

## 切削参数参考表 Recommended Milling Conditions

技术资料 K-009

| 加工材料<br>Work Material |                         | 调质钢・淬火钢<br>Prehardened Steels・Hardened Steels<br>NAK80・STAVAX・SKD61<br>(~52HRC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |              |                   | 淬火钢<br>Hardened Steels<br>SKD11・ELMAX<br>(~62HRC) |                   |                     |                   | 高速钢<br>High Speed Tool Steels<br>SKH・HAP<br>(~68HRC) |                   |                       |                   |
|-----------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------|-------------------|---------------------------------------------------|-------------------|---------------------|-------------------|------------------------------------------------------|-------------------|-----------------------|-------------------|
| (R)球头半径<br>Radius     | 有效长<br>Effective Length | 切深量<br>Depth of Cut                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   | 进给速度<br>Feed |                   | 主轴转速<br>Spindle Speed                             |                   | 切深量<br>Depth of Cut |                   | 进给速度<br>Feed                                         |                   | 主轴转速<br>Spindle Speed |                   |
|                       |                         | a <sub>p</sub> mm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | a <sub>e</sub> mm | mm/min       | min <sup>-1</sup> | a <sub>p</sub> mm                                 | a <sub>e</sub> mm | mm/min              | min <sup>-1</sup> | a <sub>p</sub> mm                                    | a <sub>e</sub> mm | mm/min                | min <sup>-1</sup> |
| 0.1                   | 0.3                     | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.005             | 600          | 40,000            | 0.005                                             | 0.005             | 450                 | 40,000            | 0.003                                                | 0.003             | 300                   | 40,000            |
|                       | 0.6                     | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.005             | 500          | 40,000            | 0.005                                             | 0.005             | 350                 | 40,000            | 0.003                                                | 0.003             | 250                   | 40,000            |
| 0.15                  | 0.3                     | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.005             | 800          | 40,000            | 0.005                                             | 0.005             | 600                 | 40,000            | 0.003                                                | 0.003             | 450                   | 40,000            |
|                       | 0.5                     | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.005             | 750          | 40,000            | 0.005                                             | 0.005             | 550                 | 40,000            | 0.003                                                | 0.003             | 400                   | 40,000            |
|                       | 0.75                    | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.005             | 700          | 40,000            | 0.005                                             | 0.005             | 500                 | 40,000            | 0.003                                                | 0.003             | 400                   | 40,000            |
| 0.2                   | 0.5                     | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.01              | 1,200        | 40,000            | 0.005                                             | 0.01              | 900                 | 40,000            | 0.005                                                | 0.005             | 600                   | 40,000            |
|                       | 0.75                    | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.01              | 1,100        | 40,000            | 0.005                                             | 0.01              | 850                 | 40,000            | 0.005                                                | 0.005             | 550                   | 40,000            |
|                       | 1                       | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.01              | 1,000        | 40,000            | 0.005                                             | 0.01              | 800                 | 40,000            | 0.005                                                | 0.005             | 500                   | 40,000            |
|                       | 1.2                     | 0.005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.01              | 1,000        | 40,000            | 0.005                                             | 0.01              | 800                 | 40,000            | 0.005                                                | 0.005             | 500                   | 40,000            |
| 0.25                  | 1                       | 0.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.01              | 1,200        | 40,000            | 0.01                                              | 0.01              | 1,000               | 40,000            | 0.005                                                | 0.005             | 700                   | 40,000            |
| 0.3                   | 1.2                     | 0.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.02              | 1,800        | 40,000            | 0.01                                              | 0.02              | 1,500               | 40,000            | 0.005                                                | 0.01              | 1,000                 | 40,000            |
|                       | 1.5                     | 0.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.02              | 1,500        | 40,000            | 0.01                                              | 0.02              | 1,200               | 40,000            | 0.005                                                | 0.01              | 800                   | 40,000            |
| 0.4                   | 1.6                     | 0.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.02              | 1,800        | 40,000            | 0.01                                              | 0.02              | 1,500               | 40,000            | 0.005                                                | 0.01              | 1,000                 | 40,000            |
|                       | 2                       | 0.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.02              | 1,500        | 40,000            | 0.01                                              | 0.02              | 1,200               | 40,000            | 0.005                                                | 0.01              | 800                   | 40,000            |
| 0.5                   | 2                       | 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.04              | 2,500        | 40,000            | 0.02                                              | 0.03              | 1,800               | 40,000            | 0.01                                                 | 0.02              | 1,200                 | 40,000            |
|                       | 2.5                     | 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.04              | 2,000        | 40,000            | 0.02                                              | 0.03              | 1,500               | 40,000            | 0.01                                                 | 0.02              | 1,000                 | 40,000            |
| 0.6                   | 2.4                     | 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.04              | 2,500        | 40,000            | 0.02                                              | 0.03              | 2,000               | 40,000            | 0.01                                                 | 0.02              | 1,500                 | 40,000            |
|                       | 3                       | 0.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.04              | 2,500        | 40,000            | 0.02                                              | 0.03              | 2,000               | 40,000            | 0.01                                                 | 0.02              | 1,500                 | 40,000            |
| 0.75                  | 3                       | 0.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.05              | 3,000        | 40,000            | 0.03                                              | 0.05              | 3,000               | 40,000            | 0.02                                                 | 0.03              | 2,000                 | 30,000            |
|                       | 3.8                     | 0.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.05              | 3,000        | 40,000            | 0.03                                              | 0.05              | 3,000               | 40,000            | 0.02                                                 | 0.03              | 2,000                 | 30,000            |
| 1                     | 4                       | 0.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.1               | 3,000        | 30,000            | 0.03                                              | 0.05              | 3,000               | 30,000            | 0.03                                                 | 0.03              | 2,000                 | 25,000            |
|                       | 5                       | 0.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.1               | 3,000        | 30,000            | 0.03                                              | 0.05              | 3,000               | 30,000            | 0.03                                                 | 0.03              | 2,000                 | 25,000            |
| 1.5                   | 6                       | 0.08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.15              | 2,300        | 20,000            | 0.05                                              | 0.075             | 2,100               | 20,000            | 0.04                                                 | 0.06              | 1,300                 | 15,000            |
|                       | 9                       | 0.06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.12              | 2,200        | 20,000            | 0.04                                              | 0.06              | 2,000               | 20,000            | 0.04                                                 | 0.05              | 1,200                 | 15,000            |
| 2                     | 8                       | 0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.18              | 2,300        | 17,000            | 0.06                                              | 0.09              | 2,100               | 15,000            | 0.05                                                 | 0.07              | 1,300                 | 12,000            |
|                       | 12                      | 0.08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.15              | 2,000        | 17,000            | 0.05                                              | 0.08              | 1,700               | 15,000            | 0.04                                                 | 0.06              | 1,200                 | 12,000            |
| 2.5                   | 10                      | 0.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.21              | 2,200        | 13,000            | 0.08                                              | 0.12              | 1,800               | 12,000            | 0.07                                                 | 0.1               | 1,300                 | 11,000            |
|                       | 15                      | 0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0.18              | 1,900        | 13,000            | 0.06                                              | 0.1               | 1,500               | 12,000            | 0.06                                                 | 0.08              | 1,100                 | 11,000            |
| 3                     | 12                      | 0.13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.24              | 2,000        | 10,000            | 0.09                                              | 0.15              | 1,600               | 10,000            | 0.08                                                 | 0.12              | 1,200                 | 10,000            |
|                       | 18                      | 0.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.21              | 1,700        | 10,000            | 0.08                                              | 0.12              | 1,400               | 10,000            | 0.07                                                 | 0.1               | 1,000                 | 10,000            |
| 备注<br>Notes           |                         | ※切深量为中精加工、精加工时的最大值。请根据机床刚性和要求精度进行调整。<br>※预加工（中精加工）时请注意精加工余量相对于加工面需保持均匀。<br>※R角等负载大的加工部位，请注意参数设定和刀路轨迹等。<br>※需要高品质的加工面时，加工时请将切深量调整为70%，进给速度调整为约70%。<br>※建议使用油雾冷却方式。<br>※因加工机床的原因要调整主轴转速时，必须按照相同的比率调整进给速度。<br>※Max. depth of cut for semi-finishing and finishing. Adjust milling conditions depending on the rigidity of the machine and desired accuracy.<br>※Obtain uniform stock amount on the cutting surface in the pre-stage cutting (semi-finishing).<br>※Required careful set up of milling conditions, tool path and etc. at cutting parts, such as corners where will become overloaded<br>※Adjust both depth of cut and feed rate at 70% of the recommended milling conditions for high quality milling surface.<br>※Oil mist coolant is recommended.<br>※Adjust feed rate at same rate as spindle speed if necessary to adjust spindle speed from recommended milling conditions. |                   |              |                   |                                                   |                   |                     |                   |                                                      |                   |                       |                   |