RECOMMENDED CUTTING CONDITIONS

These are general cutting speed recommendations of SFM rates, and may vary from application to application.

Material To Be Cut*	*Hardness Range (Bhn**)*	*Carbide Saw Cutting Speed SFM / (m/min.)*
Free Machining Carbon Steels-Wrought	100-425	130-555 (40-170)
Carbon Steels-Wrought	85-425	105-530 (35-165)
Carbon & Ferritic Alloy Steels (High Temp. Service)	150-200	320-425 (100-130)
Free Machining Alloy Steels-Wrought	150-425	35-470 (11-145)
Alloy Steels, Wrought	125-425	35-425 (11-130)
High Strength Steels-Wrought	225-400	35-255 (11-80)
Maraging Steels-Wrought	275-425	35-215 (11-65)
Tool Steels-Wrought	100-375	35-470 (11-145)
Nitriding Steels-Wrought	200-350	150-215 (50-65)
Armor Plate, Ship Plate, Aircraft Plate-Wrought	200-350	65-215 (25-65)
Structural Steels-Wrought	100-400	35-255 (11-80)
Free Machining Stainless Steels-Wrought	135-425	150-470 (50-145)
Stainless Steels-Wrought	135-425	35-425 (11-130)
Precipitation Hardening Stainless Steels-Wrought	150-440	85-340 (25-105)
Stainless Steels-Cast	135-425	105-425 (35-130)
Precipitation Hardening Stainless Steels-Cast	325-450	65-130 (25-40)
Carbon Steels-Cast	100-300	170-530 (55-165)
Alloy Steels-Cast	150-400	105-340 (35-105)
Tool Steels-Cast	150-375 & 48-50R_C	35-300 (11-90)
Gray Cast Irons	120-320	105-470 (35-145)
Compacted Graphite Cast Irons	120-330	105-170 (35-55)
Ductile Cast Irons	120-330	85-510 (25-160)

Material To Be Cut*	*Hardness Range (Bhn**)*	*Carbide Saw Cutting Speed SFM / (m/min.)*
Malleable Cast Irons	110-320	130-470 (40-145)
Chromium-Nickel Alloy Castings	275-375	85-105 (25-35)
Aluminum Alloys-Wrought	30-150	3400-4250 (1042-1300)
Aluminum Alloys-Cast	40-125	2125-5315 (640-1615)
Magnesium Alloys-Wrought	40-125	5100-6375 (1555-1955)
Magnesium Alloys-Cast	50-90	5100-6375 (1555-1955)
Titanium Alloys-Wrought	110-440	65-530 (25-165)
Titanium Alloys-Cast	150-350	170-470 (55-145)
Copper Alloys-Wrought	10R_B-100R_B	340-2125 (105-640)
Copper Alloys-Cast	40-200	340-1700 (105-510)
Nickel Alloys-Wrought and Cast	80-360	65-300 (25-90)
Beryllium Nickel Alloys-Wrought and Cast	200-425 47-52R_C	35-215 (11-65)
High Temp. Alloys-Wrought and Cast	140-475	35-255 (11-80)
Refractory Alloys-Cast, P/M	170-320	150-300 (50-90)
Zinc Alloys-Cast	80-100	1380-1700 (425-510)
Lead Alloys-Cast	5-20	1065-1275 (325-385)
TiN Alloys-Cast	15-30	1065-1275 (325-385)
Zirconium Alloys-Wrought	140-280	215-255 (65-80)
Manganese-Wrought	140-220	105-130 (35-40)
P/M Alloys-Copper	50-70R_F	170-215 (55-65)
P/M Alloys-Brasses	35-81R_H	215-255 (65-80)
P/M Alloys-Bronzes	30-75R_F	170-215 (55-65)

(Continued on Next Page)

*Materials list from Machining Data Handbook-3rd Edition, published by the Machinability Data Center. For specific metals/materials within each material category, refer to Machining Data Handbook.

**Hardness range listed in Brinell unless otherwise noted. 'Range' covers all metals/materials listed within each material group.

***Thermosetting plastics have various hardness scales. Refer to Machining Data Handbook.

Material To Be Cut*	*Hardness Range (Bhn**)*	*Carbide Saw Cutting Speed SFM / (m/min.)*
P/M Alloys- Copper-Nickel Alloys	22-100R_H	170-215 55-65
P/M Alloys- Nickel and Nickel Alloys	70-83	170-215 55-65
P/M Alloys- Refractory Metal Base	101-260	405-510 124-160
P/M Alloys- Irons	50-67	215-255 65-80
P/M Alloys- Steels	101-426	150-255 50-80
P/M Alloys- Stainless Steels	107-285	170-215 55-65
P/M Alloys- Aluminum Alloys	55-98R_H	510-640 160-195
Machinable Carbides	40-51R_C	35-45 11-13
Free Machining Magnetic Alloys	185-240	215-340 65-105
Magnetic Alloys	185-240	55-215 16-65
Free Machining Controlled Expansion Alloys	125-220	215-255 65-80
Controlled Expansion Alloys	125-250	35-45 11-13
Carbons and Graphites	8-100 Shore	150-215 50-65
Glasses and Ceramics- Machinable	250 Knoop	85-105 25-35
Plastics- Thermoplastics	60-120R_M	1065-1490 325-450
Plastics- Thermosetting	50-120R_R ***	340-1490 105-450

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**Hardness range listed in Brinell unless otherwise noted. 'Range' covers all metals/materials listed within each material group.
***Thermosetting plastics have various hardness scales. Refer to Machining Data Handbook.

USEFUL METALWORKING FORMULAS

SFM	=	.262 X (CUTTER DIA. X RPM) (or) (RPM X CUTTER DIA.) ÷ .382
RPM	=	(3.82 X SFPM) ÷ CUTTER DIA. (or) SFPM ÷ (CUTTER DIA. X .262)
IPM	=	IPR X (# TEETH X RPM)
IPT	=	IPM ÷ (# TEETH X RPM)
IPR	=	IPM ÷ RPM
CIM	=	IPR X SPD. X DOC
HP	=	CIM X UHF
FORCE	=	(33,000 X HP) ÷ SFM

FEED RATES:

Carbide Saws:
.0002"-.0015" (in.per tooth - IPT
or chip load per tooth - CLPT)

NOTE: This is a conservative recommendation as a starting point for feed rates, and may vary depending on material being cut and cutting speed (SFM).

COATINGS FOR SAWS AND CUTTERS

Cutting tool surface coatings are available upon request. Tool coatings provide tool wear resistance while significantly improving the performance of saws in most applications, particularly when cutting ferrous materials. These coatings are extremely thin, harder than steel and greatly reduce friction and wear. The most common coatings available for carbide saws are:

TiN: Titanium Nitride - General purpose TiN hard coating. Best suited for iron-based materials, unalloyed and alloyed steels and hardened steels.

TiCN: Titanium Carbonitride - Enhanced hardness and wear resistance over TiN with better surface lubricity. Suited for difficult to machine materials such as cast iron, aluminum alloys, tool steels, copper, Inconel, titanium alloys and nonferrous materials.

TiAlN: Titanium Aluminum Nitride - Nano-layered coating, high toughness and oxidation resistance. Recommended for high temperature cutting, and a good choice when coating carbide. Suited for difficult materials like cast iron, aluminum alloys, tool steels and nickel alloys.

AlCrN: Aluminum Chromium Nitride - Expanded performance capabilities over titanium-based coatings. Highest oxidation resistance and hot hardness for high temperature wear resistance. Can be used in wet/dry cutting applications. Well suited for a wide range of materials - cast iron, unalloyed steels, high strength steels, high hardness steels.

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