

# Y-Coated SOLID CARBIDE END MILLS 6 FLUTE STANDARD LENGTH (PLAIN SHANK)

Square  
Corner Radius

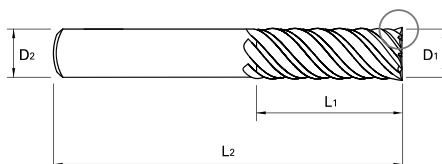
**GMG12, GMG14**  
**GMG16, GMG18**

- The unique geometry of the variable pitch provides the best chatter free tool for high speed and trochoidal milling
- Excellent performance for Stainless Steels, Mild Steels, Cast Iron, Low/Medium hardness materials under HRC40

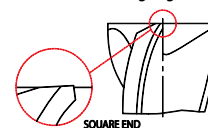
Square



Corner Radius



Reinforced cutting edge



Unit : METRIC

| OD (D1) |        | SD (D2) | LOC (L1) | OAL (L2) | Square End | Corner Radius |          |          |          |          |          |          |
|---------|--------|---------|----------|----------|------------|---------------|----------|----------|----------|----------|----------|----------|
| Metric  | Inch   |         |          |          |            | 0.50          | 1.00     | 1.50     | 2.00     | 3.00     | 4.00     | 5.00     |
|         |        |         |          |          | EDP No.    | EDP No.       | EDP No.  | EDP No.  | EDP No.  | EDP No.  | EDP No.  | EDP No.  |
| 6.0     | 0.2362 | 6       | 13       | 57       | GMG12060   | GMG16060      | GMG16901 |          |          |          |          |          |
|         |        | 6       | 24       | 75       | GMG14060   | GMG18060      | GMG18901 |          |          |          |          |          |
| 8.0     | 0.3150 | 8       | 19       | 63       | GMG12080   | GMG16080      | GMG16902 |          |          |          |          |          |
|         |        | 8       | 32       | 75       | GMG14080   | GMG18080      | GMG18902 |          | GMG18903 |          |          |          |
| 10.0    | 0.3937 | 10      | 22       | 72       | GMG12100   | GMG16100      | GMG16903 | GMG16904 | GMG16905 |          |          |          |
|         |        | 10      | 40       | 100      | GMG14100   | GMG18100      | GMG18904 | GMG18905 | GMG18906 |          |          |          |
| 12.0    | 0.4724 | 12      | 26       | 83       | GMG12120   | GMG16120      | GMG16906 | GMG16907 | GMG16908 | GMG16909 |          |          |
|         |        | 12      | 48       | 120      | GMG14120   | GMG18120      | GMG18907 | GMG18908 | GMG18909 | GMG18910 |          |          |
| 16.0    | 0.6299 | 16      | 32       | 92       | GMG12160   |               | GMG16160 | GMG16910 | GMG16911 | GMG16912 |          |          |
|         |        | 16      | 64       | 140      | GMG14160   |               | GMG18160 | GMG18911 | GMG18912 | GMG18913 |          |          |
| 20.0    | 0.7874 | 20      | 38       | 104      | GMG12200   |               | GMG16200 | GMG16913 | GMG16914 | GMG16915 |          |          |
|         |        | 20      | 80       | 150      | GMG14200   |               | GMG18200 | GMG18914 | GMG18915 | GMG18916 | GMG18917 | GMG18918 |
| 25.0    | 0.9843 | 25      | 44       | 104      | GMG12250   |               | GMG16250 | GMG16916 | GMG16917 | GMG16918 |          |          |
|         |        | 25      | 100      | 170      | GMG14250   |               | GMG18250 | GMG18919 | GMG18920 | GMG18921 | GMG18922 | GMG18923 |

| Mill Dia. Tolerance (mm) |           | Shank Dia. Tolerance |                 |
|--------------------------|-----------|----------------------|-----------------|
| Up to 3xD                |           | Over 3xD             |                 |
| Up to Ø12                | 0 ~ -0.02 | 0 ~ -0.03            | h5 (≥ Ø12 : h6) |
| Over Ø12                 | 0 ~ -0.03 |                      |                 |

◎ : Excellent ○ : Good

| ISO                  | P                      |     |                        |     |     |                                           |     |     |                        |                                    | M                           |     |     | K              |     |                   |         |                     |                   |                    |     |
|----------------------|------------------------|-----|------------------------|-----|-----|-------------------------------------------|-----|-----|------------------------|------------------------------------|-----------------------------|-----|-----|----------------|-----|-------------------|---------|---------------------|-------------------|--------------------|-----|
| Material Description | Non-alloy steel        |     |                        |     |     | Low alloy steel                           |     |     |                        | High alloyed steel, and tool steel | Stainless steel             |     |     | Grey cast iron |     | Nodular cast iron |         | Malleable cast iron |                   |                    |     |
| VDI 3323             | 1                      | 2   | 3                      | 4   | 5   | 6                                         | 7   | 8   | 9                      | 10                                 | 11                          | 12  | 13  | 14             | 15  | 16                | 17      | 18                  | 19                | 20                 |     |
| HRc                  |                        | 13  | 25                     | 28  | 32  | 10                                        | 29  | 32  | 38                     | 15                                 | 35                          | 15  | 23  | 10             | 10  | 26                | 3       | 25                  |                   | 21                 |     |
| HB                   | 125                    | 190 | 250                    | 270 | 300 | 180                                       | 275 | 300 | 350                    | 200                                | 325                         | 200 | 240 | 180            | 180 | 260               | 160     | 250                 | 130               | 230                |     |
| Recommend            | ◎                      | ◎   | ◎                      | ◎   | ◎   | ◎                                         | ◎   | ◎   | ◎                      | ◎                                  | ◎                           | ◎   | ◎   | ◎              | ○   | ○                 | ○       | ○                   | ○                 | ○                  |     |
| ISO                  | N                      |     |                        |     |     |                                           |     |     |                        |                                    | S                           |     |     |                |     |                   |         | H                   |                   |                    |     |
| Material Description | Aluminum-wrought alloy |     | Aluminum-cast, alloyed |     |     | Copper and Copper Alloys (Bronze / Brass) |     |     | Non Metallic Materials |                                    | Heat Resistant Super Alloys |     |     |                |     | Titanium Alloys   |         | Hardened steel      | Chilled Cast iron | Hardened Cast Iron |     |
| VDI 3323             | 21                     | 22  | 23                     | 24  | 25  | 26                                        | 27  | 28  | 29                     | 30                                 | 31                          | 32  | 33  | 34             | 35  | 36                | 37      | 38                  | 39                | 40                 | 41  |
| HRc                  |                        |     |                        |     |     |                                           |     |     |                        |                                    | 15                          | 30  | 25  | 38             | 34  |                   |         | 55                  | 60                | 42                 | 55  |
| HB                   | 60                     | 100 | 75                     | 90  | 130 | 110                                       | 90  | 100 |                        |                                    | 200                         | 280 | 250 | 350            | 320 | 400 Rm            | 1050 Rm | 550                 | 630               | 400                | 550 |
| Recommend            |                        |     |                        |     |     |                                           |     |     |                        |                                    | ○                           | ○   | ○   | ○              | ○   | ○                 | ○       |                     |                   |                    |     |

## GMG12, GMG13, GMG14, GMG15 GMG16, GMG17, GMG18, GMG19 SERIES

### 6 FLUTE - SIDE CUTTING

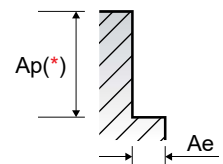


SFM = ft./min.  
RPM = rev./min.

fz = in./tooth  
FEED = in./min.

| ISO | VDI 3323 | Material Description               | Ae    | Ap   | Parameter | Diameter (Ø) |        |        |        |        |        |        |
|-----|----------|------------------------------------|-------|------|-----------|--------------|--------|--------|--------|--------|--------|--------|
|     |          |                                    |       |      |           | 6.0          | 8.0    | 10.0   | 12.0   | 16.0   | 20.0   | 25.0   |
| P   | 1-4      | Non-alloy steel                    | 0.05D | 2.0D | SFM(Vc)   | 985          | 985    | 985    | 985    | 985    | 985    | 985    |
|     |          |                                    |       |      | fz        | .0027        | .0046  | .0057  | .0068  | .0080  | .0089  | .0091  |
|     |          |                                    |       |      | RPM       | 15915        | 11937  | 9549   | 7958   | 5968   | 4775   | 3820   |
|     |          |                                    |       |      | FEED      | 255.67       | 327.09 | 324.84 | 325.20 | 284.80 | 253.78 | 209.33 |
|     | 5        |                                    | 0.05D | 2.0D | SFM(Vc)   | 665          | 665    | 665    | 665    | 665    | 665    | 665    |
|     |          |                                    |       |      | fz        | .0020        | .0033  | .0042  | .0050  | .0059  | .0066  | .0068  |
|     |          |                                    |       |      | RPM       | 10769        | 8077   | 6462   | 5385   | 4039   | 3231   | 2585   |
|     |          |                                    |       |      | FEED      | 127.20       | 162.17 | 161.81 | 162.80 | 142.13 | 127.44 | 106.22 |
|     | 6-7      | Low alloy steel                    | 0.05D | 2.0D | Vc        | 985          | 985    | 985    | 985    | 985    | 985    | 985    |
|     |          |                                    |       |      | fz        | .0027        | .0046  | .0057  | .0068  | .0080  | .0089  | .0091  |
|     |          |                                    |       |      | RPM       | 15036        | 12028  | 10024  | 7518   | 6014   | 5012   | 3759   |
|     |          |                                    |       |      | FEED      | 241.52       | 329.60 | 340.96 | 307.22 | 286.98 | 266.38 | 206.00 |
|     | 8-9      |                                    | 0.05D | 2.0D | SFM(Vc)   | 665          | 665    | 665    | 665    | 665    | 665    | 665    |
|     |          |                                    |       |      | fz        | .0020        | .0033  | .0042  | .0050  | .0059  | .0066  | .0068  |
|     |          |                                    |       |      | RPM       | 10769        | 8077   | 6462   | 5385   | 4039   | 3231   | 2585   |
|     |          |                                    |       |      | FEED      | 127.20       | 162.17 | 161.81 | 162.80 | 142.13 | 127.44 | 106.22 |
|     | 10-11.1  | High alloyed steel, and tool steel | 0.05D | 2.0D | SFM(Vc)   | 330          | 330    | 330    | 330    | 330    | 330    | 330    |
|     |          |                                    |       |      | fz        | .0016        | .0028  | .0035  | .0041  | .0048  | .0054  | .0057  |
|     |          |                                    |       |      | RPM       | 5305         | 3979   | 3183   | 2653   | 1989   | 1592   | 1273   |
|     |          |                                    |       |      | FEED      | 51.38        | 66.73  | 66.18  | 65.79  | 57.80  | 51.50  | 43.31  |
| M   | 12-13    |                                    | 0.05D | 2.0D | SFM(Vc)   | 700          | 700    | 700    | 700    | 700    | 700    | 700    |
|     |          |                                    |       |      | fz        | .0019        | .0033  | .0041  | .0049  | .0057  | .0064  | .0066  |
|     |          |                                    |       |      | RPM       | 11300        | 8475   | 6780   | 5650   | 4238   | 3390   | 2712   |
|     |          |                                    |       |      | FEED      | 130.79       | 168.15 | 166.57 | 166.85 | 146.14 | 129.72 | 107.64 |
|     | 14.1     | Stainless steel                    | 0.05D | 2.0D | SFM(Vc)   | 480          | 480    | 480    | 480    | 480    | 480    | 480    |
|     |          |                                    |       |      | fz        | .0016        | .0028  | .0035  | .0041  | .0048  | .0054  | .0056  |
|     |          |                                    |       |      | RPM       | 7799         | 5849   | 4679   | 3899   | 2924   | 2340   | 1872   |
|     |          |                                    |       |      | FEED      | 75.51        | 98.11  | 97.28  | 96.73  | 84.96  | 75.71  | 63.23  |
|     | 14.2     |                                    | 0.05D | 2.0D | SFM(Vc)   | 440          | 440    | 440    | 440    | 440    | 440    | 440    |
|     |          |                                    |       |      | fz        | .0016        | .0028  | .0035  | .0041  | .0048  | .0054  | .0056  |
|     |          |                                    |       |      | RPM       | 7109         | 5332   | 4265   | 3554   | 2666   | 2133   | 1706   |
|     |          |                                    |       |      | FEED      | 68.86        | 89.41  | 88.66  | 88.15  | 77.44  | 69.02  | 57.24  |
| S   | 31-35    | Heat Resistant Super Alloys        | 0.05D | 2.0D | SFM(Vc)   | 110          | 110    | 110    | 110    | 110    | 110    | 110    |
|     |          |                                    |       |      | fz        | .0013        | .0022  | .0028  | .0032  | .0038  | .0044  | .0045  |
|     |          |                                    |       |      | RPM       | 1751         | 1313   | 1050   | 875    | 657    | 525    | 420    |
|     |          |                                    |       |      | FEED      | 13.66        | 17.05  | 17.36  | 16.97  | 15.04  | 13.9   | 11.42  |
|     | 36-37    | Titanium Alloys                    | 0.05D | 2.0D | SFM(Vc)   | 380          | 380    | 380    | 380    | 380    | 380    | 380    |
|     |          |                                    |       |      | fz        | .0013        | .0022  | .0028  | .0033  | .0038  | .0045  | .0046  |
|     |          |                                    |       |      | RPM       | 6154         | 4615   | 3692   | 3077   | 2308   | 1846   | 1477   |
|     |          |                                    |       |      | FEED      | 47.95        | 59.96  | 61.06  | 60.31  | 52.87  | 49.29  | 40.83  |

(\*) : If product's Length of Cut(L.O.C) is below 2D, it must be applied L.O.C x 90%



**YU-VP20**

BEST VALUE IN THE WORLD OF CUTTING TOOLS



FOR TOUGH STEEL, CAST IRON, STAINLESS STEEL AND EXOTIC MATERIALS:  
**NOTHING CUTS IT BETTER**

**V7** Plus<sup>A</sup>

**INDUSTRY-LEADING  
HIGH-PERFORMANCE  
CARBIDE END MILLS:**

- 4 Flute & 6 Flute
- Square, Chamfer, Radius, Ball Nose
- Standard & Extended Length
- Plain & Weldon Flat Shanks
- Inch & Metric Sizes

**NEW**

6 Flute Chip Splitter  
Size Expansion in 1/2" x 1/2" x 1-1/4" x 3"

**Over 1,500 Items  
in Stock.**



**When The Cut Calls For  
High-Performance Carbide,  
We Have More Options  
To Meet Your Needs.**



YG-1 is the undisputed world leader in carbide end mill offerings. And now, with our newly expanded V7 Plus A line, you have even more high-performance choices than ever before. Choose from a full array of 4 Flute and 6 Flute standard-stocked or custom-designed solutions. No matter what your machining challenge, we have a product for you.

## How Our Innovative V7 Plus A Design Started a **REVOLUTION** in End Mill Technology

**We didn't create the great cutting performance of our V7 Plus A end mills line by just doing what others have done. We engineered our line from the tip of flute to end of shank with performance-enhancing technology in mind. It's what makes the V7 Plus A line the top choice in end mill performance.**

**For excellent performance in stainless steels, mild steels, low/medium hardness materials and exotic materials to boot, the V7 Plus A's advanced geometry provides:**

- ▶ Excellent material removal rates and surface finishes
- ▶ Unequal indexing for reduced chatter (harmonics) and improved stability
- ▶ Advanced coating for superior performance and tool life
- ▶ Improved flute geometry for impressive chip formation and evacuation
- ▶ Noticeably smooth operation in high-speed machining and peel-milling applications
- ▶ Superior slotting and profiling in most ferrous materials for more flexible use
- ▶ Excellent performance in high-speed trochoidal milling applications for improved accuracy, reduced vibration and better heat displacement
- ▶ Premium-grade carbide substrate for longer tool life

### GUIDE TO ICONS

The tool is made of  
micrograin carbide



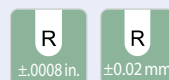
No. of Flutes



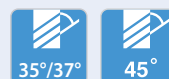
Cutting Conditions



Tolerance of Ball Radius



Helix Angle



Type of Shank



Plain  
shank



Weldon  
flat

Tool Ends



Square

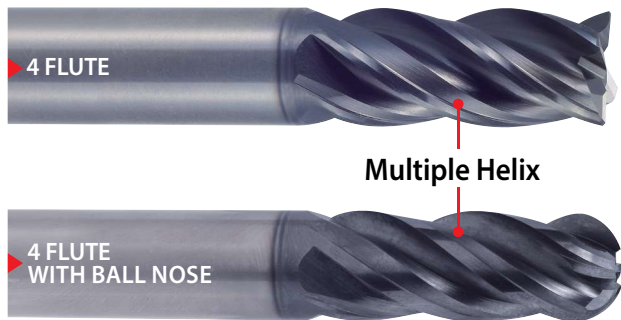
Chamfer



Radius

Ball

## V7 Plus A 4 FLUTE END MILLS



### Setting a Higher Standard in 4 Flute Design

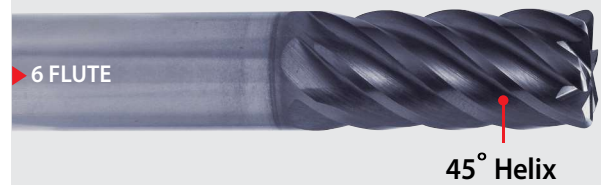
You asked for it. Now you can have state-of-the-art performance in an innovative 4 Flute design. First, you'll notice reduced vibration, optimal chip formation and excellent chip evacuation. And best of all, you'll get longer tool life in heavy cutting conditions. Available in ball nose, too.

**NEW**

## V7 Plus A 6 FLUTE CHIP SPLITTER

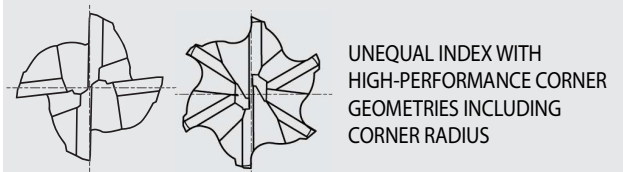


## V7 Plus A 6 FLUTE END MILLS



### Better by Every Measure

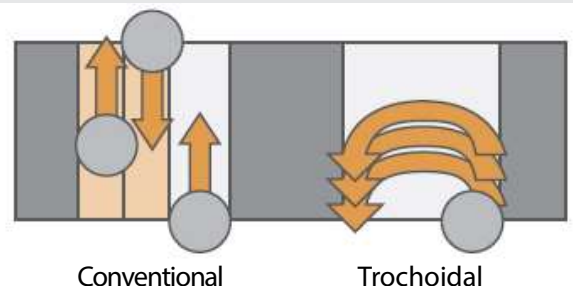
From its higher stability for lower vibration to its improved performance in high-speed and trochoidal milling applications, the V7 Plus A 6 Flute solid carbide, 45-degree helix, was designed with longer tool life and higher productivity in mind.



### Trochoidal Milling

With our V7 Plus A 6 Flute's unique cutting geometry, we made it easier to apply a small radial width-of-cut along with higher cutting speeds and excellent feed per tooth. That's why we perform better in trochoidal milling application. Here's why:

- ▶ Smaller arc engagement provides lower cutting force and better heat displacement
- ▶ More flutes provide deeper depth of cut for more productivity and reduced wear
- ▶ Stability-inducing geometry reduces vibration for increased accuracy and longer tool life
- ▶ Aggressive feed-per-tooth provides excellent chip evacuation





# 6 FLUTE

## V7 Plus A

**Say goodbye to milling tool fatigue and hello to the innovative V7 Plus A 6 Flute tool.**

Wake up to better 6 Flute performance.

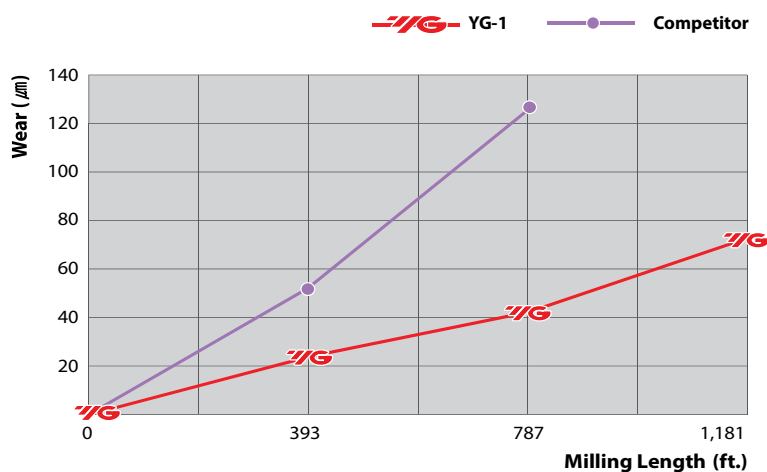
V7 Plus A's revolutionary 6 Flute design lets you handle tougher trochoidal milling at higher speeds with better feed per tooth.

The unique V7 PLUS A geometry reduces vibration, increases accuracy, and provides better heat dissipation for enhanced tool life.

## HIGH-PERFORMANCE SOLID CARBIDE 6 FLUTE END MILLS

## CASE STUDY

### 6 Flute vs. Competitor



|                      | V7 Plus A                          | Competitor                    |
|----------------------|------------------------------------|-------------------------------|
| Wear (μm)            | 70.855                             | 123.776                       |
| Milling Length (ft.) | 1,181                              | 787                           |
| Size (mm)            | Ø12(R1) x Ø12 x 26 x 83            |                               |
| Work Material        | - JIS : S45C(HRC30)<br>- DIN : C45 | - WR : 1.0503<br>- AISI: 1405 |
| Cutting Speed/RPM    | 914 ft./min. / 7,392 rev./min.     |                               |
| Feed/Feed per tooth  | 295.08 in./min. / .007 in./tooth   |                               |
| Milling Method       | Trochoidal Cutting                 |                               |
| Milling Depth        | Axial: .945 in., Radial: .024 in.  |                               |
| Coolant              | Wet Cut                            |                               |
| Overhang             | 1.417 in.                          |                               |
| Machine              | Machining Center                   |                               |