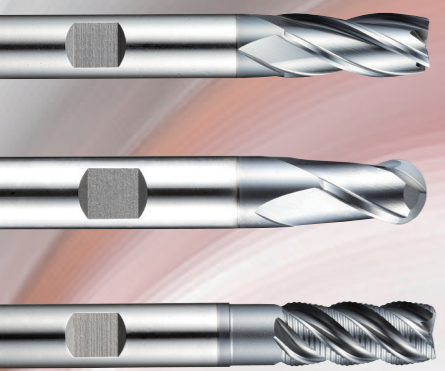


**YE-OP16**



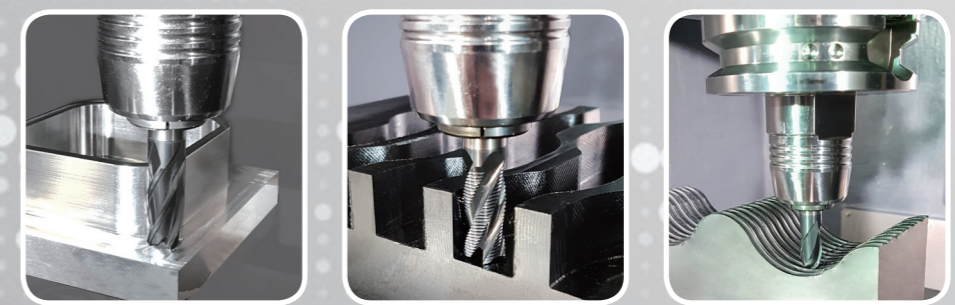
**ONLY ONE**  
COATED PM60 END MILLS



**ONLY ONE**  
COATED PM60 END MILLS

Perfect solution to protect Carbide chipping problems under vibrations.

- Better performance than Coated Solid Carbide End Mills
- Better Hardness, Better Toughness than HSS Co8
- Dramatically reduced price of PM60 making it very competitive



**YG-1 CO., LTD.**

**HEAD OFFICE**

211, Sewolcheon-ro, Bupyeong-gu, Incheon, Korea  
PHONE : +82-32-526-0909, FAX : +82-32-526-4373  
<http://www.yg1.kr>  
E-mail:yg1@yg1.kr



Tool specifications are subject to change without prior notice.



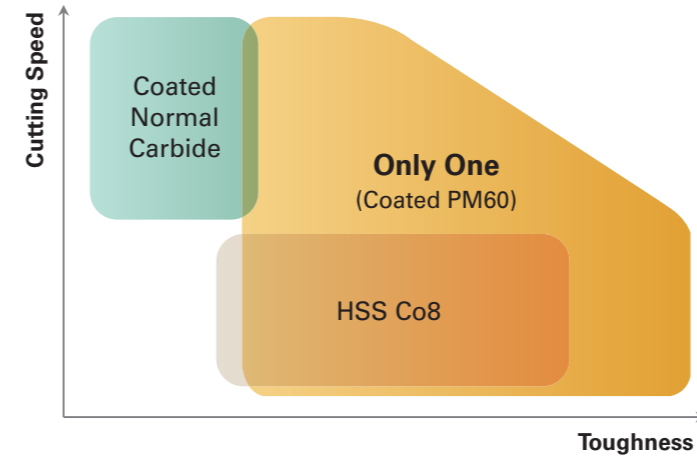
**YG-1 CO., LTD.**

- A. The ONLY ONE material is based on powder metallurgy that ensures **High Toughness** performance which is one of the advantages of Cobalt HSS.
- B. The ONLY ONE has **Exceptional Wear Resistance** which is another advantage of the micro-grain carbide tools.
- C. The ONLY ONE has **very strong toughness which can bring out better performances also on machines with unstable conditions such as vibration and irregular composition of work materials.**
- D. The ONLY ONE performs better without causing chipping than Normal coated carbide end mills under the same carbide cutting conditions.
- E. Excellent performance for Stainless Steels, Pre-hardened Steels, Carbon steels, Alloy steels and Cast Iron.

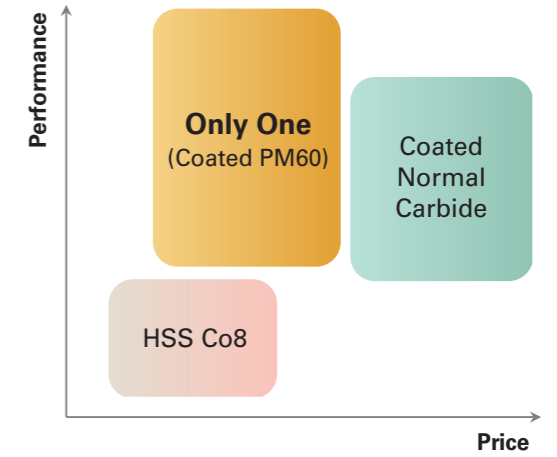


**Note** Limited performance can occur under the rigid clamping, high speed machining and/or high hardness materials above HRc45.

To protect chipping problems under the unstable machining conditions with vibration,



Higher Toughness than HSS Co8,  
Cutting Speed (Vc) is as high as Coated Normal Carbide.



Better performance than HSS Co8,  
Better price than Coated Normal Carbide.

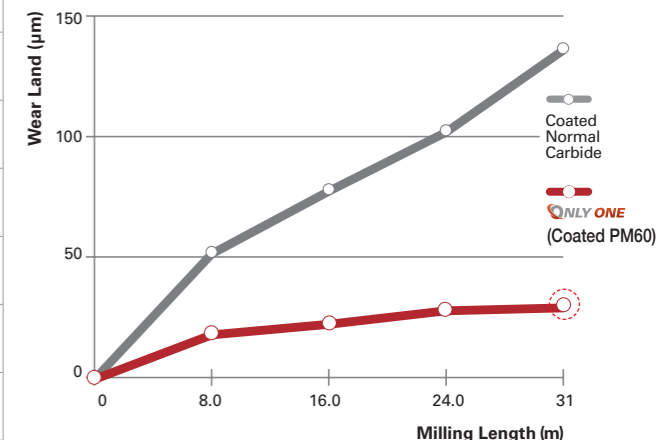
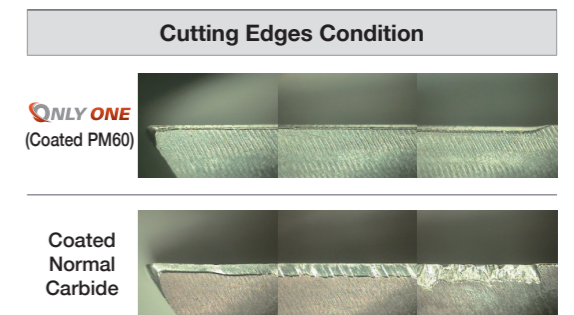
**YG** PRODUCT PHILOSOPHY

**YG** CASE STUDY 1

- A. For whom did we develop 'ONLY ONE'?
  - For every CNC machining center & Conventional milling machine, **for users who pursue to Increase productivity.**
  - 'Only One' can replace all of both Coated Solid Carbide & HSS Co8 End Mills.
- B. It can replace;
  - Both Coated and uncoated Solid Carbide End Mills.
  - Better Tool Life & Cheaper Price than Coated Solid Carbide End Mills.
  - All of HSS Co8(M42) End Mills.
- C. High Technologies applied;
  - YG-1's advanced "Y" coating technology applied, which is an AlCrN based coating
  - 4 flutes and roughers are with multiple helix (from Ø3mm to Ø25mm)

• 4 Flute Square End Mill, S45C – Carbide Cutting Condition


| Result         | Only One Coated PM60 > Coated Normal Carbide |                               |
|----------------|--|-------------------------------|
| Tool List      | Only One Coated PM60                         | Coated Normal Carbide         |
| Size           | Ø10xØ10x22x72                                | Ø10xØ10x22x70                 |
| Work Material  | - JIS : S45C<br>- DIN : C45                  | - KS : SM45C<br>- AISI : 1045 |
| RPM            | 2750 rev/min.                                |                               |
| Feed           | 520 mm/rev.                                  |                               |
| Milling Method | Down & Side Cutting                          |                               |
| Milling Depth  | Axial : 3 mm                                 | Radial : 1 mm                 |
| Coolant        | Wet Cut                                      |                               |
| Machine        | Machining Center                             |                               |

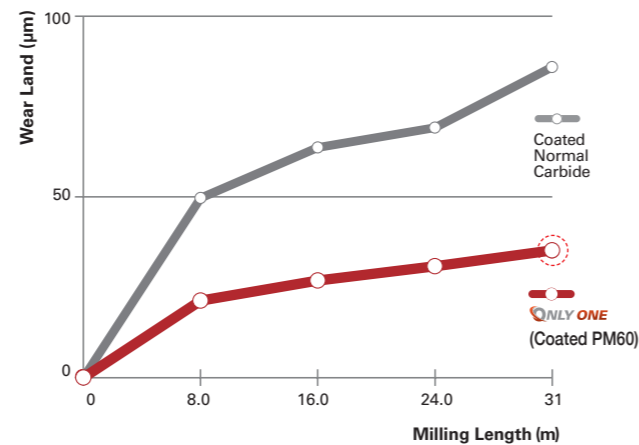
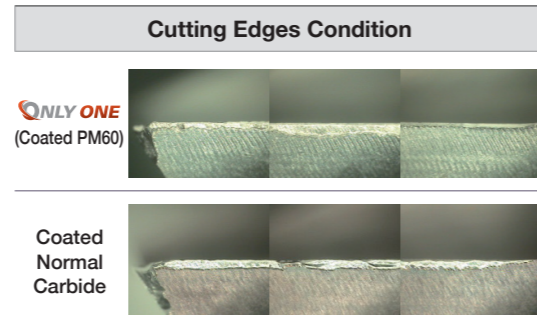


| Parameters    | HSS Co8       | Only One (Coated PM60) | Coated Normal Carbide |
|---------------|---------------|------------------------|-----------------------|
| Cutting Speed | (↓)           | (↑)                    | (↑)                   |
| Toughness     |               | (↑)                    | (↑)                   |
| Price         | (↓)(↓)<br>Low | (↓)<br>Medium          | (↑)<br>High           |




• 4 Flute Square End Mill, S45C(HRc30) – Carbide Cutting Condition











|                |   |                               |
|----------------|---|-------------------------------|
| Result         | Only One Coated PM60 > Coated Normal Carbide  |                               |
| Tool List      | Only One Coated PM60  | Coated Normal Carbide         |
| Size           | Ø10xØ10x22x72   | Ø10xØ10x22x70                 |
| Work Material  | - JIS : S45C<br>- DIN : C45   | - KS : SM45C<br>- AISI : 1045 |
| RPM            | 2750 rev/min.   |                               |
| Feed           | 520 mm/rev.   |                               |
| Milling Method | Down & Side Cutting  |                               |
| Milling Depth  | Axial : 10 mm   | Radial : 1 mm                 |
| Coolant        | Wet Cut   |                               |
| Machine        | Machining Center  |                               |



**ICON GUIDE**

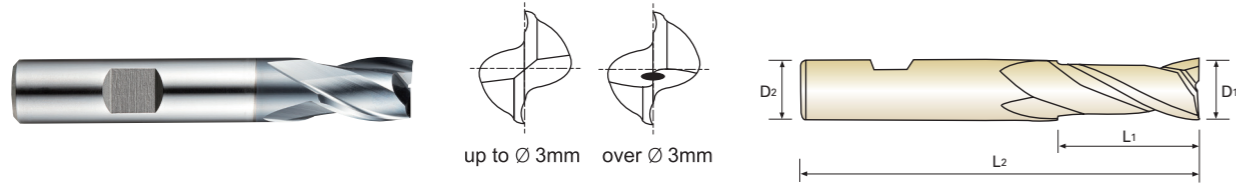
- PM 60** Powder Metallurgy HSS
- 2, 3, 4** No. of Flute
- M-Helix 30°** Helix Angle
- R ±0.02** Tolerance of Ball Radius
- FLAT** Type of Shank
- FINE COARSE** Type of Periphery
-  Cutting condition of tool see the page 000

◎:Excellent ○:Good

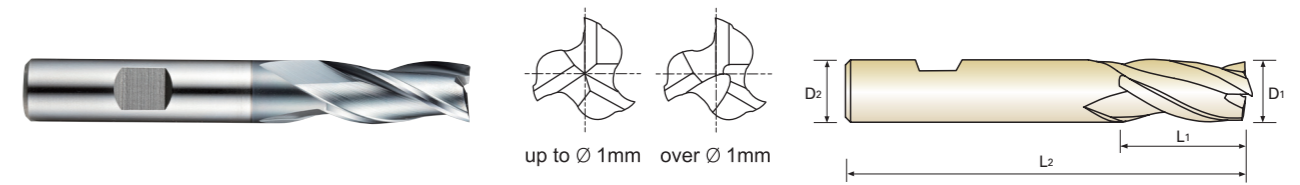
| ITEM         | MODEL   | DESCRIPTION   | SIZE |       | P             |              | M                  | N               |                  | S      | PAGE |           |
|--------------|---|---|------|-------|---------------|--------------|--------------------|-----------------|------------------|--------|------|-----------|
|              |   |   | Min. | Max.  | Carbon Steels | Alloy Steels | Prehardened Steels | Hardened Steels | Stainless Steels | Copper |      | Cast Iron |
| <b>GYF99</b> |    | PM60, 2 FLUTE SHORT LENGTH (Center Cut)   | D1.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>6</b>  |
| <b>GYG01</b> |    | PM60, 3 FLUTE SHORT LENGTH (Center Cut)   | D1.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>7</b>  |
| <b>GYF96</b> |    | PM60, 4 FLUTE SHORT LENGTH (Center Cut)   | D1.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>8</b>  |
| <b>GYG52</b> |  | <b>MULTIPLE HELIX</b><br>PM60, 4 FLUTE MULTIPLE HELIX SHORT LENGTH (Center Cut)                                   | D3.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>9</b>  |
| <b>GYG02</b> |  | PM60, 4 FLUTE LONG LENGTH (Center Cut)  | D2.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>10</b> |
| <b>GYF97</b> |  | PM60, 2 FLUTE SHORT LENGTH BALL NOSE  | R0.5 | R12.5 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>11</b> |
| <b>GYF94</b> |  | PM60, MULTI FLUTE SHORT LENGTH ROUGHING - FINE (Center Cut)   | D6.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>12</b> |
| <b>GYF98</b> |  | PM60, MULTI FLUTE LONG LENGTH ROUGHING - FINE (Center Cut)  | D6.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>13</b> |
| <b>GYG03</b> |  | PM60, MULTI FLUTE SHORT LENGTH ROUGHING - COARSE (Center Cut)   | D6.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>14</b> |
| <b>GYF95</b> |  | <b>MULTIPLE HELIX</b><br>PM60, MULTI FLUTE MULTIPLE HELIX SHORT LENGTH CORNER RADIUS ROUGHING - FINE (Center Cut) | D6.0 | D25.0 | ◎             | ◎            | ○                  | ◎               | ○                | ◎      |      | <b>15</b> |

## 2 FLUTE SHORT LENGTH (Center Cut)

## 3 FLUTE SHORT LENGTH (Center Cut)



up to  $\varnothing$  3mm over  $\varnothing$  3mm



up to  $\varnothing$  1mm over  $\varnothing$  1mm



P. 16

### GYF99 SERIES



P. 17~18

### GYG01 SERIES

Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|----------|---------------|----------------|---------------|----------------|
|          | D1            | D2             | L1            | L2             |
| GYF99010 | 1.0           | 6              | 2.5           | 47             |
| GYF99020 | 2.0           | 6              | 4             | 48             |
| GYF99030 | 3.0           | 6              | 5             | 49             |
| GYF99040 | 4.0           | 6              | 7             | 51             |
| GYF99050 | 5.0           | 6              | 8             | 52             |
| GYF99060 | 6.0           | 6              | 8             | 52             |
| GYF99070 | 7.0           | 8              | 10            | 60             |
| GYF99080 | 8.0           | 8              | 11            | 61             |
| GYF99090 | 9.0           | 10             | 11            | 61             |
| GYF99100 | 10.0          | 10             | 13            | 63             |
| GYF99120 | 12.0          | 12             | 16            | 73             |
| GYF99140 | 14.0          | 12             | 16            | 73             |
| GYF99160 | 16.0          | 16             | 19            | 79             |
| GYF99180 | 18.0          | 16             | 19            | 79             |
| GYF99200 | 20.0          | 20             | 22            | 88             |
| GYF99220 | 22.0          | 20             | 22            | 88             |
| GYF99250 | 25.0          | 25             | 26            | 102            |

| Mill Dia. Tolerance(mm) | Shank Dia. Tolerance |
|-------------------------|----------------------|
| 0 ~ -0.03               | h6                   |

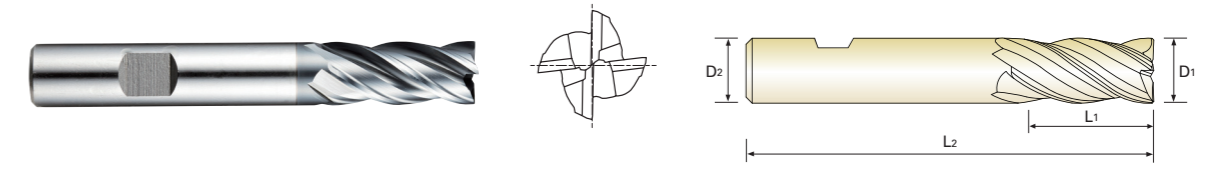
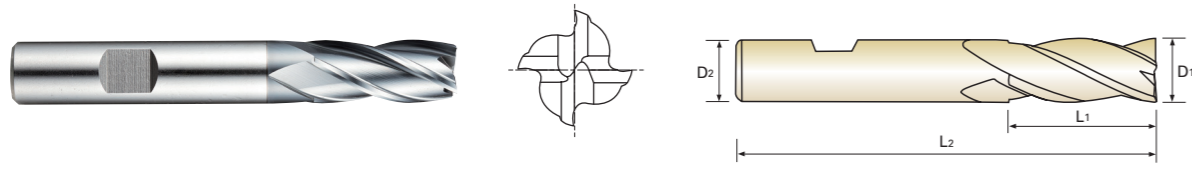
Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|----------|---------------|----------------|---------------|----------------|
|          | D1            | D2             | L1            | L2             |
| GYG01010 | 1.0           | 6              | 3             | 47             |
| GYG01020 | 2.0           | 6              | 7             | 51             |
| GYG01030 | 3.0           | 6              | 8             | 52             |
| GYG01040 | 4.0           | 6              | 11            | 55             |
| GYG01050 | 5.0           | 6              | 13            | 57             |
| GYG01060 | 6.0           | 6              | 13            | 57             |
| GYG01070 | 7.0           | 8              | 16            | 66             |
| GYG01080 | 8.0           | 8              | 19            | 69             |
| GYG01090 | 9.0           | 10             | 19            | 69             |
| GYG01100 | 10.0          | 10             | 22            | 72             |
| GYG01120 | 12.0          | 12             | 26            | 83             |
| GYG01140 | 14.0          | 12             | 26            | 83             |
| GYG01160 | 16.0          | 16             | 32            | 92             |
| GYG01180 | 18.0          | 16             | 32            | 92             |
| GYG01200 | 20.0          | 20             | 38            | 104            |
| GYG01220 | 22.0          | 20             | 38            | 104            |
| GYG01250 | 25.0          | 25             | 45            | 121            |

| Mill Dia. Tolerance(mm) | Shank Dia. Tolerance |
|-------------------------|----------------------|
| 0 ~ -0.03               | h6                   |

### 4 FLUTE SHORT LENGTH (Center Cut)

### 4 FLUTE MULTIPLE HELIX SHORT LENGTH (Center Cut)



P. 19

**GYF96 SERIES**

P. 20

**GYG52 SERIES**

Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|----------|---------------|----------------|---------------|----------------|
|          | D1            | D2             | L1            | L2             |
| GYF96010 | 1.0           | 6              | 3             | 49             |
| GYF96020 | 2.0           | 6              | 7             | 51             |
| GYF96030 | 3.0           | 6              | 8             | 52             |
| GYF96040 | 4.0           | 6              | 11            | 55             |
| GYF96050 | 5.0           | 6              | 13            | 57             |
| GYF96060 | 6.0           | 6              | 13            | 57             |
| GYF96070 | 7.0           | 8              | 16            | 66             |
| GYF96080 | 8.0           | 8              | 19            | 69             |
| GYF96090 | 9.0           | 10             | 19            | 69             |
| GYF96100 | 10.0          | 10             | 22            | 72             |
| GYF96120 | 12.0          | 12             | 26            | 83             |
| GYF96140 | 14.0          | 12             | 26            | 83             |
| GYF96160 | 16.0          | 16             | 32            | 92             |
| GYF96180 | 18.0          | 16             | 32            | 92             |
| GYF96200 | 20.0          | 20             | 38            | 104            |
| GYF96220 | 22.0          | 20             | 38            | 104            |
| GYF96250 | 25.0          | 25             | 45            | 121            |

| Mill Dia. Tolerance(mm) | Shank Dia. Tolerance |
|-------------------------|----------------------|
| 0 ~ - 0.03              | h6                   |

Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|----------|---------------|----------------|---------------|----------------|
|          | D1            | D2             | L1            | L2             |
| GYG52030 | 3.0           | 6              | 8             | 52             |
| GYG52040 | 4.0           | 6              | 11            | 55             |
| GYG52050 | 5.0           | 6              | 13            | 57             |
| GYG52060 | 6.0           | 6              | 13            | 57             |
| GYG52070 | 7.0           | 8              | 16            | 66             |
| GYG52080 | 8.0           | 8              | 19            | 69             |
| GYG52090 | 9.0           | 10             | 19            | 69             |
| GYG52100 | 10.0          | 10             | 22            | 72             |
| GYG52120 | 12.0          | 12             | 26            | 83             |
| GYG52140 | 14.0          | 12             | 26            | 83             |
| GYG52160 | 16.0          | 16             | 32            | 92             |
| GYG52180 | 18.0          | 16             | 32            | 92             |
| GYG52200 | 20.0          | 20             | 38            | 104            |
| GYG52220 | 22.0          | 20             | 38            | 104            |
| GYG52250 | 25.0          | 25             | 45            | 121            |

| Mill Dia. Tolerance(mm) | Shank Dia. Tolerance |
|-------------------------|----------------------|
| 0 ~ - 0.03              | h6                   |



### 4 FLUTE LONG LENGTH (Center Cut)



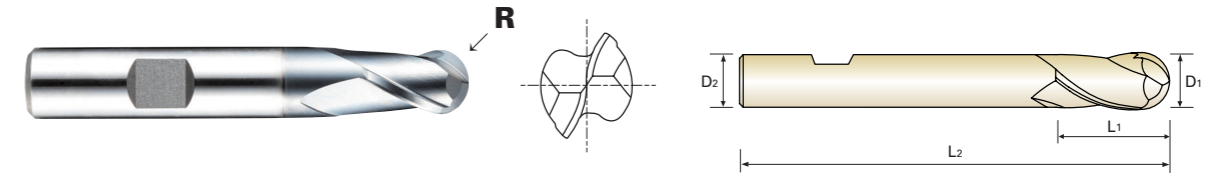
### GYG02 SERIES

Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|----------|---------------|----------------|---------------|----------------|
|          | D1            | D2             | L1            | L2             |
| GYG02020 | 2.0           | 6              | 10            | 54             |
| GYG02030 | 3.0           | 6              | 12            | 56             |
| GYG02040 | 4.0           | 6              | 19            | 63             |
| GYG02050 | 5.0           | 6              | 24            | 68             |
| GYG02060 | 6.0           | 6              | 24            | 68             |
| GYG02070 | 7.0           | 8              | 30            | 80             |
| GYG02080 | 8.0           | 8              | 38            | 88             |
| GYG02090 | 9.0           | 10             | 38            | 88             |
| GYG02100 | 10.0          | 10             | 45            | 95             |
| GYG02120 | 12.0          | 12             | 53            | 110            |
| GYG02140 | 14.0          | 12             | 53            | 110            |
| GYG02160 | 16.0          | 16             | 63            | 123            |
| GYG02180 | 18.0          | 16             | 63            | 123            |
| GYG02200 | 20.0          | 20             | 75            | 141            |
| GYG02220 | 22.0          | 20             | 75            | 141            |
| GYG02250 | 25.0          | 25             | 90            | 166            |

| Mill Dia. Tolerance(mm) | Shank Dia. Tolerance |
|-------------------------|----------------------|
| 0 ~ -0.03               | h6                   |

### 2 FLUTE SHORT LENGTH BALL NOSE

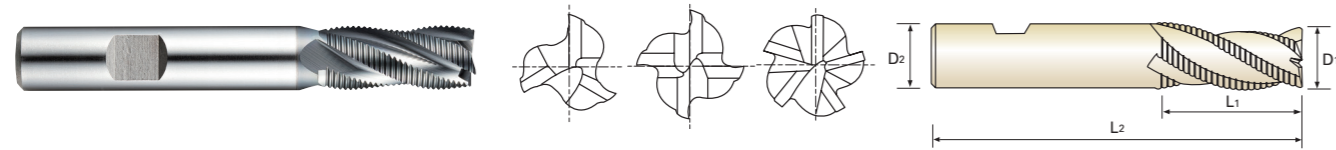


### GYF97 SERIES

Unit : mm

| EDP No.  | Radius of Ball Nose | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|----------|---------------------|---------------|----------------|---------------|----------------|
|          | R                   | D1            | D2             | L1            | L2             |
| GYF97010 | R0.5                | 1.0           | 6              | 2.5           | 47             |
| GYF97020 | R1.0                | 2.0           | 6              | 4             | 48             |
| GYF97030 | R1.5                | 3.0           | 6              | 5             | 49             |
| GYF97040 | R2.0                | 4.0           | 6              | 7             | 51             |
| GYF97050 | R2.5                | 5.0           | 6              | 8             | 52             |
| GYF97060 | R3.0                | 6.0           | 6              | 8             | 52             |
| GYF97070 | R3.5                | 7.0           | 8              | 10            | 60             |
| GYF97080 | R4.0                | 8.0           | 8              | 11            | 61             |
| GYF97090 | R4.5                | 9.0           | 10             | 11            | 61             |
| GYF97100 | R5.0                | 10.0          | 10             | 13            | 63             |
| GYF97120 | R6.0                | 12.0          | 12             | 16            | 73             |
| GYF97140 | R7.0                | 14.0          | 12             | 16            | 73             |
| GYF97160 | R8.0                | 16.0          | 16             | 19            | 79             |
| GYF97180 | R9.0                | 18.0          | 16             | 19            | 79             |
| GYF97200 | R10.0               | 20.0          | 20             | 22            | 88             |
| GYF97250 | R12.5               | 25.0          | 25             | 26            | 102            |

| Mill Dia. Tolerance(mm) | Shank Dia. Tolerance |
|-------------------------|----------------------|
| 0 ~ -0.03               | h6                   |



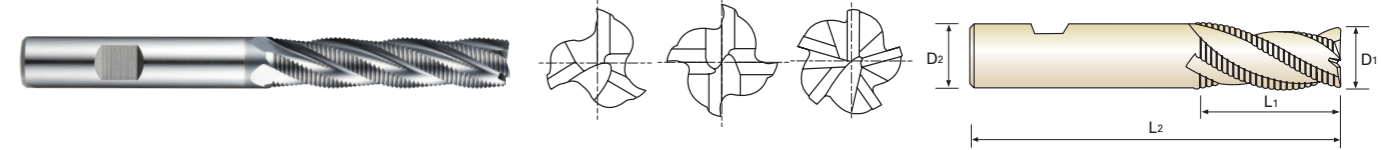
**GYF94 SERIES**

Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length | No. of Flute |
|----------|---------------|----------------|---------------|----------------|--------------|
|          | D1            | D2             | L1            | L2             |              |
| GYF94060 | 6.0           | 6              | 13            | 57             | 3            |
| GYF94070 | 7.0           | 10             | 16            | 66             | 3            |
| GYF94080 | 8.0           | 10             | 19            | 69             | 3            |
| GYF94090 | 9.0           | 10             | 19            | 69             | 3            |
| GYF94100 | 10.0          | 10             | 22            | 72             | 4            |
| GYF94120 | 12.0          | 12             | 26            | 83             | 4            |
| GYF94140 | 14.0          | 12             | 26            | 83             | 4            |
| GYF94160 | 16.0          | 16             | 32            | 92             | 4            |
| GYF94180 | 18.0          | 16             | 32            | 92             | 4            |
| GYF94200 | 20.0          | 20             | 38            | 104            | 4            |
| GYF94250 | 25.0          | 25             | 45            | 121            | 5            |

**Tolerances according to DIN 7160 & 7161**

| Tolerance range in $\mu\text{m}$  |              |               |               |
|-----------------------------------|--------------|---------------|---------------|
| Nominal-Diameter in $\mu\text{m}$ |              |               |               |
|                                   | over 6 to 10 | over 10 to 18 | over 18 to 30 |
| js12                              | ±75          | ±90           | ±105          |
| h6                                | 0<br>-9      | 0<br>-11      | 0<br>-13      |



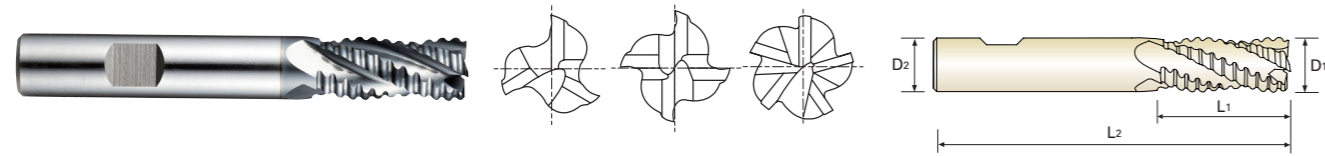
**GYF98 SERIES**

Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length | No. of Flute |
|----------|---------------|----------------|---------------|----------------|--------------|
|          | D1            | D2             | L1            | L2             |              |
| GYF98060 | 6.0           | 6              | 24            | 68             | 3            |
| GYF98070 | 7.0           | 10             | 30            | 80             | 3            |
| GYF98080 | 8.0           | 10             | 38            | 88             | 3            |
| GYF98090 | 9.0           | 10             | 38            | 88             | 3            |
| GYF98100 | 10.0          | 10             | 45            | 95             | 4            |
| GYF98120 | 12.0          | 12             | 53            | 110            | 4            |
| GYF98140 | 14.0          | 12             | 53            | 110            | 4            |
| GYF98160 | 16.0          | 16             | 63            | 123            | 4            |
| GYF98180 | 18.0          | 16             | 63            | 123            | 4            |
| GYF98200 | 20.0          | 20             | 75            | 141            | 4            |
| GYF98250 | 25.0          | 25             | 90            | 166            | 5            |

**Tolerances according to DIN 7160 & 7161**

| Tolerance range in $\mu\text{m}$  |              |               |               |
|-----------------------------------|--------------|---------------|---------------|
| Nominal-Diameter in $\mu\text{m}$ |              |               |               |
|                                   | over 6 to 10 | over 10 to 18 | over 18 to 30 |
| js12                              | ±75          | ±90           | ±105          |
| h6                                | 0<br>-9      | 0<br>-11      | 0<br>-13      |



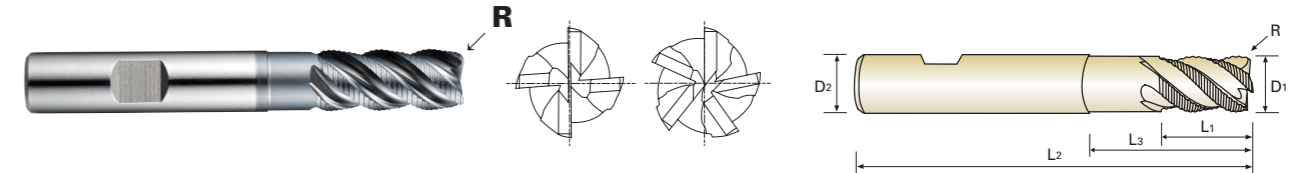
**GYG03 SERIES**

Unit : mm

| EDP No.  | Mill Diameter | Shank Diameter | Length of Cut | Overall Length | No. of Flute |
|----------|---------------|----------------|---------------|----------------|--------------|
|          | D1            | D2             | L1            | L2             |              |
| GYG03060 | 6.0           | 6              | 13            | 57             | 3            |
| GYG03070 | 7.0           | 10             | 16            | 66             | 3            |
| GYG03080 | 8.0           | 10             | 19            | 69             | 3            |
| GYG03090 | 9.0           | 10             | 19            | 69             | 3            |
| GYG03100 | 10.0          | 10             | 22            | 72             | 4            |
| GYG03120 | 12.0          | 12             | 26            | 83             | 4            |
| GYG03140 | 14.0          | 12             | 26            | 83             | 4            |
| GYG03160 | 16.0          | 16             | 32            | 92             | 4            |
| GYG03180 | 18.0          | 16             | 32            | 92             | 4            |
| GYG03200 | 20.0          | 20             | 38            | 104            | 4            |
| GYG03250 | 25.0          | 25             | 45            | 121            | 5            |

**Tolerances according to DIN 7160 & 7161**

|      | Tolerance range in $\mu\text{m}$  |               |               |
|------|-----------------------------------|---------------|---------------|
|      | Nominal-Diameter in $\mu\text{m}$ |               |               |
|      | over 6 to 10                      | over 10 to 18 | over 18 to 30 |
| js12 | ±75                               | ±90           | ±105          |
| h6   | 0<br>-9                           | 0<br>-11      | 0<br>-13      |



**GYF95 SERIES**

Unit : mm

| EDP No.  | Corner Radius | Mill Diameter | Shank Diameter | Length of Cut | Length Below Shank | Overall Length | No. of Flute |
|----------|---------------|---------------|----------------|---------------|--------------------|----------------|--------------|
|          | R             | D1            | D2             | L1            | L3                 | L2             |              |
| GYF95060 | R 0.5         | 6.0           | 6              | 13            | -                  | 57             | 4            |
| GYF95070 | R 0.5         | 7.0           | 10             | 16            | -                  | 66             | 4            |
| GYF95080 | R 0.5         | 8.0           | 10             | 19            | -                  | 69             | 4            |
| GYF95090 | R 0.5         | 9.0           | 10             | 19            | -                  | 69             | 4            |
| GYF95100 | R 0.5         | 10.0          | 10             | 22            | 31                 | 72             | 4            |
| GYF95120 | R 0.5         | 12.0          | 12             | 26            | 37                 | 83             | 4            |
| GYF95140 | R 1.0         | 14.0          | 12             | 26            | -                  | 83             | 5            |
| GYF95160 | R 1.0         | 16.0          | 16             | 32            | 44                 | 92             | 5            |
| GYF95180 | R 1.0         | 18.0          | 16             | 32            | -                  | 92             | 5            |
| GYF95200 | R 1.0         | 20.0          | 20             | 38            | 54                 | 104            | 5            |
| GYF95250 | R 1.0         | 25.0          | 25             | 45            | 63                 | 121            | 5            |

**Tolerances according to DIN 7160 & 7161**

|      | Tolerance range in $\mu\text{m}$  |               |               |
|------|-----------------------------------|---------------|---------------|
|      | Nominal-Diameter in $\mu\text{m}$ |               |               |
|      | over 6 to 10                      | over 10 to 18 | over 18 to 30 |
| js12 | ±75                               | ±90           | ±105          |
| h6   | 0<br>-9                           | 0<br>-11      | 0<br>-13      |



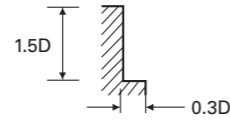
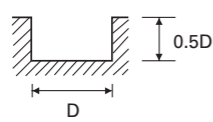




**GYG52 SERIES**

Only One Coated PM60, 4 FLUTE MULTIPLE HELIX SHORT (Center Cut)

| Material | P  |      |    |       |  |      |    |       |   |      |    |       | M                              |      |    |       |
|----------|--|------|----|-------|--|------|----|-------|---|------|----|-------|--------------------------------|------|----|-------|
|          | Structural Steels<br>Carbon Steels<br>Cast Irons |      |    |       | Carbon Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Prehardened Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Stainless Steels<br>300 Series |      |    |       |
| Hardness | ~ HRc20  |      |    |       | HRc20 ~ HRc30                                |      |    |       | HRc30 ~ HRc35                                     |      |    |       |                                |      |    |       |
| Strength | ~ 800N/mm <sup>2</sup>                           |      |    |       | 800 ~ 1000N/mm <sup>2</sup>                  |      |    |       | 1000 ~ 1300N/mm <sup>2</sup>                      |      |    |       |                                |      |    |       |
| Diameter | RPM  | FEED | Vc | Fz    | RPM  | FEED | Vc | Fz    | RPM   | FEED | Vc | Fz    | RPM                            | FEED | Vc | Fz    |
| 3.0      | 7410   | 155  | 70 | 0.005 | 6740   | 140  | 64 | 0.005 | 4720  | 95   | 44 | 0.005 | 5090                           | 100  | 48 | 0.005 |
| 4.0      | 5560   | 180  | 70 | 0.008 | 5050   | 165  | 63 | 0.008 | 3540  | 115  | 44 | 0.008 | 3800                           | 125  | 48 | 0.008 |
| 5.0      | 4440   | 205  | 70 | 0.012 | 4040   | 185  | 63 | 0.011 | 2830  | 130  | 44 | 0.011 | 3060                           | 155  | 48 | 0.013 |
| 6.0      | 3710   | 240  | 70 | 0.016 | 3370   | 220  | 64 | 0.016 | 2360  | 155  | 44 | 0.016 | 2550                           | 180  | 48 | 0.018 |
| 8.0      | 2780   | 310  | 70 | 0.028 | 2530   | 280  | 64 | 0.028 | 1770  | 195  | 44 | 0.028 | 1910                           | 220  | 48 | 0.029 |
| 10.0     | 2450   | 380  | 77 | 0.039 | 2230   | 345  | 70 | 0.039 | 1560  | 240  | 49 | 0.038 | 1530                           | 295  | 48 | 0.048 |
| 12.0     | 2050   | 385  | 77 | 0.047 | 1860   | 350  | 70 | 0.047 | 1300  | 245  | 49 | 0.047 | 1270                           | 285  | 48 | 0.056 |
| 14.0     | 1750   | 340  | 77 | 0.049 | 1590   | 310  | 70 | 0.049 | 1110  | 220  | 49 | 0.050 | 1090                           | 260  | 48 | 0.060 |
| 16.0     | 1530   | 325  | 77 | 0.053 | 1390   | 295  | 70 | 0.053 | 980   | 205  | 49 | 0.052 | 960                            | 240  | 48 | 0.063 |
| 18.0     | 1360   | 320  | 77 | 0.059 | 1240   | 295  | 70 | 0.059 | 870   | 205  | 49 | 0.059 | 850                            | 240  | 48 | 0.071 |
| 20.0     | 1220   | 320  | 77 | 0.065 | 1110   | 290  | 70 | 0.065 | 780   | 205  | 49 | 0.066 | 760                            | 235  | 48 | 0.077 |
| 25.0     | 980  | 245  | 77 | 0.063 | 890  | 225  | 70 | 0.063 | 620   | 160  | 49 | 0.065 | 610                            | 190  | 48 | 0.078 |

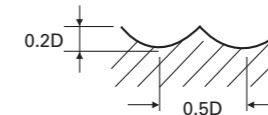


RPM = rev./min.  
FEED = mm/min.  
Vc = m/min.  
Fz = mm/tooth

**GYF97 SERIES**

Only One Coated PM60, 2 FLUTE SHORT BALL

| Material   | P                                  |      |     |       |  |      |    |       |  |      |    |       |   |      |    |       | M                |      |    |       |
|------------|------------------------------------|------|-----|-------|--|------|----|-------|--|------|----|-------|---|------|----|-------|------------------|------|----|-------|
|            | Structural Steels<br>Carbon Steels |      |     |       | Structural Steels<br>Carbon Steels<br>Cast Irons |      |    |       | Carbon Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Prehardened Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Stainless Steels |      |    |       |
| Hardness   |                                    |      |     |       | ~ HRc20  |      |    |       | HRc20 ~ HRc30                                |      |    |       | HRc30 ~ HRc40                                     |      |    |       |                  |      |    |       |
| Strength   | ~ 500N/mm <sup>2</sup>             |      |     |       | 500 ~ 800N/mm <sup>2</sup>                       |      |    |       | 800 ~ 1000N/mm <sup>2</sup>                  |      |    |       | 1000 ~ 1300N/mm <sup>2</sup>                      |      |    |       |                  |      |    |       |
| Diameter   | RPM                                | FEED | Vc  | Fz    | RPM  | FEED | Vc | Fz    | RPM  | FEED | Vc | Fz    | RPM   | FEED | Vc | Fz    | RPM              | FEED | Vc | Fz    |
| R1.5x3.0   | 8760                               | 410  | 83  | 0.023 | 6960   | 275  | 66 | 0.020 | 4680   | 150  | 44 | 0.016 | 2400  | 65   | 23 | 0.014 | 2640             | 70   | 25 | 0.013 |
| R2.0x4.0   | 7200                               | 515  | 90  | 0.036 | 5540   | 350  | 70 | 0.032 | 3600   | 190  | 45 | 0.026 | 1920  | 90   | 24 | 0.023 | 2110             | 95   | 27 | 0.023 |
| R3.0x6.0   | 5280                               | 575  | 100 | 0.054 | 4200   | 385  | 79 | 0.046 | 2760   | 215  | 52 | 0.039 | 1440  | 100  | 27 | 0.035 | 1580             | 115  | 30 | 0.036 |
| R4.0x8.0   | 4020                               | 635  | 101 | 0.079 | 3120   | 420  | 78 | 0.067 | 2160   | 240  | 54 | 0.056 | 1070  | 100  | 27 | 0.047 | 1180             | 115  | 30 | 0.049 |
| R5.0x10.0  | 3300                               | 720  | 104 | 0.109 | 2520   | 480  | 79 | 0.095 | 1680   | 275  | 53 | 0.082 | 820   | 120  | 26 | 0.073 | 900              | 130  | 28 | 0.072 |
| R6.0x12.0  | 2760                               | 635  | 104 | 0.115 | 2160   | 420  | 81 | 0.097 | 1440   | 240  | 54 | 0.083 | 700   | 100  | 26 | 0.071 | 770              | 115  | 29 | 0.075 |
| R8.0x16.0  | 2040                               | 575  | 103 | 0.141 | 1560   | 385  | 78 | 0.123 | 1070   | 215  | 54 | 0.100 | 530   | 95   | 27 | 0.090 | 590              | 110  | 30 | 0.093 |
| R10.0x20.0 | 1620                               | 505  | 102 | 0.156 | 1200   | 335  | 75 | 0.140 | 820  | 180  | 52 | 0.110 | 430   | 85   | 27 | 0.099 | 480              | 95   | 30 | 0.099 |
| R12.5x25.0 | 1140                               | 370  | 90  | 0.162 | 890  | 250  | 70 | 0.140 | 560  | 140  | 44 | 0.125 | 300   | 60   | 24 | 0.100 | 330              | 65   | 26 | 0.098 |

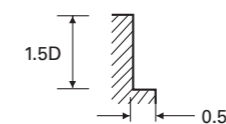


RPM = rev./min.  
FEED = mm/min.  
Vc = m/min.  
Fz = mm/tooth

**GYF94, GYF98, GYG03 SERIES**

Only One Coated PM60, MULTI FLUTE ROUGHING (Center Cut)

| Material | P                                  |      |    |       |  |      |    |       |  |      |    |       |   |      |    |       | M                |      |    |       |
|----------|------------------------------------|------|----|-------|--|------|----|-------|--|------|----|-------|---|------|----|-------|------------------|------|----|-------|
|          | Structural Steels<br>Carbon Steels |      |    |       | Structural Steels<br>Carbon Steels<br>Cast Irons |      |    |       | Carbon Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Prehardened Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Stainless Steels |      |    |       |
| Hardness |                                    |      |    |       | ~ HRc20  |      |    |       | HRc20 ~ HRc30                                |      |    |       | HRc30 ~ HRc40                                     |      |    |       |                  |      |    |       |
| Strength | ~ 500N/mm <sup>2</sup>             |      |    |       | 500 ~ 800N/mm <sup>2</sup>                       |      |    |       | 800 ~ 1000N/mm <sup>2</sup>                  |      |    |       | 1000 ~ 1300N/mm <sup>2</sup>                      |      |    |       |                  |      |    |       |
| Diameter | RPM                                | FEED | Vc | Fz    | RPM  | FEED | Vc | Fz    | RPM  | FEED | Vc | Fz    | RPM   | FEED | Vc | Fz    | RPM              | FEED | Vc | Fz    |
| 6.0      | 3360                               | 275  | 63 | 0.027 | 2640   | 215  | 50 | 0.027 | 1920   | 140  | 36 | 0.024 | 1560  | 125  | 29 | 0.027 | 1740             | 130  | 33 | 0.025 |
| 8.0      | 2880                               | 350  | 72 | 0.041 | 2280   | 275  | 57 | 0.040 | 1680   | 190  | 42 | 0.038 | 1260  | 150  | 32 | 0.040 | 1440             | 170  | 36 | 0.039 |
| 10.0     | 2280                               | 500  | 72 | 0.055 | 1800   | 380  | 57 | 0.053 | 1260   | 235  | 40 | 0.047 | 1070  | 190  | 34 | 0.044 | 1140             | 205  | 36 | 0.045 |
| 12.0     | 1920                               | 500  | 72 | 0.065 | 1440   | 395  | 54 | 0.069 | 1080   | 275  | 41 | 0.064 | 890   | 215  | 34 | 0.060 | 960              | 245  | 36 | 0.064 |
| 14.0     | 1680                               | 500  | 74 | 0.074 | 1260   | 395  | 55 | 0.078 | 910  | 275  | 40 | 0.076 | 760   | 215  | 33 | 0.071 | 830              | 245  | 37 | 0.074 |
| 16.0     | 1440                               | 500  | 72 | 0.087 | 1140   | 395  | 57 | 0.087 | 790  | 275  | 40 | 0.087 | 660   | 215  | 33 | 0.081 | 720              | 245  | 36 | 0.085 |
| 18.0     | 1260                               | 500  | 71 | 0.099 | 1070   | 395  | 61 | 0.092 | 730  | 275  | 41 | 0.094 | 590   | 215  | 33 | 0.091 | 660              | 245  | 37 | 0.093 |
| 20.0     | 1150                               | 510  | 72 | 0.111 | 910  | 395  | 57 | 0.109 | 640  | 275  | 40 | 0.107 | 530   | 215  | 33 | 0.101 | 580              | 245  | 36 | 0.106 |
| 22.0     | 1070                               | 510  | 74 | 0.095 | 780  | 395  | 54 | 0.101 | 560  | 275  | 39 | 0.098 | 480   | 215  | 33 | 0.090 | 520              | 245  | 36 | 0.094 |
| 25.0     | 950                                | 500  | 75 | 0.105 | 720  | 380  | 57 | 0.106 | 500  | 265  | 39 | 0.106 | 430   | 215  | 34 | 0.100 | 470              | 240  | 37 | 0.102 |



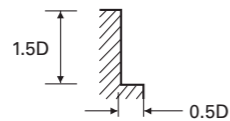
The FEED, in long & extra long types,  
should be reduced by around 50%.

RPM = rev./min.  
FEED = mm/min.  
Vc = m/min.  
Fz = mm/tooth

**GYF95 SERIES**

**ONLY ONE COATED PM60, MULTI FLUTE MULTIPLE HELIX SHORT ROUGHING (Center Cut)**

| Material | P                                  |      |    |       |  |      |    |       |  |      |    |       |   |      |    |       | M                |      |    |       |
|----------|------------------------------------|------|----|-------|--|------|----|-------|--|------|----|-------|---|------|----|-------|------------------|------|----|-------|
|          | Structural Steels<br>Carbon Steels |      |    |       | Structural Steels<br>Carbon Steels<br>Cast Irons |      |    |       | Carbon Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Prehardened Steels<br>Alloy Steels<br>Tool Steels |      |    |       | Stainless Steels |      |    |       |
| Hardness |                                    |      |    |       | ~ HRC20  |      |    |       | HRC20 ~ HRC30                                |      |    |       | HRC30 ~ HRC40                                     |      |    |       |                  |      |    |       |
| Strength | ~ 500N/mm <sup>2</sup>             |      |    |       | 500 ~ 800N/mm <sup>2</sup>                       |      |    |       | 800 ~ 1000N/mm <sup>2</sup>                  |      |    |       | 1000 ~ 1300N/mm <sup>2</sup>                      |      |    |       |                  |      |    |       |
| Diameter | RPM                                | FEED | Vc | Fz    | RPM  | FEED | Vc | Fz    | RPM  | FEED | Vc | Fz    | RPM   | FEED | Vc | Fz    | RPM              | FEED | Vc | Fz    |
| 6.0      | 4030                               | 330  | 76 | 0.020 | 3170   | 260  | 60 | 0.021 | 2300   | 170  | 43 | 0.018 | 1870  | 150  | 35 | 0.020 | 2090             | 155  | 39 | 0.019 |
| 8.0      | 3460                               | 420  | 87 | 0.030 | 2740   | 330  | 69 | 0.030 | 2020   | 230  | 51 | 0.028 | 1510  | 180  | 38 | 0.030 | 1730             | 205  | 43 | 0.030 |
| 10.0     | 2740                               | 600  | 86 | 0.055 | 2160   | 455  | 68 | 0.053 | 1510   | 280  | 47 | 0.046 | 1280  | 230  | 40 | 0.045 | 1370             | 245  | 43 | 0.045 |
| 12.0     | 2300                               | 600  | 87 | 0.065 | 1730   | 475  | 65 | 0.069 | 1300   | 330  | 49 | 0.063 | 1070  | 260  | 40 | 0.061 | 1150             | 295  | 43 | 0.064 |
| 14.0     | 2020                               | 600  | 89 | 0.059 | 1510   | 475  | 66 | 0.063 | 1090   | 330  | 48 | 0.061 | 910   | 260  | 40 | 0.057 | 1000             | 295  | 44 | 0.059 |
| 16.0     | 1730                               | 600  | 87 | 0.069 | 1370   | 475  | 69 | 0.069 | 950  | 330  | 48 | 0.069 | 790   | 260  | 40 | 0.066 | 860              | 295  | 43 | 0.069 |
| 18.0     | 1510                               | 600  | 85 | 0.079 | 1280   | 475  | 72 | 0.074 | 880  | 330  | 50 | 0.075 | 710   | 260  | 40 | 0.073 | 790              | 295  | 45 | 0.075 |
| 20.0     | 1380                               | 610  | 87 | 0.088 | 1090   | 475  | 68 | 0.087 | 770  | 330  | 48 | 0.086 | 640   | 260  | 40 | 0.081 | 700              | 295  | 44 | 0.084 |
| 25.0     | 1140                               | 600  | 90 | 0.105 | 860  | 455  | 68 | 0.106 | 600  | 320  | 47 | 0.107 | 520   | 260  | 41 | 0.100 | 560              | 290  | 44 | 0.104 |



RPM = rev./min.  
FEED = mm/min.  
Vc = m/min.  
Fz = mm/tooth

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