


## M233 Series Application Guide – Speed & Feed (metric)

ISO Code	Work Material	Type of Cut	Axial DOC	Radial DOC	Number of Flutes	Speed (M/min)	Feed (MM per Tooth)				
							6.0	10.0	12.0	16.0	20.0
	Aluminum Alloys 2024, 6061, 7075	Slotting	1 x D	1 x D	3	244	.0720	.1195	.1440	.1915	.2390
		Peripheral - Rough	≤ 2 x D	.5 x D	3	305	.0960	.1593	.1920	.2553	.3187
		Peripheral - Rough	> 2 - 3 x D	.5 x D	3	305	.0900	.1494	.1800	.2394	.2988
		Peripheral - Rough	> 3 - 4 x D	.45 x D	3	274	.0780	.1295	.1560	.2075	.2589
		*Helical Ramp Angle	3.0 deg.	1 x D	3	244	.0576	.0956	.1152	.1532	.1912
	High Silicon Aluminum A380, A390	Slotting	.75 x D	1 x D	3	152	.0540	.0896	.1080	.1436	.1793
		Peripheral - Rough	≤ 2 x D	.4 x D	3	213	.0684	.1135	.1368	.1819	.2271
		Peripheral - Rough	> 2 - 3 x D	.4 x D	3	213	.0660	.1096	.1320	.1755	.2191
		Peripheral - Rough	> 3 - 4 x D	.375 x D	3	183	.0576	.0956	.1152	.1532	.1912
		*Helical Ramp Angle	2.5 deg.	1 x D	3	152	.0432	.0717	.0864	.1149	.1434
	Magnesium Alloys	Slotting	1 x D	1 x D	3	244	.0720	.1195	.1440	.1915	.2390
		Peripheral - Rough	≤ 2 x D	.5 x D	3	305	.0960	.1593	.1920	.2553	.3187
		Peripheral - Rough	> 2 - 3 x D	.5 x D	3	305	.0900	.1494	.1800	.2394	.2988
		Peripheral - Rough	> 3 - 4 x D	.45 x D	3	274	.0780	.1295	.1560	.2075	.2589
		*Helical Ramp Angle	3.0 deg.	1 x D	3	244	.0576	.0956	.1152	.1532	.1912
	Copper Alloys, Brass	Slotting	.75 x D	1 x D	3	152	.0444	.0737	.0888	.1181	.1474
		Peripheral - Rough	≤ 2 x D	.4 x D	3	183	.0552	.0916	.1104	.1468	.1832
		Peripheral - Rough	> 2 - 3 x D	.4 x D	3	183	.0540	.0896	.1080	.1436	.1793
		Peripheral - Rough	> 3 - 4 x D	.375 x D	3	152	.0468	.0777	.0936	.1245	.1554
		*Helical Ramp Angle	2.5 deg.	1 x D	3	152	.0355	.0590	.0710	.0945	.1179
Bronze	Slotting	.75 x D	1 x D	3	152	.0420	.0697	.0840	.1117	.1394	
	Peripheral - Rough	≤ 2 x D	.4 x D	3	183	.0528	.0876	.1056	.1404	.1753	
	Peripheral - Rough	> 2 - 3 x D	.4 x D	3	183	.0504	.0837	.1008	.1341	.1673	
	Peripheral - Rough	> 3 - 4 x D	.375 x D	3	152	.0420	.0697	.0840	.1117	.1394	
	*Helical Ramp Angle	2.0 deg.	1 x D	3	152	.0336	.0558	.0672	.0894	.1115	
Composites, Plastics, Fiberglass	Slotting	.75 x D	1 x D	3	152	.0540	.0896	.1080	.1436	.1793	
	Peripheral - Rough	≤ 2 x D	.4 x D	3	213	.0684	.1135	.1368	.1819	.2271	
	Peripheral - Rough	> 2 - 3 x D	.4 x D	3	213	.0660	.1096	.1320	.1755	.2191	
	Peripheral - Rough	> 3 - 4 x D	.375 x D	3	183	.0576	.0956	.1152	.1532	.1912	
	*Helical Ramp Angle	3.0 deg.	1 x D	3	152	.0432	.0717	.0864	.1149	.1434	

\*Straight-Line Ramp Angle = Helical ramp angle x 5 for entry up to 1 x D.

Tool Tip: M233 Rougher end mills show up to 20% power reduction from M223 in the same cut.

- D** Tool Diameter
- Z** Number of Flutes
- RPM** Revolutions per Minute
- SFM** Surface Feet per Minute
- M/min** Surface Meters per Minute
- IPM** Inches per Minute
- MMPM** Millimeters per Minute
- IPT** Inch per Tooth
- MMPT** Millimeters per Tooth
- MRR** Metal Removal Rate
- RDOC** Radial Depth of Cut
- ADOC** Axial Depth of Cut

### Technical Resources

Information on tips and adjustments for the following milling operations can be found in our Technical Resources section beginning on page 129.

- HEM slotting
- Face milling
- Helical entry ramping
- Straight line ramping
- Long tool projection adjustments
- Ball nose milling adjustments
- Other helpful tips and calculations