

Milling

## 9 Must-Know Milling Types

Don Sears | Mar 05, 2019

Here's a quick, simple and visual way to see the most commonly used end mills in today's machining and their basic application in this must-see infographic.

Designed with cutting teeth on the face and edge of the body, *end mills* are intended to cut metal in several directions. While they might look similar to drills, different end mill types function in distinct and specific ways. They are used in applications for profile milling, tracer milling, shape milling, face milling and plunging. Think: Cutting out the sides of a given material including steel, aluminum, titanium and hybrid, composite materials, such as carbon-fiber reinforced polymer, which is used in many *aerospace applications*.

Certain end mill types are manufactured for specific diameters, lengths, flutes and protective coatings. These coatings include titanium nitride, titanium carbonitride, titanium aluminum nitride, aluminum titanium nitride and zirconium nitride.

The variety of end mill coatings work with the spectrum of metal used in today's machining. Coatings help make tools last longer—and often allow tools to be run at much higher spindle rates than uncoated tools.

Another key aspect of end mills are their unique flute design. MSC, on its "*Tech Essentials End Mills*" page, describes them as:

"Flutes feature grooves or valleys that are cut into the body of the tool. A higher number of flutes increases the strength of the tool and reduces space or chip flow. End mills with less flutes on the cutting edge will have more chip space, while end mills with more flutes will be able to be used on harder cutting materials."

If you are new to end mills, here's a quick, visual way to know the most commonly used end mills in today's machining. It's certainly not all of them—but it's a great place to start.

# 9 Must-Know Milling Types

From side cutting to plunging to making slots to routing or cutting composite materials, it pays to know your milling types. Need to remove big sections from raw metal material using high feeds? No problem. Help is here.

1

## Square End Mill

Used for slotting, profiling and plunge cutting.



2

## Ball Nose Mill

Rounded to make curved 3D surfaces.



3

## Roughing End Mill

For removing large amounts quickly.



4

## Diamond Router Bit

Used with composite materials and designed with up-cut and down-cut angles for grinding.



5

## Indexable Face Mill

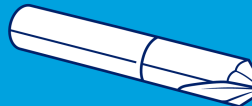
Flattens material before other milling. Uses 'insert' cutters with many styles including: square-shoulder, chamfer, angle, high feed and copy mills.



6

## Chamfer Mill

'V'-shaped mill designed to break sharp edges (60 or 90 degrees, sharp or flat).



7

## Thread Mill

For cutting threads inside or outside a material.



8

## Drill Mill

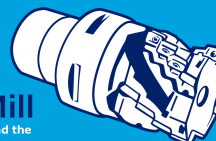
Multifunctional end mills used for spotting, drilling and countersinking.



9

## Indexable Shoulder End Mill

Allows for two faces—the periphery and the face—to be cut simultaneously whether shallow or deep.



## **Spotlight on Tooling**

Here are the top articles on the choice of tools and productivity on Better MRO:

***Milling Techniques to Improve Metal Removal Rate***

***8 Facts You May Not Know About ... Milling Titanium***

***Aerospace in Focus: Drilling and Milling CFRP Composites***

***IMTS 2018 VIDEO: Success—High-Feed Milling Cuts Machining Time by 78%***

***How to Maximize Throughput and Part Quality When Threading***

***How to Maximize Machine Productivity: Chip Thinning***

***Video: How to Measure a Milling Machine for a DRO Unit***

***The Right Tooling Helps Today's Metrics and Tomorrow's Machinists***

***Optimizing Tool Life: The Effect of Lead Angles on Turning Operations***

***What other end mills do you use? Share your experience in the forum [registration required].***

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