

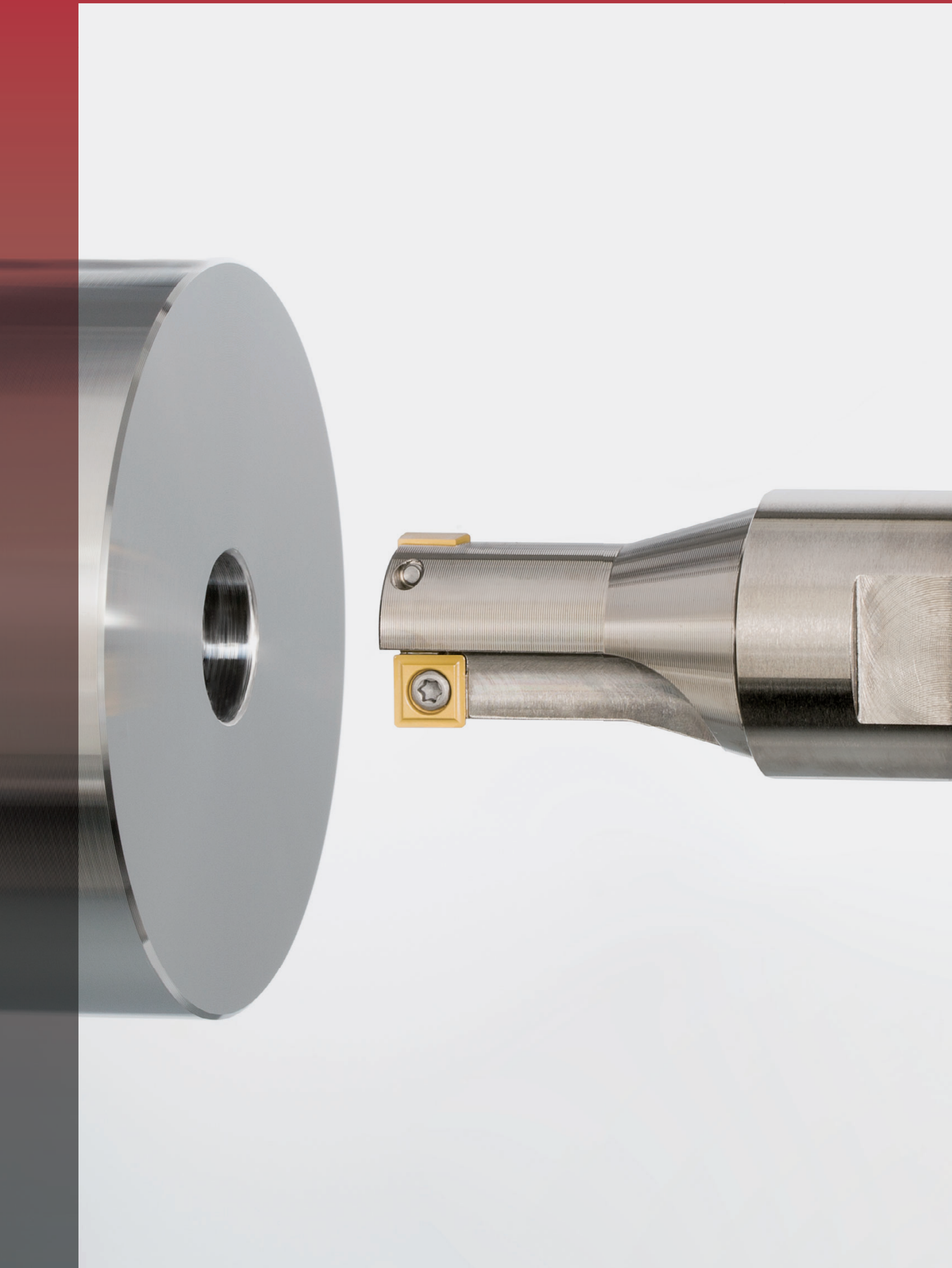
Multifunctional counterboring tool

**TCB**

Tungaloy Report No. 512-G

Multifunctional counterboring tool to  
**improve your productivity**





**INDUSTRY 4.0**  
*FEED the SPEED!*





# TCB

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Multifunctional tool with an enriched bore diameter lineup to  
**improve your production efficiency**

## Enriched tool diameter lineup for various hole making operations

- Available from tool diameter  $\varnothing 10$  mm and up, adjustable diameters for  $\varnothing 26$  mm and up

### Monoblock type

Tool diameters:  $\varnothing D_c = 10 - 43$  mm



#### Economical insert

4-edged, positive insert enhances insert economy and smooth chip flow!

#### Robust cutter body

Optimized flute-core design provides tool rigidity and smooth chip flow!

### Cartridge type (adjustable tool diameter)

Tool diameters:  $\varnothing D_c = 26 - 59$  mm



#### Cartridge

Economical solution to minimize tool inventory. The cutter body is protected from damages even when the insert or cartridge is fractured during machining. Simply replace with a new cartridge, and the cutter is good to continue.

#### Shim plates

Shim plates in various sizes are available for cutter diameter adjustments. Thin shim plates are also available for fine adjustments in  $\varnothing 0.1$  mm increments.

- A new CG style chipbreaker



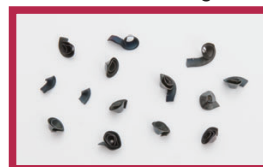
SPMP/SPMM-CG

### Optimized for boring operations

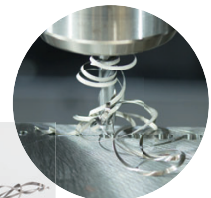
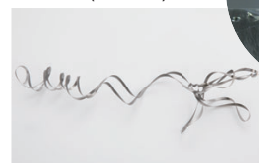
Efficient for a wide range of cutting depths and materials

**TCB**

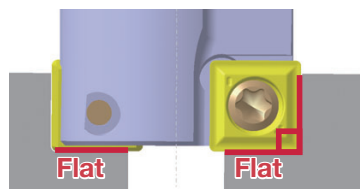
Chips from counter boring



Competitor's  
Flat drill  
(endmill)



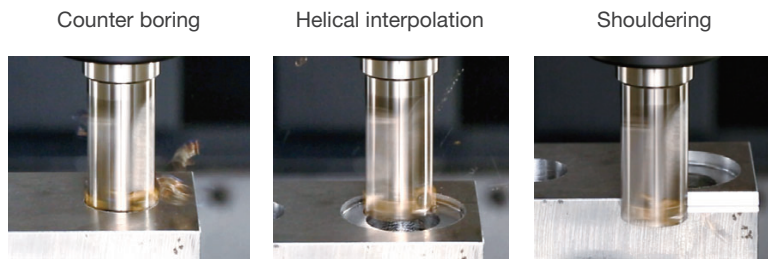
- Provides a  $90^\circ$  flat surface



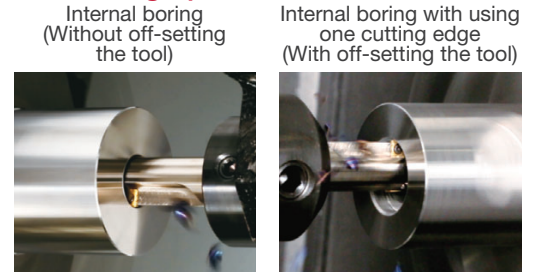
## Multifunctionality

Suited not only for counter boring but for various other applications. Thanks to this all-in-one tool feature, a major cycle time reduction and tool inventory streamlining are possible.

### For machine center



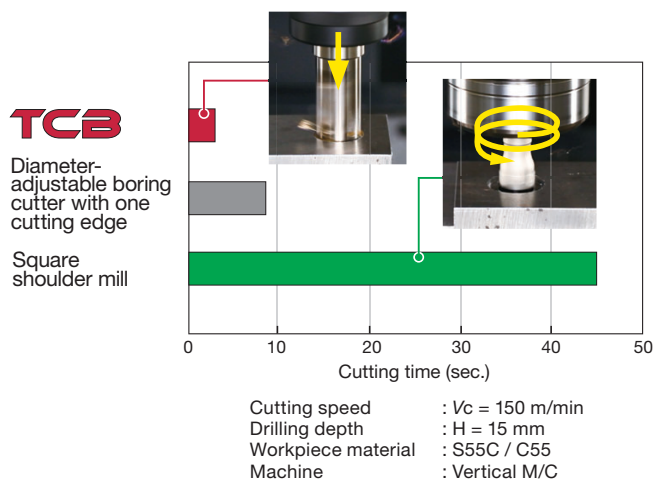
### For turning operation



## High efficiency machining

The expanded diameter range of the new TCB series now simplifies tool selection for an exact target diameter, therefore improving production efficiency.

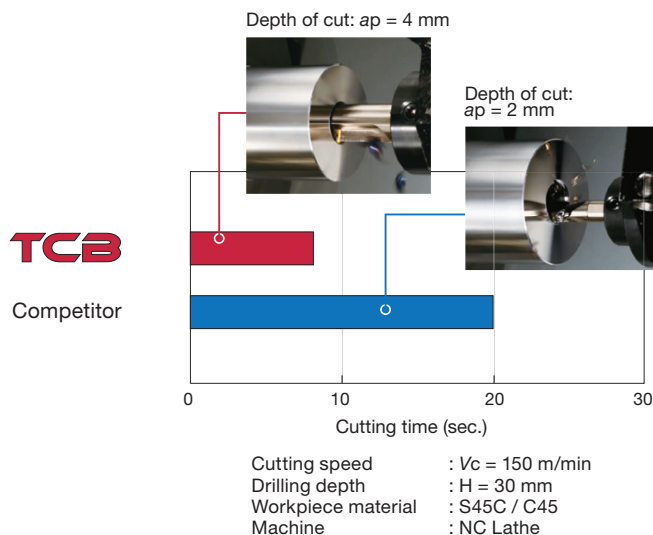
### Counter boring operation on machining center



|                                   | No. of teeth z | Machining method                         | Feed (mm/rev) | Pitch p (mm/rev) |
|-----------------------------------|----------------|--|---------------|------------------|
| <b>TCB</b>                        | 2              | Counter boring                           | 0.25 (mm/rev) | -                |
| Diameter-adjustable boring cutter | 1              | Boring                                   | 0.1 (mm/rev)  | -                |
| Shoulder mill                     | 2              | Helical interpolation and bore expansion | 0.15 (mm/t)   | 0.5              |

- TCB now allows for plunging operations for higher efficiency, compared with helical interpolating with a shoulder mill.
- High feed motion is possible due to TCB's two effective cutting edges, as opposed to a boring cutter with one cutting edge.

### Internal boring operation on lathe

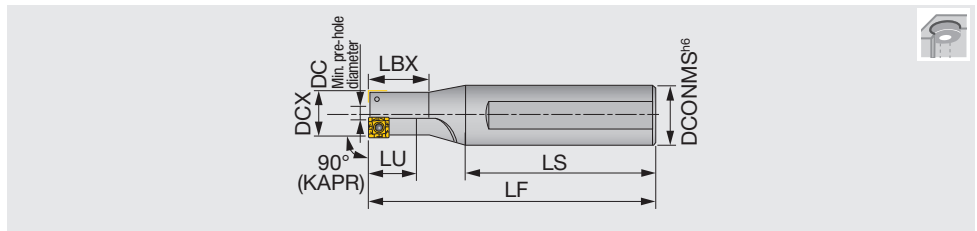


|                      | Tool dia. $\phi D_c$ (mm) | Prehole dia. $\phi$ (mm) | No. of teeth z | Roughing                |                   |
|----------------------|---------------------------|--------------------------|----------------|-------------------------|-------------------|
|                      |                           |                          |                | Depth of cut $a_p$ (mm) | Feed $f$ (mm/rev) |
| <b>TCB</b>           | 20                        | 12                       | 2              | 4 mm x 1 pass           | 0.25              |
| Internal boring tool | -                         | 12                       | 1              | 2 mm x 2 pass           | 0.15              |

TCB's two effective cutting edges counter balance each other, allowing a high feed rate with a heavy depth of cut.

## TCB

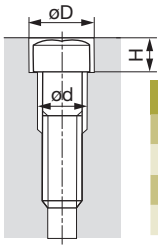
### Counter boring endmill, monoblock type



| Designation | DCX  | CICT | DC   | LU | LBX  | LF  | LS | DCONMS | Insert     |
|-------------|------|------|------|----|------|-----|----|--------|------------|
| TCB100F16   | 10   | 1    | 2.8  | 13 | 17   | 86  | 60 | 16     | SPMP771... |
| TCB110F16   | 11   | 1    | 2.8  | 14 | 18.7 | 87  | 60 | 16     | SPMP771... |
| TCB120F20   | 12   | 1    | 3.6  | 15 | 20.5 | 89  | 60 | 20     | SPMP771... |
| TCB130F20   | 13   | 2    | 4.5  | 16 | 22.2 | 91  | 60 | 20     | SPMP771... |
| TCB-140     | 14   | 1    | 4    | 11 | 18   | 117 | 80 | 25     | SPMP831... |
| TCB140F25   | 14   | 2    | 5.5  | 18 | 24   | 113 | 80 | 25     | SPMP771... |
| TCB150F25   | 15   | 2    | 6.5  | 19 | 25.7 | 114 | 80 | 25     | SPMP771... |
| TCB160F25   | 16   | 2    | 7.5  | 20 | 27.5 | 116 | 80 | 25     | SPMP771... |
| TCB170F25   | 17   | 2    | 6.6  | 13 | 21   | 114 | 80 | 25     | SPMP831... |
| TCB175F25   | 17.5 | 2    | 7.1  | 14 | 22   | 115 | 80 | 25     | SPMP831... |
| TCB180F25   | 18   | 2    | 7.5  | 15 | 23   | 116 | 80 | 25     | SPMP831... |
| TCB190F25   | 19   | 2    | 8.5  | 15 | 24   | 118 | 80 | 25     | SPMP831... |
| TCB-200     | 20   | 2    | 8.2  | 16 | 25   | 120 | 80 | 25     | SPMP042... |
| TCB200F25   | 20   | 2    | 8.2  | 16 | 25   | 120 | 80 | 25     | SPMP042... |
| TCB210F25   | 21   | 2    | 9    | 17 | 26   | 122 | 80 | 25     | SPMP042... |
| TCB220F25   | 22   | 2    | 10   | 18 | 28   | 124 | 80 | 25     | SPMP042... |
| TCB-230     | 23   | 2    | 11   | 19 | 29   | 126 | 80 | 25     | SPMP042... |
| TCB230F25   | 23   | 2    | 11   | 19 | 29   | 126 | 80 | 25     | SPMP042... |
| TCB240F25   | 24   | 2    | 12   | 20 | -    | 128 | 80 | 25     | SPMP042... |
| TCB250F25   | 25   | 2    | 13   | 25 | -    | 130 | 80 | 25     | SPMP042... |
| TCB-260     | 26   | 2    | 14   | 21 | 33   | 132 | 80 | 32     | SPMP042... |
| TCB-290     | 29   | 2    | 14   | 23 | 36   | 138 | 80 | 32     | SPMM322... |
| TCB-320     | 32   | 2    | 16.9 | 40 | -    | 144 | 80 | 32     | SPMM322... |
| TCB-350     | 35   | 2    | 14   | 43 | -    | 150 | 80 | 32     | SPMM432... |
| TCB-390     | 39   | 2    | 17.9 | 48 | -    | 158 | 80 | 32     | SPMM432... |
| TCB-430     | 43   | 2    | 21.7 | 53 | -    | 171 | 85 | 42     | SPMM432... |

| Tool diameter tolerance | Applicable tolerance range of hole diameter |
|-------------------------|---|
| +0.2 / 0                | +0.3 / 0                                    |

### Counter boring dimensions of bolt hole



| Thread size     | M6     | M8     | M10    | M12    | M14    | M16    | M18    | M20    | M22    | M24    | M27    |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| $\phi D$ (mm)   | 11     | 14     | 17.5   | 20     | 23     | 26     | 29     | 32     | 35     | 39     | 43     |
| H (mm)          | 6.5    | 8.6    | 10.8   | 13     | 15.2   | 17.5   | 19.5   | 21.5   | 23.5   | 25.5   | 29     |
| $\phi d$ (mm)   | 6      | 9      | 11     | 14     | 16     | 18     | 20     | 22     | 24     | 26     | 30     |
| Applicable tool | TCB110 | TCB140 | TCB175 | TCB200 | TCB230 | TCB260 | TCB290 | TCB320 | TCB350 | TCB390 | TCB430 |

### SPARE PARTS

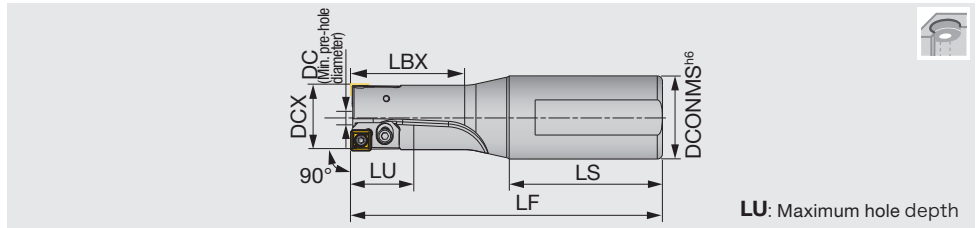


| Designation           | Clamping screw | Wrench |
|-----------------------|----------------|--------|
| TCB100... - TCB160... | CSTB-2L040     | T-6D   |
| TCB-140...            | CSTB-2.2S      | T-7D   |
| TCB170... - TCB190... | CSTB-2.2       | T-7D   |
| TCB200... - TCB260... | CSTA-NO3       | T-9D   |
| TCB-290 - TCB-320     | CSTA-NO5       | T-9D   |
| TCB-350 - TCB-430     | CSTA-4         | T-15D  |

Recommended clamping torque: CSTB-2L040 = 0.7 N·m, CSTB-2.2S / CSTB-2.2 = 1 N·m, CSTA-NO3 / CSTA-NO5 = 2.3 N·m, CSTA-4 = 3.5 N·m

## TCB

### Counter boring endmill, cartridge type



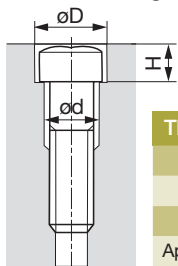
LU: Maximum hole depth

| Body Designation | DCX | DCONMS | DC   | LU | LS | LBX | LF  | WT(kg) | Cartridge set Designation | Shim plate Designation | Shim plate Thickness | Insert     |
|------------------|-----|--------|------|----|----|-----|-----|--------|---------------------------|------------------------|----------------------|------------|
| TCB260-290F32    | 26  | 32     | 13.2 | 40 | 59 | 43  | 120 | 0.6    | TCB04CA-26-29             | -                      | -                    | SPMP042... |
| TCB260-290F32    | 27  | 32     | 14.2 | 40 | 59 | 43  | 120 | 0.6    | TCB04CA-26-29             | AP16050                | 0.5                  | SPMP042... |
| TCB260-290F32    | 28  | 32     | 15.2 | 40 | 59 | 43  | 120 | 0.6    | TCB04CA-26-29             | AP16100                | 1                    | SPMP042... |
| TCB260-290F32    | 29  | 32     | 16.2 | 40 | 59 | 43  | 120 | 0.6    | TCB04CA-26-29             | AP16150                | 1.5                  | SPMP042... |
| TCB300-340F32    | 30  | 32     | 14.2 | 45 | 59 | 55  | 130 | 0.6    | TCB32CA-30-39             | -                      | -                    | SPMM322... |
| TCB300-340F32    | 31  | 32     | 15.2 | 45 | 59 | 55  | 130 | 0.6    | TCB32CA-30-39             | AP16050                | 0.5                  | SPMM322... |
| TCB300-340F32    | 32  | 32     | 16.2 | 45 | 59 | 55  | 130 | 0.6    | TCB32CA-30-39             | AP16100                | 1                    | SPMM322... |
| TCB300-340F32    | 33  | 32     | 17.2 | 45 | 59 | 55  | 130 | 0.6    | TCB32CA-30-39             | AP16150                | 1.5                  | SPMM322... |
| TCB300-340F32    | 34  | 32     | 18.2 | 45 | 59 | 55  | 130 | 0.6    | TCB32CA-30-39             | AP16200                | 2                    | SPMM322... |
| TCB350-390F32    | 35  | 32     | 19   | 50 | 59 | 70  | 140 | 0.7    | TCB32CA-30-39             | -                      | -                    | SPMM322... |
| TCB350-390F32    | 36  | 32     | 20   | 50 | 59 | 70  | 140 | 0.7    | TCB32CA-30-39             | AP16050                | 0.5                  | SPMM322... |
| TCB350-390F32    | 37  | 32     | 21   | 50 | 59 | 70  | 140 | 0.7    | TCB32CA-30-39             | AP16100                | 1                    | SPMM322... |
| TCB350-390F32    | 38  | 32     | 22   | 50 | 59 | 70  | 140 | 0.7    | TCB32CA-30-39             | AP16150                | 1.5                  | SPMM322... |
| TCB350-390F32    | 39  | 32     | 23   | 50 | 59 | 70  | 140 | 0.7    | TCB32CA-30-39             | AP16200                | 2                    | SPMM322... |
| TCB400-440F32    | 40  | 32     | 18   | 55 | 59 | 80  | 150 | 1      | TCB43CA-40-59             | -                      | -                    | SPMM432... |
| TCB400-440F32    | 41  | 32     | 19   | 55 | 59 | 80  | 150 | 1      | TCB43CA-40-59             | AP21050                | 0.5                  | SPMM432... |
| TCB400-440F32    | 42  | 32     | 20   | 55 | 59 | 80  | 150 | 1      | TCB43CA-40-59             | AP21100                | 1                    | SPMM432... |
| TCB400-440F32    | 43  | 32     | 21   | 55 | 59 | 80  | 150 | 1      | TCB43CA-40-59             | AP21150                | 1.5                  | SPMM432... |
| TCB400-440F32    | 44  | 32     | 22   | 55 | 59 | 80  | 150 | 1      | TCB43CA-40-59             | AP21200                | 2                    | SPMM432... |
| TCB450-490F32    | 45  | 32     | 23   | 65 | 59 | 90  | 160 | 1.2    | TCB43CA-40-59             | -                      | -                    | SPMM432... |
| TCB450-490F32    | 46  | 32     | 24   | 65 | 59 | 90  | 160 | 1.2    | TCB43CA-40-59             | AP21050                | 0.5                  | SPMM432... |
| TCB450-490F32    | 47  | 32     | 25   | 65 | 59 | 90  | 160 | 1.2    | TCB43CA-40-59             | AP21100                | 1                    | SPMM432... |
| TCB450-490F32    | 48  | 32     | 26   | 65 | 59 | 90  | 160 | 1.2    | TCB43CA-40-59             | AP21150                | 1.5                  | SPMM432... |
| TCB450-490F32    | 49  | 32     | 27   | 65 | 59 | 90  | 160 | 1.2    | TCB43CA-40-59             | AP21200                | 2                    | SPMM432... |
| TCB500-540F32    | 50  | 32     | 28   | 70 | 59 | 97  | 165 | 1.5    | TCB43CA-40-59             | -                      | -                    | SPMM432... |
| TCB500-540F32    | 51  | 32     | 29   | 70 | 59 | 97  | 165 | 1.5    | TCB43CA-40-59             | AP21050                | 0.5                  | SPMM432... |
| TCB500-540F32    | 52  | 32     | 30   | 70 | 59 | 97  | 165 | 1.5    | TCB43CA-40-59             | AP21100                | 1                    | SPMM432... |
| TCB500-540F32    | 53  | 32     | 31   | 70 | 59 | 97  | 165 | 1.5    | TCB43CA-40-59             | AP21150                | 1.5                  | SPMM432... |
| TCB500-540F32    | 54  | 32     | 32   | 70 | 59 | 97  | 165 | 1.5    | TCB43CA-40-59             | AP21200                | 2                    | SPMM432... |
| TCB550-590F32    | 55  | 32     | 33   | 75 | 59 | 105 | 175 | 1.9    | TCB43CA-40-59             | -                      | -                    | SPMM432... |
| TCB550-590F32    | 56  | 32     | 34   | 75 | 59 | 105 | 175 | 1.9    | TCB43CA-40-59             | AP21050                | 0.5                  | SPMM432... |
| TCB550-590F32    | 57  | 32     | 35   | 75 | 59 | 105 | 175 | 1.9    | TCB43CA-40-59             | AP21100                | 1                    | SPMM432... |
| TCB550-590F32    | 58  | 32     | 36   | 75 | 59 | 105 | 175 | 1.9    | TCB43CA-40-59             | AP21150                | 1.5                  | SPMM432... |
| TCB550-590F32    | 59  | 32     | 37   | 75 | 59 | 105 | 175 | 1.9    | TCB43CA-40-59             | AP21200                | 2                    | SPMM432... |

The cartridge sets and shim plates are included.

| Tool diameter tolerance | Applicable tolerance range of hole diameter |
|-------------------------|---|
| +0.2 / 0                | +0.3 / 0                                    |

### Counter boring dimensions of bolt hole



| Thread size     | M16    | M18    | M20    | M22    | M24    | M27    | M30    | M33    | M36    |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| øD (mm)         | 26     | 29     | 32     | 35     | 39     | 43     | 48     | 54     | 58     |
| H (mm)          | 17.5   | 19.5   | 21.5   | 23.5   | 25.5   | 29     | 32     | 35     | 38     |
| ød (mm)         | 18     | 20     | 22     | 24     | 26     | 30     | 33     | 36     | 39     |
| Applicable tool | TCB260 | TCB290 | TCB320 | TCB350 | TCB390 | TCB430 | TCB480 | TCB540 | TCB580 |



## Body SPARE PARTS

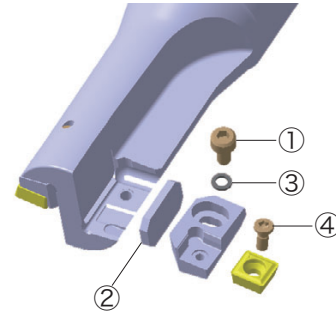


| Designation   | Cartridge screw | Shim plate | Shim plate | Shim plate | Shim plate | Wrench for cartridge | Washer    |
|---------------|-----------------|------------|------------|------------|------------|----------------------|-----------|
| TCB260-290F32 | CM3×0.5×6       | AP16050    | AP16100    | AP16150    |            | P-2.5                | 3.2X6X0.5 |
| TCB300-340F32 | CM3×0.5×6       | AP16050    | AP16100    | AP16150    | AP16200    | P-2.5                | 3.2X6X0.5 |
| TCB350-390F32 | CM3×0.5×6       | AP16050    | AP16100    | AP16150    | AP16200    | P-2.5                | 3.2X6X0.5 |
| TCB400-440F32 | CM4×0.7×10      | AP21050    | AP21100    | AP21150    | AP21200    | P-3                  | 4.3X8X0.5 |
| TCB450-490F32 | CM4×0.7×10      | AP21050    | AP21100    | AP21150    | AP21200    | P-3                  | 4.3X8X0.5 |
| TCB500-540F32 | CM4×0.7×10      | AP21050    | AP21100    | AP21150    | AP21200    | P-3                  | 4.3X8X0.5 |
| TCB550-590F32 | CM4×0.7×10      | AP21050    | AP21100    | AP21150    | AP21200    | P-3                  | 4.3X8X0.5 |

## Cartridge set SPARE PARTS



| Designation   | Insert screw | Wrench |
|---------------|--------------|--------|
| TCB04CA-26-29 | CSTA-NO3     | T-9D   |
| TCB32CA-30-39 | CSTA-NO5     | T-9D   |
| TCB32CA-30-39 | CSTA-NO5     | T-9D   |
| TCB43CA-40-59 | CSTA-4       | T-15D  |
| TCB43CA-40-59 | CSTA-4       | T-15D  |
| TCB43CA-40-59 | CSTA-4       | T-15D  |
| TCB43CA-40-59 | CSTA-4       | T-15D  |



Recommended clamping torque: CSTA-NO3 / CSTA-NO5 = 2.3 N·m, CSTA-4 = 3.5 N·m

## Fine adjustment shim plates (sold separately)

### SPARE PARTS

| Designation | Thickness |
|-------------|-----------|
| AP16005     | 0.05      |
| AP16020     | 0.2       |
| AP21005     | 0.05      |
| AP21020     | 0.2       |

### Cautions in preparing the cartridge type cutter

- Firmly press the cartridge in the arrowed direction while tightening the screw to install the cartridge on the cutter body. (Fig.1)
- Ensure that the shim plates thickness are always the same on both sides to equalize the tool diameter.
- Ensure to locate the shim plate fit within the cartridge pocket. (Fig.2)
- Use thin shim plates (not included) for fine diameter adjustments in  $\pm 0.1$  mm increments.
- When using multiple shim plates in one pocket for a diameter adjustment, always use the thinnest shim plates at the bottom to prevent them from dislocating during machining. (Fig.3)
- Ensure that the top shim is always in contact with the rim of the cartridge pocket to prevent it from dislocation during machining. (Fig.4)



Fig.1



Fig.2

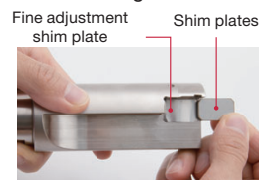


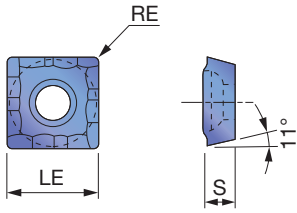
Fig.3



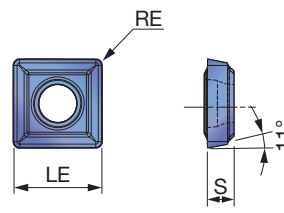
Fig.4

## INSERT

### SPMP/SPMM



### SPMP/SPMM-CG



|                         |   |   |   |  |
|-------------------------|---|---|---|--|
| <b>P</b> Steel          | ☆ | ★ | ★ |  |
| <b>M</b> Stainless      | ☆ | ★ | ★ |  |
| <b>K</b> Cast iron      | ☆ | ★ | ★ |  |
| <b>N</b> Non-ferrous    | ☆ | ☆ | ☆ |  |
| <b>S</b> Superalloys    | ☆ | ☆ | ☆ |  |
| <b>H</b> Hard materials | ☆ | ☆ | ☆ |  |

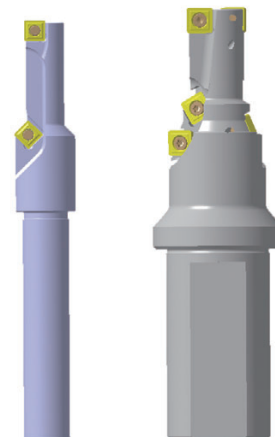
★ : First choice  
☆ : Second choice

| Designation  | RE  | Coated |        |        | LE   | S    |
|--------------|-----|--------|--------|--------|------|------|
|              |     | T313W  | AH6030 | AH6225 |      |      |
| SPMP771-CG   | 0.4 | ▲      | ●      |        | 5.4  | 1.61 |
| SPMP831-CG   | 0.4 | ▲      | ●      |        | 6.35 | 2.38 |
| SPMP831DS    | 0.4 | ●      |        |        | 6.35 | 2.38 |
| SPMP832-CG   | 0.8 |        | ○      |        | 6.35 | 2.38 |
| SPMP041ER-CG | 0.4 |        | ○      |        | 7.94 | 3.18 |
| SPMP042ER-CG | 0.8 | ▲      | ●      |        | 7.94 | 3.18 |
| SPMP042ERD   | 0.8 | ●      |        |        | 7.94 | 3.18 |
| SPMM321ER-CG | 0.4 |        | ○      |        | 9.53 | 3.18 |
| SPMM322ER-CG | 0.8 | ▲      | ●      |        | 9.53 | 3.18 |
| SPMM322ERD   | 0.8 | ●      |        |        | 9.53 | 3.18 |
| SPMM431ER-CG | 0.4 |        | ○      |        | 12.7 | 4.76 |
| SPMM432ER-CG | 0.8 | ▲      | ●      |        | 12.7 | 4.76 |
| SPMM432ERD   | 0.8 | ●      |        |        | 12.7 | 4.76 |

● : New product  
○ : Will be released in May 2023  
● : Line up  
▲ : To be discontinued

## CUSTOM-BUILT TOOL SERVICE

Tungaloy also designs and fabricates semi-standard or tailor-made tools with the TCB inserts according to the desired tool specifications. Contact your Tungaloy representative for further details.



## STANDARD CUTTING CONDITIONS

### Counter boring

| ISO      | Workpiece material | Hardness     | Cutting speed<br>Vc (m/min) | Feed : f (mm/rev) |                  |
|----------|--------------------|--------------|-----------------------------|-------------------|------------------|
|          |                    |              |                             | ø10 - 12 (z = 1)  | ø13 - 59 (z = 2) |
| <b>P</b> | Carbon steel       | - 300 HB     | 80 - 200                    | 0.03 - 0.08       | 0.1 - 0.3        |
| <b>M</b> | Stainless steel    | - 200 HB     | 80 - 150                    | 0.03 - 0.05       | 0.06 - 0.15      |
| <b>K</b> | Grey cast iron     | 150 - 250 HB | 80 - 200                    | 0.05 - 0.1        | 0.1 - 0.4        |
| <b>N</b> | Non-ferrous        | -            | 100 - 300                   | 0.05 - 0.2        | 0.1 - 0.4        |
| <b>S</b> | Superalloys        | - 40 HRC     | 50 - 80                     | 0.03 - 0.05       | 0.06 - 0.15      |
| <b>H</b> | Hard materials     | - 50 HRC     | 50 - 80                     | 0.03 - 0.05       | 0.06 - 0.15      |

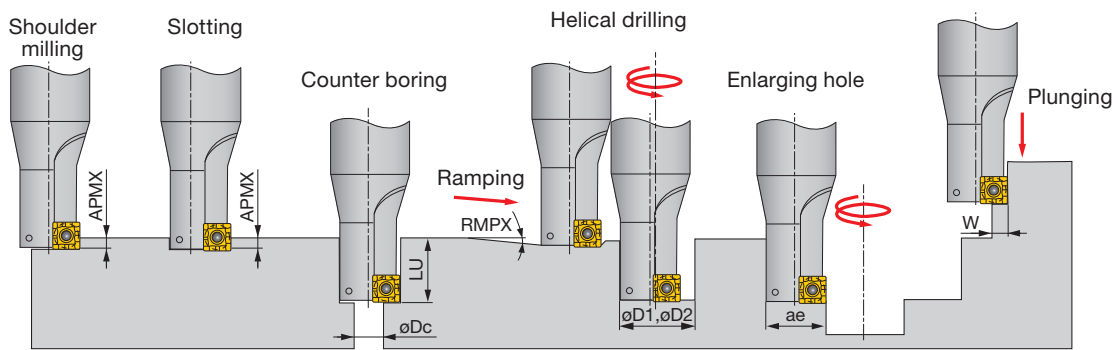
### Milling

| ISO      | Workpiece material | Hardness     | Cutting speed<br>Vc (m/min) | Feed per tooth<br>fz (mm/t) |
|----------|--------------------|--------------|-----------------------------|-----------------------------|
| <b>P</b> | Carbon steel       | - 300 HB     | 80 - 200                    | 0.05 - 0.15                 |
| <b>M</b> | Stainless steel    | - 200 HB     | 80 - 150                    | 0.05 - 0.1                  |
| <b>K</b> | Grey cast iron     | 150 - 250 HB | 80 - 200                    | 0.05 - 0.2                  |
| <b>N</b> | Non-ferrous        | -            | 100 - 300                   | 0.1 - 0.2                   |
| <b>S</b> | Superalloys        | - 40 HRC     | 50 - 80                     | 0.05 - 0.08                 |
| <b>H</b> | Hard materials     | - 50 HRC     | 50 - 80                     | 0.05 - 0.08                 |

### Internal boring (With one cutting edge)

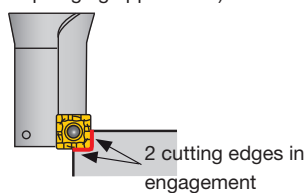
| ISO      | Workpiece material | Hardness     | Cutting speed<br>Vc (m/min) | Depth of cut<br>ap (mm) | Feed : f (mm/rev) |
|----------|--------------------|--------------|-----------------------------|-------------------------|-------------------|
| <b>P</b> | Carbon steel       | - 300 HB     | 80 - 200                    | 0.5 -                   | 0.05 - 0.15       |
| <b>M</b> | Stainless steel    | - 200 HB     | 80 - 150                    | 0.5 -                   | 0.05 - 0.1        |
| <b>K</b> | Grey cast iron     | 150 - 250 HB | 80 - 200                    | 0.5 -                   | 0.05 - 0.2        |
| <b>N</b> | Non-ferrous        | -            | 100 - 300                   | 0.5 -                   | 0.1 - 0.2         |
| <b>S</b> | Superalloys        | - 40 HRC     | 50 - 80                     | 0.5 -                   | 0.05 - 0.08       |
| <b>H</b> | Hard materials     | - 50 HRC     | 50 - 80                     | 0.5 -                   | 0.05 - 0.08       |

## APPLICATION



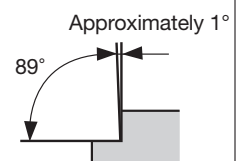
| Designation | Tool dia. DCX | Max. depth of cut APMX | Max. counter boring depth LU | Min. pre-hole diameter øDc | Max. ramping angle RMPX | Max. cutting width in plunging W | Min. machinable hole dia. øD1 | Max. machinable hole dia. øD2 | Max. cutting width in enlarging hole ae |
|-------------|---------------|------------------------|------------------------------|----------------------------|-------------------------|----------------------------------|-------------------------------|-------------------------------|---|
| TCB100F16   | 10            | 4                      | 13                           | 2.8                        | -                       | 4                                | -                             | -                             | -                                       |
| TCB110F16   | 11            | 4                      | 14                           | 2.8                        | 2.1°                    | 4                                | 12                            | 20                            | 10                                      |
| TCB120F20   | 12            | 4                      | 15                           | 3.6                        | 2.1°                    | 4                                | 14                            | 22                            | 11                                      |
| TCB130F20   | 13            | 4                      | 16                           | 4.5                        | 2.1°                    | 4                                | 17                            | 24                            | 12                                      |
| TCB-140     | 14            | 5                      | 11                           | 4                          | 3°                      | 5                                | 20                            | 25                            | 13                                      |
| TCB140F25   | 14            | 4                      | 18                           | 5.5                        | 1.9°                    | 4                                | 19                            | 26                            | 13                                      |
| TCB150F25   | 15            | 4                      | 19                           | 6.5                        | 1.6°                    | 4                                | 21                            | 28                            | 14                                      |
| TCB160F25   | 16            | 4                      | 20                           | 7.5                        | 1.3°                    | 4                                | 23                            | 30                            | 15                                      |
| TCB170F25   | 17            | 5                      | 13                           | 6.6                        | 2.5°                    | 5                                | 25                            | 32                            | 16                                      |
| TCB175F25   | 17.5          | 5                      | 14                           | 7.1                        | 2.2°                    | 5                                | 25.5                          | 33                            | 16.5                                    |
| TCB180F25   | 18            | 5                      | 15                           | 7.5                        | 2°                      | 5                                | 26                            | 34                            | 17                                      |
| TCB190F25   | 19            | 5                      | 15                           | 8.5                        | 1.5°                    | 5                                | 27                            | 36                            | 18                                      |
| TCB-200     | 20            | 6                      | 16                           | 8.2                        | 3°                      | 6                                | 29                            | 38                            | 19                                      |
| TCB200F25   | 20            | 6                      | 16                           | 8.2                        | 3°                      | 6                                | 29                            | 38                            | 19                                      |
| TCB210F25   | 21            | 6                      | 17                           | 9                          | 2.5°                    | 6                                | 30                            | 40                            | 20                                      |
| TCB220F25   | 22            | 6                      | 18                           | 10                         | 2°                      | 6                                | 31                            | 42                            | 21                                      |
| TCB-230     | 23            | 6                      | 19                           | 11                         | 3°                      | 6                                | 32                            | 44                            | 22                                      |
| TCB230F25   | 23            | 6                      | 19                           | 11                         | 3°                      | 6                                | 32                            | 44                            | 22                                      |
| TCB240F25   | 24            | 6                      | 20                           | 12                         | 1.3°                    | 6                                | 33                            | 46                            | 23                                      |
| TCB250F25   | 25            | 6                      | 25                           | 13                         | 1.1°                    | 6                                | 34                            | 48                            | 24.5                                    |
| TCB-260     | 26            | 6                      | 21                           | 14                         | 1°                      | 6                                | 35                            | 50                            | 25                                      |
| TCB-290     | 29            | 8                      | 23                           | 14                         | 3°                      | 8                                | 37                            | 56                            | 28                                      |
| TCB-320     | 32            | 8                      | 40                           | 16.9                       | 2.5°                    | 8                                | 40                            | 62                            | 31                                      |
| TCB-350     | 35            | 10                     | 43                           | 14                         | 2.5°                    | 10                               | 45                            | 68                            | 34                                      |
| TCB-390     | 39            | 10                     | 48                           | 17.9                       | 2°                      | 10                               | 49                            | 76                            | 38                                      |
| TCB-430     | 43            | 10                     | 53                           | 21.7                       | 1.5°                    | 10                               | 53                            | 84                            | 42                                      |

The insert can be used for a maximum 2 indexings.  
(full 4 indexing for a plunging application.)




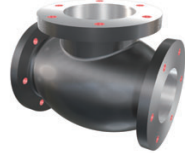
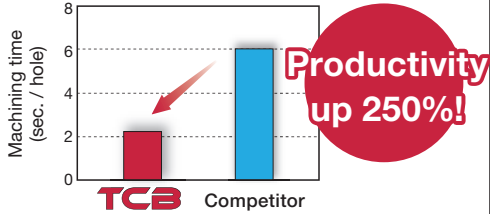
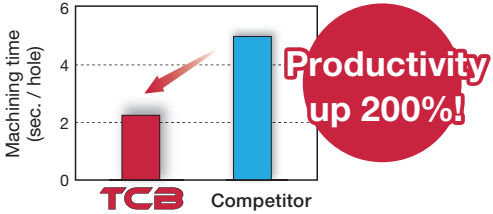


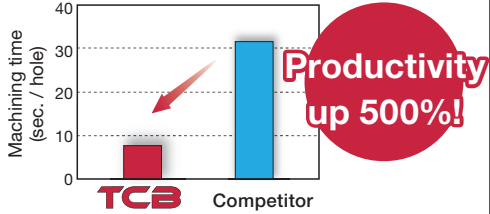
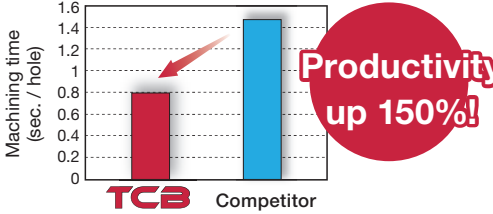
### Cautions in shouldering operation

The cutter is design so that the insert provides 1° taper relief on the periphery. The wall, therefore, will be 89° when milled.

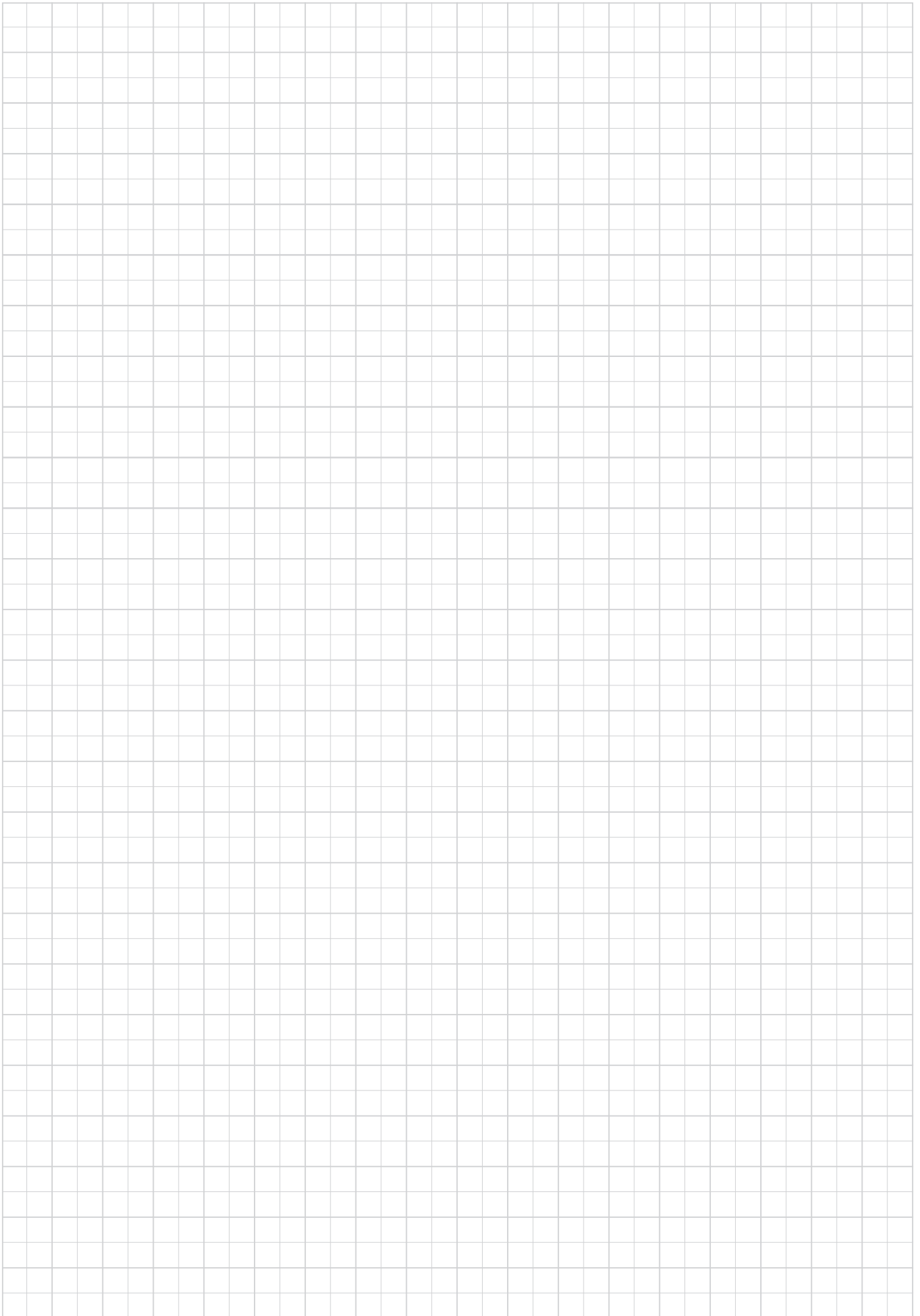




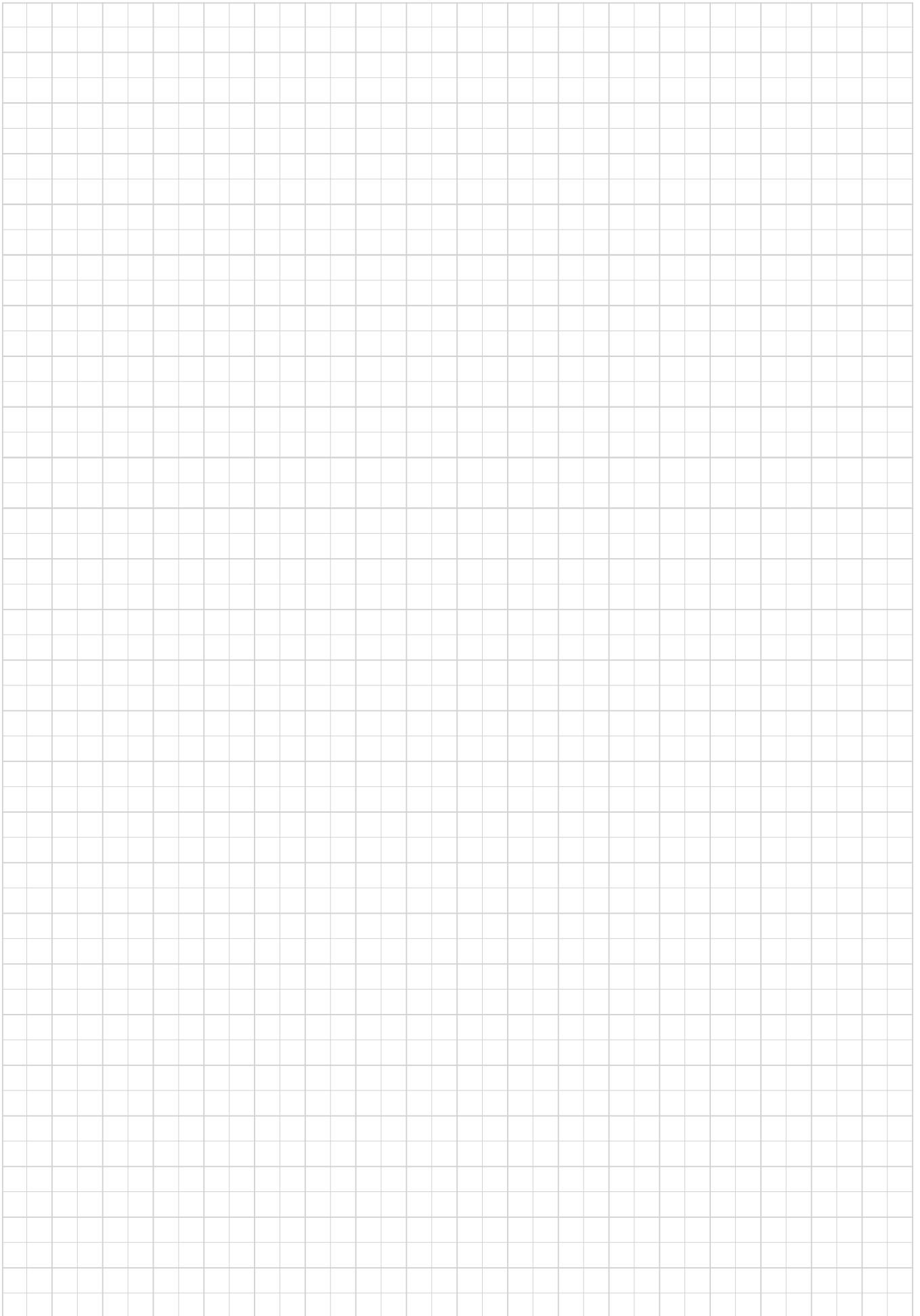
## PRACTICAL EXAMPLES

| Workpiece type     |   | Con-rods   | Valve  |  |
|--------------------|---|--|--|--|
| Drill              |   | TCB170F25  | TCB240F25  |  |
| Insert             |   | SPMP831DS  | SPMP042ERD   |  |
| Grade              |   | T313W  | T313W  |  |
|                    |   | S55C / C55   | FC250 / GG25 / 250   |  |
| Workpiece material |   |  <b>P</b>   |  <b>K</b>   |  |
| Cutting conditions | Cutting speed : $V_c$ (m/min)   | 160  | 180  |  |
|                    | Feed : $f$ (mm/rev)   | 0.2  | 0.3  |  |
|                    | Feed speed : $V_f$ (mm/min)   | 600  | 720  |  |
|                    | Drilling depth : $H$ (mm)   | 24   | 30   |  |
|                    | Machining application   | Boring   | Boring   |  |
|                    | Machine   | Dedicated machine  | Horizontal M/C, BT50   |  |
|                    | Coolant   | Wet  | Wet  |  |
| Results            |  <p>The customer was using an indexable drill to bore a cast hole. Counter boring with a TCB cutter significantly decreased machining time.</p> |  |  <p>The customer was using a cutter with one effective cutting edge to make counter bore holes. Counter boring with a TCB cutter significantly shorten the machining time.</p>  |  |
|                    |   |  |  |  |
| Workpiece type     |   | Bearing  | Machining parts  |  |
| Drill              |   | TCB-320  | TCB140F20  |  |
| Insert             |   | SPMM322ERD   | SPMP771-CG   |  |
| Grade              |   | T313W  | AH6030   |  |
|                    |   | S45C / C45   | S50C / C50   |  |
| Workpiece material |   |  <b>P</b> |  <b>P</b>   |  |
| Cutting conditions | Cutting speed : $V_c$ (m/min)   | 150  | 150  |  |
|                    | Feed : $f$ (mm/rev)   | 0.25   | 0.13   |  |
|                    | Feed speed : $V_f$ (mm/min)   | 375  | 444  |  |
|                    | Drilling depth : $H$ (mm)   | 40   | 6  |  |
|                    | Machining application   | Boring   | Boring   |  |
|                    | Machine   | NC lathe   | Vertical M/C   |  |
|                    | Coolant   | Wet  | Wet  |  |
| Results            |  <p>Competitor's turning tool required five passes to expand the hole. TCB finished the same operation in just one pass.</p>                   |  |  <p>The customer was peck milling with a solid carbide tool to facilitate smooth chip removal. Thanks to the new CG style chipbreaker's excellent chip guidance, peck milling has no longer needed, thus significantly reduced the machining time.</p> |  |
|                    |   |  |  |  |

# MEMO



# MEMO



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