Cutting Speed Recommendations - Circular Saws

These are general cutting speed recommendations on SFM - m/min. rates, and may vary from application to application. Gaylee Corporation does not assume any liability in the following recommendations, which are basically suggestions on where to start. Contact Gaylee if you have questions on speeds and feeds.

MATERIAL* TO BE CUT	HARDNESS RANGE (Bhn)**	*CARBIDE SAW* CUTTING SPEED (SFM / m/min.)	*H.S.S. SAW* CUTTING SPEED (SFM / m/min.)
Free Machining Carbon Steels-Wrought	100-425	130-555 40-170	30-130 9-40
Carbon Steels-Wrought	85-425	105-530 35-165	25-125 8-38
Carbon & Ferritic Alloy Steels (High Temp. Service)	150-200	320-425 100-130	75-100 23-30
Free Machining Alloy Steels-Wrought	150-425	35-470 11-145	8-110 2.5-34
Alloy Steels, Wrought	125-425	35-425 11-130	8-100 2.5-30
High Strength Steels-Wrought	225-400	35-255 11-80	8-60 2.5-18
Maraging Steels-Wrought	275-425	35-215 11-65	8-50 2.5-15
Tool Steels-Wrought	100-375	35-470 11-145	8-110 2.5-34
Nitriding Steels-Wrought	200-350	150-215 50-65	35-50 11-15
Armor Plate, Ship Plate, Aircraft Plate-Wrought	200-350	65-215 25-65	15-50 5-15
Structural Steels-Wrought	100-400	35-255 11-80	8-60 2.5-18
Free Machining Stainless Steels-Wrought	135-425	150-470 50-145	35-110 11-34
Stainless Steels-Wrought	135-425	35-425 11-130	8-100 2.5-30
Precipitation Hardening Stainless Steels-Wrought	150-440	85-340 25-105	20-80 6-24
Stainless Steels-Cast	135-425	105-425 35-130	25-100 8-30
Precipitation Hardening Stainlesss Steels-Cast	325-450	65-130 25-40	15-30 5-9
Carbon Steels-Cast	100-300	170-530 55-165	40-125 12-38
Alloy Steels-Cast	150-400	105-340 35-105	25-80 8-24
Tool Steels-Cast	150-375 & 48-50Rc	35-300 11-90	8-70 2.5-21
Gray Cast Irons	120-320	105-470 35-145	25-110 8-34
Compacted Graphite Cast Irons	120-330	105-170 35-55	25-40 8-12
Ductile Cast Irons	120-330	85-510 25-160	20-120 6-37

MATERIAL* TO BE CUT	HARDNESS RANGE (Bhn)**	*CARBIDE SAW* CUTTING SPEED (SFM / m/min.)	*H.S.S. SAW* CUTTING SPEED (SFM / m/min.)
Malleable Cast Irons	110-320	130-470 40-145	30-110 9-34
Chromium-Nickel Alloy Castings	275-375	85-105 25-35	20-25 6-8
Aluminum Alloys-Wrought	30-150	3400-4250 1042-1300	800-1000 245-305
Aluminum Alloys-Cast	40-125	2125-5315 640-1615	500-1250 150-380
Magnesium Alloys-Wrought	40-125	5100-6375 1555-1955	1200-1500 365-460
Magnesium Alloys-Cast	50-90	5100-6375 1555-1955	1200-1500 365-460
Titanium Alloys-Wrought	110-440	65-530 25-165	15-125 5-38
Titanium Alloys-Cast	150-350	170-470 55-145	40-110 12-34
Copper Alloys-Wrought	10R_B-100R_B	340-2125 105-640	80-500 24-150
Copper Alloys-Cast	40-200	340-1700 105-510	80-400 24-120
Nickel Alloys-Wrought and Cast	80-360	65-300 25-90	15-70 5-21
Beryllium Nickel Alloys-Wrought and Cast	200-425 47-52Rc	35-215 11-65	8-50 2.5-15
High Temp. Alloys-Wrought and Cast	140-475	35-255 11-80	8-60 2.5-18
Refractory Alloys-Cast, P/M	170-320	150-300 50-90	35-70 11-21
Zinc Alloys-Cast	80-100	1380-1700 425-510	325-400 100-120
Lead Alloys-Cast	5-20	1065-1275 325-385	250-300 76-90
TiN Alloys-Cast	15-30	1065-1275 325-385	250-300 76-90
Zirconium Alloys-Wrought	140-280	215-255 65-80	50-60 15-18
Manganese-Wrought	140-220	105-130 35-40	25-30 8-9
P/M Alloys-Copper	50-70R_F	170-215 55-65	40-50 12-15
P/M Alloys-Brasses	35-81R_H	215-255 65-80	50-60 15-18
P/M Alloys-Bronzes	30-75R_F	170-215 55-65	40-50 12-15

Cont.

*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.

Cutting Speed Recommendations (cont.)

MATERIAL* TO BE CUT	HARDNESS RANGE (Bhn)**	*CARBIDE SAW* CUTTING SPEED (SFM / m/min.)	*H.S.S. SAW* CUTTING SPEED (SFM / m/min.)
P/M Alloys- Copper-Nickel Alloys	22-100R_H	170-215 / 55-65	40-50 / 12-15
P/M Alloys- Nickel and Nickel Alloys	70-83	170-215 / 55-65	40-50 / 12-15
P/M Alloys- Refractory Metal Base	101-260	405-510 / 124-160	95-120 / 29-37
P/M Alloys- Irons	50-67	215-255 / 65-80	50-60 / 15-18
P/M Alloys- Steels	101-426	150-255 / 50-80	35-60 / 11-18
P/M Alloys- Stainless Steels	107-285	170-215 / 55-65	40-50 / 12-15
P/M Alloys- Aluminum Alloys	55-98R_H	510-640 / 160-195	120-150 / 37-46
Machinable Carbides	40-51Rc	35-45 / 11-13	8-10 / 2.5-3
Free Machining Magnetic Alloys	185-240	215-340 / 65-105	50-80 / 15-24
Magnetic Alloys	185-240	55-215 / 16-65	12-50 / 3.6-15
Free Machining Controlled Expansion Alloys	125-220	215-255 / 65-80	50-60 / 15-18
Controlled Expansion Alloys	125-250	35-45 / 11-13	8-10 / 2.5-333
Carbons and Graphites	8-100 Shore	150-215 / 50-65	35-50 / 11-15
Glasses and Ceramics- Machinable	250 Knoop	85-105 / 25-35	20-25 / 6-8
Plastics- Thermoplastics	60-120R_M 50-120R_R	1065-1490 / 325-450	250-350 / 76-105
Plastics- Thermosetting	***	340-1490 / 105-450	80-350 / 24-105

*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.

USEFUL METALWORKING FORMULAS

SFPM = .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)
H.S.S. Saws:
.002-.006 (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 (SFPM).

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 Gaylee 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.

TEST APPLICATION DATA SHEET

Solid Carbide, Carbide-Tipped and H.S.S. Saws

NATool Rep.: _____

Customer Name: _____ Date: ____ / ____ / ____

City/State: _____ Distributor: _____

Phone: _____ Fax: _____ Salesperson: _____

Contact: _____ Title: _____ Extn.: _____

GENERAL INFORMATION

(Application) B/P or Job # _____

☐ SC ☐ C-Tipped ☐ H.S.S. Saw Dia. _____ Saw Width _____ Tolerance _____

Arbor Hole Dia. _____ # Teeth _____ Special Tooth Form _____

Keyway (Y/N) _____ Keyway Dimension _____ Hub (Y/N) _____

Hub Dimension: Dia. _____ Thickness _____ Rake Angle _____

Positive / Negative _____ Surface Treatment _____

Unique Job Details _____

_____

JOB APPLICATION

Operation _____ Slot Width _____ Tolerance _____

Depth of Cut _____ Tolerance _____ Material _____

Hardness _____ Machine Tool _____ Condition _____

Speed _____ Feed _____ Coolant Type _____ Mix _____

Are saws ganged? (Y/N) _____ If yes, tolerance required _____

Form to be generated _____ (Sketch or B/P helpful)

COMPETITION

Brand Name _____ Price ($) _____

Delivery _____ Annual Usage _____

Current performance $/or problem _____

_____

Criteria for successful test _____

_____

TEST EVALUATION

GAYLEE PO# _____ Date _____ Dist. PO# _____

Results _____

_____

Were you present for test? Y/N _____ Comments _____

_____

6650 Burroughs Ave.
Sterling Heights, MI 48314 U.S.A.
Phone: 800.435.5800 or 586.803.1100
Fax: 800.810.7297 or 586.803.1101

FAX OR SEND TO GAYLEE CORPORATION WITH YOUR CONTACT INFORMATION