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Feeds and Speeds for Engraving with a Spring Loaded Engraving Tool™

Use this table when the Engraving Tool Bit is held in a Spring Loaded Engraving Tool. See below for the Maximum RPM for each Spring Loaded Engraving Tool Diameter.

Material	Chipload - IPT (MMPT)	Feederates - IPM (MM/Min.)		
		3,000 RPM	6,000 RPM	7,500 RPM
Aluminum/Aluminum Alloys	0.005-0.008(0.127-0.203)	15-25(381-635)	30-50(762-1270)	37-62(940-1575)
Brass/Bronze	0.005-0.008(0.127-0.203)	15-25(381-635)	30-50(762-1270)	37-62(940-1575)
Copper/Copper Alloys	0.005-0.008(0.127-0.203)	15-25(381-635)	30-50(762-1270)	37-62(940-1575)
Cast Iron, Soft	0.005(0.127)	15(381)	30(762)	37(940)
Cast Iron, Hard	0.0033(0.0838)	10(254)	20(508)	25 (635)
Ductile Iron	0.0043(0.1092)	13(330)	26(660)	32(812)
Malleable Iron	0.0043(0.1092)	13(330)	26(660)	32(812)
Magnesium/Magnesium Alloys	0.0067 (0.170)	20(508)	40(1016)	50(1270)
Monel/High Nickel Steel	0.0043(0.1092)	13(330)	26(660)	32(812)
Nickel Base Hi-Temp. Alloys	0.0043(0.1092)	13(330)	26(660)	32(812)
Plastics	0.0083(0.210)	25(635)	50(1270)	62.5(1587)
Plastics, Glass Filled (i.e. Phenolic)	0.0083(0.210)	25(635)	50(1270)	62.5(1587)
Steel, Low Carbon	0.0043(0.1092)	13(330)	26(660)	32(812)
Steel, Medium Carbon	0.0043(0.1092)	13(330)	26(660)	32(812)
Steel, Hardened	0.0033(0.0838)	10(254)	20(508)	25 (635)
Stainless Steel, Soft	0.0043(0.1092)	13(330)	26(660)	32(812)
Stainless Steel, Hard	0.0043(0.1092)	13(330)	26(660)	32(812)
Titanium, Soft	0.0043(0.1092)	13(330)	26(660)	32(812)
Titanium, Hard	0.0033(0.0838)	10(254)	20(508)	25 (635)
Glass & Stone (with diamond engraving tool - use coolant with spindle rotating or non-rotating)		17(431)	Not Recommended	

Please note as with all machining it is important to take appropriate safety precautions.

RPM= Revolutions per Minute = Spindle Speed.

IPM = Inches per minute.

IPT = Inch per tooth

MMPT = MM per tooth

Recommended RPM's for the Spring Loaded Engraving Tools

- The **3/4" Shaft Standard Spring Loaded Engraving Tool** has been tested up to 10,000 RPM and has a 1,000 - 10,000 RPM recommended speed range.
- The **20 mm Shaft Standard Spring Loaded Engraving Tool** has been tested up to 10,000 RPM and has a 1,000 - 10,000 RPM recommended speed range.
- The **1/2" Shaft Mini Spring Loaded Engraving Tool** should not be used at speeds above 7,500 RPM and has a 1,000 - 7,500 RPM recommended speed range.
- The **3/8" Shaft Mini Spring Loaded Engraving Tool** should not be used at speeds above 6,000 RPM and has a 1,000 - 6,000 RPM recommended speed range.
- The **1/4" Shaft Mini Spring Loaded Engraving Tool** should not be used at speeds above 3,000 RPM and has a 1,000 - 3,000 RPM recommended speed range.

Note: (RPM speeds for the Mini Spring Loaded Engraving Tools are due to the reduced shaft diameter. Bending of the shaft may occur at higher RPM's).



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To produce deeper marks, Decrease the feedrate. To produce shallower, less pronounced marks, Increase the feedrate.

When engraving tougher materials, use of the Tough Tip Engraving Tool® is recommended.

Ensure the high speed look ahead feature is enabled on the cnc machine to prevent rounding of corners due to the high feedrates required.

NOTE: It has been observed that when using the latest generation of cnc machines, the fastest feedrate actually obtained when engraving letters 0.200" tall is approximately 80 IPM. Increasing the spindle speed beyond 7500 RPM requires feedrates that the cnc machines are not capable of providing and provides no additional benefit in cycle time reduction.

Use of coolant will extend the life of the engraving tool bit.

Since the Spring Loaded Engraving Toolholder uses a spring to provide the downward pressure against the Tool Bit, in general, slower feedrates produce deeper more pronounced marks and faster feedrates produce shallower less pronounced marks.

Slow feedrates allow the spring to press the Tool Bit into the material being marked for a longer period of time and therefore produce a deeper mark. (i.e. if you completely stop feeding the tool, it will just drill down into the material until it is fully extended.)

Fast feedrates cause the Tool Bit to skim over the material being marked and produce a less pronounced mark. Too fast of a feedrate will cause the tool to skip over the material without cutting it and will produce marks that appear as dotted lines.

A depth controlling nosepiece is available for absolute depth control.

The feeds and speeds listed above are a good place to start and have been used successfully to engrave a wide variety of materials including aluminum, stainless steel, glass, and plastic parts. Increase or decrease the feedrates to achieve the desired results. Note that as you increase your spindle speed, your feed rates increase also. If you do not have a "look-ahead" feature on your machining center or CNC machine, fast feed rates may create a rounding affect on your engraved lettering.

The depth of cut (total amount of spring travel) can be up to .40". For standard engraving on flat surfaces, a depth of approximately Z-0.020 will compensate for normal material irregularities.

Note: Variations in the above table may be required depending on material being engraved and cutting conditions. Consider the above recommendations as a starting point.

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