M2 Series Application Guide (metric) • Speed & Feed

ISO Classification	Work Material	Type of Cut	Axial DOC	Radial DOC	Number of Flutes	Speed (M/Min)	Feed (MM per Tooth) 3,0	6,0	10,0	12,0	16,0	20,0
N	Aluminum Alloys 2024, 6061, 7075	Slotting	1 x D	1 x D	2	244	0.0431	0.0862	0.1437	0.1724	0.2299	0.2873
			.75 x D	1 x D	3	244	0.0360	0.0720	0.1200	0.1440	0.1920	0.2400
		Peripheral - Rough	1 x D	.75 x D	2	305	0.0599	0.1198	0.1997	0.2396	0.3195	0.3993
					3	305	0.0480	0.0960	0.1600	0.1920	0.2560	0.3200
		Peripheral - Finish	1.5 x D	.01 x D	2	365	0.0719	0.1438	0.2397	0.2876	0.3835	0.4793
					3	365	0.0599	0.1198	0.1997	0.2396	0.3195	0.3993
	High Silicon-Aluminum A380, A390	Slotting	.75 x D	1 x D	2	153	0.0312	0.0624	0.1040	0.1248	0.1664	0.2080
			.5 x D	1 x D	3	153	0.0264	0.0528	0.0880	0.1056	0.1408	0.1760
		Peripheral - Rough	1 x D	.5 x D	2	213	0.0383	0.0766	0.1277	0.1532	0.2043	0.2553
					3	213	0.0335	0.0670	0.1117	0.1340	0.1787	0.2233
		Peripheral - Finish	1.5 x D	.01 x D	2	274	0.0480	0.0960	0.1600	0.1920	0.2560	0.3200
					3	274	0.0408	0.0816	0.1360	0.1632	0.2176	0.2720
	Magnesium Alloys	Slotting	1 x D	1 x D	2	244	0.0431	0.0862	0.1437	0.1724	0.2299	0.2873
			.75 x D	1 x D	3	244	0.0360	0.0720	0.1200	0.1440	0.1920	0.2400
		Peripheral - Rough	1 x D	.75 x D	2	305	0.0599	0.1198	0.1997	0.2396	0.3195	0.3993
					3	305	0.0480	0.0960	0.1600	0.1920	0.2560	0.3200
		Peripheral - Finish	1.5 x D	.01 x D	2	365	0.0719	0.1438	0.2397	0.2876	0.3835	0.4793
					3	365	0.0599	0.1198	0.1997	0.2396	0.3195	0.3993
	Copper Alloys, Brass, Bronze	Slotting	.75 x D	1 x D	2	153	0.0239	0.0478	0.0797	0.0956	0.1275	0.1593
					3	153	0.0216	0.0432	0.0720	0.0864	0.1152	0.1440
		Peripheral - Rough	1 x D	.75 x D	2	175	0.0264	0.0528	0.0880	0.1056	0.1408	0.1760
					3	175	0.0312	0.0624	0.1040	0.1248	0.1664	0.2080
		Peripheral - Finish	1.5 x D	.01 x D	2	198	0.0431	0.0862	0.1437	0.1724	0.2299	0.2873
					3	198	0.0360	0.0720	0.1200	0.1440	0.1920	0.2400
	Composites, Plastics, Fiberglass	Slotting	1 x D	1 x D	2	153	0.0312	0.0624	0.1040	0.1248	0.1664	0.2080
					3	153	0.0264	0.0528	0.0880	0.1056	0.1408	0.1760
		Peripheral - Rough	1 x D	.75 x D	2	213	0.0383	0.0766	0.1277	0.1532	0.2043	0.2553
					3	213	0.0335	0.0670	0.1117	0.1340	0.1787	0.2233
		Peripheral - Finish	1.5 x D	.01 x D	2	274	0.0480	0.0960	0.1600	0.1920	0.2560	0.3200
					3	274	0.0408	0.0816	0.1360	0.1632	0.2176	0.2720

D = Tool diameter

Common Machining Formulas

$$RPM = \frac{M/MIN \times 318.057}{D}$$

$$M/MIN = RPM \times D \times .00314$$

$$MM/MIN = RPM \times MMPT \times Z$$

$$MRR = RDOC \times ADOC \times MM/MIN$$

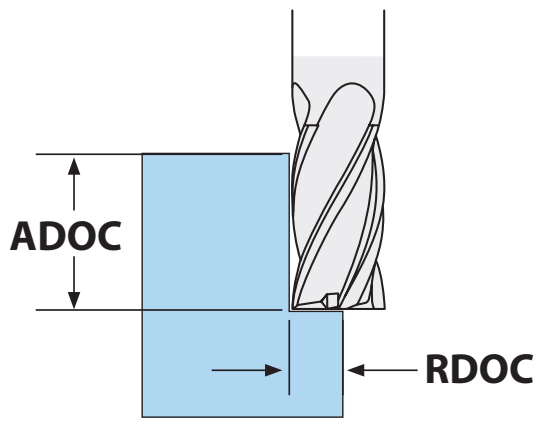
Radial Chip Thinning Adjustment

$$MMPT_{adj} = \frac{MMPT \times (D/2)}{\sqrt{(D \times RDOC) - RDOC^2}}$$

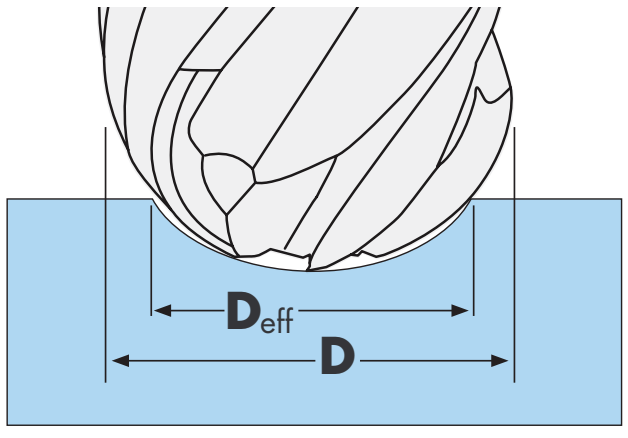
Ball Nose "Effective Diameter"

$$D_{eff} = 2x \sqrt{R^2 - (R - ADOC)^2}$$

D	Tool Cutting Diameter
R	Tool Radius
Z	Number of Flutes
RPM	Revolutions per Minute
M/MIN	Meters per Minute
MM/Min	Millimeters per Minute
MRR	Metal Removal Rate
RDOC	Radial Depth of Cut
ADOC	Axial Depth of Cut

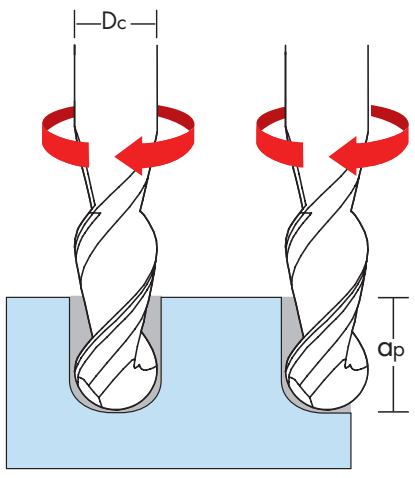


Apply chip thinning adjustment when RDOC < D



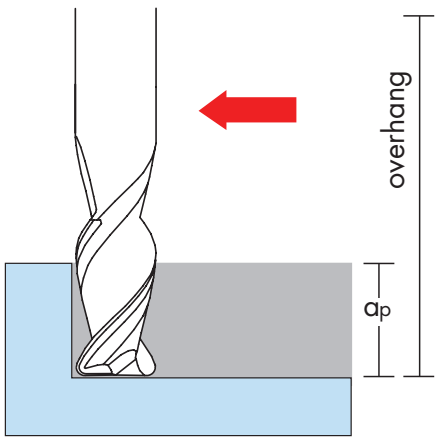
Use D_{eff} when making shallow cuts with full radius

Adjustments – Apply these adjustments when programming the following applications.



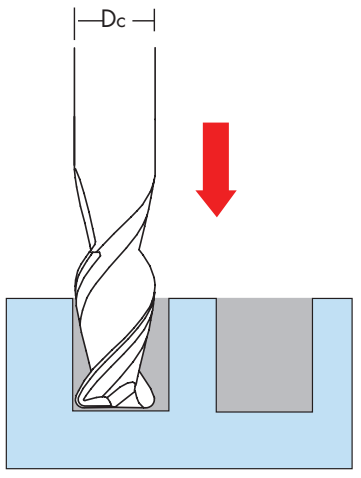
1. Ball-nose end mills

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



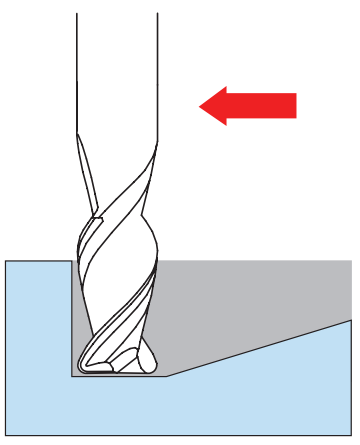
2. Long reach mills with large overhang

- 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 (ap) exceeds 50% of Dc



4. Ramp entry into work piece

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