

TECHNO CNC Feedrates & RPMs

[Chipload] x [Cutter Dia] x [# flutes] x [RPM] = [Feedrate]

2% chipload for hard materials: Hardwood, solid surface, cast acrylic, brass

4% chipload for soft materials and materials that melt: Polycarbonate, Sintra, MDF, extruded acrylic, aluminum

FEEDRATES & RPM

One of the most important factors when cutting material is the 'chip load'. The chipload is the thickness of the chip being created by the cutter.

[Chipload] x [# of flutes] x [RPM] = [feedrate].

If the chipload is too small, the cutter will heat up. This can result in burning, melting or premature wear of the cutter.

A good starting point to find the chipload is about 2% of the cutter diameter. Softer materials and materials that melt should have a thicker chip closer to 4% of the cutter diameter.

2% Hard material: Brass, hardwood, cast acrylic, solid surface

4% Soft material: Aluminum, MDF, particle board, extruded acrylic, sintra, polycarbonate

[2%-4%] x [cutter dia] x [#flutes] x [RPM] = [feedrate].

Note that for each cutter, there is a feedrate range that corresponds to the RPM range. The number of flutes determine the range at which a cutter should be fed at. The number of flutes should be taken into consideration when cutting material. 3 and 4 flute cutters are best for high feedrates, while 1 and 2 flute cutters are best at lower feedrates. Also keep in mind that spindles have peak power at the higher RPMs. It is better to use a 2 flute cutter at 18000RPM than a 4 flute at 9000RPM.

When dealing with material that melts, a thicker chip will reduce melting. When cutting deep into these materials, it becomes important to remove the chips from the cut. Cutters with less flutes are better capable of removing these chips. Also, larger cutters are better for dealing with melting.

CUTTER BITS

Bit Dia	Bit Type	Flute #	Flute Length
1/4"	UpSpiral	2	1"
1/4"	Straight	2	3/4"
1/4"	CUT L	1	3/4"
1/2"	Straight	2	2"
1/2"	EndMill	1	1-5/8"
3/4"	Straight	2	1-1/4"

Cutter Dia	1/2				
		Chipload	2%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	60	120	180	240	
7000	70	140	210	280	
8000	80	160	240	320	
9000	90	180	270	360	
10000	100	200	300	400	
11000	110	220	330	440	
12000	120	240	360	480	
13000	130	260	390	520	
14000	140	280	420	560	
15000	150	300	450	600	
16000	160	320	480	640	
17000	170	340	510	680	
18000	180	360	540	720	
19000	190	380	570	760	
20000	200	400	600	800	
21000	210	420	630	840	
22000	220	440	660	880	
23000	230	460	690	920	
24000	240	480	720	960	

Cutter Dia	3/8				
		Chipload	2%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	45	90	135	180	
7000	53	105	158	210	
8000	60	120	180	240	
9000	68	135	203	270	
10000	75	150	225	300	
11000	83	165	248	330	
12000	90	180	270	360	
13000	98	195	293	390	
14000	105	210	315	420	
15000	113	225	338	450	
16000	120	240	360	480	
17000	128	255	383	510	
18000	135	270	405	540	
19000	143	285	428	570	
20000	150	300	450	600	
21000	158	315	473	630	
22000	165	330	495	660	
23000	173	345	518	690	
24000	180	360	540	720	

Cutter Dia	1/4				
		Chipload	2%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	30	60	90	120	
7000	35	70	105	140	
8000	40	80	120	160	
9000	45	90	135	180	
10000	50	100	150	200	
11000	55	110	165	220	
12000	60	120	180	240	
13000	65	130	195	260	
14000	70	140	210	280	
15000	75	150	225	300	
16000	80	160	240	320	
17000	85	170	255	340	
18000	90	180	270	360	
19000	95	190	285	380	
20000	100	200	300	400	
21000	105	210	315	420	
22000	110	220	330	440	
23000	115	230	345	460	
24000	120	240	360	480	

Cutter Dia	3/16				
		Chipload	2%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	23	45	68	90	
7000	26	53	79	105	
8000	30	60	90	120	
9000	34	68	101	135	
10000	38	75	113	150	
11000	41	83	124	165	
12000	45	90	135	180	
13000	49	98	146	195	
14000	53	105	158	210	
15000	56	113	169	225	
16000	60	120	180	240	
17000	64	128	191	255	
18000	68	135	203	270	
19000	71	143	214	285	
20000	75	150	225	300	
21000	79	158	236	315	
22000	83	165	248	330	
23000	86	173	259	345	
24000	90	180	270	360	

Cutter Dia	1/8				
		Chipload	2%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	15	30	45	60	
7000	18	35	53	70	
8000	20	40	60	80	
9000	23	45	68	90	
10000	25	50	75	100	
11000	28	55	83	110	
12000	30	60	90	120	
13000	33	65	98	130	
14000	35	70	105	140	
15000	38	75	113	150	
16000	40	80	120	160	
17000	43	85	128	170	
18000	45	90	135	180	
19000	48	95	143	190	
20000	50	100	150	200	
21000	53	105	158	210	
22000	55	110	165	220	
23000	58	115	173	230	
24000	60	120	180	240	

Cutter Dia	1/2				
		Chipload	4%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	120	240	360	480	
7000	140	280	420	560	
8000	160	320	480	640	
9000	180	360	540	720	
10000	200	400	600	800	
11000	220	440	660	880	
12000	240	480	720	960	
13000	260	520	780	###	
14000	280	560	840	###	
15000	300	600	900	###	
16000	320	640	960	###	
17000	340	680	###	###	
18000	360	720	###	###	
19000	380	760	###	###	
20000	400	800	###	###	
21000	420	840	###	###	
22000	440	880	###	###	
23000	460	920	###	###	
24000	480	960	###	###	

Cutter Dia	3/8				
		Chipload	4%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	90	180	270	360	
7000	105	210	315	420	
8000	120	240	360	480	
9000	135	270	405	540	
10000	150	300	450	600	
11000	165	330	495	660	
12000	180	360	540	720	
13000	195	390	585	780	
14000	210	420	630	840	
15000	225	450	675	900	
16000	240	480	720	960	
17000	255	510	765	###	
18000	270	540	810	###	
19000	285	570	855	###	
20000	300	600	900	###	
21000	315	630	945	###	
22000	330	660	990	###	
23000	345	690	###	###	
24000	360	720	###	###	

Cutter Dia	1/4				
		Chipload	4%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	60	120	180	240	
7000	70	140	210	280	
8000	80	160	240	320	
9000	90	180	270	360	
10000	100	200	300	400	
11000	110	220	330	440	
12000	120	240	360	480	
13000	130	260	390	520	
14000	140	280	420	560	
15000	150	300	450	600	
16000	160	320	480	640	
17000	170	340	510	680	
18000	180	360	540	720	
19000	190	380	570	760	
20000	200	400	600	800	
21000	210	420	630	840	
22000	220	440	660	880	
23000	230	460	690	920	
24000	240	480	720	960	

Cutter Dia	3/16				
		Chipload	4%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	45	90	135	180	
7000	53	105	158	210	
8000	60	120	180	240	
9000	68	135	203	270	
10000	75	150	225	300	
11000	83	165	248	330	
12000	90	180	270	360	
13000	98	195	293	390	
14000	105	210	315	420	
15000	113	225	338	450	
16000	120	240	360	480	
17000	128	255	383	510	
18000	135	270	405	540	
19000	143	285	428	570	
20000	150	300	450	600	
21000	158	315	473	630	
22000	165	330	495	660	
23000	173	345	518	690	
24000	180	360	540	720	

Cutter Dia	1/8				
		Chipload	4%		
Feedrate					
RPM	Flutes:	1	2	3	4
6000	30	60	90	120	
7000	35	70	105	140	
8000	40	80	120	160	
9000	45	90	135	180	
10000	50	100	150	200	
11000	55	110	165	220	
12000	60	120	180	240	
13000	65	130	195	260	
14000	70	140	210	280	
15000	75	150	225	300	
16000	80	160	240	320	
17000	85	170	255	340	
18000					