Cutting Speed Guide (Surface Feet Per Minute)

Material	HSS	HSS C/F	TCT	2 Flute Carbide Drills	2 Flute Carbide C/F Drills	3 Flute Carbide Drills	Carbide Square Drills	Carbide Square Drills C/F
Aluminum & Aluminum Alloys	120-260	260-330	\	330-450	500-600	300-500	200-330	330-600
Brass & Bronze (free cutting)	120-300	250-340	240-380	260-400	400-600	300-350	400-500	500-600
Brass & Bronze (high tensile)	70-120	100-150	130-180	150-200	180-300	125-150	200-300	300-400
Cast Iron (< 260 Bhn)	80-180	100-200	180-260	200-300	250-350	250-300	150-250	230-400
Cast Iron (> 260 Bhn)	30-50	40-60	40-100	60-150	130-180	125-180	70-150	200-300
Copper Alloys	70-100	170-250	\	130-470	300-500	200-400	\	\
Lead & Lead Alloys	200-300	300-400	\	300-500	550-700	\	\	\
Magnesium	160-330	300-440	\	340-650	550-700	300-500	\	\
Nickel Based Alloys	20-50	70-90	\	40-80	100-150	\	\	\
Plastic & Related Material	100-200	230-300	\	150-300	500-800	\	\	\
Tin & Tin Alloys	200-300	300-400	260-440	300-500	600-700	\	\	\
Zinc & Zinc Alloys	200-260	230-310	200-350	230-400	490-600	300-500	\	\
Composties								
Carbonfiber	\	\	\	250-330	\	200-400	\	\
Fiberglass	\	\	\	260-300	\	200-400	\	\
Kevlar*	\	\	\	400-500	\	200-400	\	\
Steel								
Alloyed - under 200 Bhn	60-90	110-150	\	130-180	230-300	200-300	\	\
Alloyed - over 200 to 300 Bhn	30-70	80-120	\	70-130	160-210	150-250	\	\
Alloyed - over 300 to 350 Bhn	20-30	40-60	\	60-80	130-170	100-200	\	\
Cast & Forged	40-70	80-110	\	70-130	160-200	100-200	\	
Heat Treated - 35 to 40Rc	30-40	40-50	\	60-85	80-100	80-100	\	\
Heat Treated - 40 to 45Rc	\	20-30	\	40-60	60-80	50-80	\	\
Heat Treated - 45 to 50Rc	\	15-30	\	20-40	30-50	40-60	\	\
Mild - 0.2 to 0.3% Carbon	70-100	80-80	\	80-150	120-160	120-160	\	\
Mild -0.4 to 0.5% Carbon	50-80	40-100	\	60-150	80-130	80-130	\	\
Stainless Steel - 300 Series	20-50	40-60	\	30-90	70-110	\	\	\
Stainless Steel - 400 Series	40-70	50-80	\	60-125	100-150	\	\	\
Tool Steel - over 1.0% Carbon	30-50	40-60	\	50-90	80-110	\	\	\
Titanium Alloys	20-30	30-60	\	50-100	70-200	85-160	\	\

*Kevlar is a registered trade mark of Du Pont
HSS = High Speed Steel, C/F Coolant Feeding, TCT=Tungsten Carbide Tipped, Square Drills=Solid Carbide Straight flute drills with double margins.
The above are recommended but very conservative cutting speeds, depending on material and machine conditions gradual adjustments should be made to obtain optimum rates to suit production needs.

Drill Feeds:

Diameter	Feed Per Rev(IPR)	
	Normal	Heavy
Up to 1/8"	.001" to .002"	.002" to .004"
1/8" up to 1/4"	.002" to .004"	.004" to .008"
1/4" up to 3/8"	.004" to .008"	.008" to .012"
3/8" up to 5/8"	.008" to .012"	.012" to 0.16"
5/8" up to 1.00"	.012" to .016"	.016" to 0.24"
Over 1.00"	.016" to .024"	.024" to .030"

Reamer Feeds & Speeds

Reamers should be operated at slower speed (RPM) and higher feed rates (IPR) than those of drill of the same diameter and cutting the same material. A good guide is to run the reamer at speeds (RPM) of 65 to 75% of that used for drilling and feed at a rate of .002" per flute per revolution.

Please note: The above are recommended feed & speed rates only. Subject to tool construction, the condition of the machine, coolant availability, the material to be reamed and the actual hole depth, significant changes may need to be made to obtain results.

Useful Formulae:

Cutting Speeds refer to the tools peripheral speed and can be expressed in Surface Feet Per Minute (SFM) of Meters Per Minute (m/min). The Cutting Speed is related to Spindle Speed (RPM) and Tool Diameter (D) and the following formulae can be used:

SFM = .0262 (in inches) x RPM or m/min = .00314 m/min x RPM
RPM = (3.82 x SFM) D (in inches) or RPM = (3.1831 x m/min) / D (in m/m)
Drilling Time (or Tool Advance Rate) = Total Tool Travel Distance / RPM x FPR (Feed Per Rev.)