| MATERIAL | SFM | Hardness: ≤ 28 Rc (≤ 271 HBn) Chip Load (IPT) By Effective Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.015 | 0.031 | 0.047 | 0.062 | 0.078 | 0.093 | 0.125 | 0.187 | 0.250 | 0.312 | 0.375 | 0.500 | Radial Passes | Axial Passes |
| **ALUMINUM ALLOYS** | | | | | | | | | | | | | | | |
| Casting (2xx, 5xx, 7xx, 8xx) | 750 | .00015 | .00031 | .00047 | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | .00309 | .00371 | .00495 | 1 | 2 |
| Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1000 | | | | | | | | | | | | | | |
| Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 750 | .00013 | .00028 | .00042 | .00055 | .00069 | .00083 | .00111 | .00167 | .00223 | .00278 | .00334 | .00446 | 1 | 2 |
| Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 700 | | | | | | | | | | | | | | |
| Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 650 | | | | | | | | | | | | | | |
| Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 475 | | | | | | | | | | | | | | |
| Wrought - 5%-8% Si (4xxx) | 1000 | | | | | | | | | | | | | | |
| Wrought - 8%-12% Si (4xxx) | 800 | | | | | | | | | | | | | | |
| **MAGNESIUM ALLOYS** | 1500 | .00015 | .00031 | .00047 | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | .00309 | .00371 | .00495 | 1 | 2 |
| **ZINC ALLOYS** | 800 | | | | | | | | | | | | | | |
| **COPPER ALLOYS** | | .00012 | .00025 | .00037 | .00049 | .00062 | .00074 | .00099 | .00148 | .00198 | .00247 | .00297 | .00396 | 1 | 2 |
| High Coppers - 90%+ (C1xxxx) | 225 | | | | | | | | | | | | | | |
| Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 500 | | | | | | | | | | | | | | |
| Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 225 | | | | | | | | | | | | | | |
| Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 500 | | | | | | | | | | | | | | |
| Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 500 | | | | | | | | | | | | | | |
| Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 225 | | | | | | | | | | | | | | |
| Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 550 | | | | | | | | | | | | | | |

# HARVEY TOOL

Speeds & Feeds

**Product Table:** Corner Rounding End Mills - 2 & 4 Flute - Flared
**Characteristics:** 4 Flutes
**Series:** 210xx, 211xx, 212xx, 213xx, 440xx, 441xx, 442xx, 676xx, 680xx, 681xx,

## Product notes:

Due to a varying diameter, an Effective Cutter Diameter must be determined for Chip Load selection and RPM calculation:
For a Radius/Pilot ratio < 2.5, Effective Cutter Diameter = Pilot Diameter + Radius
For a Radius/Pilot ratio ≥ 2.5, Effective Cutter Diameter = Pilot Diameter + .7x Radius

Depth of Cut is shown as a full Radial stepover with multiple, descending Axial passes with following breakdown (same progression works for full Axial depth with multiple, descending Radial passes):
1 pass = 1x Radius
2 passes = .7x Radius, .3x Radius
3 passes = .4x Radius, .4x Radius, .2x Radius
4 passes = .4x Radius, .3x Radius, .2x Radius, .1x Radius
5 passes = .3x Radius, .3x Radius, .2x Radius, .1x Radius, .1x Radius

Chip Loads (IPT) within table pertain to rounding a corner on one side of existing slot.
For rounding on both sides, reduce Chip Loads to 60%-80% depending on contact length and finish

## 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, Harvey Tool has a team of technical experts available to assist you through even the most challenging applications. Please contact us at **800-645-5609** or **Harveytech@harveyperformance.com**.

WARNING: Cutting tools may shatter under improper use. Government regulations require use of safety glasses and

| MATERIAL | SFM | Hardness: 29-37 Rc (279-344 HBn) Chip Load (IPT) By Effective Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.015 | 0.031 | 0.047 | 0.062 | 0.078 | 0.093 | 0.125 | 0.187 | 0.250 | 0.312 | 0.375 | 0.500 | Radial Passes | Axial Passes |
| **CARBON STEELS** | | | | | | | | | | | | | | | |
| Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx | 600 | .00006 | .00013 | .00020 | .00026 | .00033 | .00040 | .00053 | .00080 | .00106 | .00133 | .00159 | .00213 | 1 | 3 |
| 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx | 200 | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | 1 | 3 |
| **STAINLESS STEELS** | | | | | | | | | | | | | | | |
| 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe | 450 | .00006 | .00013 | .00020 | .00026 | .00033 | .00040 | .00053 | .00080 | .00106 | .00133 | .00159 | .00213 | 1 | 3 |
| 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502 | 200 | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | 1 | 3 |
| 414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7 | 150 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 3 |
| **TOOL STEELS** | | | | | | | | | | | | | | | |
| A, L, O, P, W series | 200 | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | 1 | 3 |
| D, H, M, T, S series | 150 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 3 |
| **TITANIUM ALLOYS** | 150 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 3 |
| **HIGH TEMP ALLOYS** | | | | | | | | | | | | | | | |
| Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | 70 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 3 |

| SFM | Hardness: 38-45 Rc (353-421 HBn) Chip Load (IPT) By Effective Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.015 | 0.031 | 0.047 | 0.062 | 0.078 | 0.093 | 0.125 | 0.187 | 0.250 | 0.312 | 0.375 | 0.500 | Radial Passes | Axial Passes |
| - | - | - | - | - | - | - | - | - | - | | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | | - | - | - | - |
| 100 | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | 1 | 4 |
| 90 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 4 |
| 100 | .00006 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | 1 | 4 |
| 90 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 4 |
| 75 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 4 |
| 50 | .00004 | .00008 | .00011 | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | 1 | 4 |