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Feeds and Speeds for Engraving with an Engraving Tool

Use this table when the Engraving Tool Bit is held rigidly in a Collet, End Mill Holder, Shrink Fit Holder, Top Loading Engraving Machines, Other Industrial Engraving or other Marking System.

| Material | Chipload - IPT (MMPT) | Feedrates - IPM (MM/Min.) | | | |
|---|-----------------------|---------------------------|-----------|-------------|------------|
| | | 3,000 RPM | 6,000 RPM | 7,500 RPM | 10,000 RPM |
| Aluminum/Aluminum Alloys | 0.002 (0.051) | 6 (152) | 12 (304) | 15 (381) | 20 (508) |
| Brass/Bronze | 0.002 (0.051) | 6 (152) | 12 (304) | 15 (381) | 20 (508) |
| Copper/Copper Alloys | 0.002 (0.051) | 6 (152) | 12 (304) | 15 (381) | 20 (508) |
| Cast Iron, Soft | 0.002 (0.051) | 6 (152) | 12 (304) | 15 (381) | 20 (508) |
| Cast Iron, Hard | 0.0008 (0.020) | 2.4 (61) | 4.8 (122) | 6 (152) | 8 (203) |
| Ductile Iron | 0.001(0.025) | 3 (76) | 6 (152) | 7.5 (190) | 10 (254) |
| Malleable Iron | 0.001(0.025) | 3 (76) | 6 (152) | 7.5 (190) | 10 (254) |
| Magnesium/Magnesium Alloys | 0.002 (0.051) | 6 (152) | 12 (304) | 15 (381) | 20 (508) |
| Monel/High Nickel Steel | 0.001(0.025) | 3 (76) | 6 (152) | 7.5 (190) | 10 (254) |
| Nickel Base Hi-Temp. Alloys | 0.0008 (0.020) | 2.4 (61) | 4.8 (122) | 6 (152) | 8 (203) |
| Plastics | 0.003 (0.076) | 9 (229) | 18 (457) | 22.5 (571) | 30 (762) |
| Plastics, Glass Filled (i.e. Phenolic) | 0.003 (0.076) | 9 (229) | 18 (457) | 22.5 (571) | 30 (762) |
| Steel, Low Carbon | 0.001 (0.025) | 3 (76) | 6 (152) | 7.5 (190) | 10 (254) |
| Steel, Medium Carbon | 0.0015 (0.038) | 4.5 (114) | 9 (229) | 11.25 (286) | 15 (381) |
| Steel, Hardened | 0.0005 (0.013) | 1.5 (38) | 3 (76) | 3.75 (95) | 5 (127) |
| Stainless Steel, Soft | 0.001(0.025) | 3 (76) | 6 (152) | 7.5 (190) | 10 (254) |
| Stainless Steel, Hard | 0.0005 (0.013) | 1.5 (38) | 3 (76) | 3.75 (95) | 5 (127) |
| Titanium, Soft | 0.001(0.025) | 3 (76) | 6 (152) | 7.5 (190) | 10 (254) |
| Titanium, Hard | 0.0005 (0.013) | 1.5 (38) | 3 (76) | 3.75 (95) | 5 (127) |
| Wood, Soft | 0.002 (0.051) | 6 (152) | 12 (304) | 15 (381) | 20 (508) |
| Wood, Hard | 0.002 (0.051) | 6 (152) | 12 (304) | 15 (381) | 20 (508) |

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

Plunge Feed to Depth at 50% of feedrates listed above. Typical engraving depths for permanently marking workpieces are 0.005" – 0.010".

Notes: To reduce tip breakage on tougher materials or if small tip widths are being used, reduce feedrates above by 50% and make shallow passes (0.001" depth per pass or less is not uncommon on very tough materials). Use of the Tough Tip Engraving Tool® will allow faster feedrates at deeper cuts in tough materials. Use of coolant will extend the life of the engraving Tool Bit.

Use of the Spring Loaded Engraving Tool will allow significant increase of feedrates and reductions in cycle times. At feedrates above 15 IPM ensure the high speed lookahead feature is enabled on the cnc machine to prevent rounding of corners and sudden starts and stops in corners.

Engraved lines that appear rough or jagged are usually caused by a dull Tool Bit or material buildup on the end of the Tool Bit. Material buildup mostly occurs with gummy materials such as aluminum or copper. Too fast a feedrate or too deep a cut may not allow the material to be cleanly cut. Taking a finishing pass of .001" - .002" deep at a slower feedrate can be used to reduce any burring or jagged edges. Using coolant to engrave helps reduce this buildup. Engraving Cutters are available specifically for softer materials.

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.