

How to Drill Effectively

Successful drilling involves three elements:

1. Forming a chip
2. Accommodating a chip
3. Evacuating a chip

Drill Geometry

- Use the shortest drill possible.
- Use a split-point drill if possible. Split- points begin removing material on contact and drill more efficiently.

WARNING: 118° Two-flute drills should not be used to enlarge pre-existing holes.

Drilling the Hole

- Use the proper feed rate
- Avoid the tendency to over speed and under feed.
- Use low speeds and light feeds for hard materials.
- Use higher speeds and heavy feeds for soft materials
- To decrease drilling effort required, use a split-point drill.

Deep Hole Drilling

- When the hole depth is greater than three times the diameter, consider it a deep hole.
- Step drilling, also called “peck” drilling, is the practice of drilling a short distance, then withdrawing the drill. This is often required to remove chips when drilling deep holes.
- “Peck” drill just enough to prevent packing chips in the flutes.
- Chip congestion (eg:chips clogging the flutes) is a major cause of drill failure.

General Considerations

- Stability is important. Instability can cause drill breakage or poor hole quality, including irregular or oversized holes.
- To prevent work hardening, pay attention to speeds and feeds. Feed pressure should be constant. Do not “peck” until half way through a deep hole. Use moderate speeds and a variable drill motor if possible.
- To prevent lock-up (grabbing of drill by material or work piece at breakthrough), ease through the material by reducing speed and feed.

Trouble	Possible Cause	Correction
Drill Breaks	<ul style="list-style-type: none"> • Spring or back lash in press work • Too little lip relief • Speed too low in proportion to the feed • Dull drill • Improper chip clearing 	<ul style="list-style-type: none"> • Test press and work for rigidity and alignment • Regrind properly • Increase speed or decrease feed • Sharpen drill • Correct Application
Outer Corner Breakdown	<ul style="list-style-type: none"> • Material being drilled has hard spots, scale or sand inclusion • Too much speed • Improper cutting compound 	<ul style="list-style-type: none"> • Correct application • Reduce Speed • Use proper cutting compound
Drills Breaks in Brass or Wood	<ul style="list-style-type: none"> • Chips clog up flutes 	<ul style="list-style-type: none"> • Increase speed. Use drills designed for these materials
Cutting Lips Chipped	<ul style="list-style-type: none"> • Too much feed • Too much lip relief 	<ul style="list-style-type: none"> • Reduce feed • Regrind properly
Cracking or Checking in Cutting Edges	<ul style="list-style-type: none"> • Heated and cooled too quickly while grinding or while drilling • Too much feed 	<ul style="list-style-type: none"> • Warm slowly before using. Do not throw cold water on hot drill while grinding or drilling. • Reduce feed
Hole Too Large	<ul style="list-style-type: none"> • Unequal angle or length of the cutting edges or both • Loose spindle 	<ul style="list-style-type: none"> • Regrind properly • Test spindle for rigidity
Only One Lip Cutting Drill Splits Up Center	<ul style="list-style-type: none"> • Unequal length or angle of cutting lips or both • Too little lip relief • Too much feed 	<ul style="list-style-type: none"> • Regrind drill properly • Regrind with proper relief • Reduce feed
Rough Hole	<ul style="list-style-type: none"> • Dull or improperly ground drill • Lack of lubricant or wrong lubricant • Improper set-up • Too much feed 	<ul style="list-style-type: none"> • Regrind properly • Lubricate or change lubricant • Check set-up • Reduce feed