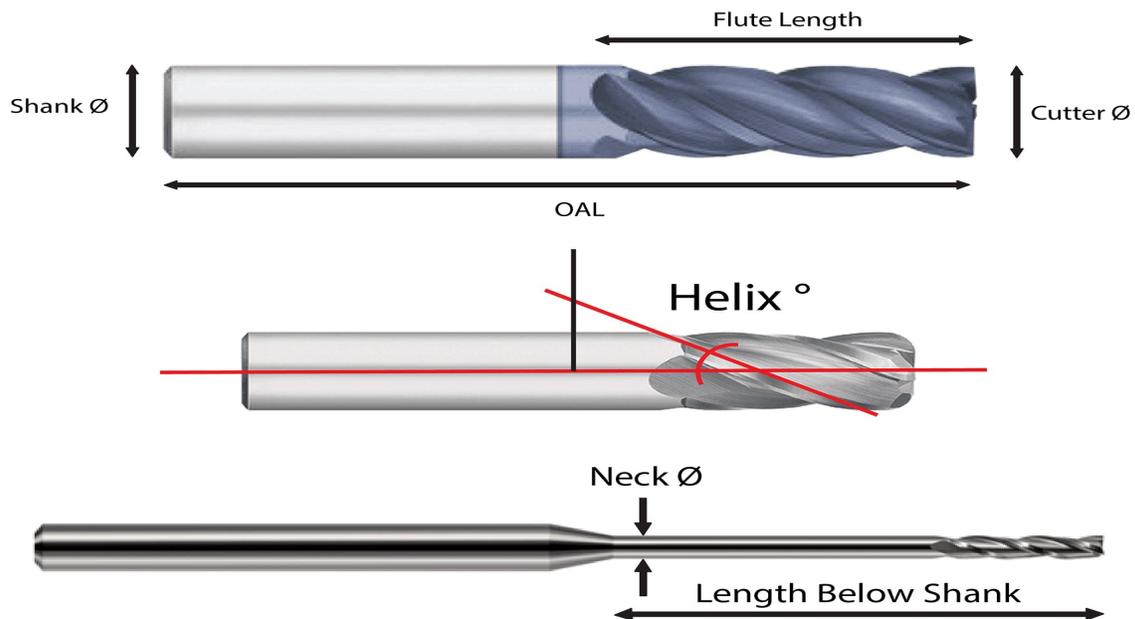


FAQ on Endmills

1. What is an Endmill?

- An Endmill is a cutting tool used in industrial milling applications.

2. What is nomenclature of an Endmill?



3. What are all the elements of an Endmill?

Following are the elements of an Endmill

- Cutter Diameter
- Shank Diameter
- Overall Length
- Flute Length
- Length Below Shank
- Neck Diameter
- Helix Angle
- Flutes
- Variable Helix
- Variable Pitch

4.What is Cutter Diameter?

- Diameter of the theoretical circle formed by the cutting edges as the tool rotates.

5.What is Shank Diameter?

- Width of the shank that is held in the toolholder.

6.What is Overall Length?

- Total length of the tool between both axial ends.

7.What is Flute Length?

- Functional cutting depth with the tool in the axial orientation.

8.What is Length Below Shank?

- Also called the reach, is the length from the neck portion to the end of the cutting end of the tool.

9.What is Neck Diameter?

- Diameter of the neck.

10.What is Helix Angle?

- Angle measured from the centreline of the tool and a straight-line tangent along the cutting edge.

11.What is Variable Helix?

- A variable helix Endmill utilizes unequal flute spacing to reduce harmonics which can extend tool life and improve part finish.

12.What is Variable Pitch?

- Variable Pitch refers to cutting edge spacing that is unequal.
- By creating an Endmill with unequal pitch between teeth, cutting forces are changed which results in reduced vibration, higher feed rates and better part finishes.

13. What is Flute?

- The spiralled cutting grooves in the tool.
- Fewer flutes allow for larger chips and a deeper cut depth, but are weaker and best suited for plastics and Aluminium.
- More flutes increase the tool strength but reduce the cutting depth for a smoother cut better suited for harder materials.

14. What is purpose of using different number of flutes in an Endmill?

- **Single Flute:** Used for high-speed machining of high-volume material removal often in plastics or CFRP.
- **Two Flute:** Used for high-volume removal in slotting and pocketing non-ferrous materials.
- **Three Flute:** The same space between flutes as the two-flute Endmill but are stronger. Used for ferrous and non-ferrous materials.
- **Four Flute:** Stronger than the three-flute Endmill allowing for faster feed rates. They have less flute space than the 3-flute Endmill and produce smaller chips. These are most often used when cutting ferrous materials.
- **Five Flute:** Have smaller flute spacing than four-flute Endmills allowing for more strength than four-flute Endmills. These are better suited for high-efficiency milling and hard materials.
- **Six Flute and Above:** These are finisher Endmills that produce a very fine finish. They are also commonly used in dynamic or high-efficiency machining (HEM).

15. What are the different types of Endmill?

- Square Endmills
- Weldon Endmills
- Ball Endmills
- Radius Endmills
- Finisher Endmills
- Drill Endmills
- Roughing Endmills
- Rounding Endmills
- Undercutting Endmills

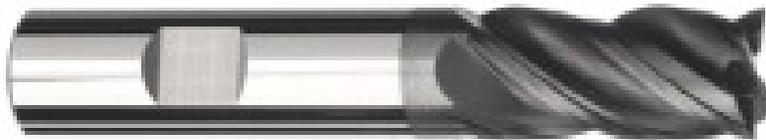
16. What is a Square Endmills?

- Square Endmills have a 90-degree profile.
- They are used for all-around milling.



17. What is a Weldon Endmills?

- Weldon Shank Endmills are produced with a Weldon flat to prevent any slippage.



18. What is a Ball Endmills?

- Ball Endmills (Ball Nose) have a round cutting surface used to mill contoured surfaces.



19. What is a Radius Endmills?

Corner Radius Endmills have a rounded corner to cut a specified radius.



20. What is a Finisher Endmills?

- Finisher Endmills provide a smooth and polished finish in a single pass.
- Not suited for plunge cutting.



21. What is a Drill Endmills?

- Drill Endmills are used for spotting, drilling milling, and countersinking.
- Not recommended for drilling steel.



22. What is a Roughing Endmills?

- Roughing Endmills also known as hog mills, are used to remove a large amount of material in a single pass.
- Roughing Endmills are available in course and fine pitch.



23. What is a Rounding Endmills?

- Corner Rounding Endmills are used to mill round edges.
- The end of the tool is strengthened to reduce chipping.



24. What is a Undercutting Endmills?

- Undercutting Endmills are also known as lollipop cutters.
- They are versatile tools with many uses.



25. How Endmill differs from drill?

- It is distinguished from the drills in its application, geometry and manufacture.
- While a drill can only cut in the axial direction, an Endmill can cut in all directions.

26. Where are Endmills used?

- Endmills are used in milling applications such as profile milling, tracer milling, face milling, plunging, contouring, slotting, drilling, and reaming.

27. What are the factors that decide selection of an Endmill?

Important factors are

- Material to be Cut
- Operations to be Performed
- Number of Flutes
- Specification of Tool Dimensions
- Type of Tool Coating

28. Why the above factors are considered in selection of an Endmill?

Selecting the right Endmill will

- reduce cycle time,
- increase tool life,
- produce a higher quality product

29. What are the common machining operations that decide selection of an Endmill?

- Traditional Roughing
- Slotting
- Finishing
- Contouring
- Plunging
- High Efficiency Milling

30. What are the criteria considered to decide the number of flutes in an Endmill during selection?

- Work Material
- Material to be removed
- Surface finish required.

31. Why coating is required for an Endmill?

When used in the correct application, a coated tool will help to boost performance by providing the following benefits:

- More Aggressive Running Parameters
- Prolonged Tool life
- Improved Chip Evacuation

32. How to overcome if there is Excessive Chatter noticed while machining?

- Increase your feed
- Reduce your cutting forces by reducing speed and/or feed or axial and/or radial depth of cut
- Increase your clamping rigidity by changing over to a stub length end mill or improving your workpiece fixturing
- Change geometry - use an end mill with variable flute spacing or a small circular margin

33. How to improve the Surface Finish during milling?

If work surface looks uneven and rough, to improve the Surface Finish, possible resolutions are

- Increase clamping rigidity
- Increase cutting speed
- Reduce feed
- Change to higher helix geometry
- Change to an end mill with more flutes

34. What is result of Tool wear?

- Tool wear at cutting edges results in poor performance of tool.

35. What are the possible solutions for reducing Tool Wear in End Mill ?

- Reduce Spindle Speed - About 50% reduction in speed will almost double the tool life
- Check the feed – Right selection of feed rate will reduce Tool Wear
- Change tool material grade and/or add a coating