# 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.

### Table of Cutting Speed Recommendations

<table>
<thead>
<tr>
<th>MATERIAL* TO BE CUT</th>
<th>CARBIDE SAW CUTTING SPEED (SFM / m/min.)</th>
<th>H.S.S. SAW CUTTING SPEED (SFM / m/min.)</th>
<th>MATERIAL* TO BE CUT</th>
<th>CARBIDE SAW CUTTING SPEED (SFM / m/min.)</th>
<th>H.S.S. SAW CUTTING SPEED (SFM / m/min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Machining Carbon Steels-Wrought</td>
<td>100-425</td>
<td>130-555</td>
<td>100-130</td>
<td>85-425</td>
<td>105-530</td>
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<tr>
<td>Carbides</td>
<td>44-170</td>
<td>35-165</td>
<td>25-110</td>
<td>30-150</td>
<td>85-105</td>
</tr>
<tr>
<td>Carbon &amp; Ferritic Alloy Steels (High Temp. Service)</td>
<td>150-200</td>
<td>320-425</td>
<td>75-100</td>
<td>100-130</td>
<td>23-30</td>
</tr>
<tr>
<td>Tool Steels, Wrought</td>
<td>100-375</td>
<td>35-470</td>
<td>11-145</td>
<td>2.5-34</td>
<td>2.5-30</td>
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<tr>
<td>Maraging Steels-Wrought</td>
<td>275-425</td>
<td>35-215</td>
<td>11-65</td>
<td>8-50</td>
<td>2.5-15</td>
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<tr>
<td>Tool Steels, Wrought</td>
<td>100-375</td>
<td>35-470</td>
<td>11-145</td>
<td>2.5-34</td>
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<tr>
<td>Stainless Steels-Wrought</td>
<td>135-425</td>
<td>150-470</td>
<td>35-110</td>
<td>11-34</td>
<td></td>
</tr>
<tr>
<td>Stainless Steels-Cast</td>
<td>135-425</td>
<td>105-425</td>
<td>25-100</td>
<td>35-130</td>
<td>8-30</td>
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<tr>
<td>Precipitation Hardening Stainless Steels-Cast</td>
<td>325-450</td>
<td>65-130</td>
<td>25-40</td>
<td>15-30</td>
<td>5-9</td>
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<tr>
<td>Carbon Steels-Cast</td>
<td>100-300</td>
<td>170-530</td>
<td>55-165</td>
<td>12-38</td>
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<td>Alloy Steels-Cast</td>
<td>150-400</td>
<td>105-340</td>
<td>25-80</td>
<td>35-105</td>
<td>8-24</td>
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<tr>
<td>Tool Steels-Cast &amp; 48-50Rc</td>
<td>150-375</td>
<td>35-300</td>
<td>11-90</td>
<td>8-70</td>
<td>2.3-21</td>
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<tr>
<td>Gray Cast Irons</td>
<td>120-320</td>
<td>105-470</td>
<td>35-145</td>
<td>25-110</td>
<td>8-34</td>
</tr>
<tr>
<td>Compacted Graphite Cast Irons</td>
<td>120-330</td>
<td>105-170</td>
<td>35-55</td>
<td>25-40</td>
<td>8-12</td>
</tr>
<tr>
<td>Ductile Cast Irons</td>
<td>120-330</td>
<td>85-510</td>
<td>25-160</td>
<td>20-120</td>
<td>6-37</td>
</tr>
</tbody>
</table>

### Materials List from Machining Data Handbook-3rd Edition, published by the Machinability Data Center

- Free Machining Stainless Steels-Wrought
- Stainless Steels-Wrought
- High Strength Steels-Wrought
- Maraging Steels-Wrought
- Tool Steels-Wrought
- Nitriding Steels-Wrought
- Stainless Steels-Wrought
- Precipitation Hardening Stainless Steels-Wrought
- Stainless Steels-Cast
- Precipitation Hardening Stainless Steels-Cast
- Carbon Steels-Cast
- Alloy Steels-Cast
- Tool Steels-Cast
- Gray Cast Irons
- Compacted Graphite Cast Irons
- Ductile Cast Irons

*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.
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).

**USEFUL METALWORKING FORMULAS**

\[
SFPM = \frac{.262 \times (\text{CUTTER DIA. \times RPM})}{(\text{RPM} \times \text{CUTTER DIA.}) \div .382}
\]

\[
\text{RPM} = \frac{(3.82 \times SFPM) \div \text{CUTTER DIA.}}{(\text{SFPM} \div (\text{CUTTER DIA. \times .262}))}
\]

\[
\text{IPM} = \text{IPR} \times (\# \text{ TEETH} \times \text{RPM})
\]

\[
\text{IPT} = \frac{\text{IPM}}{(\# \text{ TEETH} \times \text{RPM})}
\]

\[
\text{IPR} = \frac{\text{IPM}}{\text{RPM}}
\]

\[
\text{CIM} = \text{IPR} \times \text{SPD.} \times \text{DOC}
\]

\[
\text{HP} = \text{CIM} \times \text{UHF}
\]

\[
\text{FORCE} = \frac{(33,000 \times \text{HP})}{\text{SFM}}
\]

**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 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.

- **TiAIN**: 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.
NATool Rep.: ______________________________  Date: __ / __ / __
Customer Name: __________________________________________
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 ________________________________