

| MATERIAL   |  | Hardness: ≤ 28 Rc (≤ 271 HBn) |                        |        |        |              |           |                               |        |        |        |        |        |              |        |        |           |           |
|--|--|-------------------------------|------------------------|--------|--------|--------------|-----------|-------------------------------|--------|--------|--------|--------|--------|--------------|--------|--------|-----------|-----------|
|  |  | SFM                           | Chip Load (IPT) by Dia |        |        | Depth of Cut |           | Chip Load (IPT) by Cutter Dia |        |        |        |        |        | Depth of Cut |        |        |           |           |
|  |  |                               | 0.015                  | 0.031  | 0.047  | Radial       | Axial     | 0.062                         | 0.078  | 0.093  | 0.125  | 0.187  | 0.250  | 0.375        | 0.500  | Radial | Axial     |           |
| <b>ALUMINUM ALLOYS</b>   |  | 750                           | Slotting               | .00010 | .00021 | .00032       | 1 x Dia   | .07 x Dia                     | .00037 | .00047 | .00056 | .00075 | .00112 | .00150       | .00224 | .00299 | 1 x Dia   | .18 x Dia |
| Casting (2xx, 5xx, 7xx, 8xx)   |  |                               | Roughing               | .00013 | .00027 | .00040       | 28 x Dia  | .30 x Dia                     | .00046 | .00058 | .00070 | .00094 | .00140 | .00187       | .00281 | .00374 | .55 x Dia | .30 x Dia |
| Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)   |  | 1000                          | Finishing              | .00022 | .00045 | .00068       | .05 x Dia | 3 x Dia                       | .00078 | .00098 | .00116 | .00156 | .00234 | .00313       | .00469 | .00626 | .10 x Dia | 3 x Dia   |
| Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)  |  | 750                           | Slotting               | .00009 | .00019 | .00029       | 1 x Dia   | .07 x Dia                     | .00033 | .00042 | .00050 | .00067 | .00101 | .00135       | .00202 | .00269 | 1 x Dia   | .18 x Dia |
| Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)  |  | 700                           | Slotting               | .00012 | .00024 | .00036       | 28 x Dia  | .30 x Dia                     | .00042 | .00053 | .00063 | .00084 | .00126 | .00168       | .00252 | .00337 | .55 x Dia | .30 x Dia |
| Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)   |  | 650                           | Roughing               | .00012 | .00024 | .00036       | 28 x Dia  | .30 x Dia                     | .00042 | .00053 | .00063 | .00084 | .00126 | .00168       | .00252 | .00337 | .55 x Dia | .30 x Dia |
| Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)  |  | 475                           | Slotting               | .00019 | .00040 | .00061       | .05 x Dia | 3 x Dia                       | .00070 | .00088 | .00105 | .00141 | .00211 | .00282       | .00422 | .00563 | .10 x Dia | 3 x Dia   |
| Wrought - 5%-8% Si (4xxx)  |  | 1000                          | Finishing              | .00019 | .00040 | .00061       | .05 x Dia | 3 x Dia                       | .00070 | .00088 | .00105 | .00141 | .00211 | .00282       | .00422 | .00563 | .10 x Dia | 3 x Dia   |
| Wrought - 8%-12% Si (4xxx)   |  | 800                           | Slotting               | .00010 | .00021 | .00032       | 1 x Dia   | .07 x Dia                     | .00037 | .00047 | .00056 | .00075 | .00112 | .00150       | .00224 | .00299 | 1 x Dia   | .18 x Dia |
| <b>MAGNESIUM ALLOYS</b>  |  | 1500                          | Roughing               | .00013 | .00027 | .00040       | 28 x Dia  | .30 x Dia                     | .00046 | .00058 | .00070 | .00094 | .00140 | .00187       | .00281 | .00374 | .55 x Dia | .30 x Dia |
| <b>ZINC ALLOYS</b>   |  | 800                           | Finishing              | .00022 | .00045 | .00068       | .05 x Dia | 3 x Dia                       | .00078 | .00098 | .00116 | .00156 | .00234 | .00313       | .00469 | .00626 | .10 x Dia | 3 x Dia   |
| <b>COPPER ALLOYS</b>   |  |                               |                        |        |        |              |           |                               |        |        |        |        |        |              |        |        |           |           |
| High Coppers - 90%+ (C1xxx)  |  | 225                           | Slotting               | .00008 | .00017 | .00026       | 1 x Dia   | .07 x Dia                     | .00030 | .00037 | .00045 | .00060 | .00090 | .00120       | .00180 | .00239 | 1 x Dia   | .18 x Dia |
| Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C69800)                                 |  | 500                           | Slotting               | .00010 | .00021 | .00032       | 28 x Dia  | .30 x Dia                     | .00037 | .00047 | .00056 | .00075 | .00112 | .00150       | .00224 | .00299 | .55 x Dia | .30 x Dia |
| Phosphor Bronzes (Copper Tin alloys, C5xxx)  |  | 225                           | Slotting               | .00010 | .00021 | .00032       | 28 x Dia  | .30 x Dia                     | .00037 | .00047 | .00056 | .00075 | .00112 | .00150       | .00224 | .00299 | .55 x Dia | .30 x Dia |
| Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)                                       |  | 500                           | Roughing               | .00010 | .00021 | .00032       | 28 x Dia  | .30 x Dia                     | .00037 | .00047 | .00056 | .00075 | .00112 | .00150       | .00224 | .00299 | .55 x Dia | .30 x Dia |
| Silicon Bronzes (Copper Silicon alloys, C64700-C66100)   |  | 500                           | Roughing               | .00010 | .00021 | .00032       | 28 x Dia  | .30 x Dia                     | .00037 | .00047 | .00056 | .00075 | .00112 | .00150       | .00224 | .00299 | .55 x Dia | .30 x Dia |
| Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx)                                   |  | 225                           | Slotting               | .00010 | .00021 | .00032       | 28 x Dia  | .30 x Dia                     | .00037 | .00047 | .00056 | .00075 | .00112 | .00150       | .00224 | .00299 | .55 x Dia | .30 x Dia |
| Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700) |  | 550                           | Finishing              | .00017 | .00036 | .00054       | .05 x Dia | 3 x Dia                       | .00062 | .00078 | .00093 | .00125 | .00187 | .00250       | .00375 | .00501 | .10 x Dia | 3 x Dia   |



**Product Table:** Miniature End Mills - Corner Radius - Long Reach, Standard Flute  
**Characteristics:** 8x Reach Multiple, 4 Flutes  
**Series:** 8768xx, 8769xx, 8776xx, 8777xx

**Please note:**  
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](mailto: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.

| MATERIAL  |  | Hardness: 29-37 Rc (279-344 HBn) |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
|---|--|----------------------------------|------------------------|--------|--------|--------------|-----------|-------------------------------|--------|--------|--------|--------|--------|--------------|--------|-----------|-----------|-----------|
|   |  | SFM                              | Chip Load (IPT) by Dia |        |        | Depth of Cut |           | Chip Load (IPT) by Cutter Dia |        |        |        |        |        | Depth of Cut |        |           |           |           |
|   |  |                                  | 0.015                  | 0.031  | 0.047  | Radial       | Axial     | 0.062                         | 0.078  | 0.093  | 0.125  | 0.187  | 0.250  | 0.375        | 0.500  | Radial    | Axial     |           |
| <b>CARBON STEELS</b>  |  |                                  |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
| Free-Machining Low Carbon steels, 10xx-1029 & all 10Lxx, 11xx-1139 & all 11Lxx, 12xx-1215 & all 12Lxx   |  | 600                              | Slotting               | .00004 | .00007 | .00011       | 1 x Dia   | .07 x Dia                     | .00013 | .00016 | .00019 | .00026 | .00038 | .00051       | .00077 | .00103    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00004 | .00008 | .00013       | 28 x Dia  | .30 x Dia                     | .00014 | .00018 | .00022 | .00029 | .00043 | .00058       | .00087 | .00116    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00007 | .00014 | .00021       | .05 x Dia | 3 x Dia                       | .00024 | .00036 | .00049 | .00073 | .00098 | .00147       | .00196 | .10 x Dia | 3 x Dia   |           |
| 1030-1095, 1140-1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4Lxx, 5xxx & 5Lxx, 50xxx & 50Lxx, 51xxx & 51Lxx, 52xxx & 52Lxx, 6xxx, 8xx, 9xxx  |  | 200                              | Slotting               | .00003 | .00007 | .00010       | 1 x Dia   | .07 x Dia                     | .00012 | .00015 | .00017 | .00024 | .00035 | .00047       | .00071 | .00094    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00004 | .00008 | .00011       | 28 x Dia  | .30 x Dia                     | .00013 | .00016 | .00020 | .00026 | .00040 | .00053       | .00079 | .00106    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00006 | .00013 | .00019       | .05 x Dia | 3 x Dia                       | .00022 | .00028 | .00033 | .00045 | .00067 | .00089       | .00134 | .00179    | .10 x Dia | 3 x Dia   |
| <b>STAINLESS STEELS</b>   |  |                                  |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
| 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe   |  | 450                              | Slotting               | .00004 | .00007 | .00011       | 1 x Dia   | .07 x Dia                     | .00013 | .00016 | .00019 | .00026 | .00038 | .00051       | .00077 | .00103    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00004 | .00008 | .00013       | 28 x Dia  | .30 x Dia                     | .00014 | .00018 | .00022 | .00029 | .00043 | .00058       | .00087 | .00116    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00007 | .00014 | .00021       | .05 x Dia | 3 x Dia                       | .00024 | .00036 | .00049 | .00073 | .00098 | .00147       | .00196 | .10 x Dia | 3 x Dia   |           |
| 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                              | Slotting               | .00003 | .00007 | .00010       | 1 x Dia   | .07 x Dia                     | .00012 | .00015 | .00017 | .00024 | .00035 | .00047       | .00071 | .00094    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00004 | .00008 | .00011       | 28 x Dia  | .30 x Dia                     | .00013 | .00016 | .00020 | .00026 | .00040 | .00053       | .00079 | .00106    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00006 | .00013 | .00019       | .05 x Dia | 3 x Dia                       | .00022 | .00028 | .00033 | .00045 | .00067 | .00089       | .00134 | .00179    | .10 x Dia | 3 x Dia   |
| 414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7  |  | 150                              | Slotting               | .00002 | .00004 | .00006       | 1 x Dia   | .07 x Dia                     | .00007 | .00009 | .00011 | .00015 | .00022 | .00029       | .00044 | .00059    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00002 | .00005 | .00007       | 28 x Dia  | .30 x Dia                     | .00008 | .00010 | .00012 | .00017 | .00025 | .00033       | .00050 | .00066    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00004 | .00008 | .00012       | .05 x Dia | 3 x Dia                       | .00014 | .00017 | .00021 | .00028 | .00042 | .00056       | .00084 | .00112    | .10 x Dia | 3 x Dia   |
| <b>TOOL STEELS</b>  |  |                                  |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
| A, L, O, P, W series  |  | 200                              | Slotting               | .00003 | .00007 | .00010       | 1 x Dia   | .07 x Dia                     | .00012 | .00015 | .00017 | .00024 | .00035 | .00047       | .00071 | .00094    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00004 | .00008 | .00011       | 28 x Dia  | .30 x Dia                     | .00013 | .00016 | .00020 | .00026 | .00040 | .00053       | .00079 | .00106    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00006 | .00013 | .00019       | .05 x Dia | 3 x Dia                       | .00022 | .00028 | .00033 | .00045 | .00067 | .00089       | .00134 | .00179    | .10 x Dia | 3 x Dia   |
| D, H, M, T, S series  |  | 150                              | Slotting               | .00002 | .00004 | .00006       | 1 x Dia   | .07 x Dia                     | .00007 | .00009 | .00011 | .00015 | .00022 | .00029       | .00044 | .00059    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00002 | .00005 | .00007       | 28 x Dia  | .30 x Dia                     | .00008 | .00010 | .00012 | .00017 | .00025 | .00033       | .00050 | .00066    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00004 | .00008 | .00012       | .05 x Dia | 3 x Dia                       | .00014 | .00017 | .00021 | .00028 | .00042 | .00056       | .00084 | .00112    | .10 x Dia | 3 x Dia   |
| <b>TITANIUM ALLOYS</b>  |  |                                  |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
|   |  | 150                              | Slotting               | .00002 | .00004 | .00006       | 1 x Dia   | .07 x Dia                     | .00007 | .00009 | .00011 | .00015 | .00022 | .00029       | .00044 | .00059    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00002 | .00005 | .00007       | 28 x Dia  | .30 x Dia                     | .00008 | .00010 | .00012 | .00017 | .00025 | .00033       | .00050 | .00066    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00004 | .00008 | .00012       | .05 x Dia | 3 x Dia                       | .00014 | .00017 | .00021 | .00028 | .00042 | .00056       | .00084 | .00112    | .10 x Dia | 3 x Dia   |
| <b>HIGH TEMP ALLOYS</b>   |  |                                  |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
| Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discology, Incoloy   |  | 70                               | Slotting               | .00002 | .00004 | .00006       | 1 x Dia   | .07 x Dia                     | .00007 | .00009 | .00011 | .00015 | .00022 | .00029       | .00044 | .00059    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00002 | .00005 | .00007       | 28 x Dia  | .30 x Dia                     | .00008 | .00010 | .00012 | .00017 | .00025 | .00033       | .00050 | .00066    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00004 | .00008 | .00012       | .05 x Dia | 3 x Dia                       | .00014 | .00017 | .00021 | .00028 | .00042 | .00056       | .00084 | .00112    | .10 x Dia | 3 x Dia   |

| MATERIAL  |  | Hardness: 38-45 Rc (353-421 HBn) |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
|---|--|----------------------------------|------------------------|--------|--------|--------------|-----------|-------------------------------|--------|--------|--------|--------|--------|--------------|--------|-----------|-----------|-----------|
|   |  | SFM                              | Chip Load (IPT) by Dia |        |        | Depth of Cut |           | Chip Load (IPT) by Cutter Dia |        |        |        |        |        | Depth of Cut |        |           |           |           |
|   |  |                                  | 0.015                  | 0.031  | 0.047  | Radial       | Axial     | 0.062                         | 0.078  | 0.093  | 0.125  | 0.187  | 0.250  | 0.375        | 0.500  | Radial    | Axial     |           |
| <b>CARBON STEELS</b>  |  |                                  |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |
| Free-Machining Low Carbon steels, 10xx-1029 & all 10Lxx, 11xx-1139 & all 11Lxx, 12xx-1215 & all 12Lxx |  | 600                              | Slotting               | .00004 | .00007 | .00011       | 1 x Dia   | .07 x Dia                     | .00013 | .00016 | .00019 | .00026 | .00038 | .00051       | .00077 | .00103    | 1 x Dia   | .18 x Dia |
|   |  |                                  | Roughing               | .00004 | .00008 | .00013       | 28 x Dia  | .30 x Dia                     | .00014 | .00018 | .00022 | .00029 | .00043 | .00058       | .00087 | .00116    | .55 x Dia | .30 x Dia |
|   |  |                                  | Finishing              | .00007 | .00014 | .00021       | .05 x Dia | 3 x Dia                       | .00024 | .00036 | .00049 | .00073 | .00098 | .00147       | .00196 | .10 x Dia | 3 x Dia   |           |
| 1030  |  |                                  |                        |        |        |              |           |                               |        |        |        |        |        |              |        |           |           |           |