



Guide for Difficult-to-Drill Materials

As workpiece hardness increases, appropriate tool materials, point geometries and surface treatments must be used to achieve longer tool life and higher productivity. Abrasive materials such as stainless steel, fiberglass, graphite epoxies, high silicon aluminum and various cast irons will quickly dull a drill point. More abrasive resistant high speed steel (HSS) or carbide tipped bits are recommended. For cast irons, surface treatments such as titanium are gaining favor.

Coolants and lubricants will greatly improve tool life and workpiece finish. Using coolants and lubricants is a must to avoid work hardening of the material during drilling.

Primary premature tool failure causes

1. Forcing drill
2. Drilling without lubricant

Do not force a drill to cut too fast as this will wear the drill. Try to prevent the drill from suddenly emerging from the underside of the work. It is likely to catch in the resulting burrs and either break or spin the workpiece. A slow, controlled exit will not produce a large burr and will result in a clean cut.

NOTE: Always use proper lubricant.

Drilling Speeds

The most efficient cutting speed for drills varies with the material being worked, rate of feed and cutting fluid used. The following table suggests conservative speeds for both types of drills under highly controlled industrial use and in ordinary hand use. In handwork, the operator must, of course, be governed by the immediate action of the drill and adjust the speed accordingly.

For Drilling Mild Steel - Industrial Use

Drill Bit Diameter	RPM'S	RPM'S
	Machine feed with ample lubricant	Hand feed with intermittent or no lubricant
1/16"	6110	3060
3/32"	4075	2050
1/8"	3060	1530
3/16"	2040	1020
1/4"	1530	760
5/16"	1220	610
3/8"	1020	510
1/2"	764	380

For Drilling Other Metals

To find the best drilling speed for any one of the following metals, just multiply the number of RPM's in the preceding table by the number listed after the metal.

Die casting (zinc base)	3.50
Aluminum	2.50
Brass & bronze	2.00
Cast iron, soft	1.15
Malleable iron	.85
Cast iron, hard	.80
Tool steel	.60
Stainless steel	.30
Chilled cast iron	.20
Manganese steel	.15