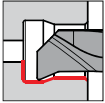




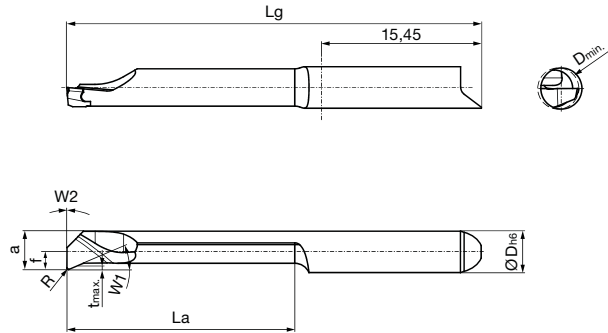
## Cutting insert for boring out and profiling



• face flat 90°

for tool holders type GH104/GB104 see from page 18

Cutting data page 214



Right hand version shown  
Left hand version mirror image

Series no. 25060

25064

Tool material

Solid carbide

Type

GT 104

GT 104

Coating

a

○

nano-A

uncoated



| Code no. | Description            | Cutting direction |      |    |    |      |      |       |       |       |      |
|----------|------------------------|-------------------|------|----|----|------|------|-------|-------|-------|------|
|          |                        | D min             | R    | W1 | W2 | f    | a    | t max | La    | Lg    | D h6 |
|          |                        | mm                | mm   | °  | °  | mm   | mm   | mm    | mm    | mm    | mm   |
| 4.001    | GT104.9006.005.03.07.R | 0.70              | 0.05 | 23 | 0  | 1.95 | 0.60 | 0.05  | 3.00  | 25.00 | 4.00 |
| 4.002    | GT104.9009.005.04.10.R | 1.00              | 0.05 | 23 | 0  | 1.95 | 0.90 | 0.10  | 4.00  | 25.00 | 4.00 |
| 4.003    | GT104.9009.005.07.10.R | 1.00              | 0.05 | 23 | 0  | 1.95 | 0.90 | 0.10  | 7.00  | 25.00 | 4.00 |
| 4.004    | GT104.9014.005.04.15.R | 1.50              | 0.05 | 23 | 0  | 1.95 | 1.40 | 0.15  | 4.00  | 25.00 | 4.00 |
| 4.007    | GT104.9014.010.04.15.R | 1.50              | 0.10 | 23 | 0  | 1.95 | 1.40 | 0.15  | 4.00  | 25.00 | 4.00 |
| 4.005    | GT104.9014.005.07.15.R | 1.50              | 0.05 | 23 | 0  | 1.95 | 1.40 | 0.15  | 7.00  | 25.00 | 4.00 |
| 4.008    | GT104.9014.010.07.15.R | 1.50              | 0.10 | 23 | 0  | 1.95 | 1.40 | 0.15  | 7.00  | 25.00 | 4.00 |
| 4.006    | GT104.9014.005.12.15.R | 1.50              | 0.05 | 23 | 0  | 1.95 | 1.40 | 0.15  | 12.00 | 30.00 | 4.00 |
| 4.009    | GT104.9014.010.12.15.R | 1.50              | 0.10 | 23 | 0  | 1.95 | 1.40 | 0.15  | 12.00 | 30.00 | 4.00 |
| 4.010    | GT104.9019.005.04.20.R | 2.00              | 0.05 | 23 | 0  | 1.95 | 1.90 | 0.15  | 4.00  | 25.00 | 4.00 |
| 4.014    | GT104.9019.010.04.20.R | 2.00              | 0.10 | 23 | 0  | 1.95 | 1.90 | 0.15  | 4.00  | 25.00 | 4.00 |
| 4.018    | GT104.9019.015.04.20.R | 2.00              | 0.15 | 23 | 0  | 1.95 | 1.90 | 0.15  | 4.00  | 25.00 | 4.00 |
| 4.011    | GT104.9019.005.07.20.R | 2.00              | 0.05 | 23 | 0  | 1.95 | 1.90 | 0.15  | 7.00  | 25.00 | 4.00 |
| 4.015    | GT104.9019.010.07.20.R | 2.00              | 0.10 | 23 | 0  | 1.95 | 1.90 | 0.15  | 7.00  | 25.00 | 4.00 |
| 4.019    | GT104.9019.015.07.20.R | 2.00              | 0.15 | 23 | 0  | 1.95 | 1.90 | 0.15  | 7.00  | 25.00 | 4.00 |
| 4.012    | GT104.9019.005.12.20.R | 2.00              | 0.05 | 23 | 0  | 1.95 | 1.90 | 0.15  | 12.00 | 30.00 | 4.00 |
| 4.016    | GT104.9019.010.12.20.R | 2.00              | 0.10 | 23 | 0  | 1.95 | 1.90 | 0.15  | 12.00 | 30.00 | 4.00 |
| 4.020    | GT104.9019.015.12.20.R | 2.00              | 0.15 | 23 | 0  | 1.95 | 1.90 | 0.15  | 12.00 | 30.00 | 4.00 |
| 4.013    | GT104.9019.005.17.20.R | 2.00              | 0.05 | 23 | 0  | 1.95 | 1.90 | 0.15  | 17.00 | 35.00 | 4.00 |
| 4.017    | GT104.9019.010.17.20.R | 2.00              | 0.10 | 23 | 0  | 1.95 | 1.90 | 0.15  | 17.00 | 35.00 | 4.00 |
| 4.021    | GT104.9019.015.17.20.R | 2.00              | 0.15 | 23 | 0  | 1.95 | 1.90 | 0.15  | 17.00 | 35.00 | 4.00 |
| 4.022    | GT104.9026.005.07.30.R | 3.00              | 0.05 | 23 | 0  | 1.95 | 2.60 | 0.20  | 7.00  | 25.00 | 4.00 |
| 4.026    | GT104.9026.010.07.30.R | 3.00              | 0.10 | 23 | 0  | 1.95 | 2.60 | 0.20  | 7.00  | 25.00 | 4.00 |
| 4.030    | GT104.9026.020.07.30.R | 3.00              | 0.20 | 23 | 0  | 1.95 | 2.60 | 0.20  | 7.00  | 25.00 | 4.00 |
| 4.023    | GT104.9026.005.12.30.R | 3.00              | 0.05 | 23 | 0  | 1.95 | 2.60 | 0.20  | 12.00 | 30.00 | 4.00 |
| 4.027    | GT104.9026.010.12.30.R | 3.00              | 0.10 | 23 | 0  | 1.95 | 2.60 | 0.20  | 12.00 | 30.00 | 4.00 |
| 4.031    | GT104.9026.020.12.30.R | 3.00              | 0.20 | 23 | 0  | 1.95 | 2.60 | 0.20  | 12.00 | 30.00 | 4.00 |
| 4.024    | GT104.9026.005.17.30.R | 3.00              | 0.05 | 23 | 0  | 1.95 | 2.60 | 0.20  | 17.00 | 35.00 | 4.00 |
| 4.028    | GT104.9026.010.17.30.R | 3.00              | 0.10 | 23 | 0  | 1.95 | 2.60 | 0.20  | 17.00 | 35.00 | 4.00 |
| 4.032    | GT104.9026.020.17.30.R | 3.00              | 0.20 | 23 | 0  | 1.95 | 2.60 | 0.20  | 17.00 | 35.00 | 4.00 |
| 4.025    | GT104.9026.005.22.30.R | 3.00              | 0.05 | 23 | 0  | 1.95 | 2.60 | 0.20  | 22.00 | 40.00 | 4.00 |
| 4.029    | GT104.9026.010.22.30.R | 3.00              | 0.10 | 23 | 0  | 1.95 | 2.60 | 0.20  | 22.00 | 40.00 | 4.00 |
| 4.033    | GT104.9026.020.22.30.R | 3.00              | 0.20 | 23 | 0  | 1.95 | 2.60 | 0.20  | 22.00 | 40.00 | 4.00 |
| 4.034    | GT104.9037.005.12.40.R | 4.00              | 0.05 | 23 | 0  | 1.70 | 3.70 | 0.30  | 12.00 | 30.00 | 4.00 |
| 4.049    | GT104.9037.010.12.40.R | 4.00              | 0.10 | 23 | 0  | 1.70 | 3.70 | 0.30  | 12.00 | 30.00 | 4.00 |
| 4.039    | GT104.9037.015.12.40.R | 4.00              | 0.15 | 23 | 0  | 1.70 | 3.70 | 0.30  | 12.00 | 30.00 | 4.00 |
| 4.044    | GT104.9037.025.12.40.R | 4.00              | 0.25 | 23 | 0  | 1.70 | 3.70 | 0.30  | 12.00 | 30.00 | 4.00 |
| 4.035    | GT104.9037.005.17.40.R | 4.00              | 0.05 | 23 | 0  | 1.70 | 3.70 | 0.30  | 17.00 | 35.00 | 4.00 |
| 4.050    | GT104.9037.010.17.40.R | 4.00              | 0.10 | 23 | 0  | 1.70 | 3.70 | 0.30  | 17.00 | 35.00 | 4.00 |



## Cutting insert for boring out and profiling

Series no. 25060

25064

| Code no. | Description            | D min | R    | W1 | W2 | f    | a    | t max | Cutting direction                                                                   |                                                                                     | D h6 |
|----------|------------------------|-------|------|----|----|------|------|-------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|
|          |                        |       |      |    |    |      |      |       |  |  |      |
|          |                        | mm    | mm   | °  | °  | mm   | mm   | mm    | mm                                                                                  | mm                                                                                  | mm   |
| 4.040    | GT104.9037.015.17.40.R | 4.00  | 0.15 | 23 | 0  | 1.70 | 3.70 | 0.30  | 17.00                                                                               | 35.00                                                                               | 4.00 |
| 4.045    | GT104.9037.025.17.40.R | 4.00  | 0.25 | 23 | 0  | 1.70 | 3.70 | 0.30  | 17.00                                                                               | 35.00                                                                               | 4.00 |
| 4.036    | GT104.9037.005.22.40.R | 4.00  | 0.05 | 23 | 0  | 1.70 | 3.70 | 0.30  | 22.00                                                                               | 40.00                                                                               | 4.00 |
| 4.051    | GT104.9037.010.22.40.R | 4.00  | 0.10 | 23 | 0  | 1.70 | 3.70 | 0.30  | 22.00                                                                               | 40.00                                                                               | 4.00 |
| 4.041    | GT104.9037.015.22.40.R | 4.00  | 0.15 | 23 | 0  | 1.70 | 3.70 | 0.30  | 22.00                                                                               | 40.00                                                                               | 4.00 |
| 4.046    | GT104.9037.025.22.40.R | 4.00  | 0.25 | 23 | 0  | 1.70 | 3.70 | 0.30  | 22.00                                                                               | 40.00                                                                               | 4.00 |
| 4.037    | GT104.9037.005.27.40.R | 4.00  | 0.05 | 23 | 0  | 1.70 | 3.70 | 0.30  | 27.00                                                                               | 45.00                                                                               | 4.00 |
| 4.042    | GT104.9037.015.27.40.R | 4.00  | 0.15 | 23 | 0  | 1.70 | 3.70 | 0.30  | 27.00                                                                               | 45.00                                                                               | 4.00 |
| 4.047    | GT104.9037.025.27.40.R | 4.00  | 0.25 | 23 | 0  | 1.70 | 3.70 | 0.30  | 27.00                                                                               | 45.00                                                                               | 4.00 |
| 4.038    | GT104.9037.005.32.40.R | 4.00  | 0.05 | 23 | 0  | 1.70 | 3.70 | 0.30  | 32.00                                                                               | 50.00                                                                               | 4.00 |
| 4.043    | GT104.9037.015.32.40.R | 4.00  | 0.15 | 23 | 0  | 1.70 | 3.70 | 0.30  | 32.00                                                                               | 50.00                                                                               | 4.00 |
| 4.048    | GT104.9037.025.32.40.R | 4.00  | 0.25 | 23 | 0  | 1.70 | 3.70 | 0.30  | 32.00                                                                               | 50.00                                                                               | 4.00 |



# SYSTEM 104

## MICRO-PRECISION TOOLS



Round shank holder

from page 18



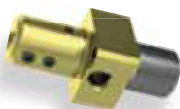
Square shank holder

from page 25



Modular holder

from page 27



Star holder

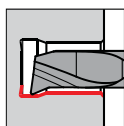
page 30



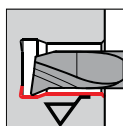
Round shank holder

Broaching  
page 63

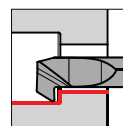
Tool holder



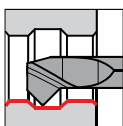
Boring out  
and profiling, Type GT  
from page 32



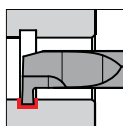
Boring out,  
with Wiper, Type GJ  
page 45



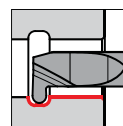
Back boring  
and profiling, Type GT  
from page 46



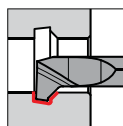
Boring out  
and chamfering, Type GT  
page 48



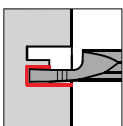
Internal grooving,  
straight slots, Type GE  
page 49



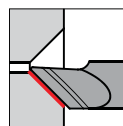
Internal grooving,  
full radius slots, Type GE  
page 51



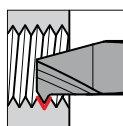
Internal pre-grooving  
and chamfering, Type GV  
page 52



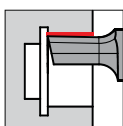
Axial grooving bores,  
Type GA  
from page 53



Axial chamfering  
bores, Type GA  
page 57



Internal threading,  
Type GG  
from page 58



Broaching,  
Type GN  
from page 64

Cutting inserts from hole-Ø 0.7 mm

| Machining                                                                                                                                                                                                                                             | Feed range<br>f (IPR) | Point radius<br>R (mm)                                                                                               | Cutting depth<br>a <sub>p</sub> (in)                                                                           | General formulas                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
|    | 0.0008 - 0.0031       | R 0.05 (0.002in)<br>R 0.10 (0.004in)<br>R 0.15 (0.006in)<br>R 0.20 (0.008in)<br>R 0.25 (0.010in)<br>R 0.30 (0.012in) | 0.0008 - 0.0028<br>0.0020 - 0.0059<br>0.0031 - 0.0079<br>0.0047 - 0.0098<br>0.0051 - 0.0110<br>0.0067 - 0.0138 | Cutting speed (SFM)<br>RPM x Dia. / 3.82 = SFM          |
|    | 0.0004 - 0.0012       |                                                                                                                      |                                                                                                                | Revolutions per minute (RPM)<br>SFM x 3.82 / Dia. = RPM |
|    | 0.0004 - 0.0020       |                                                                                                                      | Rule of thumb:<br>a <sub>p</sub> ~ r                                                                           | Feed rate (IPM)<br>IPR x RPM = IPM                      |

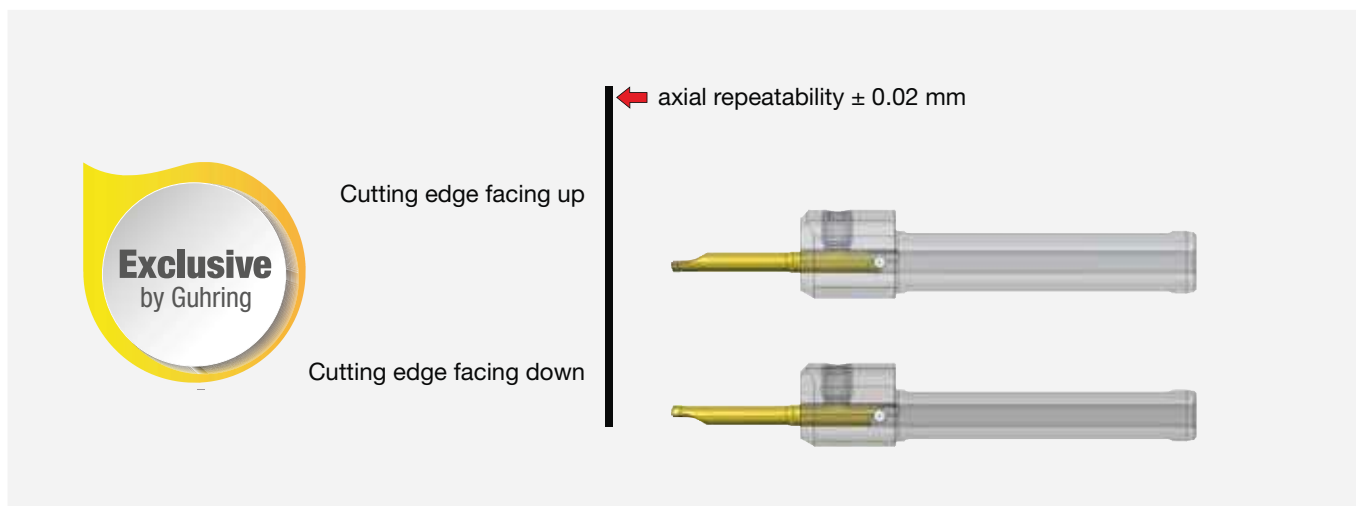
Guide values for feed and cutting depths

| ISO      | Material                                   |                                    | Material examples/<br>material number                  | Tensile<br>strength<br>(N/mm <sup>2</sup> ) | Brinell<br>hardness<br>(HB) | Cutting speed SFM<br>(surface feet / min) |             |               |
|----------|--------------------------------------------|------------------------------------|--------------------------------------------------------|---------------------------------------------|-----------------------------|-------------------------------------------|-------------|---------------|
|          |                                            |                                    |                                                        |                                             |                             | TiN<br>Ⓢ                                  | nano-A<br>Ⓢ | uncoated<br>○ |
| <b>P</b> | Carbon steel                               | C ≤ 0.15 %                         | 11SMn30+C / 1.0715<br>C15 / 1.0401                     | 500<br>600                                  | 150<br>180                  | 65-525                                    | 165-655     | 50-295        |
|          |                                            | C ≥ 0.15-0.45 %                    | S235JR (ST37-2) / 1.0037<br>Ck22 / 1.1151              | 400<br>600                                  | 120<br>180                  |                                           |             |               |
|          |                                            | C > 0.45 %                         | S355JO (St52-3) / 1.0553<br>C60 / 1.0601               | 600<br>900                                  | 180<br>270                  | 65-295                                    | 165-525     | -             |
|          | Low-alloyed steel<br>(alloy content ≤ 5%)  | annealed                           | 16MnCr5 / 1.7131<br>18CrNi8 / 1.5920                   | 650<br>650                                  | 200<br>200                  | 65-525                                    | 165-590     | 50-230        |
|          |                                            | heat-treatable                     | 25CrMoV4 / 1.7218<br>42CrMo4V / 1.7225                 | 900<br>1100                                 | 270<br>320                  | -                                         | 100-395     | -             |
|          | High-alloyed steel<br>(alloy content > 5%) | annealed                           | X37CrMoV5-1 / 1.2343<br>X153CrMoV12 / 1.2379           | 750<br>850                                  | 220<br>250                  | 80-295                                    | 130-460     | -             |
|          |                                            | heat-treatable                     | 55NiCrMoV7 / 1.2714                                    | 1200                                        | 350                         | -                                         | 100-330     | -             |
|          | Cast steel                                 | un-alloyed, low-alloyed            | GS52 / 1.0552                                          | 600                                         | 180                         | 65-395                                    | 100-590     | -             |
|          |                                            | high-alloyed                       | GX40CrNiSi22-10 / 1.4826                               | 750                                         | 220                         | -                                         | 100-295     | -             |
| <b>M</b> | Stainless steel                            | martensitic, ferritic, tempered    | X14CrMoS17 / 1.4104<br>X4CrNiMo16-5-1 / 1.4418         | 800<br>1000                                 | 240<br>300                  | 65-230                                    | 100-295     | -             |
|          |                                            |                                    | X5CrNi18-10 / 1.4301<br>X2CrNiMo17-12-2 / 1.4404       | 650                                         | 200                         | 65-300                                    | 100-360     | -             |
|          |                                            | austenitic, ferritic (Duplex)      | X2CrNiMoCuN25-6-3 / 1.4507<br>X2CrNiMoN25-7-4 / 1.4410 | 850                                         | 250                         | -                                         | 100-330     | -             |
|          |                                            |                                    |                                                        |                                             |                             |                                           |             |               |
| <b>K</b> | Grey cast iron                             | low tensile strength               | EN-GJL-200 (GG20) / 0.6020                             |                                             | 180                         | 100-490                                   | 100-590     | 100-295       |
|          |                                            | high tensile strength              | EN-GJL-400 (GG40) / 0.6040                             |                                             | 260                         | 100-395                                   | 100-490     | 100-230       |
|          | Spheroidal graphite<br>iron                | low tensile strength               | EN-GJS-400-15 (GGG40) / 0.7040                         |                                             | 160                         | 100-425                                   | 100-525     | -             |
|          |                                            | high tensile strength              | EN-GJS-700-2 (GGG70) / 0.7070                          |                                             | 260                         | 100-360                                   | 100-460     | -             |
|          | Malleable cast iron                        | low tensile strength               | EN-GJMW-350-4 (GTW35) / 0.8035                         |                                             | 125                         | 100-425                                   | 100-525     | -             |
|          |                                            | high tensile strength              | EN-GJMB-550-4 (GTS55) / 0.8155                         |                                             | 250                         | 100-360                                   | 100-460     | -             |
| <b>N</b> | Al-alloys                                  | non-heat-treatable <12% Si         | EN-AW-2017 (AlCuMg1) / 3.1325                          |                                             | 60                          | 100-1805                                  | 100-1805    | 100-820       |
|          |                                            | heat-treatable <12% Si             | EN-AW-6082 (AlMgSi1) / 3.2315                          |                                             | 100                         | 100-1310                                  | 100-1310    | 100-590       |
|          | Al-cast-alloys                             | non-heat-treatable <12% Si         | AlSi9Cu3 / 3.2163                                      |                                             | 80                          | 100-1805                                  | 100-1805    | 100-820       |
|          |                                            | heat-treatable <12% Si             | AlSi10Mg / 3.2383                                      |                                             | 100                         | 100-1310                                  | 100-1310    | 100-590       |
|          | Copper alloys                              | brass, lead alloy                  | CuZn39Pb2 (MS58) / 2.0380                              | 400                                         | 120                         | 100-1310                                  | 100-1310    | 100-590       |
|          |                                            | bronze                             | CuSn6 / 2.1020                                         | 500                                         | 150                         | 100-240                                   | 100-240     | 100-590       |
| <b>S</b> | Heat resistant alloys,<br>super alloys     | NiFe-base, annealed                | NiCr15Fe (Alloy600) / 2.4816                           | 700                                         |                             | -                                         | 50-230      |               |
|          |                                            | NiFe-base, hardened                |                                                        | 950                                         |                             | -                                         | 50-165      |               |
|          |                                            | NiCo-base, annealed                | NiMo16Cr15W (Alloy C-276) / 2.4819                     | 800                                         |                             | -                                         | 50-165      |               |
|          |                                            | NiCo-base, cast                    |                                                        | 1100                                        |                             | -                                         | 30-130      | -             |
|          |                                            | NiCo-base, hardened                | NiCr19NbMo (Alloy718) / 2.4668                         | 1200                                        |                             | -                                         | 30-115      |               |
|          | Titanium-alloys                            | annealed                           | Ti6Al4V / 3.7164                                       | 900                                         |                             | -                                         | 15-165      |               |
|          |                                            | hardened                           |                                                        | 1200                                        |                             | -                                         | 30-115      |               |
| <b>H</b> | Hardened steels                            | Heat-treatable steel               |                                                        |                                             | > 52 HRC                    | -                                         | 65-130      | -             |
|          |                                            | Heat-treatable/case hardened steel |                                                        |                                             | > 59 HRC                    | -                                         | 30-100      | -             |
|          |                                            | Heat-treatable/case hardened steel |                                                        |                                             | > 62 HRC                    | -                                         | (CBN)       | -             |

The specified values must be adapted to the machine and machining conditions.

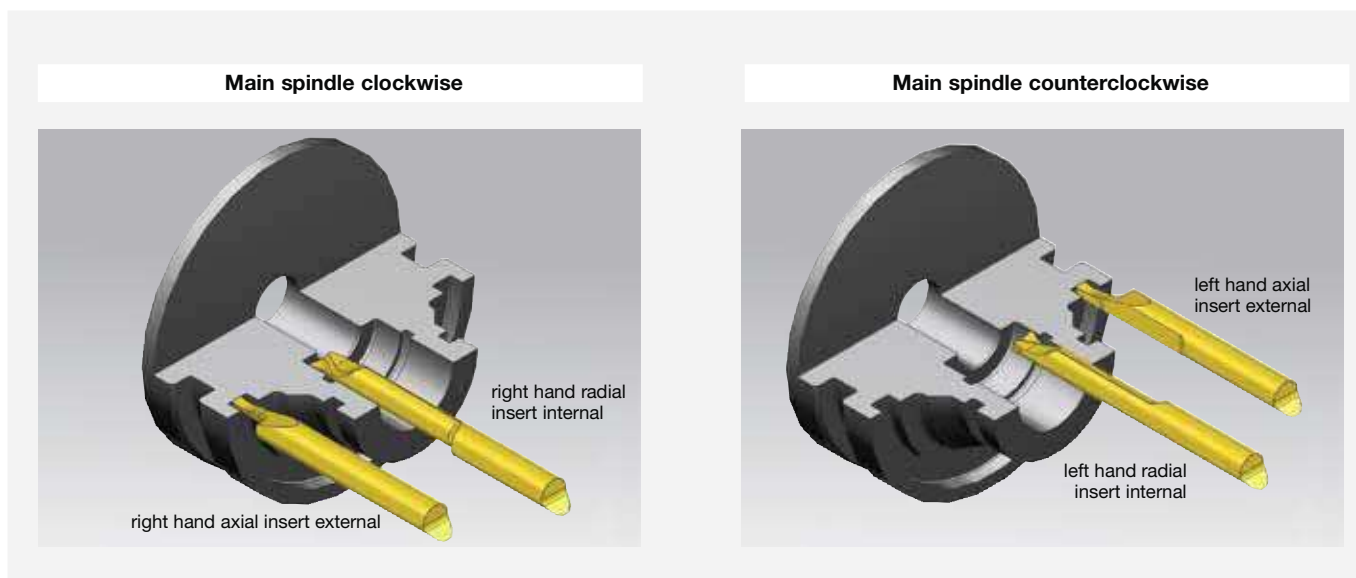


## System 104/106/108/110 Positioning and clamping



Gühring's system 104/106/108/110 is unique in terms of insert positioning and clamping: The position between cutting edge facing up and cutting edge facing down can be changed by keeping the same length position without loosening the holder.

## Definition of the cutting edge position





# Troubleshooting

| Subject                  |                                     | Solution |                |               |                        |               |       |                 |               |                    |               |                               |         |
|--------------------------|-------------------------------------|----------|----------------|---------------|------------------------|---------------|-------|-----------------|---------------|--------------------|---------------|-------------------------------|---------|
|                          |                                     | Feed     | Feed at centre | Cutting speed | RH/LH edge orientation | Corner radius | Wiper | Width of groove | Tool clamping | Workpiece clamping | Tool overhang | Centre height of cutting edge | Coolant |
| Related to wear          | Edge chipping                       | ↓        | ↓              |               |                        | ↑             |       |                 | 🔍             | 🔍                  | 🔍             | 🔍                             |         |
|                          | Build up edge                       |          |                | ↑             |                        |               |       |                 |               |                    |               |                               | 👍       |
|                          | Flank wear                          | 🔍        | ↓              | ↓             |                        | ↑             |       |                 |               |                    |               | 🔍                             | 👍       |
|                          | Plastic deformation                 | ↓        | ↑              | ↓             |                        | ↑             |       |                 |               |                    |               |                               | 👍       |
| Related to the component | Vibrations                          | ↑        |                | ↓             |                        | ↓             |       | ↓               | 🔍             | 🔍                  | ↓             | 🔍                             |         |
|                          | Burrs                               |          | ↓              |               | 👍                      | ↓             |       |                 |               |                    |               | 🔍                             | 👍       |
|                          | Surface                             | ↓        | ↓              | ↑             |                        | ↑             | 👍     | ↑               | 🔍             | 🔍                  | ↓             | 🔍                             | 👍       |
|                          | Long chips (no chip breakage)       | ↑        |                | ↑             |                        |               |       |                 |               |                    |               |                               | 👍       |
|                          | (too) short chips, compressed chips | ↓        |                |               |                        |               |       |                 |               |                    |               |                               |         |

- ↓ decrease values (large impact)
- ↑ increase values (large impact)
- ↓ decrease values (low impact)
- ↑ increase values (low impact)
- 🔍 check
- 👍 apply