

## General Purpose End Mill Recommended Cutting Data - Profile Milling

| Length      | 2 Flute Series |     | 3 Flute Series |     | 4 Flute Series |     |     |      |
|-------------|----------------|-----|----------------|-----|----------------|-----|-----|------|
| Stub        | 164            | 166 | 169            |     | 163            |     | 165 |      |
| Standard    | 121            | 150 | 116            | 145 | 111            | 140 | 117 | 114  |
| Long Length | 123*           |     |                |     | 122*           |     |     | 132* |

\*Chip thinning may not be possible with 122, 123 and 132 series if radial width of cut exceeds 20%.

For ball nose end mills - If axial depth (ap) is less than the ball diameter, the speed is figured using the effective cutting diameter.

### Inch

For diameters 1/4" and below, see Micro Charts starting on page 363.

| Workpiece Material Group  | ISO | Hardness    | Coolant                                     |     |     |  |     | Profile Milling (ae) |     |     |   |       | End Mill Diameters |       |       |       |  |  |
|---|-----|-------------|---|-----|-----|--|-----|----------------------|-----|-----|---|-------|--------------------|-------|-------|-------|--|--|
|   |     |             | • Preferred<br>○ Possible<br>x Not Possible |     |     |  |     |                      |     |     | 5/16  | 3/8   | 1/2                | 5/8   | 3/4   | 1     |  |  |
|   |     |             | Max.  | Air | MMS | 5%   | 10% | 20%                  | 30% | 50% | ae > .3D use < 1D ap<br>ae < .2D use < 2D ap  |       |                    |       |       |       |  |  |
|   |     |             |   |     |     | vc - SFM<br>Increase speeds by 30% for<br>ALtima® coated tools |     |                      |     |     | ← Multiply fz by this Factor based on ae.<br>When finishing, use the standard fz per<br>chart below. Only add chip thinning<br>when roughing or semi-finishing. |       |                    |       |       |       |  |  |
|   |     |             | fz - in/tooth                               |     |     |  |     |                      |     |     |   |       |                    |       |       |       |  |  |
| Free Machining & Low Carbon Steels<br>1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330  | P   | up to 28 Rc | •   | •   | •   | 1050   | 700 | 385                  | 375 | 350 | .0027   | .0032 | .0045              | .0054 | .0063 | .0090 |  |  |
| Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels<br>1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310 | P   | 28 to 38 Rc | •   | •   | •   | 630  | 420 | 320                  | 250 | 210 | .0027   | .0032 | .0045              | .0054 | .0063 | .0090 |  |  |
| Tool Steels & Die Steels<br>O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7  | P   | 28 to 44 Rc | •   | •   | •   | 525  | 350 | 300                  | 275 | 250 | .0027   | .0032 | .0045              | .0054 | .0063 | .0090 |  |  |
| Hardened Steels   | H   | 45-55 Rc    | •   | ○   | ○   | 250  | 240 | 230                  | 210 | 200 | .0018   | .0021 | .0030              | .0036 | .0042 | .0060 |  |  |
| Hardened Steels   |     | 55-65 Rc    | •   | ○   | ○   | 200  | 180 | 160                  | 150 | 100 | .0013   | .0014 | .0021              | .0024 | .0029 | .0041 |  |  |
| Stainless Steel - Easy to Machine<br>430F, 301, 303, 410, 416<br>Annealed, 420F, 430, 430F  | M   | up to 28 Rc | •   | x   | ○   | 650  | 600 | 550                  | 500 | 450 | .0027   | .0032 | .0045              | .0054 | .0063 | .0090 |  |  |
| Stainless Steel - Moderately Difficult<br>301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH   | M   | up to 28 Rc | •   | x   | ○   | 525  | 400 | 350                  | 300 | 250 | .0027   | .0032 | .0045              | .0054 | .0063 | .0090 |  |  |
| Stainless Steel - Difficult to Machine<br>302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics   | M   | over 28 Rc  | •   | x   | ○   | 525  | 400 | 350                  | 300 | 250 | .0027   | .0032 | .0045              | .0054 | .0063 | .0090 |  |  |

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.