

**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 Cutter Diameter										Depth of Cut Passes			
				1/16	5/64	3/32	1/8	3/16	1/4	5/16	3/8	1/2	5/8		3/4	1	
Carbon Steel	10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36	29-37 Rc (279-344 HBn)	600	Edge Break	.00033	.00042	.00050	.00067	.00100	.00134	.00167	.00201	.00268	.00335	.00402	.00537	1
				Full Chamfer (≥ 25°)	.00028	.00035	.00042	.00056	.00084	.00112	.00140	.00168	.00224	.00279	.00335	.00447	3
				Full Chamfer (< 25°)	.00021	.00026	.00031	.00042	.00063	.00084	.00105	.00126	.00168	.00210	.00252	.00335	4
Low Alloy Steel	13XX, 41XX, 43XX, 51XX, 86XX, 93XX	29-37 Rc (279-344 HBn)	200	Edge Break	.00036	.00046	.00055	.00073	.00110	.00147	.00183	.00220	.00293	.00367	.00440	.00587	1
				Full Chamfer (≥ 25°)	.00030	.00038	.00045	.00061	.00091	.00122	.00153	.00183	.00245	.00306	.00367	.00489	3
				Full Chamfer (< 25°)	.00023	.00029	.00034	.00046	.00069	.00092	.00114	.00138	.00183	.00229	.00275	.00367	4
Tool Steel	A, L, O, P, W series	29-37 Rc (279-344 HBn)	200	Edge Break	.00033	.00042	.00050	.00067	.00100	.00134	.00167	.00201	.00268	.00335	.00402	.00537	1
				Full Chamfer (≥ 25°)	.00028	.00035	.00042	.00056	.00084	.00112	.00140	.00168	.00224	.00279	.00335	.00447	3
				Full Chamfer (< 25°)	.00021	.00026	.00031	.00042	.00063	.00084	.00105	.00126	.00168	.00210	.00252	.00335	4
	D, H, M, T, S series	38-45 Rc (353-421 HBn)	100	Edge Break	.00033	.00042	.00050	.00067	.00100	.00134	.00167	.00201	.00268	.00335	.00402	.00537	1
				Full Chamfer (≥ 25°)	.00028	.00035	.00042	.00056	.00084	.00112	.00140	.00168	.00224	.00279	.00335	.00447	3
				Full Chamfer (< 25°)	.00021	.00026	.00031	.00042	.00063	.00084	.00105	.00126	.00168	.00210	.00252	.00335	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	.00036	.00046	.00055	.00073	.00110	.00147	.00183	.00220	.00293	.00367	.00440	.00587	1
				Full Chamfer (≥ 25°)	.00030	.00038	.00045	.00061	.00091	.00122	.00153	.00183	.00245	.00306	.00367	.00489	3
				Full Chamfer (< 25°)	.00023	.00029	.00034	.00046	.00069	.00092	.00114	.00138	.00183	.00229	.00275	.00367	4
Martensitic & Ferritic Stainless Steel	403, 410, 416, 420, 440, 430, 446	29-37 Rc (279-344 HBn)	200	Edge Break	.00033	.00042	.00050	.00067	.00100	.00134	.00167	.00201	.00268	.00335	.00402	.00537	1
				Full Chamfer (≥ 25°)	.00028	.00035	.00042	.00056	.00084	.00112	.00140	.00168	.00224	.00279	.00335	.00447	3
				Full Chamfer (< 25°)	.00021	.00026	.00031	.00042	.00063	.00084	.00105	.00126	.00168	.00210	.00252	.00335	4
PH Stainless Steel	15-5, 17-4, Carpenter 450, Carpenter 465	29-37 Rc (279-344 HBn)	150	Edge Break	.00021	.00026	.00031	.00042	.00063	.00084	.00105	.00126	.00168	.00210	.00252	.00335	1
				Full Chamfer (≥ 25°)	.00017	.00022	.00026	.00035	.00052	.00070	.00087	.00105	.00140	.00175	.00210	.00279	3
				Full Chamfer (< 25°)	.00013	.00016	.00019	.00026	.00039	.00052	.00065	.00079	.00105	.00131	.00157	.00210	4
Nickel Alloy	Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20	29-37 Rc (279-344 HBn)	70	Edge Break	.00021	.00026	.00031	.00042	.00063	.00084	.00105	.00126	.00168	.00210	.00252	.00335	1
				Full Chamfer (≥ 25°)	.00017	.00022	.00026	.00035	.00052	.00070	.00087	.00105	.00140	.00175	.00210	.00279	3
				Full Chamfer (< 25°)	.00013	.00016	.00019	.00026	.00039	.00052	.00065	.00079	.00105	.00131	.00157	.00210	4
Titanium Alloy	Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al	29-37 Rc (279-344 HBn)	150	Edge Break	.00021	.00026	.00031	.00042	.00063	.00084	.00105	.00126	.00168	.00210	.00252	.00335	1
				Full Chamfer (≥ 25°)	.00017	.00022	.00026	.00035	.00052	.00070	.00087	.00105	.00140	.00175	.00210	.00279	3
				Full Chamfer (< 25°)	.00013	.00016	.00019	.00026	.00039	.00052	.00065	.00079	.00105	.00131	.00157	.00210	4
Wrought Aluminum Alloy	2014, 5062, 6061, 7050, 7075, 7475	5 - 8% Si (4000)	1000	Edge Break	.00096	.00121	.00144	.00194	.00290	.00388	.00484	.00582	.00776	.00970	.01164	.01553	1
				Full Chamfer (≥ 25°)	.00080	.00101	.00120	.00162	.00242	.00323	.00404	.00485	.00647	.00809	.00970	.01294	2
				Full Chamfer (< 25°)	.00060	.00076	.00090	.00121	.00181	.00243	.00303	.00364	.00485	.00606	.00728	.00970	3
Cast Aluminum Alloy	319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0	5 - 8% Si (30X, A30X, C30X, 40X, A40X, B40X)	750	Edge Break	.00087	.00109	.00130	.00175	.00261	.00349	.00436	.00524	.00699	.00873	.01048	.01397	1
				Full Chamfer (≥ 25°)	.00072	.00091	.00108	.00146	.00218	.00291	.00363	.00437	.00582	.00728	.00873	.01164	2
				Full Chamfer (< 25°)	.00054	.00068	.00081	.00109	.00163	.00218	.00272	.00327	.00437	.00546	.00655	.00873	3
Copper Alloy	Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5	≤ 28 Rc (≤ 271 HBn)	225-500	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
Magnesium Alloys	Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5	≤ 28 Rc (≤ 271 HBn)	1500	Edge Break	.00096	.00121	.00144	.00194	.00290	.00388	.00484	.00582	.00776	.00970	.01164	.01553	1
				Full Chamfer (≥ 25°)	.00080	.00101	.00120	.00162	.00242	.00323	.00404	.00485	.00647	.00809	.00970	.01294	2
Zinc Alloys		≤ 28 Rc (≤ 271 HBn)	800	Full Chamfer (< 25°)	.00060	.00076	.00090	.00121	.00181	.00243	.00303	.00364	.00485	.00606	.00728	.00970	3

**General Notes:**

All posted speed and feed parameters are suggested starting values that may be increased given optimal setup conditions. Chip loads reflect uncoated cutters and may be increased 10%-20% if coated. For ferrous materials with hardness ≤ 28 Rc, chip loads can be increased 10%-20%. If you require additional information, Valor Holemaking has a team of technical experts available to assist you through even the most challenging applications. Please contact us at **866-840-1505** or **Valortech@harveperformance.com**.

WARNING: Cutting tools may shatter under improper use. Government regulations require use of safety glasses and other appropriate safety equipment in the vicinity of use.