

Product Notes:
Due to a varying diameter, an Effective Cutter Diameter is needed for Chip Load selection and RPM calculation:
Effective Cutter Diameter = (Major Diameter + Minor Diameter)/2.
Or consider the actual diameter along the angle that is engaged with the workpiece.

Depth of Cut is shown as number of Passes with each pass resulting in a descending stepover

Chip Loads are given 3 ways:
Traditional Edge Break of .010"-.015"
Full Chamfer engagement for cutters with angles GREATER than 25° per side (50° included)
Full Chamfer engagement for cutters with angles LESS than 25° per side (50° included)

Chip Loads within table pertain to machining on one side of workpiece.
For machining on two sides, reduce Chip Loads to 60%-80% depending on contact length and finish
For vertical plunging, reduce Chip Loads to 40%-50% depending on finish

Material Guide		Hardness	SFM	Operation	Chip Load (IPT) By Effective Cutter Diameter												Depth of Cut			
					1/16	5/64	3/32	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	Passes			
Carbon Steel	10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36	29-37 Rc (279-344 HBn)	600	Edge Break	.00030	.00037	.00044	.00060	.00089	.00119	.00149	.00179	.00238	.00298	.00358	.00477	1			
				Full Chamfer (≥ 25°)	.00025	.00031	.00037	.00050	.00074	.00099	.00124	.00149	.00199	.00248	.00298	.00397	3			
				Full Chamfer (< 25°)	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	4			
Low Alloy Steel	13XX, 41XX, 43XX, 51XX, 86XX, 93XX	29-37 Rc (279-344 HBn)	200	Edge Break	.00032	.00041	.00049	.00065	.00098	.00130	.00163	.00196	.00261	.00326	.00391	.00522	1			
				Full Chamfer (≥ 25°)	.00027	.00034	.00040	.00054	.00081	.00109	.00136	.00163	.00217	.00272	.00326	.00435	3			
				Full Chamfer (< 25°)	.00020	.00025	.00030	.00041	.00061	.00082	.00102	.00122	.00163	.00204	.00245	.00326	4			
Tool Steel	A, L, O, P, W series	29-37 Rc (279-344 HBn)	200	Edge Break	.00030	.00037	.00044	.00060	.00089	.00119	.00149	.00179	.00238	.00298	.00358	.00477	1			
				Full Chamfer (≥ 25°)	.00025	.00031	.00037	.00050	.00074	.00099	.00124	.00149	.00199	.00248	.00298	.00397	3			
				Full Chamfer (< 25°)	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	4			
		38-45 Rc (353-421 HBn)	100	Edge Break	.00030	.00037	.00044	.00060	.00089	.00119	.00149	.00179	.00238	.00298	.00358	.00477	1			
				Full Chamfer (≥ 25°)	.00025	.00031	.00037	.00050	.00074	.00099	.00124	.00149	.00199	.00248	.00298	.00397	3			
				Full Chamfer (< 25°)	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	4			
	D, H, M, T, S series	29-37 Rc (279-344 HBn)	150	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1			
				Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	4			
				Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	5			
		38-45 Rc (353-421 HBn)	75	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1			
				Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	4			
				Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	5			
Austenitic Stainless Steel	Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347	29-37 Rc (279-344 HBn)	450	Edge Break	.00032	.00041	.00049	.00065	.00098	.00130	.00163	.00196	.00261	.00326	.00391	.00522	1			
				Full Chamfer (≥ 25°)	.00027	.00034	.00040	.00054	.00081	.00109	.00136	.00163	.00217	.00272	.00326	.00435	3			
				Full Chamfer (< 25°)	.00020	.00025	.00030	.00041	.00061	.00082	.00102	.00122	.00163	.00204	.00245	.00326	4			
Martensitic & Ferritic Stainless Steel	403, 410, 416, 420, 440, 430, 446	29-37 Rc (279-344 HBn)	200	Edge Break	.00030	.00037	.00044	.00060	.00089	.00119	.00149	.00179	.00238	.00298	.00358	.00477	1			
				Full Chamfer (≥ 25°)	.00025	.00031	.00037	.00050	.00074	.00099	.00124	.00149	.00199	.00248	.00298	.00397	3			
				Full Chamfer (< 25°)	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	4			
	38-45 Rc (353-421 HBn)	100	Edge Break	.00030	.00037	.00044	.00060	.00089	.00119	.00149	.00179	.00238	.00298	.00358	.00477	1				
			Full Chamfer (≥ 25°)	.00025	.00031	.00037	.00050	.00074	.00099	.00124	.00149	.00199	.00248	.00298	.00397	4				
			Full Chamfer (< 25°)	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	5				
PH Stainless Steel	15-5, 17-4, Carpenter 450, Carpenter 465	29-37 Rc (279-344 HBn)	150	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1			
				Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	3			
				Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	4			
	38-45 Rc (353-421 HBn)	90	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1				
			Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	4				
			Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	5				
Nickel Alloy	Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20	29-37 Rc (279-344 HBn)	70	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1			
				Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	3			
				Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	4			
	38-45 Rc (353-421 HBn)	50	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1				
			Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	4				
			Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	5				
Titanium Alloy	Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al	29-37 Rc (279-344 HBn)	150	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1			
				Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	3			
				Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	4			
	38-45 Rc (353-421 HBn)	75	Edge Break	.00018	.00023	.00028	.00037	.00056	.00075	.00093	.00112	.00149	.00186	.00224	.00298	1				
			Full Chamfer (≥ 25°)	.00015	.00019	.00023	.00031	.00046	.00062	.00078	.00093	.00124	.00155	.00186	.00248	4				
			Full Chamfer (< 25°)	.00012	.00015	.00017	.00023	.00035	.00047	.00058	.00070	.00093	.00116	.00140	.00186	5				
Wrought Aluminum Alloy	2014, 5062, 6061, 7050, 7075, 7475	≤ 28 Rc (≤ 271 HBn)	1000	Edge Break	.00086	.00108	.00128	.00173	.00258	.00345	.00431	.00518	.00690	.00863	.01035	.01380	1			
				Full Chamfer (≥ 25°)	.00071	.00090	.00107	.00144	.00215	.00288	.00359	.00431	.00575	.00719	.00863	.01150	2			
	5% - 8% Si (4000X)		1000	Full Chamfer (< 25°)	.00053	.00067	.00080	.00108	.00161	.00216	.00269	.00323	.00431	.00539	.00647	.00863	3			
				Edge Break	.00077	.00097	.00116	.00155	.00232	.00311	.00388	.00466	.00621	.00776	.00932	.01242	1			
	8% - 12% Si (4000X)		800	800	Full Chamfer (≥ 25°)	.00064	.00081	.00096	.00129	.00194	.00259	.00323	.00388	.00518	.00647	.00776	.01035	2		
					Full Chamfer (< 25°)	.00048	.00061	.00072	.00097	.00145	.00194	.00242	.00291	.00388	.00485	.00582	.00776	3		
Cast Aluminum Alloy	319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0	≤ 28 Rc (≤ 271 HBn)	750	Edge Break	.00086	.00108	.00128	.00173	.00258	.00345	.00431	.00518	.00690	.00863	.01035	.01380	1			
				Full Chamfer (≥ 25°)	.00071	.00090	.00107	.00144	.00215	.00288	.00359	.00431	.00575	.00719	.00863	.01150	2			
				Full Chamfer (< 25°)	.00053	.00067	.00080	.00108	.00161	.00216	.00269	.00323	.00431	.00539	.00647	.00863	3			
	3% - 5% Si (30X, A30X, C30X, 40X, A40X, B40X)		750	Edge Break	.00077	.00097	.00116	.00155	.00232	.00311	.00388	.00466	.00621	.00776	.00932	.01242	1			
				Full Chamfer (≥ 25°)	.00064	.00081	.00096	.00129	.00194	.00259	.00323	.00388	.00518	.00647	.00776	.01035	2			
				Full Chamfer (< 25°)	.00048	.00061	.00072	.00097	.00145	.00194	.00242	.00291	.00388	.00485	.00582	.00776	3			
5% - 8% Si (30X, A30X, C30X, 40X, A40X, B40X)	700	Full Chamfer (≥ 25°)	.00064	.00081	.00096	.00129	.00194	.00259	.00323	.00388	.00518	.00647	.00776	.01035	2					
			650	Full Chamfer (≥ 25°)	.00064	.00081	.00096	.00129	.00194	.00259	.00323	.00388	.00518	.00647	.00776	.01035	2			
					475	Full Chamfer (< 25°)	.00048	.00061	.00072	.00097	.00145	.00194	.00242	.00291	.00388	.00485	.00582	.00776	3	
12% - 16% Si (30X, A30X, C30X, 40X, A40X, B40X)	475	Full Chamfer (< 25°)	.00048	.00061			.00072	.00097	.00145	.00194	.00242	.00291	.00388	.00485	.00582	.00776	3			
			Copper Alloy	Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5	≤ 28 Rc (≤ 271 HBn)	225-500	Edge Break	.00068	.00086	.00103	.00138	.00206	.00276	.00344	.00414	.00552	.00690	.00828	.01104	1
							Full Chamfer (≥ 25°)	.00057	.00072	.00086	.00115	.00172	.00230	.00287	.00345	.00460	.00575	.00690	.00920	2
Full Chamfer (< 25°)	.00043	.00054					.00064	.00086	.00129	.00173	.00215	.00259	.00345	.00431	.00518	.00690	3			
Magnesium Alloys		≤ 28 Rc (≤ 271 HBn)	1500	Edge Break	.00086	.00108	.00128	.00173	.00258	.00345	.00431	.00518	.00690	.00863	.01035	.01380	1			
				Full Chamfer (≥ 25°)	.00071	.00090	.00107	.00144	.00215	.00288	.00359	.00431	.00575	.00719	.00863	.01150	2			
Zinc Alloys		≤ 28 Rc (≤ 271 HBn)	800	Full Chamfer (< 25°)	.00053	.00067	.00080	.00108	.00161	.00216	.00269	.00323	.00431	.00539	.00647	.00863	3			