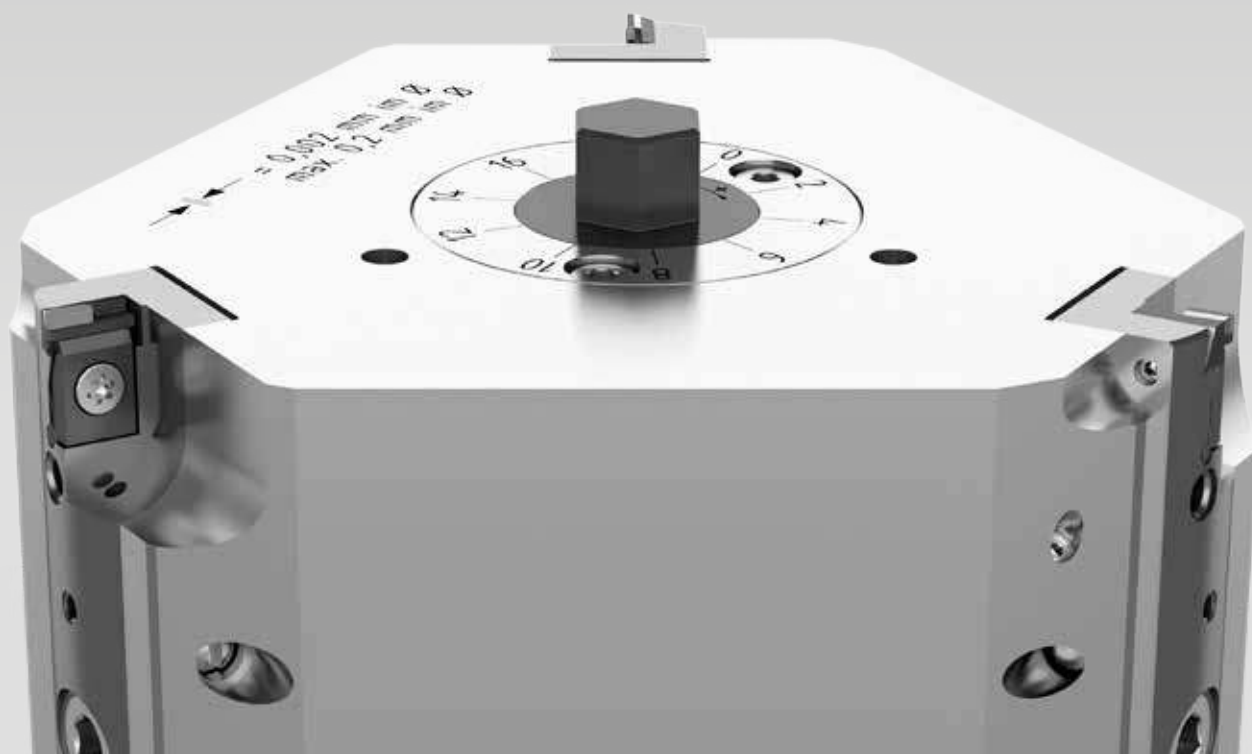




Special tools for customer applications



Your competent partner in the area of metal chip removal

At our two company locations in Nuremberg und Zorbau (Germany) we design and manufacture precision tooling for highest quality demands on state-of-the-art CNC-turning / milling / grinding and EDM machines.

All activities in our enterprise are based on our corporate quality and environmental policy and aim to contribute to a permanent increase in our customers productivity while observing all applicable legal and governmental regulations.

Additionally we strive to achieve a leading position in our sector with our products and services and to continuously improve this position by means of a high level of quality as well as an adequate environmental policy.

All processes in our enterprise are mainly based on our customers demands and are always supervised by the management team and adapted to the changing general conditions by continuous improvement processes (CIP). In order to achieve our targets we maintain a certificated quality and environmental system according to DIN EN ISO 9001 : 2008 and DIN EN ISO 14001 : 2004.

The perfect composition of highly qualified staff and most modern production methods constitutes the basis for fully developed products on a high quality standard.

The easy handling and the adjustability of our milling cutters are the basis for savings in the area of tool pre-setting as well as for achieving tight tolerances.

Our standard program constitutes the basis for a huge number of innovative special tooling solutions which get used and appreciated at our customers globally. In many cases it is the customers specific solution which opens up the full potential of our tooling systems and thus contributes to savings and increases in productivity.

We would be happy to advise you in selecting the right tooling solution for your specific application and to stay on your side as your competent partner from the start of process planning until the effective use of our tools.

Challenge us with your requirements!
precise | flexible| innovative
We always appreciate your confidence in us.

Headquarters Nuremberg



Location Zorbau



A reliable partner

HOLLFELDER-GÜHRING CUTTING TOOLS

has achieved a leading position as a reliable partner in the metal cutting industry. Innovative tooling solutions in standard tools as well as in tools made to customers specifications constitute the basis for cost optimised production.

Competence

Individual solutions for complex machining problems, tailor-made to the individual requirements are part of the self-image of our technicians and engineers. With a high qualification and an innovative thinking combined with a lot of experience, we design and manufacture in close contact with our customers tooling systems of highest precision for the µm-accurate machining of complex contours.

Profitability

HOLLFELDER-GÜHRING CUTTING TOOLS offers profitable solutions. The easy adjustment of our tools reduces non-productive times. We achieve a reduction in machining times due to our intelligent combined tools, the high number of effective teeth and the selection of the optimal cutting grade. The advantages are the utmost flexibility, productivity and certainty in process.

Our service

Depending on the technical requirements we analyse the machining processes and suggest tooling solutions which satisfy the high demands of our customers. With the proven tooling solutions of HOLLFELDER-GÜHRING CUTTING TOOLS our customers use highly precise and reliable systems which have achieved an excellent reputation worldwide.

Our service spectrum includes among others:

- In-house machining tests
- Application training also on-site at the customer's premises
- Complete CAD-layouts according to customer specifications
- Technical support

Our targets...

...are to steadily increase the efficiency of our precision tools as well as their operational possibilities. Thus our customers are leading obtain a competitive advantage due to the more efficient production with a high certainty in process.



For further information
visit our website
www.hollfelder-guehring.de

6 **Adjustment systems**

Adjustment systems for our tools

Customer specific tools for machining the workpieces mentioned below:

10 **Cylinder head**

Pre- and finish-machining, fire face, bearing passage, bearing width, axial grooving, spring seat, spark plug bore, relief bore, induction port

24 **Cylinder crankcase**

Pre- and finish-machining, bearing width, sealing surface, ventilation bore, connecting bore, balance shaft bore, bearing cap, crankshaft bore, cylinder bore, cylinder liner, clearance cut for the honing tool, crankshaft bearing passage

46 **Gearbox components**

Valve body, gearbox case, pre-machining, shoulder machining, connecting shank, bearing seats, valve plate

56 **Electric motor**

Stator bore

60 **Pumps**

Oil pump, injection pump, stainless steel pump

74 **Further components for automotive industry**

Starter housing, camshaft, crankshaft, frame, gearshift fork, axle carrier, steering housing, drive flange, balance shaft housing, brake caliper, control housing, gearbox case, balance shafts, connecting rod

92 **Components of general engineering**

Power tools, hydraulic industry, wind power industry, end machining, compressor construction industry

108 **Turbocharger housing**

Pre- and finish-machining, V-band

118 **Aviation technology**

Fuel manifold, aircraft components

122 **Turning**

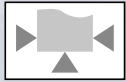
Camshaft regulator, case, profile shaft, bearing bracket, shaft

128 **Enquiry forms**

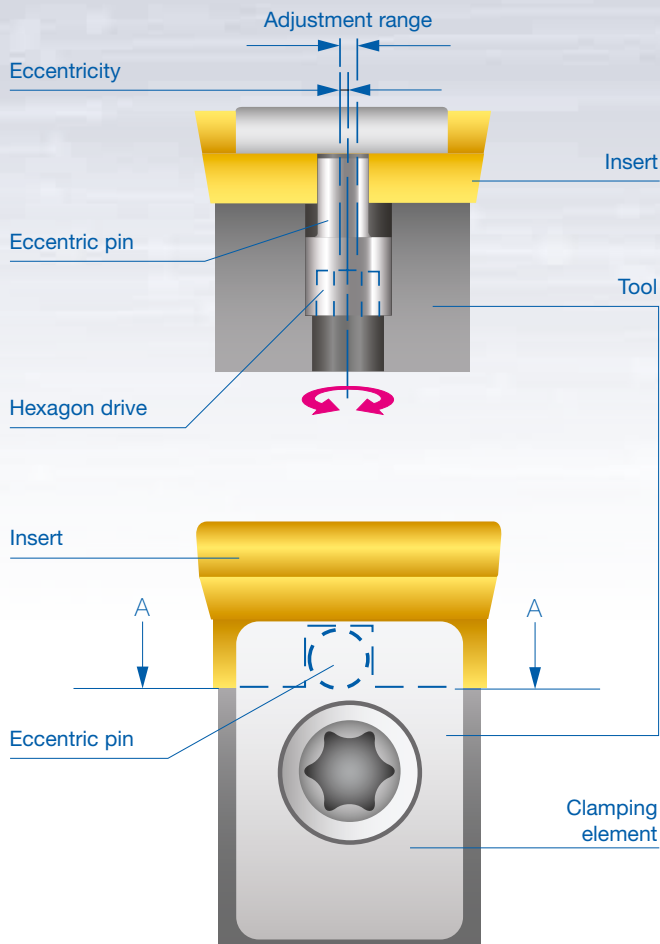
H Adjustment systems

Eccentric pin adjustment

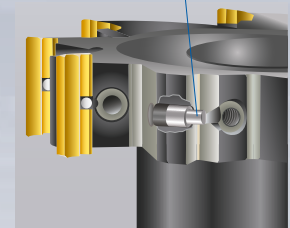
The adjustment systems in the tools constitute the basis for highly precise production results in the most different materials. They are the basis for innovative tooling designs which contribute enormously to the productivity of our customers. The application is simple and saves time.



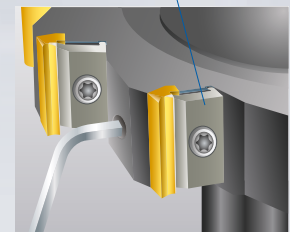
- Eccentric pin for μm -accurate adjustment
- Many design options thanks to open construction
- Design of the clamping system doesn't require any support on the side of the pocket seat
- Triangular machining is possible
- Insert can be adjusted in 2 directions



Eccentric pin



Clamping element



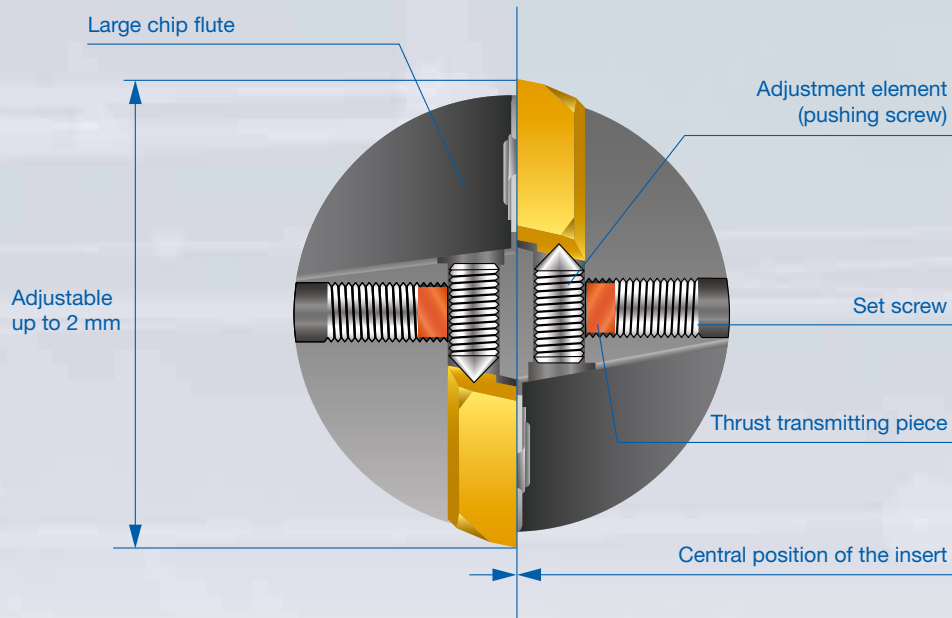
Adjustment key (hex key)
to operate the eccentric pin



Radial screw adjustment and adjustment with tapered screw



- Radial screw adjustment for μm -accurate diameter adjustment
- Large range of adjustment $\rightarrow$ up to 2 mm in diameter
- Easy handling thanks to robust design



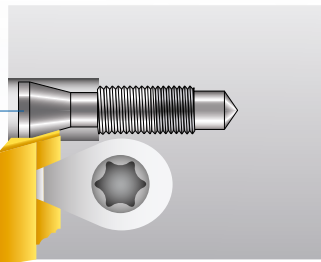
- μm -accurate diameter adjustment with tapered screw
- Adjustment possible from the front and from the top
- Can be flexibly combined and used



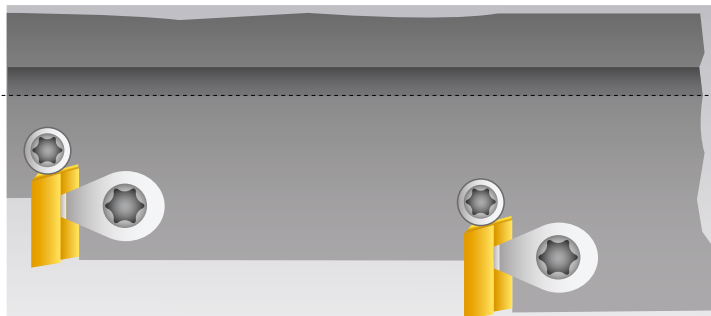
Adjustment element
(tapered screw / torx
or hexagon socket)

∇ 0,02 Shank

$\varnothing$ μm -accurate adjustable



Adjustment from the front



Adjustment from the top



H Adjustment systems

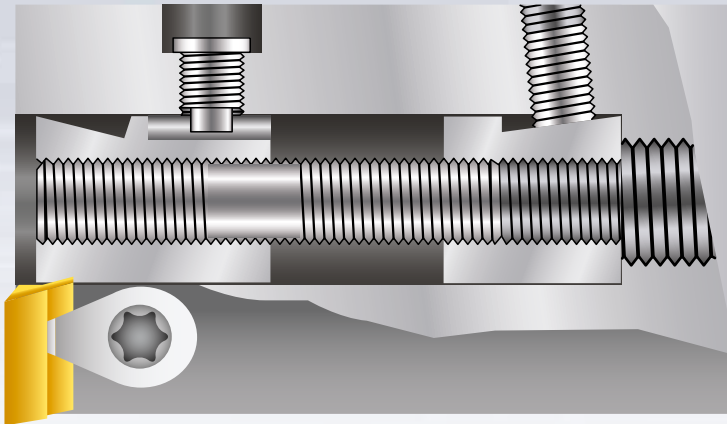
Micro-adjustment

The micro-adjustment can be considered as the logical next step in the development of the tapered screw adjustment from the front. A built-in adjustment cartridge in the holder enables the user to achieve an extremely precise adjustment of the machining measures



1 revolution
 $\Delta 0.02 \text{ mm in } \varnothing$

- Adjustment element can be integrated even for small bore diameters
- Advantageous adjustment relation $\rightarrow 1 \text{ revolution } \Delta 0.2 \text{ mm in } \varnothing$
- μm -accurate adjustment directly in the machining center
- Low machine downtime



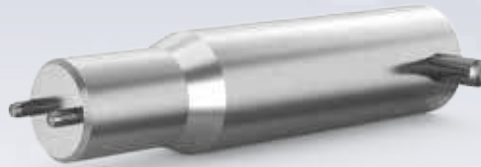
Smart Setting Motion Tools



Pre-setting
and re-adjusting of inserts
within seconds



- Individual fine adjustment of all finishing inserts.
One graduation line equals 0.002 mm in diameter
- Diameter adjustment in both directions, plus and minus
- No special equipment required for pre-setting (i.e. magnetic V-gauges)
- Cartridges available with eccentric adjustment, also available with standard ISO insert
- Option: retraction of the inserts via drawbar
→ no workpiece adjustment required
- Option: mechanical operation, using either compressed air or machine coolant
- Time saving of more than 90% per setting cycle



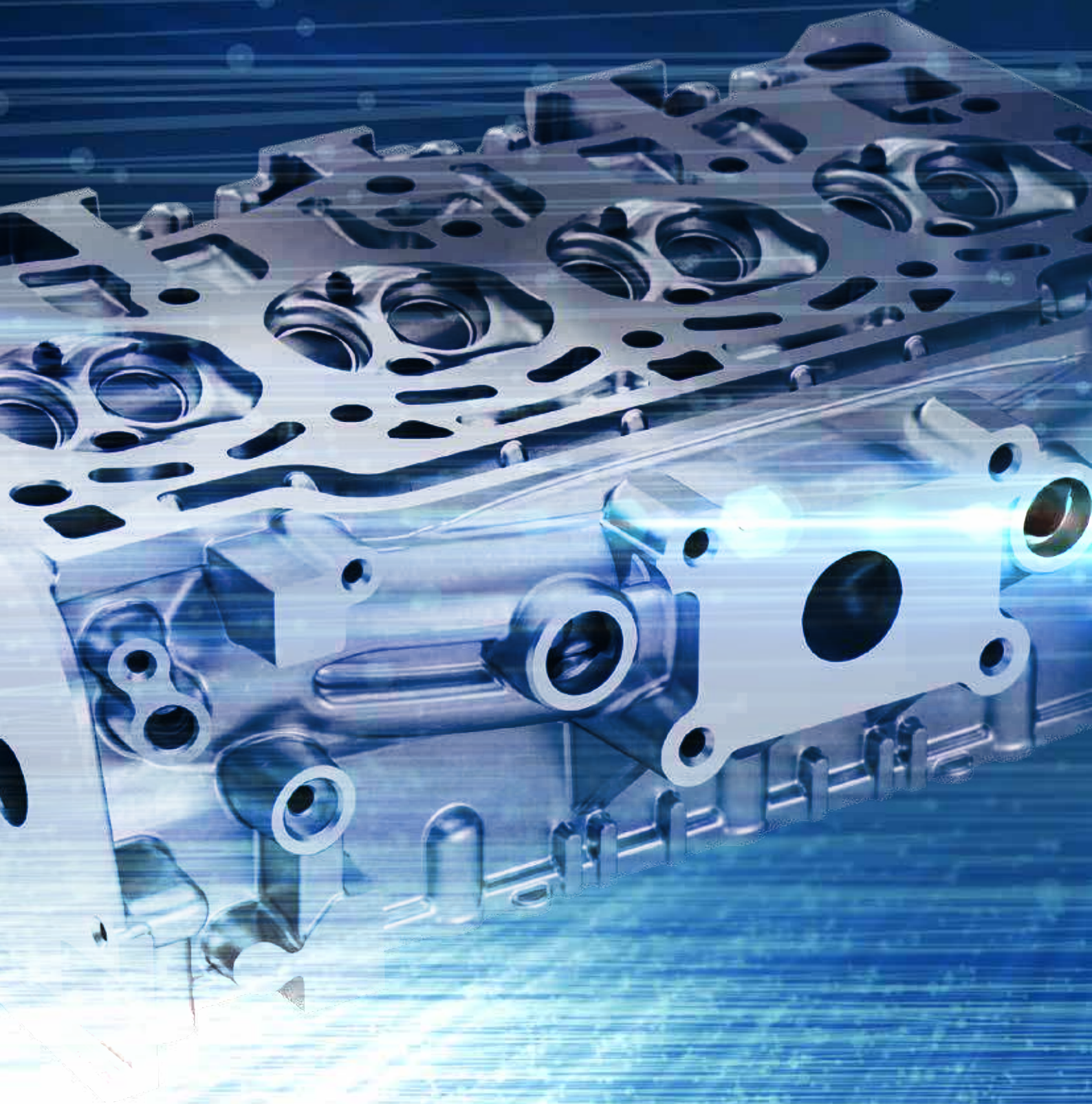
Central adjustment

- Simple pre-setting without special equipment
- Cartridges available with eccentric adjustment, also available with standard ISO insert
- Diameter adjustment in both directions, plus and minus via central adjustment screw
- Automatic readjustment if required. One rotation equals 0.03 mm on radius
- Retracting of the finishing cartridge by means of compressed air
- Expanding of the finishing cartridge inside the honing undercut



Different adjustment screws

Cylinder head



HPC rough milling cutter Ø 163 / L = 232 mm / HSK80-A / Teeth = 18



Integrated
coolant exit

Adjustable
PCD inserts



Requirements

Reduction of cycle times

Solution

HPC rough milling cutter Ø 163 / L = 232 mm / HSK80-A / Teeth = 18

Cutting data

Material	(DIN) ■ AISi10Mg(Cu) heat-treated
Cutting grade	PCD 30
Cutting speed	m/min 3,000
Feed rate per tooth	mm 0.14
Cutting depth	mm -6

Result

50% faster than competitors

Longer tool life

Lower power consumption



Customer benefits

Reduced tooling costs per component

Almost chip-free components, lower cleaning costs

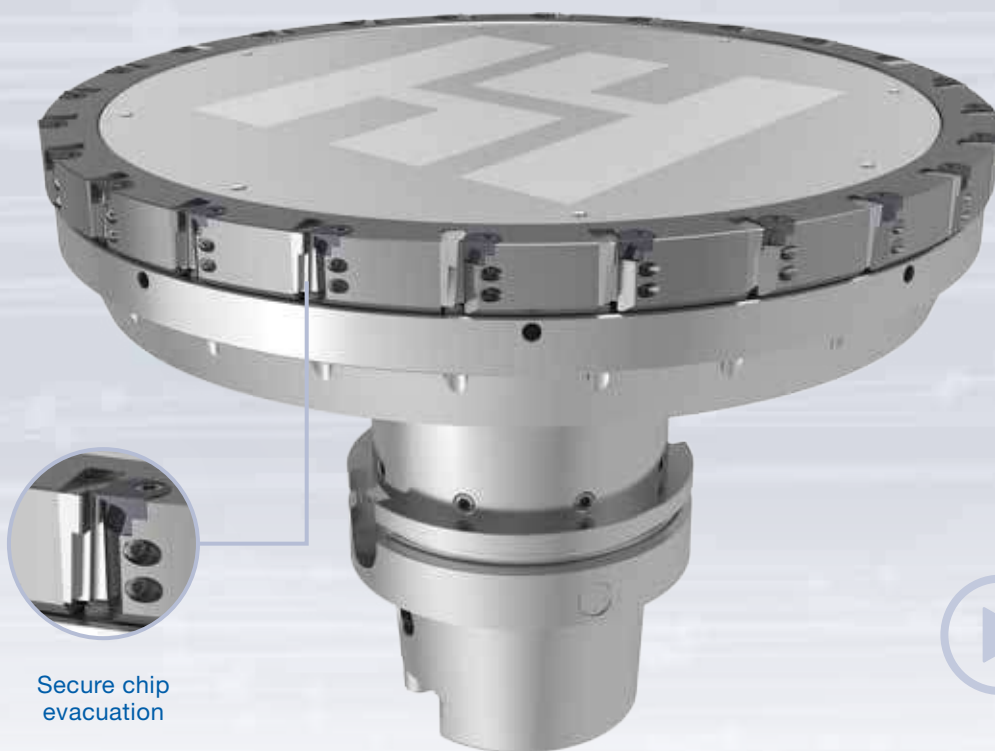
Increased productivity and energy efficiency

H Cylinder head

Finish-machining

HPC milling cutter with closed chip flutes / Ø250 reduced weight

Teeth = 21 + 3 mixture of inserts / Use of wiper inserts



Requirements

Chip-free components

Solution

HPC milling cutter with closed chip flutes

Cutting data

Material		(DIN) ■ AISi10Mg(Cu) heat-treated
Cutting grade		PCD 30
Cutting speed	m/min	3,500
Feed rate per tooth	mm	0.12
Cutting depth	mm	0.5

Result

50% faster than competitors

Longer tool life

Higher surface finish quality



Customer benefits

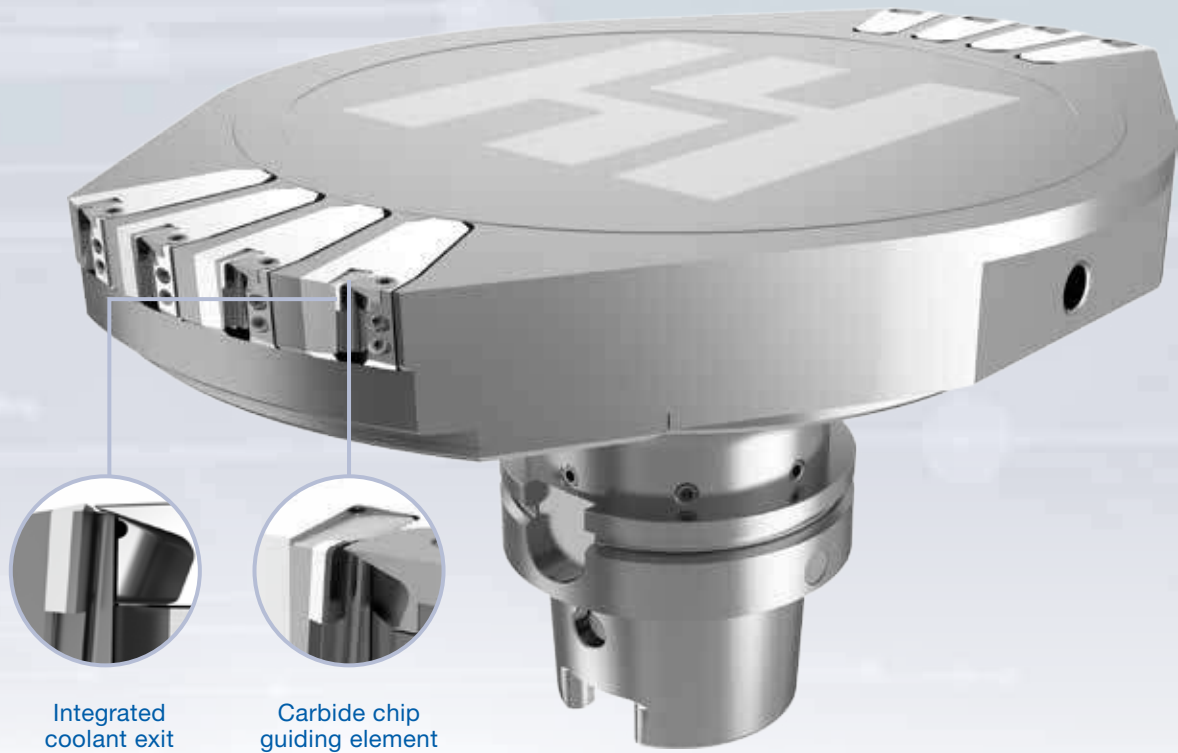
Reduced tooling costs per component

Almost chip-free components, lower cleaning costs

Increased productivity and energy efficiency

HPC bar cutter Ø315 with HSK-A100 / Teeth = 4 + 4 / Teeth_{eff.} = 8

Radially adjustable cartridge → Compensation unequal flute spacing



Requirements

Combustion chamber milling, required cutter diameter 315 mm

R_z 6.3 - R_{max} 7 - Wt3 - PMr → 65 %

Critical capability index Cmk 2.74

Maximum permissible tool diameter 250 mm

Solution

HPC bar cutter Ø315 with HSK-A100 / Teeth = 4 + 4 / Teeth_{eff.} = 8

Cutting data

Material	(DIN) ■ GD-AISI9Cu3
Cutting grade	PCD
Cutting speed	m/min 2,177
Feed rate per tooth	mm 0.13
Cutting depth	mm 0.28

Result

Uniform surface

R_z 1,4 - R_{max} 1,67 - Wt 1,28 - PMr 100 %



Customer benefits

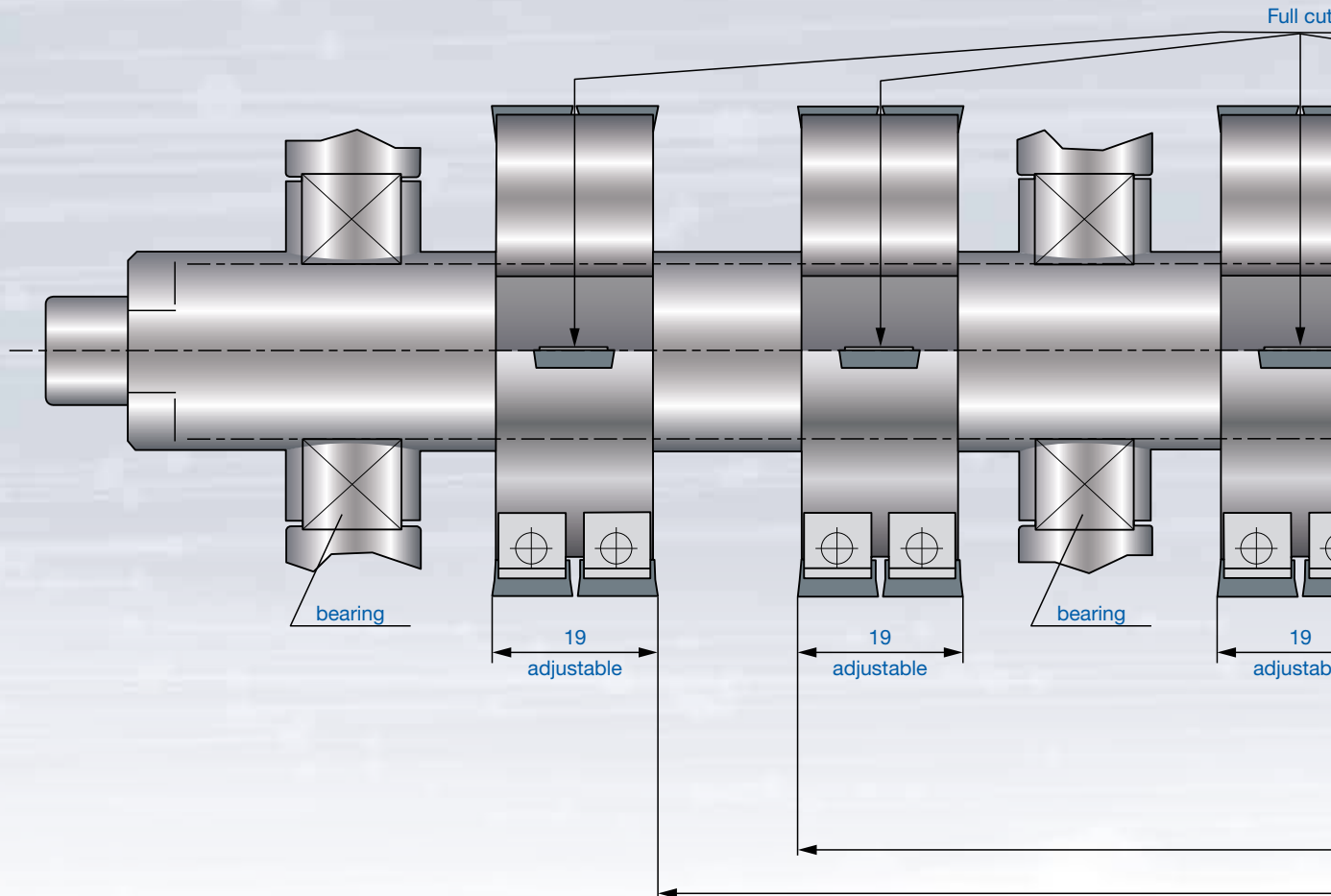
High-precision machining can be carried out on a standard machining center
(no special machine required)
Almost chip-free components, lower cleaning costs



Cylinder head

Bearing passage

Gang milling cutter / $Teeth_{eff.} = 2$



Requirements

Clearance milling, face run-out and milling cutters are adjustable towards each other

Solution

Gang milling cutter / $Teeth_{eff.} = 2$

Cutting data

Material	(DIN) ■ G-AlSi9Cu
Cutting grade	PCD
Cutting speed	m/min 220
Feed rate per tooth	mm 0.07
Cutting depth	mm 0.7 - 0.8

Result

PCD inserts regrindable and renewable

Narrow tolerances of bearing spacings achievable

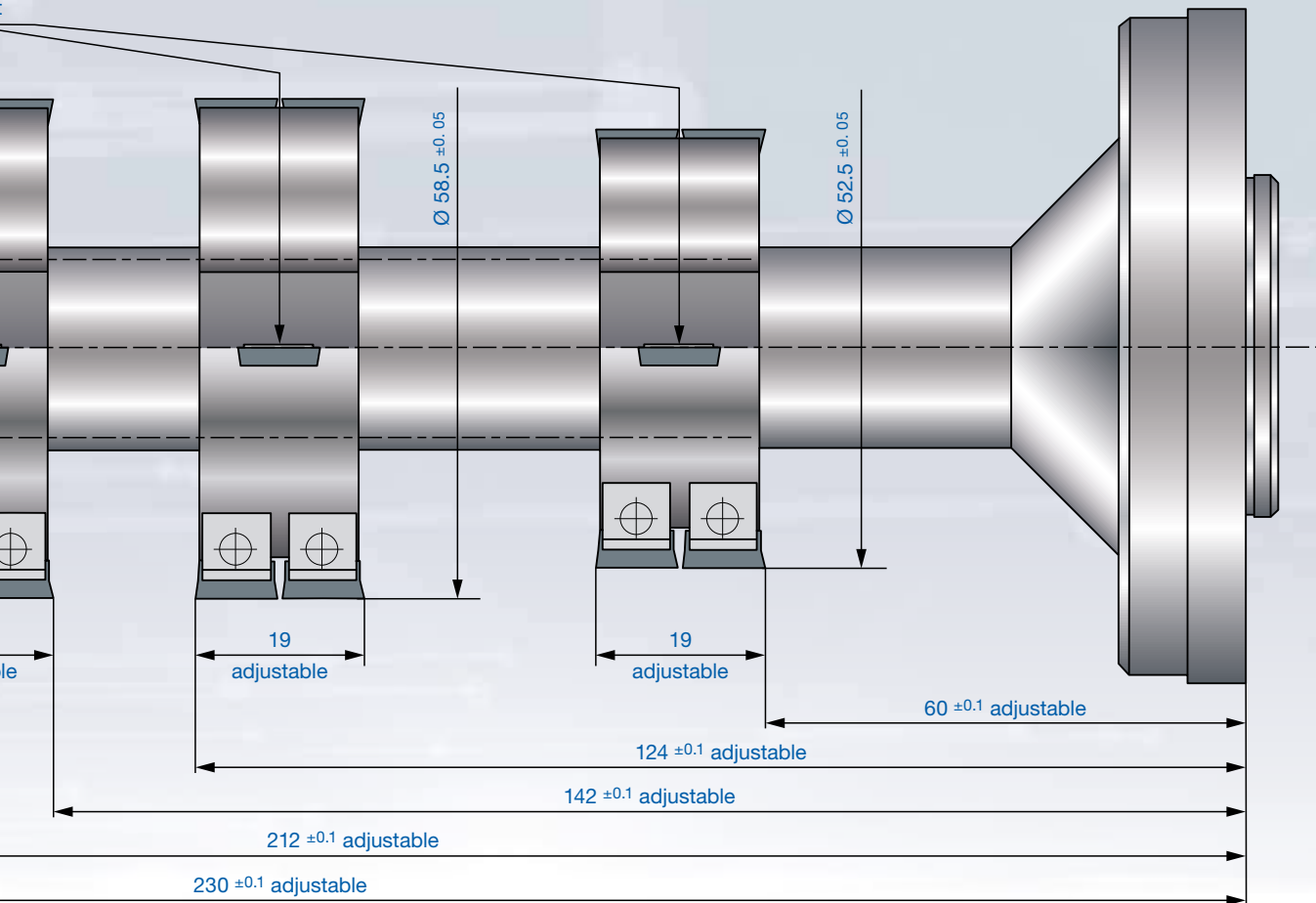
Minimal effort for insert change



Customer benefits

Reduced tooling costs per component

Low non-productive times

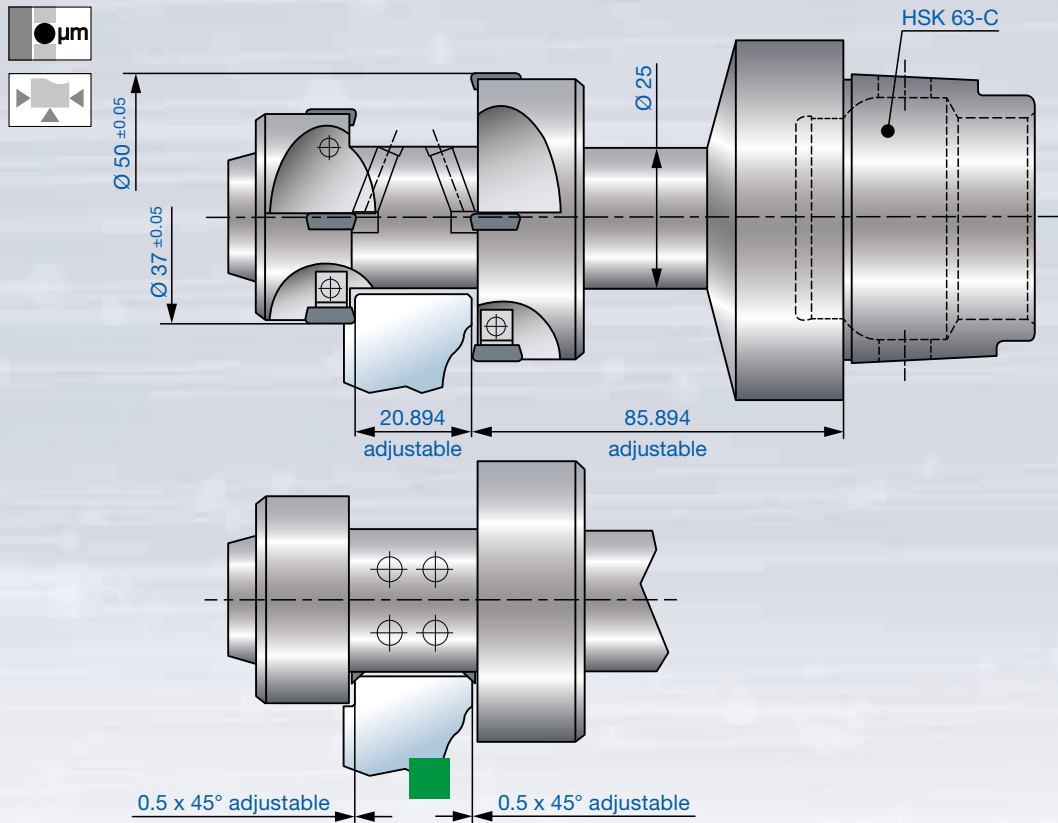




Cylinder head

Bearing width

Gang milling cutter / Teeth = 2 x 4



Requirements

Gang milling cutter for milling the bearing width with chamfering

Bearing width and chamfer sizes µm-accurate adjustable

Solution

Gang milling cutter / Teeth = 2 x 4

Cutting data

Material	(DIN)  GKAlSi7Mg	
Cutting grade	PCD	
Cutting speed	m/min	1,200
Feed rate per tooth	mm	0.1
Cutting depth	mm	2.5

Result

PCD inserts regrindable and renewable

Narrow tolerances of bearing spacings achievable

Minimal effort for insert change

Reduced machining time thanks to combination tool

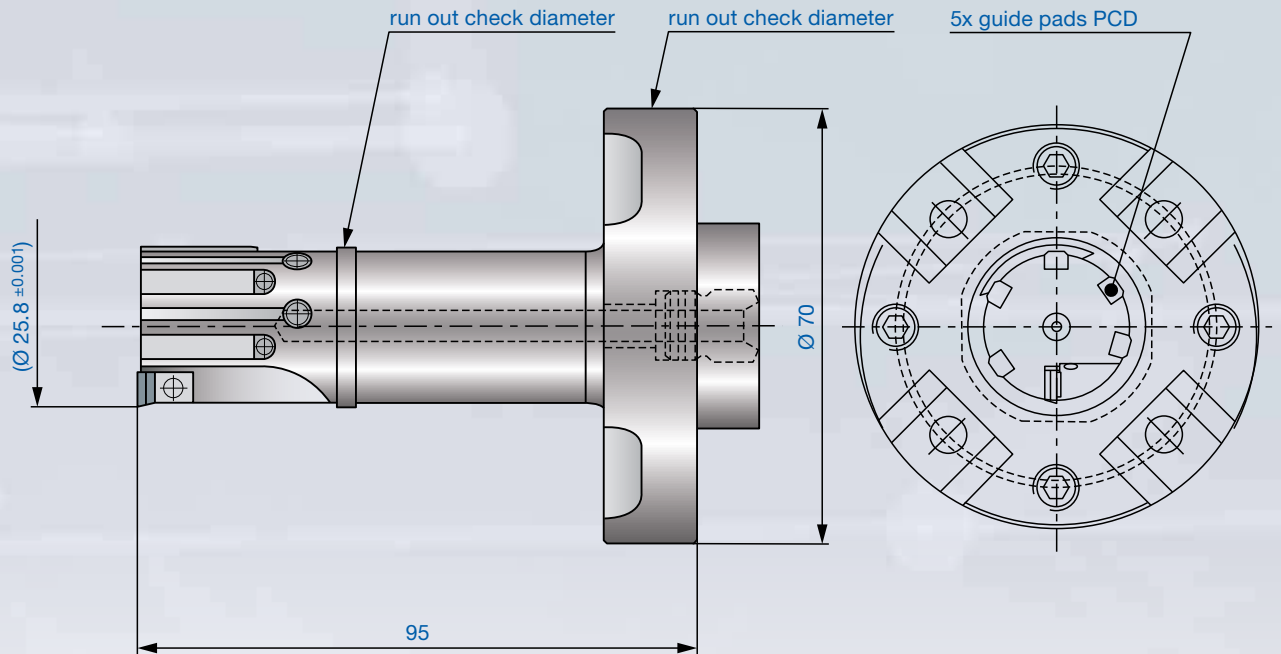


Customer benefits

Reduced tooling costs per component

Low non-productive times

Reaming tool / Teeth = 1



Requirements

Fine machining with PCD guide pads

Solution

Reaming tool / Teeth = 1

Cutting data

Material	(DIN)  AI	
Cutting grade	PCD	
Cutting speed	m/min	800
Feed rate per tooth	mm	0.1
Cutting depth	mm	0.3

Result

Narrow form and position tolerances are maintained

Surface finish quality R_a 0.5



Customer benefits

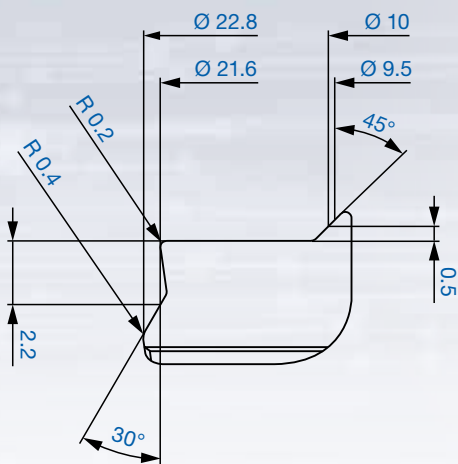
- Higher process reliability
- Easy adjustment of the inserts

H Cylinder head

Spring seat

Drilling and countersinking tool / Teeth = 2

Profile inserts adjustable and separately replaceable



Requirements

Complete machining of the hole including the spring support

Solution

Drilling and countersinking tool / Teeth = 2

Profile inserts adjustable and separately replaceable

Cutting data

Material	(DIN) ■ AlSi10Mg(Cu)
Cutting grade	PCD 10
Cutting speed	m/min 590
Feed rate per tooth	mm 0.075

Result

Tool life 85,000 drilled holes

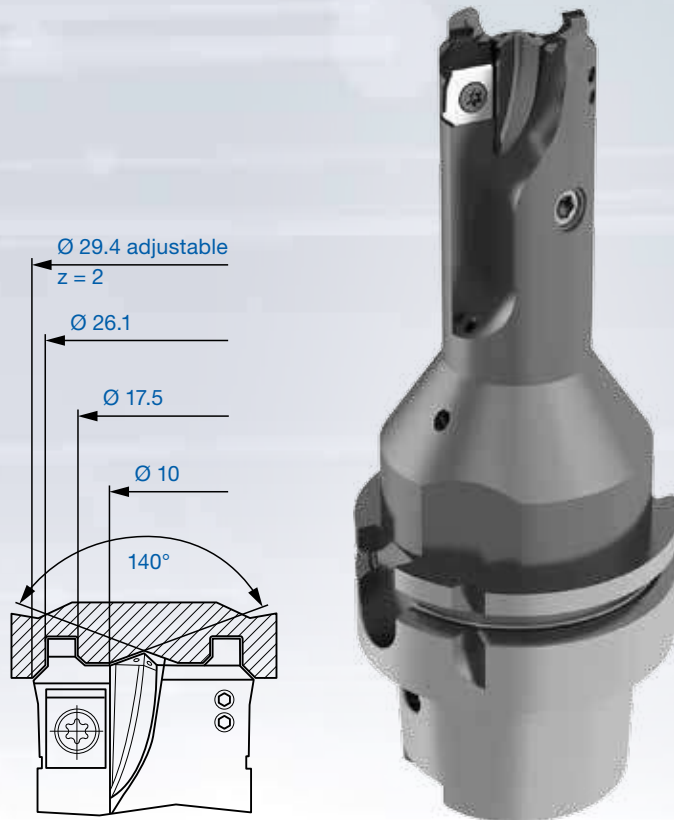
SC-drill regrindable several times



Customer benefits

Lower tool costs per part compared to brazed tools

Form countersinking tool with PCD inserts and integrated SC-drill / Teeth=2



Requirements

Machining of the complete workpiece contour with one tool

Solution

Form countersinking tool with PCD inserts and integrated SC-drill / Teeth=2

Cutting data

Material	(DIN) ■ AISi9Cu
Cutting grade	PCD
Cutting speed	m/min 850
Feed rate per tooth	mm 0.15
Cutting depth	mm 4.3

Result

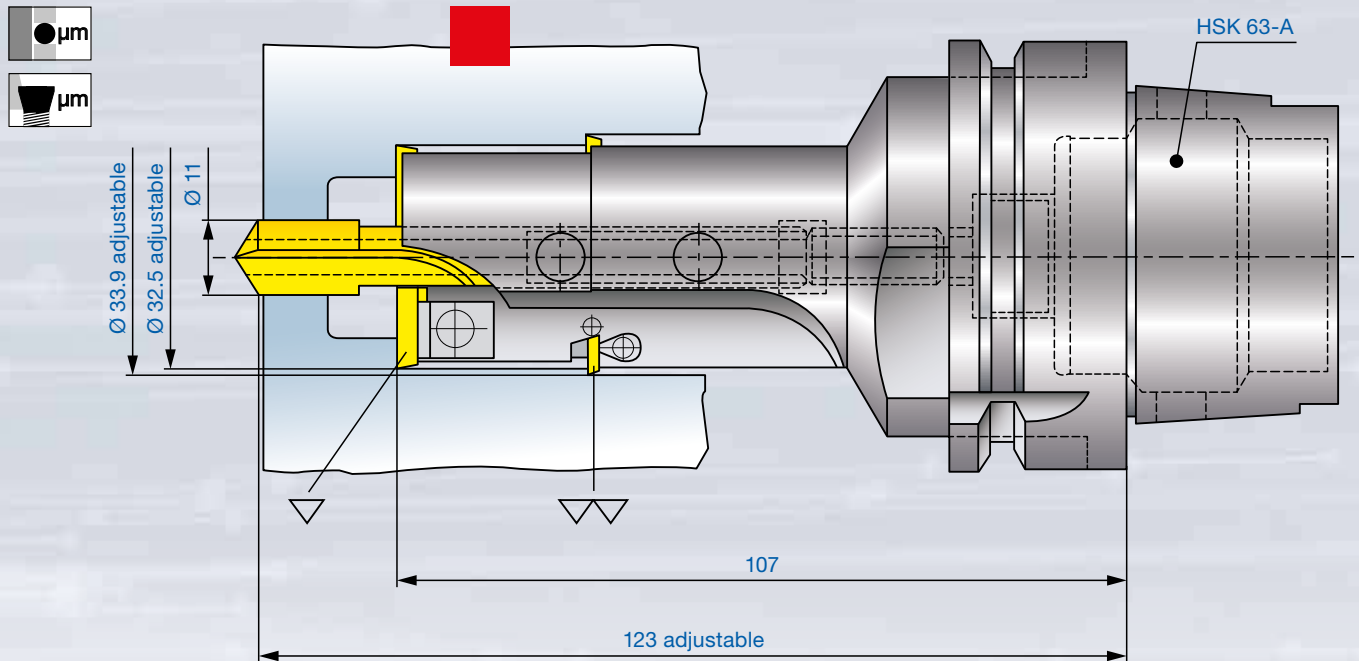
High tool life (>70,000 drilled holes) with simultaneous compliance of tolerances and surface requirements



Customer benefits

- Short processing time
- Lower costs per workpiece

Multi-step fine boring tool / Teeth = 2 per Ø



Requirements

Drilling and fine boring of the spring seat

Drill length adjustable, fine boring diameters adjustable

Solution

Multi-step fine boring tool / Teeth = 2 per Ø

Cutting data

Material	(DIN) ■ GG25
Cutting grade	carbide coated
Cutting speed	m/min (Ø 11) 88 / (Ø 33.9) 258
Feed rate per tooth	mm 0.07
Cutting depth	mm -5

Result

SC-drill regrindable several times

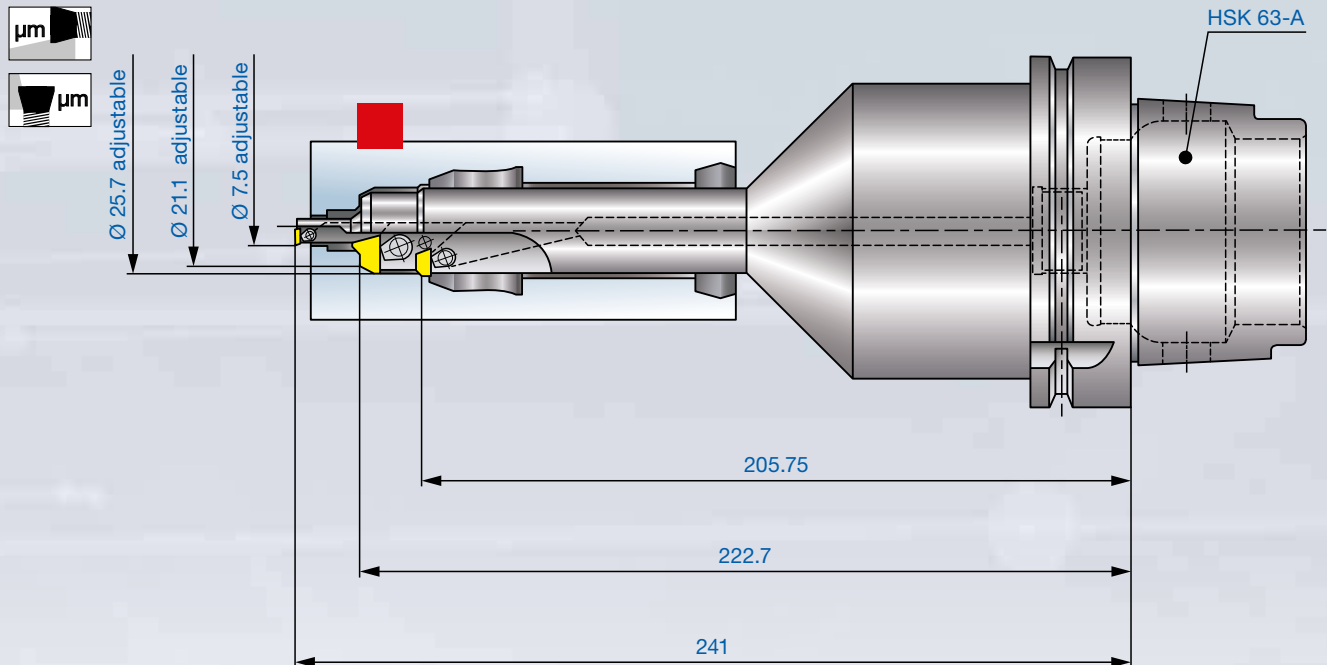
Inserts adjustable and separately replaceable



Customer benefits

Reduced tooling costs per component compared to solid carbide tools

Multi-step fine boring tool / $Teeth_{eff.} = 1$



Requirements

Pre-machining, form inserts for special profile

All inserts adjustable

Solution

Multi-step fine boring tool / $Teeth_{eff.} = 1$

Cutting data

Material	(DIN) ■ GG-Cr
Cutting grade	carbide coated
Cutting speed	m/min 220
Feed rate per tooth	mm 0.07
Cutting depth	mm 0.2-0.8

Result

Inserts adjustable and separately replaceable



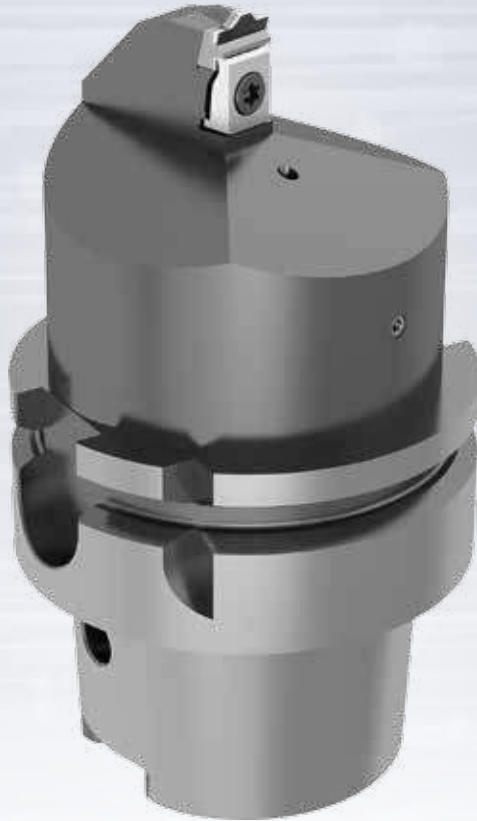
Customer benefits

Reduced tooling costs per component compared to solid carbide tools

H Cylinder head

Broaching of relief groove

Broaching tool / Teeth = 1



Requirements

Reduction of tool costs and machining time
Elimination of expensive special milling cutters

Solution

Broaching tool / Teeth = 1

Cutting data

Material	(DIN) ■ AISi10Mg(Cu)	
Cutting grade	PCD	
Cutting speed	m/min	25
Cutting depth	mm	0.5 per stroke

Result

Long tool life thanks to constant cut
Low tooling costs
Significant reduction in machining time

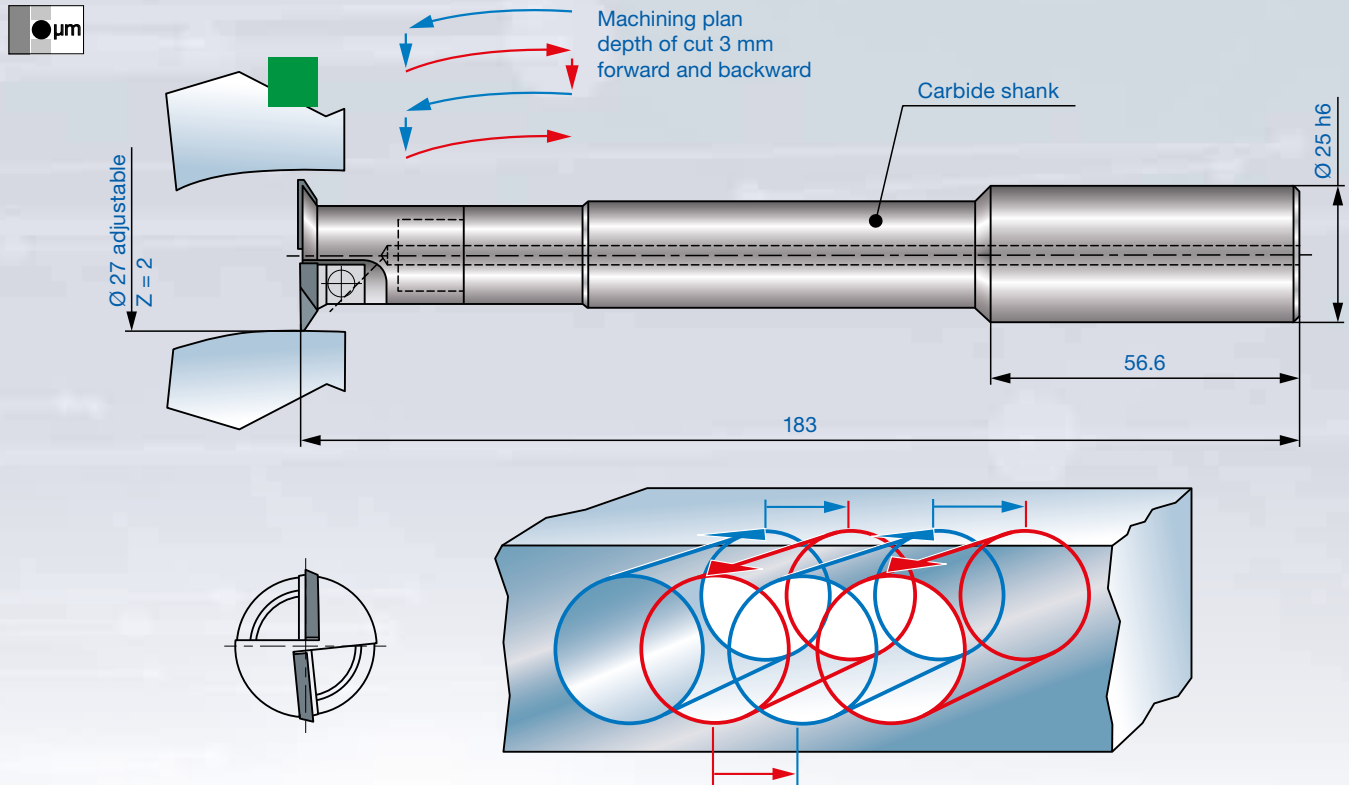


Customer benefits

Lower machine investment - no expensive milling spindle (high-speed)
Reduced tooling costs per component

Induction port milling tool / Teeth = 2

PCD inserts adjustable and replaceable



Requirements

Complete machining of the in-and outlet ducts

Solution

Induction port milling tool / Teeth = 2

PCD inserts adjustable and replaceable

Cutting data

Material	(DIN) ■ AISi10
Cutting grade	PCD 10
Cutting speed	m/min 1,357
Feed rate per tooth	mm 0.35
Cutting depth	mm 3 forward and backward

Result

High feed rates

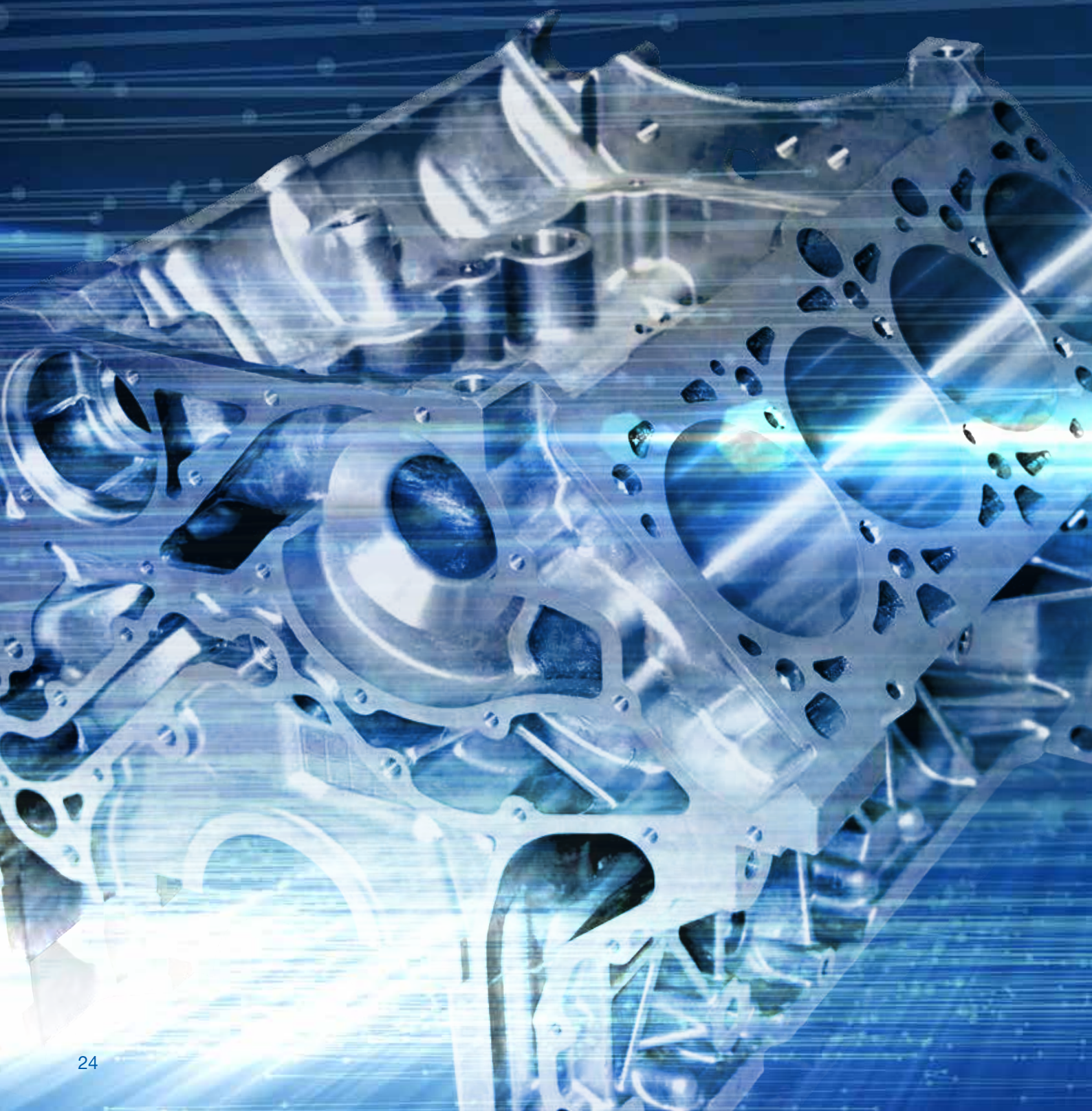
Consistent surface finish



Customer benefits

Lower tool costs thanks to interchangeable inserts

Cylinder crankcase



HPC rough milling cutter / Teeth = 15 / up to 8mm cutting depth



Firm clamping
of the inserts

Requirements

Increase tool life

Minimization of edge breakouts on the component

Solution

HPC rough milling cutter / Teeth = 15

Cutting data

Material	(DIN) ■ AISi17Cu4 T5/T6
Cutting grade	PCD 30
Cutting speed	m/min 685
Feed rate per tooth	mm 0.14
Cutting depth	mm ~1.5

Result

Tool life improvement by factor 4 to 5

Lower power consumption

No edge breakouts on the component



Customer benefits

Reduced tooling costs per component

Almost chip-free components, lower cleaning costs

Increased productivity and energy efficiency

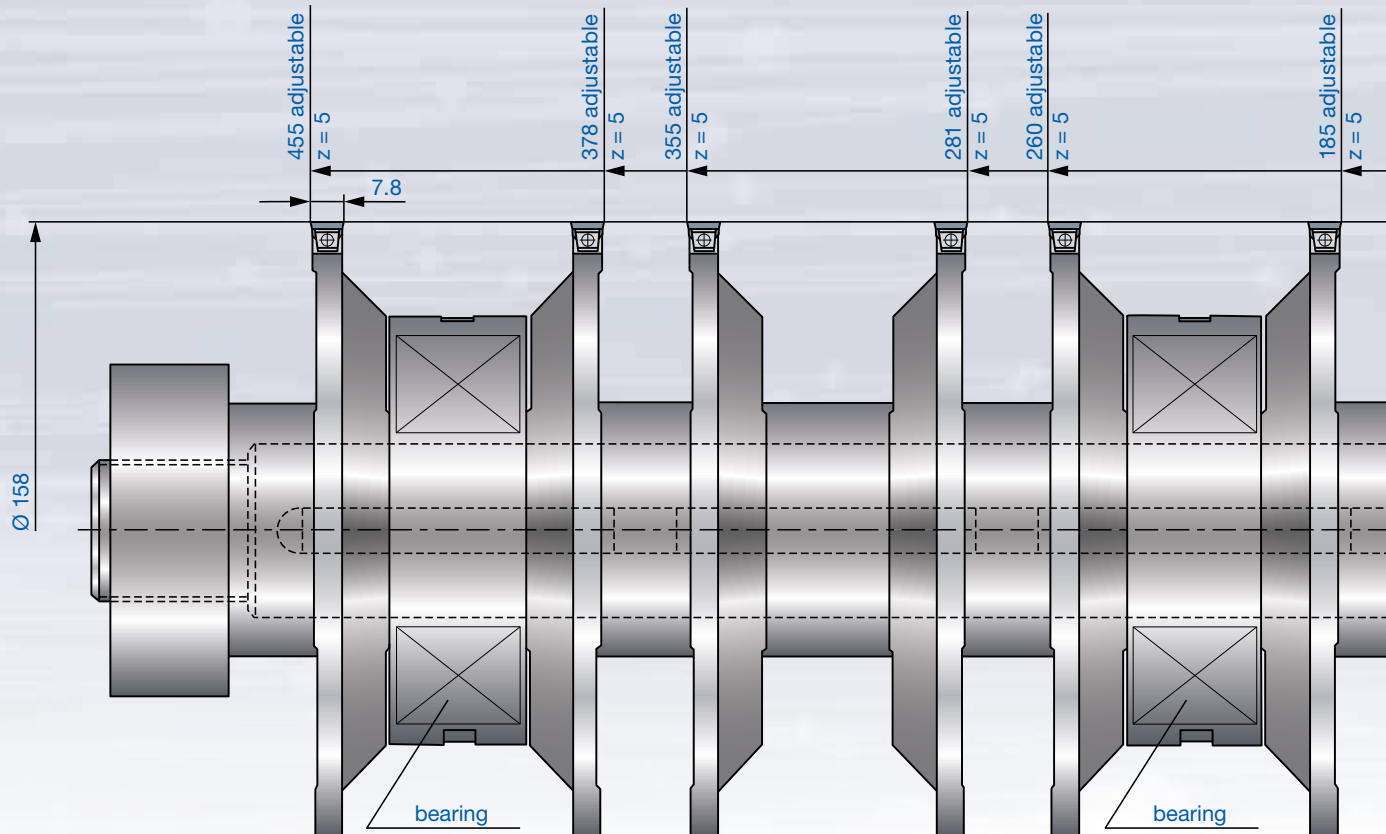


Cylinder crankcase

Bearing width

Gang milling cutter / Teeth = 5 per milling cutter

Face run-out and milling cutters adjustable to each other



Requirements

Milling of the bearing width

Face run-out and milling cutters adjustable to each other

Solution

Gang milling cutter / Teeth = 5 per milling cutter

Cutting data

Material	(DIN) ■ GD-AISI9
Cutting grade	PCD/K10
Cutting speed	m/min 500
Feed rate per tooth	mm 0.07
Cutting depth	mm -5

Result

Quick and easy changing of the inserts

Excellent surface finish

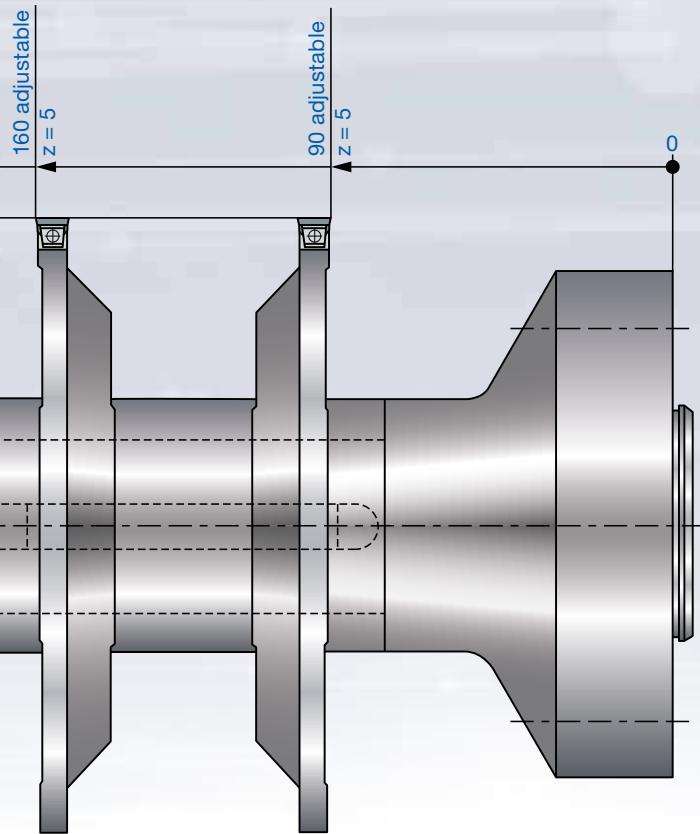
PCD inserts usable on both sides



Customer benefits

Reduced non-productive times

Half of the costs thanks to double-used PCD inserts

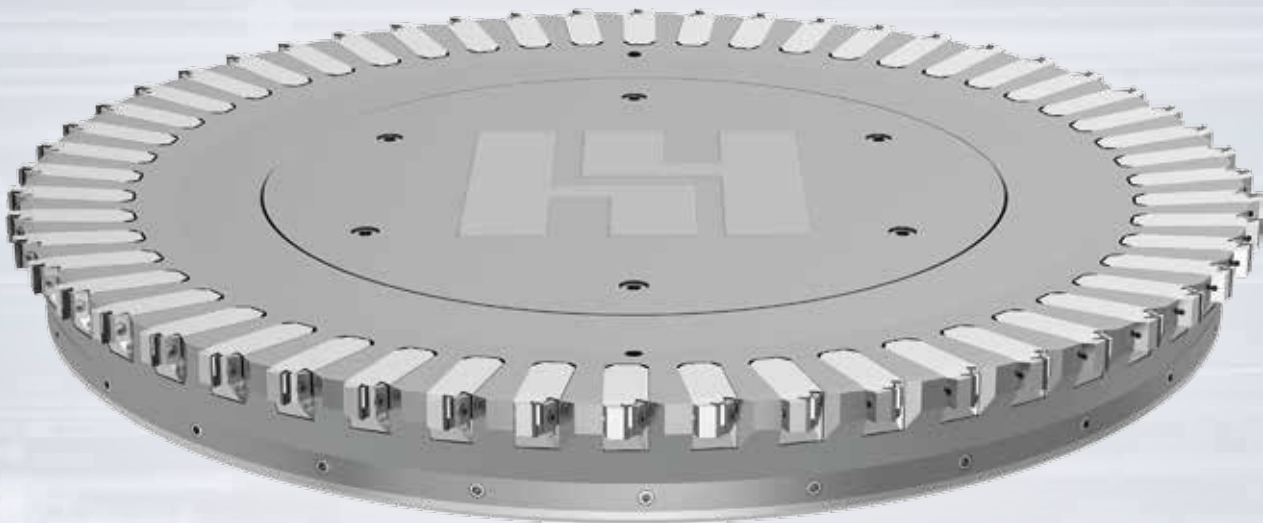


H Cylinder crankcase

Sealing surface

Face milling cutter / Ø 500 mm / Teeth = 52

Cartridge solution



Requirements

Milling of the sealing surface, Aluminium crankcase

All inserts adjustable

Solution

Face milling cutter / Teeth = 52

Cartridge solution

Cutting data

Material		(DIN) ■ GD-AISI9
Cutting grade		PCD
Cutting speed	m/min	3,000
Feed rate per tooth	mm	0.1
Cutting depth	mm	0.5

Result

Outstanding tool life

Easy adjustment of the inserts



Customer benefits

Low costs per component

Reduced non-productive times

Milling cutter with vibration damper / Teeth = 16 / Teeth_{eff.} = 8



Requirements

Milling the bearing clearances for the crankshaft

Solution

Milling cutter with vibration damper / Teeth = 16 / Teeth_{eff.} = 8

Cutting data

Material		(DIN) ■ AISi9Cu3
Cutting grade		PCD
Cutting speed	m/min	516
Feed rate per tooth	mm	0.08
Cutting depth	mm	1.5 - 8

Result

Absolutely vibration-free and high quality surface finish



Customer benefits

High tool life of PCD inserts thanks to smooth cutting performance

H Cylinder crankcase

Milling thrust bearing seat

Milling cutter with integrated vibration damper / Teeth = 16 (8 + 8)



Requirements

Maximum number of cutting edges, vibration damped for high surface quality

Solution

Milling cutter / Teeth = 16 (8 + 8)

Cutting data

Material		(DIN) ■ AISi12
Insert		PCD
Cutting speed	m/min	650
Feed rate per tooth	mm	0.1

Result

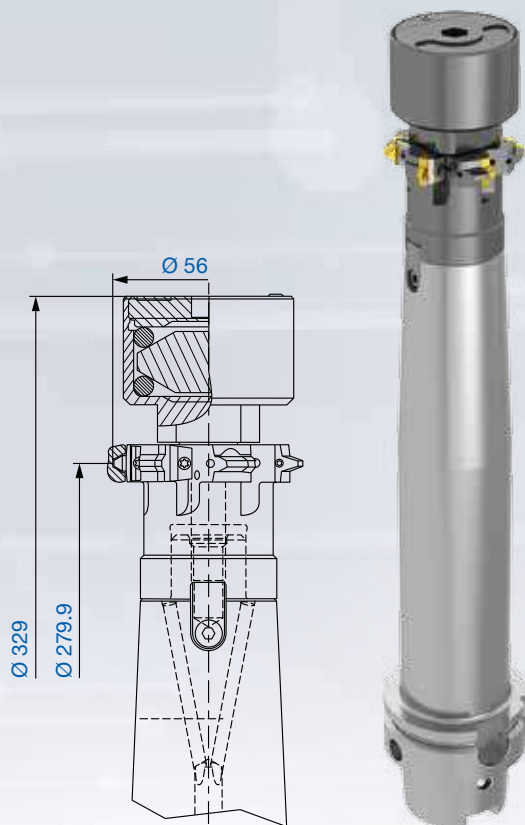
Stable milling operation, surfaces free of vibrations



Customer benefits

Cycle time reduction thanks to high number of cutting edges
Excellent surface finish

Milling cutter with vibration damper / $Teeth_{eff.} = 3$



Requirements

Milling a slot in the bearing diameter
Extreme protrusion length

Solution

Milling cutter with vibration damper / $Teeth_{eff.} = 3$

Cutting data

Material		(DIN) ■ GG25
Cutting grade		carbide coated
Cutting speed	m/min	345
Feed rate per tooth	mm	0.03
Cutting depth	mm	3.5

Result

Smooth cutting performance and good surface quality thanks to the use of a vibration damper



Customer benefits

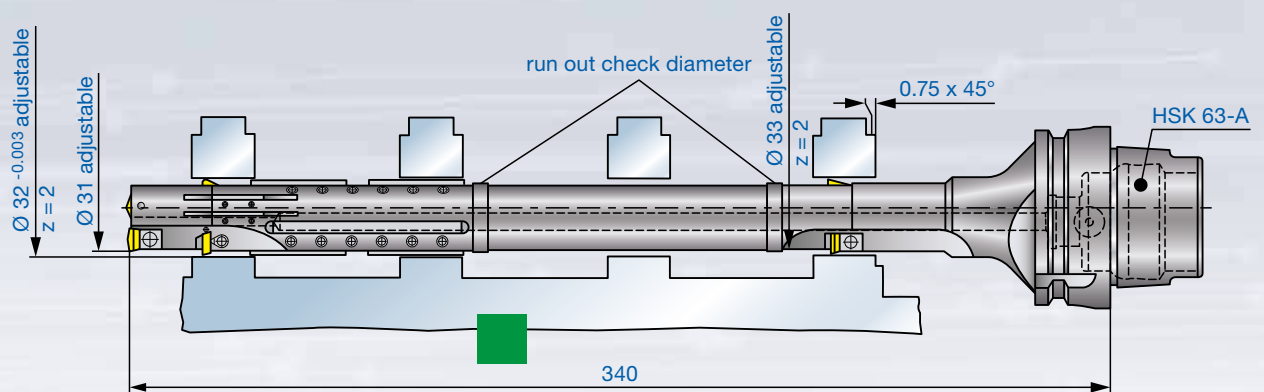
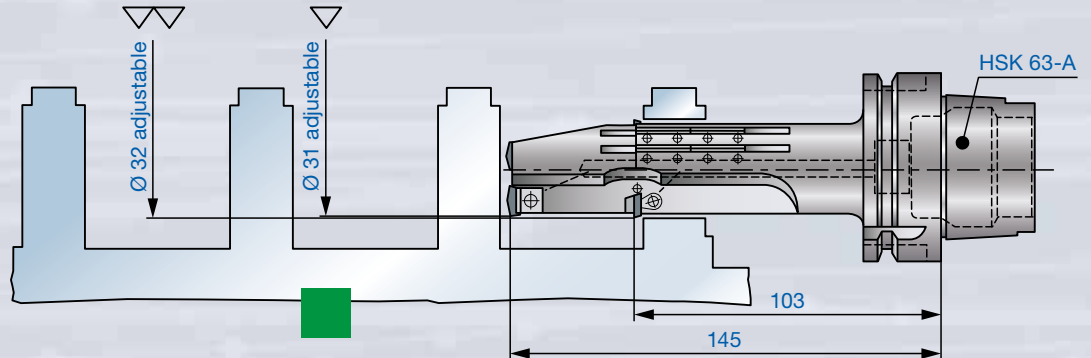
High quality components



Cylinder crankcase

Ventilation bore

Drilling and fine boring tool / Teeth (drilling) = $Teeth_{eff.} = 1$ / (counterboring) = 2



Requirements

Pilot tool with guide pads (drilling into solid - 1. web)

Finish tool with guide pads (drilling into solid)

Solution

Drilling and fine boring tool / Teeth (drilling) = $Teeth_{eff.} = 1$ / (counterboring) = 2

Cutting data

Material	(DIN) ■ GK-AlSi17Cu4Mg
Cutting grade	K10/PCD
Cutting speed	m/min 320
Feed rate per tooth	mm 0.07
Cutting depth	mm into solid/0.5

Result

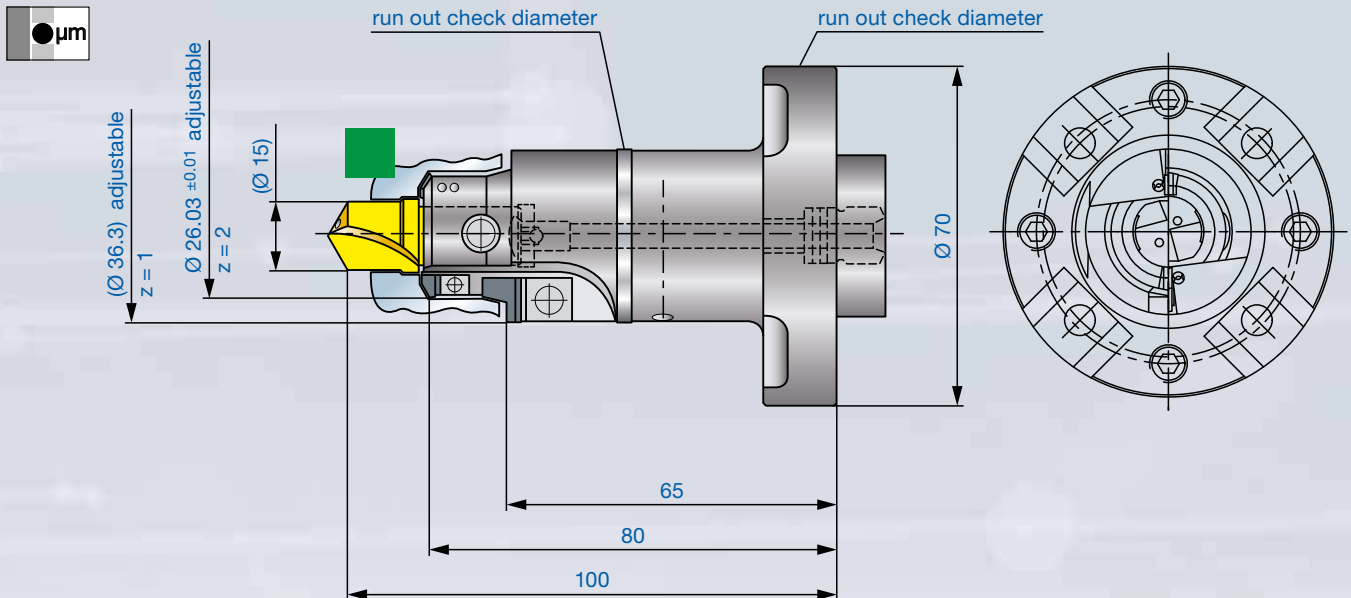
Longer tool life



Customer benefits

Process reliable production processes

Drilling and fine boring tool / Teeth = 2 + 2 + 1



Requirements

Combination tool with solid carbide drill for boring and adjustable inserts for fine boring and chamfering

Solution

Drilling and fine boring tool / Teeth = 2 + 2 + 1

Cutting data

Material	(DIN) ■ Al		
Cutting grade	PCD		
		drilling	fine boring
Cutting speed	m/min	193	470
Feed rate per tooth	mm	0.3	0.12
Cutting depth	mm	into solid	5.5

Result

Conventional solid carbide drill, regrindable several times

Insert diameter µm-accurate adjustable



Customer benefits

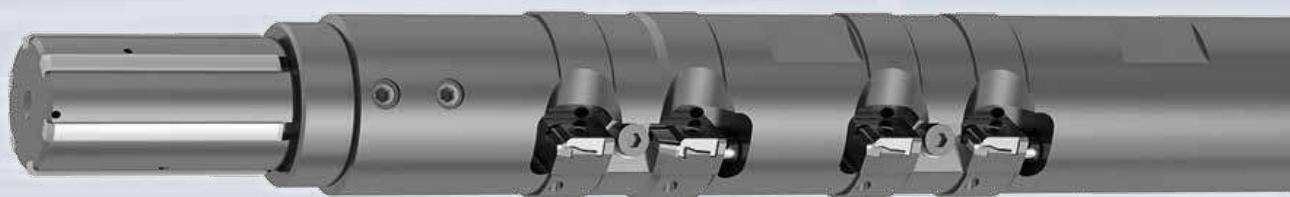
Cost-efficient solution

H Cylinder crankcase

Balance shaft bore

Line boring with cartridges and PCD-equipped pilot

Heavy metal holder with carbide guide pads for stabilisation



Requirements

Semi-finish machining with counter bearing in the component

All inserts adjustable

Solution

Line boring with cartridges and PCD-equipped pilot

Heavy metal holder with carbide guide pads for stabilisation

Cutting data

Material (DIN) ■ AISi9Cu3

Cutting grade PCD

Cutting speed m/min 280

Feed rate per tooth mm 0.12

Cutting depth mm 0.5

Result

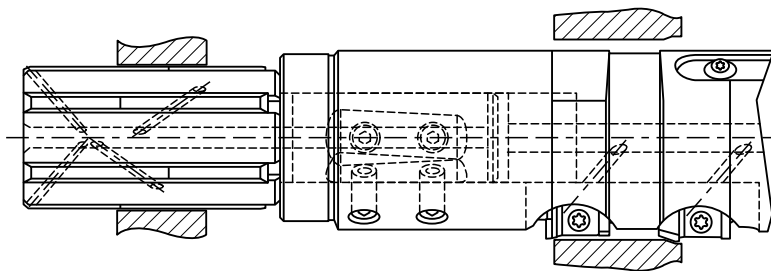
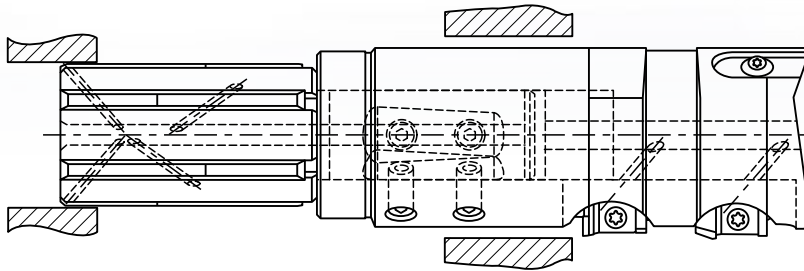
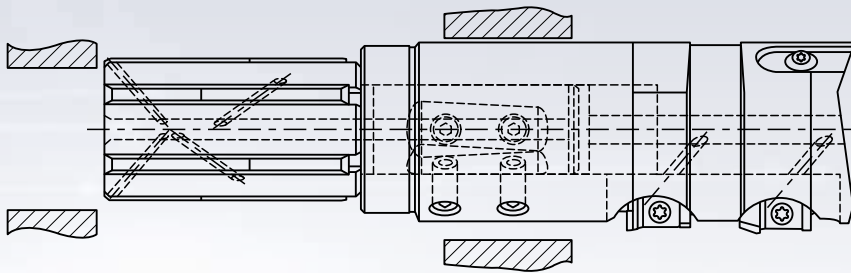
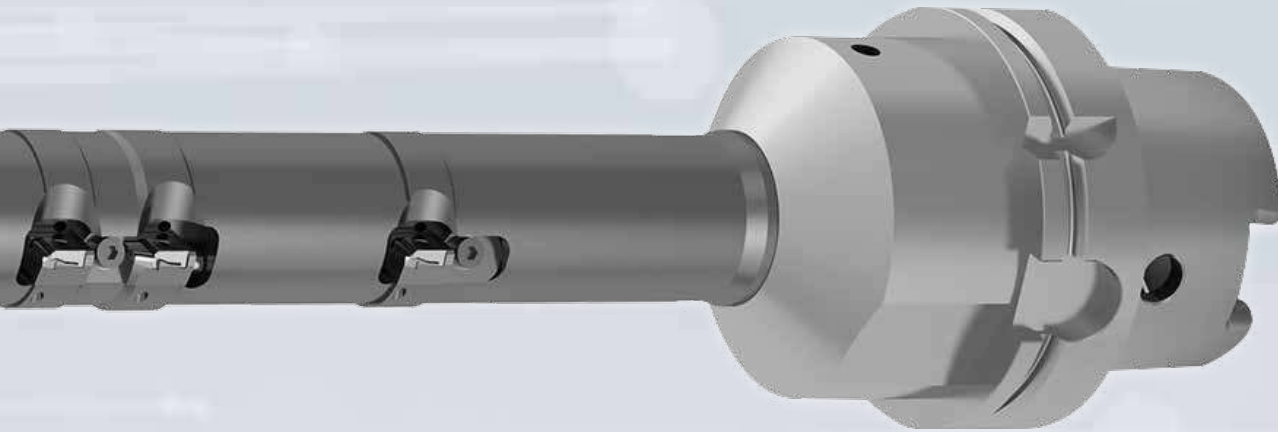
High concentricity of bearing diameters

Simple tool handling



Customer benefits

High process reliability

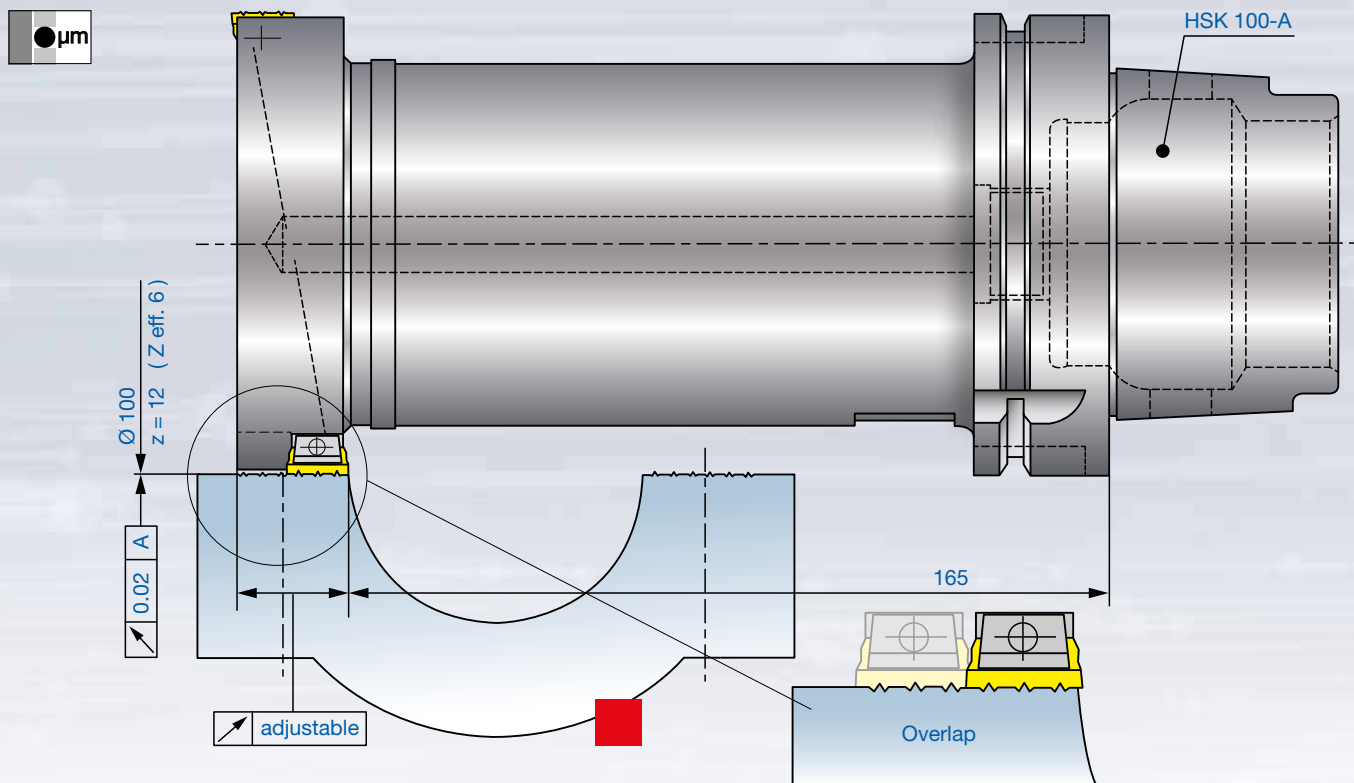


H Cylinder crankcase

Bearing cap

Form milling cutter / Teeth = 2 x 6

Transition of the insert profile adjustable



Requirements

Form milling cutter for machining bearing caps

Solution

Form milling cutter / Teeth = 2 x 6

Transition of the insert profile adjustable

Cutting data

Material		(DIN) ■ GGG40
Cutting grade		carbide coated
Cutting speed	m/min	240
Feed rate per tooth	mm	0.1
Cutting depth	mm	1

Result

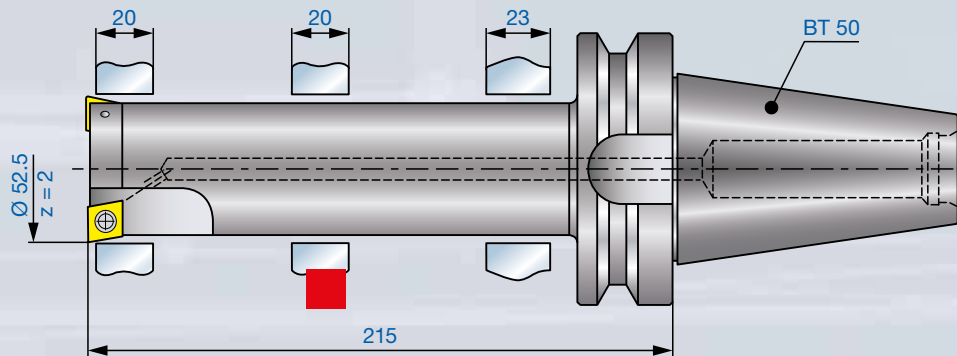
Low cutting forces thanks to cutting division



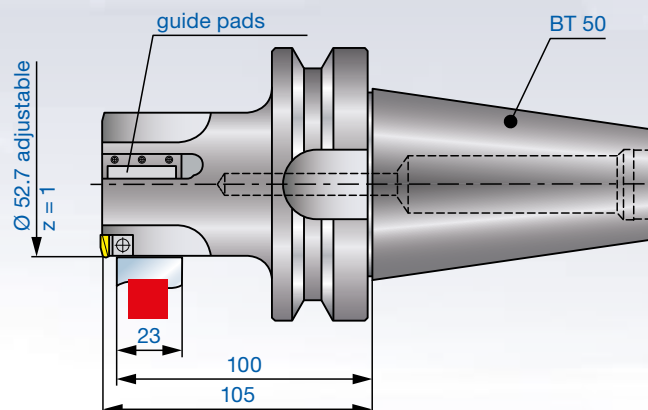
Customer benefits

Cost-effective interchangeable inserts solution

Operation 1: counterboring tool / Teeth = 2



Operation 2: fine boring tool / Teeth = 1



Requirements

Operation 1: pre-machining from 2 sides

Operation 2: pilot bore

Solution

Operation 1: counterboring tool / Teeth = 2

Operation 2: fine boring tool / Teeth = 1

Cutting data		Operation 1	Operation 2
Material		(DIN) ■ GG	
Cutting grade		carbide coated	
Cutting speed	m/min	150	135
Feed rate per tooth	mm	0.2	0.1
Cutting depth	mm	2.5	0.1

Result

Simple tool handling thanks to eccentric pin adjustment

Guide pads easily replaceable



Customer benefits

Reduced non-productive times

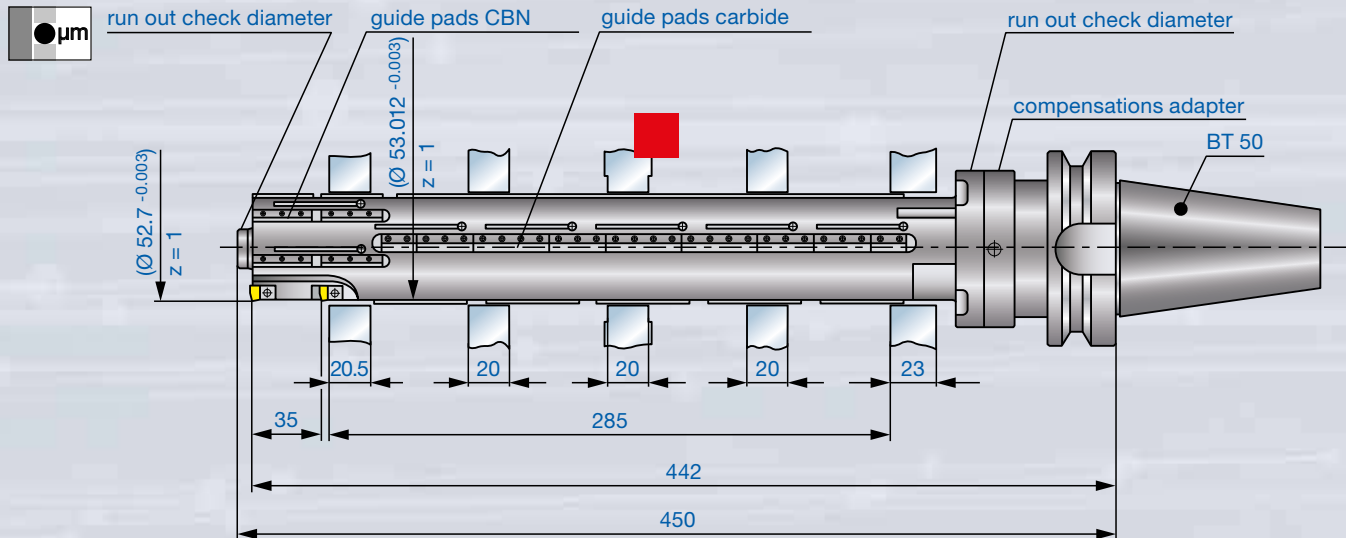
High quality components



Cylinder crankcase

Crankshaft bore

Operation 3: fine boring tool / Teeth = 1 + 1



Requirements

Operation 3: finish-machining

Solution

Operation 3: fine boring tool / Teeth = 1 + 1

Cutting data		Operation 3
Material		(DIN) ■ GG
Cutting grade		carbide coated
Cutting speed	m/min	238
Feed rate per tooth	mm	0.1
Cutting depth	mm	0.1

Result

Simple tool handling thanks to eccentric pin adjustment

Guide pads easily replaceable



Customer benefits

Reduced non-productive times

High quality components

Boring tool with integrated vibration damper, adjustable cartridges and ISO indexable inserts / Teeth = 5



KV400 KKH
axially adjustable



Requirements

Roughing operation

Ø 74±01

Solution

Boring tool with adjustable cartridges and ISO indexable inserts / Teeth = 5

Cutting data

Material	(DIN) ■ GG25	
Cutting grade	carbide coated	
Cutting speed	m/min	150
Feed rate per tooth	mm	0.2
Cutting depth	mm	Ø 1 - 1.5

Result

Very good tool life

Stable machining process



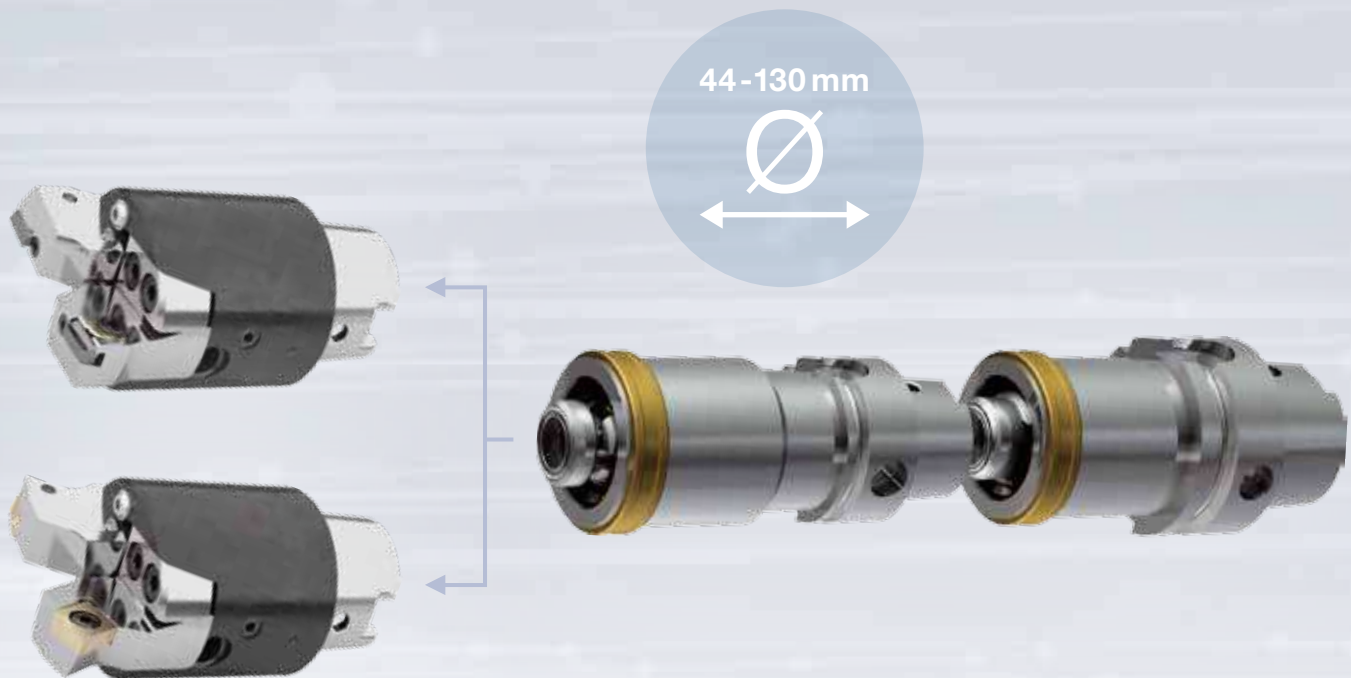
Customer benefits

Low costs per component

H Cylinder crankcase

Cylinder bore

Boring system GA 200 Vario /
Teeth = 2 for roughing and finish-machining



Requirements

Roughing operation

Ø 72.5±0.2 Rz100

Solution

GA 200 Vario / Teeth = 2

Cutting data

Material		(DIN) ■ GG
Cutting grade		CBN
Cutting speed	m/min	649
Feed rate per tooth	mm	0.2
Cutting depth	mm	Ø 1.5 - 2

Result

Increased tool life

Simple tool handling



Customer benefit

Low cost per component

Milling of clearance cut for the honing tool

Tight cutting edge spacing

Various cutting materials can be used

With a stable core cross-section, this robust solution can achieve high feed rates



Requirements

Circular milling a clearance cut for the honing tool into the cylinder bore

Mixed machining Aluminium and Cast Iron

Solution

Circular milling cutter with fixed insert seat

Double positive cutting geometry

Cutting data

Material	■ AISi9 / ■ GG25	
Cutting grade	PCD/PROTON coated carbide	
Cutting speed	m/min	242
Feed rate per tooth	mm	0.18
Cutting depth	mm	6-7

Result

Short machining time with high cutting depth



Customer benefits

Solid solution → high feeds possible

Inserts can be changed individually

→ lower costs per component



Cylinder crankcase

Cylinder bore

Automatically adjustable tool / Teeth = 1

SMART SETTING MOTION TOOLS concept



Requirements

Simple tool handling

Solution

Automatically adjustable tool / Teeth = 1

SMART SETTING MOTION TOOLS concept

Cutting data

Material (DIN) ■ GG25

Cutting grade CBN

Cutting speed m/min 750

Feed rate per tooth mm 0.28

Cutting depth mm 0.3

Result

Fully automatic diameter adjustment



Customer benefits

Increase in tool life quantity

Very easy handling and very precise adjustment

Automatically adjustable tool / Teeth = 3 + 2

*SMART SETTING MOTION TOOLS concept
and control of the drawbar via compressed air*



Requirements

Reduction of processing costs

Solution

Automatically adjustable tool / Teeth = 3 + 2

SMART SETTING MOTION TOOLS concept

Control of the drawbar via compressed air

Cutting data

Material		(DIN) ■ GG
Cutting grade		CBN
Cutting speed	m/min	700
Feed rate per tooth	mm	0.18
Cutting depth	mm	0.3

Result

Semi-finish and finishing machining in one tool

No retraction marks thanks to retractable inserts



Customer benefits

High process reliability
Simple tool handling



Cylinder crankcase

Crankshaft bearing passage

Line boring bar / Teeth = 5 + 5 / Teeth_{eff.} = 1 + 1

SMART SETTING MOTION TOOLS concept



Requirements

Reduced non-productive time and cycle time

Defined surface R_z 12-20

Solution

Line boring bar / Teeth = 5 + 5 / Teeth_{eff.} = 1 + 1

SMART SETTING MOTION TOOLS concept

Cutting data

Material		(DIN) ■ GG25
Cutting grade		solid carbide
Cutting speed	m/min	185
Feed rate per tooth	mm	0.27/0.2
Cutting depth	mm	0.5

Result

Non-productive times for re-adjusting reduced from 20 minutes to 2 minutes

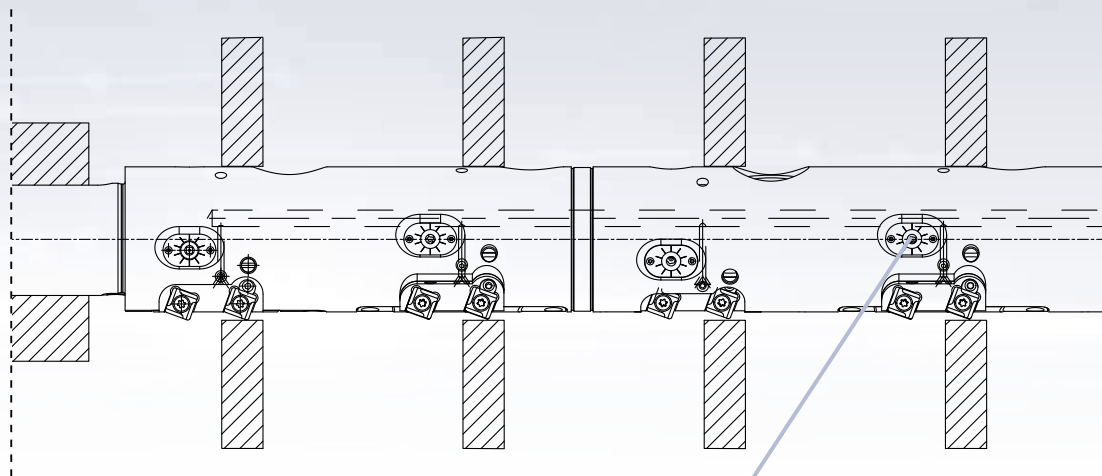
Simple handling



Customer benefits

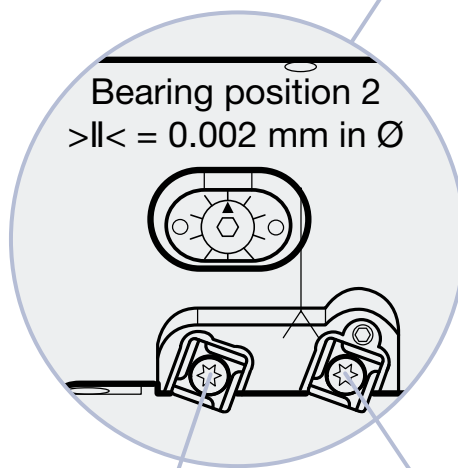
High process reliability

Dramatic reduction of non-productive time



→ Machining direction

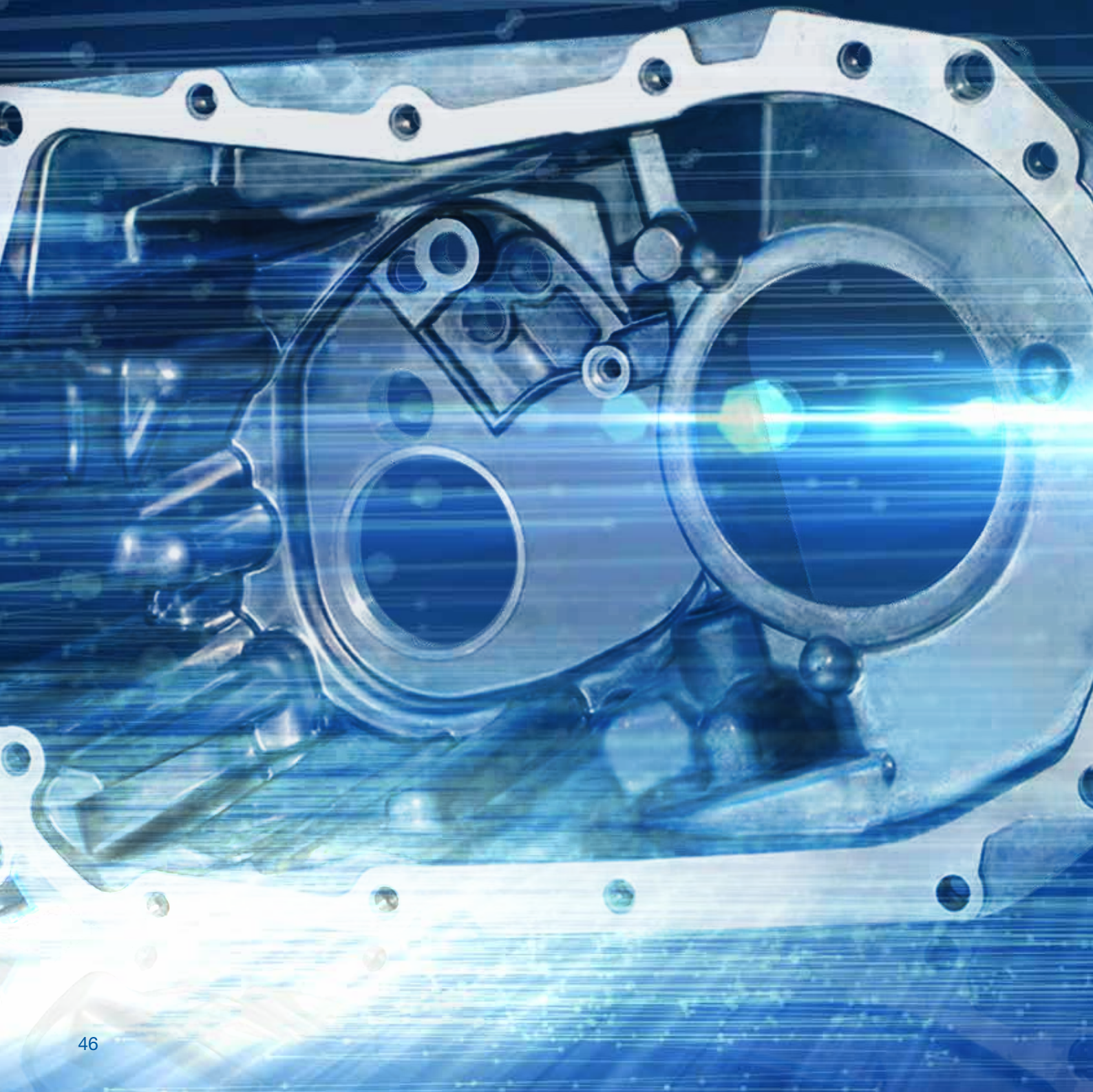
Bearing position 2
 $>|| < = 0.002 \text{ mm in } \varnothing$



Finish-machining

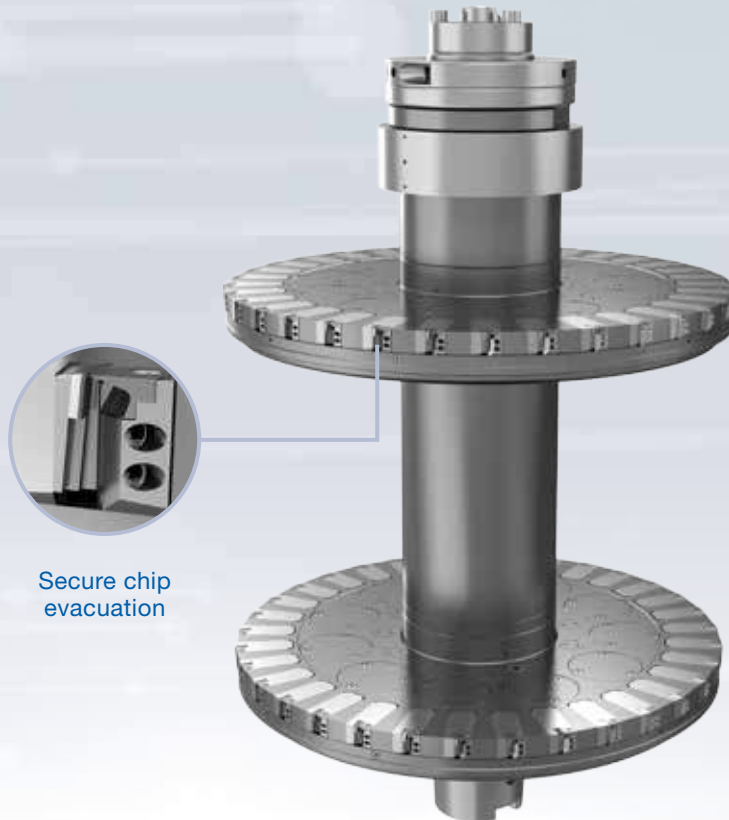
Semi-finish-machining

Gearbox ***components***



HPC gang milling cutter Ø380 mm / Teeth = 2 x 33

Adjustable distance between milling cutters (Dimension 280 mm)



Secure chip
evacuation

Requirements

Machining of the sealing surface
Chip free components
Simultaneous machining of two components

Solution

HPC gang milling cutter Ø380 mm / Teeth = 2 x 33
Adjustable distance between milling cutters (Dimension 280 mm)

Cutting data

Material	(DIN) ■ AISi7
Cutting grade	PCD
Cutting speed	m/min 780
Feed rate per tooth	mm 0.07
Cutting depth	mm 0.5

Result

Excellent surface finish
Very good tool life



Customer benefits

Almost chip-free components, lower cleaning costs
Reduced tooling costs per component



Gearbox case

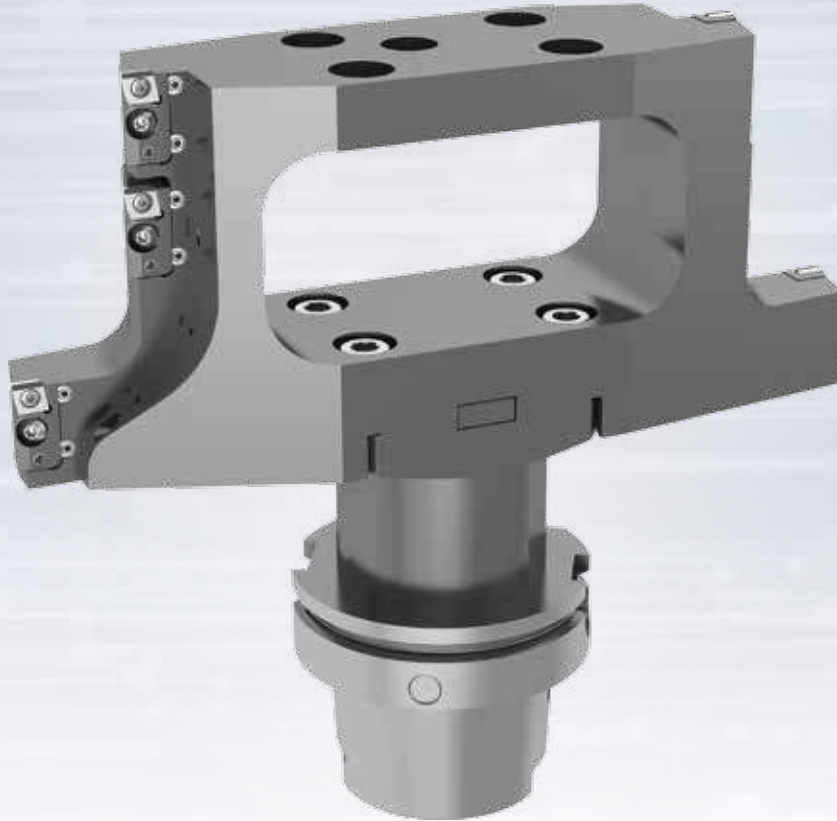
Pre-machining

*Stepped countersinking tool Ø206 mm + Ø209 mm + Ø285 mm /
Teeth = 2 + 2 + 2*

Basic tool body in steel and aluminium with cartridges



Light-weight
design



Requirements

Minimization of tool weight and tool dimensions

Solution

Stepped countersinking tool / Teeth = 2 + 2

Basic tool body in steel and aluminium with cartridges

Cutting data

Material		(DIN) ■ AIADC10
Cutting grade		PCD
Cutting speed	m/min	1,200
Feed rate per tooth	mm	0.12

Result

Reduced tool weight



Customer benefits

Slim design saves space within the tool magazine of the machine

Low costs thanks to standard cartridges and ISO inserts

Stepped countersinking tool $\varnothing 219 \text{ mm} + \varnothing 220 \text{ mm}$ /
Teeth = 2 + 4

Basic tool body in steel and aluminium with cartridges



Light-weight
design



Requirements

Minimization of tool weight and tool dimensions

Solution

Stepped countersinking tool / Teeth = 4 + 2

Basic tool body in steel and aluminium with cartridges

Cutting data

Material		(DIN) ■ AIADC10
Cutting grade		PCD
Cutting speed	m/min	1,200
Feed rate per tooth	mm	0.1

Result

Reduced tool weight

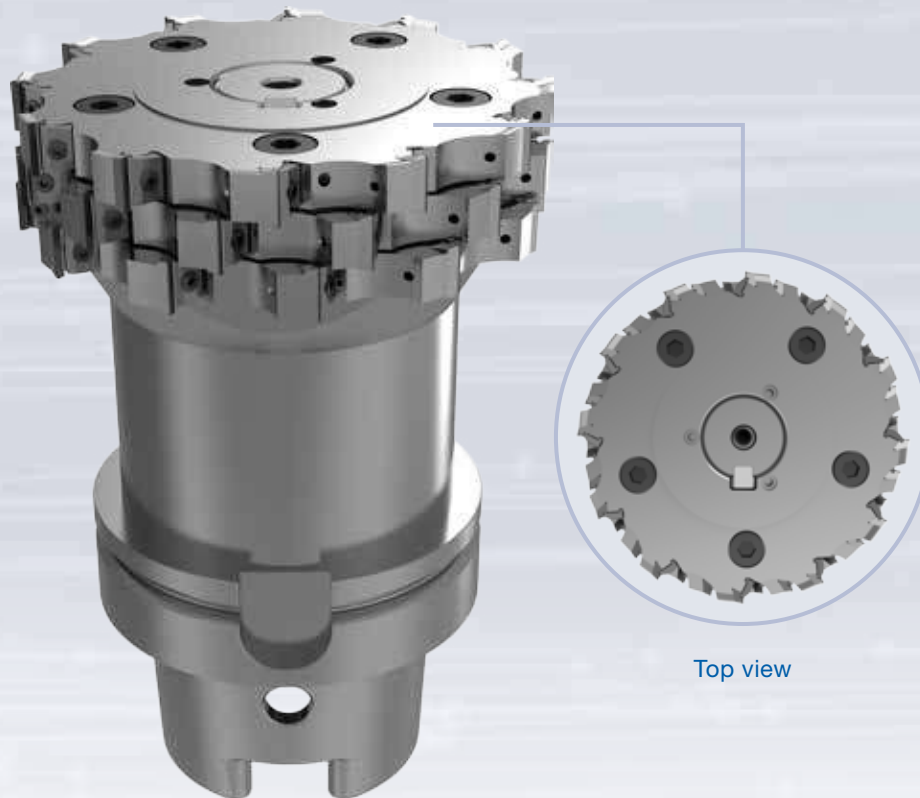


Customer benefits

Reduced machining times

Low costs thanks to standard cartridges and ISO inserts

Multi tooth cutter Ø 125 / Teeth = 36 / Teeth_{eff.} = 12



Requirements

High surface quality on face and shoulder surface

Solution

Multi tooth cutter / Teeth = 36 / Teeth_{eff.} = 12

Cutting data

Material	(DIN) ■ AISi9Cu3
Cutting grade	PCD 10
Cutting speed	m/min 2,500
Feed rate per tooth	mm 0.12
Cutting depth	mm 0.8

Result

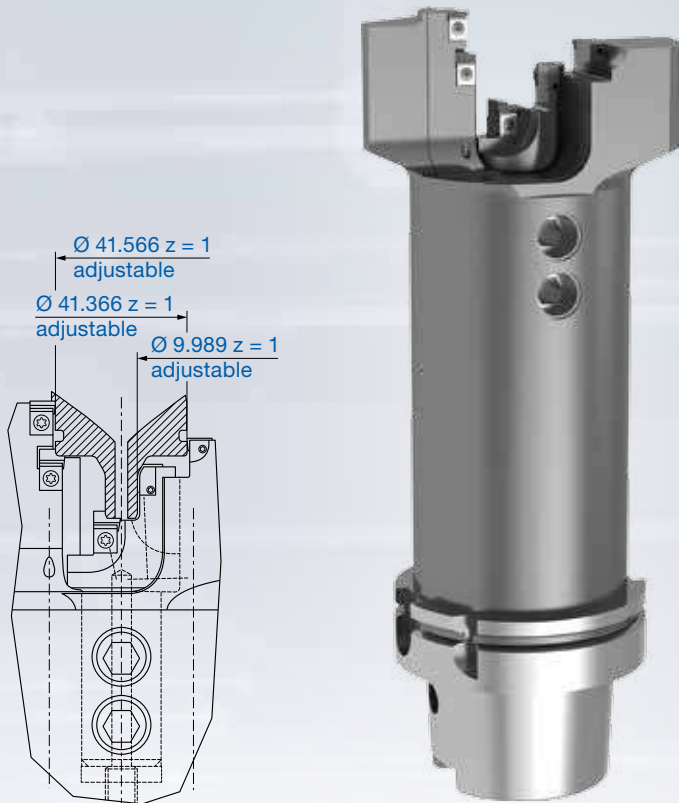
Almost uninterrupted shoulder thanks to high concentricity



Customer benefits

Inserts separately replaceable
Increased productivity and energy-efficiency

Combination tool with adjustable inserts -
eccentric pin adjustment / Teeth = 5 / Teeth_{eff.} = 1



Requirements

High concentricity requirements and concentricity of the individual diameters to each other
Adjustability of inserts

Solution

Combination tool with adjustable inserts - eccentric pin adjustment / Teeth = 5 / Teeth_{eff.} = 1

Cutting data

Material	(DIN) ■ AISi9
Cutting grade	PCD
Cutting speed	m/min 1,380
Feed rate per tooth	mm 0.15

Result

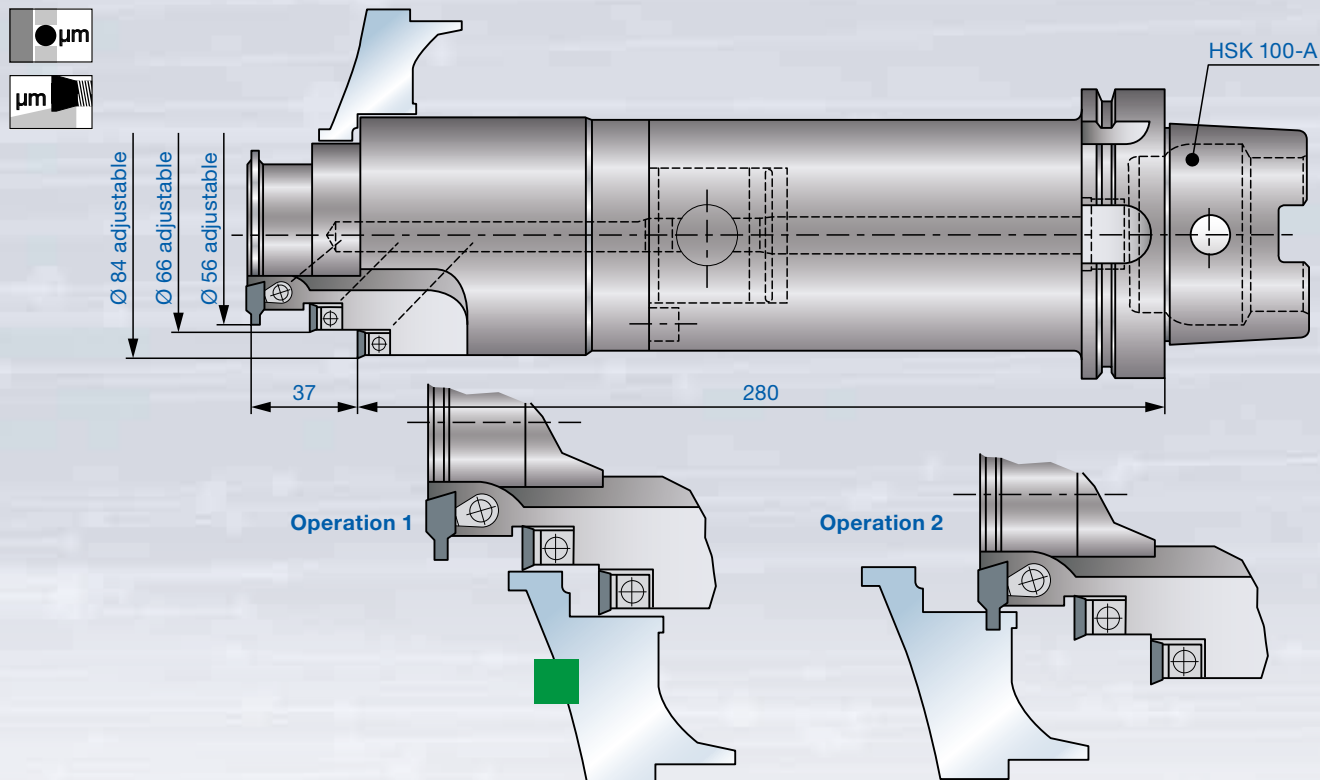
Easy readjustment of the inserts



Customer benefits

Reduced non-productive times
Cost-effective interchangeable inserts solution

Fine boring and circular milling tool / Teeth = 3 per Ø



Requirements

Combination tool for fine boring and circular milling

Solution

Fine boring and circular milling tool / Teeth = 3 per Ø

Cutting data

Material		(DIN)  AlSi9	
Cutting grade		PCD	
		fine boring	milling
Cutting speed	m/min	450	517
Feed rate per tooth	mm	0.08	0.12
Cutting depth	mm	-4	-4

Result

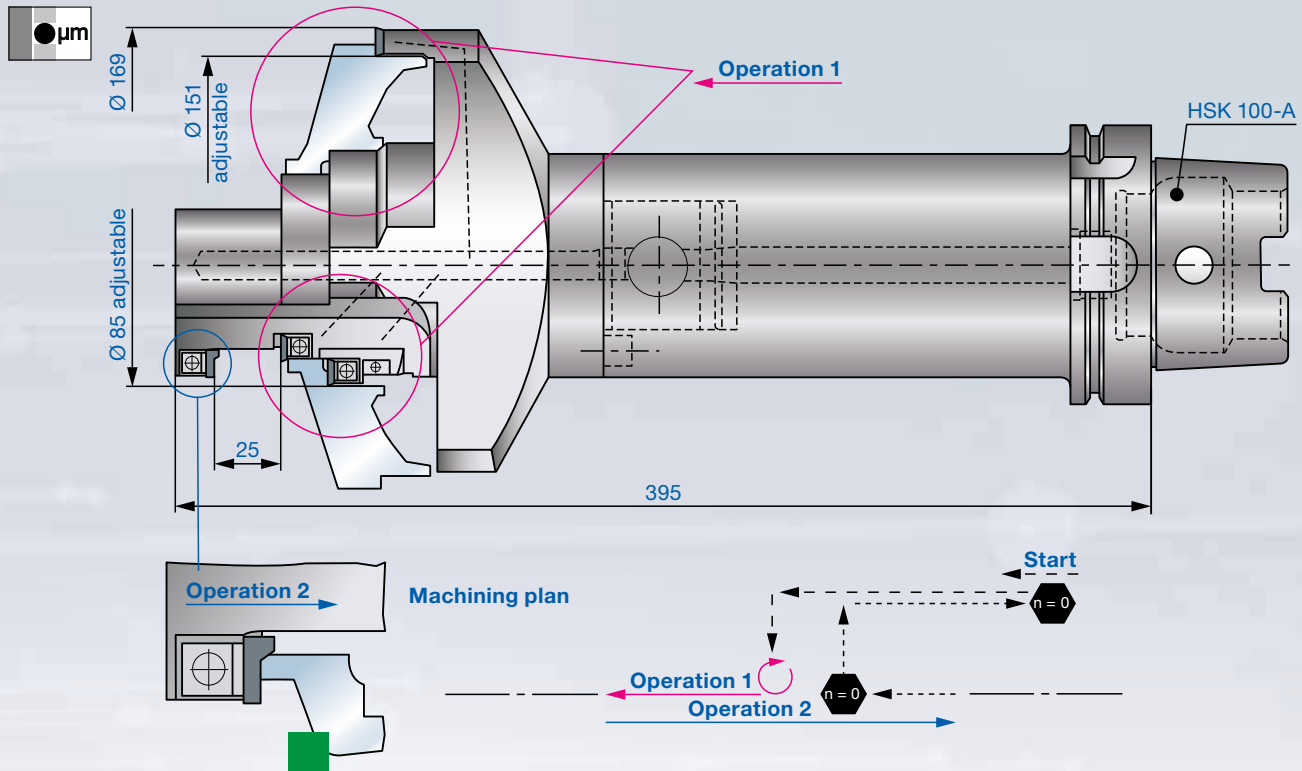
Inserts separately replaceable



Customer benefits

Reduced tooling costs per component

Fine boring tool / $Z = 5$ / $Teeth_{eff.} = 1$



Requirements

Combination tool for forward and backward fine boring
and for over turning of outside diameter

Solution

Fine boring tool / Teeth = 5 / $Teeth_{eff.} = 1$

Cutting data

Material	(DIN) ■ AISi9
Cutting grade	PCD
Cutting speed	m/min (Ø 85) 450
Feed rate per tooth	mm 0.12

Result

Inserts separately replaceable



Customer benefits

Reduced machining times
Reduced tooling costs per component

**Face milling cutter Ø49 mm with heavy metal shank
(anti-vibration effect) / Teeth = 8**



Requirements

Axial plunging into the component, face milling of the surface through the clamping device

PMr(3) >50 % - R_z 8 - R_{max} 10 and axially adjustable

Solution

Face milling cutter with heavy metal shank (anti-vibration effect) / Teeth = 8

Cutting data

Material	(DIN) ■ GD-AISI9Cu3
Cutting grade	PCD
Cutting speed	m/min 2,700
Feed rate per tooth	mm 0.034 - 0.069 - 0.086
Cutting depth	mm 0.6

Result

Excellent surface finish

PMr(3) 100 % - R_z 2.2 - R_{max} 2.6

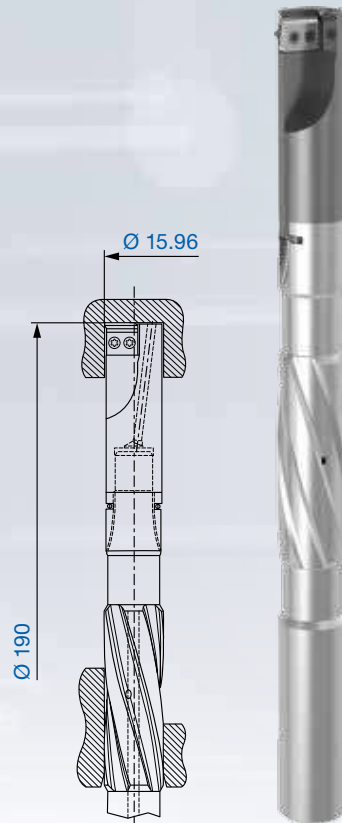


Customer benefits

Very high tool life quantity

Excellent surface finish quality

*Fine machining tool with heavy metal shank and twisted guide shank /
Teeth = 1*



Requirements

Precise diameter and high coaxiality

Solution

Fine machining tool with heavy metal shank and twisted guide shank / Teeth = 1

Cutting data

Material		(DIN) ■ AI
Cutting grade		PCD
Cutting speed	m/min	449
Feed rate per tooth	mm	0.056
Cutting depth	mm	-8

Result

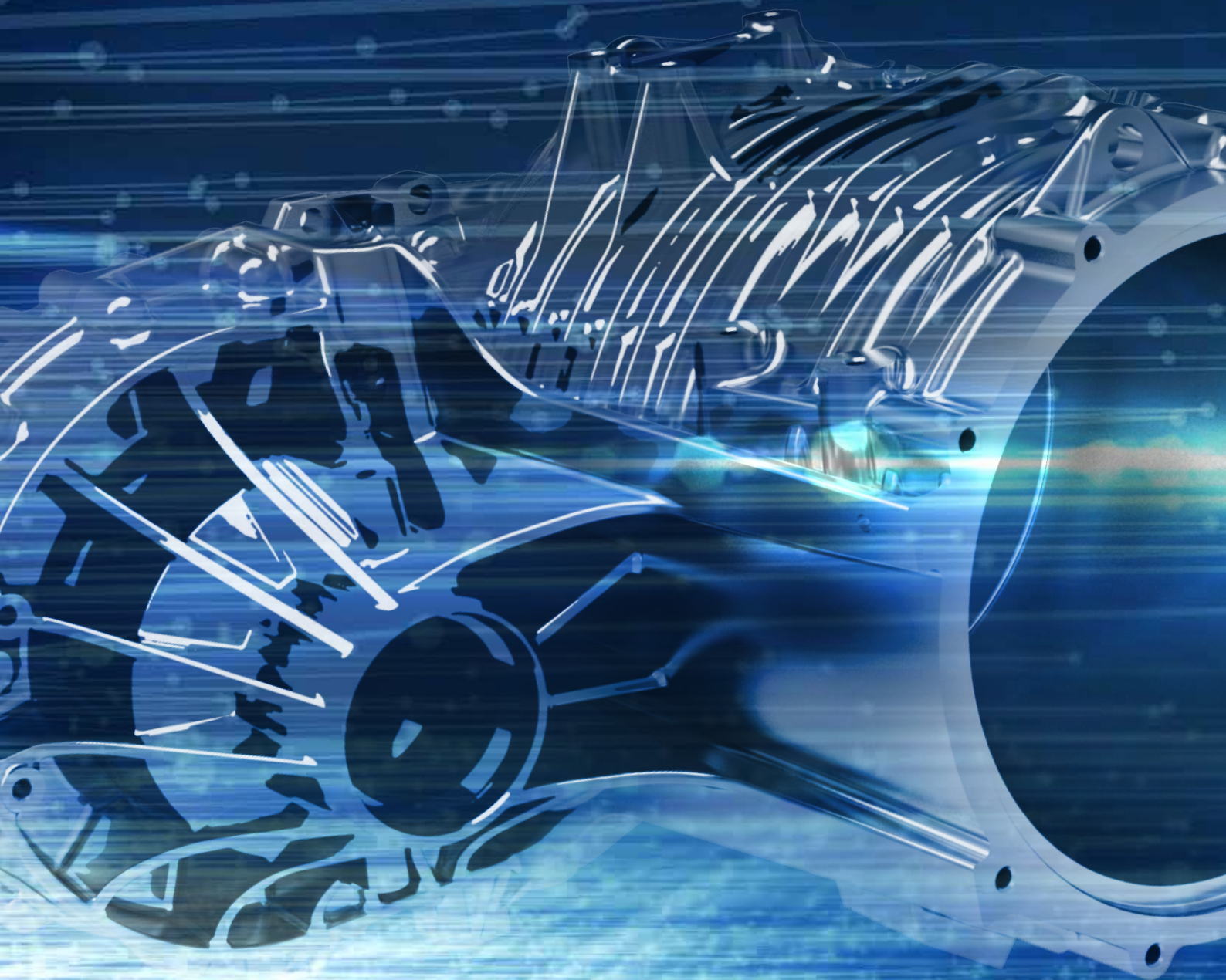
Excellent surface finish quality



Customer benefits

Fewer tools required for machining

Electric motor



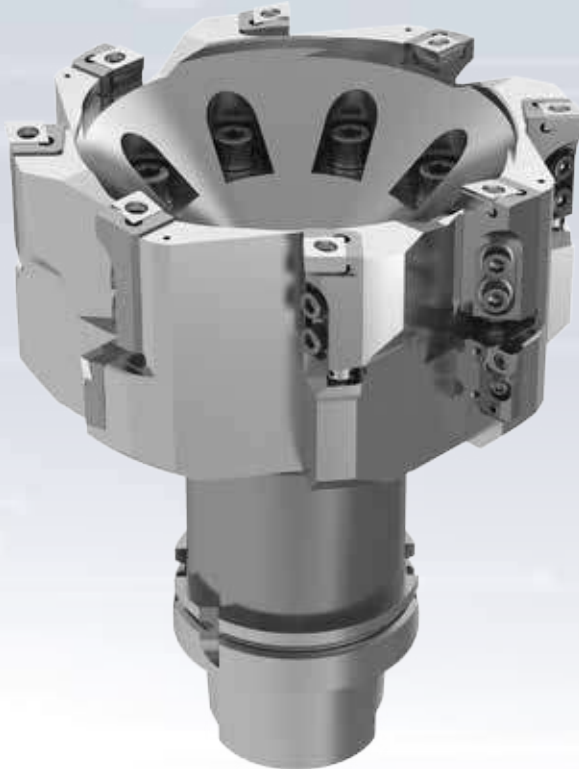
Tangential inserts tool / Teeth = 4 + 4 + 4

External and internal diameter machining $\varnothing 218 \text{ mm} + \varnothing 214 + \varnothing 160 \text{ mm}$

Basic tool body in steel and aluminium with cartridges



Light-weight
design



Requirements

Strongly fluctuating allowances and machining several steps reliably

Safety cut required for bottom surface over 28 mm width

Solution

Light-weight stepped countersinking tool / Teeth = 4 + 4 + 4

Tangential inserts with underhand grip installed in the cartridge, thus very stable embedding

Cutting data

Material	■ AISi10MgCu-T6	
Cutting grade	PCD	
Cutting speed	m/min	600 m/min
Feed rate per tooth	mm	0.15

Result

Process reliable machining combined with high feed rates

Long tool life thanks to a stable tool



Customer benefits

Roughing with only one tool

Reduced cycle times



Electric motor

Semi-finish machining stator bore

Adjustable pre-machining tool / Teeth = 4 + 4 + 2 + 2 + 2

Light-weight tool concept with cartridges and PCD guide pads



Light-weight
design



Requirements

Exact premachining for finishing tool

Solution

Adjustable ISO indexable inserts combined with different diameters

Light-weight construction with aluminium base body

Cutting data

Material		■ AISi10MgCu-T6
Cutting grade		PCD
Cutting speed	m/min	820
Feed rate per tooth	mm	0.12

Result

Stable machining process



Customer benefits

Pre-machining and finishing of several steps

Low cycle time thanks to multi-teeth tool

Multi-teeth fine boring tool / Teeth = 6 + 2 + 2 + 2

Light-weight tool concept with cartridges and PCD guide pads



Light-weight
design



Requirements

Fitting Ø with high surface quality and short cycle time

Solution

6-fluted tool with mixture of inserts

Light-weight construction with aluminium base body

Cutting data

Material		■ AISi10MgCu-T6
Cutting grade		PCD
Cutting speed	m/min	1,000
Feed rate per tooth	mm	0.18

Result

Compliance with all tolerances and surface requirements



Customer benefits

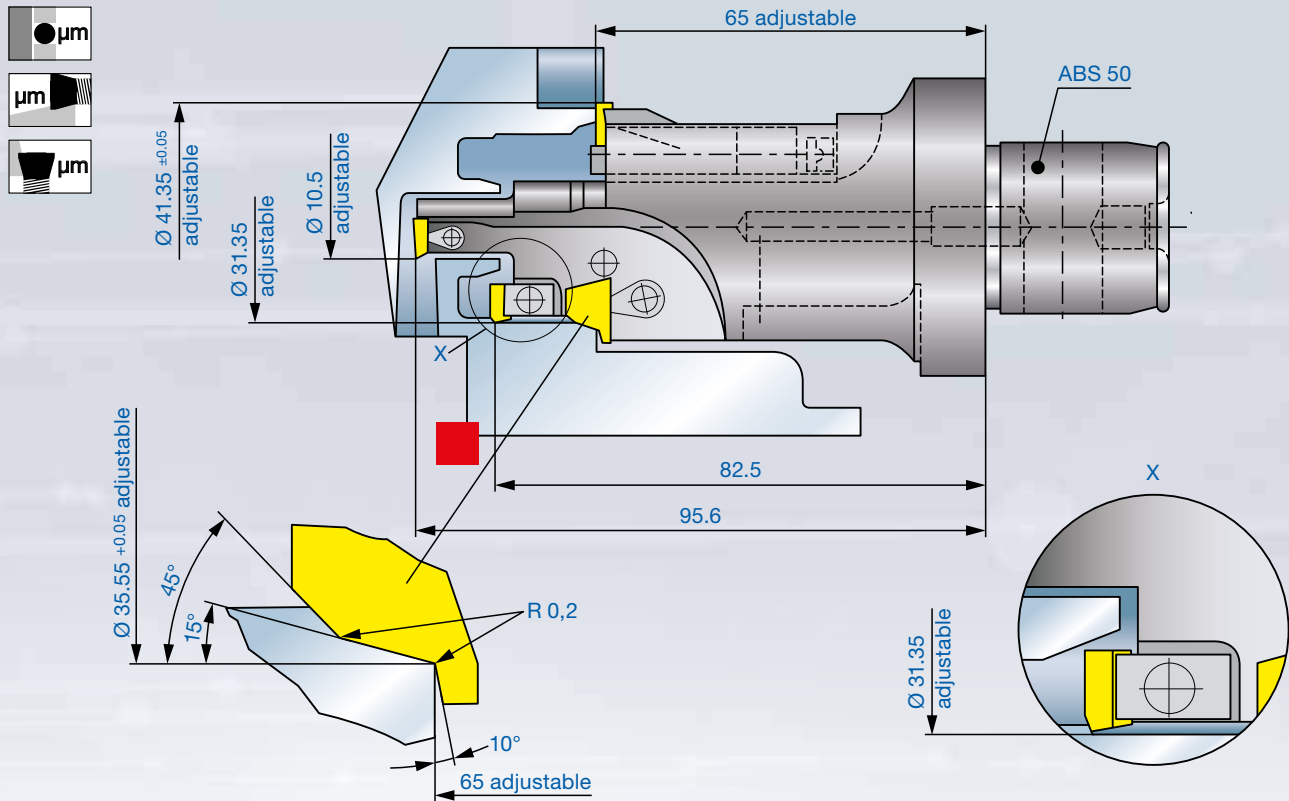
Low cycle time thanks to a high feed rate

Excellent surface finish quality

Pumps



Multi-step fine boring tool / Teeth = 4 / Teeth_{eff.} = 1



Requirements

Combination tool, all diameters adjustable

Solution

Multi-step fine boring tool / Teeth = 4 / Teeth_{eff.} = 1

Cutting data

Material	(DIN)  GGG40
Cutting grade	carbide coated
Cutting speed	m/min (Ø 41.35) 197
Feed rate per tooth	mm 0.15
Cutting depth	mm -3

Result

Flexible tool design

Inserts separately adjustable



Customer benefits

High flexibility of diameter offsets



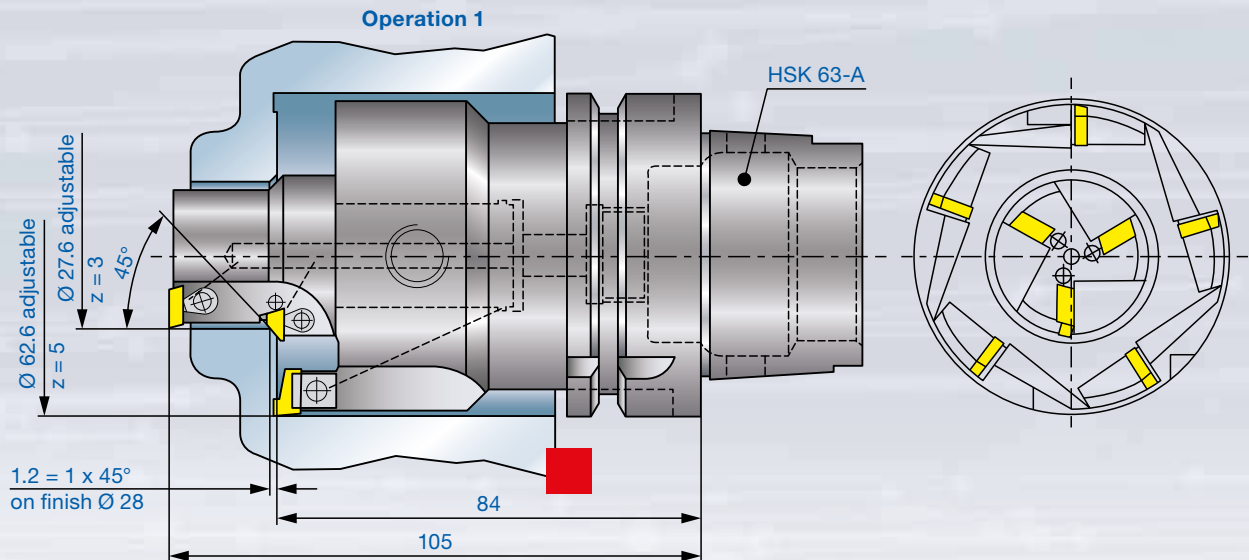
Oil pump

Pump cavity

Operation 1: multi-step fine boring tool / Teeth = 3 + 5

Operation 2: step milling cutter / Teeth = 4 + 8

Operation 3: multi-step fine boring tool / Teeth = 1 + 1 / 3



Requirements

Operation 1: fine boring tool for rough machining of the pump cavity

Operation 2: step milling cutter for simultaneous milling of the sealing surfaces, distance (dim. 49) μ m-accurate adjustable

Operation 3: fine machining of both diameters with CBN

Solution

Operation 1: multi-step fine boring tool / Teeth = 3 + 5

Operation 2: step milling cutter / Teeth = 4 + 8

Operation 3: multi-step fine boring tool / Teeth = 1 + 1 / 3

Cutting data		Operation 1	Operation 2	Operation 3
Material		(DIN) ■ GG25		
Cutting grade		carbide coated	carbide coated	CBN
Cutting speed	m/min	(Ø 27.6) 108 (Ø 62.6) 242	(Ø 23) 92 (Ø 63) 250	240
Feed rate per tooth	mm	(Ø 27.6) 0.15 (Ø 62.6) 0.09	(Ø 23) 0.12 (Ø 63) 0.06	0.1
Cutting depth	mm	-3	~ 2	0.2

Result

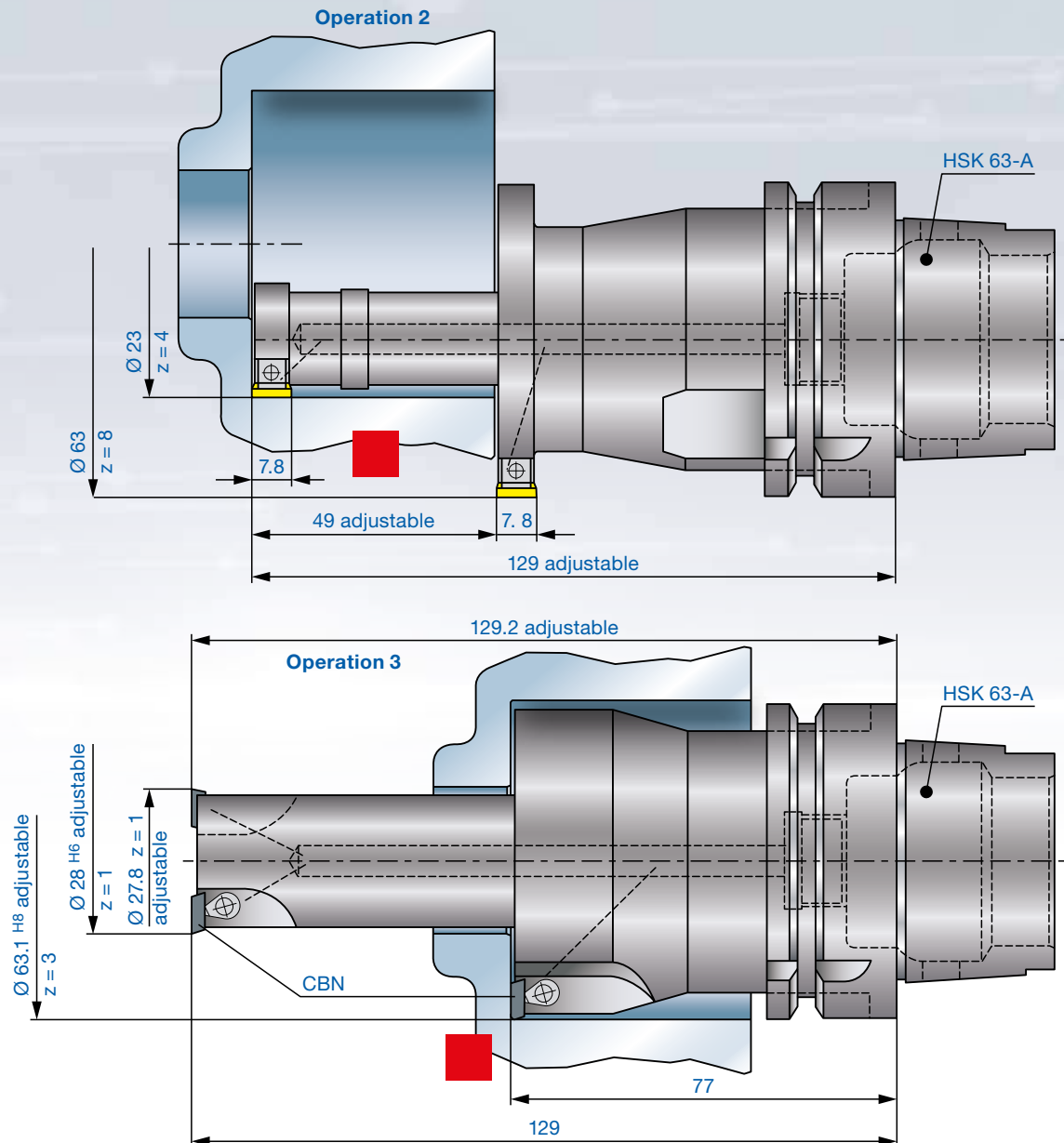
Reduced machining time



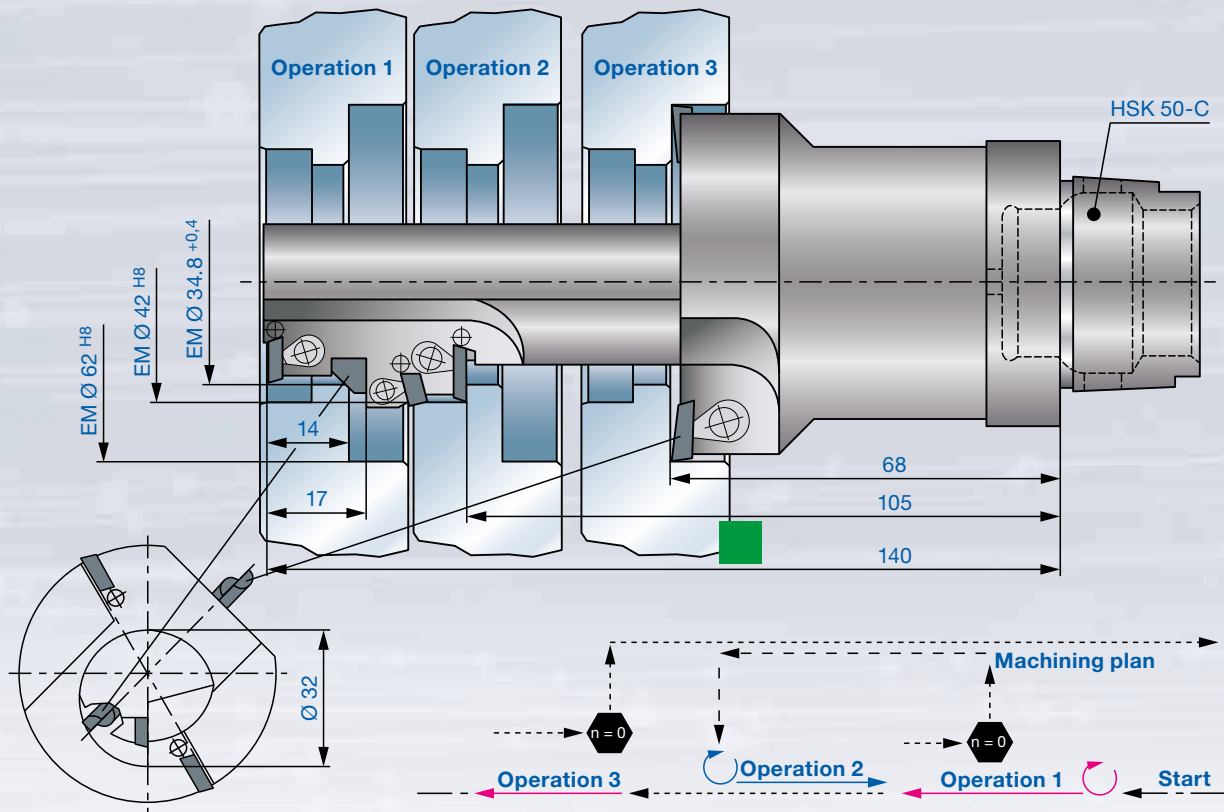
Customer benefits

Low costs per component
Higher process reliability

Operation 3: fine machining of both diameters with CBN



Forward and backward fine boring tool / Teeth = 7 / Teeth_{eff.} = 1



Requirements

Combination tool for 6 machining steps

All inserts adjustable

Solution

Forward and backward fine boring tool / Teeth = 7 / Teeth_{eff.} = 1

Cutting data

Material	(DIN) ■ AISi9
Cutting grade	PCD
Cutting speed	m/min (Ø62) 467
Feed rate per tooth	mm 0.12
Cutting depth	mm 0.5

Result

Short processing time

Inserts can be changed separately



Customer benefits

Low costs per component

Multi-step fine boring tool / $Teeth_{eff.} = 2$



Requirements

Multi-step machining with one tool

Solution

Multi-step fine boring tool / $Teeth_{eff.} = 2$

Cutting data

Material	(DIN) ■ ENAC-AlSi12CuNiMg	
Cutting grade	PCD 10	
Cutting speed	m/min	1,500
Feed rate per tooth	mm	0.13

Result

Short machining time

Very good surface quality and dimensional accuracy

Inserts can be changed separately depending on wear



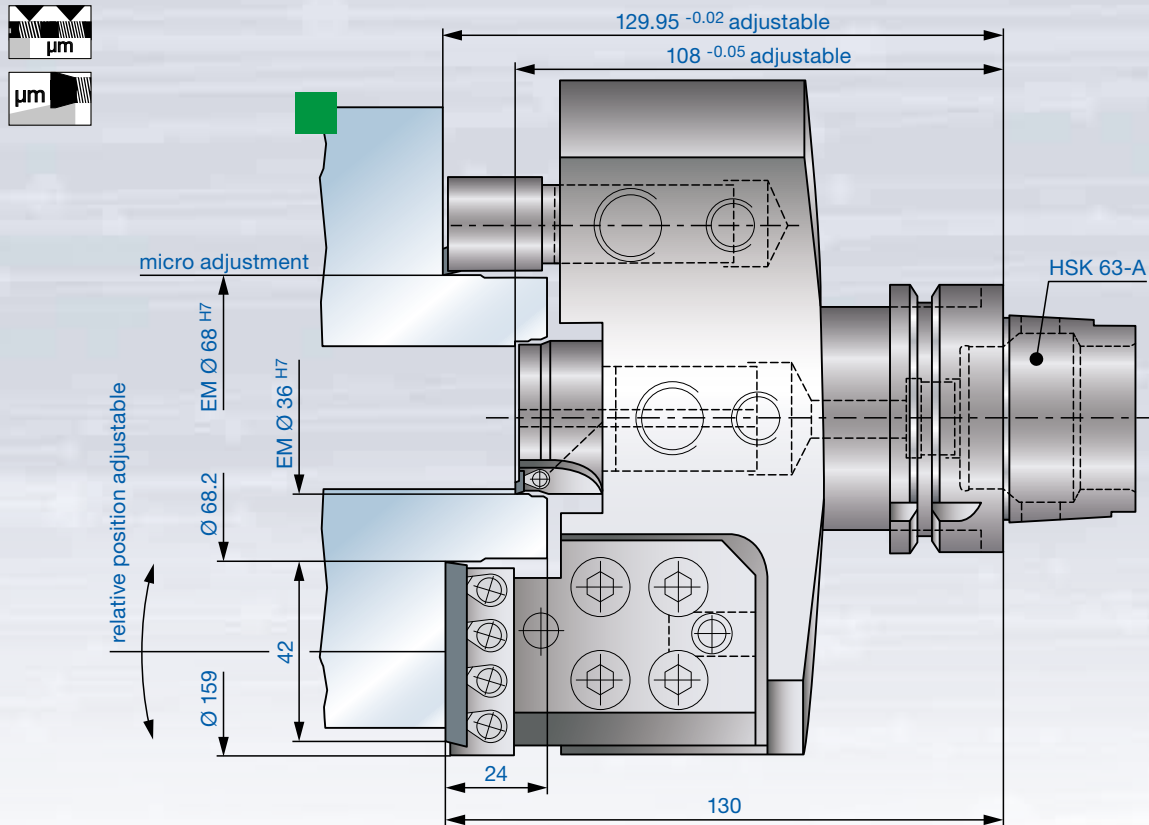
Customer benefits

Cycle time reduction thanks to combination of several machining steps

Low costs per component

Modular designed fine boring tool

Angular position of inserts for sealing surface adjustable



Requirements

Combination tool for 6 machining steps, cartridges for different types of workpieces

Inserts adjustable in diameter

Solution

Modular designed fine boring tool

Angular position of inserts for sealing surface adjustable

Cutting data

Material	(DIN) ■ GD-AISI12Cu
Cutting grade	PCD
Cutting speed	m/min (Ø68) 641
Feed rate per tooth	mm 0.12
Cutting depth	mm -4

Result

Flexible tool design for high requirements



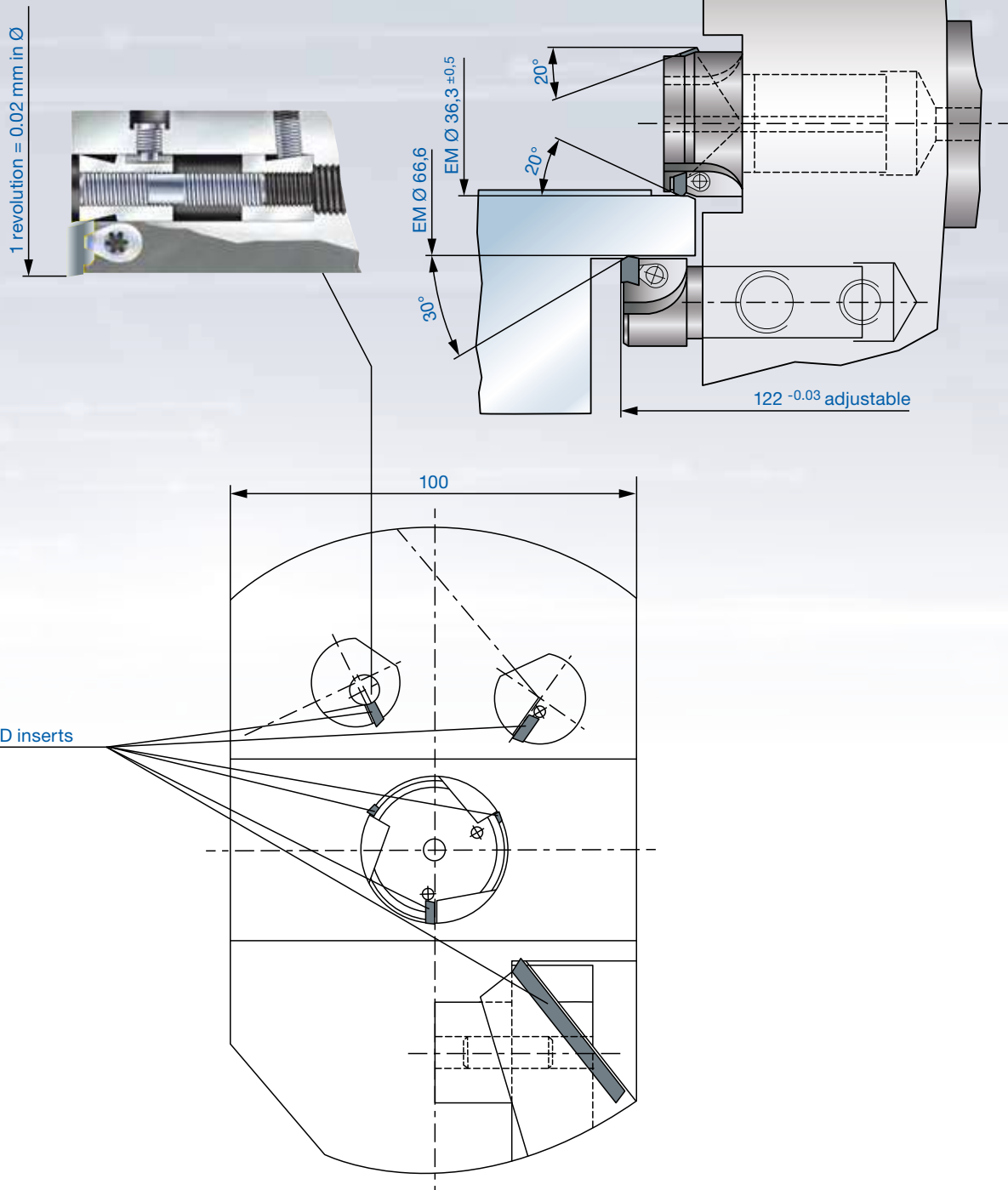
Customer benefits

High process reliability



Micro-adjustment

allows the precise adjustment of the tool diameter directly in the machine without using any devices, this leads to a reduction of non-productive times in continuously running processes e.g. mass production of automotive components.

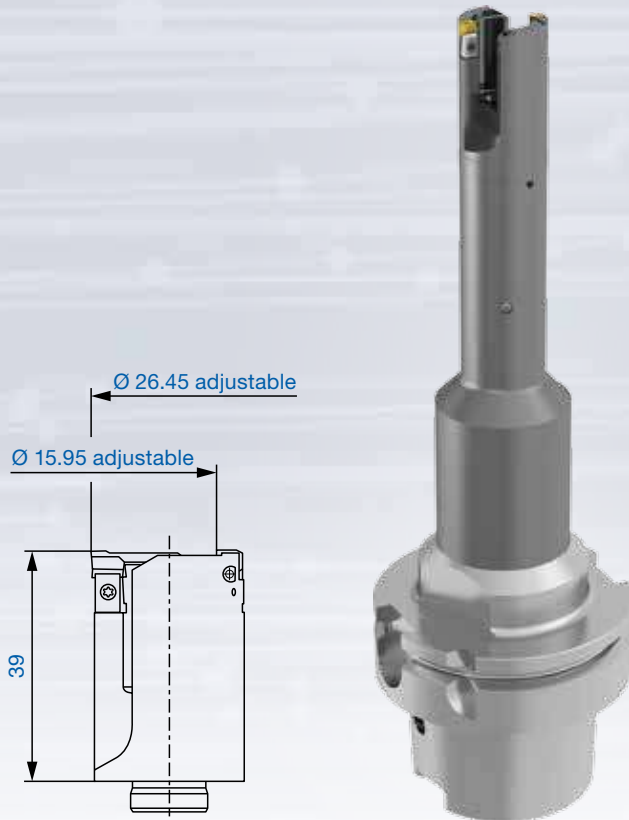


H Injection pump

Axial grooving

Axial grooving tool with heavy metal shank / Teeth = 2 / Teeth_{eff.} = 1

Replaceable head design



Requirements

Grooving tool with adjustable inserts

Solution

Axial grooving tool with heavy metal shank / Teeth = 2 / Teeth_{eff.} = 1

Replaceable head design

Cutting data

Material	(DIN) ■ 20MnCr5
Cutting grade	carbide coated
Cutting speed	m/min (Ø21,2) 121
Feed rate per tooth	mm 0.08
Cutting depth	mm into solid

Result

Good chip control thanks to cutting division

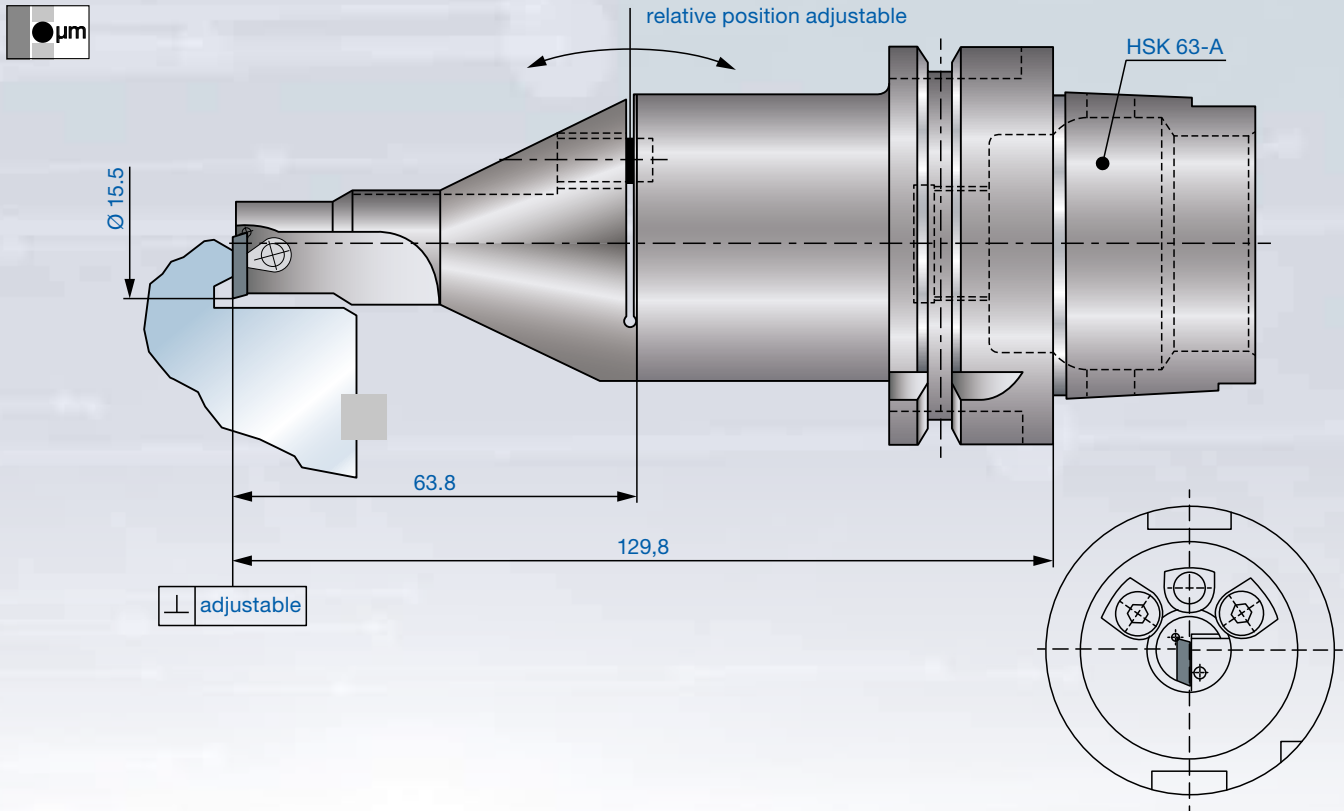
Excellent surface finish



Customer benefits

High process reliability

Fine boring tool / Teeth = 1



Requirements

Hard machining of the sealing surface

Angular position of inserts on tool holder adjustable

Solution

Fine boring tool / Teeth = 1

Cutting data

Material	60 - 62 HRC	(DIN) ■ 20MnCr5
Cutting grade		CBN
Cutting speed	m/min	195
Feed rate per tooth	mm	0.025
Cutting depth	mm	0.2

Result

Excellent surface finish quality

Very good tool life

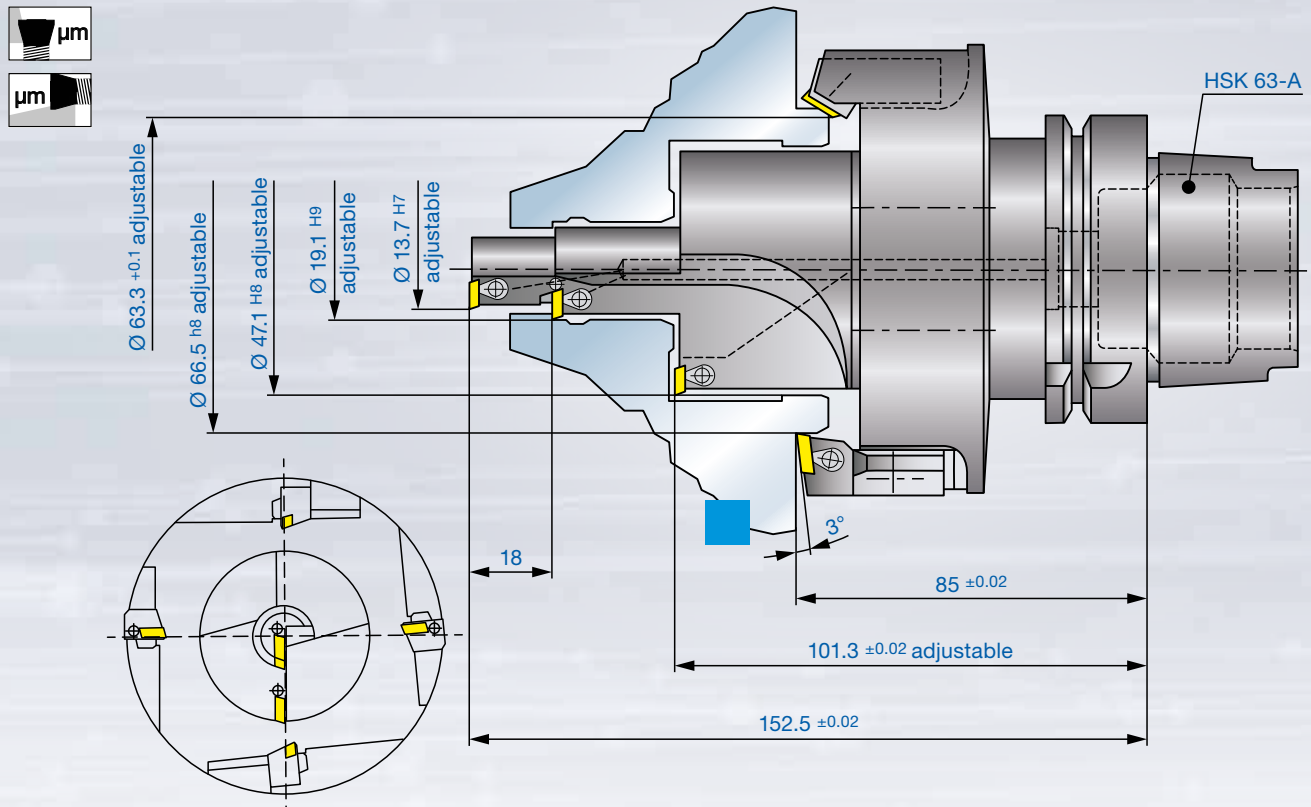
Regrindable CBN inserts



Customer benefits

Low costs per component

Multi-step fine boring tool / Teeth = 7 / Teeth_{eff.} = 1 /
(Ø 66.5 + Ø 63.3) Teeth = 2



Requirements

Combination tool for 5 machining steps

Solution

Multi-step fine boring tool / Teeth = 7 / Teeth_{eff.} = 1 / (Ø 66.5 + Ø 63.3) Teeth = 2

Cutting data

Material	(DIN) ■ 20MnCr5
Cutting grade	carbide coated
Cutting speed	m/min (Ø 13.7) 37 (Ø 66.5) 180
Feed rate per tooth	mm (Ø 13.7) 0.15 (Ø 66.5) 0.075
Cutting depth	mm (Ø 13.7) 0.5 (Ø 66.5) 0.5 - 1.5

Result

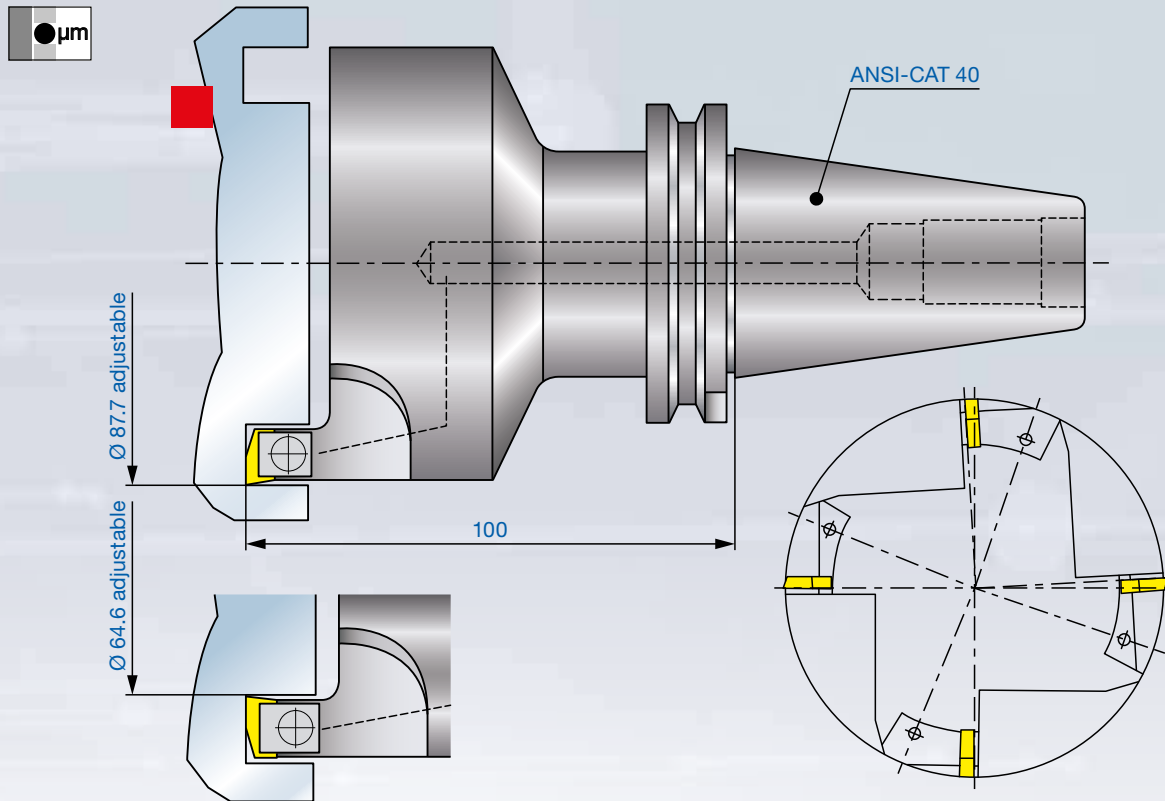
Inserts separately adjustable and replaceable



Customer benefits

Low costs per component

Fine boring/grooving tool / Teeth = 2 + 2



Requirements

Inside and outside diameter adjustable

Solution

Fine boring/grooving tool / Teeth = 2 + 2

Cutting data

Material	(DIN) ■ GG25
Cutting grade	carbide coated
Cutting speed	m/min 220
Feed rate per tooth	mm 0.1
Cutting depth	mm ~ 12, entire cutting width

Result

Very good tool life



Customer benefits

Low costs per component
High process reliability
Simple tool handling



Injection pump

Pre-machining connecting flange

OD turning tool,
stationary tool (turning machine) / Teeth = 2 + 2 + 1 + 1



Requirements

Reduction of cycle times

Solution

OD turning tool, stationary tool (turning machine) / Teeth_{eff.} = 2 / 1

Cutting data

Material		(DIN) ■ X17CrNi16/1.4057
Cutting grade		carbide coated
Cutting speed	m/min	200
Feed rate per tooth	mm	0.125
Cutting depth	mm	4

Result

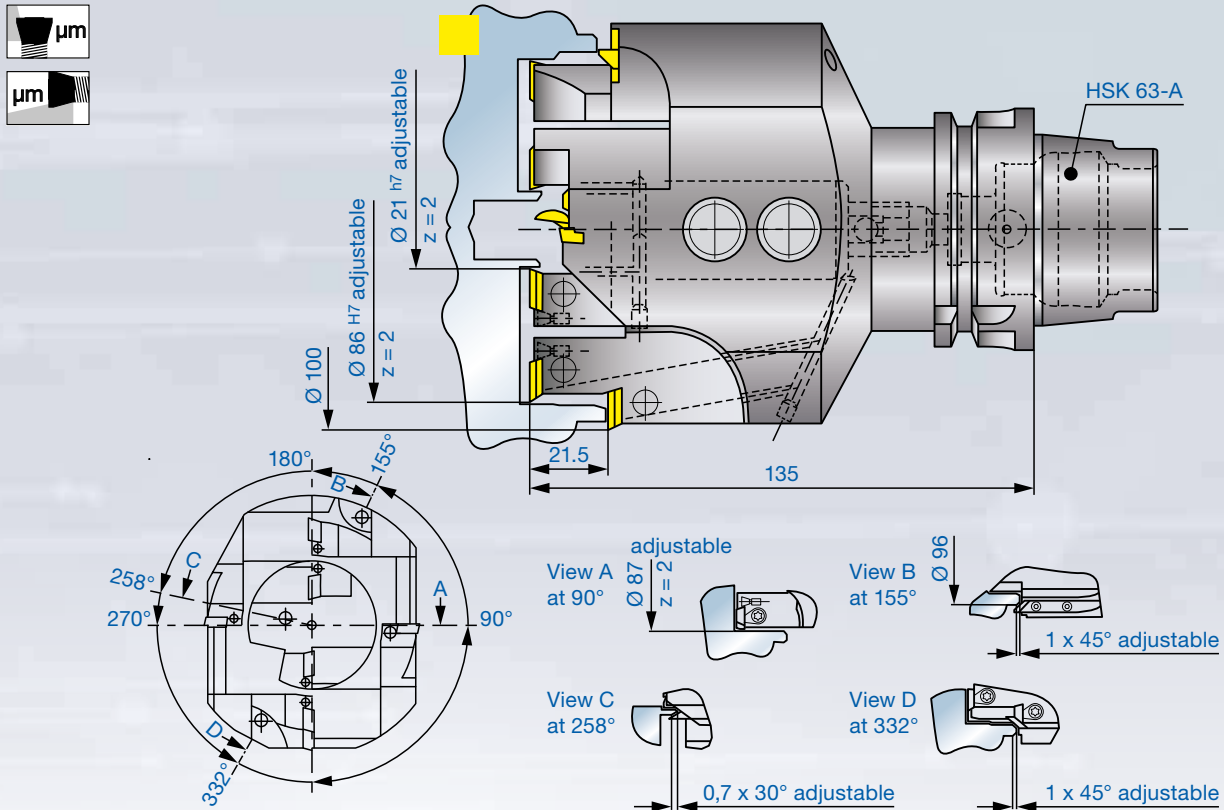
Faster machining with consistent quality



Customer benefits

Reduced cycle times up to 66 %

Multi-step fine boring tool / Teeth = 2 + 2 + 2 + 1 + 1 + 1 + 1



Requirements

Combination tool, all diameters adjustable

Solution

Multi-step fine boring tool / Teeth = 2 + 2 + 2 + 1 + 1 + 1 + 1

Cutting data

Material	(DIN)  X2CrNi19-11
Cutting grade	carbide coated
Cutting speed	m/min 25 - 100
Feed rate per tooth	mm 0.025
Cutting depth	mm 0.4

Result

Flexible tool design



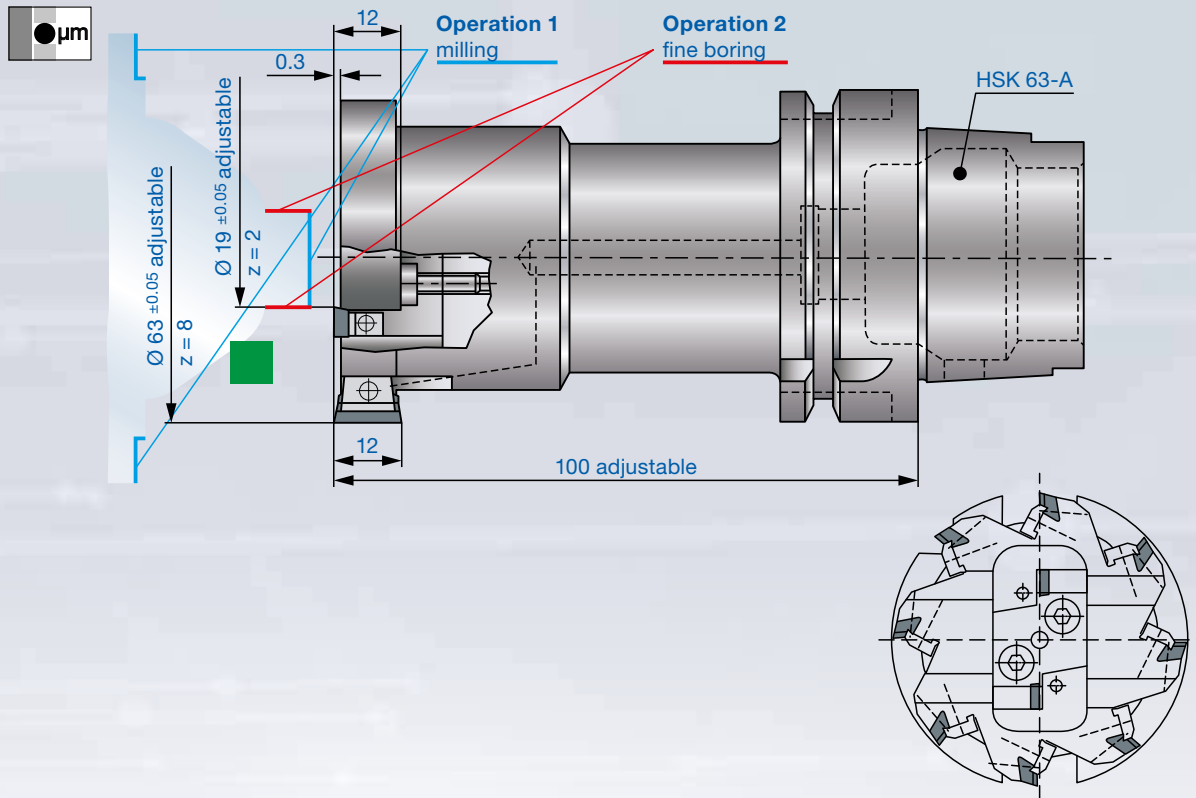
Customer benefits

- Short machining time
- Low costs per component

Various automotive components



Milling and overturning tool / Teeth = 8 (milling), 2 (fine boring)



Requirements

Milling and overturning of a stud with one tool

Face runout of the milling cutter and diameter of the fine boring tool are adjustable

Solution

Milling and overturning tool / Teeth = 8 (milling), 2 (fine boring)

Cutting data

Material		(DIN)  GDAISI12	
Cutting grade		PCD	
		milling	fine boring
Cutting speed	m/min	(Ø 63) 1.800	(Ø 19) 543
Feed rate per tooth	mm	0.12	0.12
Cutting depth	mm	0.8	0.8

Result

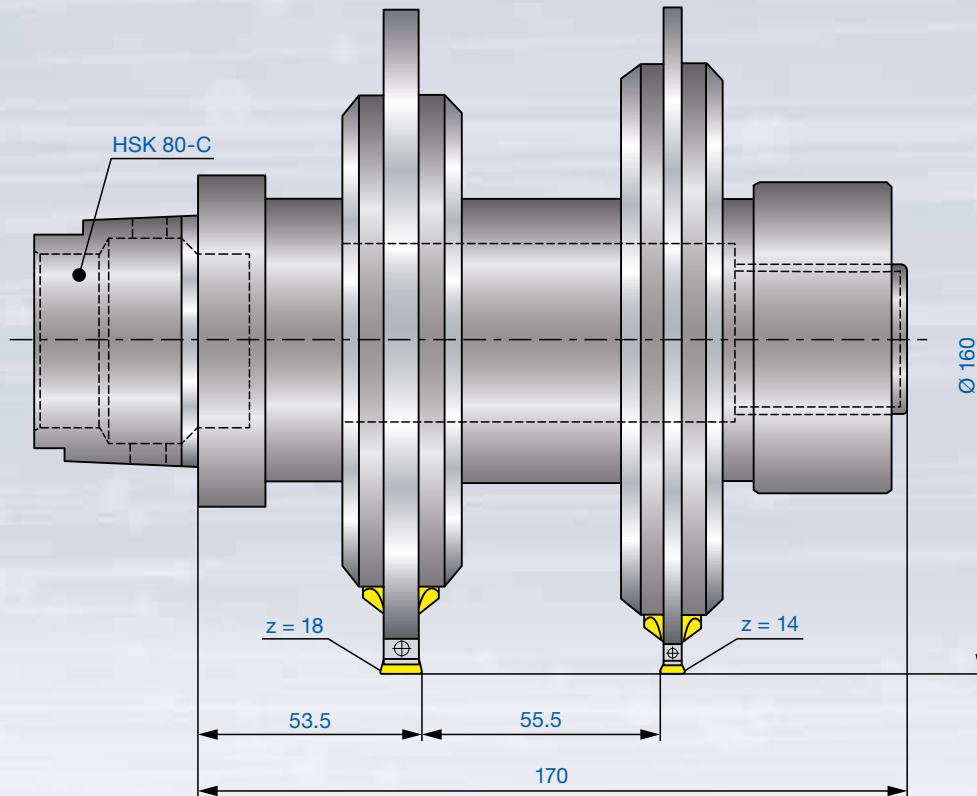
Reduced machining time thanks to combination tool



Customer benefits

- Low costs per component
- Increased productivity

Gang milling cutter / Teeth = 18 / 14



Requirements

Machining of two types of camshafts with only one tool

Solution

Gang milling cutter / Teeth = 18/14

Cutting data

Material	(DIN) ■ GGG40
Cutting grade	carbide coated
Cutting speed	m/min 80
Feed rate per tooth	mm 0.06
Cutting depth	mm Teeth = 18/16 Teeth = 14/7

Result

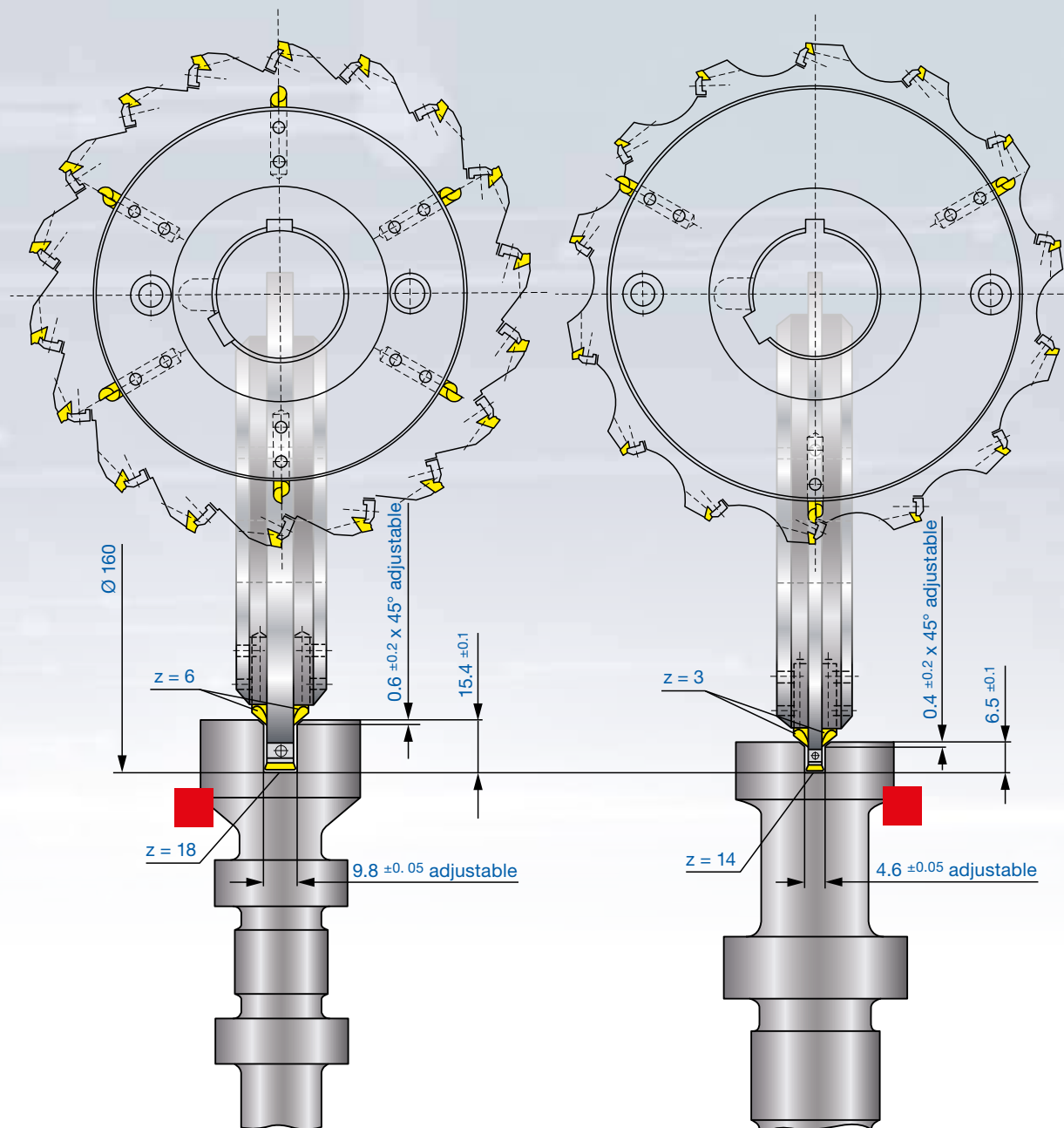
Reduced non-productive times

Reduced machining stations

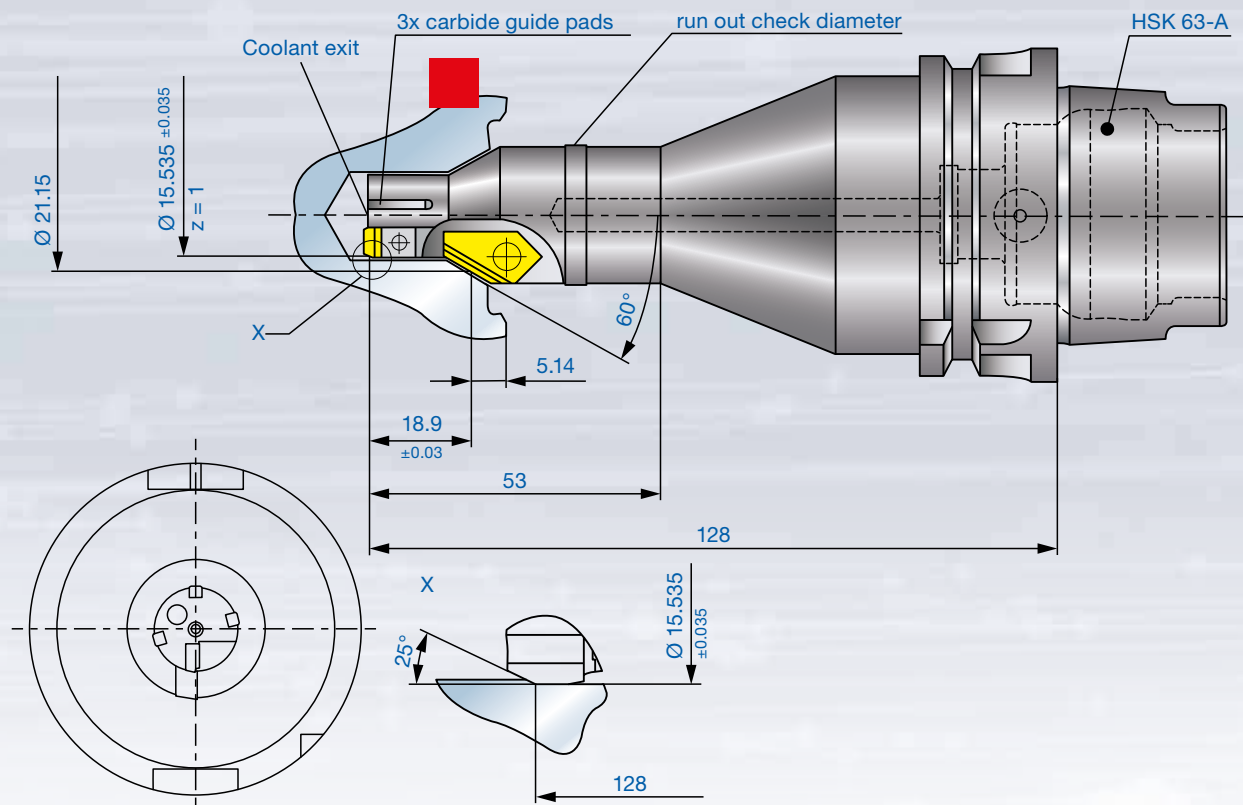


Customer benefits

Increased productivity



Fine boring and chamfer tool / Teeth = 1 + 1



Requirements

Fine boring tool with carbide guide pads for machining of the flange bore

Solution

Fine boring and chamfer tool / Teeth = 1 + 1

Cutting data

Material	(DIN) ■ GGG60
Cutting grade	carbide coated
Cutting speed	m/min 80
Feed rate per tooth	mm 0.12
Cutting depth	mm 0.15

Result

High dimensional accuracy thanks to tool concept with guide pads

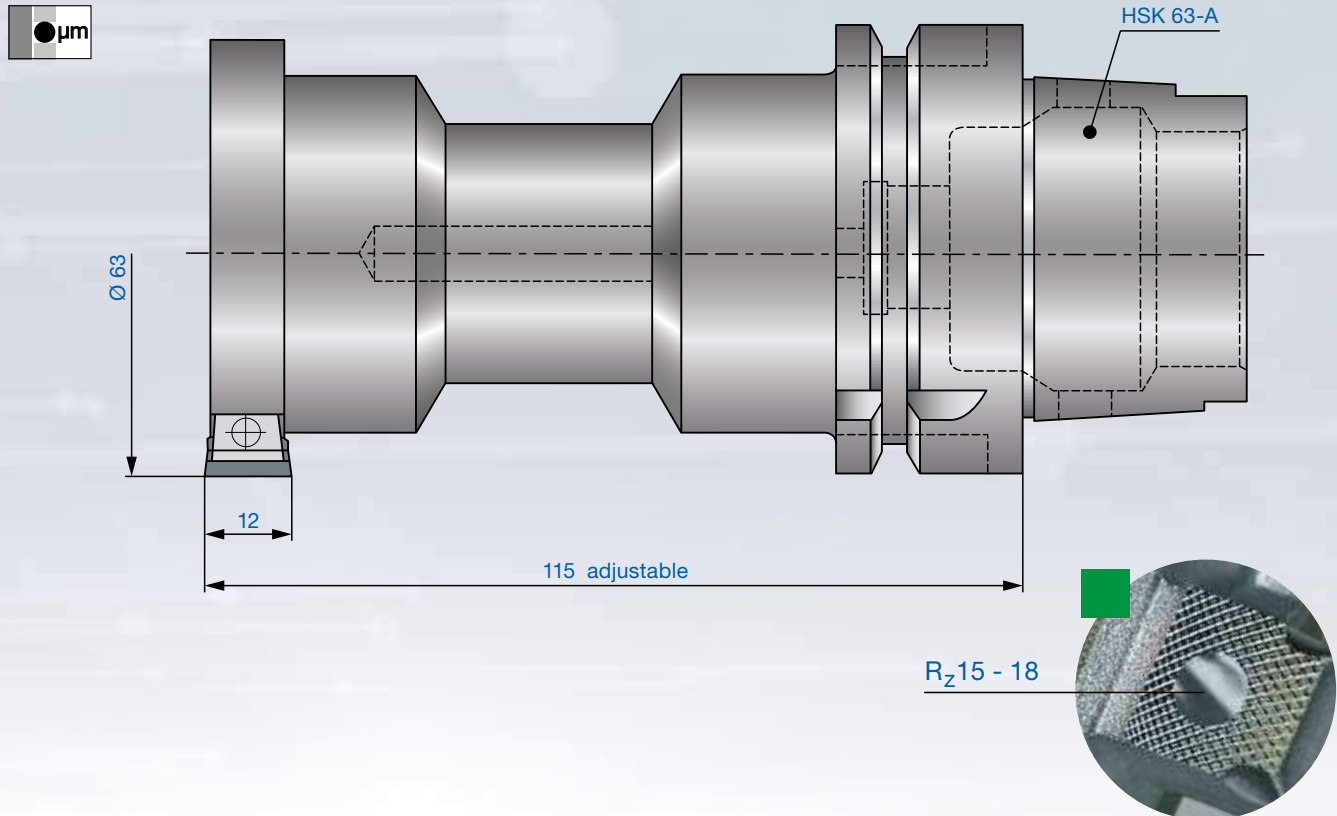


Customer benefits

Higher process reliability

Special face milling cutter / Teeth = 8

Equipped with standard PCD inserts



Requirements

Milling of the sealing surface with a defined surface roughness

All inserts axially adjustable

Solution

Special face milling cutter / Teeth = 8

Equipped with standard PCD inserts

Cutting data

Material	(DIN)	■ AISi12Cu
Cutting grade		PCD
Cutting speed	m/min	3560
Feed rate per tooth	mm	0.16

Result

High machining speed thanks to special insert geometry

Constant wear - all inserts set to same height



Customer benefits

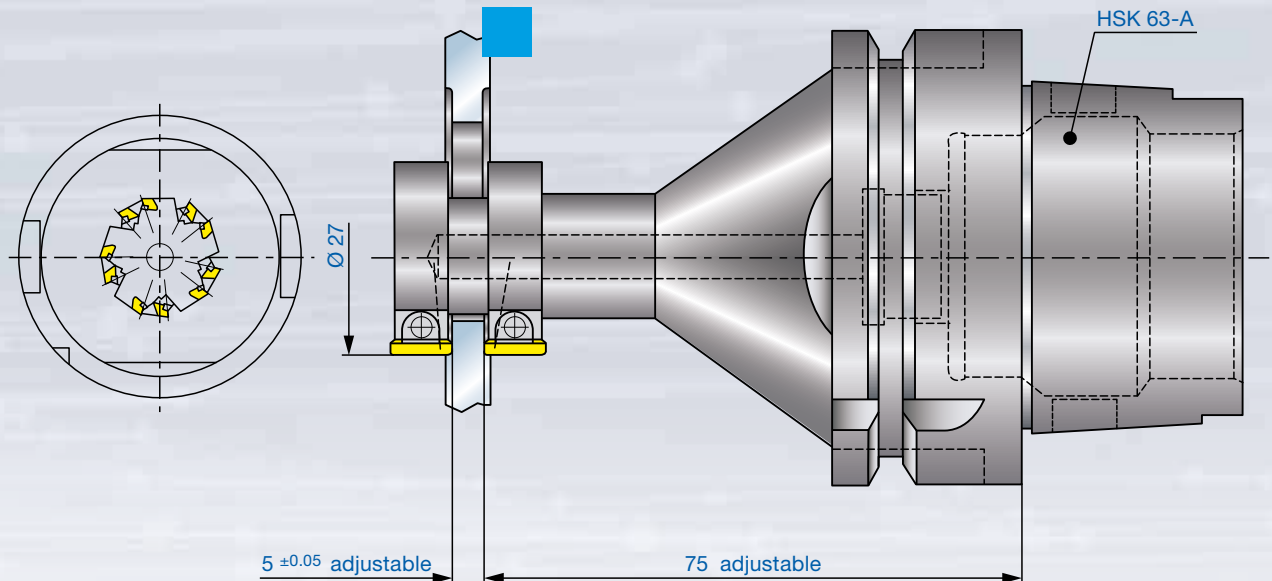
Low costs per component

Increased productivity

Gang milling cutter (monoblock) / Teeth = 10 / Teeth_{eff.} = 5

Inserts interchangeable among each other, thus both cutting edges of the inserts can be used

All inserts adjustable (dim. 5 mm)



Requirements

Very unstable component, requires low cutting forces of the tool

Machining of the two ring surfaces in one cut

Solution

Gang milling cutter (monoblock) / Teeth = 10 / Teeth_{eff.} = 5

Inserts interchangeable among each other thus both cutting edges of the inserts can be used

All inserts adjustable (dim. 5 mm)

Cutting data

Material	(DIN) ■ C35-520 N/mm ²
Cutting grade	carbide coated
Cutting speed	m/min 120
Feed rate per tooth	mm 0.1
Cutting depth	mm both sides 0.6

Result

Short machining time

Inserts usable on both sides



Customer benefits

Low costs per component

Large radii can be achieved

Tangential inserts with PCD cutting edges



Requirements

Milling connection taps in a single step

Solution

Gang milling cutter for double-sided milling of two taps

Cutting data

Material		■ AISi9
Cutting grade		PCD
Cutting speed	m/min	1,250
Feed rate per tooth	mm	0.1
Cutting depth	mm	3-12!

Result

Process reliable machining of combined work steps



Customer benefit

Long tool life thanks to PCD-coated cutting inserts

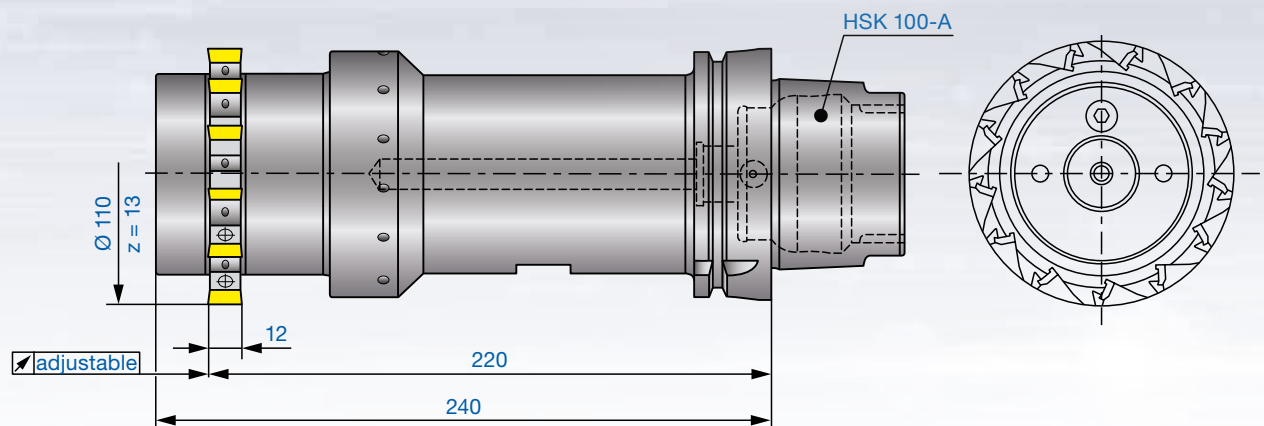
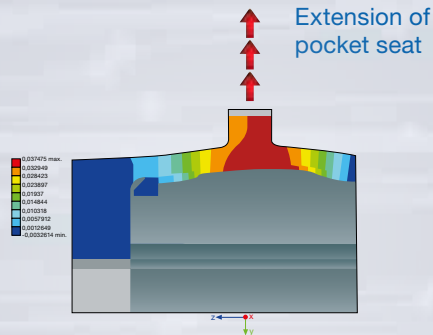
Short machining times as a result of multiple operations being combined in one tool

Reaming tool / Teeth = 13

Adjustment range 60 µm for diameter → 5 µm per turn

Interchangeable inserts

- Diameter µm-accurate adjustable
- Adjustment to both directions
- Adjustment range 60 µm for diameter
→ 5 µm per turn
- Interchangeable inserts



Requirements

Diameter µm-accurate adjustable in both directions

Solution

Reaming tool / Teeth = 13

Adjustment range 60 µm for diameter → 5 µm per turn

Freely selectable and exchangeable inserts

Cutting data

Material	(DIN) ■ GGG50
Cutting grade	carbide coated
Cutting speed	m/min 160
Feed rate per tooth	mm 0.2
Cutting depth	mm 0.25

Result

Reduced non-productive time thanks to adjustment options on the machine

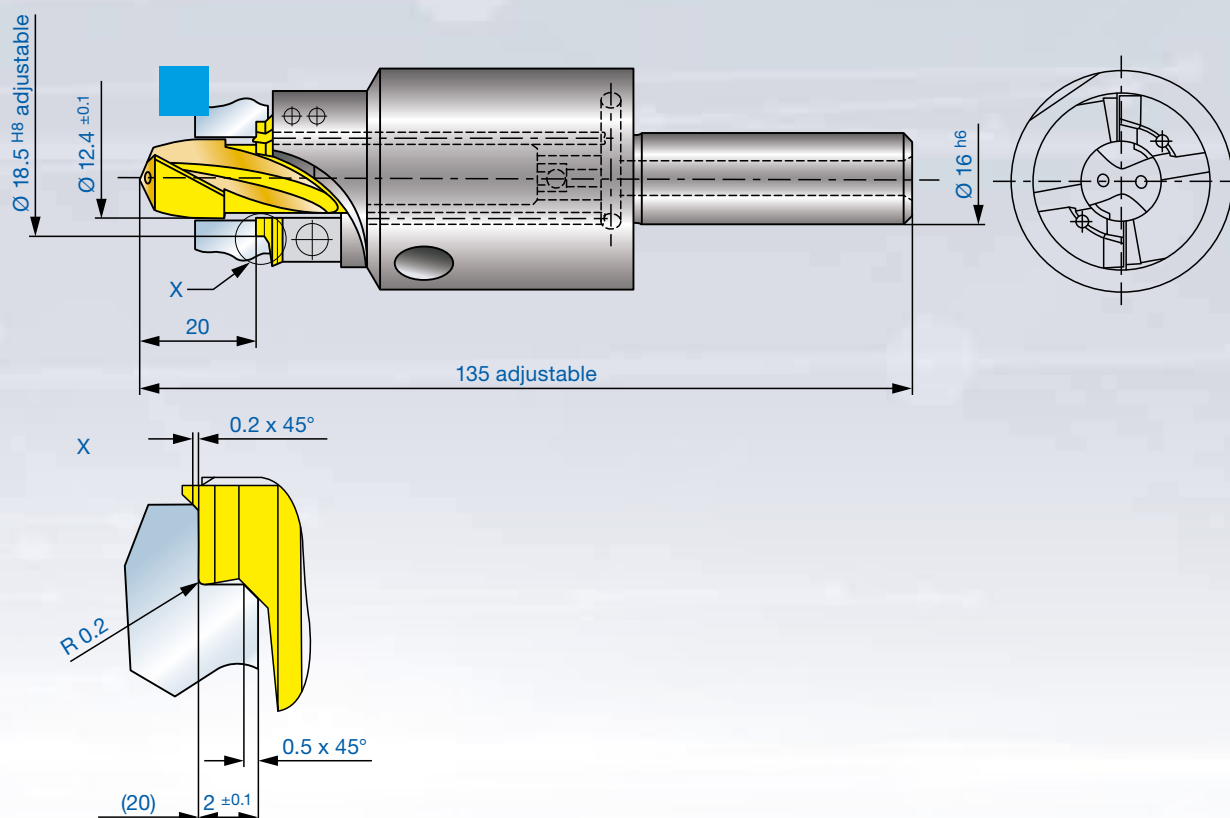


Customer benefits

- High process reliability
- High productivity

Combination tool for the complete component contour

$\varnothing 18,5^{H8}$ adjustable by means of eccentric pin adjustment



Requirements

Combination tool for the complete component contour

Solution

Drilling and fine boring tool / Teeth = 2

$\varnothing 18,5^{H8}$ adjustable by means of eccentric pin adjustment

Cutting data

Material		(DIN)  Ck45	
Cutting grade		carbide coated	
		drilling	fine boring
Cutting speed	m/min	71	141
Feed rate per tooth	mm	0.12	0.08
Cutting depth	mm	into solid	3

Result

Reduction of machining time thanks to combination tool

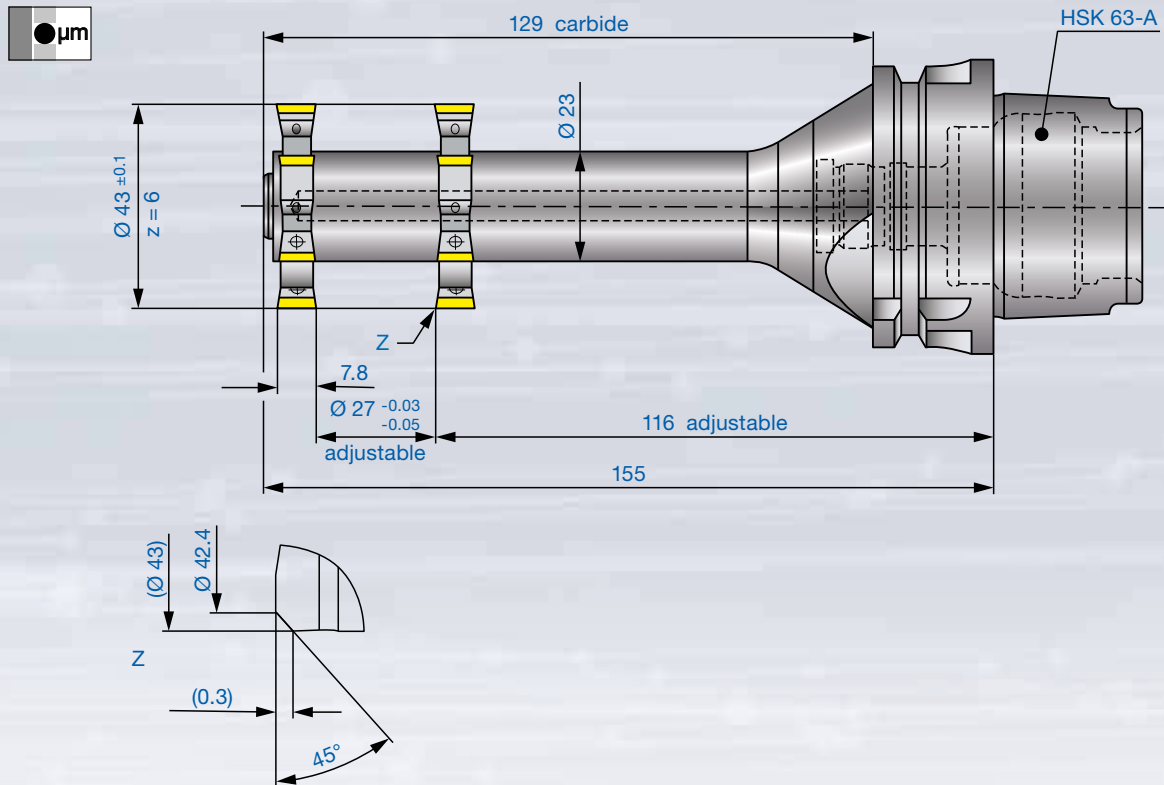


Customer benefits

Low costs per component
Increased productivity

H Balance shaft housing

Gang milling cutter / Teeth = 6 + 6



Requirements

Machining of both ring surfaces in one cut

Solution

All inserts adjustable (dim. 5 mm)

Cutting data

Material	(DIN) ■ GG25
Cutting grade	carbide coated
Cutting speed	m/min 270
Feed rate per tooth	mm 0.15
Cutting depth	mm 0.2

Result

Short machining time

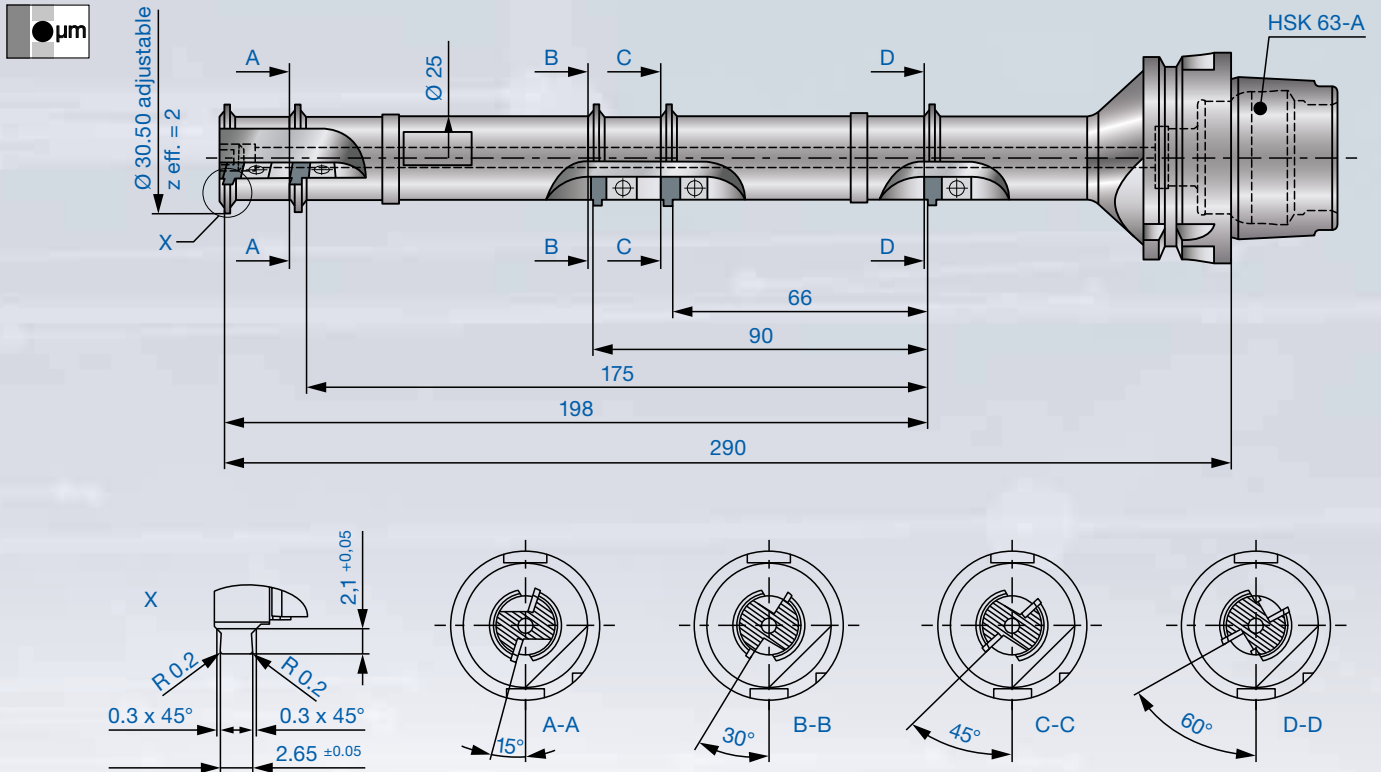
Inserts usable on both sides



Customer benefits

Low costs per component

Circular milling cutter / Teeth = 2 + 2 + 2 + 2 + 2



Requirements

Circular milling cutter for the machining of grooves

Solution

Circular milling cutter / Teeth = 2 + 2 + 2 + 2 + 2

Cutting data

Material	(DIN) ■ Al
Cutting grade	PCD
Cutting speed	m/min 490
Feed rate per tooth	mm 0.1
Cutting depth	mm 0.5 - 1.0

Result

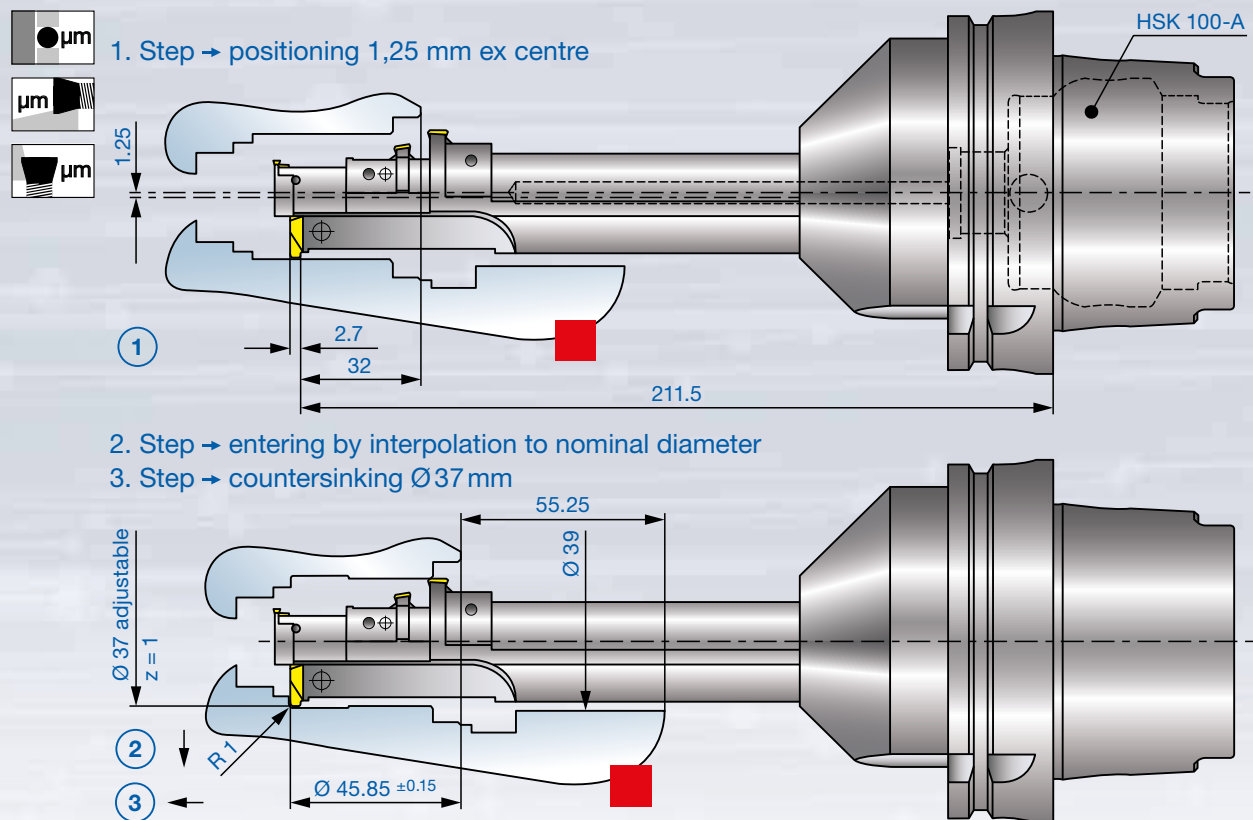
Tool life tripled



Customer benefits

Reduced tooling costs
Reduced handling costs

Interpolation turning tool / Teeth = 4 + 1



Requirements

Combination tool for Ø37 mm plus seal grooves

Solution

Interpolation turning tool / Teeth = 4 + 1

Cutting data

Material	(DIN) ■ GGG45
Cutting grade	carbide coated
Cutting speed	m/min 70
Feed rate per tooth	mm 0.12
Cutting depth	mm 0.75

Result

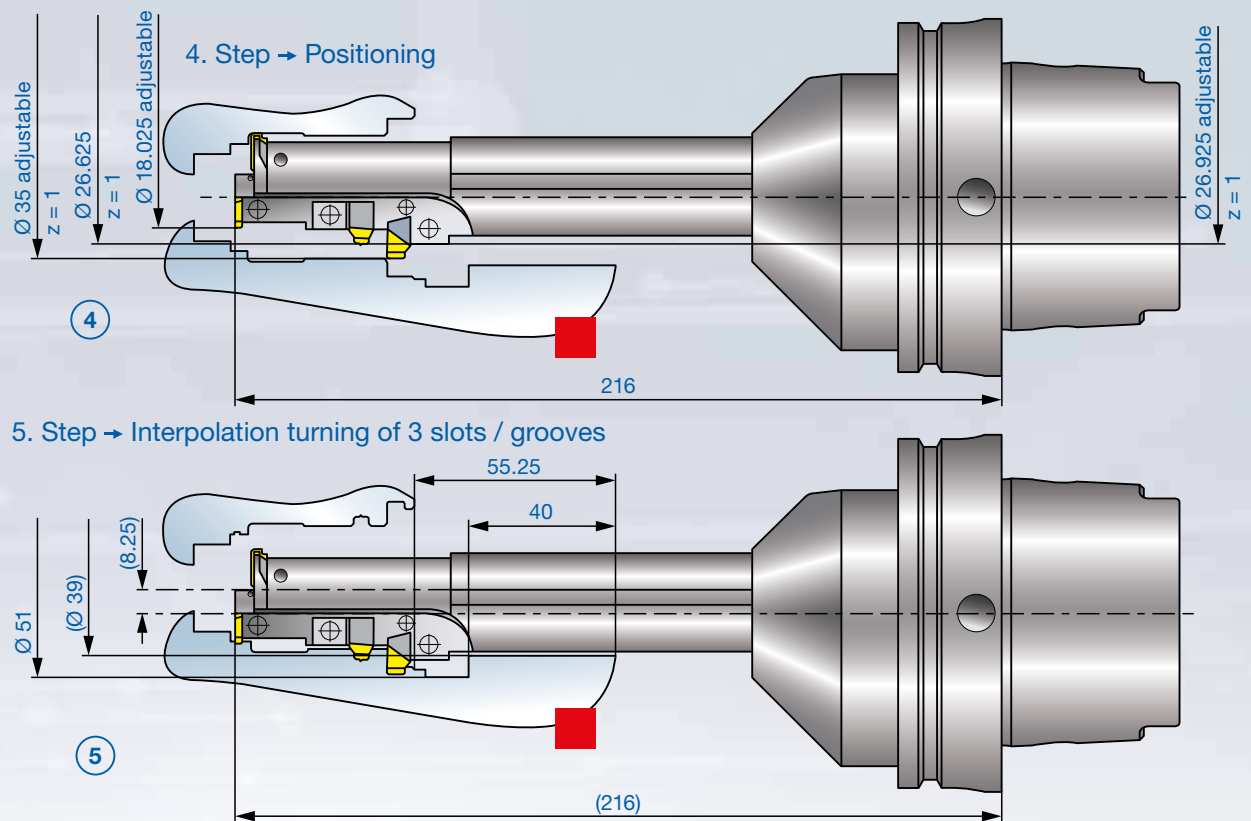
Reduction of machining time thanks to combination tool

Long tool life thanks to constant cut (interpolation turning process)



Customer benefits

Low costs per component
High productivity



Drilling and countersinking tool with interchangeable inserts



Requirements

Machining of the complete workpiece contour with one tool

Solution

Step tool with interchangeable inserts

Cutting data

Material		(DIN) ■ GGG40
Cutting grade		carbide coated
Cutting speed	m/min	52 (Ø27.7)
Feed rate per tooth	mm	0.28
Cutting depth	mm	into solid

Result

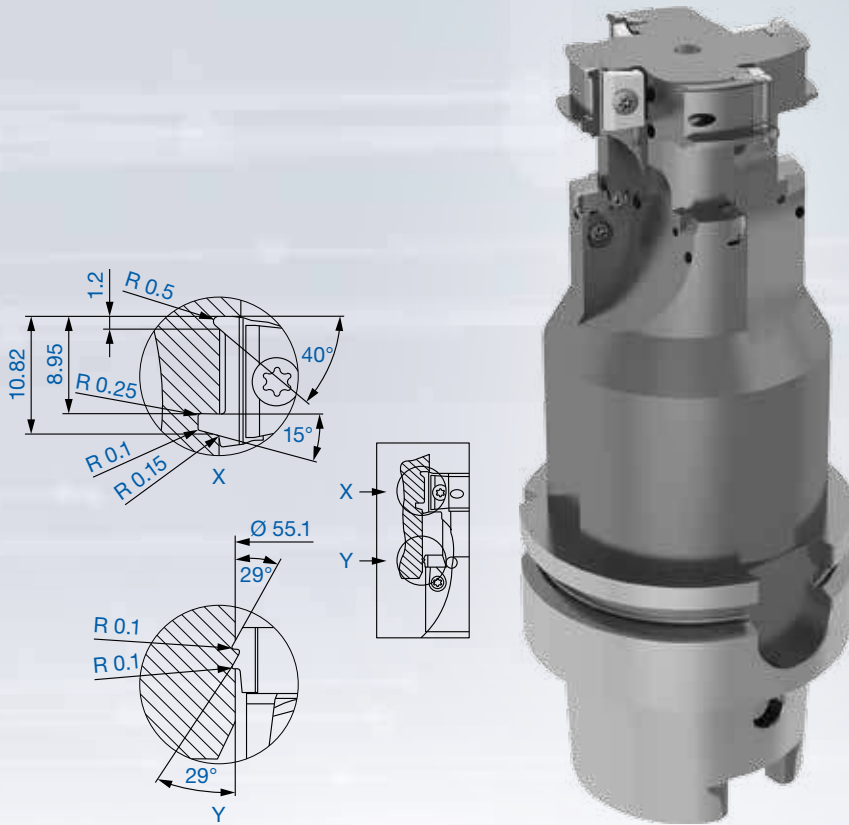
Tool life tripled



Customer benefits

Reduced tooling costs
Reduced handling costs

Circular milling cutter with form inserts / Teeth = 4 + 4



Requirements

Grouping of several groove machining operations

Solution

Circular milling cutters with form inserts / Teeth = 4 + 4

Cutting data

Material	(DIN)  GD-AISI9Cu3	
Cutting grade	PCD	
Cutting speed	m/min	1,060
Feed rate per tooth	mm	0.13

Result

High positional accuracy of the grooves and edge outlines in relation to each other

Several grooves can be produced with one tool



Customer benefits

High process reliability
High productivity

Multi-fluted OD tool / Teeth = 3 + 1

Coolant outlet at front for 1-channel MQL system



Requirements

Reduction of costs per component

Solution

Multi-fluted OD tool / Teeth = 3 + 1

Cutting data

Material		(DIN) ■ C56E2
Cutting grade		carbide coated
Cutting speed	m/min	160
Feed rate per tooth	mm	0,2
Cutting depth	mm	6 mm in Ø

Result

Increased tool life by 60 %

Low cutting forces

Very good chip control



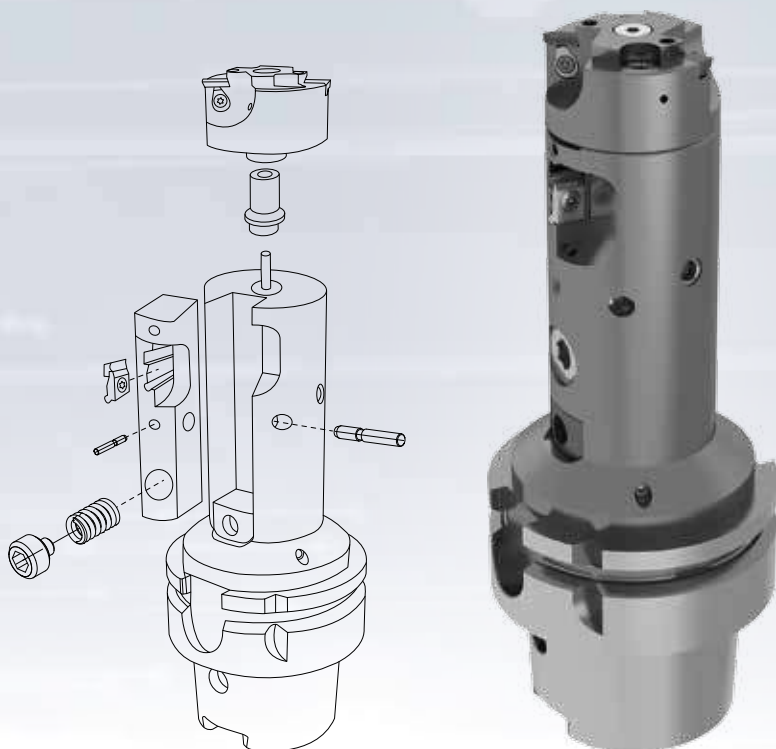
Customer benefits

Significant reduced costs per component

Automatically adjustable tool / Teeth = 2 + 1

SMART SETTING MOTION TOOLS concept

Machining diameter can be set μm -accurately larger and smaller by means of a central adjusting screw



**Smart
Setting
Motion
Tools**

Requirements

Reduction of non-productive times

Solution

Automatically adjustable tool / Teeth = 2 + 1

SMART SETTING MOTION TOOLS concept

Machining diameter can be set μm -accurately larger and smaller by means of a central adjusting screw

Cutting data

Material		(DIN) ■ 36MnVS4
Cutting grade		carbide coated
Cutting speed	m/min	138
Feed rate per tooth	mm	0.1/0.2

Result

High tool life quantity (it is re-adjusted approx. 2x per tool life)

Easy handling by readjusting the machining diameter directly in the machine spindle



Customer benefits

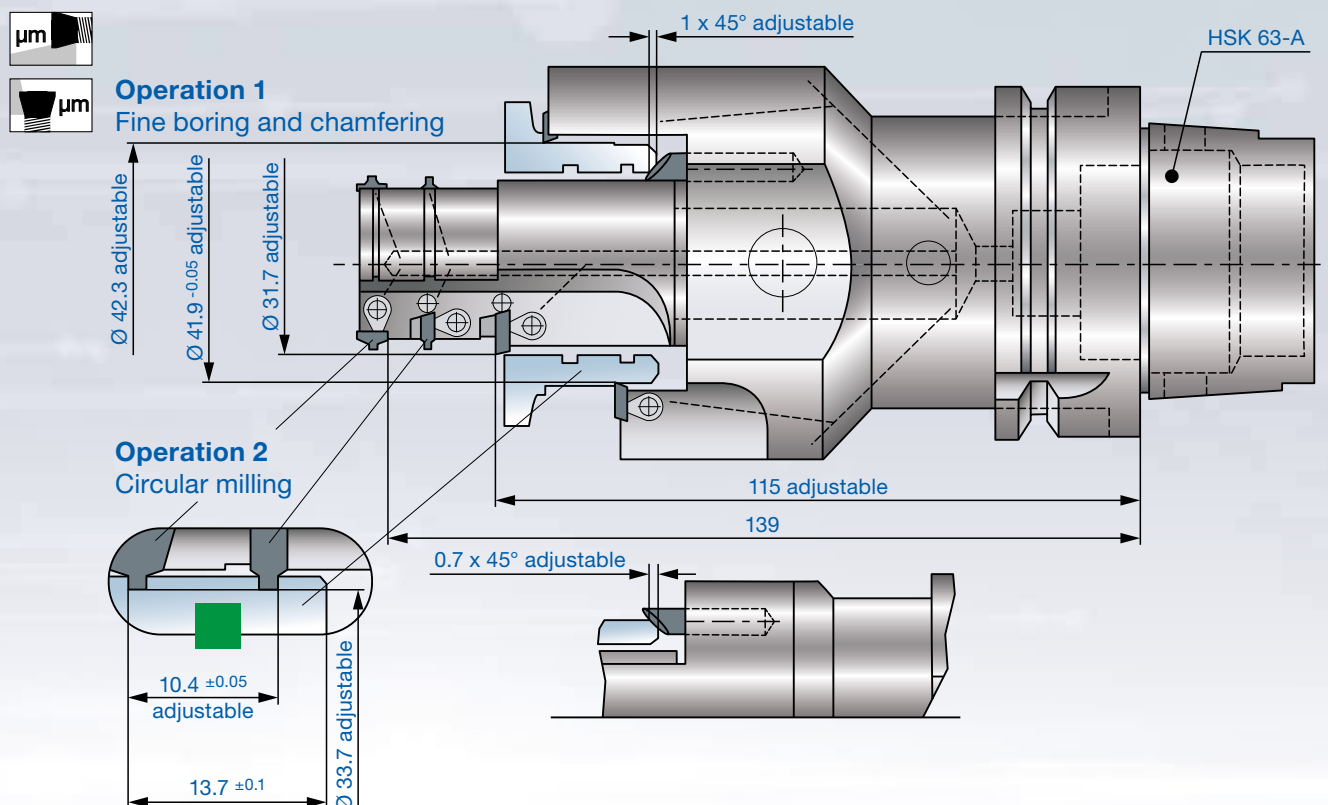
High productivity

General engineering

Fine boring, chamfering and circular milling tool
 $\text{Teeth} = 8 / \text{Teeth}_{\text{eff.}} = 1 \text{ per } \varnothing \text{ (fine boring) } / \text{Teeth} = 8 / \text{eff. } 2 \text{ per } \varnothing \text{ (milling)}$

Middle part exchangeable for different types of components

All inserts adjustable



Requirements

Combination tool for fine boring, chamfering and milling

Solution

Fine boring, chamfering and circular milling tool / $\text{Teeth} = 8 / \text{Teeth}_{\text{eff.}} = 1 \text{ je } \varnothing \text{ (fine boring) } / \text{Teeth} = 8 / \text{Teeth}_{\text{eff.}} = 2 \text{ je } \varnothing \text{ (milling)}$

Middle part exchangeable for different types of components

All inserts adjustable

Cutting data

Material	(DIN)  GD-ALSi9Cu3
Cutting grade	PCD
Cutting speed	m/min $(\varnothing 31.7) 750 (\varnothing 42.3) 1000$
Feed rate per tooth	mm (milling) 0.065 0.13
Cutting depth	mm 2 - 3

Result

Short machining time

High dimensional accuracy



Customer benefits

Low costs per component

Reduced non-productive times

for angle grinders

Fine boring, chamfering and face tool / Teeth = 6 eff. 1 per Ø

All inserts adjustable

Exchangeable cartridges for different types of housings



Requirements

Combination tool for 6 machining steps

Solution

Fine boring, chamfering and face tool / Teeth = 6 eff. 1 per Ø

All inserts adjustable

Exchangeable cartridges for different types of housings

Cutting data

Material		(DIN)  GD-AlSi9Cu3
Cutting grade		PCD
Cutting speed	m/min	800
Feed rate per tooth	mm	-0.15
Cutting depth	mm	0.5

Result

Short machining time

High dimensional accuracy



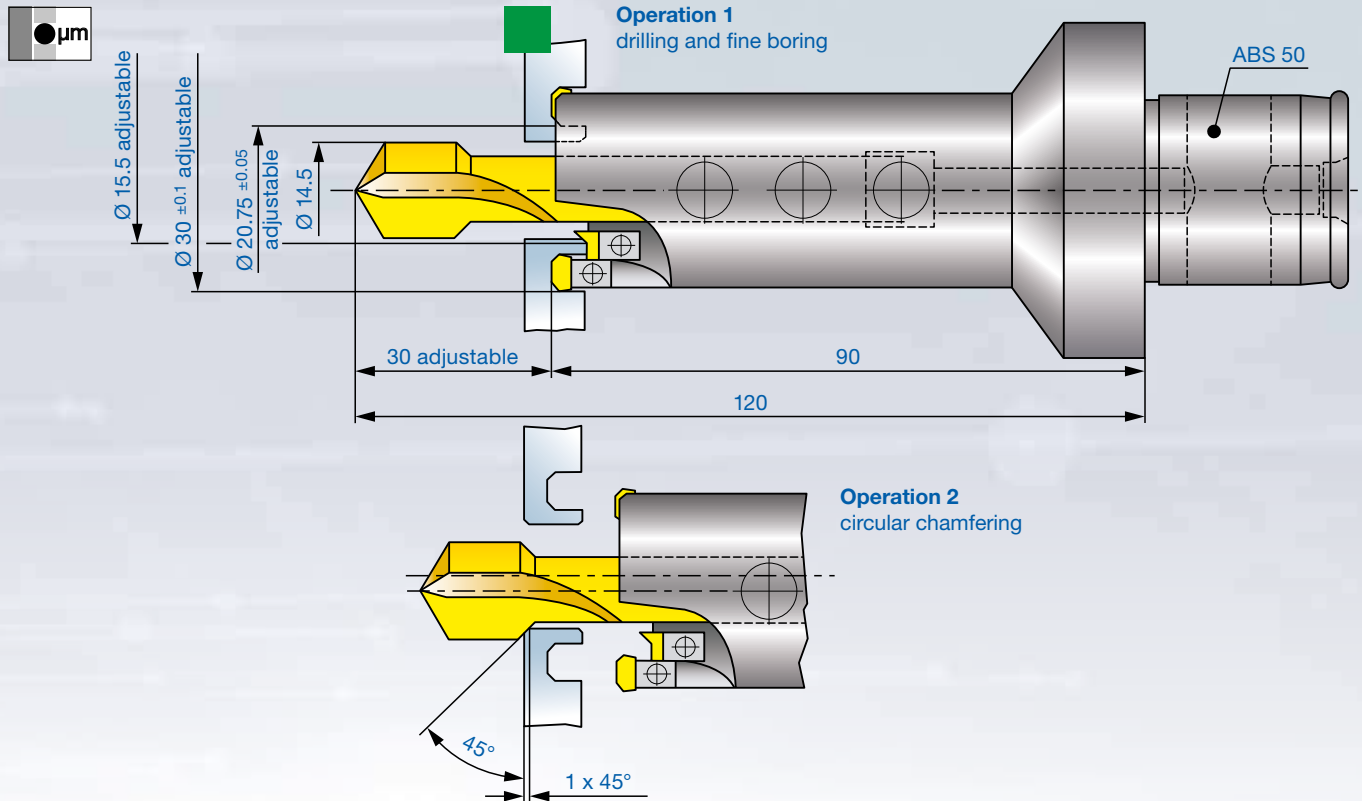
Customer benefits

Low costs per component

Reduced non-productive times

Drilling and fine boring tool

Inserts adjustable



Requirements

Combination tool for 5 machining steps

Diameter of the chamfer and the facegroove adjustable

Solution

Drilling and fine boring tool

Inserts adjustable

Cutting data

Material	(DIN) AISi12
Cutting grade	carbide coated
	drilling and chamfering fine boring and chamfering
Cutting speed	m/min ($\varnothing 14.5$) 160 ($\varnothing 30$) 331
Feed rate per tooth	mm 0.15 0.07
Cutting depth	mm 7.25 4.9

Result

Short machining time

High dimensional accuracy

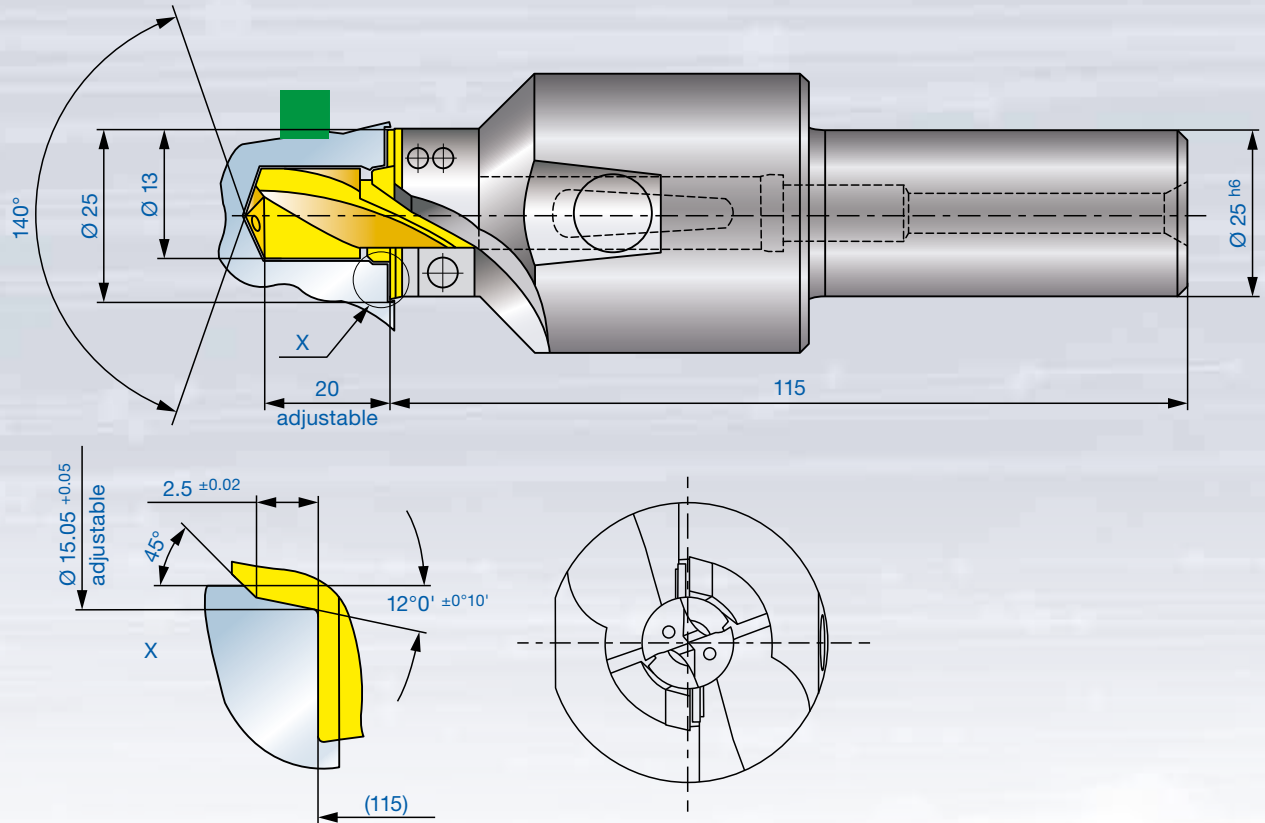


Customer benefits

Low costs per component

Reduced non-productive times

Drilling and fine boring tool



Requirements

Drilling, chamfering and fine boring in one tool

Solution

Drilling and fine boring tool

Cutting data

Material	(DIN) ■ Al		
Cutting grade	K10		
	drilling	fine boring	
Cutting speed	m/min	374	374
Feed rate per tooth	mm	0.38	0.09
Cutting depth	mm	into solid	1.3

Result

Short machining time

High dimensional accuracy

Solid carbide drill regrindable for several times



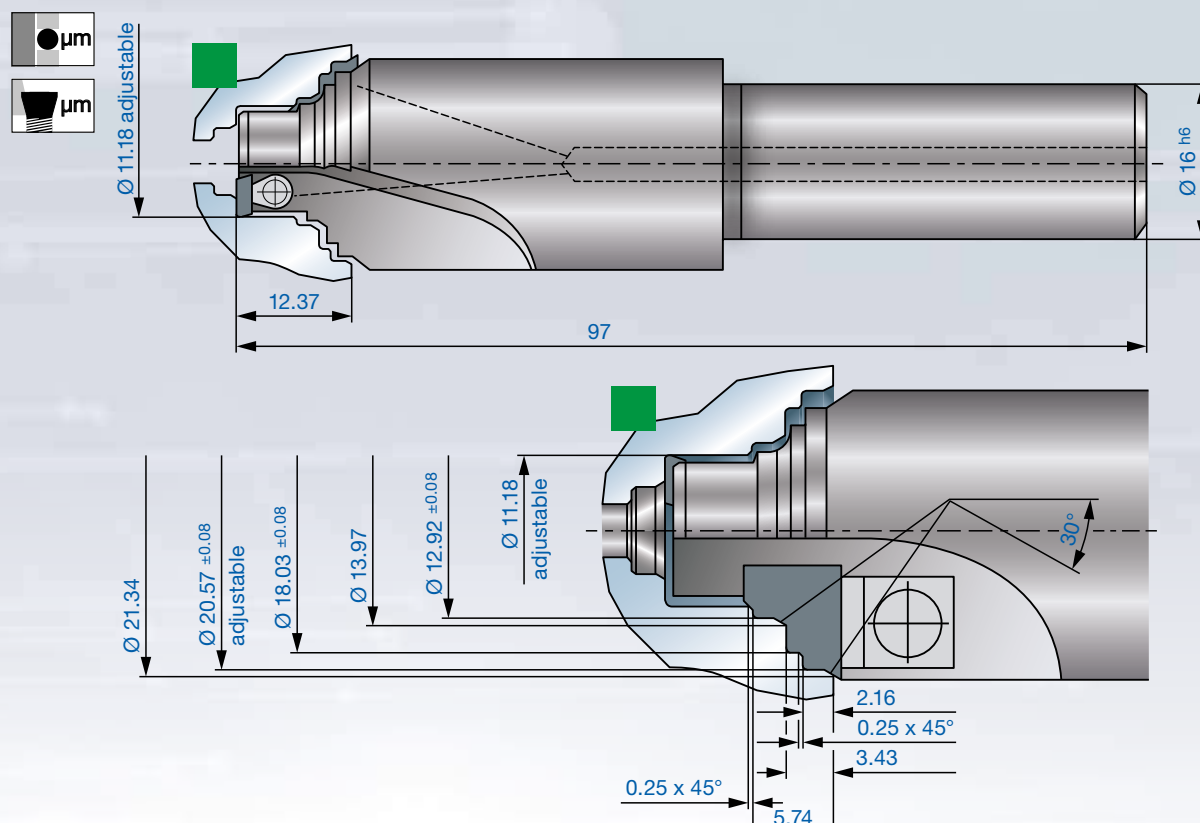
Customer benefits

Low costs per component

Reduced non-productive times

Fine boring and chamfering tool with indexable inserts

PCD-form inserts with 5 steps, all diameters adjustable



Requirements

Multi-step fine boring tool for hydraulic connection

Solution

Fine boring and chamfering tool with indexable inserts

PCD-form inserts with 5 steps, all diameters adjustable

Cutting data

Material	(DIN) ■ GDAISI9
Cutting grade	PCD
Cutting speed	m/min (Ø21.34) 700
Feed rate per tooth	mm 0.1
Cutting depth	mm -5

Result

Simple correction of diameters by means of taper screw or eccentric pin adjustment

Inserts separately replaceable



Customer benefits

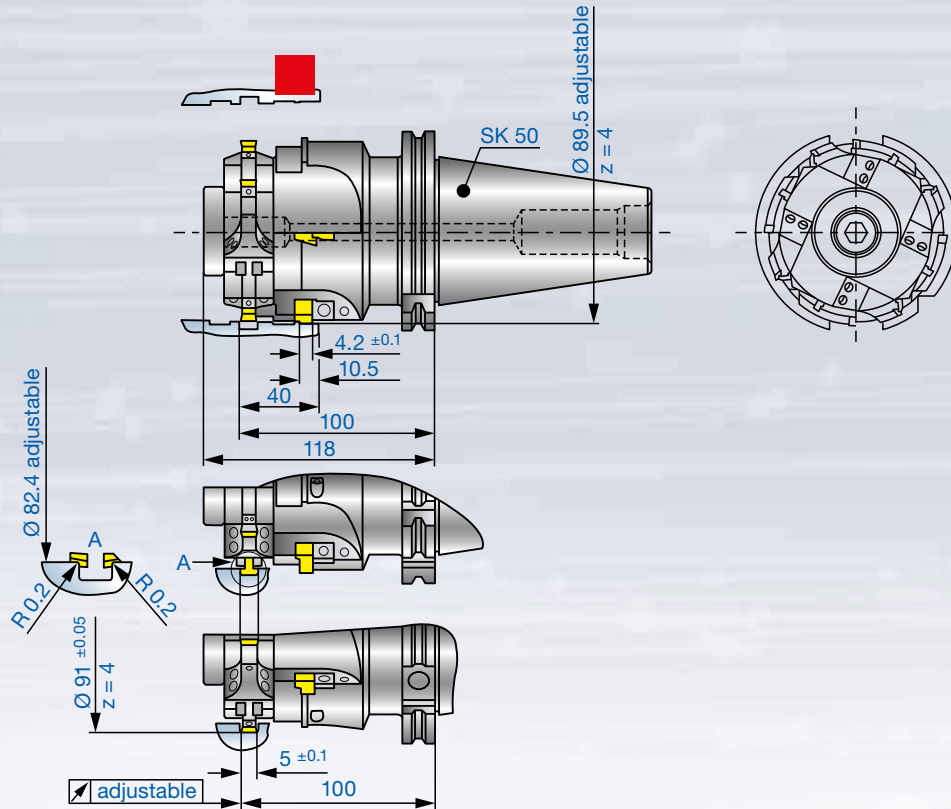
Low costs per component



Brake component

for wind mill

Circular milling cutter / Teeth = 16 / Teeth_{eff.} = 4



Requirements

Multi-step circular milling cutter for machining grooves

Solution

Circular milling cutter / Teeth = 16 / Teeth_{eff.} = 4

Cutting data

Material	(DIN) ■ GGG40
Cutting grade	carbide coated
Cutting speed	m/min 95
Feed rate per tooth	mm 0.11
Cutting depth	mm 4

Result

Short machining time

High dimensional accuracy



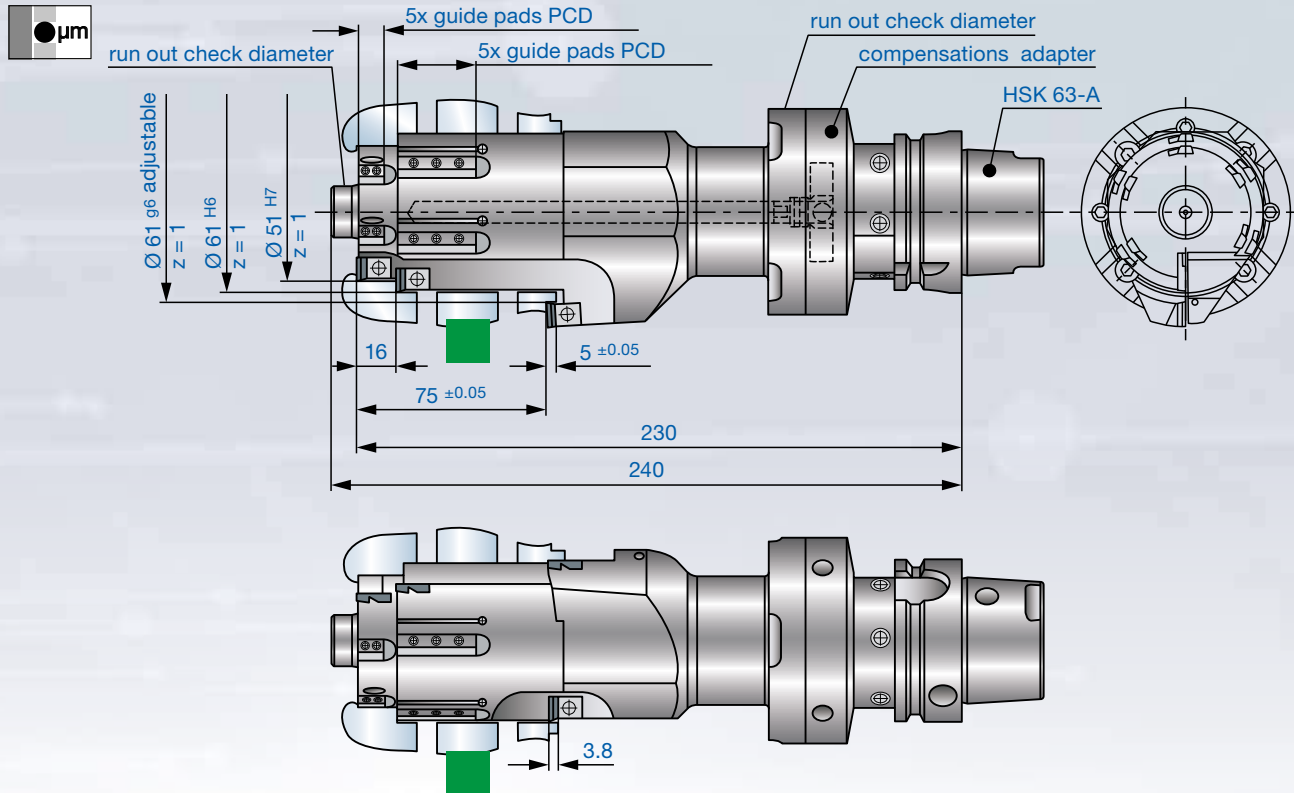
Customer benefits

Low costs per component

Reduced non-productive times

**Stepped fine boring tool with clamped PCD guide pads /
Teeth = 4 / Teeth_{eff.} = 1**

All inserts adjustable



Requirements

Multi-step fine boring tool

Solution

Stepped fine boring tool with clamped PCD guide pads / Teeth = 4 / Teeth_{eff.} = 1

All inserts adjustable

Cutting data

Material	(DIN) ■ AISi11Cu2(Fe)
Cutting grade	PCD
Cutting speed	m/min 600
Feed rate per tooth	mm 0.1
Cutting depth	mm 0.2

Result

Excellent surface finish

Simple tool handling



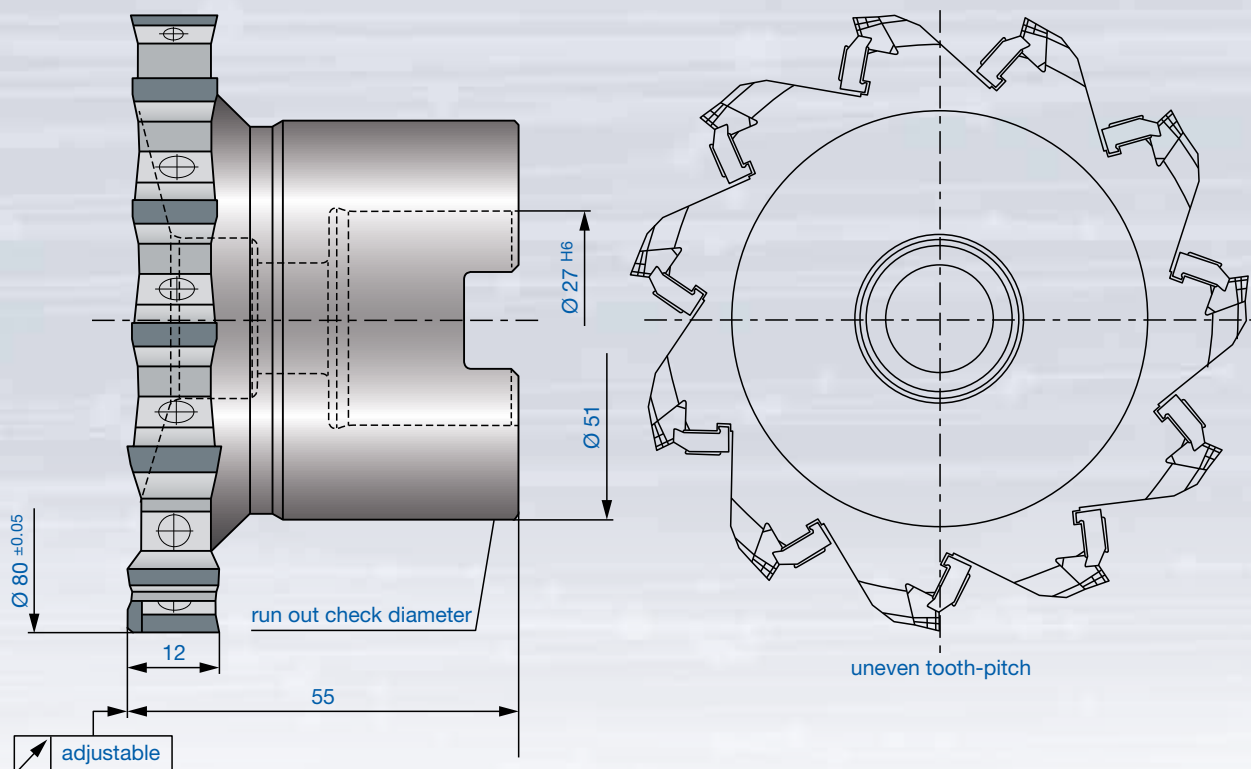
Customer benefits

Higher process reliability

Low costs for replacing the PCD guide pads, if necessary

Put on milling cutter Ø80 mm / Teeth = 8 + 3

Mixed assembly: semi finish inserts (Teeth = 8) and wiper inserts (Teeth = 3)



Requirements

Surface finish R_z max. 20 µm

Flatness 0.05 mm

Solution

Put on milling cutter Ø80 mm / Teeth = 8 + 3

Mixed assembly: semi finish inserts (Teeth = 8) and wiper inserts (Teeth = 3)

Cutting data

Material	(DIN) ■ GG25
Cutting grade	CBN
Cutting speed	m/min 1,200
Feed rate per tooth	mm 0.140
Cutting depth	mm 0.10

Result

Increased tool life by 300 - 400 %

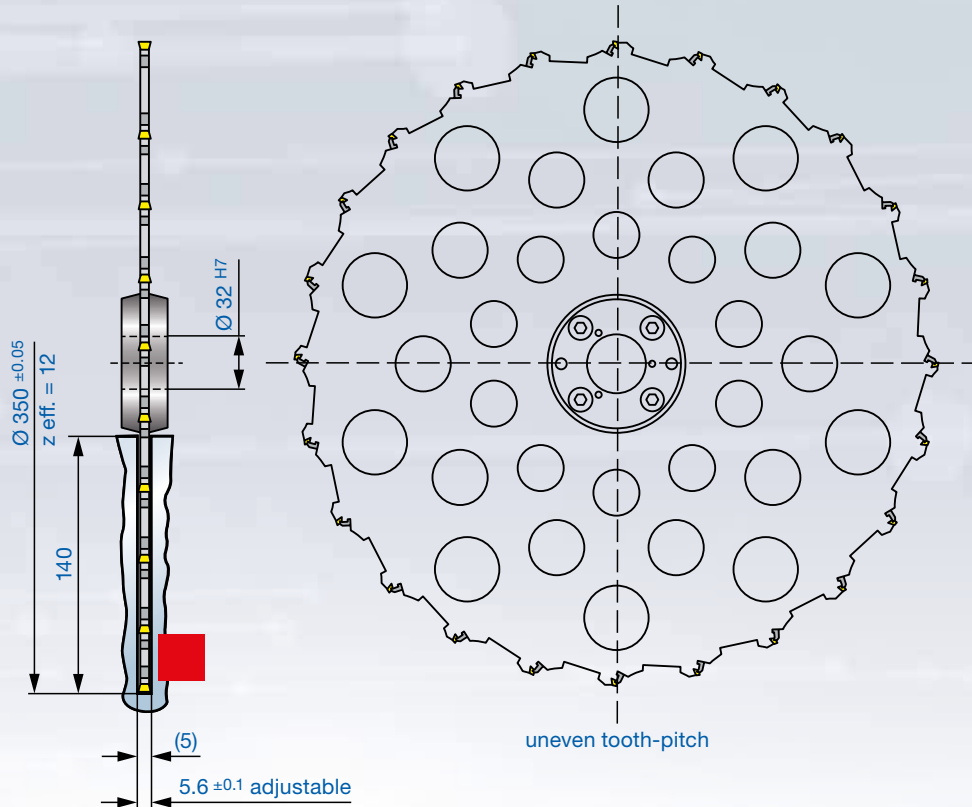


Customer benefits

Dramatically reduced costs per component

Side milling cutter Ø350 mm / Teeth = 12 + 12

Width 5.6 mm adjustable



Requirements

Milling of the rotor grooves

Solution

Side milling cutter Ø350 mm / Teeth = 12 + 12

Width 5.6 mm adjustable

Cutting data

Material	(DIN) ■ GGG50
Cutting grade	carbide coated
Cutting speed	m/min 80
Feed rate per tooth	mm 0.05
Cutting depth	mm 140

Result

Finish machining of slots in one cut

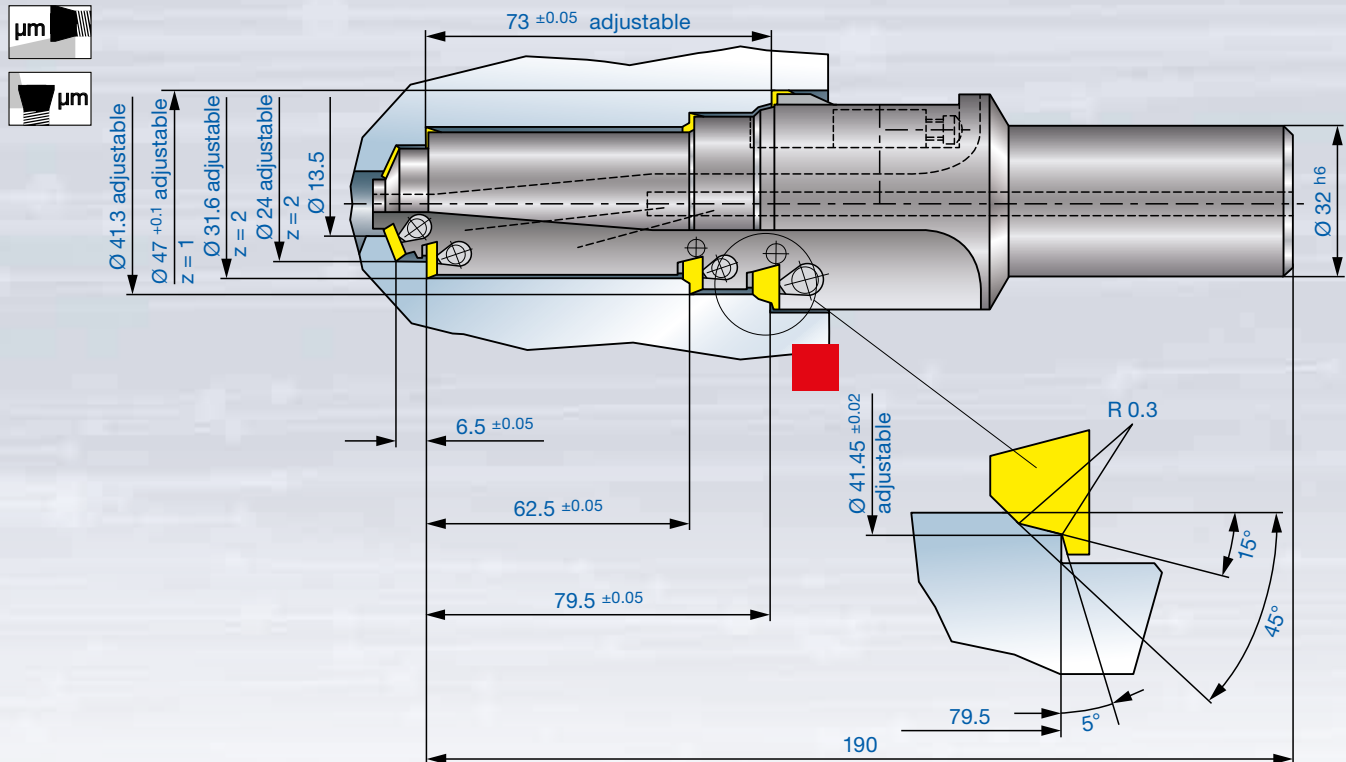
Therefore dramatic shortening of processing time compared to the grinding process



Customer benefits

Dramatically reduced costs per component

Multi-step fine boring tool with adjustable inserts / Teeth = 8 / Teeth_{eff.} = 2



Requirements

Tool for hydraulic connection

All diameters adjustable

Solution

Multi-step fine boring tool with adjustable inserts / Teeth = 8 / Teeth_{eff.} = 2

Cutting data

Material	(DIN) ■ GGG50
Cutting grade	carbide coated
Cutting speed	m/min (Ø47) 180
Feed rate per tooth	mm (Ø47/Ø41) 0.1
Cutting depth	mm -5

Result

Short machining time

Stable machining process

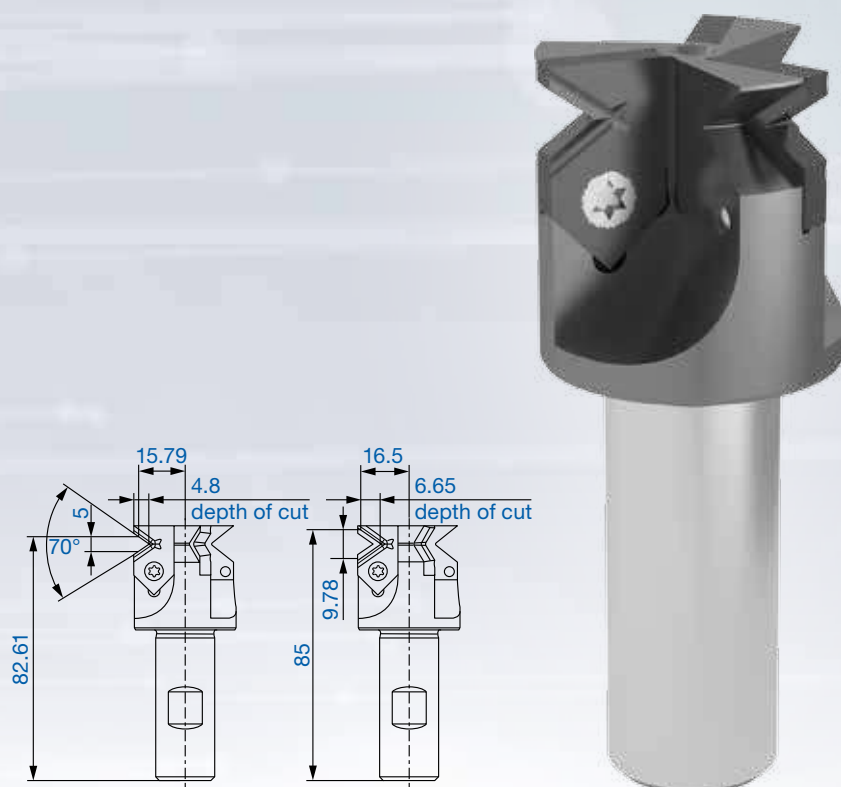


Customer benefits

Low costs per component

Milling tool with fixed insert seat / Teeth = 3

Machining of different sizes with one holder and different interchangeable inserts



Requirements

Geometric shape accuracy

Mixed machining (Steel unhardened / hardened)

Faster machining

Solution

Milling tool with fixed insert seat / Teeth = 3

Cutting data

Material	(DIN) ■ Toolox 33
Cutting grade	CBN/carbide
Cutting speed	m/min CBN 250/carbide 140
Feed rate per tooth	mm CBN 0.03/carbide 0.03
Cutting depth	mm 4.8 resp. 6.65

Result

Higher surface finish quality

Reduced tooling costs



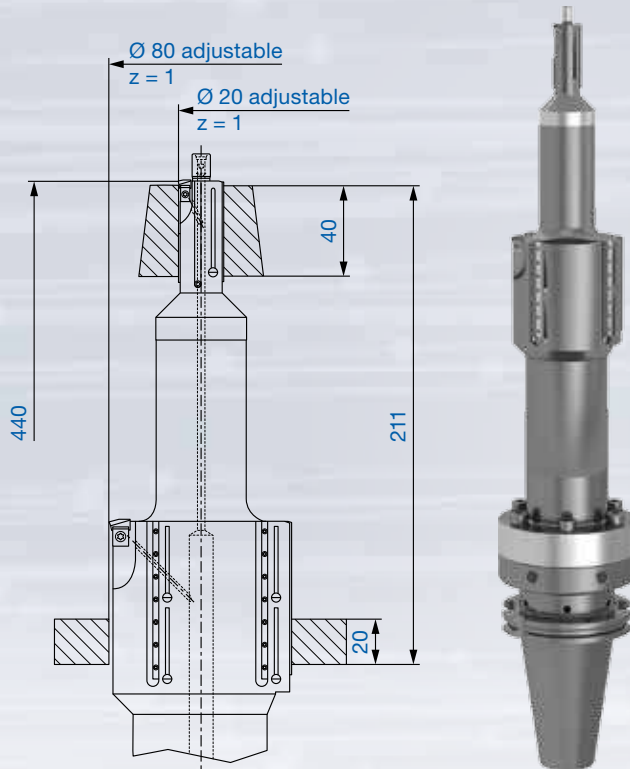
Customer benefits

Cycle time reduction with higher surface quality

Only one tool required for different workpiece geometries

Reduced tooling costs

Countersinking tool with guide pads / Teeth = 1 + 1



Requirements

Manufacturing of fitting diameters

High surface finish quality

Solution

Countersinking tool with guide pads / Teeth = 1 + 1

Cutting data

Material	(DIN) ■ GG25
Cutting grade	carbide coated
Cutting speed	m/min 88
Feed rate per tooth	mm 0.075
Cutting depth	mm 0.2

Result

Very good coaxiality despite the long distance to be bridged

Diameter can be set with micrometre precision

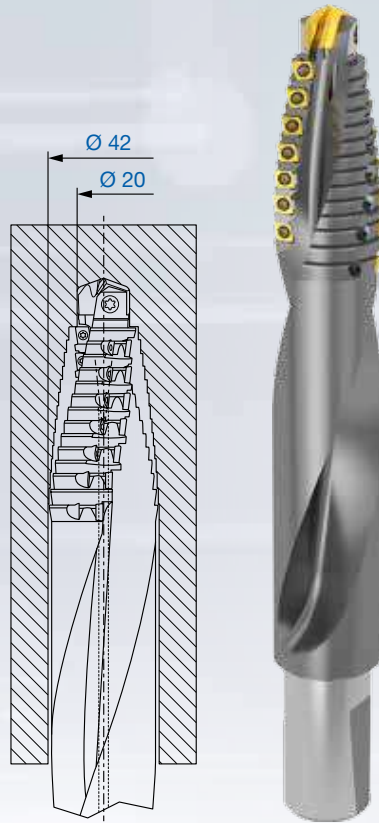


Customer benefits

Reduction of the number of tools

Long tool life

Drilling and countersinking tool (HT 800 + 14 steps) / Teeth = 16



Requirements

Increasing the process reliability

Solution

Drilling and countersinking tool (HT 800 + 14 steps) / Teeth = 16

Cutting data

Material	(DIN) ■ GGG40	
Cutting grade	carbide	
Cutting speed	m/min	120
Feed rate per tooth	mm	0.4
Cutting depth	mm	into solid

Result

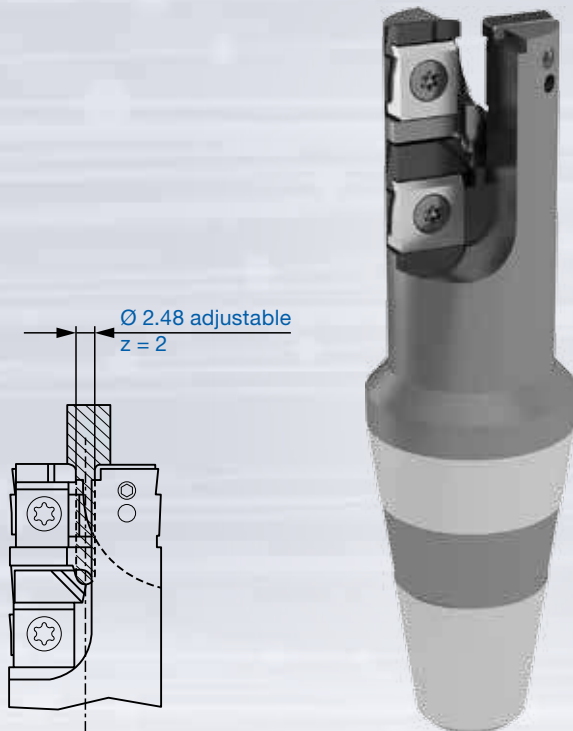
Faster machining time



Customer benefits

High process reliability
Longer tool life

Fine boring tool with adjustable form inserts / Teeth = 2 + 1



Requirements

Alternative solution to a ground carbide tool

Solution

Fine boring tool with adjustable form inserts / Teeth = 2 + 1

Cutting data

Material	(DIN) ■ CuZn39Pb3R500
Cutting grade	carbide uncoated
Cutting speed	m/min 76
Feed rate per tooth	mm 0.065
Cutting depth	mm into solid

Result

Tool life: 1,000,000 plug contacts

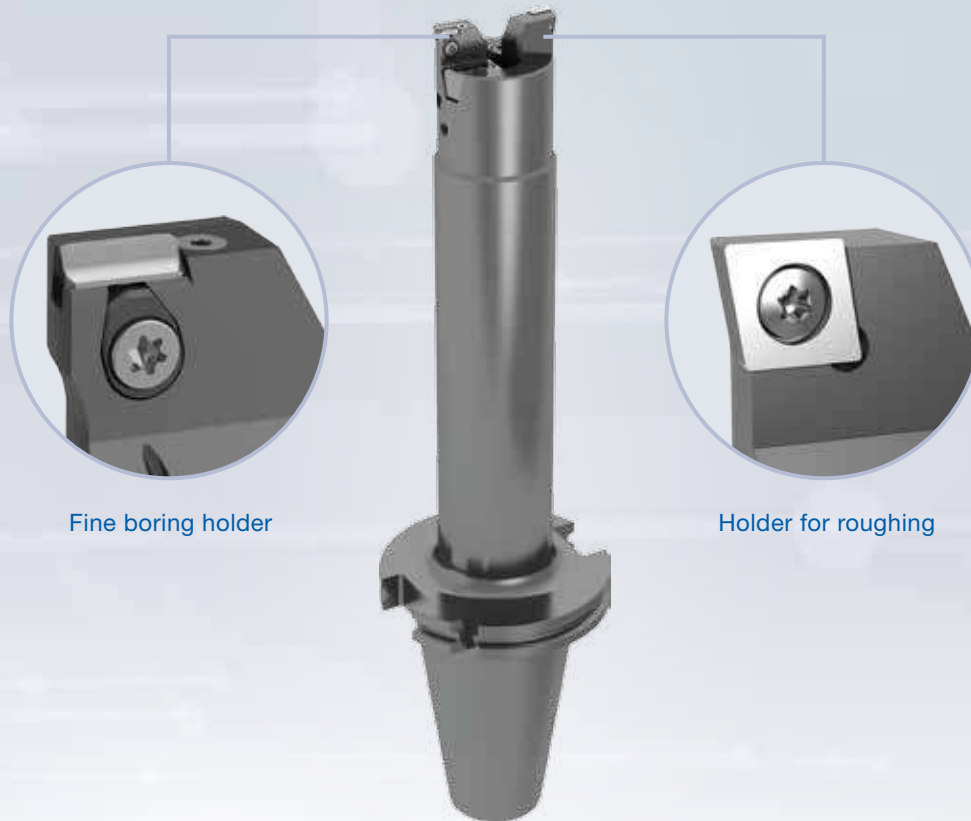
µm-accurate adjustability of diameters



Customer benefits

- No regrinding of the entire tool necessary
- Reduced storage costs

GA200 Vario special solution (roughing/finishing combination) / Teeth = 1 + 1



Fine boring holder

Holder for roughing

Requirements

Reduction of machining time

Solution

GA200 Vario special solution (roughing/finishing combination) / Teeth = 1 + 1

Cutting data

Material		(DIN) ■ CuZn35Pb2Al
Cutting grade		carbide/PCD
Cutting speed	m/min	300
Feed rate per tooth	mm	0.06
Cutting depth	mm	4

Result

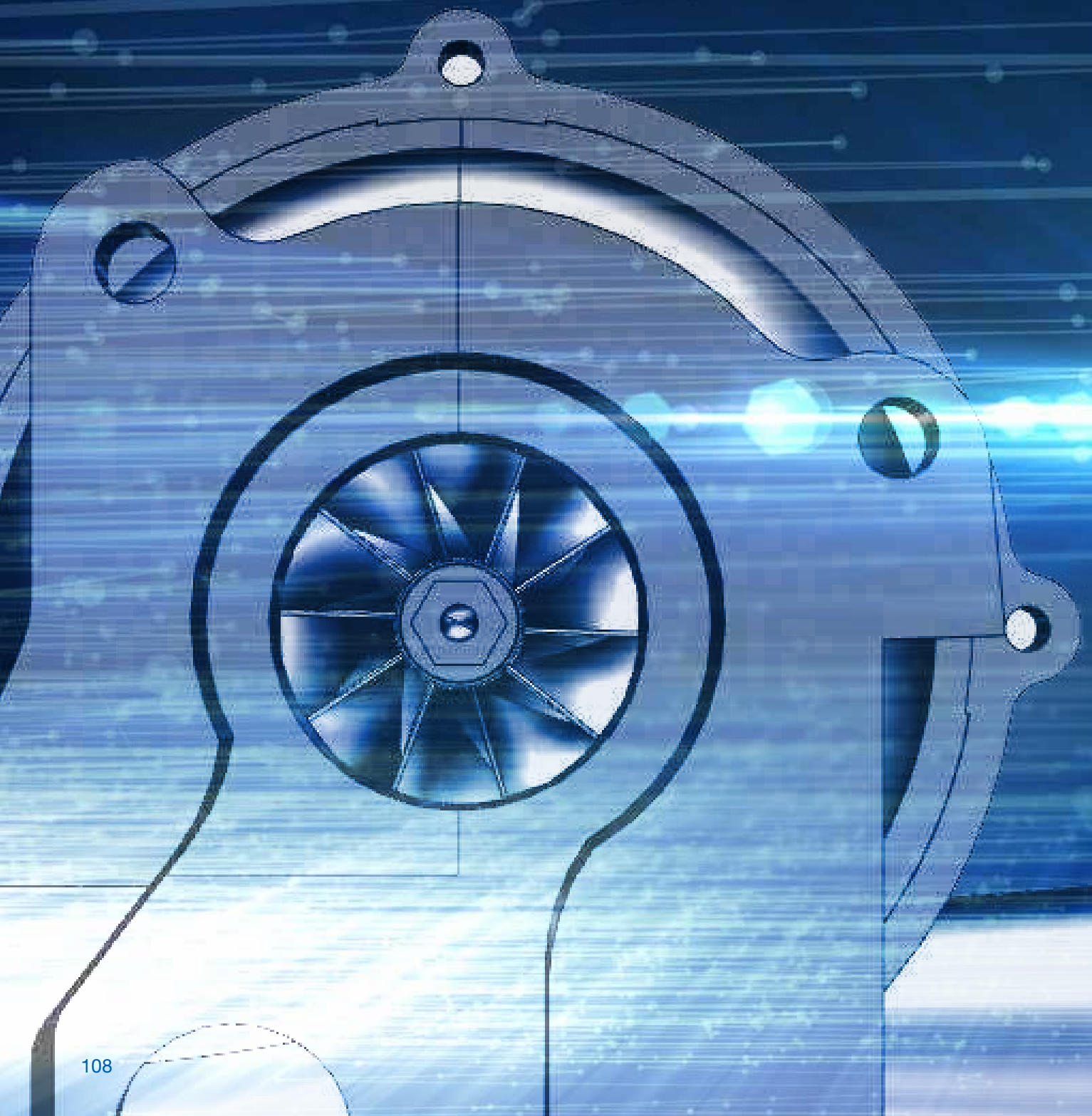
Reduction of required tools from 2 to 1



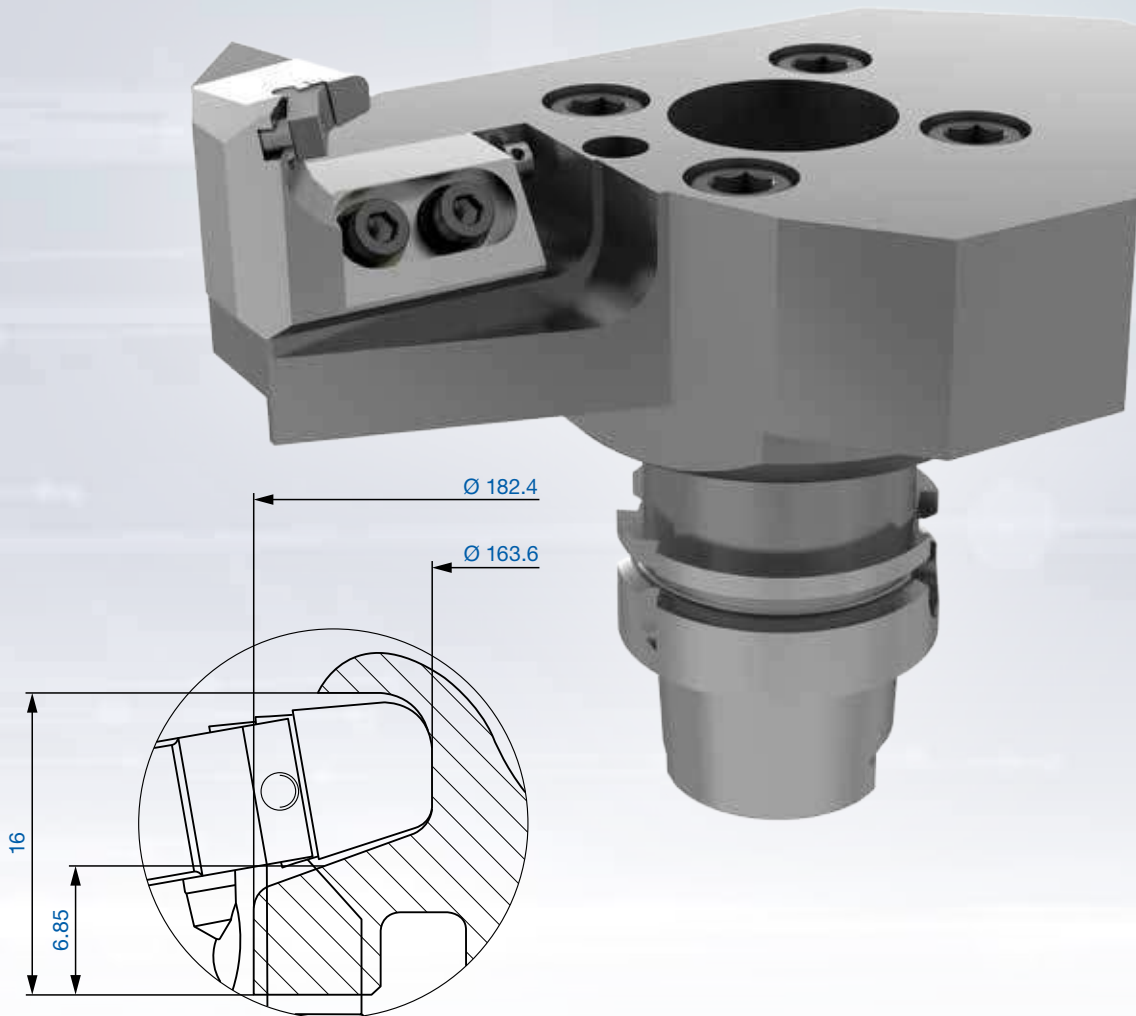
Customer benefits

Cycle time reduction machining with consistent quality
Reduced tooling costs

Turbocharger housing



Interpolation turning tool / Teeth = 1



Requirements

Machining of a V-contour despite limited space conditions

Solution

Interpolation turning tool / Teeth = 1

Cutting data

Material	(DIN) ■ GX40NiCrSiNb38-19	
Cutting grade	carbide coated	
Cutting speed	m/min	100
Feed rate per tooth	mm	0.1

Result

Very short machining time

Flexible and stable tool concept with cartridge

Long tool life



Customer benefits

Low costs per component

H Turbocharger housing

Pre-machining

Stepped countersinking tool

Various inserts adjustable



Requirements

Several machining steps in one tool

Solution

Stepped countersinking tool

Various inserts adjustable

Cutting data

Material (DIN) ■ GX40NiCrSiNb38-19

Cutting grade carbide coated

Cutting speed m/min 95

Feed rate per tooth mm 0.1

Result

Very short machining time thanks to maximum possible number of teeth

Thanks to the division of the chip spaces, it is possible

to combine several machining steps



Customer benefits

Lower tool costs by using ISO inserts

Reduced cycle times

Fine boring tool / Teeth = 1 + 1

Adjustment of the diameter by fine adjustment



**Smart
Setting
Motion
Tools**

Requirements

Step tool for finishing operation

Solution

Countersinking tool / Teeth = 1 + 1

Adjustment of the diameter by means of thread wedge adjustment

Cutting data

Material		(DIN) ■ GX40NiCrSiNb38-19
Cutting grade		carbide coated
Cutting speed	m/min	120
Feed rate per tooth	mm	0.075

Result

Short machining time



Customer benefits

Lower tool costs by using ISO inserts

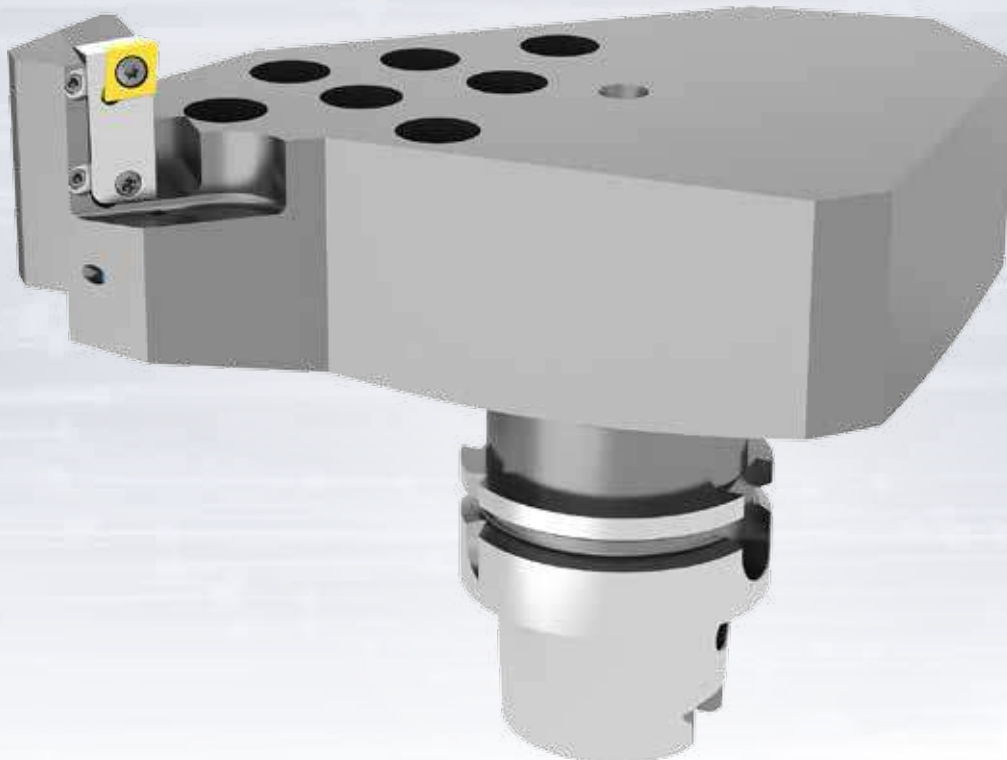
µm accurate adjustment directly at the spindle → low machine downtime

H Turbocharger housing

Finish-machining

*Countersinking and interpolation tool in one Ø 182.4 mm
→ Finishing*

*Plane surface from 182.4 to 155.698 mm
→ Interpolation process*



Requirements

Different machining processes in one tool

Solution

Countersinking and interpolation tool in one Ø 182.4 mm → Finishing

Plane surface from 182.4 to 155.698 mm → Interpolation process

Cutting data

Material		(DIN) ■ GX40NiCrSiNb38-19
Cutting grade		carbide coated
Cutting speed	m/min	100
Feed rate per tooth	mm	0.1

Result

2 machining processes in one tool

Adjustment of the diameter by means of thread wedge adjustment



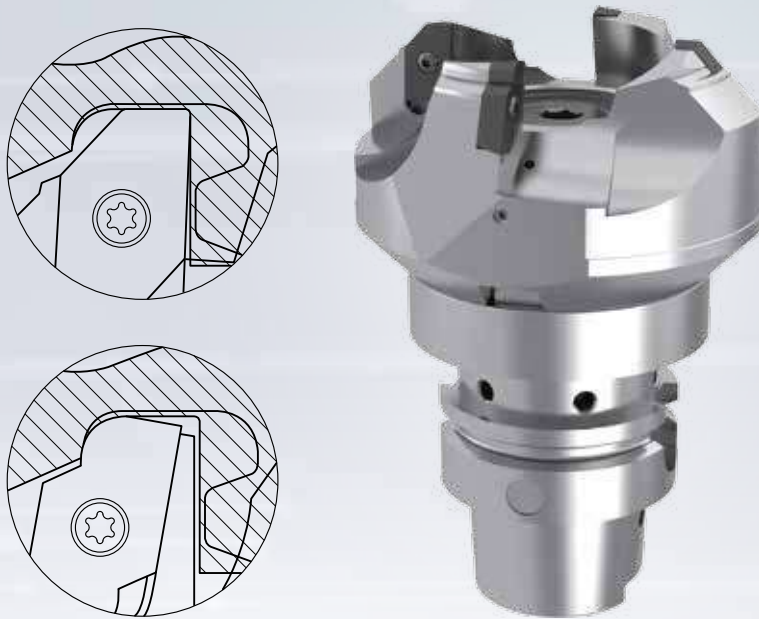
Customer benefits

Lower tool costs by using ISO inserts

Axial grooving tool / Teeth = 2 + 2

Division of the contour into two different cutting insert geometries

Compact tool concept



Requirements

Pre-machining of a complex contour

Solution

Axial grooving tool / Teeth = 2 + 2

Division of the contour into two different cutting insert geometries

Compact tool concept

Cutting data

Material		(DIN) ■ GX40NiCrSiNb38-19
Cutting grade		carbide coated
Cutting speed	m/min	110
Feed rate per tooth	mm	0.125

Result

Simple tool handling



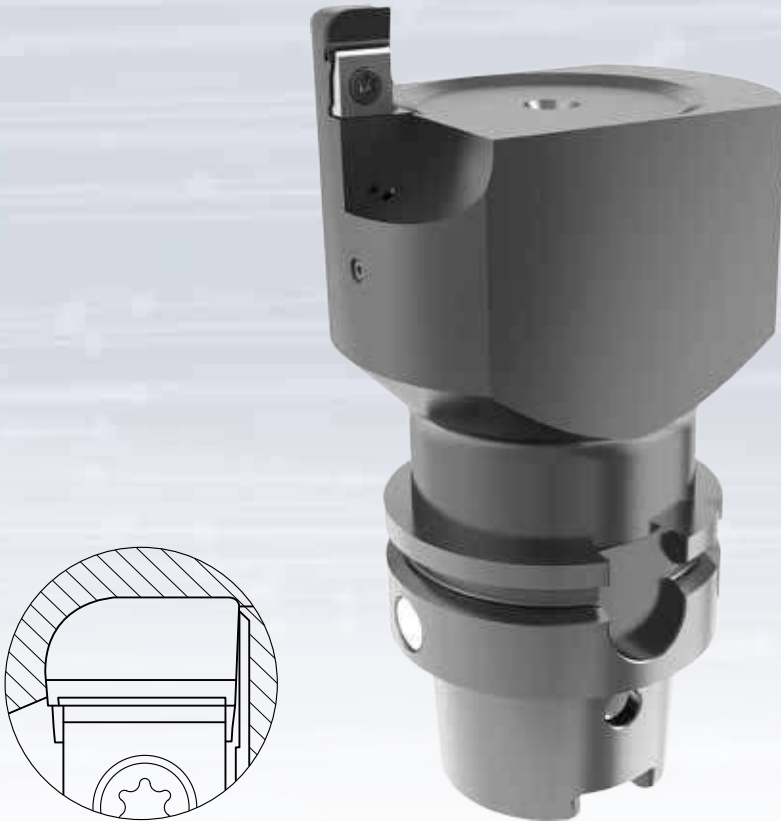
Customer benefits

Low costs per component thanks to multi-fluted insert

H Turbocharger housing

Finish-machining

Axial grooving tool with profile insert / Teeth = 1



Requirements

Finishing of a complex contour

Solution

Axial grooving tool with profile insert / Teeth = 1

Cutting data

Material		(DIN) ■ GX40NiCrSiNb38-19
Cutting grade		carbide coated
Cutting speed	m/min	100
Feed rate per tooth	mm	0.1

Result

Very good surface quality and dimensional accuracy

µm-accurate adjustability of diameter



Customer benefits

Low costs per component

Axial grooving tool, adjustable diameter / Teeth = 1 + 1

Division of the contour on two different inserts

Compact tool concept



Requirements

Pre-machining of a complex contour

Solution

Axial grooving tool, adjustable diameter / Teeth = 1 + 1

Division of the contour on two different inserts

Compact tool concept

Cutting data

Material		(DIN) ■ GX40NiCrSiNb38-19
Cutting grade		carbide coated
Cutting speed	m/min	95
Feed rate per tooth	mm	0.09

Result

Simple tool handling

Inserts µm-accurate adjustable



Customer benefits

Low costs per component thanks to long tool life

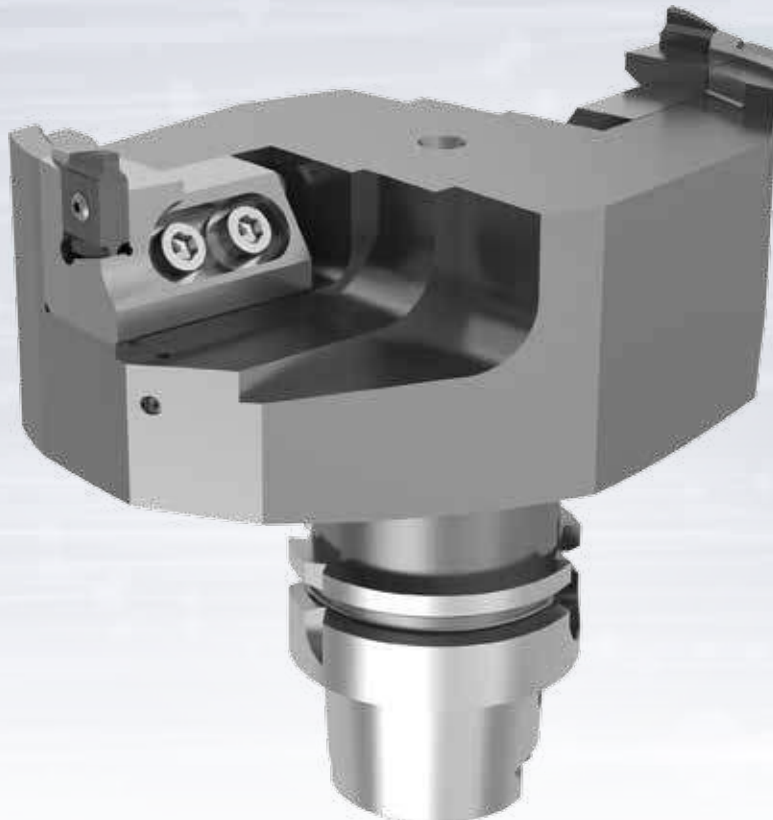
H Turbocharger housing

Pre-machining

Axial grooving tool, adjustable diameter / Teeth = 1 + 1

Division of the contour into two different cutting inserts

Compact tool concept with cartridges



Requirements

Pre-machining of a complex contour

Solution

Axial grooving tool, adjustable diameter / Teeth = 1 + 1

Division of the contour into two different cutting inserts

Compact tool concept with cartridges

Cutting data

Material		(DIN) ■ GX40NiCrSiNb38-19
Cutting grade		carbide coated
Cutting speed	m/min	110
Feed rate per tooth	mm	0.15

Result

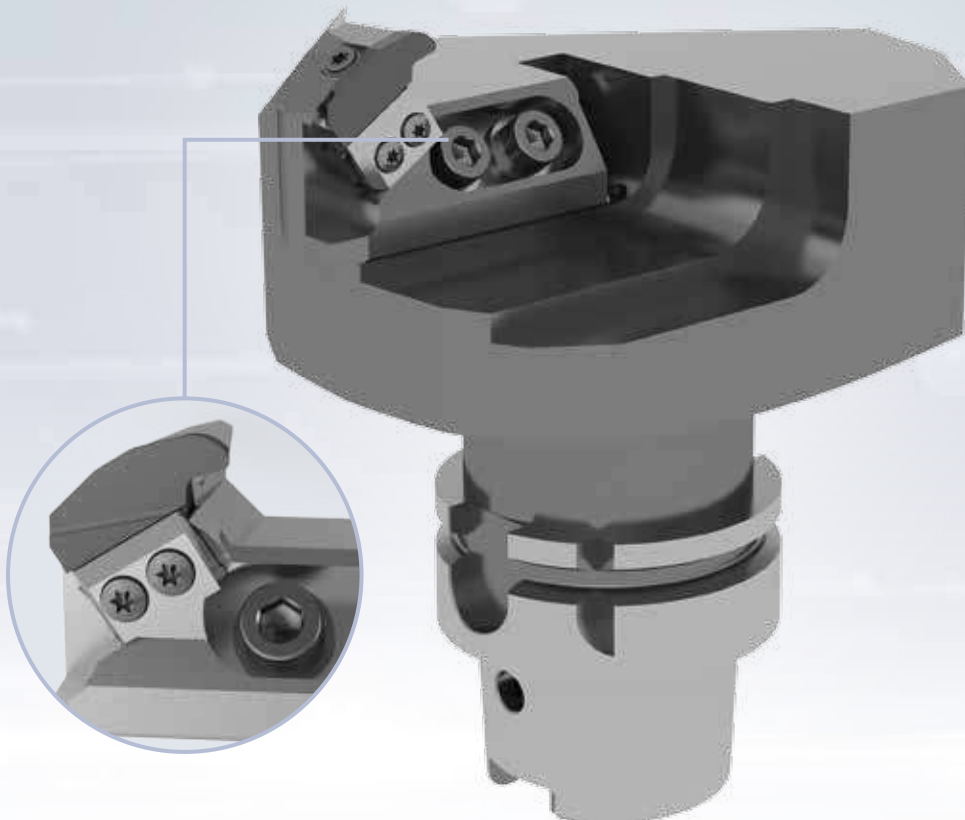
Simple tool handling



Customer benefits

Low costs per component thanks to multi-edge insert

Interpolation turning tool / Teeth = 1



Requirements

Machining of a V-contour despite limited space conditions

Solution

Interpolation turning tool / Teeth = 1

Cutting data

Material	(DIN) ■ GX40NiCrSiNb38-19	
Cutting grade	carbide coated	
Cutting speed	m/min	110
Feed rate per tooth	mm	0.15

Result

Very short machining time

Flexible and stable tool concept with cartridge

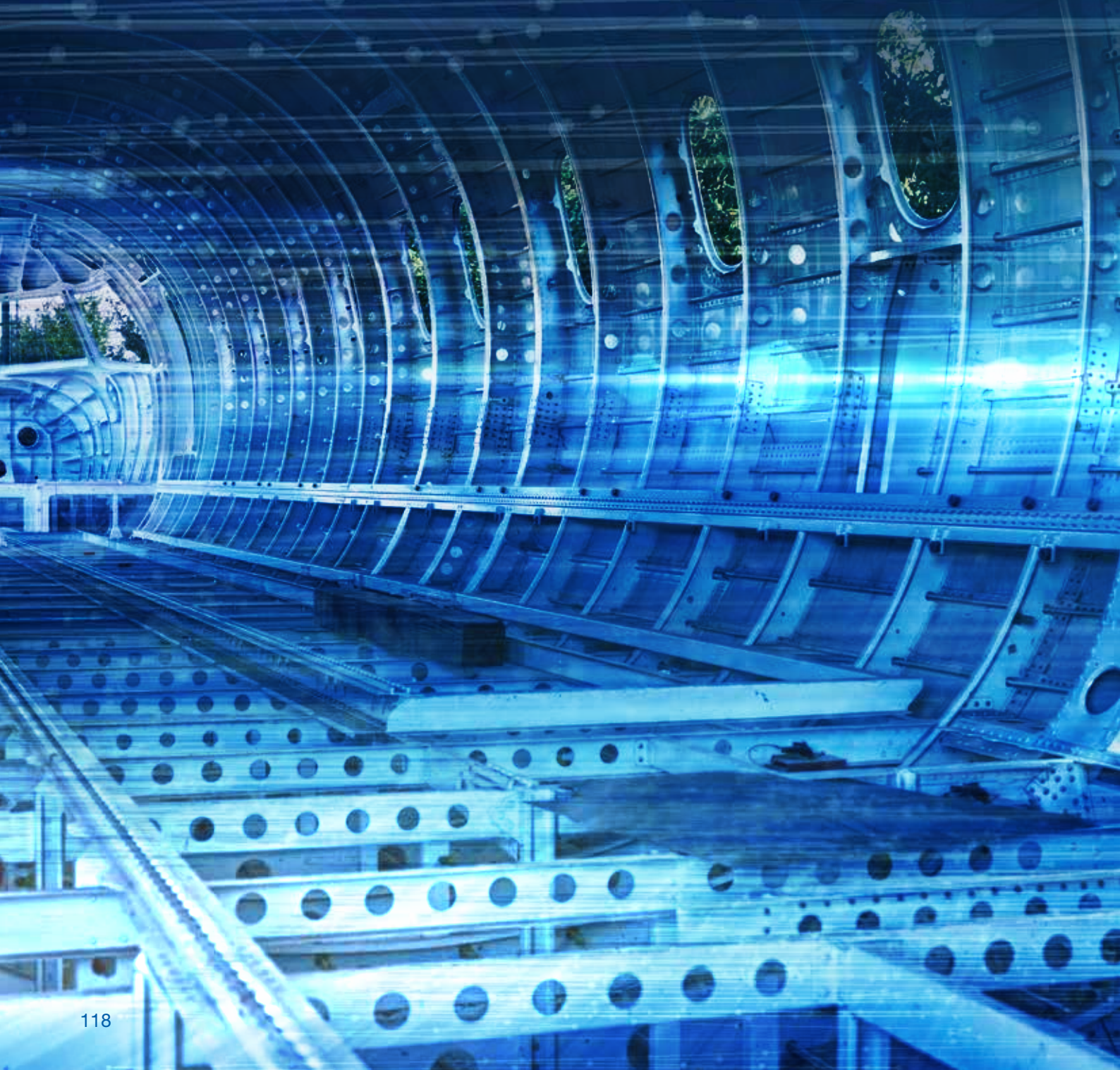
Long tool life



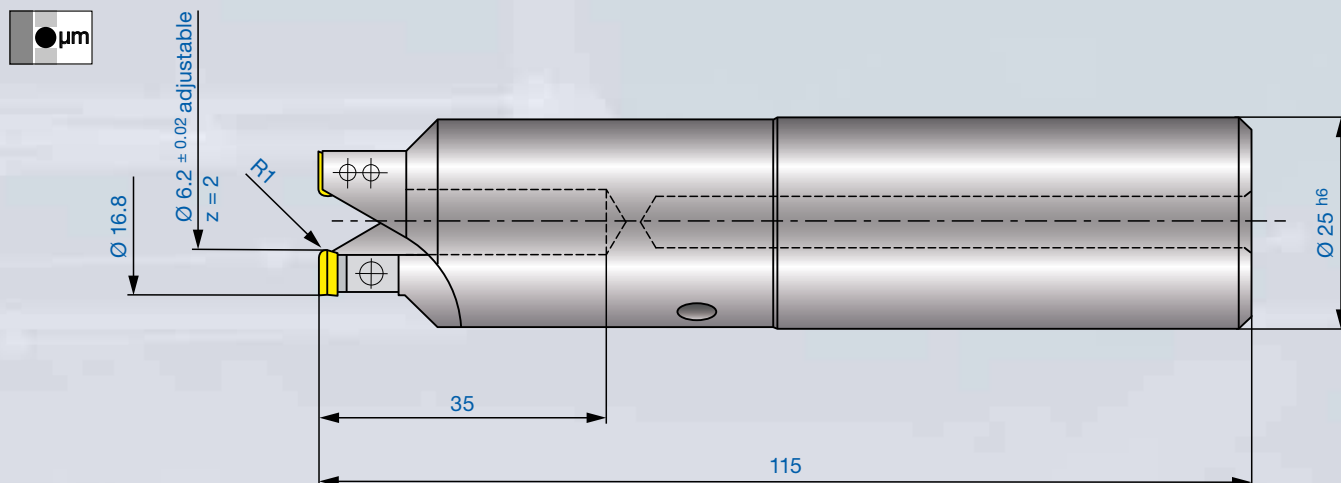
Customer benefits

Low costs per component

Aviation technology



Axial grooving tool / Teeth = 2



Requirements

Machining of various outside diameters
with high requirements for diameter tolerance and roundness
Reduction of machining time

Solution

Axial grooving tool / Teeth = 2

Cutting data

Material	(DIN)  TiAl6V4
Cutting grade	carbide
Cutting speed	m/min 48
Feed rate per tooth	mm 0.03
Feed rate per tooth	mm 0.25

Result

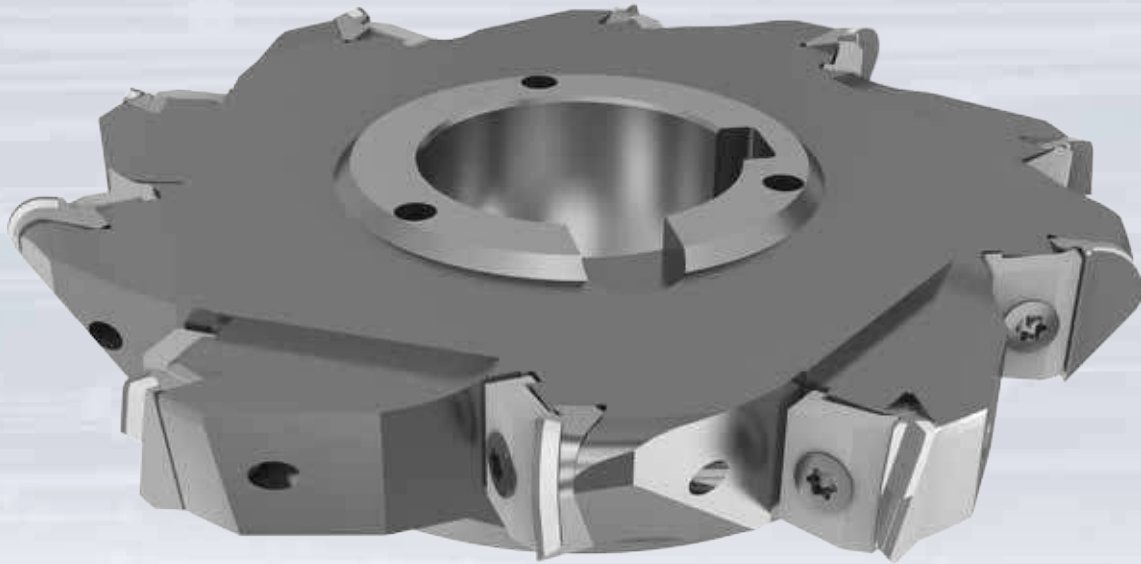
Significantly shorter machining time due to double fluted tool
Uniform distribution of cutting forces compared to a single-fluted tool -
resulting in very high roundness and uniform wall thickness



Customer benefits

High process reliability

Side milling cutter with distribution of cut /
Teeth = 10 / Teeth_{eff.} = 5



Requirements

Increase in process reliability

Reduction of delamination with so called mesh material

Solution

Side milling cutter with distribution of cut / Teeth = 10 / Teeth_{eff.} = 5

Cutting data

Material		(DIN) ■ Composite / CFK
Cutting grade		PCD
Cutting speed	m/min	370
Feed rate per tooth	mm	0.08
Cutting width	mm	0

Result

Increase in tool life quantity



Customer benefits

Higher quality, therefore lower costs for re-work

*Drilling and countersinking tool with interchangeable inserts /
Teeth = 1*

Insert diameter μm -accurate adjustable



Requirements

Machining of rivet holes

Burr-free transition from holes to chamfer

Solution

Drilling and countersinking tool with interchangeable inserts / Teeth = 1

Insert diameter μm -accurate adjustable

Cutting data

Material (DIN)  CFK/titanium

Cutting grade PCD

Cutting speed m/min 380

Feed rate per tooth mm 0.11

Cutting depth mm into solid

Result

High quality of chamfer or transition thanks to PCD cutting insert

High concentricity accuracy of the solid carbide drill due to use of hydraulic chuck



Customer benefits

High process reliability

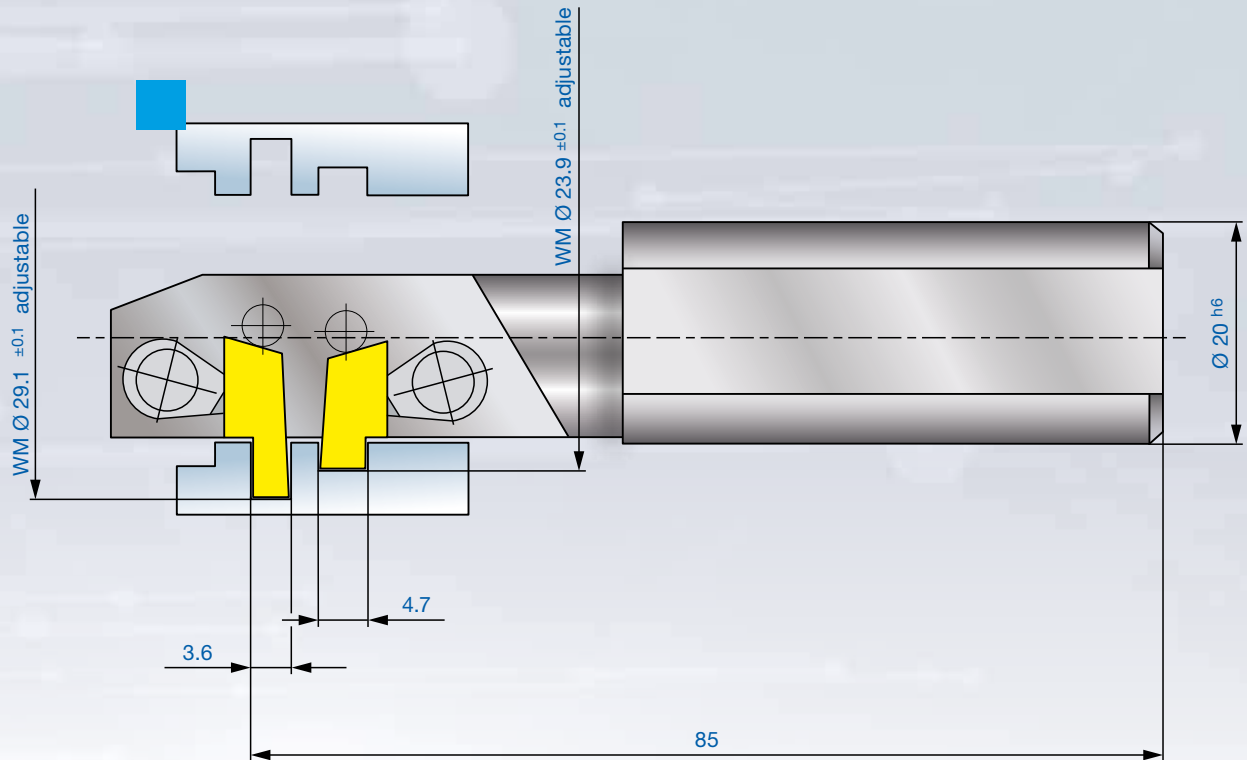
Low costs per component



Turning tools

Grooving tool for turning machines / Teeth = 2 / Teeth_{eff.} = 1

Grooving inserts adjustable towards each other



Requirements

Narrow tolerances of the grooves to each other

Reduction of machining time

Solution

Plunging tool for turning machines / Teeth = 2 / Teeth_{eff.} = 1

Grooving inserts adjustable towards each other

Cutting data

Material	(DIN) ■ Sind D 11 (sintered metal)
Cutting grade	carbide coated
Cutting speed	m/min (Ø 29.1) 220
Feed rate per tooth	mm 0.1
Cutting depth	mm ~ 4.5

Result

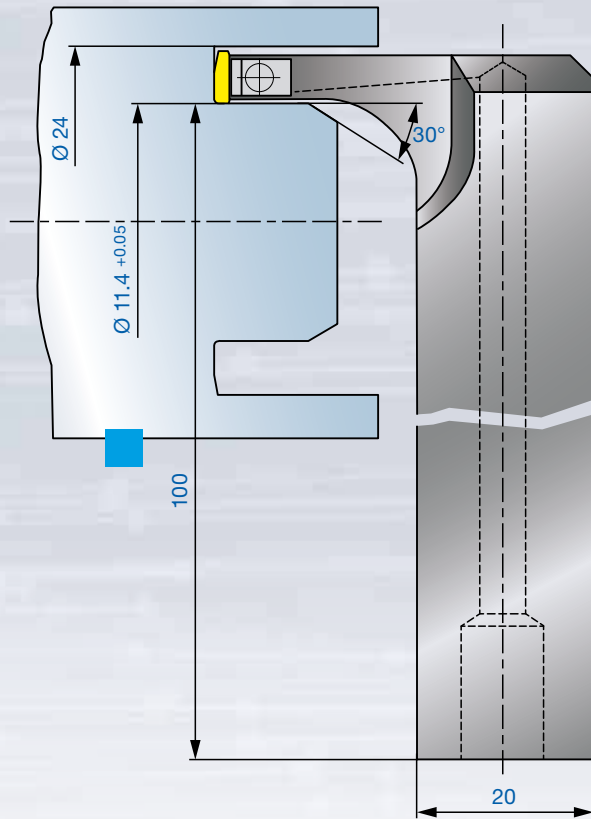
Reduced machining time thanks to combination tool



Customer benefits

Low costs per component

Reduced non-productive times thanks to simple tool handling



Requirements

Finish machining chamfer 30° and $\varnothing 11.4 +0.05$

Solution

Grooving tool / Teeth = 1

Cutting data

Material		(DIN) ■ 9SMn28K
Cutting grade		carbide coated
Cutting speed	m/min	($\varnothing 11.4$) 95
Feed rate per tooth	mm	0.12
Cutting depth	mm	-1

Result

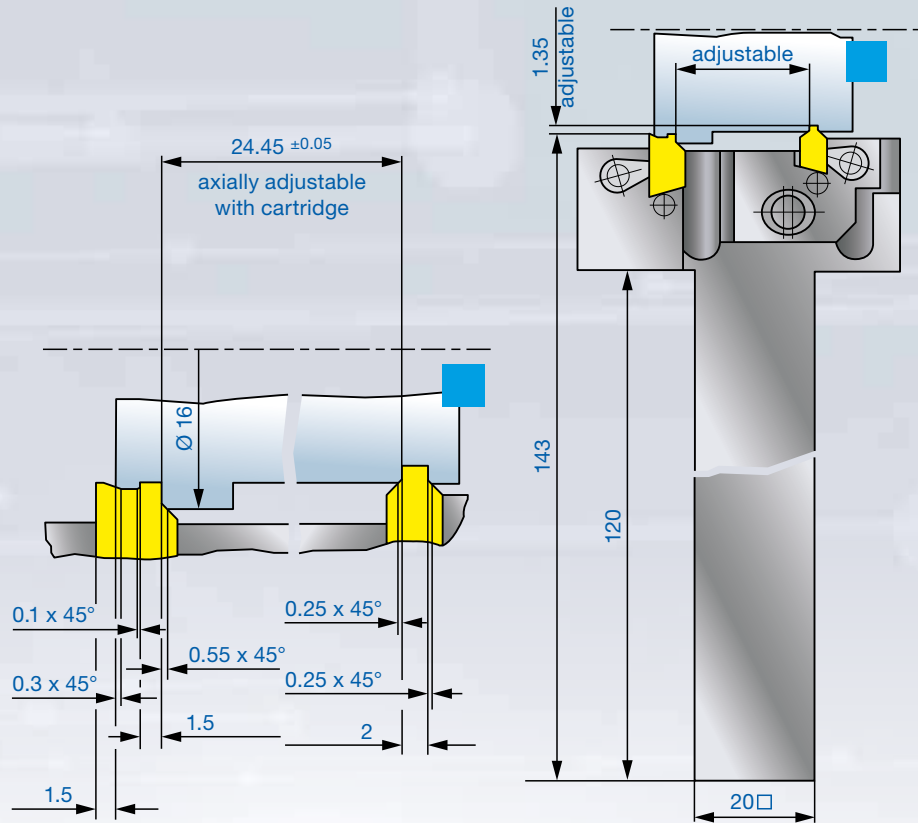
High dimensional accuracy thanks to precision-ground cutting insert



Customer benefits

High process reliability thanks to stable insert clamping

Grooving tool / Teeth = 2 / Teeth_{eff.} = 1



Requirements

Groove turning - profil recess

Recesses adjustable towards each other

Solution

Grooving tool / Teeth = 2 / Teeth_{eff.} = 1

Cutting data

Material		(DIN) ■ 9SMn28K
Cutting grade		carbide coated
Cutting speed	m/min	120
Feed rate per tooth	mm	0.1
Cutting depth	mm	2

Result

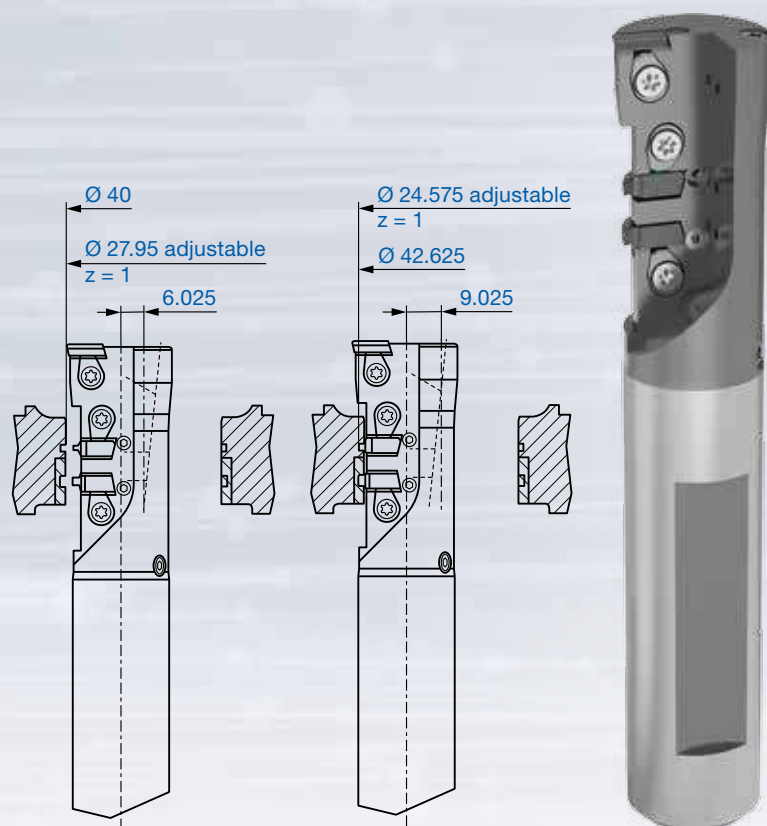
Complete machining with one tool



Customer benefits

Cycle time reduction

Combi turning tool (finishing/grooving) / Teeth = 3 / Teeth_{eff.} = 1 + 1



Requirements

Reduction of cycle time

Solution

Combi turning tool (finishing/grooving) / Teeth = 3 / Teeth_{eff.} = 1 + 1

Cutting data

Material	(DIN) ■ AISi12Cu1(Fe) EN-AC47100/11SMn30 + C1,0715		
Cutting grade	carbide coated/uncoated		
		grooving	finishing
Cutting speed	m/min	240	320
Feed rate per tooth	mm	0.12	0.1

Result

Reduced machining times



Customer benefits

Saving of tool places on turret

Holder for skiving operations / Teeth = 1**Requirements**

Very high surface quality

Reduction of machining time

Solution

Holder for skiving operations / Teeth = 1

Cutting data

Material		(DIN) ■ steel
Cutting grade		carbide coated
Cutting speed	m/min	225
Feed rate per tooth	mm	1.5
Cutting depth	mm	0.4

Result

Very fast machining time

Excellent surface finish quality

**Customer benefits**

Cycle time reduction

Up to 10x faster than conventional turning

Saving of one work step (grinding)



Enquiry form

for special tools

Customer	_____	Date	_____
Contact person	_____	Telephone	_____
Street	_____	Fax	_____
Town/post code	_____	E-Mail	_____
Workpiece	_____	Drawing number	_____
Material	_____	Hardness/tensile strength	_____

Machining

☐ Into solid	☐ Pre cast	☐ Pre bored
☐ Blind hole	☐ Through hole	
☐ Continuous cut	☐ Interrupted cut	☐ Highly interrupted cut
☐ Others	_____	

Required surface finish $R_a =$ _____ $R_z =$ _____ Others _____

Stock _____ mm ☐ In Radius ☐ In diameter $a_p =$ _____ $a_e =$ _____

Fixture ☐ Stable ☐ Instable ☐ Very instable

Interference ☐ No ☐ Yes _____ mm

Machine ☐ MC ☐ Transferline ☐ Lathe ☐ Turn / milling centre ☐ Boring head ☐ Multi-spindle

Spindle Steep taper DIN _____ Size ☐ 30 ☐ 40 ☐ 45 ☐ 50

HSK DIN _____ Size ☐ 32 ☐ 40 ☐ 50 ☐ 63 ☐ 80 ☐ 100

Others _____ Internal coolant ☐ Yes ☐ No

max. Rpm _____ Power _____ kW

Tool ☐ Right-hand cutting ☐ Left-hand cutting ☐ Non-Rotating ☐ Rotating

☐ Face milling cutter ☐ Groove/end milling cutter ☐ Disc milling cutter Power _____

Shank style/Form _____ Size _____

Tool balanced ☐ No ☐ Yes > Balancing grade G _____ at _____ 1/min

Necessary cutting data $v_c =$ _____ m/min $f =$ _____ mm/U ☐ mm/teeth ☐ mm/min

Coolant ☐ Internal ☐ External ☐ Without

☐ Emulsion ☐ Oil ☐ MQL ☐ Dry

Remarks _____

Please complete the enquiry form and fax to: +49 (0) 911 / 64 19 22-10 or scan and send e-mail to info@hollfelder-guehring.de. An online enquiry can be found at www.hollfelder-guehring.de

Company name/no. if available

Contact person

Street

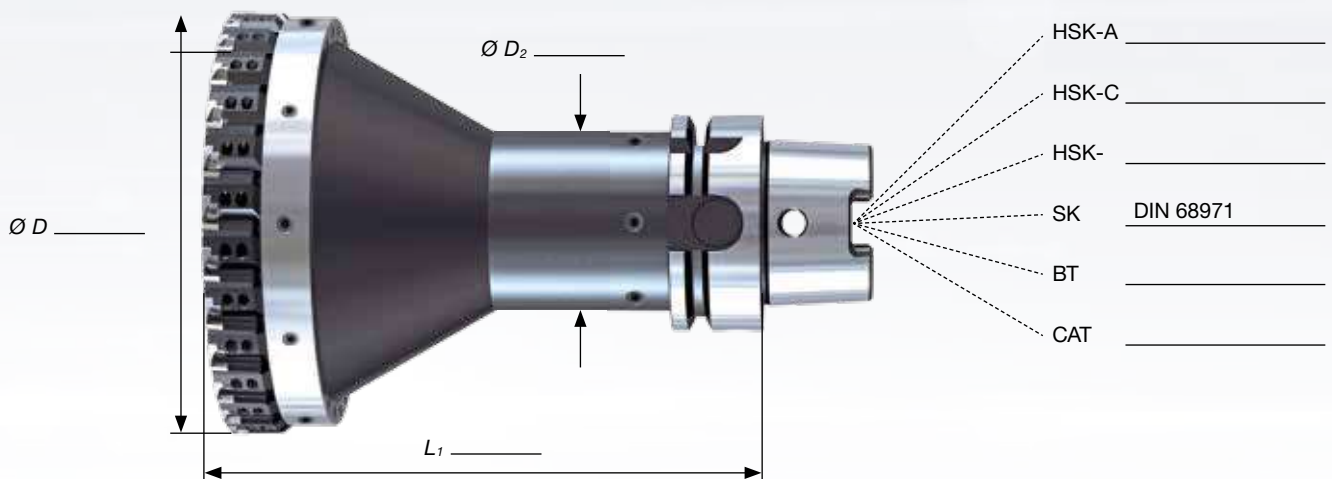
Town/post code

Telephone

e-mail address

Date

Signature



Workpiece _____ Width of cut (a_e) _____ Maximum no. of teeth ☐

Material _____ IC (bar) _____ Reduced no. of teeth _____ Rough milling cutter ☐

Allowance (a_p) _____ MQL 1 channel ☐ Maximum tool weight _____ Finish milling cutter ☐

Surface finish R_z _____ MQL 2 channel ☐



Enquiry form

for automatically adjustable tools

Customer	_____	Date	_____
Contact person	_____	Telephone	_____
Street	_____	Fax	_____
Town/post code	_____	e-mail	_____
Workpiece	_____	Drawing number	_____
Material	_____	Hardness/tensile strength	_____

Designation workpiece / 3D model required!

Machining ☐ Crankshaft bearing passage ☐ Balance shaft ☐ Cylinder liner

Required surface finish $R_a =$ _____ $R_z =$ _____ Others _____

Stock _____ mm ☐ in radius ☐ in Diameter

Machine ☐ MC ☐ Transferline ☐ Multi-spindle machining

Machine manufacturer _____

Machine type _____

Spindle ☐ Steep taper DIN _____ Size _____

☐ HSK DIN _____ Size _____

☐ Others _____

☐ max. Rpm _____

☐ With Internal coolant

☐ Without internal coolant

☐ Power _____ KW

Retraction of the inserts required (drawbar)? ☐ Yes ☐ Air ☐ Emulsion ☐ Mechanical
☐ No

Hubmechanismus ☐ Yes ☐ No

Lagerung ☐ Intermediate bearing ☐ Counter bearing → drawing required!

Tool ☐ Right-hand cutting ☐ Left-hand cutting

Cutting data (current process) $v_c =$ _____ m/min $f =$ _____ mm/U ☐ mm/teeth ☐ mm/min

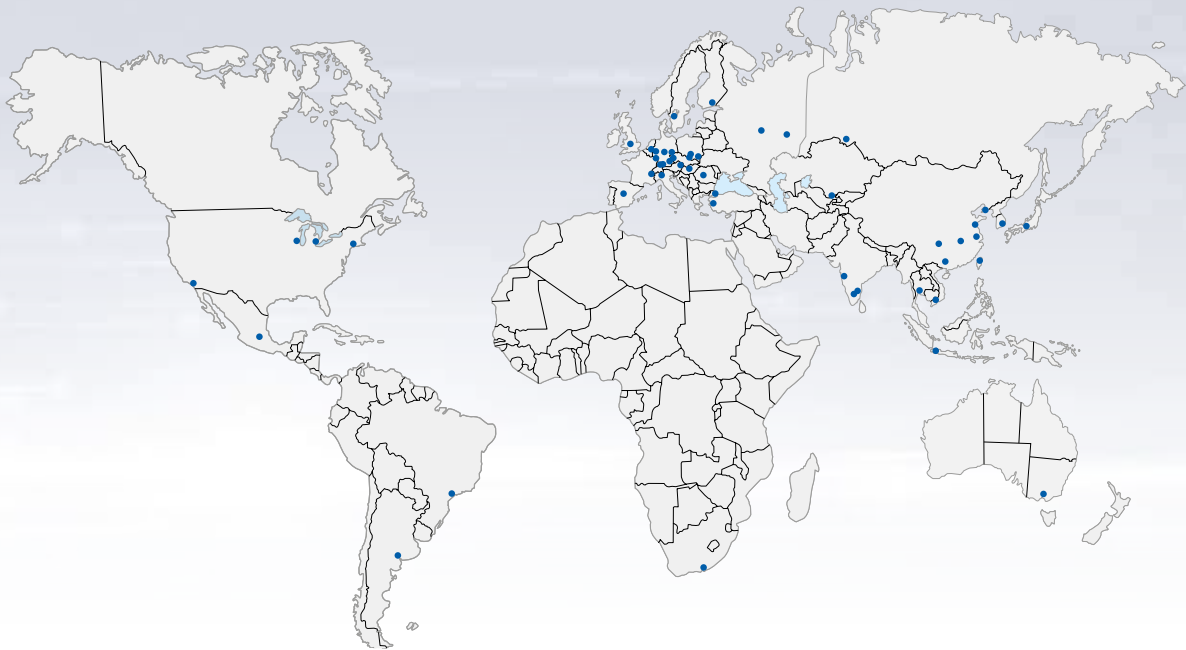
Coolant ☐ Emulsion ☐ MQL ☐ Air (dry)

Description of machining strategy (e.g., machining direction? roughing/finishing?)

Our innovative tooling systems are used all over the world in many areas in the metal cutting industry. Both the highly precise standard tools which can be used flexibly as well as our customer specific innovative tooling solutions qualify us as a reliable partner in the metal machining industry.

Thanks to many years of experience and our specific know-how we will increase your productivity.

Challenge us with your requirements!





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