

## RECOMMENDED CUTTING CONDITIONS (SHELL TYPE)

### CUTTING CONDITIONS FOR SHOULDER MILLING

|          | Work Material               | Hardness                       | Insert Grade/Breaker | Cutting Speed<br><b>vc</b><br>(m/min) | Depth of Cut<br><b>ap</b><br>(mm) | Width of Cut<br><b>ae</b><br>(mm) | Feed per Tooth<br><b>fz</b><br>(mm/tooth) |
|----------|-----------------------------|--------------------------------|----------------------|---------------------------------------|-----------------------------------|-----------------------------------|-------------------------------------------|
| <b>P</b> | Mild Steel                  | ≤180HB                         | VP15TF<br>JM         | 120<br>(100–140)                      | –0.5D <sub>1</sub>                | –10                               | 0.15–0.30                                 |
|          |                             |                                |                      | 120<br>(100–140)                      | 0.5D <sub>1</sub> –               | –10                               | 0.15–0.25                                 |
|          | Carbon Steel<br>Alloy Steel | 180–350HB                      | VP15TF<br>JM         | 120<br>(80–130)                       | –0.5D <sub>1</sub>                | –10                               | 0.15–0.30                                 |
|          |                             |                                |                      | 100<br>(80–120)                       | 0.5D <sub>1</sub> –               | –10                               | 0.15–0.25                                 |
|          | Alloy Tool Steel            | ≤300HB                         | VP15TF<br>JM         | 100<br>(60–110)                       | –0.5D <sub>1</sub>                | –10                               | 0.10–0.20                                 |
|          |                             |                                |                      | 80<br>(60–100)                        | 0.5D <sub>1</sub> –               | –10                               | 0.10–0.15                                 |
| <b>M</b> | Stainless Steel             | ≤200HB                         | VP20RT<br>JM         | 140<br>(100–150)                      | –0.5D <sub>1</sub>                | –10                               | 0.10–0.25                                 |
|          |                             |                                |                      | 120<br>(100–140)                      | 0.5D <sub>1</sub> –               | –10                               | 0.10–0.20                                 |
| <b>K</b> | Cast Iron                   | Tensile<br>Strength<br>≤350MPa | VP15TF<br>WH         | 120<br>(80–130)                       | –0.5D <sub>1</sub>                | –10                               | 0.25–0.40                                 |
|          |                             |                                |                      | 100<br>(80–120)                       | 0.5D <sub>1</sub> –               | –10                               | 0.25–0.40                                 |
|          |                             |                                | VP15TF<br>JM         | 120<br>(80–130)                       | –0.5D <sub>1</sub>                | –10                               | 0.15–0.30                                 |
|          |                             |                                |                      | 100<br>(80–120)                       | 0.5D <sub>1</sub> –               | –10                               | 0.15–0.25                                 |
|          | Ductile Cast Iron           | Tensile<br>Strength<br>≤800MPa | VP15TF<br>WH         | 100<br>(60–110)                       | –0.5D <sub>1</sub>                | –10                               | 0.20–0.35                                 |
|          |                             |                                |                      | 80<br>(60–110)                        | 0.5D <sub>1</sub> –               | –10                               | 0.20–0.35                                 |
|          |                             |                                | VP15TF<br>JM         | 100<br>(60–120)                       | –0.5D <sub>1</sub>                | –10                               | 0.15–0.30                                 |
|          |                             |                                |                      | 80<br>(60–120)                        | 0.5D <sub>1</sub> –               | –10                               | 0.15–0.30                                 |
| <b>S</b> | Ti Alloy                    | ≤350HB                         | VP20RT<br>JM         | 45<br>(35–50)                         | –0.5D <sub>1</sub>                | –10                               | 0.08–0.10                                 |
|          |                             |                                |                      | 40<br>(35–50)                         | 0.5D <sub>1</sub> –               | –10                               | 0.08–0.10                                 |

(Note 1) The above cutting conditions are determined based on high rigidity machine and workpiece, where no vibration occurred.  
Please adjust the machining conditions if vibration is generated.

### CUTTING CONDITIONS FOR SLOT MILLING

|          | Work Material               | Hardness                       | Insert Grade/Breaker | Cutting Speed<br><b>vc</b><br>(m/min) | Depth of Cut<br><b>ap</b><br>(mm) | Width of Cut<br><b>ae</b><br>(mm) | Feed per Tooth<br><b>fz</b><br>(mm/tooth) |
|----------|-----------------------------|--------------------------------|----------------------|---------------------------------------|-----------------------------------|-----------------------------------|-------------------------------------------|
| <b>P</b> | Mild Steel                  | ≤180HB                         | VP15TF<br>JM         | 120<br>(100–140)                      | –10                               | D <sub>1</sub>                    | 0.15–0.25                                 |
|          | Carbon Steel<br>Alloy Steel | 180–350HB                      | VP15TF<br>JM         | 100<br>(80–120)                       | –0.25D <sub>1</sub>               | D <sub>1</sub>                    | 0.15–0.25                                 |
|          | Alloy Tool Steel            | ≤300HB                         | VP15TF<br>JM         | 80<br>(60–100)                        | –10                               | D <sub>1</sub>                    | 0.10–0.20                                 |
| <b>M</b> | Stainless Steel             | ≤200HB                         | VP20RT<br>JM         | 100<br>(80–140)                       | –10                               | D <sub>1</sub>                    | 0.10–0.15                                 |
| <b>K</b> | Cast Iron                   | Tensile<br>Strength<br>≤350MPa | VP15TF<br>WH         | 80<br>(60–100)                        | –0.25D <sub>1</sub>               | D <sub>1</sub>                    | 0.10–0.25                                 |
|          |                             |                                |                      | 60<br>(50–100)                        | –0.6D <sub>1</sub>                | D <sub>1</sub>                    | 0.10–0.20                                 |
|          |                             |                                | VP15TF<br>JM         | 80<br>(60–100)                        | –0.25D <sub>1</sub>               | D <sub>1</sub>                    | 0.10–0.20                                 |
|          |                             |                                |                      | 60<br>(50–100)                        | –0.6D <sub>1</sub>                | D <sub>1</sub>                    | 0.10–0.15                                 |
|          | Ductile Cast Iron           | Tensile<br>Strength<br>≤800MPa | VP15TF<br>WH         | 80<br>(60–100)                        | –0.25D <sub>1</sub>               | D <sub>1</sub>                    | 0.10–0.25                                 |
|          |                             |                                |                      | 60<br>(50–100)                        | –0.5D <sub>1</sub>                | D <sub>1</sub>                    | 0.10–0.20                                 |
|          |                             |                                | VP15TF<br>JM         | 80<br>(60–100)                        | –0.25D <sub>1</sub>               | D <sub>1</sub>                    | 0.10–0.20                                 |
|          |                             |                                |                      | 60<br>(50–100)                        | –0.5D <sub>1</sub>                | D <sub>1</sub>                    | 0.10–0.15                                 |
| <b>S</b> | Ti Alloy                    | ≤350HB                         | VP20RT<br>JM         | 40<br>(35–50)                         | –0.25D <sub>1</sub>               | D <sub>1</sub>                    | 0.06–0.10                                 |

(Note 1) The above cutting conditions are determined based on high rigidity machine and workpiece, where no vibration occurred.  
Please adjust the machining conditions if vibration is generated.