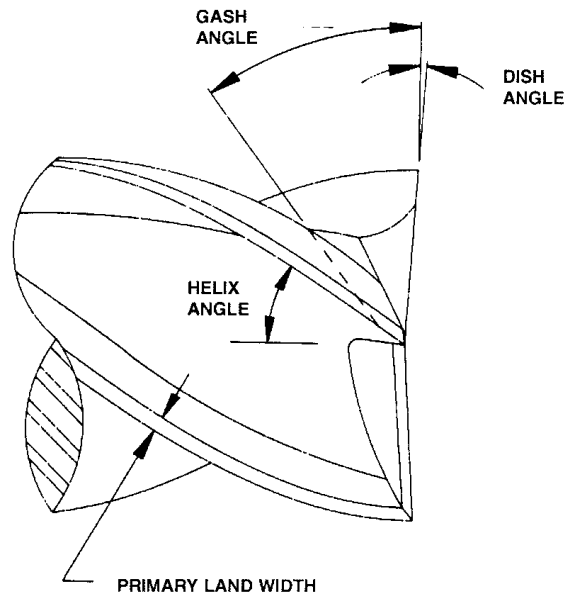


April 1, 2011

Subject: Helix Angle as related to End Mills



- Helix Angle - The angle formed by a line tangent to the helix and a plane through the axis of the cutter or the cutting edge angle which a helical cutting edge makes with a plane containing the axis of a cylindrical cutter.

All end mills have a helix angle unless they are straight fluted tools. Helix can be either right handed or Left handed. A Right handed helix means the cutter will remove the chip in an upward motion or away from the work piece. During cutting this may have a tendency to lift the part. This is pretty typical for most tools. The Left hand helix tools will force the chip toward the material or solid locator. The advantage to a left hand helix is a much more rigid setup during cutting but you must have clearance for the chip. Left-hand helix cutters are used allot to circular interpolate a bore because it is a more stable process. Again, it doesn't have a tendency to lift the part.

There are also End Mills that have Hi-Helix and some with Low-Helix.

Low-Helix End Mills generally have a 35-degree helix or less. Hi-Helix End Mills have a 35-degree or greater helix angle. Some tools used for roughing and finishing may use a 38-degree helix angle. This gives you the balanced benefit of a low enough helix to reduce chatter and enough helix to obtain good finish passes.

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We will start with Hi-Helix End Mills.

**Benefits of Hi-Helix are as follows:**

- Tool Deflection is reduced because the transferred stresses are vertically thru the spindle rather than horizontal.
- Speeds chip removal because chip evacuation is vertical.
- This prevents clogging of the flutes.
- You have more cutting-edge in the cut.
- The axial rake is more positive so better shearing.
- These are commonly used in Exotic Materials because of the extra cutting edge for wear and the positive shearing action although they are also used in Aluminum.
- Hi-Helix end mills like allot of feed or they will chatter.
- Greater shearing action results in increased speeds and feeds and faster stock removal.
- Horsepower consumption will be decreased with greater shearing action.
- Inherent to the production of Hi-Helix End Mills is a much thicker core resulting in a much stronger tool.

Some downfalls are as follows:

- With more cutting-edge in the cut they have a tendency to chatter when entering corners while pocketing.
- With more cutting-edge in the cut the tool is much more aggressive and may have a tendency to pull into the material. In soft materials this may pull the tool out of the holder.

**Benefits of Low-Helix End Mills:**

- Less Chatter
- Less Aggressive, which mean better performance in soft materials.
- Less lunging in the cut.
- Stronger Tools for Hardened Materials.

Some Downfalls of Low-Helix End Mills:

- Less Feed, resulting in low production rates.
- Less cutting edge in the cut, resulting is less aggressive cutting.

For all your application questions, please contact M.A. Ford at 800-553-8024/563-391-6220 or [sales@maford.com](mailto:sales@maford.com). You can also ask a question on our web site blog page. <http://www.maford.com/Blog/index.aspx>