





IPT13/IPC13 Application Guide – Speed & Feed (inch)

| ISO Code | Work Material | Type of Cut | Axial DOC | Radial DOC | No. of Flutes | Speed (SFM) | Feed (Inches per Tooth) | | | | |
|---|---|---|----------------------------------|------------------|---------------|-------------|-------------------------|-------|-------|-------|-------|
| | | | | | | | 1/2 | 5/8 | 3/4 | 1 | 1 1/4 |
|  | Gray ASTM-A48 Class 20, 25, 30, 35 & 40 | Peripheral - HEM | ≤ 2 x D | .07 x D | 13 | 370 | .0045 | .0056 | .0068 | .0090 | .0113 |
| | | Peripheral - HEM | > 2 - 3 x D | .07 x D | 13 | 370 | .0040 | .0050 | .0060 | .0080 | .0100 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .07 x D | 13 | 360 | .0034 | .0043 | .0051 | .0068 | .0085 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .06 x D | 13 | 360 | .0030 | .0038 | .0045 | .0060 | .0075 |
| | | Finish | 3 x D | .01 x D | 13 | 365 | .0020 | .0025 | .0030 | .0040 | .0050 |
| | Cast Iron Malleable | Peripheral - HEM | ≤ 2 x D | .07 x D | 13 | 380 | .0048 | .0060 | .0072 | .0096 | .0120 |
| | | Peripheral - HEM | > 2 - 3 x D | .07 x D | 13 | 380 | .0042 | .0053 | .0063 | .0084 | .0105 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .07 x D | 13 | 365 | .0039 | .0049 | .0059 | .0078 | .0098 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .07 x D | 13 | 365 | .0036 | .0045 | .0054 | .0072 | .0090 |
| | | Finish | 3 x D | .01 x D | 13 | 340 | .0017 | .0021 | .0026 | .0034 | .0043 |
|  | Low Carbon Steels ≤ 38 Rc 1018, 1020, 12L14, 5120, 8620 | Peripheral - HEM | ≤ 2 x D | .07 x D | 13 | 450 | .0044 | .0055 | .0066 | .0088 | .0110 |
| | | Peripheral - HEM | > 2 - 3 x D | .07 x D | 13 | 430 | .0039 | .0049 | .0059 | .0078 | .0098 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .07 x D | 13 | 420 | .0036 | .0045 | .0054 | .0072 | .0090 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .07 x D | 13 | 410 | .0034 | .0043 | .0051 | .0068 | .0085 |
| | | Finish | 3 x D | .01 x D | 13 | 395 | .0017 | .0021 | .0026 | .0034 | .0043 |
| | Medium Carbon Steels ≤ 48 HRC 1045, 4140, 4340, 5140 | Peripheral - HEM | ≤ 2 x D | .06 x D | 13 | 405 | .0044 | .0055 | .0066 | .0088 | .0110 |
| | | Peripheral - HEM | > 2 - 3 x D | .06 x D | 13 | 405 | .0041 | .0051 | .0062 | .0082 | .0103 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .05 x D | 13 | 405 | .0039 | .0049 | .0059 | .0078 | .0098 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .05 x D | 13 | 405 | .0036 | .0045 | .0054 | .0072 | .0090 |
| | | Finish | 3 x D | .01 x D | 13 | 370 | .0017 | .0021 | .0026 | .0034 | .0043 |
| | Tool and Die Steels ≤ 48 Rc A2, D2, O1, S7, P20, H13 | Peripheral - HEM | ≤ 2 x D | .06 x D | 13 | 420 | .0045 | .0056 | .0068 | .0090 | .0113 |
| | | Peripheral - HEM | > 2 - 3 x D | .06 x D | 13 | 420 | .0040 | .0050 | .0060 | .0080 | .0100 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .05 x D | 13 | 415 | .0037 | .0046 | .0056 | .0074 | .0093 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .05 x D | 13 | 415 | .0035 | .0044 | .0053 | .0070 | .0088 |
| | | Finish | 3 x D | .01 x D | 13 | 385 | .0015 | .0019 | .0023 | .0030 | .0038 |
|  | Martensitic & Ferritic Stainless Steels 410, 416, 440 | Peripheral - HEM | ≤ 2 x D | .06 x D | 13 | 460 | .0050 | .0063 | .0075 | .0100 | .0125 |
| | | Peripheral - HEM | > 2 - 3 x D | .06 x D | 13 | 460 | .0048 | .0060 | .0072 | .0096 | .0120 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .06 x D | 13 | 450 | .0040 | .0050 | .0060 | .0080 | .0100 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .06 x D | 13 | 445 | .0035 | .0044 | .0053 | .0070 | .0088 |
| | | Finish | 3 x D | .01 x D | 13 | 390 | .0018 | .0023 | .0027 | .0036 | .0045 |
| | Austenitic Stainless Steels, FeNi Alloys 303, 304, 316, Invar, Kovar | Peripheral - HEM | ≤ 2 x D | .06 x D | 13 | 450 | .0041 | .0051 | .0062 | .0082 | .0103 |
| | | Peripheral - HEM | > 2 - 3 x D | .06 x D | 13 | 450 | .0040 | .0050 | .0060 | .0080 | .0100 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .05 x D | 13 | 450 | .0037 | .0046 | .0056 | .0074 | .0093 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .05 x D | 13 | 445 | .0035 | .0044 | .0053 | .0070 | .0088 |
| | | Finish | 3 x D | .01 x D | 13 | 415 | .0015 | .0019 | .0023 | .0030 | .0038 |
| | Precipitation Hardening Stainless Steels 17-4, 15-5 | Peripheral - HEM | > 2 - 3 x D | .06 x D | 13 | 440 | .0041 | .0051 | .0062 | .0082 | .0103 |
| | | Peripheral - HEM | > 3 - 3.5 x D | .05 x D | 13 | 435 | .0038 | .0048 | .0057 | .0076 | .0095 |
| | | Peripheral - HEM | > 3.5 - 4 x D | .05 x D | 13 | 435 | .0034 | .0043 | .0051 | .0068 | .0085 |
| | | Finish | 3 x D | .01 x D | 13 | 400 | .0017 | .0021 | .0026 | .0034 | .0043 |
| | |  | Titanium Alloys 6Al-4V, 6-2-4 | Peripheral - HEM | ≤ 2 x D | .08 x D | 13 | 395 | .0050 | .0063 | .0075 |
| Peripheral - HEM | > 2 - 3 x D | | | .07 x D | 13 | 390 | .0045 | .0056 | .0068 | .0090 | .0113 |
| Peripheral - HEM | > 3 - 3.5 x D | | | .06 x D | 13 | 380 | .0041 | .0051 | .0062 | .0082 | .0103 |
| Peripheral - HEM | > 3.5 - 4 x D | | | .06 x D | 13 | 380 | .0034 | .0043 | .0051 | .0068 | .0085 |
| Finish | 3 x D | | | .015 x D | 13 | 355 | .0022 | .0028 | .0033 | .0044 | .0055 |
| Difficult-to-Machine Titanium Alloys 10-2-3 | Peripheral - HEM | | ≤ 2 x D | 0.06 | 13 | 350 | .0050 | .0063 | .0075 | .0100 | .0125 |
| | Peripheral - HEM | | > 2 - 3 x D | 0.06 | 13 | 330 | .0036 | .0045 | .0054 | .0072 | .0090 |
| | Peripheral - HEM | | > 3 - 3.5 x D | 0.055 | 13 | 315 | .0035 | .0044 | .0053 | .0070 | .0088 |
| | Peripheral - HEM | | > 3.5 - 4 x D | 0.05 | 13 | 310 | .0032 | .0040 | .0048 | .0064 | .0080 |
| | Finish | | 3 x D | .01 x D | 13 | 300 | .0017 | .0021 | .0026 | .0034 | .0043 |
| Hastalloy, Waspalloy | Peripheral - HEM | | ≤ 2 x D | .07 x D | 13 | 105 | .0071 | .0089 | .0107 | .0142 | .0178 |
| | Peripheral - HEM | | > 2 - 3 x D | .065 x D | 13 | 100 | .0064 | .0080 | .0096 | .0128 | .0160 |
| | Peripheral - HEM | | > 3 - 3.5 x D | .055 x D | 13 | 90 | .0062 | .0078 | .0093 | .0124 | .0155 |
| | Peripheral - HEM | | > 3.5 - 4 x D | .05 x D | 13 | 90 | .0057 | .0071 | .0086 | .0114 | .0143 |
| | Finish | | 3 x D | .01 x D | 13 | 90 | .0044 | .0055 | .0066 | .0088 | .0110 |
| Inconel 718, Rene 88 | Peripheral - HEM | | ≤ 2 x D | .06 x D | 13 | 100 | .0052 | .0065 | .0078 | .0104 | .0130 |
| | Peripheral - HEM | | > 2 - 3 x D | .05 x D | 13 | 95 | .0052 | .0065 | .0078 | .0104 | .0130 |
| | Peripheral - HEM | | > 3 - 3.5 x D | .05 x D | 13 | 95 | .0048 | .0060 | .0072 | .0096 | .0120 |
| | Peripheral - HEM | | > 3.5 - 4 x D | .04 x D | 13 | 95 | .0048 | .0060 | .0072 | .0096 | .0120 |
| | Finish | | 3 x D | .01 x D | 13 | 90 | .0023 | .0029 | .0035 | .0046 | .0058 |

D = Tool Diameter HEM = High-efficiency machining

≈ Approximately Equals < Less Than
 ≤ Less Than or Equal To > Greater Than
 ≥ Greater Than or Equal To = Equals
 x Multiply