

# KTG SH Super High Hardness & Super High Speed Cutting

End Mill Series For High Hardness Steeles

Super Hardness Steel Coating "SH" - SH Power Ball

## Features

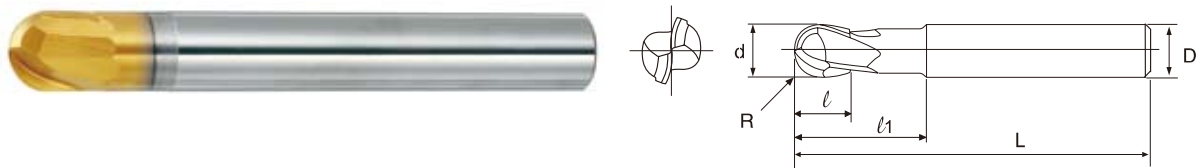
Developed NaNo SH Coating of high adhesion and high hardness is adopted.

- Long Tool Life • The tool life has drastically been improved
- High Accuracy • Less dimensional change, It's suitable for finishing

A new geometry is adopted to ensure rigidity and excellent R accuracy & specially cutting edge.

- High Efficient • A powerful roughing is available
- High Accuracy • Highly accurate finish cutting is possible

- The tool exhibits its power to various materials from pre-hardened steel (45 HRC class to high hardness 65 HRC class)
- Especially for pre-hardened steel cutting, this tool shows incomparably longer life than with the tool of conventional type (3 times or more longer than of a general TiAlN material)
- R tolerance:  $\pm 0.01\text{mm}$ . Highly accurate finish cutting is possible



## Dimensions

| MODE       | R     | D   | l   | l <sub>1</sub> | Neck Dia | L  | D  |
|------------|-------|-----|-----|----------------|----------|----|----|
| KTG 0102SH | 0.5R  | 1   | 1   | 2.5            | 0.96     | 50 | 6  |
| KTG 0152SH | 0.75R | 1.5 | 1.5 | 4              | 1.46     | 50 | 6  |
| KTG 0202SH | 1R    | 2   | 2   | 6              | 1.96     | 50 | 6  |
| KTG 0252SH | 1.25R | 2.5 | 2.5 | 7              | 2.46     | 50 | 6  |
| KTG 0302SH | 1.5R  | 3   | 3   | 8              | 2.96     | 50 | 6  |
| KTG 4402SH | 2R    | 4   | 4   | 8              | 3.96     | 50 | 4  |
| KTG 0402SH | 2R    | 4   | 4   | 8              | 3.96     | 50 | 6  |
| KTG 0502SH | 2.5R  | 5   | 5   | 12             | 4.96     | 50 | 6  |
| KTG 0602SH | 3R    | 6   | 6   | 13             | 5.96     | 50 | 6  |
| KTG 0802SH | 4R    | 8   | 8   | 16             | 7.9      | 60 | 8  |
| KTG 1002SH | 5R    | 10  | 10  | 20             | 9.9      | 75 | 10 |
| KTG 1202SH | 6R    | 12  | 12  | 24             | 11.9     | 75 | 12 |

### Standard Cutting Conditions

| Work material | Alloy steels, Tool steels, Prehardened steels, SCM, SKD61, SKD11, NAK, AISI H13, AISI D2 ect. |                                  |                            |             | Hardened steels, SKD61, SKD11, STAVAX, AISI H13 ect. |                            |               |             | Hardened steels, SKD11, SKH, SKS, ASP23, AISI H13 ect. |                            |               |             |                |
|---------------|---|----------------------------------|----------------------------|-------------|--|----------------------------|---------------|-------------|--|----------------------------|---------------|-------------|----------------|
|               | R (mm)  | Inclination of Machining Surface | Speed (min <sup>-1</sup> ) | mm          |  | Speed (min <sup>-1</sup> ) | Feed (mm/min) | mm          |  | Speed (min <sup>-1</sup> ) | Feed (mm/min) | mm          |                |
|               |   |                                  |                            | Pf          | Ad   |                            |               | Pf          | Ad   |                            |               | Pf          | Ad             |
|               |   |                                  |                            | Pick feed   | Milling Amount                                       |                            |               | Pick feed   | Milling Amount   |                            |               | Pick feed   | Milling Amount |
| 0.5R          | $\alpha \leq 15^\circ$  | 40000                            | 3120                       | $\leq 0.2R$ | $\leq 0.1R$  | 35000                      | 2340          | $\leq 0.2R$ | $\leq 0.1R$  | 21000                      | 1300          | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 35000                            | 2080                       | $\leq 0.2R$ | $\leq 0.1R$  | 30000                      | 1430          | $\leq 0.2R$ | $\leq 0.1R$  | 15000                      | 740           | $\leq 0.2R$ | $\leq 0.05R$   |
| 0.75R         | $\alpha \leq 15^\circ$  | 40000                            | 3900                       | $\leq 0.2R$ | $\leq 0.1R$  | 30000                      | 2470          | $\leq 0.2R$ | $\leq 0.1R$  | 14000                      | 1160          | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 30000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 25000                      | 1560          | $\leq 0.4R$ | $\leq 0.1R$  | 10000                      | 610           | $\leq 0.2R$ | $\leq 0.05R$   |
| 1R            | $\alpha \leq 15^\circ$  | 35000                            | 3900                       | $\leq 0.4R$ | $\leq 0.1R$  | 25000                      | 2340          | $\leq 0.4R$ | $\leq 0.1R$  | 11000                      | 1040          | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 25000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 20000                      | 1430          | $\leq 0.4R$ | $\leq 0.1R$  | 8000                       | 560           | $\leq 0.2R$ | $\leq 0.05R$   |
| 1.25R         | $\alpha \leq 15^\circ$  | 33000                            | 3900                       | $\leq 0.4R$ | $\leq 0.1R$  | 22000                      | 2210          | $\leq 0.4R$ | $\leq 0.1R$  | 9300                       | 920           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 24000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 17000                      | 1300          | $\leq 0.4R$ | $\leq 0.1R$  | 6500                       | 480           | $\leq 0.2R$ | $\leq 0.05R$   |
| 1.5R          | $\alpha \leq 15^\circ$  | 30000                            | 3900                       | $\leq 0.4R$ | $\leq 0.1R$  | 20000                      | 2210          | $\leq 0.4R$ | $\leq 0.1R$  | 8000                       | 870           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 23000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 15000                      | 1300          | $\leq 0.4R$ | $\leq 0.1R$  | 5600                       | 450           | $\leq 0.2R$ | $\leq 0.05R$   |
| 2R            | $\alpha \leq 15^\circ$  | 25000                            | 3900                       | $\leq 0.4R$ | $\leq 0.1R$  | 17000                      | 2210          | $\leq 0.4R$ | $\leq 0.1R$  | 6400                       | 830           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 20000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 13000                      | 1300          | $\leq 0.4R$ | $\leq 0.1R$  | 4500                       | 440           | $\leq 0.2R$ | $\leq 0.05R$   |
| 2.5R          | $\alpha \leq 15^\circ$  | 23000                            | 3900                       | $\leq 0.4R$ | $\leq 0.1R$  | 15000                      | 2210          | $\leq 0.4R$ | $\leq 0.1R$  | 5000                       | 710           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 17000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 11000                      | 1300          | $\leq 0.4R$ | $\leq 0.1R$  | 3500                       | 380           | $\leq 0.2R$ | $\leq 0.05R$   |
| 3R            | $\alpha \leq 15^\circ$  | 20000                            | 3900                       | $\leq 0.4R$ | $\leq 0.1R$  | 13000                      | 2210          | $\leq 0.4R$ | $\leq 0.1R$  | 4200                       | 690           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 15000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 10000                      | 1300          | $\leq 0.4R$ | $\leq 0.1R$  | 2900                       | 350           | $\leq 0.2R$ | $\leq 0.05R$   |
| 4R            | $\alpha \leq 15^\circ$  | 15000                            | 3900                       | $\leq 0.4R$ | $\leq 0.1R$  | 10000                      | 2210          | $\leq 0.4R$ | $\leq 0.1R$  | 3200                       | 700           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 11000                            | 2210                       | $\leq 0.4R$ | $\leq 0.1R$  | 7500                       | 1300          | $\leq 0.4R$ | $\leq 0.1R$  | 2200                       | 360           | $\leq 0.2R$ | $\leq 0.05R$   |
| 5R            | $\alpha \leq 15^\circ$  | 12000                            | 3770                       | $\leq 0.4R$ | $\leq 0.1R$  | 8000                       | 2080          | $\leq 0.4R$ | $\leq 0.1R$  | 2500                       | 660           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 9000                             | 2080                       | $\leq 0.4R$ | $\leq 0.1R$  | 6000                       | 1170          | $\leq 0.4R$ | $\leq 0.1R$  | 1800                       | 350           | $\leq 0.2R$ | $\leq 0.05R$   |
| 6R            | $\alpha \leq 15^\circ$  | 10000                            | 3250                       | $\leq 0.4R$ | $\leq 0.1R$  | 6600                       | 1820          | $\leq 0.4R$ | $\leq 0.1R$  | 2100                       | 570           | $\leq 0.2R$ | $\leq 0.05R$   |
|               | $\alpha > 15^\circ$   | 7500                             | 1820                       | $\leq 0.4R$ | $\leq 0.1R$  | 5000                       | 1040          | $\leq 0.4R$ | $\leq 0.1R$  | 1500                       | 300           | $\leq 0.2R$ | $\leq 0.05R$   |

### High Speed Milling Conditions

|      |     |       |      |     |      |       |      |      |      |       |      |      |      |
|------|-----|-------|------|-----|------|-------|------|------|------|-------|------|------|------|
| 0.5R | (R) | 40000 | 3120 | 0.2 | 0.05 | 40000 | 2470 | 0.15 | 0.04 | 30000 | 1560 | 0.1  | 0.03 |
|      | (F) | 40000 | 3900 | 0.1 | 0.05 | 40000 | 3120 | 0.8  | 0.04 | 30000 | 1950 | 0.6  | 0.03 |
| 1R   | (R) | 40000 | 6240 | 0.2 | 0.2  | 40000 | 4940 | 0.2  | 0.15 | 20000 | 2080 | 0.15 | 0.12 |
|      | (F) | 40000 | 7800 | 0.2 | 0.1  | 40000 | 6240 | 0.1  | 0.1  | 20000 | 2600 | 0.1  | 0.06 |
| 2R   | (R) | 30000 | 6240 | 0.4 | 0.3  | 30000 | 4940 | 0.3  | 0.2  | 20000 | 2470 | 0.25 | 0.15 |
|      | (F) | 30000 | 7800 | 0.2 | 0.15 | 30000 | 6240 | 0.2  | 0.1  | 20000 | 3120 | 0.2  | 0.1  |
| 3R   | (R) | 20000 | 5200 | 0.6 | 0.4  | 20000 | 4160 | 0.5  | 0.3  | 16000 | 2470 | 0.3  | 0.2  |
|      | (F) | 20000 | 6500 | 0.2 | 0.2  | 20000 | 5200 | 0.2  | 0.2  | 16000 | 3120 | 0.2  | 0.2  |
| 4R   | (R) | 16000 | 4940 | 1   | 0.8  | 16000 | 3900 | 0.8  | 0.6  | 10000 | 1820 | 0.7  | 0.5  |
|      | (F) | 16000 | 6240 | 0.2 | 0.2  | 16000 | 4940 | 0.2  | 0.2  | 10000 | 2340 | 0.2  | 0.2  |
| 5R   | (R) | 12000 | 4680 | 2   | 1    | 12000 | 3640 | 1    | 0.8  | 8000  | 1560 | 1    | 0.7  |
|      | (F) | 12000 | 5850 | 0.3 | 0.3  | 12000 | 4680 | 0.2  | 0.2  | 8000  | 2080 | 0.2  | 0.2  |
| 6R   | (R) | 10000 | 3900 | 3   | 1.2  | 10000 | 3120 | 1.5  | 1.2  | 6400  | 1248 | 1.5  | 1    |
|      | (F) | 10000 | 4870 | 0.3 | 0.3  | 10000 | 3900 | 0.2  | 0.2  | 6400  | 1560 | 0.2  | 0.2  |

#### Caution :

1.  $\alpha$  is the inclination of machining surface.
2. If the rigidity of the machine or the work material installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
3. Cutting condition may be considerably different due to the overhang(milling depth and neck length), depth of cut, and machine tools.
4. If the depth of cut is shallow, the revolution and feed rate can be increased.