## Speeds & Feeds

**Product Table:** Drill/End Mills - Mill Style - 3 Flute
**Characteristics:** 3 Flutes, 90° Included Angle
**Series:** 8238xx

### Product Notes:

Milling - Presented data reflects slotting application using OD of cutter up to .5x Dia Axial DOC
- Use OD of cutter for Chip Load selection and RPM calculation
- If Axial DOC exceeds .5x Dia, Chip Load and/or Radial DOC must be reduced

Chamfering - Presented data reflects full chamfer engagement on one side of workpiece
- Due to a varying tip diameter, an Effective Cutter Diameter is needed for Chip Load selection and RPM calculation. Consider the major and minor diameters along the actual contact length and average them: (Major Diameter + Minor Diameter)/2
- Depth of Cut is shown as number of Passes with each made using a descending stepover
- Feed rates may be increased (or number of passes decreased) when creating traditional edge breaks

Drilling - Presented values are Chip Load per Tooth and not Chip Load per Rev
- Use OD for Chip Load selection and RPM calculation
- Depth of Cut not shown as it is not applicable
- Drilling is not recommended for tools with < 82° included point angle

### 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 other appropriate safety equipment in the vicinity of use.

### Hardness: ≤ 28 Rc (≤ 271 HBn)

| MATERIAL | SFM | | Chip Load (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0.062 | 0.078 | 0.093 | 0.125 | 0.187 | 0.250 | 0.312 | 0.375 | 0.500 | 0.625 | 0.750 | 1.000 | Radial | Axial |
| **ALUMINUM ALLOYS** | 750 | Milling | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | .00309 | .00371 | .00495 | .00619 | .00743 | .00990 | 1x Dia | .5x Dia |
| Casting (2xx, 5xx, 7xx, 8xx) | | Chamfering | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | .00309 | .00371 | .00495 | .00619 | .00743 | .00990 | 2 passes | |
| Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx) | 1000 | Drilling | .00037 | .00046 | .00055 | .00074 | .00111 | .00149 | .00185 | .00223 | .00297 | .00371 | .00446 | .00594 | - | |
| Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 750 | Milling | .00055 | .00069 | .00083 | .00111 | .00167 | .00223 | .00278 | .00334 | .00446 | .00557 | .00668 | .00891 | 1x Dia | .5x Dia |
| Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 700 | | | | | | | | | | | | | | | |
| Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 650 | Chamfering | .00055 | .00069 | .00083 | .00111 | .00167 | .00223 | .00278 | .00334 | .00446 | .00557 | .00668 | .00891 | 2 passes | |
| Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) | 475 | | | | | | | | | | | | | | | |
| Wrought - 5%-8% Si (4xxx) | 1000 | Drilling | .00033 | .00042 | .00050 | .00067 | .00100 | .00134 | .00167 | .00200 | .00267 | .00334 | .00401 | .00535 | - | |
| Wrought - 8%-12% Si (4xxx) | 800 | | | | | | | | | | | | | | | |
| **MAGNESIUM ALLOYS** | 1500 | Milling | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | .00309 | .00371 | .00495 | .00619 | .00743 | .00990 | 1x Dia | .5x Dia |
| | | Chamfering | .00061 | .00077 | .00092 | .00124 | .00185 | .00248 | .00309 | .00371 | .00495 | .00619 | .00743 | .00990 | 2 passes | |
| **ZINC ALLOYS** | 800 | Drilling | .00037 | .00046 | .00055 | .00074 | .00111 | .00149 | .00185 | .00223 | .00297 | .00371 | .00446 | .00594 | - | |
| **COPPER ALLOYS** | | | | | | | | | | | | | | | | |
| High Coppers - 90%+ (C1xxxx) | 225 | | | | | | | | | | | | | | | |
| Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800) | 500 | Milling | .00049 | .00062 | .00074 | .00099 | .00148 | .00198 | .00247 | .00297 | .00396 | .00495 | .00594 | .00792 | 1x Dia | .5x Dia |
| Phosphor Bronzes (Copper Tin alloys, C5xxxx) | 225 | | | | | | | | | | | | | | | |
| Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) | 500 | | | | | | | | | | | | | | | |
| Silicon Bronzes (Copper Silicon alloys, C64700-C66100) | 500 | Chamfering | .00049 | .00062 | .00074 | .00099 | .00148 | .00198 | .00247 | .00297 | .00396 | .00495 | .00594 | .00792 | 2 passes | |
| Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx) | 225 | | | | | | | | | | | | | | | |
| Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) | 550 | Drilling | .00029 | .00037 | .00044 | .00059 | .00089 | .00119 | .00148 | .00178 | .00238 | .00297 | .00356 | .00475 | - | |

### Hardness: 29-37 Rc (279-344 HBn)

| MATERIAL | SFM | | Chip Load (IPT) By Cutter Diameter | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0.062 | 0.078 | 0.093 | 0.125 | 0.187 | 0.250 | 0.312 | 0.375 | 0.500 | 0.625 | 0.750 | 1.000 | Radial | Axial |
| **CARBON STEELS** | 600 | Milling | .00021 | .00027 | .00032 | .00043 | .00064 | .00085 | .00106 | .00128 | .00170 | .00213 | .00255 | .00340 | 1x Dia | .5x Dia |
| Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx | | Chamfering | .00026 | .00033 | .00040 | .00053 | .00080 | .00106 | .00133 | .00159 | .00213 | .00266 | .00319 | .00425 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx | 200 | Milling | .00019 | .00024 | .00029 | .00039 | .00058 | .00078 | .00097 | .00117 | .00156 | .00194 | .00233 | .00311 | 1x Dia | .5x Dia |
| | | Chamfering | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | .00243 | .00292 | .00389 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| **STAINLESS STEELS** | 450 | Milling | .00021 | .00027 | .00032 | .00043 | .00064 | .00085 | .00106 | .00128 | .00170 | .00213 | .00255 | .00340 | 1x Dia | .5x Dia |
| 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe | | Chamfering | .00026 | .00033 | .00040 | .00053 | .00080 | .00106 | .00133 | .00159 | .00213 | .00266 | .00319 | .00425 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 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 | Milling | .00019 | .00024 | .00029 | .00039 | .00058 | .00078 | .00097 | .00117 | .00156 | .00194 | .00233 | .00311 | 1x Dia | .5x Dia |
| | | Chamfering | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | .00243 | .00292 | .00389 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7 | 150 | Milling | .00012 | .00015 | .00018 | .00024 | .00036 | .00049 | .00061 | .00073 | .00097 | .00122 | .00146 | .00194 | 1x Dia | .5x Dia |
| | | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| **TOOL STEELS** | 200 | Milling | .00019 | .00024 | .00029 | .00039 | .00058 | .00078 | .00097 | .00117 | .00156 | .00194 | .00233 | .00311 | 1x Dia | .5x Dia |
| A, L, O, P, W series | | Chamfering | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | .00243 | .00292 | .00389 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| D, H, M, T, S series | 150 | Milling | .00012 | .00015 | .00018 | .00024 | .00036 | .00049 | .00061 | .00073 | .00097 | .00122 | .00146 | .00194 | 1x Dia | .5x Dia |
| | | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| **TITANIUM ALLOYS** | 150 | Milling | .00012 | .00015 | .00018 | .00024 | .00036 | .00049 | .00061 | .00073 | .00097 | .00122 | .00146 | .00194 | 1x Dia | .5x Dia |
| | | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| **HIGH TEMP ALLOYS** | 70 | Milling | .00012 | .00015 | .00018 | .00024 | .00036 | .00049 | .00061 | .00073 | .00097 | .00122 | .00146 | .00194 | 1x Dia | .5x Dia |
| Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy | | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 3 passes | |
| | | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |

### Hardness: 38-45 Rc (353-421 HBn)

| SFM | | Chip Load (IPT) By Cutter Diameter | | | | | | | | | | | | | Depth of Cut | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0.062 | 0.078 | 0.093 | 0.125 | 0.187 | 0.250 | 0.312 | 0.375 | 0.500 | 0.625 | 0.750 | 1.000 | Radial | Axial |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 100 | Milling | .00010 | .00012 | .00014 | .00019 | .00029 | .00039 | .00049 | .00058 | .00078 | .00097 | .00117 | .00156 | 1x Dia | .5x Dia |
| | Chamfering | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | .00243 | .00292 | .00389 | 4 passes | |
| | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 90 | Milling | .00006 | .00008 | .00009 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00061 | .00073 | .00097 | 1x Dia | .5x Dia |
| | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 4 passes | |
| | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 100 | Milling | .00010 | .00012 | .00014 | .00019 | .00029 | .00039 | .00049 | .00058 | .00078 | .00097 | .00117 | .00156 | 1x Dia | .5x Dia |
| | Chamfering | .00024 | .00030 | .00036 | .00049 | .00073 | .00097 | .00121 | .00146 | .00194 | .00243 | .00292 | .00389 | 4 passes | |
| | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 90 | Milling | .00006 | .00008 | .00009 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00061 | .00073 | .00097 | 1x Dia | .5x Dia |
| | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 4 passes | |
| | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 75 | Milling | .00006 | .00008 | .00009 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00061 | .00073 | .00097 | 1x Dia | .5x Dia |
| | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 4 passes | |
| | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 50 | Milling | .00006 | .00008 | .00009 | .00012 | .00018 | .00024 | .00030 | .00036 | .00049 | .00061 | .00073 | .00097 | 1x Dia | .5x Dia |
| | Chamfering | .00015 | .00019 | .00023 | .00030 | .00045 | .00061 | .00076 | .00091 | .00122 | .00152 | .00182 | .00243 | 4 passes | |
| | Drilling | - | - | - | - | - | - | - | - | - | - | - | - | - | |