VALOR™ HOLEMAKING

**Product Table:** High Performance Chamfer Cutters - Helically Fluted
**Characteristics:** 5 Flute

**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 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 | .00026 | .00033 | .00039 | .00052 | .00078 | .00104 | .00130 | .00156 | .00209 | .00261 | .00313 | .00417 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00022 | .00027 | .00032 | .00043 | .00065 | .00087 | .00109 | .00130 | .00174 | .00217 | .00261 | .00348 | 3 |
| | | | | Full Chamfer (< 25°) | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 4 |
| Low Alloy Steel | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 29-37 Rc (279-344 HBn) | 200 | Edge Break | .00028 | .00036 | .00042 | .00057 | .00085 | .00114 | .00142 | .00171 | .00228 | .00285 | .00342 | .00456 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00024 | .00030 | .00035 | .00048 | .00071 | .00095 | .00119 | .00143 | .00190 | .00238 | .00285 | .00380 | 3 |
| | | | | Full Chamfer (< 25°) | .00018 | .00022 | .00027 | .00036 | .00053 | .00071 | .00089 | .00107 | .00143 | .00178 | .00214 | .00285 | 4 |
| Tool Steel | A, L, O, P, W series | 29-37 Rc (279-344 HBn) | 200 | Edge Break | .00026 | .00033 | .00039 | .00052 | .00078 | .00104 | .00130 | .00156 | .00209 | .00261 | .00313 | .00417 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00022 | .00027 | .00032 | .00043 | .00065 | .00087 | .00109 | .00130 | .00174 | .00217 | .00261 | .00348 | 3 |
| | | | | Full Chamfer (< 25°) | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 4 |
| | | 38-45 Rc (353-421 HBn) | 100 | Edge Break | .00026 | .00033 | .00039 | .00052 | .00078 | .00104 | .00130 | .00156 | .00209 | .00261 | .00313 | .00417 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00022 | .00027 | .00032 | .00043 | .00065 | .00087 | .00109 | .00130 | .00174 | .00217 | .00261 | .00348 | 4 |
| | | | | Full Chamfer (< 25°) | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 5 |
| | D, H, M, T, S series | 29-37 Rc (279-344 HBn) | 150 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 3 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 4 |
| | | 38-45 Rc (353-421 HBn) | 75 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 4 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 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 | .00028 | .00036 | .00042 | .00057 | .00085 | .00114 | .00142 | .00171 | .00228 | .00285 | .00342 | .00456 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00024 | .00030 | .00035 | .00048 | .00071 | .00095 | .00119 | .00143 | .00190 | .00238 | .00285 | .00380 | 3 |
| | | | | Full Chamfer (< 25°) | .00018 | .00022 | .00027 | .00036 | .00053 | .00071 | .00089 | .00107 | .00143 | .00178 | .00214 | .00285 | 4 |
| Martensitic & Ferritic Stainless Steel | 403, 410, 416, 420, 440, 430, 446 | 29-37 Rc (279-344 HBn) | 200 | Edge Break | .00026 | .00033 | .00039 | .00052 | .00078 | .00104 | .00130 | .00156 | .00209 | .00261 | .00313 | .00417 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00022 | .00027 | .00032 | .00043 | .00065 | .00087 | .00109 | .00130 | .00174 | .00217 | .00261 | .00348 | 3 |
| | | | | Full Chamfer (< 25°) | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 4 |
| | | 38-45 Rc (353-421 HBn) | 100 | Edge Break | .00026 | .00033 | .00039 | .00052 | .00078 | .00104 | .00130 | .00156 | .00209 | .00261 | .00313 | .00417 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00022 | .00027 | .00032 | .00043 | .00065 | .00087 | .00109 | .00130 | .00174 | .00217 | .00261 | .00348 | 4 |
| | | | | Full Chamfer (< 25°) | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 5 |
| PH Stainless Steel | 15-5, 17-4, Carpenter 450, Carpenter 465 | 29-37 Rc (279-344 HBn) | 150 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 3 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 4 |
| | | 38-45 Rc (353-421 HBn) | 90 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 4 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 5 |
| Nickel Alloy | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 29-37 Rc (279-344 HBn) | 70 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 3 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 4 |
| | | 38-45 Rc (353-421 HBn) | 50 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 4 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 5 |
| Titanium Alloy | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 29-37 Rc (279-344 HBn) | 150 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 3 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 4 |
| | | 38-45 Rc (353-421 HBn) | 75 | Edge Break | .00016 | .00020 | .00024 | .00033 | .00049 | .00065 | .00081 | .00098 | .00130 | .00163 | .00196 | .00261 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00013 | .00017 | .00020 | .00027 | .00041 | .00054 | .00068 | .00082 | .00109 | .00136 | .00163 | .00217 | 4 |
| | | | | Full Chamfer (< 25°) | .00010 | .00013 | .00015 | .00020 | .00030 | .00041 | .00051 | .00061 | .00082 | .00102 | .00122 | .00163 | 5 |
| Wrought Aluminum Alloy | 2014, 5062, 6061, 7050, 7075, 7475 | ≤ 28 Rc (≤ 271 HBn) | 1000 | Edge Break | .00075 | .00094 | .00112 | .00151 | .00226 | .00302 | .00377 | .00453 | .00604 | .00755 | .00906 | .01208 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00062 | .00078 | .00094 | .00126 | .00188 | .00252 | .00314 | .00377 | .00503 | .00629 | .00755 | .01006 | 2 |
| | | | | Full Chamfer (< 25°) | .00047 | .00059 | .00070 | .00094 | .00141 | .00189 | .00235 | .00283 | .00377 | .00472 | .00566 | .00755 | 3 |
| | 5% - 8% Si (4XXX) | | 1000 | Edge Break | .00067 | .00085 | .00101 | .00136 | .00203 | .00272 | .00339 | .00408 | .00543 | .00679 | .00815 | .01087 | 1 |
| | 8% - 12% Si (4XXX) | | 800 | Full Chamfer (≥ 25°) | .00056 | .00071 | .00084 | .00113 | .00169 | .00226 | .00283 | .00340 | .00453 | .00566 | .00679 | .00906 | 2 |
| | | | | Full Chamfer (< 25°) | .00042 | .00053 | .00063 | .00085 | .00127 | .00170 | .00212 | .00255 | .00340 | .00425 | .00509 | .00679 | 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 | .00075 | .00094 | .00112 | .00151 | .00226 | .00302 | .00377 | .00453 | .00604 | .00755 | .00906 | .01208 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00062 | .00078 | .00094 | .00126 | .00188 | .00252 | .00314 | .00377 | .00503 | .00629 | .00755 | .01006 | 2 |
| | | | | Full Chamfer (< 25°) | .00047 | .00059 | .00070 | .00094 | .00141 | .00189 | .00235 | .00283 | .00377 | .00472 | .00566 | .00755 | 3 |
| | 3% - 5% Si (3XX, A3XX, C3XX, 4XX, A4XX, B4XX) | | 750 | Edge Break | .00067 | .00085 | .00101 | .00136 | .00203 | .00272 | .00339 | .00408 | .00543 | .00679 | .00815 | .01087 | 1 |
| | 5% - 8% Si (3XX, A3XX, C3XX, 4XX, A4XX, B4XX) | | 700 | Full Chamfer (≥ 25°) | .00056 | .00071 | .00084 | .00113 | .00169 | .00226 | .00283 | .00340 | .00453 | .00566 | .00679 | .00906 | 2 |
| | 8% - 12% Si (3XX, A3XX, C3XX, 4XX, A4XX, B4XX) | | 650 | | | | | | | | | | | | | | |
| | 12% - 16% Si (3XX, A3XX, C3XX, 4XX, A4XX, B4XX) | | 475 | Full Chamfer (< 25°) | .00042 | .00053 | .00063 | .00085 | .00127 | .00170 | .00212 | .00255 | .00340 | .00425 | .00509 | .00679 | 3 |
| Copper Alloy | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | ≤ 28 Rc (≤ 271 HBn) | 225-500 | Edge Break | .00060 | .00075 | .00090 | .00121 | .00181 | .00242 | .00301 | .00362 | .00483 | .00604 | .00725 | .00966 | 1 |
| | | | | Full Chamfer (≥ 25°) | .00050 | .00063 | .00075 | .00101 | .00151 | .00201 | .00251 | .00302 | .00403 | .00503 | .00604 | .00805 | 2 |
| | | | | Full Chamfer (< 25°) | .00037 | .00047 | .00056 | .00075 | .00113 | .00151 | .00188 | .00226 | .00302 | .00377 | .00453 | .00604 | 3 |
| Magnesium Alloys | | ≤ 28 Rc (≤ 271 HBn) | 1500 | Edge Break | .00075 | .00094 | .00112 | .00151 | .00226 | .00302 | .00377 | .00453 | .00604 | .00755 | .00906 | .01208 | 1 |
| Zinc Alloys | | | 800 | Full Chamfer (≥ 25°) | .00062 | .00078 | .00094 | .00126 | .00188 | .00252 | .00314 | .00377 | .00503 | .00629 | .00755 | .01006 | 2 |
| | | | | Full Chamfer (< 25°) | .00047 | .00059 | .00070 | .00094 | .00141 | .00189 | .00235 | .00283 | .00377 | .00472 | .00566 | .00755 | 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@harveyperformance.com**.