

Table 10. Cutting Feeds and Speeds for Milling Aluminum Alloys

| Material                                                        | Material Condition* | End Milling                                                                                        |      |                                   | Face Milling                      |                         |      | Slit Milling                      |      |      |      |
|-----------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------|------|-----------------------------------|-----------------------------------|-------------------------|------|-----------------------------------|------|------|------|
|                                                                 |                     | HSS                                                                                                |      | Indexable Insert Uncoated Carbide | Indexable Insert Uncoated Carbide | Polycrystalline Diamond | HSS  | Indexable Insert Uncoated Carbide |      |      |      |
|                                                                 |                     | Opt.                                                                                               | Avg. | Opt.                              | Avg.                              | Opt.                    | Avg. | Opt.                              | Avg. |      |      |
|                                                                 |                     | f = feed (0.001 in./tooth), s = speed (ft/min) Metric Units: f × 25.4 = mm/rev, s × 0.3048 = m/min |      |                                   |                                   |                         |      |                                   |      |      |      |
| All wrought aluminum alloys, 6061-T651, 5000, 6000, 7000 series | CD                  | f 15                                                                                               | 8    | 15                                | 8                                 | 39                      | 20   | 16                                | 8    | 39   | 20   |
|                                                                 | ST and A            | s 165                                                                                              | 850  | 620                               | 2020                              | 755                     | 1720 | 1600                              | 4680 | 840  | 2390 |
| All aluminum sand and permanent mold casting alloys             | CD                  |                                                                                                    |      |                                   |                                   |                         |      |                                   |      |      |      |
|                                                                 | ST and A            |                                                                                                    |      |                                   |                                   |                         |      |                                   |      |      |      |
| Aluminum Die-Casting Alloys                                     |                     |                                                                                                    |      |                                   |                                   |                         |      |                                   |      |      |      |
| Alloys 308.0 and 319.0                                          | —                   | f 15                                                                                               | 8    | 15                                | 8                                 | 39                      | 20   | 16                                | 8    | 39   | 20   |
|                                                                 |                     | s 30                                                                                               | 100  | 620                               | 2020                              | 755                     | 1720 | 160                               | 375  | 840  | 2390 |
| Alloys 360.0 and 380.0                                          | —                   | f 15                                                                                               | 8    | 15                                | 8                                 | 39                      | 20   | 16                                | 8    | 39   | 20   |
|                                                                 |                     | s 30                                                                                               | 90   | 485                               | 1905                              | 555                     | 1380 | 145                               | 355  | 690  | 2320 |
| Alloys 390.0 and 392.0                                          | —                   | f                                                                                                  |      |                                   |                                   | 39                      | 20   |                                   |      |      |      |
|                                                                 |                     | s                                                                                                  |      |                                   |                                   | 220                     | 370  |                                   |      |      |      |
| Alloy 413                                                       | —                   | f                                                                                                  |      |                                   |                                   | 39                      | 20   |                                   |      |      |      |
|                                                                 | ST and A            | s                                                                                                  |      |                                   |                                   | 405                     | 665  | 2320                              | 500  | 1680 | 1680 |
| All other aluminum die-casting alloys                           | AC                  | f 15                                                                                               | 8    | 15                                | 8                                 | 39                      | 20   | 16                                | 8    | 39   | 20   |
|                                                                 |                     | s 30                                                                                               | 90   | 485                               | 1905                              | 555                     | 1380 | 145                               | 335  | 690  | 2320 |

Abbreviations designate: A, annealed; AC, as cast; CD, cold drawn; and ST and A, solution treated and aged, respectively.

**End Milling:** Table data for end milling are based on a 3-tooth, 20-degree helix angle tool with a diameter of 1.0 inch, an axial depth of cut of 0.2 inch, and a radial depth of cut of 1 inch (full slot). Use [Table 15b](#) to adjust speeds for other feeds and axial depths of cut, and [Table 15c](#) to adjust speeds if the radial depth of cut is less than the tool diameter. Speeds are valid for all tool diameters.

**Face Milling:** Table data for face milling are based on a 10-tooth, 8-inch diameter face mill, operating with a 15-degree lead angle,  $\frac{3}{64}$ -inch nose radius, axial depth of cut = 0.1 inch, and radial depth (width) of cut = 6 inches (i.e., width of cut to cutter diameter ratio =  $\frac{3}{4}$ ). These speeds are valid if the cutter axis is above or close to the center line of the workpiece (eccentricity is small). Under these conditions, use [Table 15d](#) to adjust speeds for other feeds and axial and radial depths of cut. For larger eccentricity (i.e., when the cutter axis to workpiece center line offset is one half the cutter diameter or more), use the end and side milling adjustment factors ([Tables 15b](#) and [15c](#)) instead of the face milling factors.

**Slit and Slot Milling:** Table data for slit milling are based on an 8-tooth, 10-degree helix angle tool with a cutter width of 0.4 inch, diameter *D* of 4.0 inch, and a depth of cut of 0.6 inch. Speeds are valid for all tool diameters and widths. See the examples in the text for adjustments to the given speeds for other feeds and depths of cut.

Tool life for all tabulated values is approximately 45 minutes; use [Table 15e](#) to adjust tool life from 15 to 180 minutes. The combined feed/speed data in this table are based on tool grades (identified in [Table 16](#)) as follows: uncoated carbide = 15; diamond = 9.