

As a new user of the revolutionary Lamina Multi-Mat® (Multi Material) inserts, we would like to present to you a short machining guide to insure your satisfaction from our product.

The cutting data specified in this guide should be considered as a good starting point. Each insert is able to perform in a wider range of cutting conditions.

For complete cutting data please see our catalog or our online catalog at our web site www.lamina-tech.ch

Milling

1. Select the material group to be machined. In case of doubt, refer to material reference pages in the catalog.
2. Check machining recommendations with or without coolant.
3. Select feed as a function of the tool lead angle.
4. The cutting speed is indicated in the right-hand column.

Basic cutting conditions for first time user - Milling

Material Group	Group No	Material Examples	hardness BHn	Coolant	feed per tooth		Initial SFM				
					45°	90°					
Low Carbon Steel	1	1018 / 1020	150	No	0.012	0.009	1000				
		1026 / 12414	180				875				
		1045	210				750				
Alloy Steel	2	8620	180	No	0.010	0.007	750				
		4140	230				700				
		4340	280				550				
		52100	320				360				
		ASTM A353	220				425				
High Alloy Steel	3	H13	280	Yes	0.009	0.006	350				
			320				325				
			350				280				
Austenitic Stainless Steel	4	303 / 304 304 L	210 to 250	No	0.010	0.007	700				
		5	316 / 316 L				230 to 270	Yes	0.009	0.006	600
			6				316 Ti 630 (F16PH)				230 to 270
Ferritic Stainless Steel	7	430 / 439 / 444	200 to 300	No	0.010	0.007	650				
Martensitic Stainless Steel	8	410 / 420	200 to 300	No	0.010	0.007	650				
Grey Cast Iron	9	Class 20	140	No	0.012	0.009	750				
		Class 30	to 250				700				
		Class 40					600				
Nodular Cast Iron	10	60-40-18	210	Yes	0.010	0.006	570				
		80-55-06	260				450				
		1000-70-03	310				400				
Nickel Based Alloys	11	Inconel 625	-----	Yes	0.009	0.006	100				
		Inconel 718					100				
		Hastelloy C					170				
Titanium Based Alloys	12	TiAl 6 V4 T40	-----	Yes	0.009	0.006	150 140				
Aluminium	13	Si < 4%	----	Yes	0.10	0.006	2400				
		4% < Si < 9%	----				0.007	0.005	1350		
For Alu group 13, please use our Alu line grade LT-05											
Aluminium	14	Si > 9%	----	Yes	0.010	0.006	750				
		For Alu group 14, please use inserts grade LT-10									

Milling tips

- The cutting conditions are Lamina Technologies guidelines for optimal machining, however our inserts can work in a wider range of cutting conditions to meet special machining needs.
- It is always recommended to machine in 'Climb Milling' way.
- For Stainless Steel, work over the minimum speed, as machining Stainless Steel at low speeds causes material sticking.
- Coolant recommendations:
Use coolant with materials from groups 11, 12.
Do not use coolant with materials from groups 1, 2, 3, 4, 7, 9, 10. Use coolant with materials from groups 5, 6, 8 - depending on the application.
- Do not use coolant if it is not efficient enough.
- In any case of vibrations, we recommend reducing cutting speed and/ or Depth Of Cut, and increasing feed rate. Also always the Cutter's shank should be as short as possible and as wide as possible.
- Always check clamping stability.
- If chips are turning with the cutter, increase cutting speed, feed rate or both.
- If the work piece warms up, increase feed rate.
- Always verify that the tool holder is in good condition (not damaged).

• The above values are indicated as functions of the cutting edge angle, i.e. kappa 45° or 90°. The high feed relates to cutting inserts for surfacing, attack angles 45° and 75°. The low feed relates to cutting inserts for surfacing, trimming angle 90°. The above-mentioned cutting conditions are indicated for each material group and the respective hardness.

Turning

1. Select the material group to be machined. In case of doubt, consult material reference pages in the catalog.
2. Select the insert nose radius.
3. Select cutting depth and feed according to radius.
4. The cutting speed is indicated in the right-hand column.

Turning tips

- The cutting conditions are Lamina Technologies guidelines for optimal machining, however our inserts can work in a wider range of cutting conditions to meet special machining needs.
- If working according to our recommended cutting conditions A-max should be respected.
- For Stainless Steel, work over the minimum speed, as machining Stainless Steel at low speeds causes material sticking.
- Coolant recommendations:
Use coolant with materials from groups 6, 7, 8, 9, 10, 11, 12.
Do not use coolant with materials from groups 1, 2, 4. Use coolant with materials from groups 3, 5 - depending on the application.

- Always verify that the tool holder and shim are in good condition (not damaged).
- If cutting chips are too long, we recommend increasing feed rate.
- If cutting chips are not controlled (vary in shape and size), we recommend increasing feed rate and reducing depth of cut.
- For internal boring operation, the tool holder should be as short as possible and shank as wide as possible.
- In any case of vibrations, we recommend reducing cutting speed, and increasing feed rate.
- In strong interrupted cut, feed rate should be reduced.

Basic cutting conditions for first time user - Turning

Material Group	Group No	Material Examples	hardness BHn	Nose radius 1/64"		Nose radius 2/64"		Nose radius 3/64"		Initial SFM	
				(04)		(08)		(12)			
				d.o.c	f	d.o.c	f	d.o.c	f		
Low Carbon Steel	1	1018 / 1020	150	0.015	0.004	0.030	0.009	0.040	0.012	1300	
		1026 / 12414	180	to	to	to	to	to	to	975	
		1045	210	0.060	0.006	0.125	0.011	0.200	0.020	825	
Alloy Steel	2	8620	180	0.015	0.004	0.030	0.009	0.040	0.012	1000	
		4140	230							800	
		4340	280							675	
		52100	320							550	
		ASTM A353	220							525	
High Alloy Steel	3	H13	280	0.015	0.004	0.030	0.008	0.040	0.013	400	
			320							350	
			350							300	
Austenitic Stainless Steel	4	303 / 304 304 L	210 to 250	0.015	0.005	0.030	0.007	0.040	0.012	700	
		5	316 / 316 L	230 to 270	0.015	0.004	0.030	0.007	0.040	0.011	600
			6	316 Ti 630 (F16PH)	230 to 270	0.015	0.005	0.030	0.007	0.040	0.011
Ferritic Stainless Steel	7	430 / 439 / 444	200 to 300	0.015	0.005	0.030	0.009	0.030	0.012	600	
Martensitic Stainless Steel	8	410 / 420	200 to 300	0.015	0.005	0.030	0.009	0.030	0.012	600	
Grey Cast Iron	9	Class 20	140	0.008	0.003	0.030	0.007	0.030	0.012	750	
		Class 30	to 250	to	to	to	to	to	to	700	
		Class 40		0.060	0.006	0.187	0.014	0.200	0.024	625	
Nodular Cast Iron	10	60-40-18	210	0.008	0.004	0.030	0.007	0.030	0.012	625	
		80-55-06	260	to	to	to	to	to	to	550	
		1000-70-03	310	0.060	0.005	0.125	0.012	0.200	0.020	450	
Nickel Based Alloys	11	Inconel 625	-----	0.009	0.004	0.030	0.007	0.030	0.012	100	
		Inconel 718		to	to	to	to	to	to	115	
		Hastelloy C		0.047	0.005	0.125	0.011	0.125	0.017	200	
Titanium Based Alloys	12	TiAl 6 V4 T40	-----	0.009	0.004	0.030	0.007	0.030	0.012	165	
				0.047	0.006	0.125	0.012	0.157	0.018	125	
Aluminium	13	Si < 4%	----	0.008	0.005	0.008	0.006			2400	
		4% < Si < 9%	----	0.200	0.010	0.200	0.020			1350	
For Alu group 13, please use our Alu line grade LT-05											
Aluminium	14	Si > 9%	----	0.020-0.200	0.003-0.009	0.020-0.200	0.007-0.016	0.020-0.200	0.009-0.024	750	
		For Alu group 14, please use inserts grade LT-10									