| Type | Rc Hardness | MILLING SFM (Vc) |  |  |  |  | CHIPLOAD PER FLUTE (Fz) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 2 flute stub/std. | 2 flute extra length | 3\&4flute stub / std. | $3 \& 4$ fute extra length | Diamond Coated | 1/32"-1/8" | 1/8" - 1/4" | 1/4"-1/2" | 1/2" - 1" | 1"-1-1/4" |
| COBALT BASE ALLOYS |  |  |  |  |  |  |  |  |  |  |  |
| Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605 | $\begin{aligned} & <35 \\ & >35 \end{aligned}$ | - | - | $\begin{aligned} & \begin{array}{l} 175-225 \\ 125-175 \end{array} \end{aligned}$ | $\begin{aligned} & 150-200 \\ & 100-150 \\ & \end{aligned}$ | -- | $\begin{aligned} & .0005^{\prime \prime} .00010^{\prime \prime \prime} \\ & .0003^{\prime \prime} \end{aligned}$ | $\begin{gathered} .0008 "-.0020 " \\ .0005 "^{\prime \prime} .00155^{\prime \prime} \end{gathered}$ | $\begin{aligned} & .0010^{\prime \prime} .0030 " 10 \text { " } 0.02020^{\prime \prime} \\ & \hline \end{aligned}$ | $.0020^{\prime \prime}-.0040^{\prime \prime}$ |  |
| NICKEL BASE ALLOYS |  |  |  |  |  |  |  |  |  |  |  |
| Invar, Kovar, Inconel-625/718, Waspaloy, Rene, Hastelloy, A286 | $\begin{aligned} & <35 \\ & >35 \end{aligned}$ | - | - | $\begin{aligned} & 125-175 \\ & 70-115 \end{aligned}$ | $\begin{aligned} & 100-150 \\ & 70-100 \end{aligned}$ | - |  | $\begin{aligned} & .0008^{\prime \prime}-.0020 " 1 \\ & .0005^{\prime \prime}-.0015^{\prime \prime} \end{aligned}$ |  | $.0020^{\prime \prime}-.0040^{\prime \prime}$ $.0010^{\prime \prime}-.0030^{\prime \prime}$ | $\begin{aligned} & .0030^{\prime \prime} .0050 " \\ & .0020^{\prime \prime} .0040^{\prime \prime} \end{aligned}$ |
| IRON BASE ALLOYS |  |  |  |  |  |  |  |  |  |  |  |
| Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3 | $\begin{aligned} & <35 \\ & >35 \end{aligned}$ | - | - | $\begin{aligned} & \begin{array}{l} 175-225 \\ 125-175 \end{array}, ~ \end{aligned}$ | $\begin{aligned} & 150-200 \\ & 100-150 \end{aligned}$ | - | $\begin{aligned} & .0005^{" ~}-.0010^{\prime \prime} \\ & .0003^{\prime}-.0005^{\prime \prime} \end{aligned}$ | $\begin{aligned} & .0008^{"-.0020 " 1} \\ & .0005^{\prime \prime}-.0015^{\prime \prime} \end{aligned}$ | $\begin{aligned} & .0010^{\prime \prime}-0030 " 10 \text { " } 0.0200^{\prime \prime} \\ & \hline \end{aligned}$ | $\begin{aligned} & .00201 "-.0040 " 10 \\ & .0010^{\prime \prime}-.0030^{\prime \prime} \end{aligned}$ | .0030" -0050" ".0040" |
| MONEL |  |  |  |  |  |  |  |  |  |  |  |
| Monel - $65 \%$ Nickel |  | 175-300 | 125-175 | 175-300 | 125-175 | - | .0007" - $0015{ }^{\text {" }}$ | .0010" - 0025 " | .0015". 0040 " | .0030". 0050 " | .0040"-0060" |
| TITANIUM ALLOYS |  |  |  |  |  |  |  |  |  |  |  |
| Commercially Pure, 6Al--4V, Astm 1/2/3,6Al-25N-4Zr-2Mo-Si |  | 200-300 | 125-250 | 200-300 | 125-250 | - | .0007" - $0015{ }^{\text {" }}$ | .0010". $0025{ }^{\prime \prime}$ | .0015" - 0040" | .0030" -0050" | .0040" - 0060" |
| 5553/ Beta Titanium |  | - | - | 125-225 | 100-200 | - | .0005" - 0010 " | .0008" - 0020 " | .0010 - . 0030" | .0020".0040" | .0030 - .0050" |
| STAINLESS STEELS |  |  |  |  |  |  |  |  |  |  |  |
| 13/8, 15/5, 17-4,pHTypes | $<35$ $>35$ | - | - | $\begin{aligned} & \begin{array}{l} 150-250 \\ 125-175 \end{array} \end{aligned}$ | $\begin{aligned} & 100-150 \\ & 80-150 \end{aligned}$ | - |  | $\begin{aligned} & .0008^{"-.0020 " 1} \\ & .0005^{\prime \prime}-.00155^{\prime \prime} \end{aligned}$ |  | $.0020^{\prime \prime}-.004010$ | $\begin{aligned} & .0030^{\prime \prime}-.0050 " \\ & .0020^{\prime \prime}-.0040^{\prime \prime} \end{aligned}$ |
| Inox, 200 Serie, 300 Series | <35 | - | - | 200-250 | 125-175 | - | .0005" ${ }^{\text {a }}$.0010" | .0008" ${ }^{\text {a }}$.0020" | .0010". $.0030^{\prime \prime}$ | .0020" $0.0040^{\prime \prime}$ | .0030" -0050" |
|  | >35 | - | - | $150-200$ $90-125$ | $100-150$ $80-120$ | - | .0003" $0.00055^{\prime \prime}$ | .0005" $0.00155^{\prime \prime}$ |  | .0010" $000300^{\prime \prime}$ | $\xrightarrow{.00200^{\prime \prime}-.0040^{\prime \prime}}$ |
| 304L, 316L, Nitronic 50, Inox | >35 | - | - | 75-110 | 80.90 60 | - | .0003"-.0005" | .0005" -0010" | .0010".-0015" | $.0010^{\prime \prime}-.0030^{\prime \prime}$ | $.00020-.00040 " 0$ |
| 400 Series | $\begin{aligned} & <35 \\ & >35 \end{aligned}$ | - | - | $\begin{aligned} & 150-250 \\ & \\ & \hline 1050 \end{aligned}$ | $\begin{aligned} & 100-150 \\ & 100 \end{aligned}$ | - |  | $.0008^{-.0020^{\prime \prime}}$ | $.0010^{\prime \prime} \text { ". } 003010$ | $.0020^{\prime \prime}-.0040^{\prime \prime}$ | $.0030^{\prime \prime}-.0050^{\prime \prime}$ |
| HIGH STRENGTH TOOL STEELS |  |  |  |  |  |  |  |  |  |  |  |
| 4140, 4340, 6150, 5210, A2, D2, P20, H11, $113,52,01$ | <30 | - | - | 150-225 | 125-175 | - | .0005" - .0010" | .0008" - 0020 " | .0010"-.0030" | .0020".0040" | .0030"-.0050" |
|  | 30-38 | - | - | 90-125 | 80-120 | - | .0003"-.0005" | .0005" - 0015 " | .0010" - .0020" | .0010".0030" | .0020" $0.0400^{\prime \prime}$ |
|  | >38 | - | - | 60-90 | 50-80 | - | .0002" -.0004" | .0003" -0007" | .0008" -0015" | .0010"-0025" | .0015".0035" |
| <35 MEDIUM ALLOY TOOL STEELS |  |  |  |  |  |  |  |  |  |  |  |
| 200, 250,300,8620 | $\begin{aligned} & <35 \\ & >35 \end{aligned}$ | - | - | $\begin{aligned} & 175-250 \\ & 100-175 \end{aligned}$ | $\begin{aligned} & 150-200 \\ & 100-150 \end{aligned}$ | - | $\begin{aligned} & .0007^{\prime \prime}-0015^{\prime \prime} \\ & \hline 0005^{-0} 01010 \end{aligned}$ | $\begin{aligned} & .0010 "-.0025 " \\ & .0008 "^{\prime \prime}-.0020^{\prime \prime} \end{aligned}$ | $\begin{aligned} & .0015 " \text { ". } 0.040 \text { " } \\ & .0010030 " \\ & \hline \end{aligned}$ | $\begin{aligned} & .0030^{\prime \prime}-.0050 " 1 \\ & .0020^{\prime \prime}-.0040 " \end{aligned}$ | $\begin{aligned} & .0040^{\prime \prime} .0060 " 10 \\ & .0030^{\prime \prime} .0050^{\prime \prime} \end{aligned}$ |
| CARBON STEELS |  |  |  |  |  |  |  |  |  |  |  |
| A36, 12L14, $1000^{\prime}$, $1100^{\prime}$ ', $1300^{\prime}$ 's | $\begin{aligned} & <35 \\ & >35 \end{aligned}$ | - | - | $\begin{aligned} & 175-250 \\ & 100-175 \end{aligned}$ | $\begin{aligned} & 150-200 \\ & 100-150 \end{aligned}$ |  |  | $\begin{aligned} & .0010 "-.0025 " \\ & .0008 "^{\prime \prime}-.0020^{\prime \prime} \end{aligned}$ | $\begin{aligned} & .0015 " \text { ". } 0.040 \text { " } \\ & .0010030 \text { - } .0030 \end{aligned}$ | $\begin{aligned} & .0030^{\prime \prime}-.0050 " 1 \\ & .0020^{\prime \prime}-.0040 " \end{aligned}$ |  |
| CAST MATERIAL |  |  |  |  |  |  |  |  |  |  |  |
| Steel |  | 225-325 | 175-250 | 250-350 | 175-250 | - | .0010" - .0020" | .0015". $00400^{\prime \prime}$ | .0020" - .060" | .0030". 01000 | .0050" - 01000 |
| Ductile Iron |  | 200-300 | 125-200 | 200-300 | 125-200 | - | .0005" - 00015 " | .0010" - $00300^{\prime \prime}$ | .0015" - .040" | .0020"-.0060" | .0030" - .088" |
| Gray Iron |  | 225-325 | 175-250 | 250-350 | 175-250 | - | .0010" $-.0020^{\prime \prime}$ | .0015" -.0040" | .0020" - $00600^{\prime \prime}$ | .0030".0100" | .0050" - 01001 |
| Aluminum |  | 250-350 | 250-350 | 250-350 | 250-350 | - | .0010" - $0020{ }^{\prime \prime}$ | .0015"-.0040" | .0020" - .066" | .0030"-.0100" | .0050" - .0100" |
| ALUMINUM |  |  |  |  |  |  |  |  |  |  |  |
| Aircraft Grade (6061, 7075) | $\begin{aligned} & \text { Standard } \\ & \text { Speed } \end{aligned}$ | 300-500 | 300-500 | 300-500 | 300-500 | - | .0010"-.0020" | .0015". $00400^{\prime \prime}$ | .0020" - .066" | .0030".0100" | .0050"-.0150" |
|  | $\begin{aligned} & \text { Hphgh } \\ & \text { Speed } \end{aligned}$ | (SEE HIGH SPEED ALUMINUM CHART - PAGE 272) |  |  |  |  |  |  |  |  |  |
| MAGNESIUM |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 300-500 | 300-500 | 300-500 | $300-500$ | - | .0010" -0020" | .0015".0040" | .0020" - 0060" | .0030".0100" | .0050"-0100" |
| COPPER |  |  |  |  |  |  |  |  |  |  |  |
| Copper Alloys |  | 300-400 | 250-350 | 300-450 | 250-350 | - | .0007" - $0015{ }^{\text {" }}$ | .0010".0025" | .0015". $00035^{\prime \prime}$ | .0020".0080" | .0040"-0100" |
| BRASS, BRONZE |  |  |  |  |  |  |  |  |  |  |  |
| Brass, Aluminum/Bronze, Low Silicon Bronze |  | 300-400 | 200-300 | 275-375 | 200-300 | - | .0007 $-.0015^{\prime \prime}$ | .0010" ${ }^{\text {. } 0025 " ~}$ | .0015" -0035" | .0020" -0080" | .0040" -0100" |
| COMPOSITE MATERIAL |  |  |  |  |  |  |  |  |  |  |  |
| Glass Epoxy, Fiberglass, Plastics |  | 200-400 | 200-400 | 200-400 | 200-400 | 200-500 | .0010" -0020" | .0015"-.0040" | .0020" - 0060" | .0030".0100" | .0050"-.0100" |
| Graphite, G10 |  | (SEE GRAPHITE CHART - PAGE 293) |  |  |  | 300-1000 | .0010". $00200^{\prime \prime}$ | .0015". 0040 " | .0020"-.066" | .0030"-.0100" | .0050"-.0100" |

When plunging into a solid, drop feed by approximately $50 \%$. $20 \%$ of diameter for basic engagement parameters.

NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.

