

CUTTING PARAMETERS - GETTING STARTED REFERENCE GUIDE

LANGMUIR SYSTEMS MR-1 CNC MILLING MACHINE (REV. 11/21/2022)

NON-FERROUS MATERIAL <small>Includes: Aluminum, Brass, Bronze, Copper, Plastics Excludes: Titanium Alloys</small>	Cutting Tool Size	Cutting Tool Spec. (Recommended)	Spindle Speed (RPM)	Cutting Direction	Width of Cut [a.k.a Step Over or Optimal Load] (mm, Maximum)	Depth of Cut (mm, Maximum) [2]	Feed Rate (MM per Minute [MMPM]) [3]	Plunging
Adaptive Clearing, Pocketing, Countouring, Boring, General Roughing	1/8"(3.175mm) End Mill	2 Flutes, Carbide, High Helix Angle (45°), Variable Flute, Variable Pitch, DLC or ZRN Coated [1]	8000	CLIMB OR CONVENTIONAL	0.762	3.175	381-762	Helical Ramp, 1.8", 1016 MMPM
	1/4"(6.35mm) End Mill		8000		1.270	6.350	762-1270	
	3/8"(9.525mm) End Mill		8000		1.270	9.525	1524-2540	
	1/2"(12.7mm) End Mill		8000		1.270	12.700	1524-2540	
Facing (Roughing)	1/8"(3.175mm) End Mill	2 Flutes, Carbide, High Helix Angle (45°), Variable Flute, Variable Pitch, DLC or ZRN Coated [1]	8000	BOTH WAYS	1.778	0.762	381-762	N/A
	1/4"(6.35mm) End Mill		8000		5.080	1.270	762-1270	
	3/8"(9.525mm) End Mill		8000		8.128	1.524	1524-2286	
	1/2"(12.7mm) End Mill		8000		11.430	1.524	1524-2286	
	Langmuir Fly Cutter	Aluminum Cutting Inserts, Set to Smallest Diameter (~55.88mm)	1500	N/A	50.800	0.508	254-508	
Chamfering	Any 1/4"(6.35mm) to 1/2"(12.7mm) Chamfer Mill	2 Flute or 4 Flute Carbide	8000	CLIMB	0.127 to 1.524 Chamfer Size		254-508	N/A
Finishing Pass (Facing, Floors, and Side Walls)	1/4"(6.35mm) End Mill	2 Flutes, High Helix Angle (45°), Variable Flute, Variable Pitch, DLC or ZRN Coated [1]	8000	CLIMB	Leave a maximum of 0.127mm stock on floors and side walls for finishing. Finish side walls in one pass at full part depth if possible.		889	N/A
	3/8"(9.525mm) End Mill		8000				889	
	1/2"(12.7mm) End Mill		8000				889	
	Langmuir Fly Cutter	Set to Smallest Diameter (~55.88mm)	1500	N/A			254-381	
SOFTER FERROUS MATERIAL <small>Includes: Mild Steel, Tool Steel (annealed), Cast Iron Excludes: Stainless Alloys, Alloy Steel, Hardened Steel</small>	Cutting Tool Size	Cutting Tool Spec. (Recommended)	Spindle Speed (RPM)	Cutting Direction	Width of Cut [a.k.a Step Over or Optimal Load] (mm, Maximum)	Depth of Cut (mm, Maximum) [2]	Feed Rate (MM per Minute [MMPM]) [3]	Plunging
Adaptive Clearing, Pocketing, Countouring, Boring, General Roughing	1/8"(3.175mm) End Mill	4 Flutes, Carbide, Variable Flute, Variable Pitch, TiAlN Coated [4]	8000	CLIMB	0.508	1.905	381-762	Helical Ramp, 1.8", 1016 MMPM
	1/4"(6.35mm) End Mill		8000		0.762	3.810	508-1270	
	3/8"(9.525mm) End Mill		7200		1.270	5.080	762-1778	
	1/2"(12.7mm) End Mill		5300		1.270	6.350	635-1270	
Facing (Roughing)	1/8"(3.175mm) End Mill	4 Flutes, Carbide, Variable Flute, Variable Pitch, TiAlN Coated [4]	8000	BOTH WAYS	1.778	0.381	381-762	N/A
	1/4"(6.35mm) End Mill		8000		5.080	0.635	508-1270	
	3/8"(9.525mm) End Mill		7200		8.128	0.762	762-1778	
	1/2"(12.7mm) End Mill		5300		11.430	0.762	635-1270	
Chamfering	Any 1/4"(6.35mm) to 1/2"(12.7mm) Chamfer Mill	2 Flute or 4 Flute Carbide	8000	CLIMB	0.127 to 1.524 Chamfer Size		254-509	N/A
Finishing Pass (Facing, Floors, and Side Walls)	1/4"(6.35mm) End Mill	4 Flutes, Carbide, Variable Flute, Variable Pitch, TiAlN Coated [4]	8000	CLIMB	Leave a maximum of 0.127mm stock on floors and side walls for finishing. Finish side walls in one pass at full part depth if possible.		762	N/A
	3/8"(9.525mm) End Mill		7200				762	
	1/2"(12.7mm) End Mill		5300				762	
NON-FERROUS MATERIAL <small>Includes: Aluminum, Brass, Bronze, Copper, Plastics Excludes: Titanium Alloys</small>	Cutting Tool Size	Cutting Tool Spec. (Recommended)	Spindle Speed (RPM)	Cutting Direction	Width of Cut [a.k.a Step Over or Optimal Load] (mm, Maximum)	Depth of Cut (mm, Maximum) [2]	Feed Rate (MM per Minute [MMPM]) [3]	Plunging
Adaptive Clearing, Pocketing, Countouring, Boring, General Roughing	1/8"(3.175mm) End Mill	4 Flutes, Carbide, Variable Flute, Variable Pitch, TiAlN Coated [4]	8000	CLIMB OR CONVENTIONAL	0.508	1.270	254-508	Helical Ramp, 1.8", 1016 MMPM
	1/4"(6.35mm) End Mill		5000		0.762	1.778	254-508	
	3/8"(9.525mm) End Mill		3700		1.016	2.540	254-762	
Facing (Roughing)	1/8"(3.175mm) End Mill	4 Flutes, Carbide, Variable Flute, Variable Pitch, TiAlN Coated [4]	8000	BOTH WAYS	1.778	0.254	254-508	N/A
	1/4"(6.35mm) End Mill		5000		5.080	0.381	254-508	
	3/8"(9.525mm) End Mill		7200		8.128	0.508	254-762	
Chamfering	Any 1/4"(6.35mm) to 1/2"(12.7mm) Chamfer Mill	2 Flute or 4 Flute Carbide	8000	CLIMB	0.127 to 1.524 Chamfer Size		254-381	N/A
Finishing Pass (Facing, Floors, and Side Walls)	1/8"(3.175mm) End Mill	4 Flutes, Carbide, Variable Flute, Variable Pitch, TiAlN Coated [4]	8000	CLIMB	Leave a maximum of 0.127mm stock on floors and side walls for finishing. Finish side walls in one pass at full part depth if possible.		254	N/A
	1/4"(6.35mm) End Mill		5000				381	
	3/8"(9.525mm) End Mill		3700				381	

[1] We STRONGLY recommend using this type of tooling on MR-1 for best cutting results. Some examples of this approved tooling includes Langmuir Systems 2 Flute End Mills, Lakeshore Carbide (Part #'s 320014X, 320038X, 320012X, etc.), Shars Tool Company (Part #'s 415-0193, 415-0195, 415-0196, etc.), YG-1 ALU Power End Mill Series (3 Flute), McMaster Carr (Part #'s 8829A19, 8829A31, etc.), or appropriate equivalents.

[2] For best results, we recommend not exceeding the listed Depth of Cut for a given roughing pass. If you need to cut deeper, use the 'Multiple Depths' feature in your CAM programming software to limit the maximum roughing pass depth to the max value listed in this table. It will then use multiple roughing depths to achieve the cutting depth needed.

[3] If you encounter tool chatter when using a slower feed rate, we recommend using the Overrides Menu in CutControl to increase the feed rate and/or decrease the Spindle Speed RPM until the chatter subsides.

[4] We STRONGLY recommend using this type of tooling on MR-1 for best cutting results. Some examples of this approved tooling includes Langmuir Systems 4 Flute End Mills and Roughing End Mills, Lakeshore Carbide (Part #'s 18MTMX, 14MTMX, 38MTMX, 12MTMX, etc.), Shars Tool Company (Part #'s 416-2930, 416-2928, 416-2931, etc.), McMaster Carr (Part #'s 8745A23, 8745A11, 8745A648, 8745A14 etc.), or appropriate equivalents.