Series 177/179 Metric

Workpiece Material Group		Examples	Coolant Max	Coolant Air	Coolant MMS	Slotting 25% Axial	Slotting 50% Axial	1 x Diameter Axial Depth — Profiling — Small Radial Depth ==========> Largest Radial Depth: 1% of Dia.	5% of Dia.	10% of Dia.	15% of Dia.	20% of Dia.	30% of Dia.	50% of Dia.
			Type			SMM								
Steels	P	Free Machining	●	●	●	150	150	730	685	620	565	500	380	150
		Low Carbon	●	●	●	150	150	730	685	620	565	500	380	150
		Medium Carbon	●	●	●	90	90	335	310	290	260	240	180	90
		Alloy Steels	●	●	●	75	75	150	140	130	130	120	105	75
		High Strength Alloys	●	●	●	75	75	150	140	130	130	120	105	75
		Structural Steels	●	●	●	150	150	730	685	620	565	500	380	150
		Die/Tool Steels	●	●	●	60	60	120	115	115	110	110	90	60
Stainless Steels	M	Free Machining	●	x	○	90	90	150	145	140	135	130	115	90
		Moderate Stainless	●	x	○	75	75	150	115	115	110	105	95	75
		Difficult Stainless	●	x	○	60	60	105	100	95	90	90	75	60
		PH Stainless	●	x	○	40	40	75	75	75	70	70	60	40
		Cobalt Chrome Alloys	●	x	○	45	45	75	75	75	70	70	60	45
		Duplex (22%)	●	x	○	40	40	75	75	75	70	70	60	40
		Super Duplex (25%)	●	x	○	30	30	60	60	55	55	50	45	30
Special Alloys	S	High Temp Alloys	●	x	x	45	45	75	75	75	70	60	55	45
		Titanium Alloys	●	x	x	55	55	125	120	115	105	100	80	55
Cast Irons	K	Gray Cast Iron	●	○	○	120	120	450	430	400	360	335	250	120
		SG Iron	●	○	○	105	105	365	345	320	295	275	215	105
		Ductile Cast Iron	●	○	○	90	90	150	145	140	130	130	115	90
		Malleable Iron	●	○	○	90	90	120	115	110	105	105	100	90

● Preferred
○ Possible
x Not Possible

If axial depth is less than the ball diameter, the speed is figured using the effective cutting diameter.

Workpiece Material Group		Examples	Tool Diameter (mm) 1	3	4	6	8	10	12	16	18	25
			mm/Tooth									
Steels	P	Free Machining Low Carbon Medium Carbon Alloy Steels High Strength Alloys Structural Steels Die/Tool Steels	.005	.010	.017	.025-.040	.033-.053	.040	.066	.066-.083	.078-.088	.088-.129
Stainless Steels	M	Free Machining Moderate Stainless Difficult Stainless PH Stainless Cobalt Chrome Alloys Duplex (22%) Super Duplex (25%)	.005	.010	.017	.025-.040	.033-.053	.040	.066	.066-.083	.078-.088	.088-.129
Special Alloys	S	Titanium Alloys										
		High Temp Alloys	.002	.005	.020	.012-.020	.017-.027	.017-.033	.025-.040	.025-.043	.027-.045	.030-.050
Cast Irons	K	Gray Cast Iron SG Iron Ductile Cast Iron Malleable Iron	.005	.010	.017	.017-.040	.025-.055	.038-.071	.045-.083	.060-.088	.071-.099	.060-.127

Example: Profile Milling

1) Select Material from chart.
2) Select Tool Size.
3) Select feed per tooth.
4) Figure percentage of clutter Diameter Radial Cut Depth.
5) Select Chip Load Factor for Radial Depth.
6) Multiply Chip Load Factor x Feed per Tooth.
7) Answer: New Feed per Tooth.
8) RPM x New Feed per Tooth x number of Teeth = mm/min (Millimeters per Minute)

Example:Slotting

1) Select Material from chart.
2) Select Tool Size.
3) Select feed per tooth from chart.
4) Multiply Feed per Tooth x Number of Teeth x RPM.
5) Answer: mm/min (Millimeters per Minute)

Spindle Max.

Should the Calculated Spindle Speed be more than your actual Spindle Max., Use Formula Below:

$$\frac{\text{Calculated Feed x Spindle Max.}}{\text{Calculated Speed}}$$

During Profile Milling less than 50% of the cutter diameter radial depth, the actual chipload at the cutting edge is less than the programmed chip load. Below are Chip Load factors depending on Radial Depth Percentage. Multiply your inches per tooth by the factor before figuring your IPM.

Radial Depth in Percentage of Cutter Diameter	Increase Chip Load Factor
50%	1.00
30%	1.10
20%	1.20
15%	1.40
10%	1.80
5%	2.30
1%	5.00