








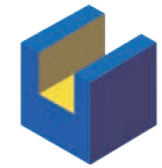
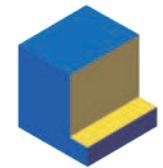
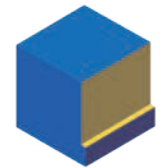


# Speed & Feed Recommendations

| Z1PCR, Z1PLC, Z1PLB<br>Fractional   | HARDNESS<br>BRINELL | CUT<br>Type | SPEED<br>sfm | FEED (inch/flute) |         |        |        |        |        |        |
|---|---------------------|-------------|--------------|-------------------|---------|--------|--------|--------|--------|--------|
|   |                     |             |              | 1/16              | 1/8     | 1/4    | 3/8    | 1/2    | 3/4    | 1      |
|  <b>CARBON STEEL</b><br>1018, 1040, 1080, 1090,<br>10L50, 1140, 1212, 12L15,<br>1525, 1536 | ≤ 175               | Slot        | 505          | 0.00019           | 0.00047 | 0.0012 | 0.0023 | 0.0031 | 0.0037 | 0.0043 |
|   |                     | Profile     | 630          | 0.00019           | 0.00047 | 0.0012 | 0.0023 | 0.0031 | 0.0037 | 0.0043 |
|   |                     | Light       | 1040         | 0.00044           | 0.00107 | 0.0028 | 0.0053 | 0.0071 | 0.0085 | 0.0100 |
|   | > 175<br>≤ 275      | Slot        | 440          | 0.00019           | 0.00047 | 0.0012 | 0.0023 | 0.0031 | 0.0037 | 0.0043 |
|   |                     | Profile     | 550          | 0.00019           | 0.00047 | 0.0012 | 0.0023 | 0.0031 | 0.0037 | 0.0043 |
|   |                     | Light       | 910          | 0.00044           | 0.00107 | 0.0028 | 0.0053 | 0.0071 | 0.0085 | 0.0100 |
|  <b>ALLOY STEEL</b><br>4140, 4150, 4320, 5120,<br>5150, 8630, 86L20, 50100                 | ≤ 275               | Slot        | 370          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Profile     | 465          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Light       | 765          | 0.00033           | 0.00079 | 0.0021 | 0.0040 | 0.0053 | 0.0063 | 0.0074 |
|   | > 275<br>≤ 375      | Slot        | 250          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Profile     | 315          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Light       | 520          | 0.00033           | 0.00079 | 0.0021 | 0.0040 | 0.0053 | 0.0063 | 0.0074 |
|  <b>TOOL STEEL</b><br>A2, D2, H13, L2, M2,<br>P20, S7, T15, W2                             | ≤ 250               | Slot        | 240          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Profile     | 300          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Light       | 495          | 0.00033           | 0.00079 | 0.0021 | 0.0040 | 0.0053 | 0.0063 | 0.0074 |
|   | > 250<br>≤ 375      | Slot        | 145          | 0.00011           | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0022 | 0.0025 |
|   |                     | Profile     | 185          | 0.00011           | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0022 | 0.0025 |
|   |                     | Light       | 305          | 0.00026           | 0.00062 | 0.0017 | 0.0031 | 0.0041 | 0.0050 | 0.0058 |
|  <b>CAST IRON</b><br>Gray, Malleable, Ductile  | ≤ 220               | Slot        | 355          | 0.00018           | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0039 |
|   |                     | Profile     | 445          | 0.00018           | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0039 |
|   |                     | Light       | 730          | 0.00040           | 0.00096 | 0.0026 | 0.0048 | 0.0064 | 0.0077 | 0.0090 |
|   | > 220<br>≤ 260      | Slot        | 265          | 0.00018           | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0039 |
|   |                     | Profile     | 330          | 0.00018           | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0039 |
|   |                     | Light       | 545          | 0.00040           | 0.00096 | 0.0026 | 0.0048 | 0.0064 | 0.0077 | 0.0090 |
|  <b>STAINLESS (free machining)</b><br>303, 416, 420F, 430F, 440F                         | ≤ 275               | Slot        | 455          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Profile     | 570          | 0.00014           | 0.00035 | 0.0009 | 0.0017 | 0.0023 | 0.0028 | 0.0032 |
|   |                     | Light       | 935          | 0.00033           | 0.00079 | 0.0021 | 0.0040 | 0.0053 | 0.0063 | 0.0074 |
|  <b>STAINLESS (difficult)</b><br>304, 304L, 316, 316L                                    | ≤ 275               | Slot        | 315          | 0.00011           | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0022 | 0.0025 |
|   |                     | Profile     | 395          | 0.00011           | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0022 | 0.0025 |
|   |                     | Light       | 650          | 0.00026           | 0.00062 | 0.0017 | 0.0031 | 0.0041 | 0.0050 | 0.0058 |
|  <b>STAINLESS (PH)</b><br>17-4PH, 15-5PH, Custom<br>450, 16-6PH, PH13-8Mo                | ≤ 325               | Slot        | 290          | 0.00011           | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0022 | 0.0025 |
|   |                     | Profile     | 360          | 0.00011           | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0022 | 0.0025 |
|   |                     | Light       | 595          | 0.00026           | 0.00062 | 0.0017 | 0.0031 | 0.0041 | 0.0050 | 0.0058 |
|  <b>TITANIUM</b><br>Ti5Al-5V-5Mo,<br>Ti6Al4V, Ti-7Al4Mo                                  | ≤ 350               | Slot        | 170          | 0.00013           | 0.00030 | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
|   |                     | Profile     | 215          | 0.00013           | 0.00030 | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
|   |                     | Light       | 355          | 0.00029           | 0.00069 | 0.0018 | 0.0034 | 0.0046 | 0.0055 | 0.0064 |
|  <b>HIGH TEMPERATURE ALLOY</b><br>A-286, Hastelloy, Incoloy,<br>Inconel, Rene, Waspalloy | ≤ 300               | Slot        | 65           | 0.00009           | 0.00023 | 0.0006 | 0.0011 | 0.0015 | 0.0018 | 0.0021 |
|   |                     | Profile     | 80           | 0.00009           | 0.00023 | 0.0006 | 0.0011 | 0.0015 | 0.0018 | 0.0021 |
|   |                     | Light       | 130          | 0.00022           | 0.00052 | 0.0014 | 0.0026 | 0.0034 | 0.0041 | 0.0048 |

| CUT TYPE  |  |   |   |   |   |
|---|--|---|---|---|---|
| SLOT  |  | PROFILE   |   | LIGHT*  |   |
| Regular<br>Rw = D <sub>1</sub><br>Ad = D <sub>1</sub>                               | Long Reach<br>Rw = D <sub>1</sub><br>Ad = .25 x D <sub>1</sub> | Regular<br>Rw = .5 x D <sub>1</sub><br>Ad = 1.5 x D <sub>1</sub>                    | Long Reach<br>Rw = .2 x D <sub>1</sub><br>Ad = 1.5 x D <sub>1</sub> | Regular, Long Reach<br>Rw = .05 x D <sub>1</sub><br>Ad = L <sub>2</sub>             | $rpm = sfm \times 3.82 / D_1$<br>$ipm = (inch/flute) \times rpm$ <ul style="list-style-type: none"> <li>• maximum recommended depths shown</li> <li>• reduce speed and feed for materials harder than listed</li> <li>* finish cuts typically require reduced feed and cutting depths of .02 x D<sub>1</sub> maximum</li> <li>• refer to the SGS Tool Wizard for more complete technical information (available at )</li> </ul> |
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