

M2 Series Application Guide (Inch) • Speed & Feed

| ISO Classification | Work Material | Type of Cut | Axial DOC | Radial DOC | Number of Flutes | Speed (SFM) | Feed (Inch per Tooth) | | | | | | |
|--|-------------------------------------|---------------------|-----------|------------|------------------|-------------|-----------------------|-------|-------|-------|-------|-------|-------|
| | | | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 |
| N | Aluminum Alloys 2024, 6061, 7075 | Slotting | 1 x D | 1 x D | 2 | 800 | .0018 | .0036 | .0054 | .0072 | .0090 | .0108 | .0144 |
| | | | .75 x D | 1 x D | 3 | 800 | .0015 | .0030 | .0045 | .0060 | .0075 | .0090 | .0120 |
| | | Peripheral - Rough | 1 x D | .75 x D | 2 | 1000 | .0025 | .0050 | .0075 | .0100 | .0125 | .0150 | .0200 |
| | | | | | 3 | 1000 | .0020 | .0040 | .0060 | .0080 | .0100 | .0120 | .0160 |
| | | Peripheral - Finish | 1.5 x D | .01 x D | 2 | 1200 | .0030 | .0060 | .0090 | .0120 | .0150 | .0210 | .0240 |
| | | | | | 3 | 1200 | .0025 | .0050 | .0075 | .0100 | .0125 | .0150 | .0200 |
| | High Silicon-Aluminum A380, A390 | Slotting | .75 x D | 1 x D | 2 | 500 | .0013 | .0026 | .0039 | .0052 | .0065 | .0078 | .0104 |
| | | | .5 x D | 1 x D | 3 | 500 | .0011 | .0022 | .0033 | .0044 | .0055 | .0066 | .0088 |
| | | Peripheral - Rough | 1 x D | .5 x D | 2 | 700 | .0016 | .0033 | .0049 | .0065 | .0081 | .0098 | .0130 |
| | | | | | 3 | 700 | .0014 | .0028 | .0041 | .0055 | .0069 | .0083 | .0110 |
| | | Peripheral - Finish | 1.5 x D | .01 x D | 2 | 900 | .0020 | .0041 | .0061 | .0082 | .0102 | .0122 | .0163 |
| | | | | | 3 | 900 | .0017 | .0035 | .0052 | .0069 | .0086 | .0104 | .0138 |
| | Magnesium Alloys | Slotting | 1 x D | 1 x D | 2 | 800 | .0018 | .0036 | .0054 | .0072 | .0090 | .0108 | .0144 |
| | | | .75 x D | 1 x D | 3 | 800 | .0015 | .0030 | .0045 | .0060 | .0075 | .0090 | .0120 |
| | | Peripheral - Rough | 1 x D | .75 x D | 2 | 1000 | .0025 | .0050 | .0075 | .0100 | .0125 | .0150 | .0200 |
| | | | | | 3 | 1000 | .0020 | .0040 | .0060 | .0080 | .0100 | .0120 | .0160 |
| | | Peripheral - Finish | 1.5 x D | .01 x D | 2 | 1200 | .0030 | .0060 | .0090 | .0120 | .0150 | .0210 | .0240 |
| | | | | | 3 | 1200 | .0025 | .0050 | .0075 | .0100 | .0125 | .0150 | .0200 |
| | Copper Alloys, Brass, Bronze | Slotting | .75 x D | 1 x D | 2 | 500 | .0011 | .0022 | .0033 | .0044 | .0055 | .0066 | .0088 |
| | | | | | 3 | 500 | .0009 | .0018 | .0027 | .0036 | .0045 | .0054 | .0072 |
| | | Peripheral - Rough | 1 x D | .75 x D | 2 | 575 | .0011 | .0022 | .0033 | .0044 | .0055 | .0066 | .0088 |
| | | | | | 3 | 575 | .0013 | .0026 | .0039 | .0052 | .0065 | .0078 | .0104 |
| | | Peripheral - Finish | 1.5 x D | .01 x D | 2 | 650 | .0018 | .0036 | .0054 | .0072 | .0090 | .0108 | .0144 |
| | | | | | 3 | 650 | .0015 | .0030 | .0045 | .0060 | .0075 | .0090 | .0120 |
| Composites, Plastics, Fiberglass | Slotting | 1 x D | 1 x D | 2 | 500 | .0013 | .0026 | .0039 | .0052 | .0065 | .0078 | .0104 | |
| | | | | 3 | 500 | .0011 | .0022 | .0033 | .0044 | .0055 | .0066 | .0088 | |
| | Peripheral - Rough | 1 x D | .75 x D | 2 | 700 | .0016 | .0033 | .0049 | .0065 | .0081 | .0098 | .0130 | |
| | | | | 3 | 700 | .0014 | .0028 | .0041 | .0055 | .0069 | .0083 | .0110 | |
| | Peripheral - Finish | 1.5 x D | .01 x D | 2 | 900 | .0020 | .0041 | .0061 | .0082 | .0102 | .0122 | .0163 | |
| | | | | 3 | 900 | .0017 | .0035 | .0052 | .0069 | .0086 | .0104 | .0138 | |

D = Tool diameter

Common Machining Formulas

$$RPM = \frac{SFM \times 3.82}{D}$$

$$SFM = RPM \times D \times .262$$

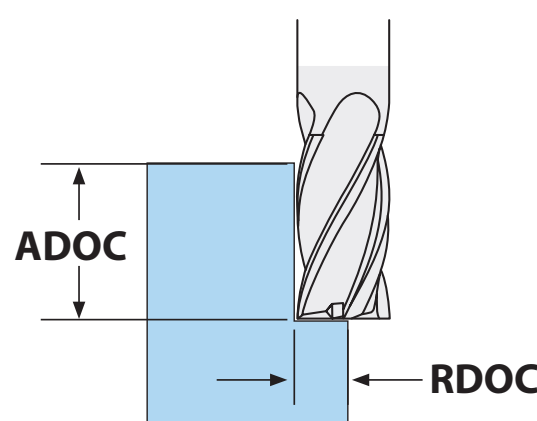
$$IPM = RPM \times IPT \times Z$$

$$MRR = RDOC \times ADOC \times IPM$$

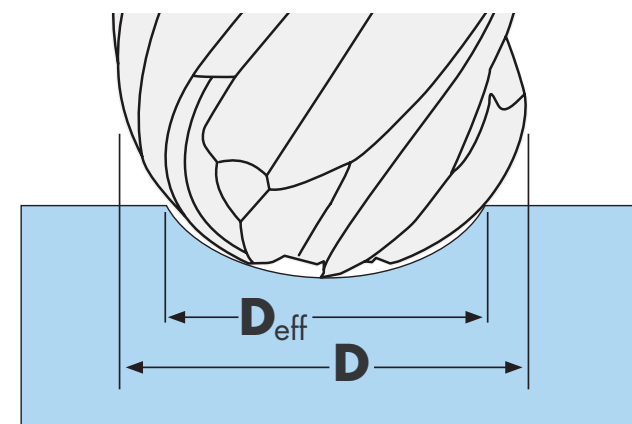
$$\text{Radial Chip Thinning Adjustment } IPT_{adj} = \frac{IPT \times (D/2)}{\sqrt{(D \times RDOC) - RDOC^2}}$$

$$\text{Ball Nose "Effective Diameter"} D_{eff} = 2 \times \sqrt{R^2 - (R - ADOC)^2}$$

- D Tool Cutting Diameter
- R Tool Radius
- Z Number of Flutes
- RPM Revolutions per Minute
- SFM Surface Feet per Minute
- IPM Inches per Minute
- MRR Metal Removal Rate
- RDOC Radial Depth of Cut
- ADOC Axial Depth of Cut

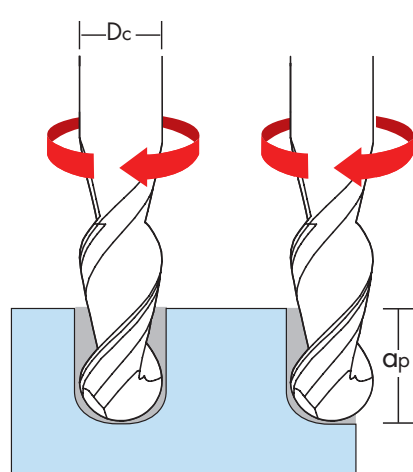


Apply chip thinning adjustment when $RDOC < D$



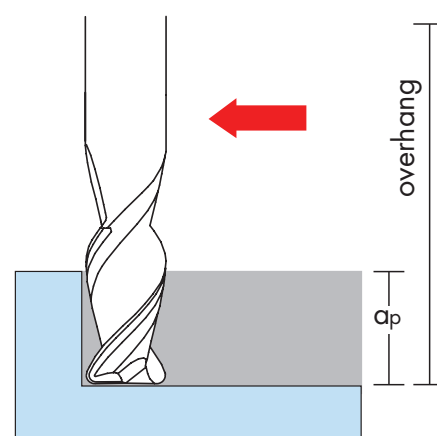
Use D_{eff} when making shallow cuts with full radius

Adjustments - Apply these adjustments when programming the following applications.



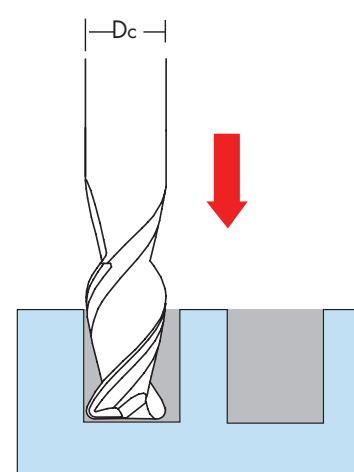
1. Ball-nose end mills

- Reduce chip load by 25% from roughing/slotting recommendation when axial DOC (a_p) exceeds 75% of D_c



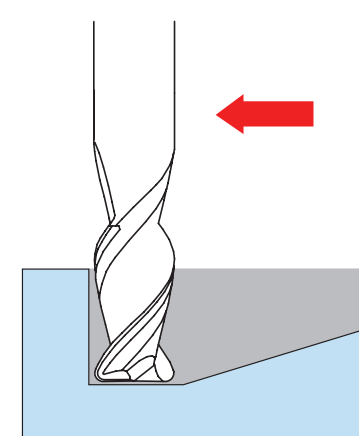
2. Long reach mills with large overhang

- Reduce speed rate and chip load by 10%



3. Plunge entry into work piece

- Reduce chip load by 80% of recommended slotting rate
- Peck mill if axial DOC (a_p) exceeds 50% of D_c



4. Ramp entry into work piece

- Ramp at 1.5° - 2.5° angle
- Reduce chip load by 20% of recommended slotting rate