

MillLine

TCB

www.tungaloy.com

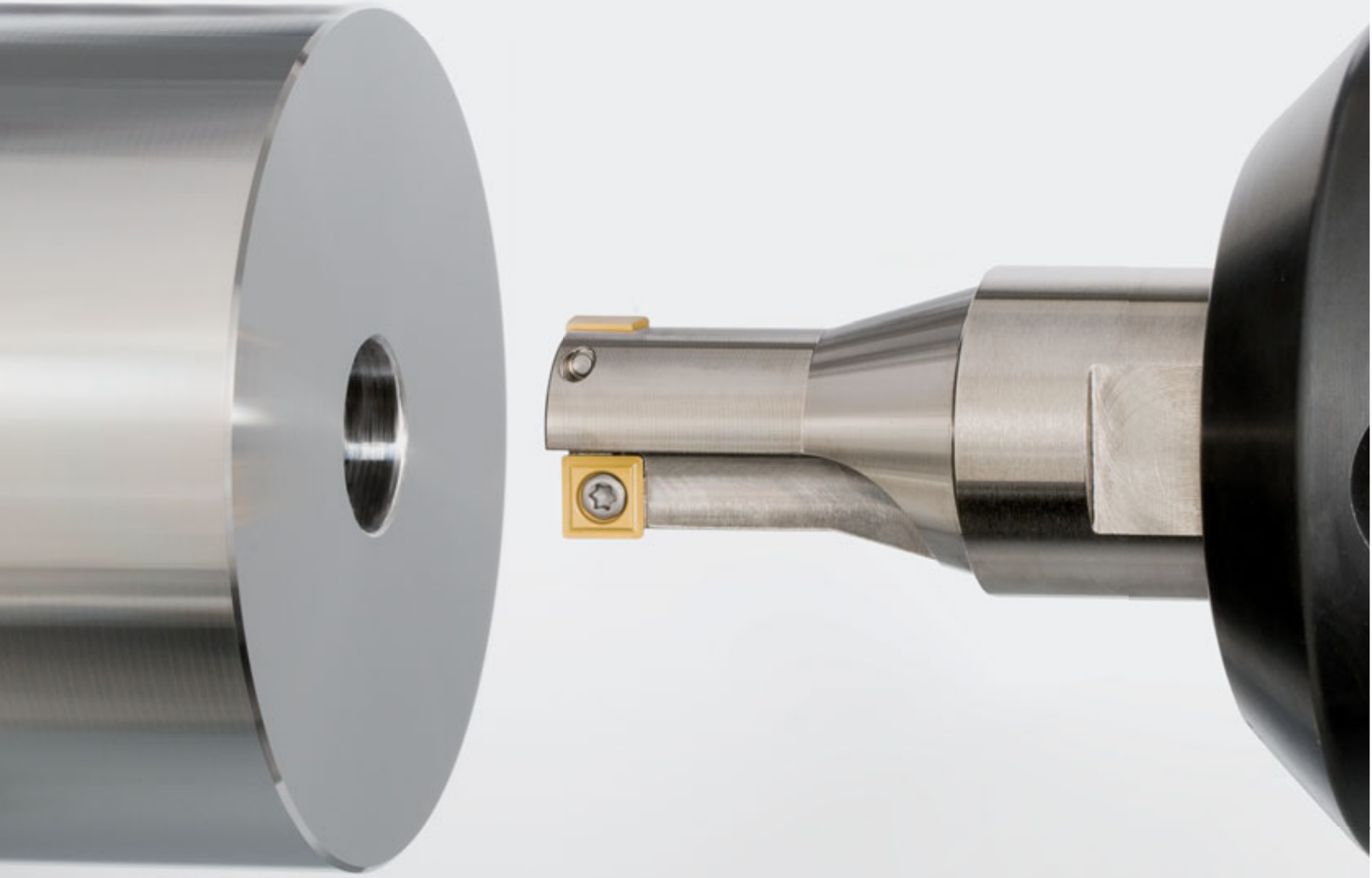
Tungaloy Report No. 512-G

Member IMC Group
Tungaloy

Multifunctional counterboring tool to **improve your productivity**



INDUSTRY 4.0
FEED the SPEED!



ACCELERATED MACHINING

MillLine

TCB
TUNGALOY



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

www.tungaloy.com

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!

New 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

New



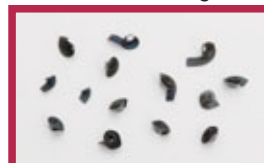
SPMP/SPMM-CG

Optimized for boring operations

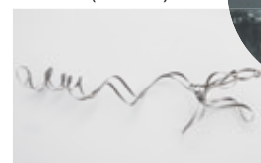
Efficient for a wide range of cutting depths and materials

TCB

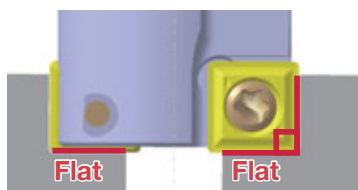
Chips from boring and countersinking



Competitor's
Flat drill
(endmill)



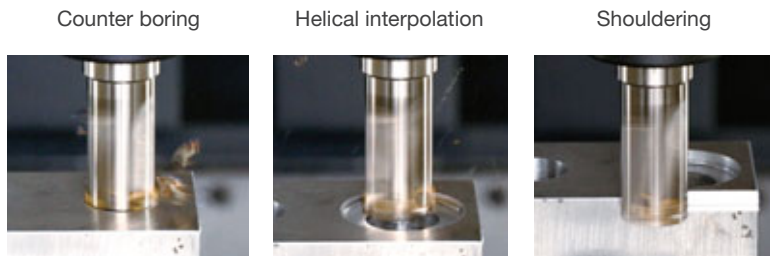
Provides a 90° flat surface



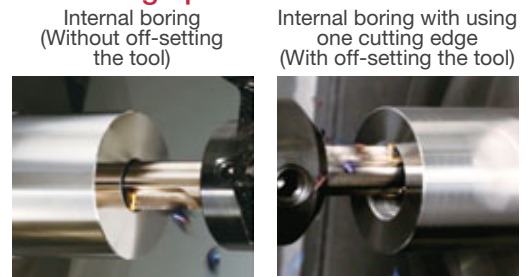
Multifunctionality

Suited not only for 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



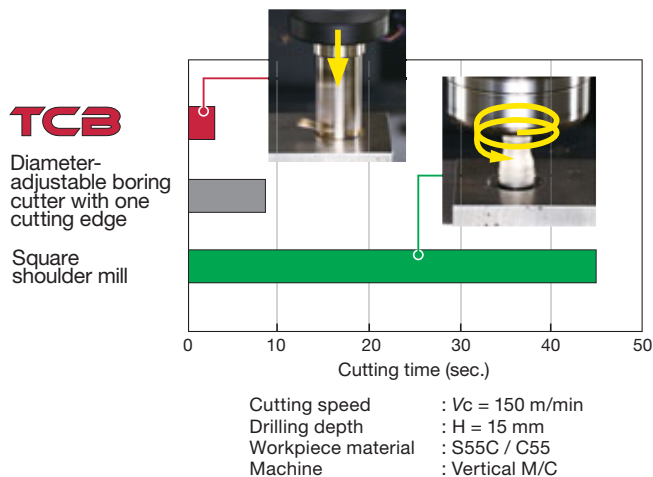
For turning operation



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.

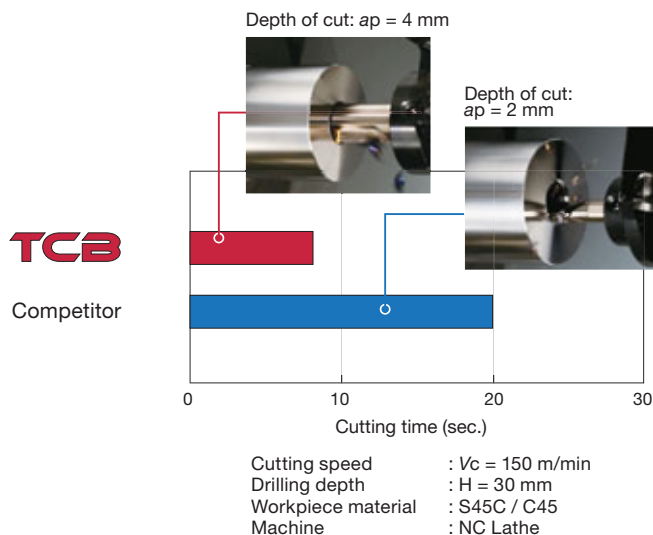
Counter boring operation on machining center



| | No. of teeth z | Machining method | Feed (mm/rev) | Pitch p (mm/rev) |
|-----------------------------------|----------------|--|---------------|------------------|
| TCB | 2 | Counterboring | 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

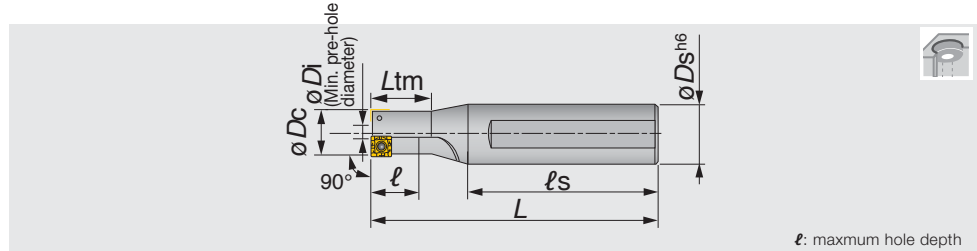


| | Tool dia. ϕD_c (mm) | Prehole dia. ϕ (mm) | No. of teeth z | Roughing | |
|----------------------|---------------------------|--------------------------|----------------|-------------------------|-------------------|
| | | | | Depth of cut a_p (mm) | Feed f (mm/rev) |
| TCB | 20 | 12 | 2 | 4 mm x 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.

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Monoblock type



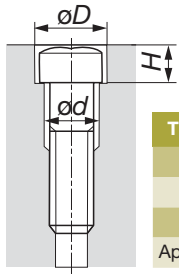
ℓ : maximum hole depth

| | Designation | Stock | ϕD_c | z | ϕD_i | ℓ | L_{tm} | L | ℓ_s | ϕD_s | Insert |
|-----|-------------|-------|------------|---|------------|--------|----------|-----|----------|------------|------------|
| New | TCB100F16 | ● | 10 | 1 | 2.8 | 13 | 17 | 86 | 60 | 16 | SPMP771... |
| New | TCB110F16 | ● | 11 | 1 | 2.8 | 14 | 18.7 | 87 | 60 | 16 | SPMP771... |
| New | TCB120F20 | ● | 12 | 1 | 3.6 | 15 | 20.5 | 89 | 60 | 20 | SPMP771... |
| New | TCB130F20 | ● | 13 | 2 | 4.5 | 16 | 22.2 | 91 | 60 | 20 | SPMP771... |
| | TCB-140 | ● | 14 | 1 | 4 | 11 | 18 | 117 | 80 | 25 | SPMP831... |
| New | TCB140F25 | ● | 14 | 2 | 5.5 | 18 | 24 | 113 | 80 | 25 | SPMP771... |
| New | TCB150F25 | ● | 15 | 2 | 6.5 | 19 | 25.7 | 114 | 80 | 25 | SPMP771... |
| New | 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... |
| | 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... |
| New | 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... |

●: Line up
 ▲: To be discontinued
 ★: Coming soon

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

Counter sink dimensions of bolt hole



| Thread size | M6 | M8 | M10 | M12 | M14 | M16 | M18 | M20 | M22 | M24 | M27 |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| øD (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 |
| ød (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

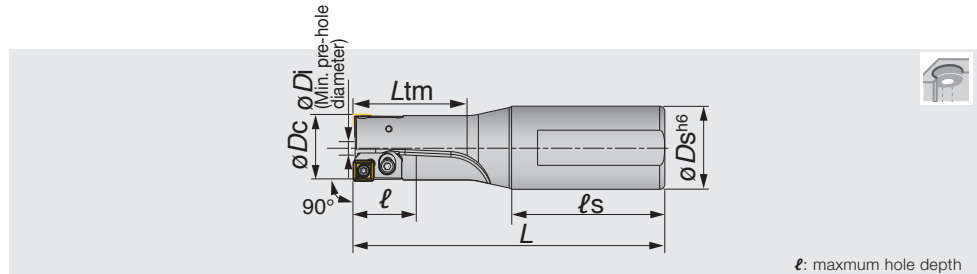


| Designation | Clamping screw | Wrench |
|-----------------------|----------------|--------|
| TCB100... - TCB160... | CSTB-2L040 | T-6D |
| TCB-140... | CSTB-2.2S | T-7D |
| TCB170... - TCB190... | CSTB-2.2 | T-7D |
| TCB200... - TCB260... | CSTA-NO3 | T-9D |
| TCB-290 - TCB-320 | CSTA-NO5 | T-9D |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

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Cartridge type

New



ℓ : maximum hole depth

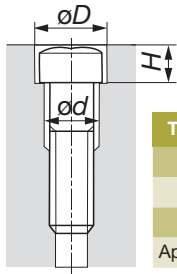
| Body Designation | Stock | ϕD_c | ϕD_s | ϕD_i | ℓ | ℓ_s | L_{tm} | L | Kg | Cartridge set Designation | Shim plate Designation | Shim plate Thickness | Insert |
|------------------|-------|------------|------------|------------|--------|----------|----------|-----|-----|---------------------------|------------------------|----------------------|------------|
| 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.

★: Coming soon

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

Counter sink 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



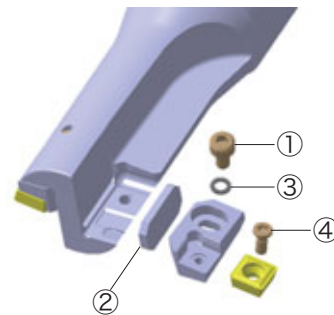
| Designation | ① Cartridge screw | ② Shim plate | ② Shim plate | ② Shim plate | ② Shim plate | Wrench for cartridge | ③ Washer |
|---------------|-------------------|--------------|--------------|--------------|--------------|----------------------|-----------|
| TCB260-290F32 | CM3x0.5x6 | AP16050 | AP16100 | AP16150 | | P-2.5 | 3.2X6X0.5 |
| TCB300-340F32 | CM3x0.5x6 | AP16050 | AP16100 | AP16150 | AP16200 | P-2.5 | 3.2X6X0.5 |
| TCB350-390F32 | CM3x0.5x6 | AP16050 | AP16100 | AP16150 | AP16200 | P-2.5 | 3.2X6X0.5 |
| TCB400-440F32 | CM4x0.7x10 | AP21050 | AP21100 | AP21150 | AP21200 | P-3 | 4.3X8X0.5 |
| TCB450-490F32 | CM4x0.7x10 | AP21050 | AP21100 | AP21150 | AP21200 | P-3 | 4.3X8X0.5 |
| TCB500-540F32 | CM4x0.7x10 | AP21050 | AP21100 | AP21150 | AP21200 | P-3 | 4.3X8X0.5 |
| TCB550-590F32 | CM4x0.7x10 | AP21050 | AP21100 | AP21150 | AP21200 | P-3 | 4.3X8X0.5 |

Cartridge set

SPARE PARTS



| Designation | ④ 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 |



Fine adjustment shim plates (not included)

SPARE PARTS

| Designation | Stock | 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. (Fig.2)
- Ensure to locate the shim plate fit within the cartridge pocket. (Fig.2)
- Use thin shim plates (not included) for fine diameter adjustments in ø0.1 mm increments. (Fig.3)
- 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

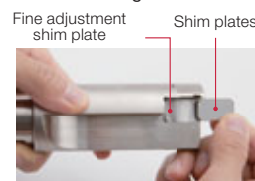


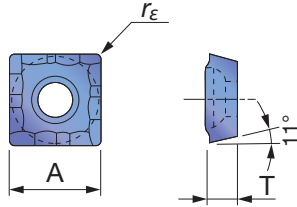
Fig.3



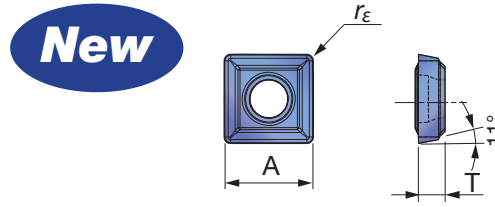
Fig.4

INSERT

SPMP/SPMM



SPMP-CG



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

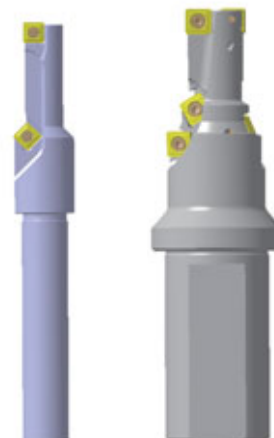
★ : First choice
☆ : Second choice

| Designation | rε | Coated | | | | | | | | | | A | T |
|--------------|-----|--------|--------|--|--|--|--|--|--|--|--|------|------|
| | | T313W | AH6030 | | | | | | | | | | |
| SPMP771-CG | 0.4 | ● | | | | | | | | | | 5.4 | 1.61 |
| SPMP831-CG | 0.4 | ● | | | | | | | | | | 6.35 | 2.38 |
| SPMP042ER-CG | 0.8 | ● | | | | | | | | | | 7.94 | 3.18 |
| SPMM322ER-CG | 0.8 | ● | | | | | | | | | | 9.53 | 3.18 |
| SPMM432ER-CG | 0.8 | ● | | | | | | | | | | 12.7 | 4.76 |
| SPMP831DS | 0.4 | ● | | | | | | | | | | 6.35 | 2.38 |
| SPMP042ERD | 0.8 | ● | | | | | | | | | | 7.94 | 3.18 |
| SPMM322ERD | 0.8 | ● | | | | | | | | | | 9.53 | 3.18 |
| SPMM432ERD | 0.8 | ● | | | | | | | | | | 12.7 | 4.76 |

● : New product
● : Line up

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 materials | Cutting speed V_c (m/min) | Feed : f (mm/rev) | |
|----------|---------------------|--------------------------------|----------------------------|----------------------------|
| | | | $\phi 10 - 12$ ($z = 1$) | $\phi 13 - 59$ ($z = 2$) |
| P | Carbon steel | 80 - 200 | 0.03 - 0.08 | 0.1 - 0.3 |
| M | Stainless steel | 80 - 150 | 0.03 - 0.05 | 0.06 - 0.15 |
| K | Grey cast iron | 80 - 200 | 0.05 - 0.1 | 0.1 - 0.4 |
| N | Non-ferrous | 100 - 300 | 0.05 - 0.2 | 0.1 - 0.4 |
| S | Superalloys | 50 - 80 | 0.03 - 0.05 | 0.06 - 0.15 |
| H | Hard materials | 50 - 80 | 0.03 - 0.05 | 0.06 - 0.15 |

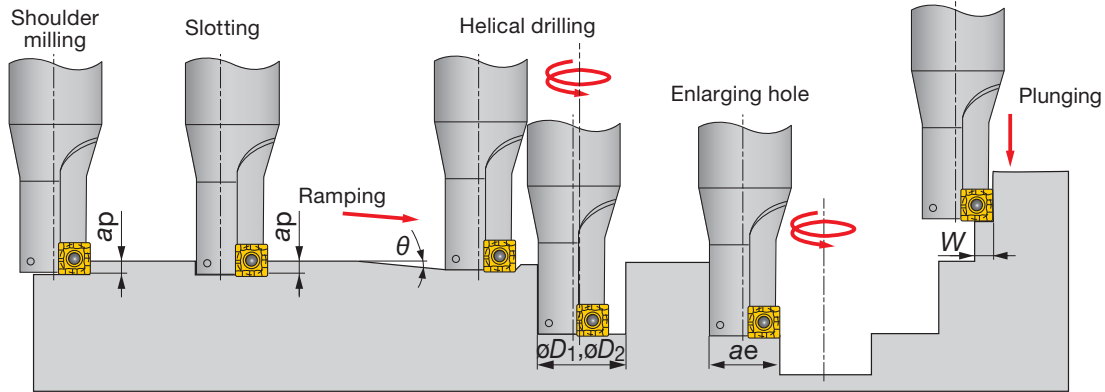
Milling

| ISO | Workpiece materials | Cutting speed V_c (m/min) | Feed per tooth f_z (mm/t) |
|----------|---------------------|--------------------------------|--------------------------------|
| P | Carbon steel | 80 - 200 | 0.05 - 0.15 |
| M | Stainless steel | 80 - 150 | 0.05 - 0.1 |
| K | Grey cast iron | 80 - 200 | 0.05 - 0.2 |
| N | Non-ferrous | 100 - 300 | 0.1 - 0.2 |
| S | Superalloys | 50 - 80 | 0.05 - 0.08 |
| H | Hard materials | 50 - 80 | 0.05 - 0.08 |

Internal boring (With one cutting edge)

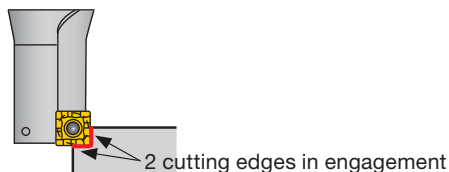
| ISO | Workpiece materials | Cutting speed V_c (m/min) | Depth of cut a_p (mm) | Feed f (mm/rev) |
|----------|---------------------|--------------------------------|----------------------------|----------------------|
| P | Carbon steel | 80 - 200 | 0.5 - | 0.05 - 0.15 |
| M | Stainless steel | 80 - 150 | 0.5 - | 0.05 - 0.1 |
| K | Grey cast iron | 80 - 200 | 0.5 - | 0.05 - 0.2 |
| N | Non-ferrous | 100 - 300 | 0.5 - | 0.1 - 0.2 |
| S | Superalloys | 50 - 80 | 0.5 - | 0.05 - 0.08 |
| H | Hard materials | 50 - 80 | 0.5 - | 0.05 - 0.08 |

APPLICATION



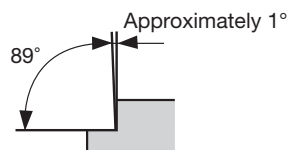
| Designation | Tool dia. | Max. depth of cut | Max. ramping angle | Max. cutting width in plunging | Min. machinable hole dia. | Max. machinable hole dia. | Max. cutting width in enlarging hole |
|----------------------|------------|-------------------|--------------------|--------------------------------|---------------------------|---------------------------|--------------------------------------|
| | ϕD_c | Max a_p | θ° | W | ϕD_1 | ϕD_2 | a_e |
| New TCB100F16 | 10 | 4 | - | 4 | - | - | - |
| New TCB110F16 | 11 | 4 | 2.1 | 4 | 12 | 20 | 10 |
| New TCB120F20 | 12 | 4 | 2.1 | 4 | 14 | 22 | 11 |
| New TCB130F20 | 13 | 4 | 2.1 | 4 | 17 | 24 | 12 |
| TCB-140 | 14 | 5 | 3 | 5 | 20 | 25 | 13 |
| New TCB140F25 | 14 | 4 | 1.9 | 4 | 19 | 26 | 13 |
| New TCB150F25 | 15 | 4 | 1.6 | 4 | 21 | 28 | 14 |
| New TCB160F25 | 16 | 4 | 1.3 | 4 | 23 | 30 | 15 |
| TCB170F25 | 17 | 5 | 2.5 | 5 | 25 | 32 | 16 |
| TCB175F25 | 17.5 | 5 | 2.2 | 5 | 25.5 | 33 | 16.5 |
| TCB180F25 | 18 | 5 | 2 | 5 | 26 | 34 | 17 |
| TCB190F25 | 19 | 5 | 1.5 | 5 | 27 | 36 | 18 |
| TCB200F25 | 20 | 6 | 3 | 6 | 29 | 38 | 19 |
| TCB210F25 | 21 | 6 | 2.5 | 6 | 30 | 40 | 20 |
| TCB220F25 | 22 | 6 | 2 | 6 | 31 | 42 | 21 |
| TCB230F25 | 23 | 6 | 1.6 | 6 | 32 | 44 | 22 |
| TCB240F25 | 24 | 6 | 1.3 | 6 | 33 | 46 | 23 |
| New TCB250F25 | 25 | 6 | 1.1 | 6 | 34 | 48 | 24.5 |
| TCB-260 | 26 | 6 | 1 | 6 | 35 | 50 | 25 |
| TCB-290 | 29 | 8 | 3 | 8 | 37 | 56 | 28 |
| TCB-320 | 32 | 8 | 2.5 | 8 | 40 | 62 | 31 |
| TCB-350 | 35 | 10 | 2.5 | 10 | 45 | 68 | 34 |
| TCB-390 | 39 | 10 | 2 | 10 | 49 | 76 | 38 |
| TCB-430 | 43 | 10 | 1.5 | 10 | 53 | 84 | 42 |

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



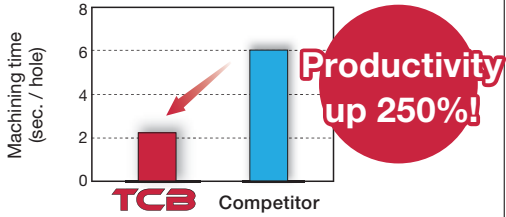
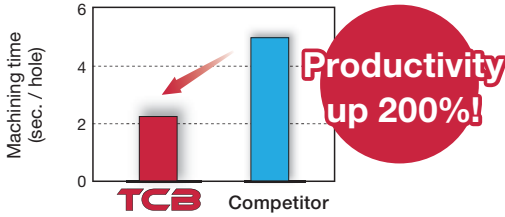


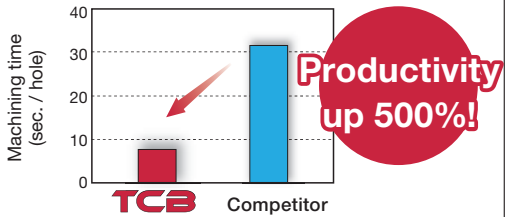
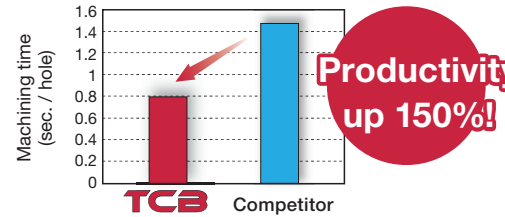


Cautions in shouldering operation

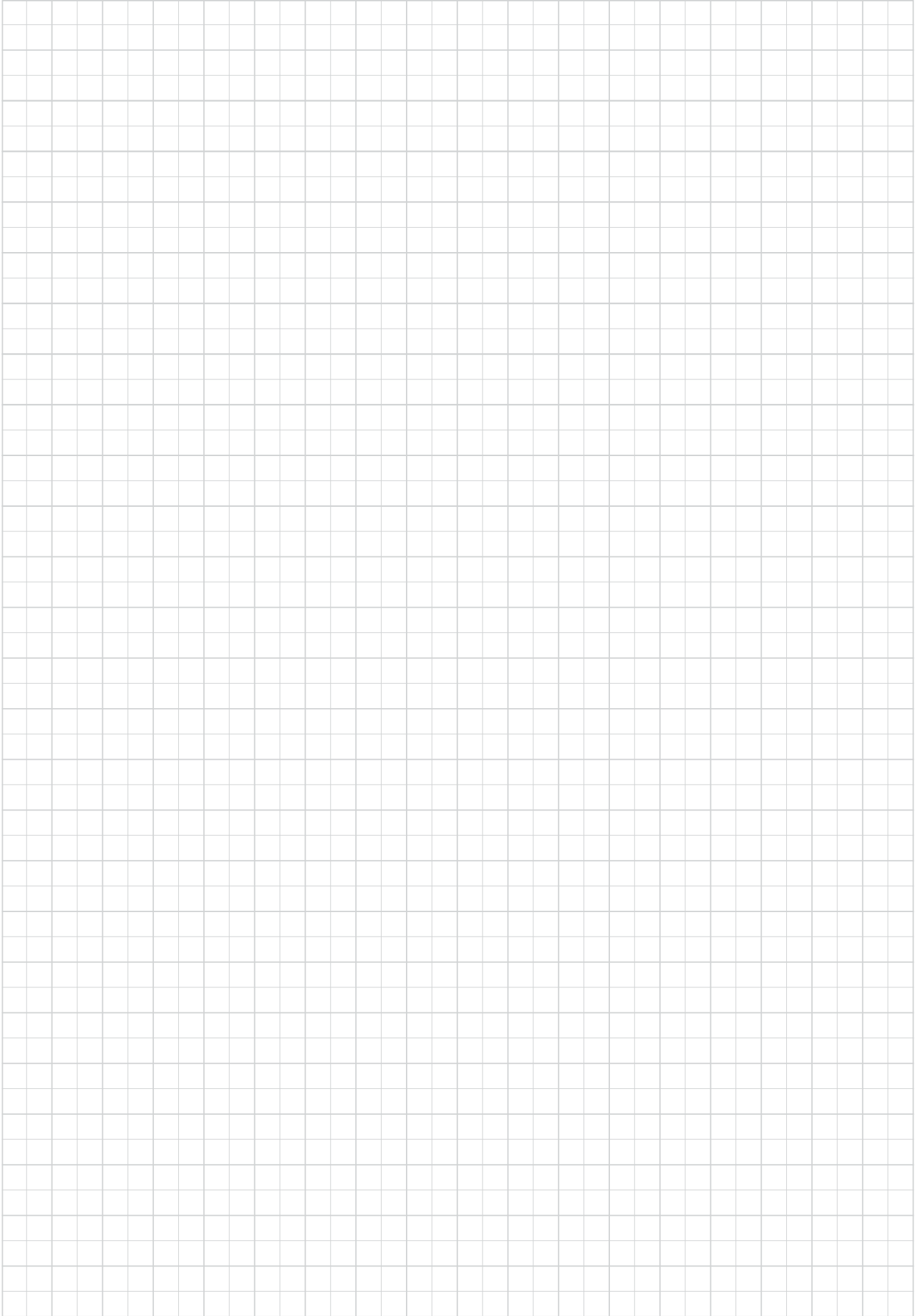
The cutter is design so that the insert provides 1° taper relief on the periphery. The wall, therefore, will be 89° when milled.



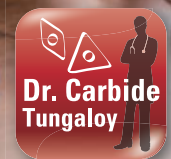
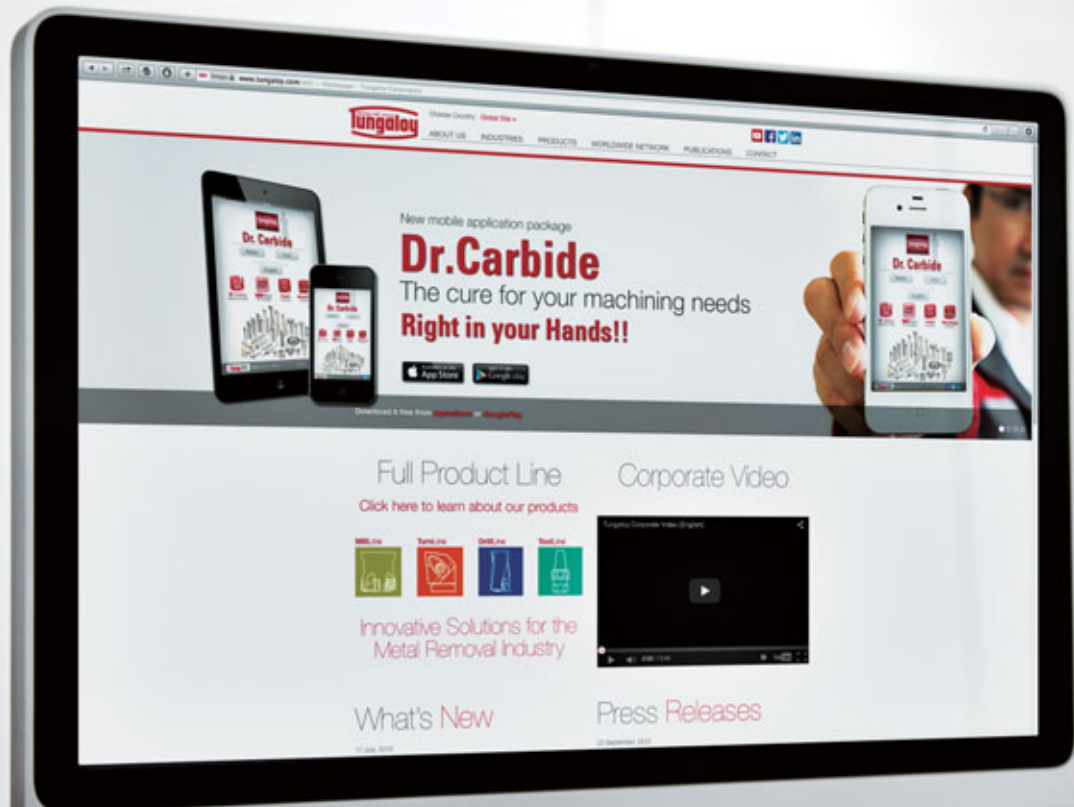
PRACTICAL EXAMPLES

| Workpiece type | | Con-rods | Valve |
|--------------------|------------------------------|--|--|
| Drill | | TCB170F25 | TCB240F25 |
| Insert | | SPMP831DS | SPMP042ERD |
| Grade | | T313W S55C / C55 | T313W FC250 / GG25 / 250 |
| Workpiece material | |  P |  K |
| 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. Counterboring 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. Counterboring with a TCB cutter significantly shortened the machining time.</p> |
| Workpiece type | | Bearing | Machining parts |
| Drill | | TCB-320 | TCB140F20 |
| Insert | | SPMM322ERD | SPMP771-CG |
| Grade | | T313W S45C / C45 | AH6030 S50C / C50 |
| Workpiece material | |  P |  P |
| 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



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