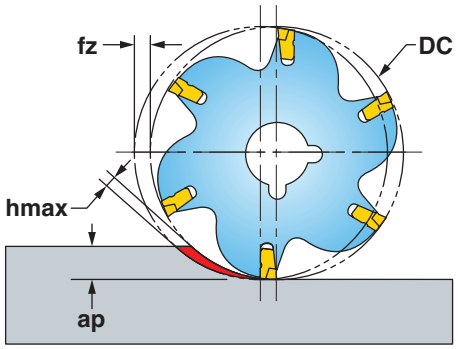
# Operating Guidelines

**Chip Thinning**




For radial depths of cut (ap) less than 1/4 of cutter diameter (DC), increase feed rates by the following %, or use the Chip Thinning Calculator to ensure hmax is within the fz range:

https://www.imc-i.com/mpwr/Milling/HChipThickness

| Depth of Cut (ap) x Cutter Dia. (DC) | 1/4 | 1/6 | 1/8 | 1/10 | 1/20 |
|---|---|---|---|---|---|
| Increase Feed Rate by | 0% | 15%- | 30% | 45% | 100% |

| Materials | | | | Vc Cutting Speed SFM | | fz* Feed/Tooth (inch) | | Harder «---» Tougher | | | Coolant |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ISO | Material Group #VDI 3323 | Type | Examples | Dry Machining | Wet Machining | CW - Width 0.0787 (2mm) | CW - Width 0.1180 (3mm) | K10 | TT9080 | TT8020 | |
| P | 1–5 | Non-alloy steel | 1018, A36, 1045, A572, 1070 | 800-950 | 650-800 | 0.003-0.007 | 0.003-0.010 | | 2 | 1 | No |
| | 6–9 | Low-alloy steel | 4140, 4340, P20, 8620, 300M | 700-850 | 500-650 | | | | | | |
| | 10, 11 | High-alloy steel | H13, A2, D2, M2, T1 | 500-600 | 350-450 | | | | | | |
| M | 12, 13 | Stainless steel (ferritic & martensitic) | 410, 416, 440 | 400-600 | 250-450 | 0.002-0.005 | 0.002-0.007 | | 2 | 1 | Yes |
| | 14 | Stainless steel (austenitic) | 303, 304, 316, 15-5, 17-4 | | | | | | | | May not be required at high speeds |
| K | 15, 16 | Gray cast iron | CLS. 20, 30, 45 | 600-800 | 500-650 | 0.003-0.007 | 0.003-0.010 | | 1 | 2 | No |
| | 17, 18 | Ductile cast iron | 60-40-18, 100-70-03 | 450-700 | 350-550 | | | | | | Yes |
| N | 21–30 | Aluminum | 7075, 6061 | 2500-5000 | 1600-2600 | 0.002-0.005 | 0.002-0.007 | 1 | | | Yes |
| S | 31–35 | High-temp alloys | Inconel, Hastelloy, Monel | 350-400 | 200-250 | 0.002-0.005 | 0.002-0.007 | | 1 | 2 | Yes |
| | 36, 37 | Titanium alloys | 6Al-4V, 5Al-5Mo-5V-3Cr | 125-150 | 100-125 | | | | 2 | 1 | |
| H | 38, 39 | Hardened steel >48 | A2, O1, D2 | 100-125 | - | 0.002-0.005 | 0.002-0.007 | | | 1 | No |

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.