | 18.5 | 19.1 | 19.6 | 21.1 |
| ESLNB20 15-20 | 1.5 | 0.75 | 1.35 | 20 | 1.44 | 60  | 4       | 2.9  | 22                                    | 22.8 | 23.4 | 24   | -    |
| ESLNB20 16-8  | 1.6 | 0.8  | 1.4  | 8  | 1.54 | 50  | 4       | 5.3  | 9.4                                   | 9.9  | 10.3 | 10.7 | 11.3 |
| ESLNB20 16-10 | 1.6 | 0.8  | 1.4  | 10 | 1.54 | 55  | 4       | 4.6  | 11.5                                  | 12.1 | 12.5 | 12.9 | 13.7 |
| ESLNB20 16-12 | 1.6 | 0.8  | 1.4  | 12 | 1.54 | 55  | 4       | 4.1  | 13.6                                  | 14.2 | 14.7 | 15.2 | 15.9 |
| ESLNB20 16-16 | 1.6 | 0.8  | 1.4  | 16 | 1.54 | 55  | 4       | 3.3  | 17.8                                  | 18.5 | 19.1 | 19.6 | 21.1 |
| ESLNB20 16-20 | 1.6 | 0.8  | 1.4  | 20 | 1.54 | 60  | 4       | 2.8  | 22                                    | 22.8 | 23.4 | 24   | -    |
| ESLNB20 18-8  | 1.8 | 0.9  | 1.6  | 8  | 1.73 | 50  | 4       | 5.1  | 9.4                                   | 9.9  | 10.3 | 10.7 | 11.3 |
| ESLNB20 18-12 | 1.8 | 0.9  | 1.6  | 12 | 1.73 | 55  | 4       | 3.9  | 13.7                                  | 14.3 | 14.7 | 15.2 | 15.9 |
| ESLNB20 18-16 | 1.8 | 0.9  | 1.6  | 16 | 1.73 | 55  | 4       | 3.1  | 17.9                                  | 18.6 | 19.1 | 19.6 | 21.1 |
| ESLNB20 18-20 | 1.8 | 0.9  | 1.6  | 20 | 1.73 | 60  | 4       | 2.6  | 22                                    | 22.8 | 23.4 | 24   | -    |
| ESLNB20 20-3  | 2   | 1    | 1.7  | 3  | 1.92 | 50  | 4       | 8.3  | 4.1                                   | 4.4  | 4.6  | 4.8  | 5.2  |
| ESLNB20 20-4  | 2   | 1    | 3    | 4  | 1.92 | 50  | 4       | 7.3  | 5.2                                   | 5.5  | 5.8  | 6    | 6.5  |
| ESLNB20 20-6  | 2   | 1    | 3    | 6  | 1.92 | 50  | 4       | 5.8  | 7.3                                   | 7.7  | 8.1  | 8.4  | 9    |
| ESLNB20 20-8  | 2   | 1    | 3    | 8  | 1.92 | 50  | 4       | 4.9  | 9.5                                   | 9.9  | 10.3 | 10.7 | 11.3 |
| ESLNB20 20-10 | 2   | 1    | 3    | 10 | 1.92 | 50  | 4       | 4.2  | 11.6                                  | 12.1 | 12.6 | 12.9 | 13.6 |
| ESLNB20 20-12 | 2   | 1    | 3    | 12 | 1.92 | 55  | 4       | 3.7  | 13.7                                  | 14.3 | 14.8 | 15.2 | 15.9 |
| ESLNB20 20-14 | 2   | 1    | 3    | 14 | 1.92 | 55  | 4       | 3.2  | 15.8                                  | 16.4 | 16.9 | 17.4 | 18.5 |
| ESLNB20 20-16 | 2   | 1    | 3    | 16 | 1.92 | 55  | 4       | 2.9  | 17.9                                  | 18.6 | 19.1 | 19.6 | -    |
| ESLNB20 20-18 | 2   | 1    | 3    | 18 | 1.92 | 60  | 4       | 2.7  | 20                                    | 20.7 | 21.3 | 21.8 | -    |
| ESLNB20 20-20 | 2   | 1    | 3    | 20 | 1.92 | 60  | 4       | 2.4  | 22.1                                  | 22.8 | 23.4 | 24   | -    |
| ESLNB20 20-22 | 2   | 1    | 3    | 22 | 1.92 | 60  | 4       | 2.3  | 24.1                                  | 24.9 | 25.6 | 26.3 | -    |
| ESLNB20 20-25 | 2   | 1    | 3    | 25 | 1.92 | 65  | 4       | 2    | 27.3                                  | 28.1 | 28.8 | -    | -    |
| ESLNB20 20-30 | 2   | 1    | 3    | 30 | 1.92 | 70  | 4       | 1.7  | 32.4                                  | 33.4 | 34.2 | -    | -    |
| ESLNB20 20-35 | 2   | 1    | 3    | 35 | 1.92 | 75  | 4       | 1.5  | 37.6                                  | 38.6 | -    | -    | -    |
| ESLNB20 20-40 | 2   | 1    | 3    | 40 | 1.92 | 80  | 4       | 1.4  | 42.8                                  | 43.8 | -    | -    | -    |
| ESLNB20 25-10 | 2.5 | 1.25 | 4    | 10 | 2.4  | 50  | 4       | 3.4  | 11.6                                  | 12.1 | 12.6 | 13   | 13.6 |
| ESLNB20 25-16 | 2.5 | 1.25 | 4    | 16 | 2.4  | 55  | 4       | 2.3  | 17.9                                  | 18.6 | 19.1 | 19.6 | -    |
| ESLNB20 25-20 | 2.5 | 1.25 | 4    | 20 | 2.4  | 60  | 4       | 1.9  | 22.1                                  | 22.8 | 23.5 | -    | -    |
| ESLNB20 30-8  | 3   | 1.5  | 4    | 8  | 2.88 | 55  | 6       | 6.2  | 9.6                                   | 10   | 10.4 | 10.7 | 11.3 |
| ESLNB20 30-10 | 3   | 1.5  | 4    | 10 | 2.88 | 55  | 6       | 5.5  | 11.7                                  | 12.2 | 12.6 | 13   | 13.6 |
| ESLNB20 30-13 | 3   | 1.5  | 4    | 13 | 2.88 | 60  | 6       | 4.6  | 14.8                                  | 15.4 | 15.9 | 16.3 | 17.1 |
| ESLNB20 30-16 | 3   | 1.5  | 4    | 16 | 2.88 | 60  | 6       | 4    | 18                                    | 18.6 | 19.1 | 19.6 | 21.1 |
| ESLNB20 30-18 | 3   | 1.5  | 4    | 18 | 2.88 | 60  | 6       | 3.6  | 20                                    | 20.7 | 21.3 | 21.8 | 23.7 |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | Steel<br>HRc30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESLNB20

## 2 Flutes Long Neck Ball End Mill

Endmill

| EDP No        | DC | RE  | APMX | LU | DN   | OAL | DCON MS | BHTA | Effective length by inclination angle |      |      |      |      |
|---------------|----|-----|------|----|------|-----|---------|------|---------------------------------------|------|------|------|------|
|               |    |     |      |    |      |     |         |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESLNB20 30-20 | 3  | 1.5 | 4    | 20 | 2.88 | 65  | 6       | 3.4  | 22.1                                  | 22.9 | 23.5 | 24   | 26.4 |
| ESLNB20 30-25 | 3  | 1.5 | 4    | 25 | 2.88 | 70  | 6       | 2.8  | 27.3                                  | 28.2 | 28.8 | 29.9 | -    |
| ESLNB20 30-30 | 3  | 1.5 | 4    | 30 | 2.88 | 75  | 6       | 2.2  | 37.7                                  | 38.7 | 40   | 41.9 | -    |
| ESLNB20 30-35 | 3  | 1.5 | 4    | 35 | 2.88 | 80  | 6       | 4.5  | 11.6                                  | 12.1 | 12.5 | 12.9 | 13.5 |
| ESLNB20 40-10 | 4  | 2   | 5    | 10 | 3.9  | 55  | 6       | 3.6  | 14.7                                  | 15.3 | 15.8 | 16.2 | 17   |
| ESLNB20 40-13 | 4  | 2   | 5    | 13 | 3.9  | 60  | 6       | 3.1  | 17.9                                  | 18.5 | 19.1 | 19.5 | 20.9 |
| ESLNB20 40-16 | 4  | 2   | 5    | 16 | 3.9  | 60  | 6       | 2.5  | 22.1                                  | 22.8 | 23.4 | 23.9 | -    |
| ESLNB20 40-20 | 4  | 2   | 5    | 20 | 3.9  | 65  | 6       | 2.1  | 27.3                                  | 28.1 | 28.8 | 29.8 | -    |
| ESLNB20 40-25 | 4  | 2   | 5    | 25 | 3.9  | 70  | 6       | 1.8  | 32.4                                  | 33.4 | 34.2 | -    | -    |
| ESLNB20 40-30 | 4  | 2   | 5    | 30 | 3.9  | 75  | 6       | 1.6  | 37.6                                  | 38.6 | 39.9 | -    | -    |
| ESLNB20 40-35 | 4  | 2   | 5    | 35 | 3.9  | 80  | 6       | 1.4  | 42.8                                  | 43.8 | -    | -    | -    |
| ESLNB20 40-40 | 4  | 2   | 5    | 40 | 3.9  | 80  | 6       | 1.2  | 47.9                                  | 49.1 | -    | -    | -    |
| ESLNB20 40-45 | 4  | 2   | 5    | 45 | 3.9  | 90  | 6       | 1.1  | 53.1                                  | 54.5 | -    | -    | -    |
| ESLNB20 40-50 | 4  | 2   | 5    | 50 | 3.9  | 100 | 6       | 1.4  | 22                                    | 22.8 | -    | -    | -    |
| ESLNB20 50-20 | 5  | 2.5 | 6    | 20 | 4.9  | 65  | 6       | 1.2  | 27.2                                  | 28.1 | -    | -    | -    |
| ESLNB20 50-25 | 5  | 2.5 | 6    | 25 | 4.9  | 70  | 6       | 1    | 32.4                                  | -    | -    | -    | -    |
| ESLNB20 50-30 | 5  | 2.5 | 6    | 30 | 4.9  | 75  | 6       | 0.8  | 42.8                                  | -    | -    | -    | -    |
| ESLNB20 50-35 | 5  | 2.5 | 6    | 35 | 4.9  | 80  | 6       | 0.7  | 42.8                                  | -    | -    | -    | -    |
| ESLNB20 50-40 | 5  | 2.5 | 6    | 40 | 4.9  | 90  | 6       | -    | -                                     | -    | -    | -    | -    |

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

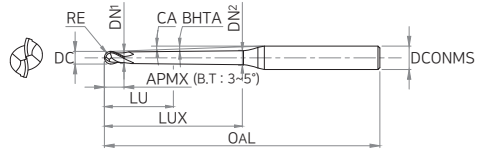
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESTNB20 2 Flutes Tapered Neck Ball End Mill



► Tolerance

| DC       |            | Shank Dia |
|----------|------------|-----------|
| ~ Ø6     | 0 ~ -0.012 |           |
| Ø8 ~ Ø12 | 0 ~ -0.015 | h5        |



CARBIDE
AITIN
2
30° HELIX
R ±0.01
R ±0.015
DATA P.674

Ø6 OR UNDER      ABOVE Ø6

| EDP No            | DC   | RE   | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU   | BHTA | Effective length by inclination angle |     |      |      |      |
|-------------------|------|------|------|-----|-----|-----------------|-----------------|-----|---------|------|------|---------------------------------------|-----|------|------|------|
|                   |      |      |      |     |     |                 |                 |     |         |      |      | 0.5°                                  | 1°  | 1.5° | 2°   | 3°   |
| ESTNB20 02-1-04   | 0.2  | 0.1  | 0.15 | 1   | 0.4 | 0.17            | 0.18            | 50  | 4       | 1.35 | 10.9 | 1.5                                   | 1.7 | 1.8  | 2    | 2.3  |
| ESTNB20 02-1.5-04 | 0.2  | 0.1  | 0.15 | 1.5 | 0.4 | 0.17            | 0.19            | 50  | 4       | 1.77 | 10.4 | 2                                     | 2.2 | 2.4  | 2.6  | 2.9  |
| ESTNB20 02-2-09   | 0.2  | 0.1  | 0.15 | 2   | 0.9 | 0.17            | 0.23            | 50  | 4       | 1.1  | 10.1 | -                                     | 2.8 | 3.1  | 3.4  | 3.9  |
| ESTNB20 02-2.5-09 | 0.2  | 0.1  | 0.15 | 2.5 | 0.9 | 0.17            | 0.24            | 50  | 4       | 1.1  | 9.6  | -                                     | 3.3 | 3.7  | 4    | 4.5  |
| ESTNB20 03-2-04   | 0.3  | 0.15 | 0.25 | 2   | 0.4 | 0.28            | 0.29            | 50  | 4       | 2.19 | 10   | 2.5                                   | 2.8 | 3    | 3.2  | 3.5  |
| ESTNB20 03-3-09   | 0.3  | 0.15 | 0.25 | 3   | 0.9 | 0.28            | 0.36            | 50  | 4       | 1.2  | 9.3  | -                                     | 3.8 | 4.2  | 4.5  | 5.1  |
| ESTNB20 03-4-09   | 0.3  | 0.15 | 0.25 | 4   | 0.9 | 0.28            | 0.39            | 50  | 4       | 1.2  | 8.6  | -                                     | 4.8 | 5.3  | 5.7  | 6.3  |
| ESTNB20 04-2-04   | 0.4  | 0.2  | 0.3  | 2   | 0.4 | 0.37            | 0.39            | 50  | 4       | 2.2  | 10   | 2.5                                   | 2.8 | 3    | 3.2  | 3.5  |
| ESTNB20 04-3-04   | 0.4  | 0.2  | 0.3  | 3   | 0.4 | 0.37            | 0.41            | 50  | 4       | 2.44 | 9.1  | 3.6                                   | 3.9 | 4.1  | 4.4  | 4.8  |
| ESTNB20 04-4-04   | 0.4  | 0.2  | 0.3  | 4   | 0.4 | 0.37            | 0.42            | 50  | 4       | 2.44 | 8.4  | 4.7                                   | 5.2 | 5.6  | 5.9  | 6.5  |
| ESTNB20 04-4-09   | 0.4  | 0.2  | 0.3  | 4   | 0.9 | 0.37            | 0.49            | 50  | 4       | 1.25 | 8.5  | -                                     | 4.8 | 5.3  | 5.7  | 6.3  |
| ESTNB20 04-5-04   | 0.4  | 0.2  | 0.3  | 5   | 0.4 | 0.37            | 0.44            | 50  | 4       | 2.44 | 7.8  | 5.7                                   | 6.3 | 6.7  | 7.1  | 7.7  |
| ESTNB20 04-5-09   | 0.4  | 0.2  | 0.3  | 5   | 0.9 | 0.37            | 0.52            | 50  | 4       | 1.25 | 7.9  | -                                     | 5.9 | 6.4  | 6.8  | 7.5  |
| ESTNB20 05-4-04   | 0.5  | 0.25 | 0.35 | 4   | 0.4 | 0.47            | 0.52            | 50  | 4       | 2.49 | 8.4  | 4.6                                   | 5   | 5.3  | 5.5  | 5.9  |
| ESTNB20 05-8-09   | 0.5  | 0.25 | 0.35 | 8   | 0.9 | 0.47            | 0.71            | 50  | 4       | 1.3  | 6.5  | -                                     | 8.9 | 9.6  | 10.1 | 10.9 |
| ESTNB20 05-12-09  | 0.5  | 0.25 | 0.35 | 12  | 0.9 | 0.47            | 0.84            | 50  | 4       | 1.3  | 5.3  | -                                     | 13  | 13.9 | 14.5 | 15.4 |
| ESTNB20 054-2-04  | 0.54 | 0.27 | 0.37 | 2   | 0.4 | 0.52            | 0.54            | 50  | 4       | 1.8  | 10   | 2.3                                   | 2.5 | 2.7  | 2.8  | 3    |
| ESTNB20 054-4-04  | 0.54 | 0.27 | 0.37 | 4   | 0.4 | 0.52            | 0.57            | 50  | 4       | 1.8  | 8.4  | 4.5                                   | 4.9 | 5.2  | 5.5  | 5.9  |
| ESTNB20 054-5-04  | 0.54 | 0.27 | 0.37 | 5   | 0.4 | 0.52            | 0.59            | 50  | 4       | 1.8  | 7.8  | 5.5                                   | 6   | 6.3  | 6.6  | 7.1  |
| ESTNB20 054-6-04  | 0.54 | 0.27 | 0.37 | 6   | 0.4 | 0.52            | 0.6             | 50  | 4       | 1.8  | 7.2  | 6.7                                   | 7.3 | 7.8  | 8.2  | 8.8  |

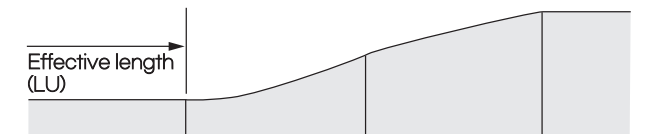
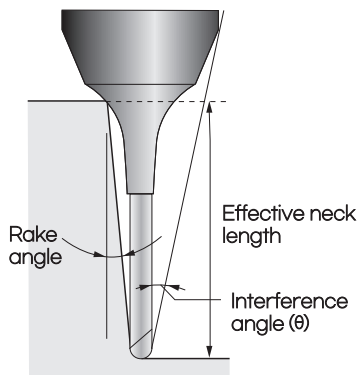
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |                   |                            | K                 | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|-------------------|----------------------------|-------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel HB225 | Prehardened Steel HRc30~50 | Cast Iron ~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | ~325              | HRc30~50                   |                   |        |          |          |                 |                      |
| ◎               | ○               |              | ○                 | ◎                          |                   |        |          |          |                 |                      |

# ESTNB20 2 Flutes Tapered Neck Ball End Mill

Endmill



※ The marked effective neck length is the default value to prevent interference with the workpiece.

Zamus Star

E-Star

U-Wing

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

| EDP No             | DC   | RE   | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU   | BHTA | Effective length by inclination angle |      |      |      |      |
|--------------------|------|------|------|-----|-----|-----------------|-----------------|-----|---------|------|------|---------------------------------------|------|------|------|------|
|                    |      |      |      |     |     |                 |                 |     |         |      |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESTNB20 054-6.5-04 | 0.54 | 0.27 | 0.37 | 6.5 | 0.4 | 0.52            | 0.61            | 50  | 4       | 1.8  | 7    | 7.2                                   | 7.9  | 8.3  | 8.7  | 9.4  |
| ESTNB20 054-7-04   | 0.54 | 0.27 | 0.37 | 7   | 0.4 | 0.52            | 0.61            | 50  | 4       | 1.8  | 6.8  | 7.7                                   | 8.4  | 8.9  | 9.3  | 10   |
| ESTNB20 06-2-04    | 0.6  | 0.3  | 0.4  | 2   | 0.4 | 0.57            | 0.59            | 50  | 4       | 2.17 | 10   | 2.4                                   | 2.5  | 2.7  | 2.8  | 3    |
| ESTNB20 06-4-04    | 0.6  | 0.3  | 0.4  | 4   | 0.4 | 0.57            | 0.62            | 50  | 4       | 2.54 | 8.4  | 4.6                                   | 5    | 5.2  | 5.5  | 5.9  |
| ESTNB20 06-6-04    | 0.6  | 0.3  | 0.4  | 6   | 0.4 | 0.57            | 0.65            | 50  | 4       | 2.54 | 7.2  | 6.8                                   | 7.4  | 7.8  | 8.2  | 8.8  |
| ESTNB20 06-6-09    | 0.6  | 0.3  | 0.4  | 6   | 0.9 | 0.57            | 0.75            | 50  | 4       | 1.35 | 7.3  | -                                     | 6.9  | 7.5  | 7.9  | 8.6  |
| ESTNB20 06-8-09    | 0.6  | 0.3  | 0.4  | 8   | 0.9 | 0.57            | 0.81            | 50  | 4       | 1.35 | 6.4  | -                                     | 8.9  | 9.6  | 10.1 | 10.9 |
| ESTNB20 06-10-04   | 0.6  | 0.3  | 0.4  | 10  | 0.4 | 0.57            | 0.7             | 50  | 4       | 2.54 | 5.6  | 10.8                                  | 11.7 | 12.2 | 12.7 | 13.5 |
| ESTNB20 06-10-09   | 0.6  | 0.3  | 0.4  | 10  | 0.9 | 0.57            | 0.87            | 50  | 4       | 1.35 | 5.7  | -                                     | 11   | 11.8 | 12.3 | 13.2 |
| ESTNB20 06-12-09   | 0.6  | 0.3  | 0.4  | 12  | 0.9 | 0.57            | 0.93            | 55  | 4       | 1.35 | 5.2  | -                                     | 13   | 13.9 | 14.5 | 15.4 |
| ESTNB20 06-15-04   | 0.6  | 0.3  | 0.4  | 15  | 0.4 | 0.57            | 0.77            | 55  | 4       | 2.54 | 4.4  | 15.9                                  | 17   | 17.6 | 18.2 | 19.2 |
| ESTNB20 06-15-09   | 0.6  | 0.3  | 0.4  | 15  | 0.9 | 0.57            | 1.03            | 55  | 4       | 1.35 | 4.5  | -                                     | 16.1 | 17.1 | 17.7 | 18.8 |
| ESTNB20 08-4-04    | 0.8  | 0.4  | 0.5  | 4   | 0.4 | 0.77            | 0.82            | 50  | 4       | 2.64 | 8.3  | 4.6                                   | 4.9  | 5.2  | 5.5  | 5.9  |
| ESTNB20 08-6-04    | 0.8  | 0.4  | 0.5  | 6   | 0.4 | 0.77            | 0.85            | 50  | 4       | 2.64 | 7.1  | 6.6                                   | 7.1  | 7.5  | 7.7  | 8.3  |
| ESTNB20 08-8-09    | 0.8  | 0.4  | 0.5  | 8   | 0.9 | 0.77            | 1.01            | 50  | 4       | 1.45 | 6.3  | -                                     | 8.9  | 9.6  | 10.1 | 10.9 |
| ESTNB20 08-12-09   | 0.8  | 0.4  | 0.5  | 12  | 0.9 | 0.77            | 1.13            | 55  | 4       | 1.45 | 5    | -                                     | 13   | 13.9 | 14.5 | 15.4 |
| ESTNB20 08-16-09   | 0.8  | 0.4  | 0.5  | 16  | 0.9 | 0.77            | 1.26            | 55  | 4       | 1.45 | 4.2  | -                                     | 17.1 | 18.1 | 18.8 | 19.9 |
| ESTNB20 09-4-04    | 0.9  | 0.45 | 0.6  | 4   | 0.4 | 0.86            | 0.91            | 50  | 4       | 3.46 | 8.2  | 4.5                                   | 4.7  | 4.9  | 5.1  | 5.4  |
| ESTNB20 09-8-04    | 0.9  | 0.45 | 0.6  | 8   | 0.4 | 0.86            | 0.96            | 55  | 4       | 3.46 | 6.1  | 8.7                                   | 9.3  | 9.7  | 10   | 10.6 |
| ESTNB20 09-12-04   | 0.9  | 0.45 | 0.6  | 12  | 0.4 | 0.86            | 1.02            | 55  | 4       | 3.46 | 4.8  | 12.9                                  | 13.8 | 14.4 | 14.9 | 15.7 |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | HB225<br>~325 | Steel<br>HRC30~50 | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |                 | ○             | ◎                 |           |        |          |          |                 |                      |

# ESTNB20

## 2 Flutes Tapered Neck Ball End Mill

Endmill

| EDP No           | DC  | RE   | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU   | BHTA | Effective length by inclination angle |      |      |      |      |
|------------------|-----|------|------|-----|-----|-----------------|-----------------|-----|---------|------|------|---------------------------------------|------|------|------|------|
|                  |     |      |      |     |     |                 |                 |     |         |      |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESTNB20 09-16-04 | 0.9 | 0.45 | 0.6  | 16  | 0.4 | 0.86            | 1.08            | 60  | 4       | 3.46 | 4    | 17                                    | 18   | 18.7 | 19.3 | 20.5 |
| ESTNB20 09-18-04 | 0.9 | 0.45 | 0.6  | 18  | 0.4 | 0.86            | 1.1             | 65  | 4       | 3.46 | 3.7  | 19.1                                  | 20.1 | 20.9 | 21.5 | 23.1 |
| ESTNB20 09-20-04 | 0.9 | 0.45 | 0.6  | 20  | 0.4 | 0.86            | 1.13            | 65  | 4       | 3.46 | 3.4  | 21.1                                  | 22.2 | 23   | 23.6 | 25.6 |
| ESTNB20 09-22-04 | 0.9 | 0.45 | 0.6  | 22  | 0.4 | 0.86            | 1.16            | 65  | 4       | 3.46 | 3.2  | 23.1                                  | 24.3 | 25.1 | 25.8 | 28.2 |
| ESTNB20 09-24-04 | 0.9 | 0.45 | 0.6  | 24  | 0.4 | 0.86            | 1.19            | 70  | 4       | 3.46 | 3    | 25.2                                  | 26.4 | 27.2 | 27.9 | -    |
| ESTNB20 10-6-04  | 1   | 0.5  | 0.8  | 6   | 0.4 | 0.94            | 1.01            | 50  | 6       | 5.09 | 8.3  | 6.8                                   | 7.2  | 7.5  | 7.8  | 8.3  |
| ESTNB20 10-8-04  | 1   | 0.5  | 0.8  | 8   | 0.4 | 0.94            | 1.04            | 55  | 6       | 5.09 | 7.5  | 8.8                                   | 9.3  | 9.7  | 10   | 10.6 |
| ESTNB20 10-10-04 | 1   | 0.5  | 0.8  | 10  | 0.4 | 0.94            | 1.07            | 55  | 6       | 5.09 | 6.8  | 11                                    | 11.7 | 12.3 | 12.7 | 13.5 |
| ESTNB20 10-10-09 | 1   | 0.5  | 0.8  | 10  | 0.9 | 0.94            | 1.23            | 55  | 6       | 2.7  | 6.9  | -                                     | 11.2 | 11.9 | 12.4 | 13.2 |
| ESTNB20 10-15-09 | 1   | 0.5  | 0.8  | 15  | 0.9 | 0.94            | 1.39            | 60  | 6       | 2.7  | 5.7  | -                                     | 16.2 | 17.1 | 17.8 | 18.8 |
| ESTNB20 10-20-04 | 1   | 0.5  | 0.8  | 20  | 0.4 | 0.94            | 1.21            | 65  | 6       | 5.09 | 4.7  | 21.2                                  | 22.3 | 23   | 23.6 | 25.7 |
| ESTNB20 10-20-09 | 1   | 0.5  | 0.8  | 20  | 0.4 | 0.94            | 1.54            | 65  | 6       | 2.7  | 4.8  | -                                     | 21.3 | 22.4 | 23.1 | 24.6 |
| ESTNB20 10-25-09 | 1   | 0.5  | 0.8  | 25  | 0.4 | 0.94            | 1.7             | 70  | 6       | 2.7  | 4.2  | -                                     | 26.4 | 27.6 | 28.4 | 30.8 |
| ESTNB20 10-30-04 | 1   | 0.5  | 0.8  | 30  | 0.4 | 0.94            | 1.35            | 75  | 6       | 5.09 | 3.6  | 31.3                                  | 32.7 | 33.6 | 34.8 | 38.5 |
| ESTNB20 10-30-09 | 1   | 0.5  | 0.8  | 30  | 0.9 | 0.94            | 1.86            | 75  | 6       | 2.7  | 3.7  | -                                     | 31.4 | 32.8 | 33.7 | 36.9 |
| ESTNB20 10-35-09 | 1   | 0.5  | 0.8  | 35  | 0.9 | 0.94            | 2.02            | 80  | 6       | 2.7  | 3.3  | -                                     | 36.5 | 38   | 39   | 43.1 |
| ESTNB20 10-40-09 | 1   | 0.5  | 0.8  | 40  | 0.9 | 0.94            | 2.17            | 85  | 6       | 2.7  | 3    | -                                     | 41.6 | 43.2 | 44.4 | -    |
| ESTNB20 10-50-09 | 1   | 0.5  | 0.8  | 50  | 0.9 | 0.94            | 2.49            | 95  | 6       | 2.7  | 2.5  | -                                     | 51.7 | 53.5 | 55.5 | -    |
| ESTNB20 10-60-09 | 1   | 0.5  | 0.8  | 60  | 0.9 | 0.94            | 2.8             | 105 | 6       | 2.7  | 2.2  | -                                     | 61.8 | 63.8 | 66.6 | -    |
| ESTNB20 10-70-09 | 1   | 0.5  | 0.8  | 70  | 0.9 | 0.94            | 3.11            | 115 | 6       | 2.7  | 1.9  | -                                     | 71.9 | 74   | -    | -    |
| ESTNB20 15-8-04  | 1.5 | 0.75 | 1.35 | 8   | 0.4 | 1.42            | 1.51            | 55  | 6       | 7.07 | 7.3  | 8.9                                   | 9.4  | 9.7  | 10   | 10.6 |
| ESTNB20 15-10-04 | 1.5 | 0.75 | 1.35 | 10  | 0.4 | 1.42            | 1.54            | 55  | 6       | 7.07 | 6.6  | 10.9                                  | 11.5 | 11.9 | 12.2 | 12.9 |
| ESTNB20 15-12-04 | 1.5 | 0.75 | 1.35 | 12  | 0.4 | 1.42            | 1.57            | 55  | 6       | 7.07 | 6    | 13                                    | 13.6 | 14   | 14.4 | 15.4 |
| ESTNB20 15-15-09 | 1.5 | 0.75 | 1.35 | 15  | 0.9 | 1.42            | 1.85            | 60  | 6       | 3.89 | 5.4  | -                                     | 16.4 | 17.2 | 17.8 | 18.8 |
| ESTNB20 15-20-09 | 1.5 | 0.75 | 1.35 | 20  | 0.9 | 1.42            | 2.01            | 65  | 6       | 3.89 | 4.5  | -                                     | 21.4 | 22.4 | 23.2 | 24.7 |
| ESTNB20 15-30-09 | 1.5 | 0.75 | 1.35 | 30  | 0.9 | 1.42            | 2.32            | 75  | 6       | 3.89 | 3.4  | -                                     | 31.5 | 32.9 | 33.7 | 37   |
| ESTNB20 18-4-04  | 1.8 | 0.9  | 1.6  | 4   | 0.4 | 1.73            | 1.76            | 50  | 6       | 4.38 | 9.2  | 4.6                                   | 4.8  | 4.9  | 5.1  | 5.4  |
| ESTNB20 18-8-04  | 1.8 | 0.9  | 1.6  | 8   | 0.4 | 1.73            | 1.82            | 50  | 6       | 6.61 | 7.1  | 8.6                                   | 9    | 9.2  | 9.4  | 10.2 |
| ESTNB20 18-12-04 | 1.8 | 0.9  | 1.6  | 12  | 0.4 | 1.73            | 1.88            | 55  | 6       | 6.61 | 5.8  | 12.9                                  | 13.5 | 14   | 14.4 | 15.4 |
| ESTNB20 18-16-04 | 1.8 | 0.9  | 1.6  | 16  | 0.4 | 1.73            | 1.93            | 60  | 6       | 6.61 | 4.9  | 17                                    | 17.7 | 18.3 | 18.7 | 20.5 |
| ESTNB20 18-20-04 | 1.8 | 0.9  | 1.6  | 20  | 0.4 | 1.73            | 1.99            | 65  | 6       | 6.61 | 4.3  | 21.2                                  | 22.3 | 23   | 23.6 | 25.6 |
| ESTNB20 18-24-04 | 1.8 | 0.9  | 1.6  | 24  | 0.4 | 1.73            | 2.04            | 65  | 6       | 6.61 | 3.8  | 25.3                                  | 26.5 | 27.3 | 27.9 | 30.8 |
| ESTNB20 18-28-04 | 1.8 | 0.9  | 1.6  | 28  | 0.4 | 1.73            | 2.1             | 70  | 6       | 6.61 | 3.4  | 29.4                                  | 30.6 | 31.5 | 32.4 | 35.9 |
| ESTNB20 18-32-04 | 1.8 | 0.9  | 1.6  | 32  | 0.4 | 1.73            | 2.15            | 70  | 6       | 6.61 | 3    | 33.4                                  | 34.8 | 35.7 | 37.1 | -    |

Zamus Star  
E-Star  
U-Wing  
Zamus Thunder  
X-Star  
S-Wing  
A-Wing  
Standard  
Copper-Mate  
Gra-Mate

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

# ESTNB20 2 Flutes Tapered Neck Ball End Mill

Endmill

| EDP No                            | DC  | RE  | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU    | BHTA | Effective length by inclination angle |      |      |      |       |
|-----------------------------------|-----|-----|------|-----|-----|-----------------|-----------------|-----|---------|-------|------|---------------------------------------|------|------|------|-------|
|                                   |     |     |      |     |     |                 |                 |     |         |       |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°    |
| ESTNB20 18-36-04                  | 1.8 | 0.9 | 1.6  | 36  | 0.4 | 1.73            | 2.21            | 75  | 6       | 6.61  | 2.8  | 37.5                                  | 38.9 | 39.9 | 41.7 | -     |
| ESTNB20 18-38-04                  | 1.8 | 0.9 | 1.6  | 38  | 0.4 | 1.73            | 2.24            | 80  | 6       | 6.61  | 2.7  | 39.5                                  | 41   | 42   | 44   | -     |
| ESTNB20 18-40-04                  | 1.8 | 0.9 | 1.6  | 40  | 0.4 | 1.73            | 2.27            | 80  | 6       | 6.61  | 2.6  | 41.5                                  | 43.1 | 44.2 | 46.3 | -     |
| Zamus Star<br>ESTNB20 20-8-04     | 2   | 1   | 1.7  | 8   | 0.4 | 1.92            | 2.01            | 50  | 6       | 7.42  | 7    | 8.7                                   | 9    | 9.2  | 9.5  | 10.2  |
| ESTNB20 20-12-04                  | 2   | 1   | 1.7  | 12  | 0.4 | 1.92            | 2.06            | 55  | 6       | 7.42  | 5.7  | 13                                    | 13.6 | 14   | 14.4 | 15.4  |
| E-Star<br>ESTNB20 20-16-04        | 2   | 1   | 1.7  | 16  | 0.4 | 1.92            | 2.12            | 60  | 6       | 7.42  | 4.8  | 17                                    | 17.7 | 18.3 | 18.7 | 20.5  |
| ESTNB20 20-20-04                  | 2   | 1   | 1.7  | 20  | 0.4 | 1.92            | 2.18            | 65  | 6       | 7.42  | 4.1  | 21.3                                  | 22.3 | 23   | 23.6 | 25.6  |
| ESTNB20 20-20-09                  | 2   | 1   | 1.7  | 20  | 0.9 | 1.92            | 2.5             | 65  | 6       | 4.24  | 4.2  | -                                     | 21.4 | 22.4 | 23.2 | 24.6  |
| ESTNB20 20-25-09                  | 2   | 1   | 1.7  | 25  | 0.9 | 1.92            | 2.65            | 65  | 6       | 4.24  | 3.6  | -                                     | 26.5 | 27.7 | 28.5 | 30.8  |
| U-Wing<br>ESTNB20 20-30-04        | 2   | 1   | 1.7  | 30  | 0.4 | 1.92            | 2.32            | 70  | 6       | 7.42  | 3.1  | 31.4                                  | 32.7 | 33.6 | 34.8 | 38.5  |
| ESTNB20 20-30-09                  | 2   | 1   | 1.7  | 30  | 0.9 | 1.92            | 2.81            | 70  | 6       | 4.24  | 3.2  | -                                     | 31.6 | 32.9 | 33.7 | 36.9  |
| ESTNB20 20-35-09                  | 2   | 1   | 1.7  | 35  | 0.9 | 1.92            | 2.97            | 75  | 6       | 4.24  | 2.8  | -                                     | 36.6 | 38   | 39   | -     |
| Zamus Thunder<br>ESTNB20 20-40-04 | 2   | 1   | 1.7  | 40  | 0.4 | 1.92            | 2.46            | 80  | 6       | 7.42  | 2.5  | 41.5                                  | 43.1 | 44.2 | 46.3 | -     |
| ESTNB20 20-40-09                  | 2   | 1   | 1.7  | 40  | 0.9 | 1.92            | 3.12            | 80  | 6       | 4.24  | 2.6  | -                                     | 41.7 | 43.2 | 44.5 | -     |
| ESTNB20 20-50-09                  | 2   | 1   | 1.7  | 50  | 0.9 | 1.92            | 3.44            | 90  | 6       | 4.24  | 2.1  | -                                     | 51.5 | 53.5 | 55.5 | -     |
| ESTNB20 20-60-09                  | 2   | 1   | 1.7  | 60  | 0.9 | 1.92            | 3.75            | 100 | 6       | 4.24  | 1.8  | -                                     | 61.9 | 63.8 | -    | -     |
| X-Star<br>ESTNB20 20-70-09        | 2   | 1   | 1.7  | 70  | 0.9 | 1.92            | 4.07            | 110 | 6       | 4.24  | 1.8  | -                                     | 72   | 74.1 | -    | -     |
| ESTNB20 30-8-04                   | 3   | 1.5 | 2.5  | 8   | 0.4 | 2.86            | 2.94            | 50  | 6       | 8.5   | 6.3  | 8.8                                   | 9.1  | 9.3  | 9.5  | 10.3  |
| ESTNB20 30-16-04                  | 3   | 1.5 | 2.5  | 16  | 0.4 | 2.86            | 3.05            | 55  | 6       | 12.52 | 4.1  | 17.2                                  | 17.8 | 18.3 | 18.7 | 20.6  |
| ESTNB20 30-20-04                  | 3   | 1.5 | 2.5  | 20  | 0.4 | 2.86            | 3.1             | 60  | 6       | 12.52 | 3.4  | 21.2                                  | 22   | 22.6 | 23.3 | 25.7  |
| S-Wing<br>ESTNB20 30-30-04        | 3   | 1.5 | 2.5  | 30  | 0.4 | 2.86            | 3.24            | 70  | 6       | 12.52 | 2.5  | 31.6                                  | 32.8 | 33.7 | 34.9 | -     |
| ESTNB20 30-30-09                  | 3   | 1.5 | 2.5  | 30  | 0.9 | 2.86            | 3.72            | 70  | 6       | 6.95  | 2.6  | -                                     | 31.8 | 33   | 33.8 | -     |
| ESTNB20 30-40-04                  | 3   | 1.5 | 2.5  | 40  | 0.4 | 2.86            | 3.38            | 80  | 6       | 12.52 | 2    | 41.7                                  | 43.2 | 44.3 | -    | -     |
| A-Wing<br>ESTNB20 30-40-09        | 3   | 1.5 | 2.5  | 40  | 0.9 | 2.86            | 4.04            | 80  | 6       | 6.95  | 2    | -                                     | 41.9 | 43.3 | -    | -     |
| ESTNB20 30-50-09                  | 3   | 1.5 | 2.5  | 50  | 0.9 | 2.86            | 4.35            | 90  | 6       | 6.95  | 1.7  | -                                     | 52   | 53.6 | -    | -     |
| ESTNB20 30-60-09                  | 3   | 1.5 | 2.5  | 60  | 0.9 | 2.86            | 4.67            | 100 | 6       | 6.95  | 1.4  | -                                     | 62.1 | -    | -    | -     |
| Standard<br>ESTNB20 30-70-09      | 3   | 1.5 | 2.5  | 70  | 0.9 | 2.86            | 4.98            | 110 | 6       | 6.95  | 1.2  | -                                     | 72.1 | -    | -    | -     |
| ESTNB20 40-20-10                  | 4   | 2   | 8    | 20  | 1   | 3.86            | 4.28            | 70  | 8       | 12.01 | 5    | 20.5                                  | 21.6 | 22.3 | 22.8 | 23.5  |
| ESTNB20 40-30-10                  | 4   | 2   | 8    | 30  | 1   | 3.86            | 4.63            | 80  | 8       | 12.01 | 3.51 | 22                                    | 31.6 | 32.5 | 33.2 | 34.16 |
| Copper-Mate<br>ESTNB20 40-40-10   | 4   | 2   | 8    | 40  | 1   | 3.86            | 4.98            | 90  | 8       | 12.01 | 2.7  | 22                                    | 42   | 43.4 | 44.3 | -     |
| ESTNB20 40-50-10                  | 4   | 2   | 8    | 50  | 1   | 3.86            | 5.33            | 100 | 8       | 12.01 | 2.2  | 22                                    | 52   | 53.6 | 54.7 | -     |
| ESTNB20 40-60-10                  | 4   | 2   | 8    | 60  | 1   | 3.86            | 5.68            | 110 | 8       | 12.01 | 1.9  | 22                                    | 62   | 63.8 | -    | -     |
| ESTNB20 50-30-10                  | 5   | 2.5 | 10   | 30  | 1   | 4.86            | 5.56            | 80  | 8       | 14.01 | 2.8  | 25.5                                  | 31.7 | 32.6 | 33.2 | -     |
| Gra-Mate<br>ESTNB20 50-40-10      | 5   | 2.5 | 10   | 40  | 1   | 4.86            | 5.91            | 90  | 8       | 14.01 | 2.1  | 25.5                                  | 41.7 | 42.8 | 43.5 | -     |

► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H              |              | P            |             |                   | K         | N      |          |          | M               | S                    |
|----------------|--------------|--------------|-------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel |              | Carbon Steel | Alloy Steel | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61 ~HRC55   | SKD11 HRC55~ | ~HB225       | HB225 ~325  | HRC30-50          | ~FCD500   |        |          |          |                 |                      |
| ◎              | ○            |              | ○           | ◎                 |           |        |          |          |                 |                      |

# ESTNB20

## 2 Flutes Tapered Neck Ball End Mill

Endmill

| EDP No            | DC | RE  | APMX | LUX | CA | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU    | BHTA | Effective length by inclination angle |      |      |    |    |
|-------------------|----|-----|------|-----|----|-----------------|-----------------|-----|---------|-------|------|---------------------------------------|------|------|----|----|
|                   |    |     |      |     |    |                 |                 |     |         |       |      | 0.5°                                  | 1°   | 1.5° | 2° | 3° |
| ESTNB20 50-60-10  | 5  | 2.5 | 10   | 60  | 1  | 4.86            | 6.61            | 110 | 8       | 14.01 | 1.5  | 25.5                                  | 62.1 | -    | -  | -  |
| ESTNB20 60-30-10  | 6  | 3   | 12   | 30  | 1  | 5.86            | 6.49            | 80  | 8       | 16.01 | 1.9  | 29                                    | 31.8 | 32.6 | -  | -  |
| ESTNB20 60-40-10  | 6  | 3   | 12   | 40  | 1  | 5.86            | 6.84            | 90  | 8       | 16.01 | 1.5  | 29                                    | 41.8 | -    | -  | -  |
| ESTNB20 60-50-10  | 6  | 3   | 12   | 50  | 1  | 5.86            | 7.19            | 100 | 8       | 16.01 | 1.2  | 29                                    | 51.8 | -    | -  | -  |
| ESTNB20 60-60-10  | 6  | 3   | 12   | 60  | 1  | 5.86            | 7.54            | 110 | 10      | 16.01 | 1.9  | 29                                    | 62.2 | 63.9 | -  | -  |
| ESTNB20 60-70-10  | 6  | 3   | 12   | 70  | 1  | 5.86            | 7.89            | 120 | 10      | 16.01 | 1.7  | 29                                    | 72.2 | 74.1 | -  | -  |
| ESTNB20 60-80-10  | 6  | 3   | 12   | 80  | 1  | 5.86            | 8.23            | 130 | 10      | 16.01 | 1.5  | 29                                    | 82.2 | -    | -  | -  |
| ESTNB20 80-50-10  | 8  | 4   | 14   | 50  | 1  | 7.86            | 9.12            | 110 | 10      | 18.01 | 1.2  | 32                                    | 51.9 | -    | -  | -  |
| ESTNB20 80-60-10  | 8  | 4   | 14   | 60  | 1  | 7.86            | 9.47            | 120 | 10      | 18.01 | 1    | 32                                    | -    | -    | -  | -  |
| ESTNB20 80-70-10  | 8  | 4   | 14   | 70  | 1  | 7.86            | 9.82            | 130 | 10      | 18.01 | 0.9  | 32                                    | -    | -    | -  | -  |
| ESTNB20 80-80-10  | 8  | 4   | 14   | 80  | 1  | 7.86            | 10.16           | 140 | 12      | 18.01 | 1.5  | 32                                    | 82.3 | -    | -  | -  |
| ESTNB20 100-60-10 | 10 | 5   | 18   | 60  | 1  | 9.86            | 11.33           | 130 | 12      | 22.01 | 1.1  | 39                                    | 62.1 | -    | -  | -  |
| ESTNB20 100-75-10 | 10 | 5   | 18   | 75  | 1  | 9.86            | 11.85           | 140 | 12      | 22.01 | 0.9  | 39                                    | -    | -    | -  | -  |

- Zamus Star
- E-Star
- U-Wing
- Zamus Thunder
- X-Star
- S-Wing
- A-Wing
- Standard
- Copper-Mate
- Gra-Mate

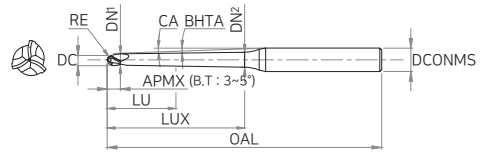
► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |

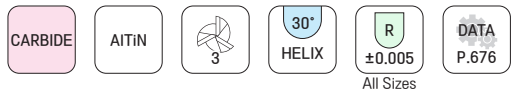
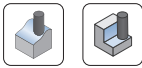
# ESTNB30

## 3 Flutes Tapered Neck Ball End Mill



### ► Tolerance

| DC        |            | Shank Dia |
|-----------|------------|-----------|
| All Sizes | 0 ~ -0.015 | h5        |



| EDP No           | DC | RE  | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCONMS | LU    | BHTA | Effective length by inclination angle |      |      |      |      |
|------------------|----|-----|------|-----|-----|-----------------|-----------------|-----|--------|-------|------|---------------------------------------|------|------|------|------|
|                  |    |     |      |     |     |                 |                 |     |        |       |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESTNB30 20-8-04  | 2  | 1   | 1.7  | 8   | 0.4 | 1.92            | 2.01            | 50  | 6      | 7.42  | 7    | 8.7                                   | 9    | 9.2  | 9.5  | 10.2 |
| ESTNB30 20-12-04 | 2  | 1   | 1.7  | 12  | 0.4 | 1.92            | 2.06            | 55  | 6      | 7.42  | 5.7  | 13                                    | 13.6 | 14   | 14.4 | 15.4 |
| ESTNB30 20-16-04 | 2  | 1   | 1.7  | 16  | 0.4 | 1.92            | 2.12            | 60  | 6      | 7.42  | 4.8  | 17                                    | 17.7 | 18.3 | 18.7 | 20.5 |
| ESTNB30 20-20-04 | 2  | 1   | 1.7  | 20  | 0.4 | 1.92            | 2.18            | 65  | 6      | 7.42  | 4.1  | 21.3                                  | 22.3 | 23   | 23.6 | 25.6 |
| ESTNB30 20-20-09 | 2  | 1   | 1.7  | 20  | 0.9 | 1.92            | 2.5             | 65  | 6      | 4.24  | 4.2  | -                                     | 21.4 | 22.4 | 23.2 | 24.6 |
| ESTNB30 20-25-09 | 2  | 1   | 1.7  | 25  | 0.9 | 1.92            | 2.65            | 65  | 6      | 4.24  | 3.6  | -                                     | 26.5 | 27.7 | 28.5 | 30.8 |
| ESTNB30 20-30-04 | 2  | 1   | 1.7  | 30  | 0.4 | 1.92            | 2.32            | 70  | 6      | 7.42  | 3.1  | 31.4                                  | 32.7 | 33.6 | 34.8 | 38.5 |
| ESTNB30 20-30-09 | 2  | 1   | 1.7  | 30  | 0.9 | 1.92            | 2.81            | 70  | 6      | 4.24  | 3.2  | -                                     | 31.6 | 32.9 | 33.7 | 36.9 |
| ESTNB30 20-35-09 | 2  | 1   | 1.7  | 35  | 0.9 | 1.92            | 2.97            | 75  | 6      | 4.24  | 2.8  | -                                     | 36.6 | 38   | 39   | -    |
| ESTNB30 20-40-04 | 2  | 1   | 1.7  | 40  | 0.4 | 1.92            | 2.46            | 80  | 6      | 7.42  | 2.5  | 41.5                                  | 43.1 | 44.2 | 46.3 | -    |
| ESTNB30 20-40-09 | 2  | 1   | 1.7  | 40  | 0.9 | 1.92            | 3.12            | 80  | 6      | 4.24  | 2.6  | -                                     | 41.7 | 43.2 | 44.5 | -    |
| ESTNB30 20-50-09 | 2  | 1   | 1.7  | 50  | 0.9 | 1.92            | 3.44            | 90  | 6      | 4.24  | 2.1  | -                                     | 51.8 | 53.5 | 55.5 | -    |
| ESTNB30 20-60-09 | 2  | 1   | 1.7  | 60  | 0.9 | 1.92            | 3.75            | 100 | 6      | 4.24  | 1.8  | -                                     | 61.9 | 63.8 | -    | -    |
| ESTNB30 20-70-09 | 2  | 1   | 1.7  | 70  | 0.9 | 1.92            | 4.07            | 110 | 6      | 4.24  | 1.6  | -                                     | 72   | 74.1 | -    | -    |
| ESTNB30 30-8-04  | 3  | 1.5 | 2.5  | 8   | 0.4 | 2.86            | 2.94            | 50  | 6      | 8.5   | 6.3  | 8.8                                   | 9.1  | 9.3  | 9.5  | 10.3 |
| ESTNB30 30-16-04 | 3  | 1.5 | 2.5  | 16  | 0.4 | 2.86            | 3.05            | 55  | 6      | 12.52 | 4.1  | 17.2                                  | 17.8 | 18.3 | 18.7 | 20.6 |
| ESTNB30 30-20-04 | 3  | 1.5 | 2.5  | 20  | 0.4 | 2.86            | 3.1             | 60  | 6      | 12.52 | 3.4  | 21.2                                  | 22   | 22.6 | 23.3 | 25.7 |
| ESTNB30 30-30-04 | 3  | 1.5 | 2.5  | 30  | 0.4 | 2.86            | 3.24            | 70  | 6      | 12.52 | 2.5  | 31.6                                  | 32.8 | 33.7 | 34.9 | -    |
| ESTNB30 30-30-09 | 3  | 1.5 | 2.5  | 30  | 0.9 | 2.86            | 3.72            | 70  | 6      | 6.95  | 2.6  | -                                     | 31.8 | 33   | 33.8 | -    |
| ESTNB30 30-40-04 | 3  | 1.5 | 2.5  | 40  | 0.4 | 2.86            | 3.38            | 80  | 6      | 12.52 | 2    | 41.7                                  | 43.2 | 44.3 | -    | -    |

### ► Applicable Working Material

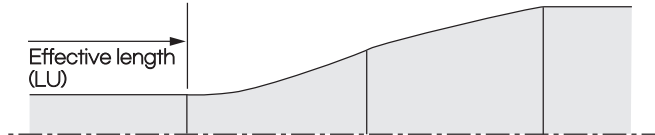
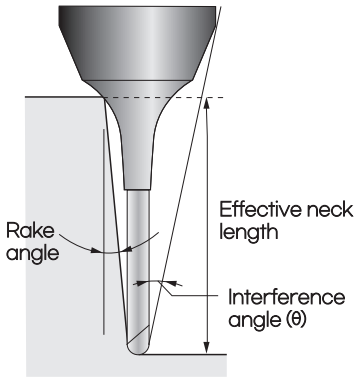
○ : GOOD ◎ : EXCELLENT

| H               |                 | P               |                     |                               | K                    | N      |          |          | M               | S                    |
|-----------------|-----------------|-----------------|---------------------|-------------------------------|----------------------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel    | Alloy Steel         | Prehardened Steel             | Cast Iron<br>~FCD500 | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRC55 | SKD11<br>HRC55~ | Steel<br>~HB225 | Alloy Steel<br>~325 | Prehardened Steel<br>HRC30-50 |                      |        |          |          |                 |                      |
| ◎               | ○               |                 | ○                   | ◎                             |                      |        |          |          |                 |                      |

# ESTNB30

## 3 Flutes Tapered Neck Ball End Mill

Endmill



※ The marked effective neck length is the default value to prevent interference with the workpiece.

Zamus Star  
E-Star

U-Wing

| EDP No           | DC | RE  | APMX | LUX | CA  | DN <sup>1</sup> | DN <sup>2</sup> | OAL | DCON MS | LU    | BHTA | Effective length by inclination angle |      |      |      |      |
|------------------|----|-----|------|-----|-----|-----------------|-----------------|-----|---------|-------|------|---------------------------------------|------|------|------|------|
|                  |    |     |      |     |     |                 |                 |     |         |       |      | 0.5°                                  | 1°   | 1.5° | 2°   | 3°   |
| ESTNB30 30-40-09 | 3  | 1.5 | 2.5  | 40  | 0.9 | 2.86            | 4.04            | 80  | 6       | 6.95  | 2    | -                                     | 41.9 | 43.3 | -    | -    |
| ESTNB30 30-50-09 | 3  | 1.5 | 2.5  | 50  | 0.9 | 2.86            | 4.35            | 90  | 6       | 6.95  | 1.7  | -                                     | 52   | 53.6 | -    | -    |
| ESTNB30 30-60-09 | 3  | 1.5 | 2.5  | 60  | 0.9 | 2.86            | 4.67            | 100 | 6       | 6.95  | 1.4  | -                                     | 62.1 | -    | -    | -    |
| ESTNB30 30-70-09 | 3  | 1.5 | 2.5  | 70  | 0.9 | 2.86            | 4.98            | 110 | 6       | 6.95  | 1.2  | -                                     | 72.1 | -    | -    | -    |
| ESTNB30 40-20-10 | 4  | 2   | 8    | 20  | 1   | 3.86            | 4.28            | 70  | 8       | 12.01 | 5    | 20.5                                  | 21.6 | 22.3 | 22.8 | 23.5 |
| ESTNB30 40-30-10 | 4  | 2   | 8    | 30  | 1   | 3.86            | 4.63            | 80  | 8       | 12.01 | 3.6  | 22                                    | 31.6 | 32.5 | 33.2 | 34.1 |
| ESTNB30 40-40-10 | 4  | 2   | 8    | 40  | 1   | 3.86            | 4.98            | 90  | 8       | 12.01 | 2.7  | 22                                    | 42   | 43.4 | 44.3 | -    |
| ESTNB30 40-50-10 | 4  | 2   | 8    | 50  | 1   | 3.86            | 5.33            | 100 | 8       | 12.01 | 2.2  | 22                                    | 52   | 53.6 | 54.7 | -    |
| ESTNB30 40-60-10 | 4  | 2   | 8    | 60  | 1   | 3.86            | 5.68            | 110 | 8       | 12.01 | 1.9  | 22                                    | 62   | 63.8 | -    | -    |
| ESTNB30 50-30-10 | 5  | 2.5 | 10   | 30  | 1   | 4.86            | 5.56            | 80  | 8       | 14.01 | 2.8  | 25.5                                  | 31.7 | 32.6 | 33.2 | -    |
| ESTNB30 50-40-10 | 5  | 2.5 | 10   | 40  | 1   | 4.86            | 5.91            | 90  | 8       | 14.01 | 2.1  | 25.5                                  | 41.7 | 42.8 | 43.5 | -    |
| ESTNB30 50-60-10 | 5  | 2.5 | 10   | 60  | 1   | 4.86            | 6.61            | 110 | 8       | 12.52 | 1.5  | 25.5                                  | 62.1 | -    | -    | -    |

Zamus Thunder

X-Star

S-Wing

A-Wing

Standard

Copper-Mate

Gra-Mate

### ► Applicable Working Material

○ : GOOD ◎ : EXCELLENT

| H               |                 | P            |               |                   | K         | N      |          |          | M               | S                    |
|-----------------|-----------------|--------------|---------------|-------------------|-----------|--------|----------|----------|-----------------|----------------------|
| Hardened Steel  |                 | Carbon Steel | Alloy Steel   | Prehardened Steel | Cast Iron | Copper | Graphite | Aluminum | Stainless Steel | Heat Resistant Alloy |
| SKD61<br>~HRc55 | SKD11<br>HRc55~ | ~HB225       | HB225<br>~325 | HRc30~50          | ~FCD500   |        |          |          |                 |                      |
| ◎               | ○               |              | ○             | ◎                 |           |        |          |          |                 |                      |