



| ITEM | MODEL | DESCRIPTION | PAGE |
|------|-------|-------------|------|
|------|-------|-------------|------|

INCH

|                  |                                                                                   |                                                   |            |
|------------------|-----------------------------------------------------------------------------------|---------------------------------------------------|------------|
| <b>XB1A</b>      |  | i-Xmill BALL INSERT FOR GENERAL PURPOSE           | <b>598</b> |
| <b>XB2C</b>      |                                                                                   | i-Xmill BALL INSERT FOR HARDENED STEEL            |            |
| <b>XB1D</b>      |                                                                                   | i-Xmill BALL INSERT FOR GRAPHITE                  |            |
| <b>ZBT / ZBS</b> |  | i-Xmill BALL HOLDERS - STEEL                      | <b>599</b> |
| <b>ZBC</b>       |  | i-Xmill BALL HOLDERS - CARBIDE                    | <b>600</b> |
| <b>XR1A</b>      |  | i-Xmill CORNER RADIUS INSERTS FOR GENERAL PURPOSE | <b>601</b> |
| <b>XR2A</b>      |                                                                                   | i-Xmill CORNER RADIUS INSERTS FOR HARDENED STEEL  |            |
| <b>XR1D</b>      |                                                                                   | i-Xmill CORNER RADIUS INSERTS FOR GRAPHITE        |            |
| <b>ZRT / ZRS</b> |  | i-Xmill CORNER RADIUS HOLDERS - STEEL             | <b>602</b> |

METRIC

|                  |                                                                                     |                                                   |            |
|------------------|-------------------------------------------------------------------------------------|---------------------------------------------------|------------|
| <b>XB1N</b>      |  | i-Xmill BALL INSERT FOR GENERAL PURPOSE           | <b>603</b> |
| <b>XB2N</b>      |                                                                                     | i-Xmill BALL INSERT FOR HARDENED STEEL            |            |
| <b>XBAD</b>      |                                                                                     | i-Xmill BALL INSERT FOR GRAPHITE                  |            |
| <b>ZBT / ZBS</b> |  | i-Xmill BALL HOLDERS - STEEL                      | <b>604</b> |
| <b>ZBC</b>       |  | i-Xmill BALL HOLDERS - CARBIDE                    | <b>605</b> |
| <b>XRAA</b>      |  | i-Xmill CORNER RADIUS INSERTS FOR GENERAL PURPOSE | <b>606</b> |
| <b>XRBA</b>      |                                                                                     | i-Xmill CORNER RADIUS INSERTS FOR HARDENED STEEL  |            |
| <b>XRAD</b>      |                                                                                     | i-Xmill CORNER RADIUS INSERTS FOR GRAPHITE        |            |
| <b>ZRT / ZRS</b> |  | i-Xmill CORNER RADIUS HOLDERS - STEEL             | <b>608</b> |
|                  |                                                                                     | ASSEMBLY RECOMMENDATIONS                          | <b>609</b> |
|                  |                                                                                     | RECOMMENDED CUTTING CONDITIONS                    | <b>610</b> |

| P             |        |              |        |             |        |                 | M                | K         | N        |          |
|---------------|--------|--------------|--------|-------------|--------|-----------------|------------------|-----------|----------|----------|
| Carbon Steels |        | Alloy Steels |        | Tool Steels |        | Hardened Steels | Stainless Steels | Cast Iron | Aluminum | Graphite |
| ~HRC35        | HRC35~ | ~HRC35       | HRC35~ | ~HRC35      | HRC35~ | HRC50~          | ~HRC28           | ~HRC35    | ~HRC8    |          |

|   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|
| ◎ | ○ | ◎ | ○ | ◎ | ○ |   | ○ | ○ | ○ |   |
| ○ | ◎ | ○ | ◎ | ○ | ◎ | ◎ |   | ◎ |   |   |
| ○ |   | ○ |   | ○ |   |   |   |   | ○ | ◎ |
|   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |
| ◎ | ○ | ◎ | ○ | ◎ | ○ |   | ○ | ○ | ○ |   |
| ○ | ◎ | ○ | ◎ | ○ | ◎ | ◎ |   | ◎ |   |   |
| ○ |   | ○ |   | ○ |   |   |   |   | ○ | ◎ |
|   |   |   |   |   |   |   |   |   |   |   |

|   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|
| ◎ | ○ | ◎ | ○ | ◎ | ○ |   | ○ | ○ | ○ |   |
| ○ | ◎ | ○ | ◎ | ○ | ◎ | ◎ |   | ◎ |   |   |
| ○ |   | ○ |   | ○ |   |   |   |   | ○ | ◎ |
|   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |
| ◎ | ○ | ◎ | ○ | ◎ | ○ |   | ○ | ○ | ○ |   |
| ○ | ◎ | ○ | ◎ | ○ | ◎ | ◎ |   | ◎ |   |   |
| ○ |   | ○ |   | ○ |   |   |   |   | ○ | ◎ |
|   |   |   |   |   |   |   |   |   |   |   |

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA



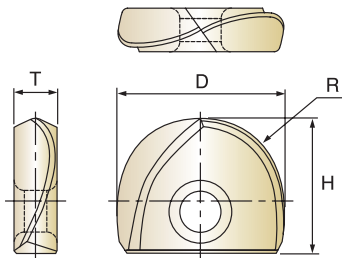
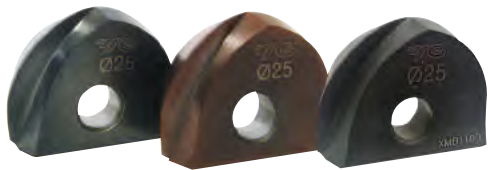
**XB1A** SERIES

**XB2C** SERIES

**XB1D** SERIES

## i-Xmill BALL INSERTS

- Exchangeable End Mill for economic use
- Three Types of Inserts are available
  - For General Purpose (~HRc50)
  - For Hardened Material (HRc40~HRc65)
  - For Graphite
- Special Geometry and extremely abrasive resistant Coating for Excellent Performance



cutting conditions : p.610

Unit : Inch

| EDP No.              |                       |              | Radius of Ball Nose | Mill Diameter | Height | Thickness |
|----------------------|-----------------------|--------------|---------------------|---------------|--------|-----------|
| For General Material | For Hardened Material | For Graphite | R                   | D             | H      | T         |
| XB1A020              | XB2C020               | XB1D020      | R5/32               | 5/16          | 5/16   | .094      |
| XB1A024              | XB2C024               | XB1D024      | R3/16               | 3/8           | 3/8    | .106      |
| XB1A032              | XB2C032               | XB1D032      | R1/4                | 1/2           | 7/16   | .126      |
| XB1A040              | XB2C040               | XB1D040      | R5/16               | 5/8           | 1/2    | .165      |
| XB1A048              | XB2C048               | XB1D048      | R3/8                | 3/4           | 5/8    | .205      |
| XB1A100              | XB2C100               | XB1D100      | R1/2                | 1             | 3/4    | .244      |
| XB1A116              | XB2C116               | XB1D116      | R5/8                | 1-1/4         | 31/32  | .283      |

- The ball radius tolerance is ±.0004” and the set-up accuracy is ±.0008”

◎ : Excellent ○ : Good

|             | P             |        |              |        |             |        |                 | M                | K         | N        |          |
|-------------|---------------|--------|--------------|--------|-------------|--------|-----------------|------------------|-----------|----------|----------|
|             | Carbon Steels |        | Alloy Steels |        | Tool Steels |        | Hardened Steels | Stainless Steels | Cast Iron | Aluminum | Graphite |
|             | ~HRc35        | HRc35~ | ~HRc35       | HRc35~ | ~HRc35      | HRc35~ | HRc50~          | ~HRc28           | ~HRc35    | ~HRc8    |          |
| <b>XB1A</b> | ◎             | ○      | ◎            | ○      | ◎           | ○      |                 | ○                | ○         | ○        |          |
| <b>XB2C</b> | ○             | ◎      | ○            | ◎      | ○           | ◎      | ◎               |                  | ◎         |          |          |
| <b>XB1D</b> | ○             |        | ○            |        | ○           |        |                 |                  |           | ○        | ◎        |

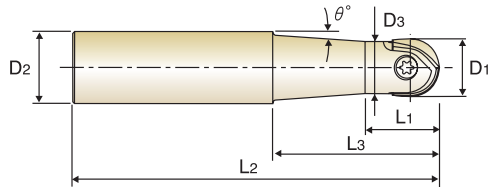


**ZBT** SERIES

**ZBS** SERIES

## i-Xmill BALL HOLDERS - STEEL

- Premium alloy steel with excellent strength.
- Precise shank, Tolerance (h6).
- Nickel plated, to prevent corrosion and improve lubricity.

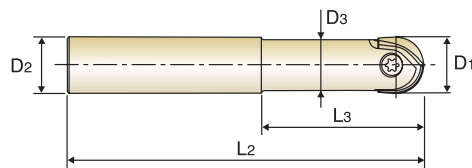


### Taper neck Type

Unit : Inch

| EDP No. | Mill Diameter | Shank Diameter | Length of Cut | Length Below Shank | Overall Length | Neck Diameter | Interference Angle | Length Type | Wrench No. | Screw No. |
|---------|---------------|----------------|---------------|--------------------|----------------|---------------|--------------------|-------------|------------|-----------|
|         | D1            | D2             | L1            | L3                 | L2             | D3            | θ°                 |             |            |           |
| ZBT1020 | 5/16          | 1/2            | 1/2           | 1-5/8              | 3-5/8          | 9/32          | 4° 33'             | Short       | TWF07      | TX0807    |
| ZBT2020 |               |                | 1             | 2-1/2              | 4-3/8          |               | 3° 25'             | Regular     |            |           |
| ZBT1024 | 3/8           | 1/2            | 5/8           | 1-1/2              | 3-9/16         | 11/32         | 3° 49'             | Short       | TWF08      | TX1008    |
| ZBT2024 |               |                | 1-1/4         | 2-5/16             | 4-3/8          |               | 3° 08'             | Regular     |            |           |
| ZBT1032 | 1/2           | 5/8            | 11/16         | 2-3/16             | 4-3/8          | 7/16          | 2° 49'             | Short       | TWF10      | TX1210    |
| ZBT1040 | 5/8           | 3/4            | 13/16         | 2-9/16             | 5              | 9/16          | 2° 25'             | Short       | TWF15      | TX1615    |
| ZBT1048 | 3/4           | 1              | 1             | 3-1/8              | 6              | 43/64         | 3° 53'             | Short       | TWB20      | TX2020    |
| ZBT1100 | 1             | 1-1/4          | 1-1/4         | 3-9/16             | 7              | 29/32         | 3° 45'             | Short       | TWB25      | TX2525    |
| ZBT1116 | 1-1/4         | 1-1/4          | 1-9/16        | 4-3/8              | 8              | 1-1/16        | 1° 30'             | Short       | TWB30      | TX3030    |

- Need to use T Handle : TWH600 (See page 52)



### Straight neck Type

Unit :Inch

| EDP No. | Mill Diameter | Shank Diameter | Length Below Shank | Overall Length | Neck Diameter | Length Type | Wrench No. | Screw No. |
|---------|---------------|----------------|--------------------|----------------|---------------|-------------|------------|-----------|
|         | D1            | D2             | L3                 | L2             | D3            |             |            |           |
| ZBS1032 | 1/2           | 1/2            | 1-3/8              | 3-1/2          | 7/16          | Short       | TWF10      | TX1210    |
| ZBS2032 |               |                | 2-3/16             | 4-3/8          |               | Regular     |            |           |
| ZBS1040 | 5/8           | 5/8            | 1-3/8              | 3-3/4          | 9/16          | Short       | TWF15      | TX1615    |
| ZBS2040 |               |                | 2-9/16             | 5              |               | Regular     |            |           |
| ZBS1048 | 3/4           | 3/4            | 1-9/16             | 4-3/8          | 43/64         | Short       | TWB20      | TX2020    |
| ZBS2048 |               |                | 3                  | 6              |               | Regular     |            |           |
| ZBS1100 | 1             | 1              | 1-3/4              | 5              | 29/32         | Short       | TWB25      | TX2525    |
| ZBS2100 |               |                | 3-9/16             | 6-3/4          |               | Regular     |            |           |
| ZBS1116 | 1-1/4         | 1-1/4          | 2-1/4              | 5-1/2          | 1-1/16        | Short       | TWB30      | TX3030    |
| ZBS2116 |               |                | 4-3/8              | 7-3/4          |               | Regular     |            |           |

- Need to use T Handle : TWH600 (See page 52)

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

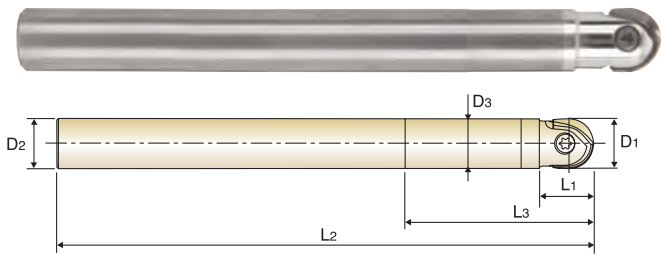
STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA



i-Xmill BALL HOLDERS - CARBIDE

- ▶ Equal tool rigidity like solid carbide end mill that makes the stable and high finishing machining with less vibration.
- ▶ The high finishing machining for the deeper part of mold.
- ▶ The tool's life of carbide ball holders is longer than steel holder.
- ▶ Shrink Fit Holding system can be applied.
- ▶ Upon request, the worn holder is able to be regenerated.



Unit : Inch

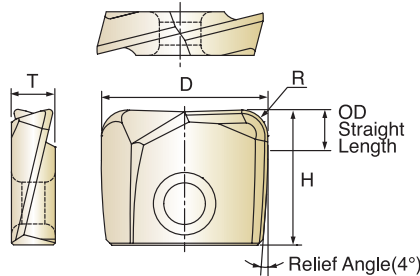
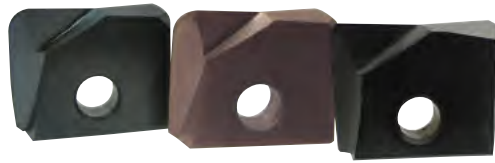
| EDP No. | Mill Diameter | Shank Diameter | Length of Cut | Length Below Shank | Overall Length | Neck Diameter | Length Type | Wrench No. | Screw No. |
|---------|---------------|----------------|---------------|--------------------|----------------|---------------|-------------|------------|-----------|
|         | D1            | D2             | L1            | L3                 | L2             | D3            |             |            |           |
| ZBCB020 | 5/16          | 5/16           | 1/2           | 1-9/16             | 5-1/8          | 19/64         | Long        | TWF07      | TX0807    |
| ZBCB024 | 3/8           | 3/8            | 5/8           | 2                  | 5-1/2          | 23/64         | Long        | TWF08      | TX1008    |
| ZBCB032 | 1/2           | 1/2            | 11/16         | 2-3/8              | 5-15/16        | 31/64         | Long        | TWF10      | TX1210    |
| ZBCB040 | 5/8           | 5/8            | 13/16         | 3-3/16             | 7-15/16        | 39/64         | Long        | TWF15      | TX1615    |
| ZBCD040 |               |                |               | 9-7/8              | 9-7/8          |               |             |            |           |
| ZBCB048 | 3/4           | 3/4            | 1             | 3-3/16             | 7-15/16        | 47/64         | Long        | TWB20      | TX2020    |
| ZBCC048 |               |                |               | 4                  | 9-7/8          |               |             |            |           |
| ZBCB100 | 1             | 1              | 1-3/16        | 4-3/4              | 9-7/8          | 63/64         | Long        | TWB25      | TX2525    |
| ZBCB116 | 1-1/4         | 1-1/4          | 1-9/16        | 5-15/16            | 11-7/8         | 1-15/64       | Long        | TWB30      | TX3030    |

● Need to use T Handle : TWH600 (See page 52)



i-Xmill CORNER RADIUS INSERTS

- ▶ The optimum geometry of the tool to achieve the better reliability and less vibration and cutting load.
- ▶ Interchangeability with i-Xmill ball holder, but the precise cutting is possible with i-Xmill corner radius holder due to higher stability and strength of tool.
- ▶ The various and wide cutting range makes it possible to machine over the roughing and finishing.
- ▶ Special coating makes high hardness with high thermal stability against oxidation.
- ▶ Three Types of Inserts are available
  - For General Purpose (~HRC50)
  - For Hardened Material (HRC40~HRC65)
  - For Graphite



cutting conditions : p.611

Unit : Inch

| EDP No.              |                       |              | Radius of Ball Nose<br>R | Mill Diameter<br>D | Height<br>H | Thickness |  | OD Straight Length |
|----------------------|-----------------------|--------------|--------------------------|--------------------|-------------|-----------|--|--------------------|
| For General Material | For Hardened Material | For Graphite |                          |                    |             | T         |  |                    |
| XR1A020 01           | XR2A020 01            | XR1D020 01   | R1/64                    | 5/16               | 5/16        | .094      |  | .079               |
| XR1A020 02           | XR2A020 02            | XR1D020 02   | R1/32                    |                    |             |           |  |                    |
| XR1A024 01           | XR2A024 01            | XR1D024 01   | R1/64                    | 3/8                | 3/8         | .106      |  | .118               |
| XR1A024 02           | XR2A024 02            | XR1D024 02   | R1/32                    |                    |             |           |  |                    |
| XR1A024 04           | XR2A024 04            | XR1D024 04   | R1/16                    | 1/2                | 7/16        | .126      |  | .118               |
| XR1A032 01           | XR2A032 01            | XR1D032 01   | R1/64                    |                    |             |           |  |                    |
| XR1A032 02           | XR2A032 02            | XR1D032 02   | R1/32                    |                    |             |           |  |                    |
| XR1A032 04           | XR2A032 04            | XR1D032 04   | R1/16                    |                    |             |           |  |                    |
| XR1A040 01           | XR2A040 01            | XR1D040 01   | R1/64                    | 5/8                | 1/2         | .165      |  | .157               |
| XR1A040 02           | XR2A040 02            | XR1D040 02   | R1/32                    |                    |             |           |  |                    |
| XR1A040 04           | XR2A040 04            | XR1D040 04   | R1/16                    |                    |             |           |  |                    |
| XR1A040 08           | XR2A040 08            | XR1D040 08   | R1/8                     |                    |             |           |  |                    |
| XR1A048 01           | XR2A048 01            | XR1D048 01   | R1/64                    | 3/4                | 5/8         | .205      |  | .157               |
| XR1A048 02           | XR2A048 02            | XR1D048 02   | R1/32                    |                    |             |           |  |                    |
| XR1A048 04           | XR2A048 04            | XR1D048 04   | R1/16                    |                    |             |           |  |                    |
| XR1A048 08           | XR2A048 08            | XR1D048 08   | R1/8                     |                    |             |           |  |                    |
| XR1A100 01           | XR2A100 01            | XR1D100 01   | R1/64                    | 1                  | 3/4         | .244      |  | .157               |
| XR1A100 02           | XR2A100 02            | XR1D100 02   | R1/32                    |                    |             |           |  |                    |
| XR1A100 04           | XR2A100 04            | XR1D100 04   | R1/16                    |                    |             |           |  |                    |
| XR1A100 08           | XR2A100 08            | XR1D100 08   | R1/8                     |                    |             |           |  |                    |
| XR1A116 01           | XR2A116 01            | XR1D116 01   | R1/64                    | 1-1/4              | 29/32       | .283      |  | .157               |
| XR1A116 02           | XR2A116 02            | XR1D116 02   | R1/32                    |                    |             |           |  |                    |
| XR1A116 04           | XR2A116 04            | XR1D116 04   | R1/16                    |                    |             |           |  |                    |
| XR1A116 08           | XR2A116 08            | XR1D116 08   | R1/8                     |                    |             |           |  |                    |

- The other corner radius values are available on request.
- The corner radius tolerance is ±.0006" and the set-up accuracy is ±.0008"

◎ : Excellent ○ : Good

|      | P             |        |              |        |             |        |                 | M                | K         | N        |          |
|------|---------------|--------|--------------|--------|-------------|--------|-----------------|------------------|-----------|----------|----------|
|      | Carbon Steels |        | Alloy Steels |        | Tool Steels |        | Hardened Steels | Stainless Steels | Cast Iron | Aluminum | Graphite |
|      | ~HRC35        | HRC35~ | ~HRC35       | HRC35~ | ~HRC35      | HRC35~ | HRC50~          | ~HRC28           | ~HRC35    | ~HRC8    |          |
| XR1A | ◎             | ○      | ◎            | ○      | ◎           | ○      |                 | ○                | ○         | ○        |          |
| XR2A | ○             | ◎      | ○            | ◎      | ○           | ◎      | ◎               |                  | ◎         |          |          |
| XR1D | ○             |        | ○            |        | ○           |        |                 |                  |           | ○        | ◎        |

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

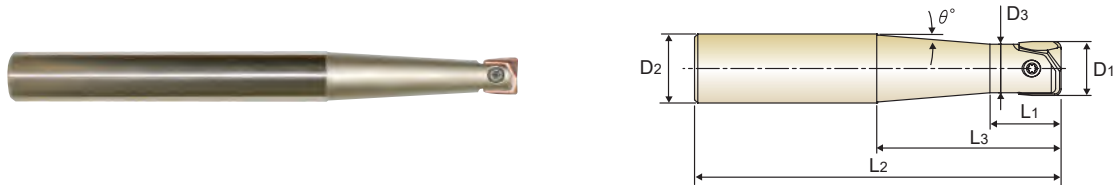
STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA



## i-Xmill CORNER RADIUS HOLDERS - STEEL

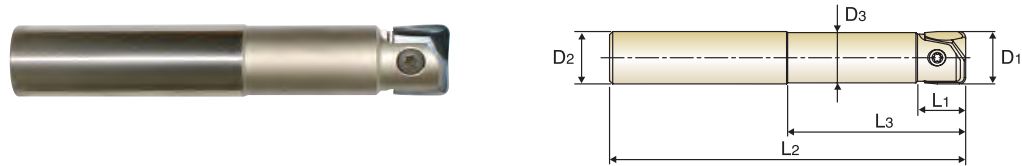
- Premium alloy steel with excellent strength.
- Precise shank, Tolerance (h6).
- Nickel plated, to prevent corrosion and improve lubricity.



### Taper neck Type

Unit : Inch

| EDP No. | Mill Diameter<br>D <sub>1</sub> | Shank Diameter<br>D <sub>2</sub> | Length of Cut<br>L <sub>1</sub> | Length Below Shank<br>L <sub>3</sub> | Overall Length<br>L <sub>2</sub> | Neck Diameter<br>D <sub>3</sub> | Interference Angle<br>θ° | Length Type | Wrench No. | Screw No. |
|---------|---------------------------------|----------------------------------|---------------------------------|--------------------------------------|----------------------------------|---------------------------------|--------------------------|-------------|------------|-----------|
| ZRT1032 | 5/16                            | 1/2                              | 13/32                           | 7/8                                  | 4                                | 17/64                           | 13 ° 58'                 | Regular     | TWF07      | TX0807    |
| ZRT2032 |                                 |                                  |                                 | 2                                    | 5-1/8                            |                                 | 4 ° 12'                  | Long        |            |           |
| ZRT2410 | 3/8                             | 1/2                              | 17/32                           | 1                                    | 4                                | 5/16                            | 9 ° 27'                  | Regular     | TWF08      | TX1008    |
| ZRT2420 |                                 |                                  |                                 | 2                                    | 5-15/16                          |                                 | 3 ° 6'                   | Long        |            |           |
| ZRT3220 | 1/2                             | 5/8                              | 5/8                             | 2-3/8                                | 6-5/16                           | 27/64                           | 3 ° 19'                  | Long        | TWF10      | TX1210    |



### Straight neck Type

Unit :Inch

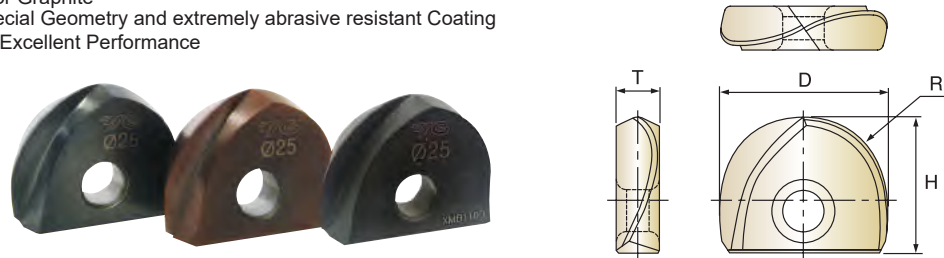
| EDP No. | Mill Diameter<br>D <sub>1</sub> | Shank Diameter<br>D <sub>2</sub> | Length of Cut<br>L <sub>1</sub> | Length Below Shank<br>L <sub>3</sub> | Overall Length<br>L <sub>2</sub> | Neck Diameter<br>D <sub>3</sub> | Length Type  | Wrench No. | Screw No. |
|---------|---------------------------------|----------------------------------|---------------------------------|--------------------------------------|----------------------------------|---------------------------------|--------------|------------|-----------|
| ZRS1032 | 1/2                             | 1/2                              | 17/32                           | 1-3/16                               | 4-3/8                            | 7/16                            | Regular      | TWF10      | TX1210    |
| ZRS1040 | 5/8                             | 5/8                              | 5/8                             | 2                                    | 5-1/8                            | 19/32                           | Regular      | TWF15      | TX1615    |
| ZRS2040 |                                 |                                  |                                 | 2-9/16                               | 6-1/2                            |                                 | Intermediate |            |           |
| ZRS1048 | 3/4                             | 3/4                              | 23/32                           | 2-3/8                                | 5-1/2                            | 23/32                           | Regular      | TWB20      | TX2020    |
| ZRS2048 |                                 |                                  |                                 | 3-1/8                                | 7-1/8                            |                                 | Intermediate |            |           |
| ZRS1100 | 1                               | 1                                | 29/32                           | 2-3/4                                | 5-15/16                          | 31/32                           | Regular      | TWB25      | TX2525    |
| ZRS2100 |                                 |                                  |                                 | 3-9/16                               | 8                                |                                 | Intermediate |            |           |
| ZRS1116 | 1-1/4                           | 1-1/4                            | 1-1/8                           | 3-1/8                                | 6-5/16                           | 1-7/32                          | Regular      | TWB30      | TX3030    |
| ZRS2116 |                                 |                                  |                                 | 4                                    | 8-11/16                          |                                 | Intermediate |            |           |

- Need to use T Handle : TWH600 (See page 52)



## i-Xmill BALL INSERTS

- Indexable Ball End Mill for economic use
- Three Types of Inserts are available
  - For General Purpose (~HRc50)
  - For Hardened Material (HRc40~HRc65)
  - For Graphite
- Special Geometry and extremely abrasive resistant Coating for Excellent Performance



cutting conditions : p.610

Unit : mm

| EDP No.              |                       |              | Radius of Ball Nose | Mill Diameter | Height | Thickness |
|----------------------|-----------------------|--------------|---------------------|---------------|--------|-----------|
| For General Material | For Hardened Material | For Graphite | R                   | D             | H      | T         |
| XB1N080              | XB2N080               | XBAD080      | R4.0                | 8.0           | 8      | 2.4       |
| XB1N100              | XB2N100               | XBAD100      | R5.0                | 10.0          | 9.5    | 2.7       |
| XB1N120              | XB2N120               | XBAD120      | R6.0                | 12.0          | 11     | 3.2       |
| XB1N160              | XB2N160               | XBAD160      | R8.0                | 16.0          | 13     | 4.2       |
| XB1N200              | XB2N200               | XBAD200      | R10.0               | 20.0          | 16     | 5.2       |
| XB1N250              | XB2N250               | XBAD250      | R12.5               | 25.0          | 19.5   | 6.2       |
| XB1N300              | XB2N300               | XBAD300      | R15.0               | 30.0          | 23.5   | 7.2       |
| XB1N320              | XB2N320               | XBAD320      | R16.0               | 32.0          | 24.5   | 7.2       |

- The ball radius tolerance is ±0.01mm and the set-up accuracy is ±0.02mm

◎ : Excellent ○ : Good

|      | P             |        |              |        |             |        |                 | M                | K         | N        |          |
|------|---------------|--------|--------------|--------|-------------|--------|-----------------|------------------|-----------|----------|----------|
|      | Carbon Steels |        | Alloy Steels |        | Tool Steels |        | Hardened Steels | Stainless Steels | Cast Iron | Aluminum | Graphite |
|      | ~HRc35        | HRc35~ | ~HRc35       | HRc35~ | ~HRc35      | HRc35~ | HRc50~          | ~HRc28           | ~HRc35    | ~HRc8    |          |
| XB1N | ◎             | ○      | ◎            | ○      | ◎           | ○      |                 | ○                | ○         | ○        |          |
| XB2N | ○             | ◎      | ○            | ◎      | ○           | ◎      | ◎               |                  | ◎         |          |          |
| XBAD | ○             |        | ○            |        | ○           |        |                 |                  |           | ○        | ◎        |

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
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V7 PLUS A  
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V7 MILL INOX  
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HPC  
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CFRP  
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ROUTERS  
CFRP

STANDARD  
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ONLY ONE  
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SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA



i-Xmill BALL HOLDERS - STEEL

- Premium alloy steel with excellent strength.
- Precise shank, Tolerance (h6).
- Nickel plated, to prevent corrosion and improve lubricity.

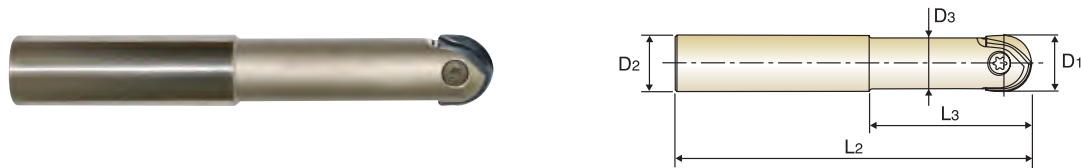


Taper neck Type

Unit : mm

| EDP No. | Mill Diameter | Shank Diameter | Length of Cut | Length Below Shank | Overall Length | Neck Diameter | Interference Angle | Length Type | Wrench No. | Screw No. |
|---------|---------------|----------------|---------------|--------------------|----------------|---------------|--------------------|-------------|------------|-----------|
|         | D1            | D2             | L1            | L3                 | L2             | D3            | θ°                 |             |            |           |
| ZBT0801 | 8.0           | 12             | 12            | 35                 | 90             | 7.2           | 4 ° 43´            | Short       | TWF07      | TX0807    |
| ZBT0802 |               |                | 25            | 55                 | 110            |               | 3 ° 37´            | Regular     |            |           |
| ZBT1001 | 10.0          | 12             | 15            | 35                 | 90             | 9             | 2 ° 51´            | Short       | TWF08      | TX1008    |
| ZBT1002 |               |                | 30            | 55                 | 110            |               | 2 ° 17´            | Regular     |            |           |
| ZBT1201 | 12.0          | 16             | 17            | 55                 | 110            | 10.5          | 3 ° 23´            | Short       | TWF10      | TX1210    |
| ZBT1601 | 16.0          | 20             | 20            | 65                 | 125            | 14.5          | 2 ° 51´            | Short       | TWF15      | TX1615    |
| ZBT2001 | 20.0          | 25             | 25            | 75                 | 145            | 18            | 3 ° 26´            | Short       | ■ TWB20    | TX2020    |
| ZBT2501 | 25.0          | 32             | 30            | 90                 | 170            | 22.5          | 4 ° 03´            | Short       | ■ TWB25    | TX2525    |
| ZBT3001 | 30.0          | 32             | 40            | 110                | 195            | 27            | 1 ° 38´            | Short       | ■ TWB30    | TX3030    |
|         | 32.0          |                |               |                    |                |               |                    |             |            |           |

- Need to use T Handle : TWH600 (See page 52)



Straight neck Type

Unit : mm

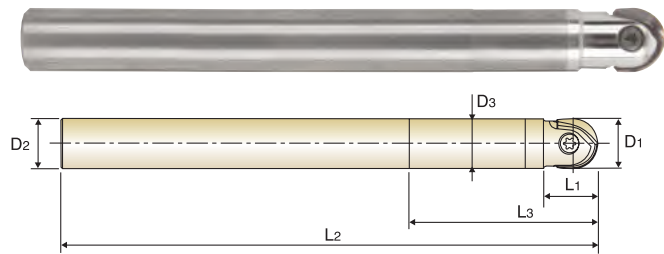
| EDP No. | Mill Diameter | Shank Diameter | Length Below Shank | Overall Length | Neck Diameter | Length Type | Wrench No. | Screw No. |
|---------|---------------|----------------|--------------------|----------------|---------------|-------------|------------|-----------|
|         | D1            | D2             | L3                 | L2             | D3            |             |            |           |
| ZBS1201 | 12.0          | 12             | 35                 | 90             | 10.5          | Short       | TWF10      | TX1210    |
| ZBS1202 |               |                | 55                 | 110            |               | Regular     |            |           |
| ZBS1601 | 16.0          | 16             | 35                 | 95             | 14.5          | Short       | TWF15      | TX1615    |
| ZBS1602 |               |                | 65                 | 125            |               | Regular     |            |           |
| ZBS2001 | 20.0          | 20             | 40                 | 110            | 18            | Short       | ■ TWB20    | TX2020    |
| ZBS2002 |               |                | 75                 | 145            |               | Regular     |            |           |
| ZBS2501 | 25.0          | 25             | 45                 | 125            | 22.5          | Short       | ■ TWB25    | TX2525    |
| ZBS2502 |               |                | 90                 | 170            |               | Regular     |            |           |
| ZBS3001 | 30.0          | 32             | 55                 | 140            | 27            | Short       | ■ TWB30    | TX3030    |
| ZBS3002 | 32.0          |                | 110                | 195            |               | Regular     |            |           |

- Need to use T Handle : TWH600 (See page 52)



i-Xmill BALL HOLDERS - CARBIDE

- Equal tool rigidity like solid carbide end mill that makes the stable and high finishing machining with less vibration.
- The high finishing machining for the deeper part of mold.
- The tool's life of carbide ball holders is longer than steel holder.
- Shrink Fit Holding system can be applied.
- Upon request, the worn holder is able to be regenerated.



Unit : mm

| EDP No. | Mill Diameter | Shank Diameter | Length of Cut | Length Below Shank | Overall Length | Neck Diameter | Length Type | Wrench No. | Screw No. |
|---------|---------------|----------------|---------------|--------------------|----------------|---------------|-------------|------------|-----------|
|         | D1            | D2             | L1            | L3                 | L2             | D3            |             |            |           |
| ZBC1080 | 8.0           | 8              | 12            | 25                 | 130            | 7.7           | Long        | TWF07      | TX0807    |
| ZBC1100 | 10.0          | 10             | 15            | 30                 | 140            | 9.7           | Long        | TWF08      | TX1008    |
| ZBC1120 | 12.0          | 12             | 17            | 35                 | 150            | 11.7          | Long        | TWF10      | TX1210    |
| ZBC1160 | 16.0          | 16             | 20            | 50                 | 200            | 15.7          | Long        | TWF15      | TX1615    |
| ZBC1200 | 20.0          | 20             | 25            | 60                 | 200            | 19.7          | Long        | ■ TWB20    | TX2020    |
| ZBC1250 | 25.0          | 25             | 30            | 75                 | 200            | 24.7          | Long        | ■ TWB25    | TX2525    |
| ZBC1320 | 30.0          | 32             | 40            | 90                 | 250            | 29.7          | Long        | ■ TWB30    | TX3030    |
|         | 32.0          |                |               |                    |                |               |             |            |           |

- Need to use T Handle : TWH600 (See page 52)

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

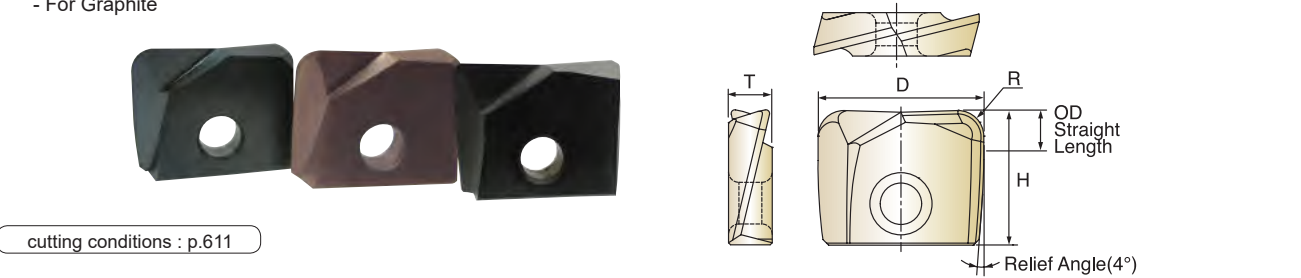
STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA



i-Xmill CORNER RADIUS INSERTS

- ▶ The optimum geometry of the tool to achieve the better reliability and less vibration and cutting load.
- ▶ Interchangeability with i-Xmill ball holder, but the precise cutting is possible with i-Xmill corner radius holder due to higher stability and strength of tool.
- ▶ The various and wide cutting range makes it possible to machine over the roughing and finishing.
- ▶ Special coating makes high hardness with high thermal stability against oxidation.
- ▶ Three Types of Inserts are available
  - For General Purpose (~HRc50)
  - For Hardened Material (HRc40~HRc65)
  - For Graphite



cutting conditions : p.611

Unit : mm

| EDP No.              |                       |              | Corner Radius<br>R | Mill Diameter<br>D | Height<br>H | Thickness<br>T | OD Straight Length |
|----------------------|-----------------------|--------------|--------------------|--------------------|-------------|----------------|--------------------|
| For General Material | For Hardened Material | For Graphite |                    |                    |             |                |                    |
| XRAA080 03           | XRBA080 03            | XRAD080 03   | R0.3               | 8.0                | 8           | 2.4            | 2                  |
| XRAA080 05           | XRBA080 05            | XRAD080 05   | R0.5               |                    |             |                |                    |
| XRAA080 10           | XRBA080 10            | XRAD080 10   | R1.0               |                    |             |                |                    |
| XRAA100 05           | XRBA100 05            | XRAD100 05   | R0.5               | 10.0               | 9.5         | 2.7            | 3                  |
| XRAA100 10           | XRBA100 10            | XRAD100 10   | R1.0               |                    |             |                |                    |
| XRAA100 20           | XRBA100 20            | XRAD100 20   | R2.0               |                    |             |                |                    |
| XRAA120 05           | XRBA120 05            | XRAD120 05   | R0.5               | 12.0               | 11          | 3.2            | 3                  |
| XRAA120 10           | XRBA120 10            | XRAD120 10   | R1.0               |                    |             |                |                    |
| XRAA120 20           | XRBA120 20            | XRAD120 20   | R2.0               |                    |             |                |                    |
| XRAA130 05           | XRBA130 05            | XRAD130 05   | R0.5               | 13.0               | 11.2        | 3.2            | 3                  |
| XRAA130 10           | XRBA130 10            | XRAD130 10   | R1.0               |                    |             |                |                    |
| XRAA130 20           | XRBA130 20            | XRAD130 20   | R2.0               |                    |             |                |                    |
| XRAA160 05           | XRBA160 05            | XRAD160 05   | R0.5               | 16.0               | 13          | 4.2            | 4                  |
| XRAA160 10           | XRBA160 10            | XRAD160 10   | R1.0               |                    |             |                |                    |
| XRAA160 20           | XRBA160 20            | XRAD160 20   | R2.0               |                    |             |                |                    |
| XRAA170 05           | XRBA170 05            | XRAD170 05   | R0.5               | 17.0               | 13          | 4.2            | 4                  |
| XRAA170 10           | XRBA170 10            | XRAD170 10   | R1.0               |                    |             |                |                    |
| XRAA170 20           | XRBA170 20            | XRAD170 20   | R2.0               |                    |             |                |                    |

- The other corner radius values are available on request.
- The corner radius tolerance is ±0.015mm and the set-up accuracy is ±0.02mm

▶ NEXT PAGE

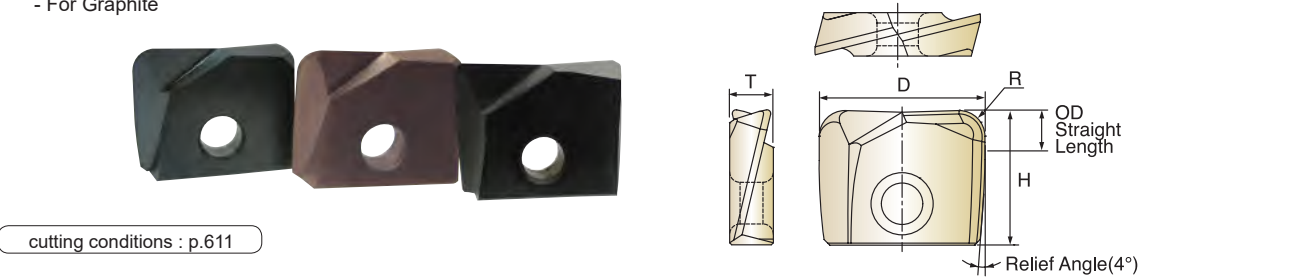
◎ : Excellent ○ : Good

|      | P             |        |              |        | M           |                 | K                | N         |          |          |
|------|---------------|--------|--------------|--------|-------------|-----------------|------------------|-----------|----------|----------|
|      | Carbon Steels |        | Alloy Steels |        | Tool Steels | Hardened Steels | Stainless Steels | Cast Iron | Aluminum | Graphite |
|      | ~HRc35        | HRc35~ | ~HRc35       | HRc35~ | ~HRc35      | HRc35~          | HRc50~           | ~HRc28    | ~HRc35   | ~HRc8    |
| XRAA | ◎             | ○      | ◎            | ○      | ◎           | ○               |                  | ○         | ○        | ○        |
| XRBA | ○             | ◎      | ○            | ◎      | ○           | ◎               | ◎                |           | ◎        |          |
| XRAD | ○             |        | ○            |        | ○           |                 |                  |           | ○        | ◎        |



i-Xmill CORNER RADIUS INSERTS

- ▶ The optimum geometry of the tool to achieve the better reliability and less vibration and cutting load.
- ▶ Interchangeability with i-Xmill ball holder, but the precise cutting is possible with i-Xmill corner radius holder due to higher stability and strength of tool.
- ▶ The various and wide cutting range makes it possible to machine over the roughing and finishing.
- ▶ Special coating makes high hardness with high thermal stability against oxidation.
- ▶ Three Types of Inserts are available
  - For General Purpose (~HRc50)
  - For Hardened Mat erial (HRc40~HRc65)
  - For Graphite



cutting conditions : p.611

Unit : mm

| EDP No.              |                       |              | Corner Radius<br>R | Mill Diameter<br>D | Height<br>H | Thickness<br>T | OD Straight Length |
|----------------------|-----------------------|--------------|--------------------|--------------------|-------------|----------------|--------------------|
| For General Material | For Hardened Material | For Graphite |                    |                    |             |                |                    |
| XRAA200 05           | XRBA200 05            | XRAD200 05   | R0.5               | 20.0               | 16          | 5.2            | 4                  |
| XRAA200 10           | XRBA200 10            | XRAD200 10   | R1.0               |                    |             |                |                    |
| XRAA200 20           | XRBA200 20            | XRAD200 20   | R2.0               |                    |             |                |                    |
| XRAA210 05           | XRBA210 05            | XRAD210 05   | R0.5               | 21.0               | 16          | 5.2            | 4                  |
| XRAA210 10           | XRBA210 10            | XRAD210 10   | R1.0               |                    |             |                |                    |
| XRAA210 20           | XRBA210 20            | XRAD210 20   | R2.0               |                    |             |                |                    |
| XRAA250 05           | XRBA250 05            | XRAD250 05   | R0.5               | 25.0               | 19.5        | 6.2            | 4                  |
| XRAA250 10           | XRBA250 10            | XRAD250 10   | R1.0               |                    |             |                |                    |
| XRAA250 20           | XRBA250 20            | XRAD250 20   | R2.0               |                    |             |                |                    |
| XRAA260 05           | XRBA260 05            | XRAD260 05   | R0.5               | 26.0               | 19.5        | 6.2            | 4                  |
| XRAA260 10           | XRBA260 10            | XRAD260 10   | R1.0               |                    |             |                |                    |
| XRAA260 20           | XRBA260 20            | XRAD260 20   | R2.0               |                    |             |                |                    |
| XRAA300 05           | XRBA300 05            | XRAD300 05   | R0.5               | 30.0               | 23.5        | 7.2            | 4                  |
| XRAA300 10           | XRBA300 10            | XRAD300 10   | R1.0               |                    |             |                |                    |
| XRAA300 20           | XRBA300 20            | XRAD300 20   | R2.0               |                    |             |                |                    |
| XRAA320 05           | XRBA320 05            | XRAD320 05   | R0.5               | 32.0               | 23.5        | 7.2            | 4                  |
| XRAA320 10           | XRBA320 10            | XRAD320 10   | R1.0               |                    |             |                |                    |
| XRAA320 20           | XRBA320 20            | XRAD320 20   | R2.0               |                    |             |                |                    |

- The other corner radius values are available on request.
- The corner radius tolerance is ±0.015mm and the set-up accuracy is ±0.02mm

◎ : Excellent ○ : Good

|      | P             |        |              |        | M           |                 | K                | N         |          |          |
|------|---------------|--------|--------------|--------|-------------|-----------------|------------------|-----------|----------|----------|
|      | Carbon Steels |        | Alloy Steels |        | Tool Steels | Hardened Steels | Stainless Steels | Cast Iron | Aluminum | Graphite |
|      | ~HRc35        | HRc35~ | ~HRc35       | HRc35~ | ~HRc35      | HRc35~          | HRc50~           | ~HRc28    | ~HRc35   | ~HRc8    |
| XRAA | ◎             | ○      | ◎            | ○      | ◎           | ○               |                  | ○         | ○        | ○        |
| XRBA | ○             | ◎      | ○            | ◎      | ○           | ◎               | ◎                |           | ◎        |          |
| XRAD | ○             |        | ○            |        | ○           |                 |                  |           | ○        | ◎        |

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

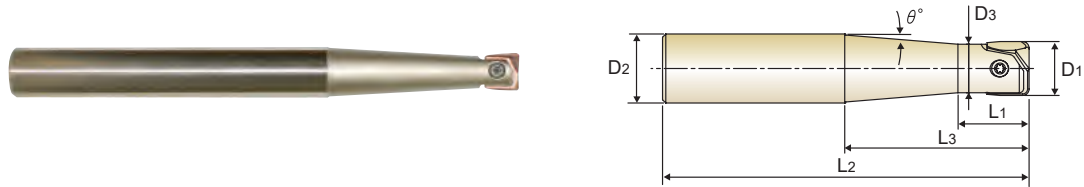
STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA



i-Xmill CORNER RADIUS HOLDERS - STEEL

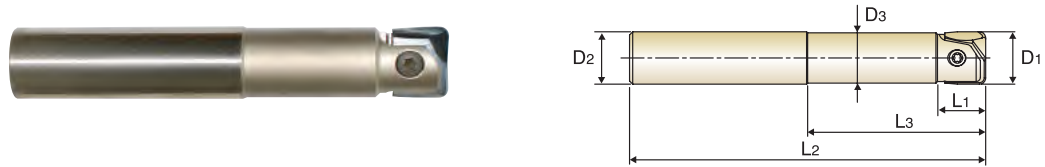
- Premium alloy steel with excellent strength.
- Precise shank, Tolerance (h6).
- Nickel plated, to prevent corrosion and improve lubricity.



Taper neck Type

Unit : mm

| EDP No. | Mill Diameter<br>D1 | Shank Diameter<br>D2 | Length of Cut<br>L1 | Length Below Shank<br>L3 | Overall Length<br>L2 | Neck Diameter<br>D3 | Interference Angle<br>θ° | Length Type | Wrench No. | Screw No. |
|---------|---------------------|----------------------|---------------------|--------------------------|----------------------|---------------------|--------------------------|-------------|------------|-----------|
| ZRT8011 | 8.0                 | 12                   | 10                  | 22                       | 100                  | 6.7                 | 9 °                      | Regular     | TWF07      | TX0807    |
| ZRT8021 |                     |                      |                     | 50                       | 130                  |                     | 2 ° 43'                  | Long        |            |           |
| ZRT1001 | 10.0                | 12                   | 13                  | 25                       | 100                  | 8.6                 | 4 ° 45'                  | Regular     | TWF08      | TX1008    |
| ZRT1002 |                     |                      |                     | 50                       | 150                  |                     | 1 ° 32'                  | Long        |            |           |
| ZRT1202 | 12.0<br>13.0        | 16                   | 15                  | 60                       | 160                  | 10.2                | 2 ° 32'                  | Long        | TWF10      | TX1210    |



Straight neck Type

Unit : mm

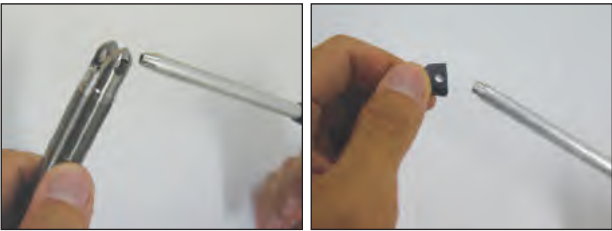
| EDP No. | Mill Diameter<br>D1 | Shank Diameter<br>D2 | Length of Cut<br>L1 | Length Below Shank<br>L3 | Overall Length<br>L2 | Neck Diameter<br>D3 | Length Type  | Wrench No. | Screw No. |
|---------|---------------------|----------------------|---------------------|--------------------------|----------------------|---------------------|--------------|------------|-----------|
| ZRS1120 | 12.0<br>13.0        | 12                   | 13                  | 30                       | 110                  | 11                  | Regular      | TWF10      | TX1210    |
| ZRS1160 | 16.0                | 16                   | 15                  | 50                       | 130                  | 15                  | Regular      | TWF15      | TX1615    |
| ZRS2160 | 17.0                |                      |                     | 65                       | 165                  |                     | Intermediate |            |           |
| ZRS1200 | 20.0                | 20                   | 18                  | 60                       | 140                  | 19                  | Regular      | TWB20      | TX2020    |
| ZRS2200 | 21.0                |                      |                     | 80                       | 180                  |                     | Intermediate |            |           |
| ZRS1250 | 25.0                | 25                   | 23                  | 70                       | 150                  | 24                  | Regular      | TWB25      | TX2525    |
| ZRS2250 | 26.0                |                      |                     | 90                       | 200                  |                     | Intermediate |            |           |
| ZRS1300 | 30.0                | 32                   | 27                  | 80                       | 160                  | 29                  | Regular      | TWB30      | TX3030    |
| ZRS2300 |                     |                      |                     | 100                      | 220                  |                     | Intermediate |            |           |
| ZRS1320 | 32.0                | 32                   | 28                  | 80                       | 160                  | 31                  | Regular      | TWB30      | TX3030    |
| ZRS2320 |                     |                      |                     | 100                      | 220                  |                     | Intermediate |            |           |

● Need to use T Handle : TWH600 (See page 52)



RECOMMENDED CUTTING CONDITIONS

ASSEMBLY OF i-Xmill



◀ Make sure to clean the insert and insert seat.



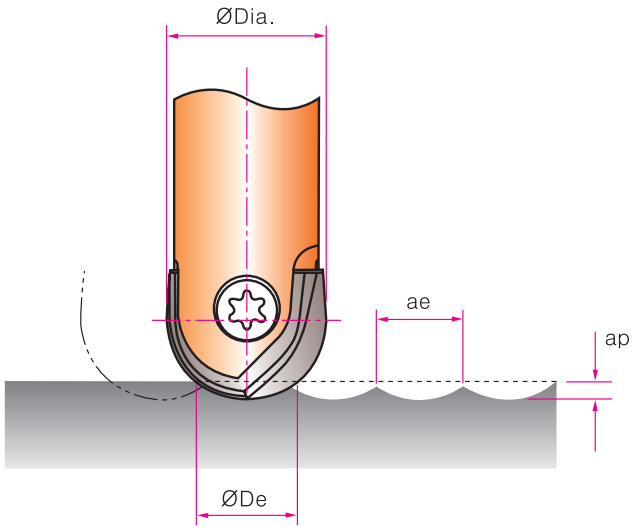
◀ Slide the insert into the slot of the holder.  
Tighten the screw using anti-seize compound.

| SIZE   |            | CLAMPING TORQUE |
|--------|------------|-----------------|
| ØD     |            | [ in· lbs ]     |
| Ø5/16  | (Ø8)       | 9.0             |
| Ø3/8   | (Ø10)      | 13.5            |
| Ø1/2   | (Ø12~ Ø13) | 22.5            |
| Ø5/8   | (Ø16~ Ø17) | 31.5            |
| Ø3/4   | (Ø20~ Ø21) | 44.5            |
| Ø1     | (Ø25~ Ø26) | 53.0            |
| Ø1-1/4 | (Ø30~ Ø32) | 58.0            |

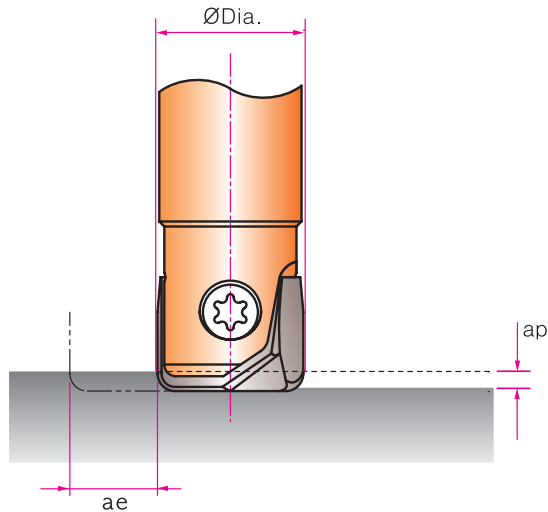
\* When the screw is worn out, please change the new screw.  
\* Please tighten up the screw with recommended torque.  
(Please refer to the table)  
\* Don't press down the insert, when the screw is tightened.



CUTTING CONDITION



RPM = revolution per minute (rev/min)  
SFM = surface feet per minute (ft/min)  
Dia. = diameter of insert (inch)  
IPR = feed rate (inch/rev)  
IPM = inch per minute penetration rate  
De = effective tool diameter (inch)  
ap = axial depth of cut (inch)  
ae = radial depth of cut (inch)



$$\begin{aligned} \text{SFM [ft/min]} &= \frac{(\text{RPM}) \cdot (\pi) \cdot (\text{Dia.})}{12} \\ \text{IPM [inch/min]} &= (\text{RPM}) \cdot (\text{IPR}) \\ \text{RPM [rev/min]} &= \frac{(\text{SFM}) \cdot (12)}{(\pi) \cdot (\text{Dia.})} \\ \text{De [inch]} &= 2 \sqrt{(\text{ap}) \cdot (\text{Dia.} - \text{ap})} \end{aligned}$$

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
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ONLY ONE  
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SINE -POWER  
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TANK-POWER  
END MILLS

STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA



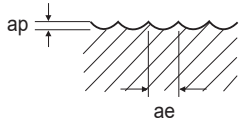
RECOMMENDED CUTTING CONDITIONS

i-Xmill BALL INSERTS

XB1A, XB2C, XB1N, XB2N SERIES

| WORK MATERIAL     |                    | P                                               |                          |                      |                |                                       |                          |                      |                |
|-------------------|--------------------|-------------------------------------------------|--------------------------|----------------------|----------------|---------------------------------------|--------------------------|----------------------|----------------|
|                   |                    | NON-ALLOYED STEELS<br>ALLOY STEELS<br>CAST IRON |                          |                      |                | ALLOY STEELS<br>HEAT RESISTANT STEELS |                          |                      |                |
| HARDNESS          | HB                 | ~280                                            |                          |                      |                | 280~380                               |                          |                      |                |
|                   | HRc                | ~30                                             |                          |                      |                | 30~40                                 |                          |                      |                |
| STRENGTH          | N/mm²              | ~1000                                           |                          |                      |                | 1000~1250                             |                          |                      |                |
| i-Xmill TYPE      |                    | XB1A, XB1N                                      |                          |                      |                | XB1A, XB1N                            |                          |                      |                |
| CUTTING CONDITION | Roughing~Finishing | RPM<br>[rev/min]                                | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] | RPM<br>[rev/min]                      | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] |
| Ø5/16(Ø8)         |                    | 6370~12730                                      | 100~200                  | 525~1050             | .008~.008      | 4770~11140                            | 80~180                   | 394~919              | .008~.008      |
| Ø3/8(Ø10)         |                    | 5090~11460                                      | 80~180                   | 525~1181             | .008~.008      | 3820~9550                             | 60~150                   | 394~984              | .008~.008      |
| Ø1/2(Ø12, Ø13)    |                    | 4240~10080                                      | 70~160                   | 525~1247             | .008~.008      | 3180~9280                             | 50~150                   | 394~1148             | .008~.008      |
| Ø5/8(Ø16, Ø17)    |                    | 3180~9550                                       | 60~230                   | 525~1575             | .010~.012      | 2390~7560                             | 50~180                   | 394~1247             | .010~.012      |
| Ø3/4(Ø20, Ø21)    |                    | 2550~9230                                       | 50~290                   | 525~1903             | .010~.016      | 1910~6680                             | 40~210                   | 394~1378             | .010~.016      |
| Ø1(Ø25, Ø26)      |                    | 2040~7640                                       | 40~300                   | 525~1969             | .010~.020      | 1530~6110                             | 30~240                   | 394~1575             | .010~.020      |
| Ø1-1/4(Ø30, Ø32)  |                    | 1700~7430                                       | 30~350                   | 525~2297             | .010~.024      | 1270~5840                             | 30~280                   | 394~1804             | .010~.024      |

| P                               |                          |                      |                |                  |                          |                      |                | N                |                          |                      |                |
|---------------------------------|--------------------------|----------------------|----------------|------------------|--------------------------|----------------------|----------------|------------------|--------------------------|----------------------|----------------|
| DIE TOOL STEELS<br>PRE-HARDENED |                          |                      |                | HARDENED STEELS  |                          |                      |                | GRAPHITE         |                          |                      |                |
| 380~480                         |                          |                      |                | 480~740          |                          |                      |                |                  |                          |                      |                |
| 40~50                           |                          |                      |                | 50~65            |                          |                      |                |                  |                          |                      |                |
| 1250~1500                       |                          |                      |                | 1500~            |                          |                      |                |                  |                          |                      |                |
| XB1A, XB1N XB2C, XB2N           |                          |                      |                | XB2C, XB2N       |                          |                      |                | XB1D, XBAD       |                          |                      |                |
| RPM<br>[rev/min]                | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] | RPM<br>[rev/min] | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] | RPM<br>[rev/min] | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] |
| 3980~8750                       | 50~140                   | 328~722              | .006~.008      | 3180~7160        | 30~110                   | 262~591              | .004~.008      | 11940~15920      | 190~250                  | 984~1312             | .008~.008      |
| 3180~8280                       | 40~130                   | 328~853              | .006~.008      | 2550~6370        | 20~100                   | 262~656              | .004~.008      | 9550~12730       | 150~200                  | 984~1312             | .008~.008      |
| 2650~7430                       | 30~120                   | 328~919              | .006~.008      | 2120~5840        | 20~90                    | 262~722              | .004~.008      | 7960~10610       | 130~170                  | 984~1312             | .008~.008      |
| 1990~6960                       | 30~160                   | 328~1148             | .008~.012      | 1590~5170        | 20~120                   | 262~853              | .006~.012      | 5970~7960        | 120~190                  | 984~1312             | .010~.012      |
| 1590~6370                       | 30~200                   | 328~1312             | .008~.016      | 1270~5090        | 20~160                   | 262~1050             | .006~.016      | 4770~7640        | 110~210                  | 984~1575             | .012~.014      |
| 1270~5730                       | 20~230                   | 328~1476             | .008~.020      | 1020~4580        | 10~180                   | 262~1181             | .006~.020      | 3820~7130        | 110~220                  | 984~1837             | .014~.016      |
| 1060~5310                       | 20~250                   | 328~1640             | .008~.024      | 850~4240         | 10~200                   | 262~1312             | .006~.024      | 3180~6900        | 100~270                  | 984~2133             | .016~.020      |



ae : Roughing - 0.1 x D  
Finishing - Under Ø1/2 : 0.01  
Under Ø3/4 : 0.012  
From Ø3/4 : 0.016

ap : Roughing - Under Ø5/8 : 0.025 x D  
From Ø5/8 : 0.05 x D  
Finishing - 0.004

► Recommend to reduce the feed rate to 70 ~ 85% when you use long (long & intermediate Type Holder)

RPM = rev./min.  
FEED = inch/min.



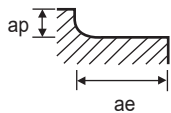
RECOMMENDED CUTTING CONDITIONS

i-Xmill CORNER RADIUS INSERTS

XR1A, XR2A, XRAA, XRBA SERIES

| WORK MATERIAL     |                    | P                                               |                          |                      |                |                                       |                          |                      |                |
|-------------------|--------------------|-------------------------------------------------|--------------------------|----------------------|----------------|---------------------------------------|--------------------------|----------------------|----------------|
|                   |                    | NON-ALLOYED STEELS<br>ALLOY STEELS<br>CAST IRON |                          |                      |                | ALLOY STEELS<br>HEAT RESISTANT STEELS |                          |                      |                |
| HARDNESS          | HB                 | ~280                                            |                          |                      |                | 280~380                               |                          |                      |                |
|                   | HRc                | ~30                                             |                          |                      |                | 30~40                                 |                          |                      |                |
| STRENGTH          | N/mm²              | ~1000                                           |                          |                      |                | 1000~1250                             |                          |                      |                |
| i-Xmill TYPE      |                    | XR1A, XRAA                                      |                          |                      |                | XR1A, XRAA                            |                          |                      |                |
| CUTTING CONDITION | Roughing~Finishing | RPM<br>[rev/min]                                | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] | RPM<br>[rev/min]                      | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] |
| Ø5/16(Ø8)         |                    | 6370~11940                                      | 100~140                  | 525~984              | .008~.006      | 4770~11140                            | 80~130                   | 394~919              | .008~.006      |
| Ø3/8(Ø10)         |                    | 5090~9550                                       | 80~110                   | 525~984              | .008~.006      | 3820~8910                             | 60~110                   | 394~919              | .008~.006      |
| Ø1/2(Ø12, Ø13)    |                    | 4240~7960                                       | 70~90                    | 525~984              | .008~.006      | 3180~7430                             | 50~90                    | 394~919              | .008~.006      |
| Ø5/8(Ø16, Ø17)    |                    | 3180~5970                                       | 60~90                    | 525~984              | .010~.008      | 2390~5570                             | 50~90                    | 394~919              | .010~.008      |
| Ø3/4(Ø20, Ø21)    |                    | 2550~4770                                       | 50~80                    | 525~984              | .010~.008      | 1910~4460                             | 40~70                    | 394~919              | .010~.008      |
| Ø1(Ø25, Ø26)      |                    | 2040~3820                                       | 40~60                    | 525~984              | .010~.008      | 1530~3570                             | 30~60                    | 394~919              | .010~.008      |
| Ø1-1/4(Ø30, Ø32)  |                    | 1700~3180                                       | 30~50                    | 525~984              | .010~.008      | 1270~2970                             | 30~50                    | 394~919              | .010~.008      |

| P                               |                          |                      |                |                  |                          |                      |                | N                |                          |                      |                |
|---------------------------------|--------------------------|----------------------|----------------|------------------|--------------------------|----------------------|----------------|------------------|--------------------------|----------------------|----------------|
| DIE TOOL STEELS<br>PRE-HARDENED |                          |                      |                | HARDENED STEELS  |                          |                      |                | GRAPHITE         |                          |                      |                |
| 380~480                         |                          |                      |                | 480~740          |                          |                      |                |                  |                          |                      |                |
| 40~50                           |                          |                      |                | 50~65            |                          |                      |                |                  |                          |                      |                |
| 1250~1500                       |                          |                      |                | 1500~            |                          |                      |                |                  |                          |                      |                |
| XR1A, XRAA XR2A, XRBA           |                          |                      |                | XR2A, XRBA       |                          |                      |                | XR1D, XRAD       |                          |                      |                |
| RPM<br>[rev/min]                | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] | RPM<br>[rev/min] | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] | RPM<br>[rev/min] | Feed (IPM)<br>[inch/min] | Vc (SFM)<br>[ft/min] | fz<br>[inch/t] |
| 3980~11140                      | 40~52                    | 328~919              | .005~.002      | 3180~7160        | 25~34                    | 262~722              | .004~.002      | 11940~15920      | 190~250                  | 984~1312             | .008~.008      |
| 3180~8910                       | 30~42                    | 328~919              | .005~.002      | 2550~6370        | 20~28                    | 262~722              | .004~.002      | 9550~12730       | 150~200                  | 984~1312             | .008~.008      |
| 2650~7430                       | 25~35                    | 328~919              | .005~.002      | 2120~5840        | 18~24                    | 262~722              | .004~.002      | 7960~10610       | 130~170                  | 984~1312             | .008~.008      |
| 1990~5570                       | 24~34                    | 328~919              | .006~.003      | 1590~5170        | 18~22                    | 262~722              | .006~.002      | 5970~7960        | 90~130                   | 984~1312             | .008~.008      |
| 1590~4460                       | 20~26                    | 328~919              | .006~.003      | 1270~5090        | 15~18                    | 262~722              | .006~.002      | 4770~6370        | 90~130                   | 984~1312             | .010~.010      |
| 1270~3570                       | 15~20                    | 328~919              | .006~.003      | 1020~4580        | 12~14                    | 262~722              | .006~.002      | 3820~5090        | 80~100                   | 984~1312             | .010~.010      |
| 1060~2970                       | 14~18                    | 328~919              | .006~.003      | 850~4240         | 10~12                    | 262~722              | .006~.002      | 3180~4240        | 60~80                    | 984~1312             | .010~.010      |



ae : Roughing - 0.1 x D  
Finishing - 0.008

ap : Roughing - Under Ø5/8 : 0.025 x D  
From Ø5/8 : 0.05 x D  
Finishing - Under Ø5/8 : 0.004  
From Ø5/8 : 0.008

► Recommend to reduce the feed rate to 70 ~ 85% when you use long (long & intermediate Type Holder)

CARBIDE

HSS

CBN  
END MILLS

i-Xmill  
END MILLS

i-SMART  
MODULAR  
TYPE END MILLS

X5070  
END MILLS

4G MILL  
END MILLS

X-POWER  
END MILLS

JET-POWER  
END MILLS

TitaNox  
-POWER  
END MILLS

V7 PLUS A  
END MILLS

V7 MILL INOX  
END MILLS

ALU-POWER  
HPC  
END MILLS

ALU-POWER  
END MILLS

D-POWER  
GRAPHITE  
END MILLS

D-POWER  
CFRP  
END MILLS

ROUTERS  
CFRP

STANDARD  
CARBIDE  
END MILLS

ONLY ONE  
COATED PM60  
END MILLS

SINE -POWER  
END MILLS

TANK-POWER  
END MILLS

STANDARD  
COBALT & HSS  
END MILLS

TECHNICAL  
DATA