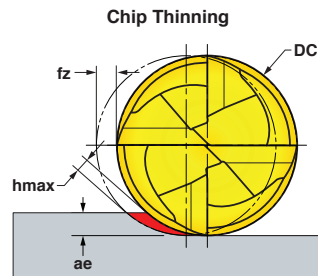




# OPERATING GUIDELINES: 90° END MILLS



When ae is less than 25% DC, recommend use of Chip Thinning Calculator to ensure hmax is within fz range.

| Materials |                |                                          |                                    | Cutting Speed SFM | DC Cutting Dia. (inch) | fz* Feed per Tooth (inch) | Harder <-----> Tougher |       |                  |        | Coolant                            |
|-----------|----------------|------------------------------------------|------------------------------------|-------------------|------------------------|---------------------------|------------------------|-------|------------------|--------|------------------------------------|
| ISO       | Material Group | Type                                     | Examples                           |                   |                        |                           | IN2006                 | IN055 | IN2505<br>IN2205 | IN2005 |                                    |
| P         | 1-5            | Non-alloy Steel                          | 1018, A36, 1045, A572, 1070        | 400-1000          | .062-.094              | .0005-.0020               | 2                      |       |                  | 1      | No                                 |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0030               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .312-.500              | .0010-.0045               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .625-.750              | .0010-.0070               |                        |       |                  |        |                                    |
|           | 6-9            | Low-alloy Steel                          | 4140, 4340, P20, 8620, 300M        | 350-700           | 1.00-1.25              | .0010-.0080               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0020               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0030               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .312-.500              | .0010-.0040               |                        |       |                  |        |                                    |
|           | 10-11          | High-alloy Steel                         | H13, A2, D2, M2, T1                | 300-600           | .625-.750              | .0010-.0060               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | 1.00-1.25              | .0010-.0070               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0015               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0025               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .312-.500              | .0010-.0040               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .625-.750              | .0010-.0050               |                        |       |                  |        |                                    |
| M         | 12-13          | Stainless Steel (Ferritic & Martensitic) | 410, 416, 440                      | 350-600           | 1.00-1.25              | .0010-.0060               |                        |       |                  | 1      | Yes                                |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0015               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0025               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .312-.500              | .0010-.0040               |                        |       |                  |        |                                    |
|           | 14             | Stainless Steel (Austenitic)             | 303, 304, 316, 15-5, 17-4          | 300-550           | .625-.750              | .0010-.0050               |                        |       |                  |        | May not be required at high speeds |
|           |                |                                          |                                    |                   | 1.00-1.25              | .0010-.0060               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0015               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0025               |                        |       |                  |        |                                    |
|           | 15-16          | Gray Cast Iron                           | CLS. 20, 30, 45                    | 500-1000          | .312-.500              | .0010-.0045               |                        |       |                  |        | No                                 |
|           |                |                                          |                                    |                   | .625-.750              | .0010-.0070               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | 1.00-1.25              | .0010-.0080               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0015               |                        |       |                  |        |                                    |
|           | 17-20          | Nodular Cast Iron                        | "60-40-18, 100-70-03"              | 400-800           | .125-.250              | .0007-.0025               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .312-.500              | .0010-.0040               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .625-.750              | .0010-.0050               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | 1.00-1.25              | .0010-.0060               |                        |       |                  |        |                                    |
| N         | 21-30          | Aluminum                                 | 7075, 6061                         | 1000-3000         | .062-.094              | .0005-.0025               |                        | 1     |                  |        | Yes                                |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0040               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .312-.500              | .0010-.0060               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .625-.750              | .0010-.0080               |                        |       |                  |        |                                    |
|           | 31-35          | High-Temp Alloys                         | Inconel, Hastelloy, Nimonic, Monel | 65-200            | 1.00-1.25              | .0010-.0090               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0015               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0025               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .312-.500              | .0010-.0040               |                        |       |                  |        |                                    |
|           | 36-37          | Titanium Alloys                          | "6Al-4V, 5Al-5Mo-5V-3Cr"           | 85-200            | .625-.750              | .0010-.0050               |                        |       |                  |        | Yes                                |
|           |                |                                          |                                    |                   | 1.00-1.25              | .0010-.0060               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0015               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .125-.250              | .0007-.0025               |                        |       |                  |        |                                    |
|           | 38-39          | Hardened Steel >48                       | A2, O1, D2                         | 130-250           | .312-.500              | .0010-.0020               |                        |       |                  |        | No                                 |
|           |                |                                          |                                    |                   | .625-.750              | .0010-.0030               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | 1.00-1.25              | .0010-.0040               |                        |       |                  |        |                                    |
|           |                |                                          |                                    |                   | .062-.094              | .0005-.0010               |                        |       |                  |        |                                    |

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.