HOLLFELDER
GÜHRING
CUTTING TOOLS

Special tooling for customer applications

HOLLFELDER-GÜHRING CUTTING TOOLS

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 most modern 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 : 2009 and DIN EN ISO 14001.

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 presetting 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 an increase in productivity.

We would be pleased to assist 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.

Call us, we will also meet your requirement
. . . precise . . . flexible . . . innovative.
We always appreciate your confidence in us.

HOLLFELDER GÜHRING CUTTING TOOLS

Headquarters Nuremberg

Location Zorbau

Contents

Individual and economic solutions require the utmost competence.

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:
- machining tests in our premises
- trainings for user also at our customers 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.

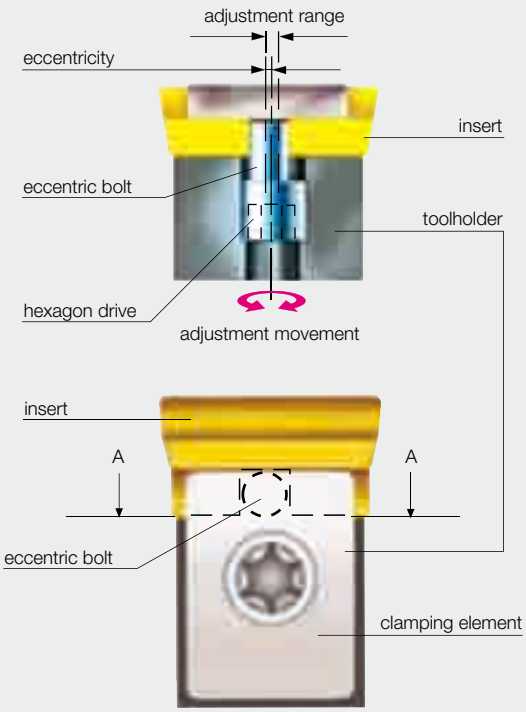
For further informations look at our web page
www.hollfelder-guehring.de

Adjustment systems
Function

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 bolt adjustment

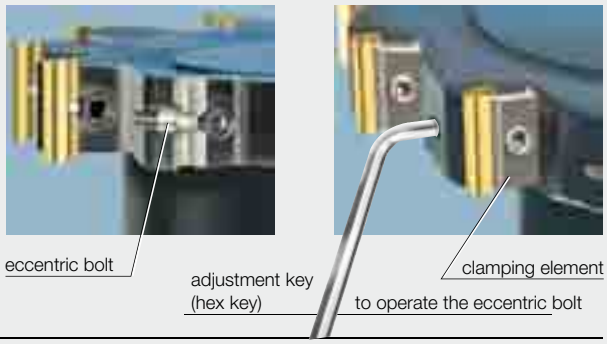
cut A-A



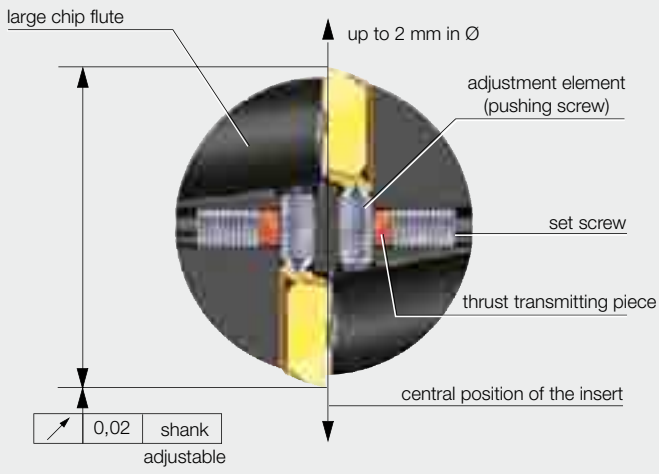
The eccentric bolt adjustment system offers a lot of design possibilities based on its open style.
For instance the periphery of the milling cutters can be provided with an extremely high number of inserts and thus extremely high feed rates can be achieved. Based on the embedded eccentric bolt and the stable clamping element the system shows special strength in the area of deep and precise face grooving applications. The design of the clamping system doesn‘t require any support on the side of the pocket seat which leads to

the fact that a triangular treatment is possible.

By means of a slot in the insert, it can be adjusted radially or axially depending on its position in the tool body. The insert can be adjusted in 2 directions. Also with this clamping / adjustment systems the inserts remain clamped during adjustment.



Radial screw adjustment

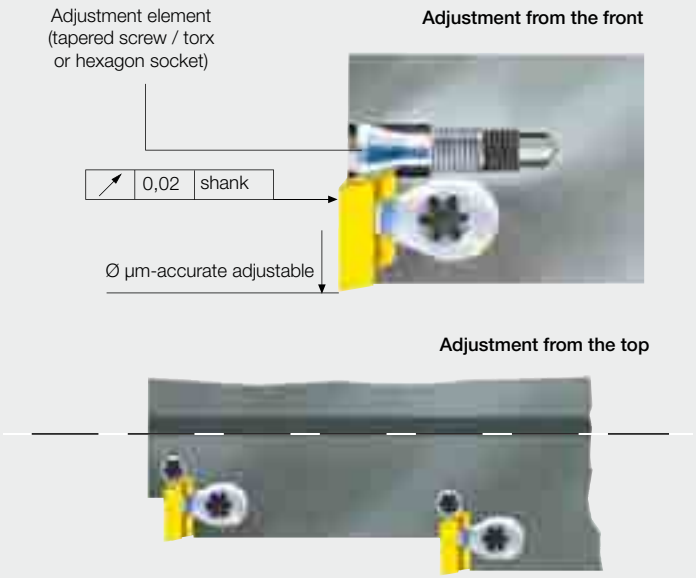


This adjustment system is characterised by a large range of adjustment and its robust design. Its main area of usage are machining operations with tolerances ≥ 0.05 and frequently changing machining diameters.

Adjustment systems
Function

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.

Adjustment with tapered screw from the front and the top



The adjustment with tapered screw is an adjustment system of utmost flexibility which offers a solution in nearly every application making use of the possibility to adjust either in front or at the top.
Whereas in single-step tools adjustment in front is preferably used, it's the adjustment at the top which renders many advantages for multi-step tools.
Both types feature µm-accurate adjustment without releasing the clamping of the inserts.

Micro-adjustment

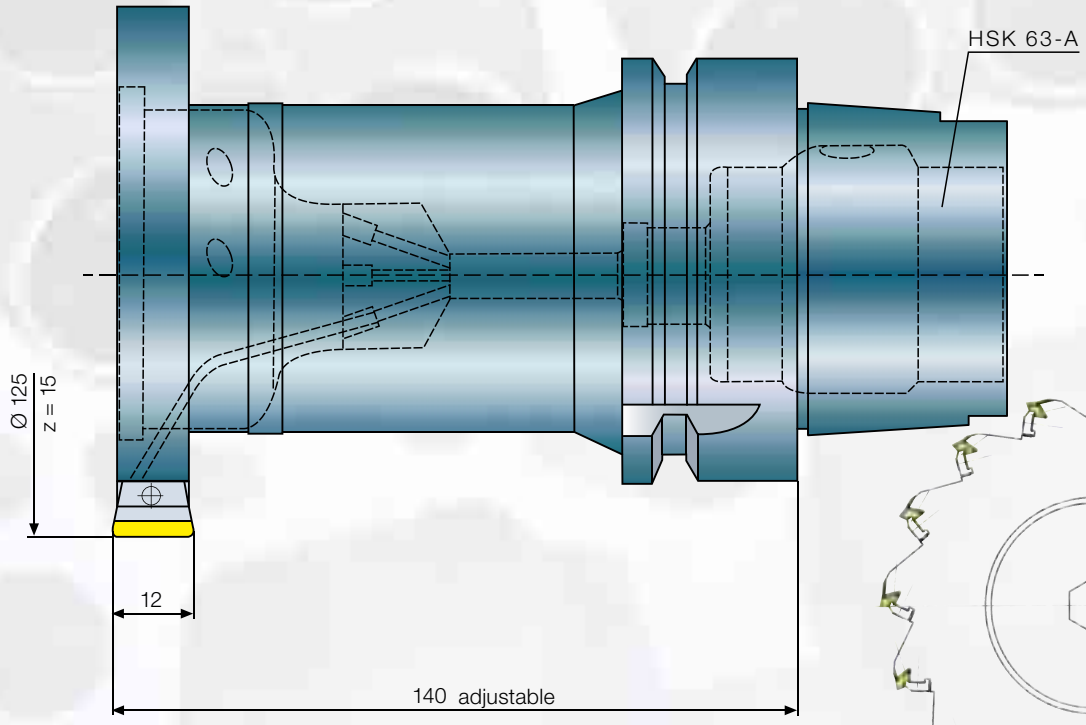
1 revolution ≙ 0,02 mm in Ø

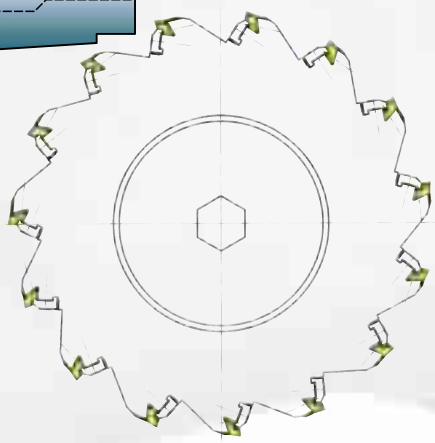
The micro-adjustment can be considered as the logical next step in the development of the tapered screw adjustment from the front. A built-in adjustment cartridge in the holder enables the user to achieve an extremely precise adjustment of the machining measures when using inserts of the product ranges W 2850.... and W 3570.... . This adjustment cartridge can be integrated from bore diameter 14 mm. The advantageous relation - 1 turn of screw ≙ 0,02 mm adjustment range of machining diameter - results in an extremly precise adjustment **directly in the machining center without any additional devices.** Particularly in uninterrupted processes such as serial production of automotive parts, the wear of the insert can easily be compensated by use of the micro-adjustment.
This type of adjustment system offers advantages also for the machining of highly precise single-item production parts as the **adjustment process does not require the direct exchange of the tool.**

Cylinder head

Cylinder head
Cylinder head faces

Pre-milling of cylinder head faces. All inserts adjustable.

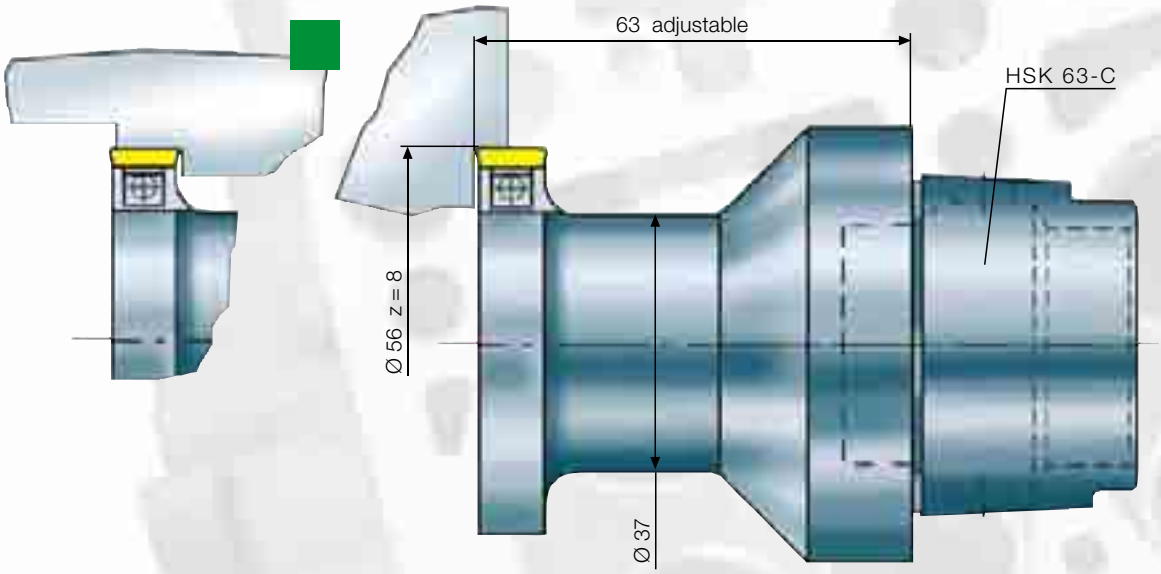




Workpiece		**Cylinder head** car
Material		(DIN) G Al Si 12 Cu
Tool		**Monoblock milling cutter**
Number of teeth		15
Insert		standard
Cutting grade		PCD
Cutting speed	m/min	3.900
Number of revolutions	min^{-1}	9.936
Feed rate	mm/min	22.356
Feed rate per tooth	mm	0,15
Depth of cut	mm	~ 4
Coolant		MQL

Cylinder head
Various milling applications

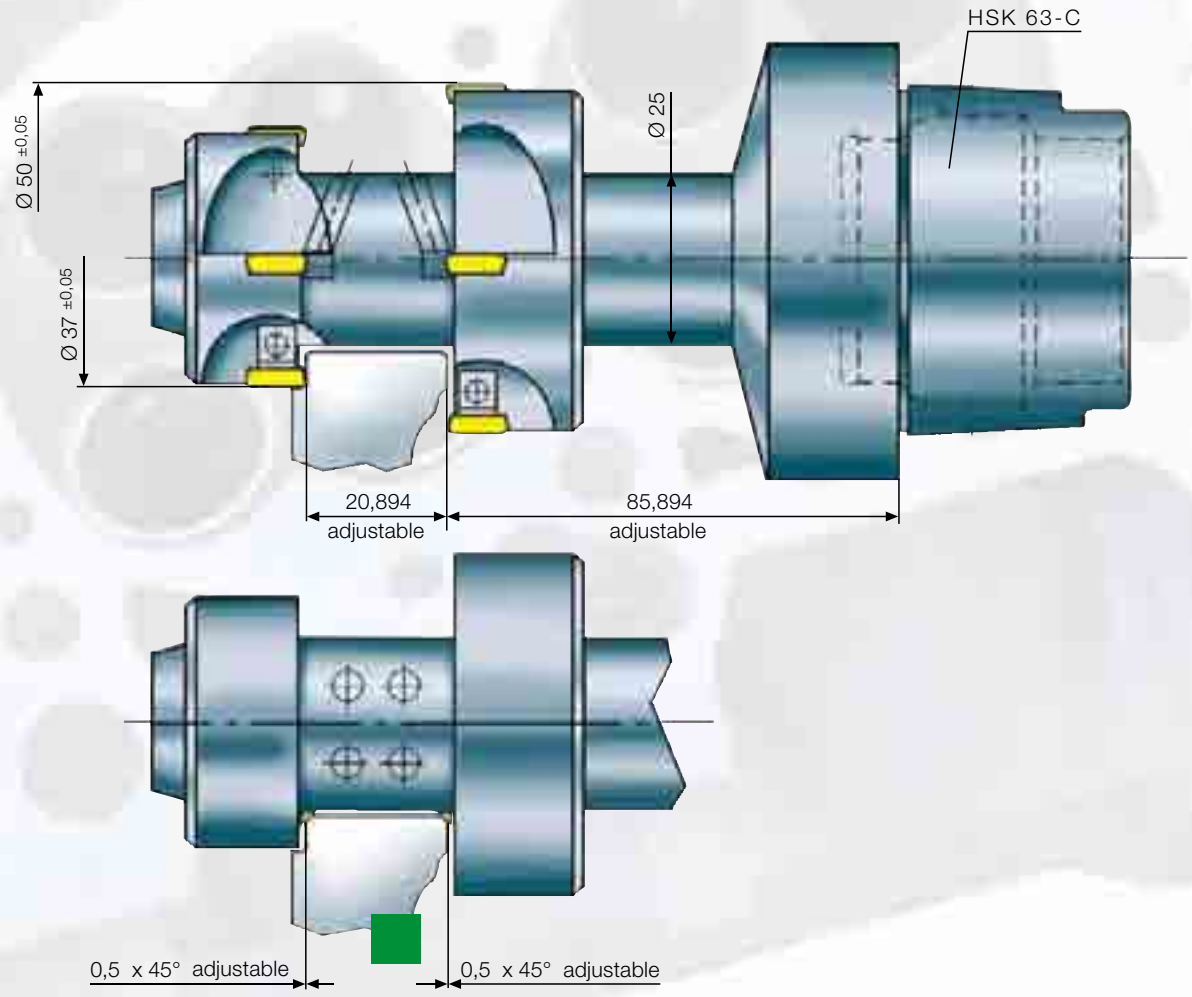
Milling in undercut is possible. All inserts µm-accurate adjustable.



Workpiece			**Cylinder head** car
Material			(DIN) ■ Al Si 9 Cu
Tool			**Milling cutter**
Number of teeth			8
Insert			standard
Cutting grade		PCD	K10
Cutting speed	m/min	-3.165	-1.000
Number of revolutions	min^{-1}	18.000	5.686
Feed rate	mm/min	25.920	8.190
Feed rate per tooth	mm	0,18	0,18
Depth of cut	mm	~ 5	~ 5
Coolant		yes, internal	yes, internal
Surface finish		R_Z 8-10	R_Z 8-10

Cylinder head
Bearing width

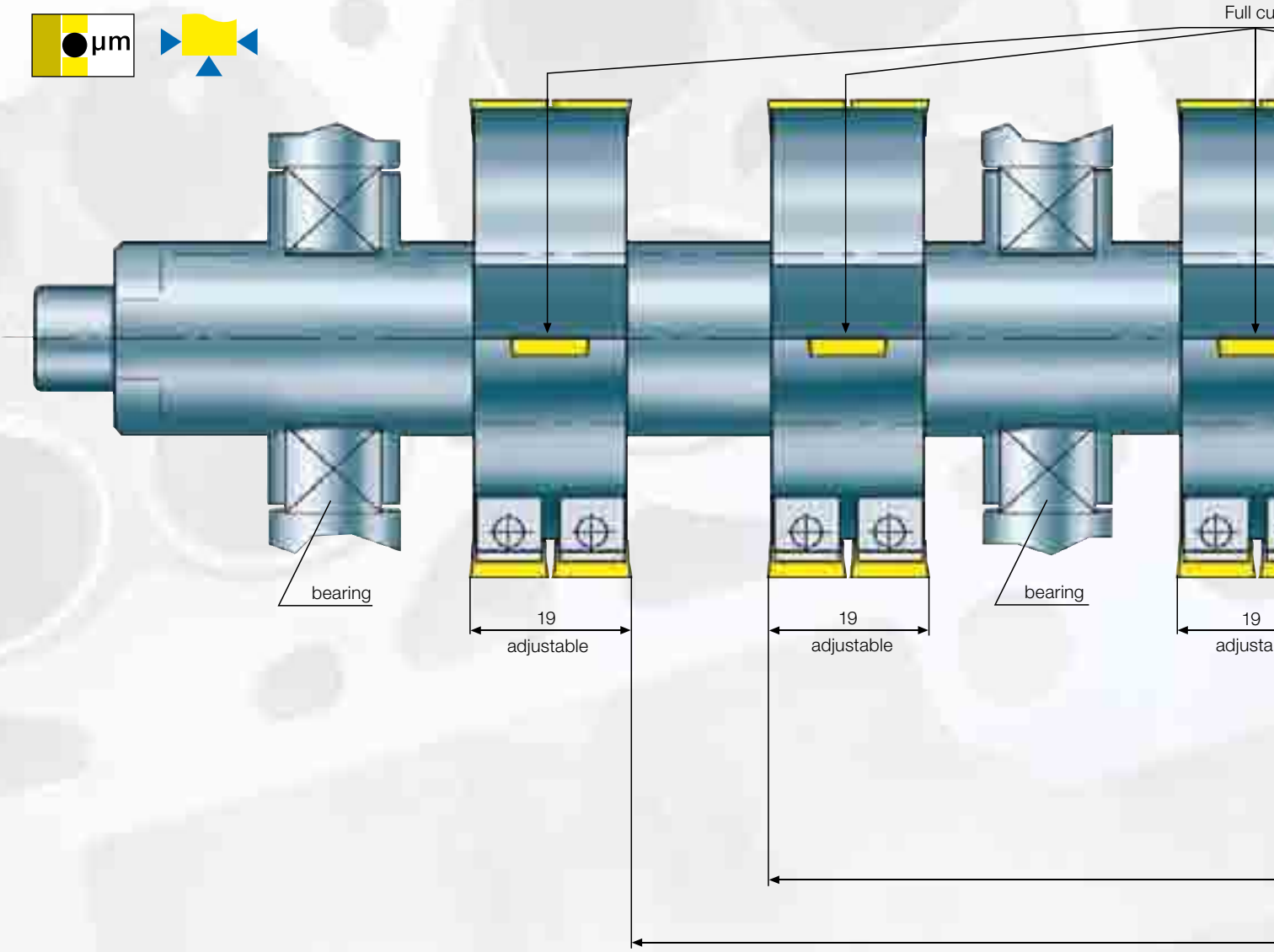
Gang milling cutter to mill the bearing width with chamfering.
Bearing width and chamfer sizes µm-accurate adjustable.



Workpiece		**Cylinder head** car
Material		(DIN) GK Al Si 7 Mg
Tool		**Gang milling cutter**
Number of teeth		2 x 4
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	1.200
Number of revolutions	min^{-1}	7.643
Feed rate	mm/min	3.057
Feed rate per tooth	mm	0,1
Depth of cut	mm	2,5
Coolant		yes, internal

Cylinder head
Clearance cut of bearing seats/thrust bearing

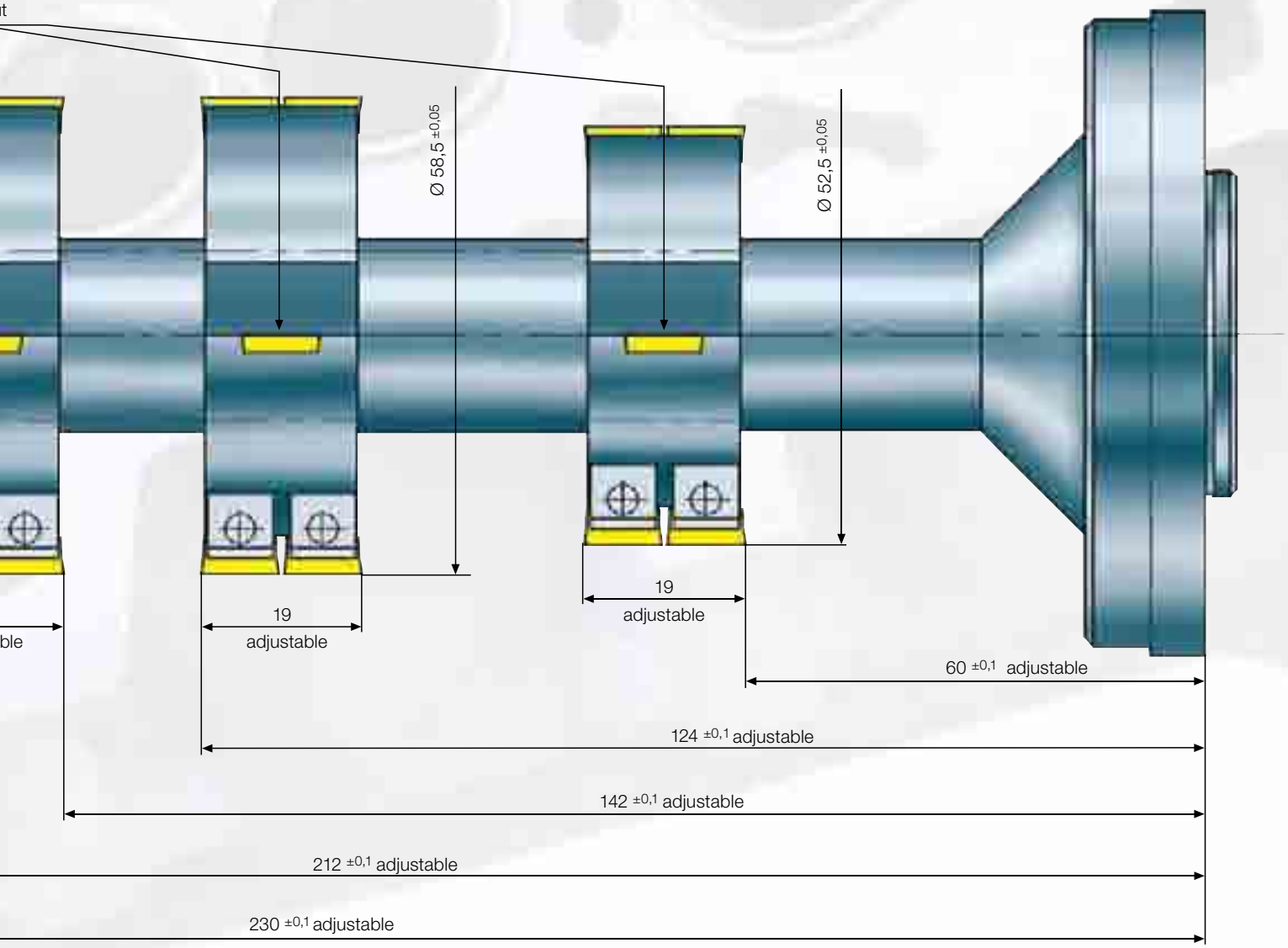
Clearance milling.
Face run-out and milling cutters are adjustable towards each other.



Workpiece		**Cylinder head** car
Material		(DIN) G - Al Si 9 Cu
Tool		**Gang milling cutter**
Number of teeth		effective 2 each
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	735
Number of revolutions	min^{-1}	4.000
Feed rate	mm/min	1.200
Feed rate per tooth	mm	0,15
Depth of cut	mm	~ 2
Coolant		yes, internal

Cylinder head

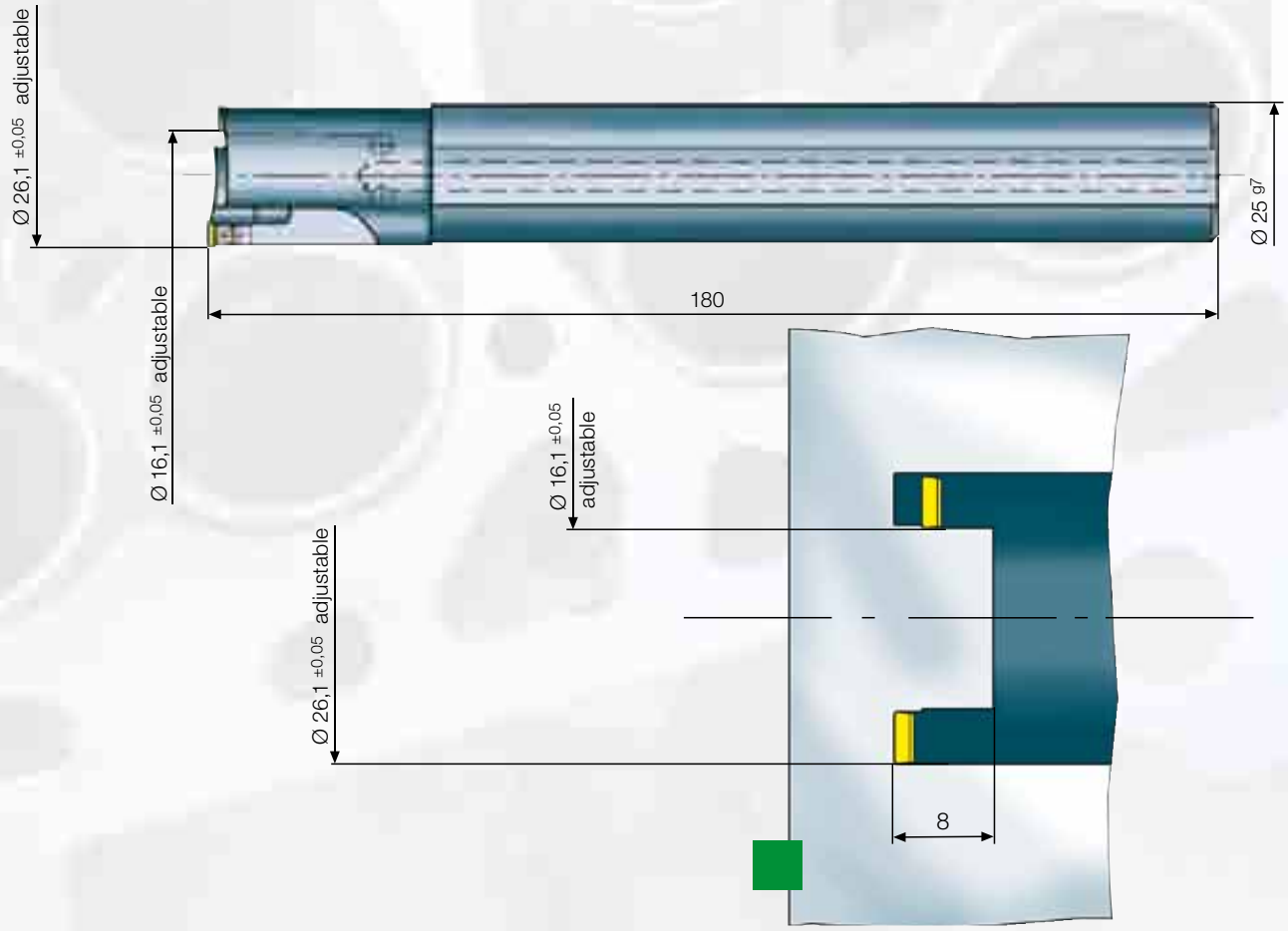
Clearance cut of bearing seats/thrust bearing



Cylinder head
Spring seat

Face grooving tool. Inserts adjustable in diameter.

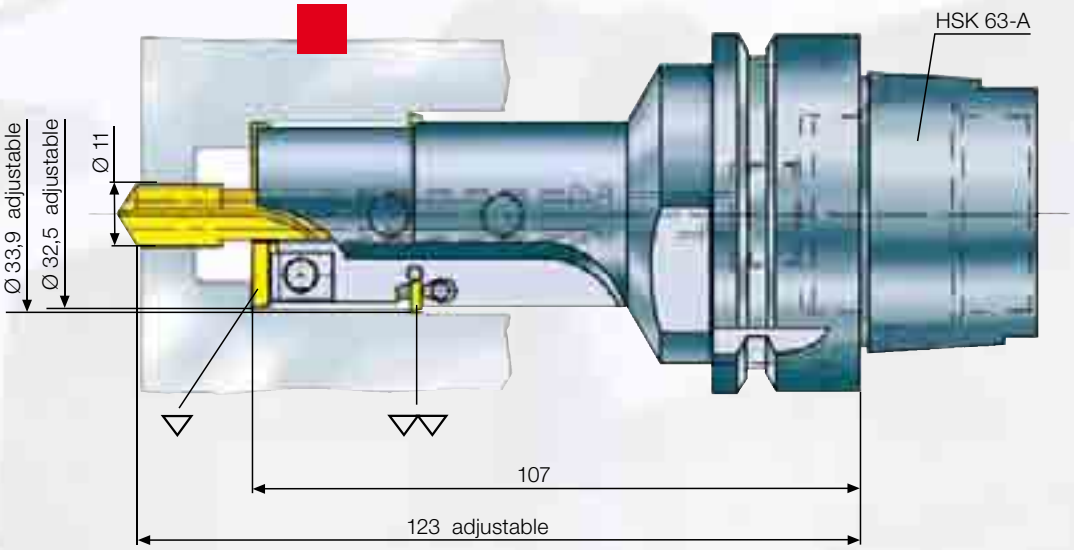
µm



Workpiece		**Cylinder head** motorbike
Material		(DIN) ■ GK Al Si 10 Mg Cu
Tool		**Plunging tool**
Number of teeth		effective 1
Insert		according to customer specification
Cutting grade		PCD / K10
Cutting speed	m/min	860
Number of revolutions	min^{-1}	10.500
Feed rate	mm/min	840
Feed rate per tooth	mm	0,08
Depth of cut	mm	8 full cut
Coolant		yes, internal

Cylinder head
Spring seat

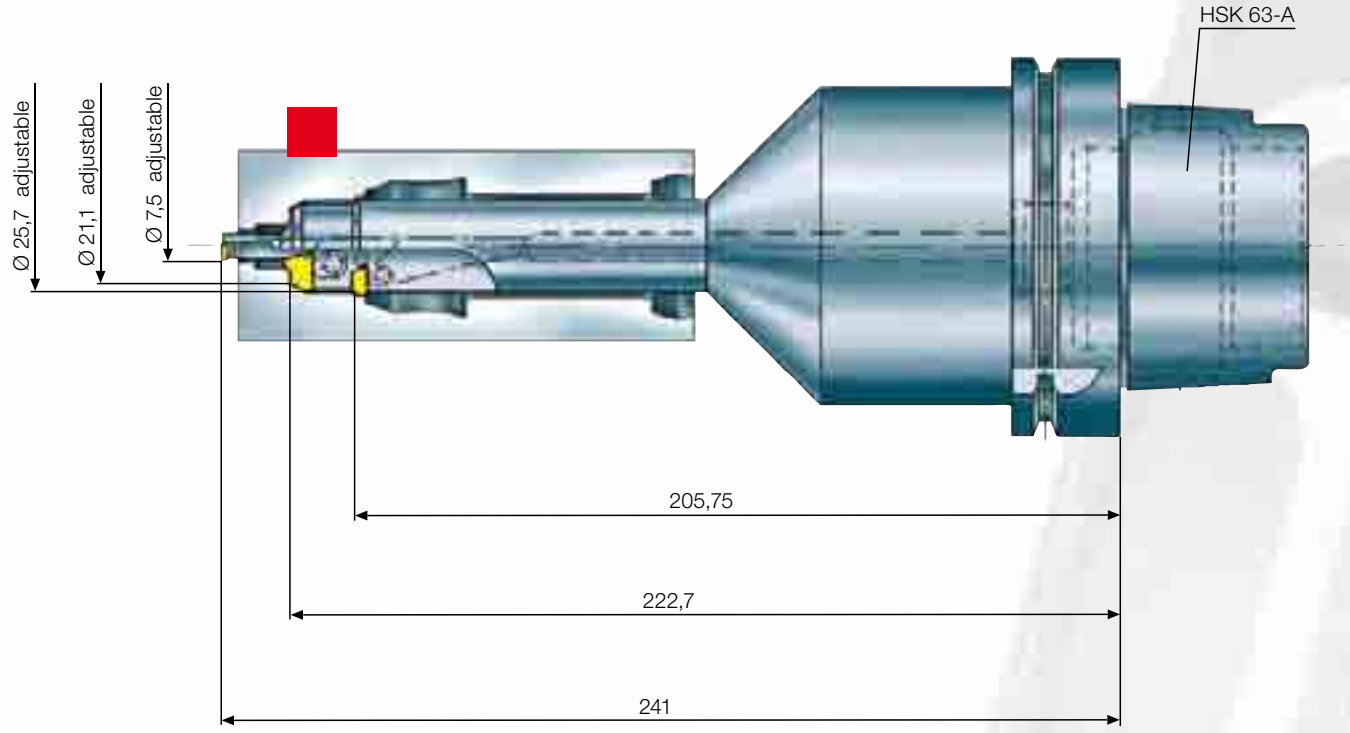
Drilling and fineboring of the spring seat.
Length of drill adjustable. Fineboring diameters adjustable.



Workpiece		**Cylinder head**
Material		(DIN) ■ GG 25
Tool		**Multistep-fineboring tool**
Number of teeth		2 per Ø
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 11) 88 / (Ø 33,9) 258
Number of revolutions	min^{-1}	2.424
Feed rate	mm/min	340
Feed rate per tooth	mm	0,07
Depth of cut	mm	-5
Coolant		yes, internal

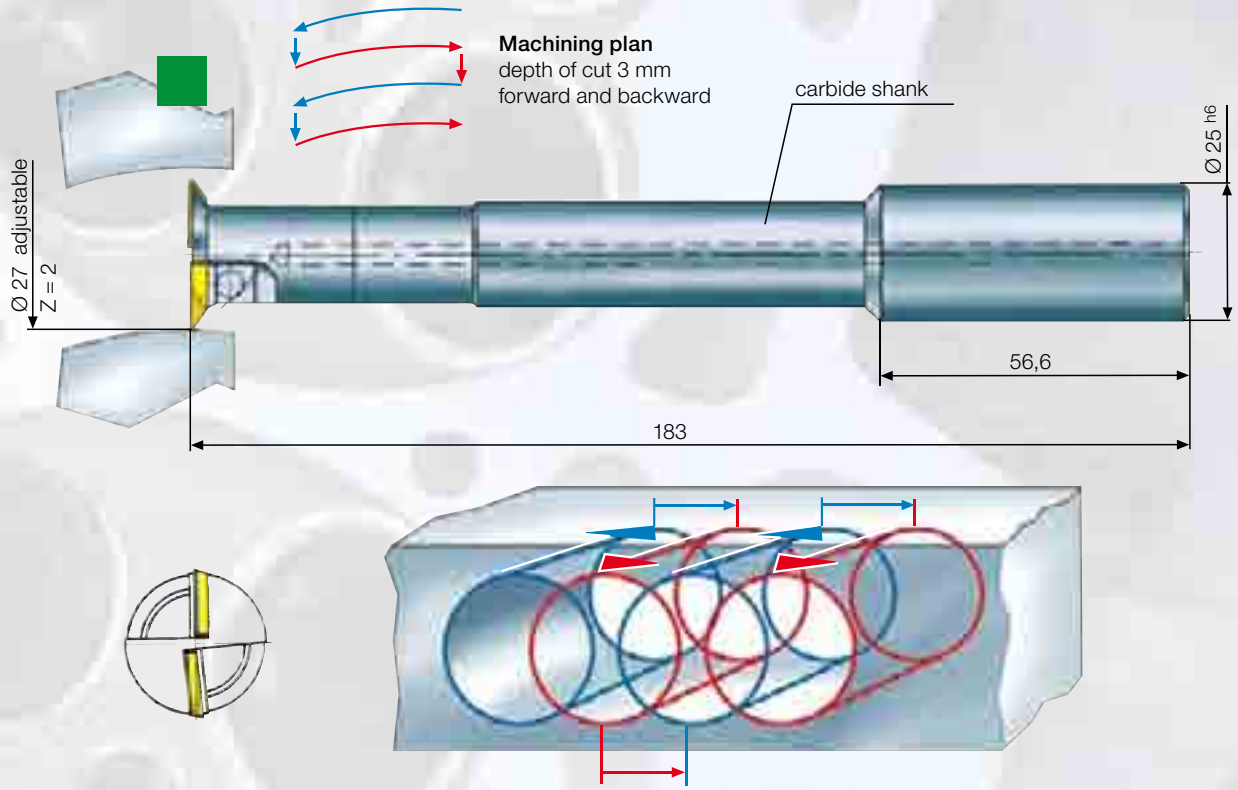
Cylinder head
Spark plug bore

Pre-machining. Form inserts for special profile.
All inserts adjustable.



Workpiece		**Cylinder head**
Material		(DIN) ■ GG - Cr
Tool		**Multistep fineboring tool**
Number of teeth		effective 1
Insert		standard and acc. to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	220
Number of revolutions	min^{-1}	2.725
Feed rate	mm/min	191
Feed rate per tooth	mm	0,07
Depth of cut	mm	0,2 - 0,8
Coolant		yes, internal

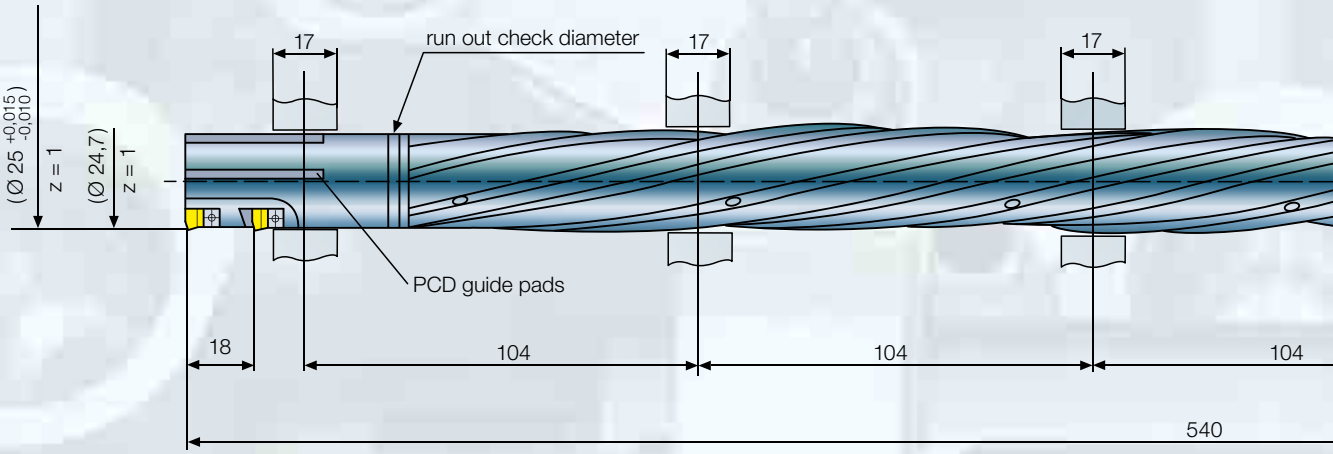
Machining of induction port on a 5 axis MC.



Workpiece		**Cylinder head** car
Material		(DIN) ■ Al Si 10
Tool		**Induction port milling tool**
Number of teeth		2
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	1.357
Number of revolutions	min^{-1}	16.000
Feed rate	mm/min	11.200
Feed rate per tooth	mm	0,35
Depth of cut	mm	3 forward and backward
Coolant		yes, internal

Cylinder head
Camshaft boring

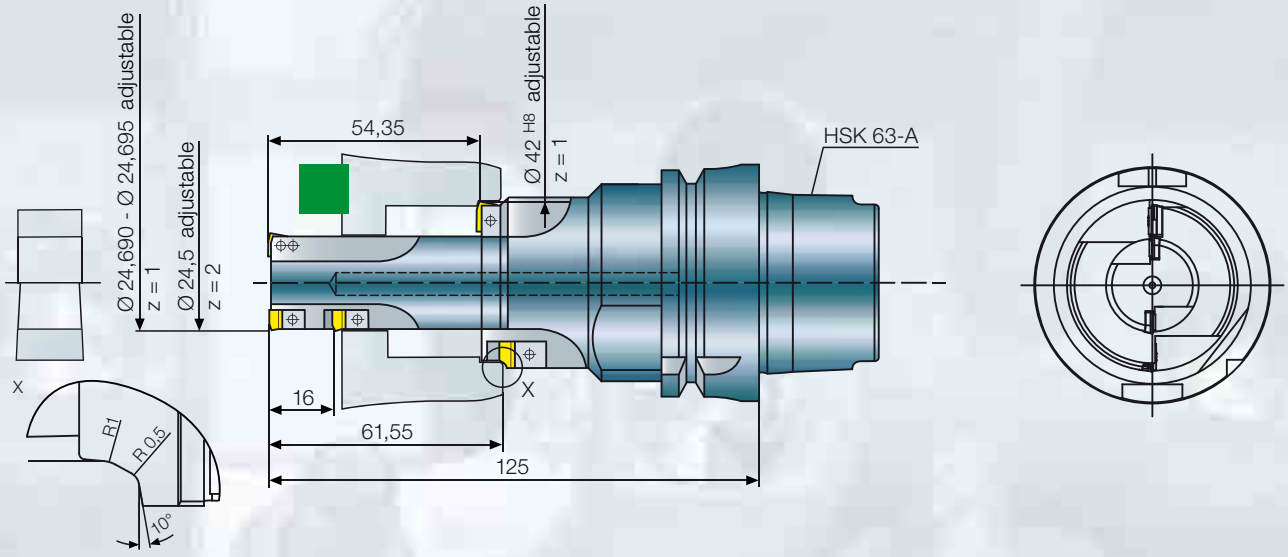
Fineboring tool with twisted carbide guide component and guide pads.

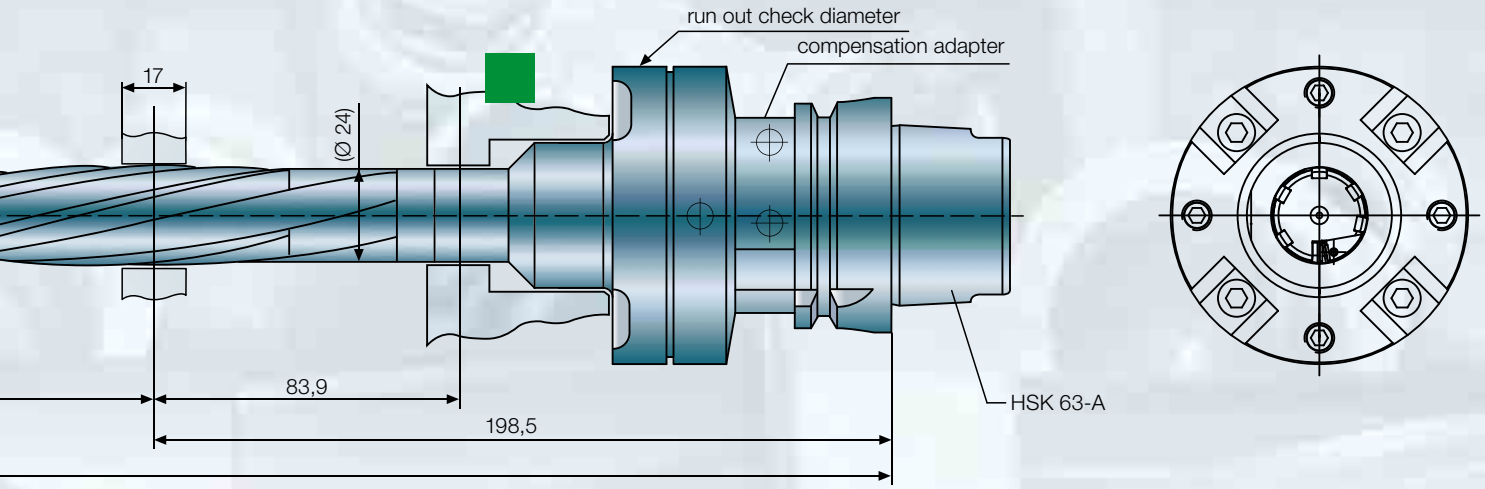


		Pilot tool
Workpiece		**Cylinder head**
Material		(DIN) Al Si 9
Tool		**Multistep-fineboring tool**
Number of teeth		2 / 1 / 1 / 1
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	600
Number of revolutions	min^{-1}	7.350
Feed rate	mm/min	1.470 / 735 > z 1
Feed rate per tooth	mm	0,1
Depth of cut	mm	0,35
Coolant		yes, internal

Cylinder head
Camshaft boring

Pilot tool

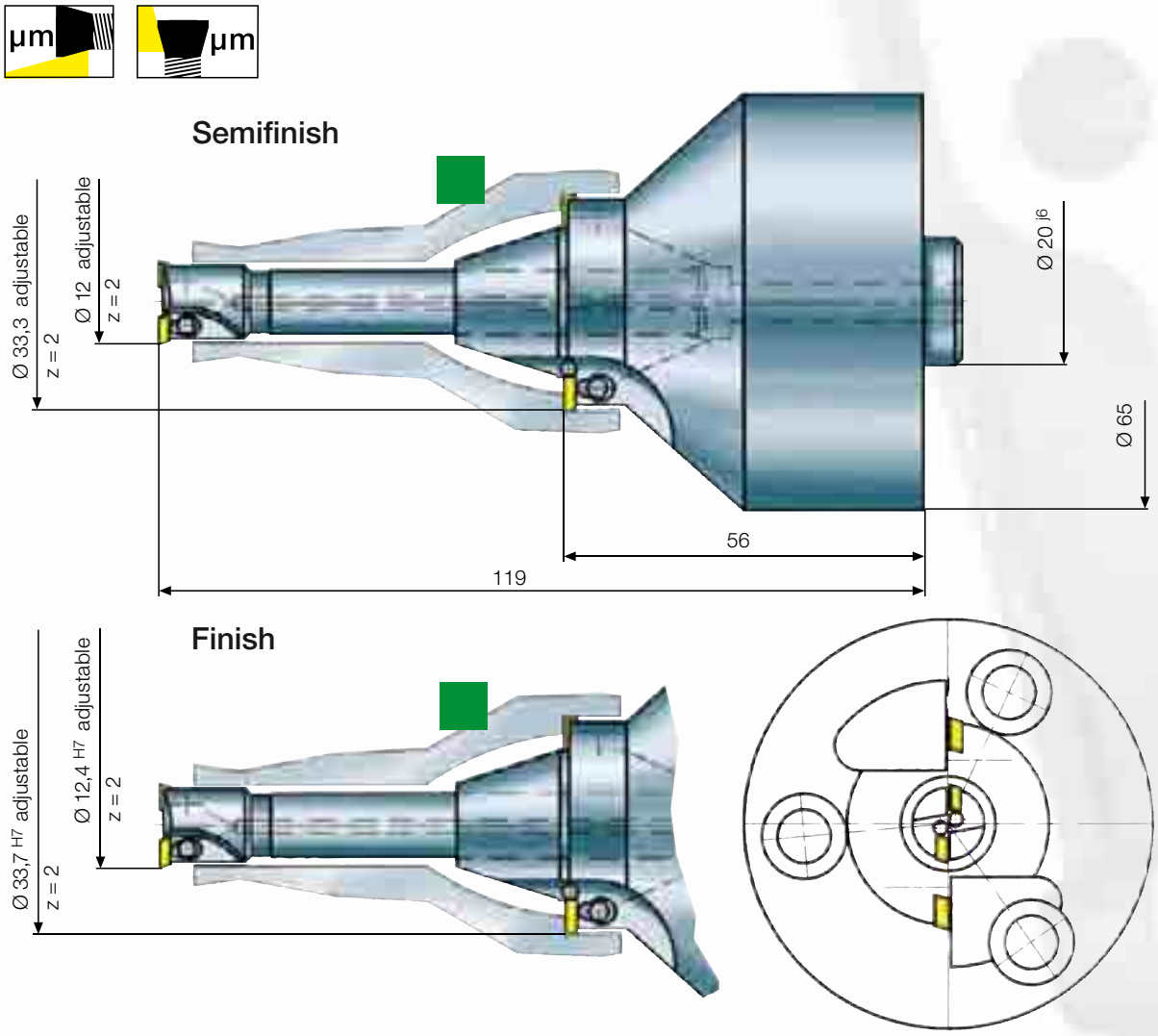




		Finishing tool
Workpiece		**Cylinder head**
Material		(DIN) Al Si 9
Tool		**Fineboring tool**
Number of teeth		1 / 1
Insert		standard
Cutting grade		PCD
Cutting speed	m/min	300
Number of revolutions	min^{-1}	3.670
Feed rate	mm/min	367
Feed rate per tooth	mm	0,1
Depth of cut	mm	0,15
Coolant		yes, internal

Cylinder head
Valve seat

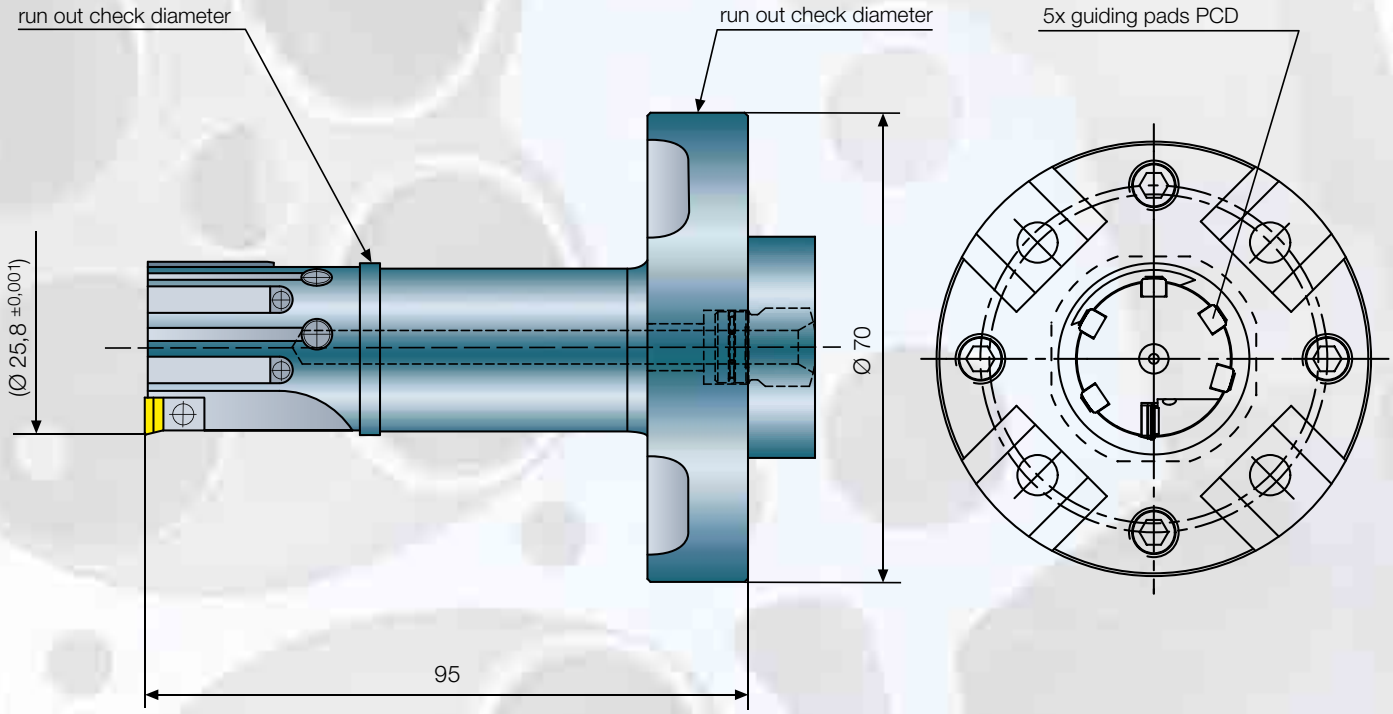
Valve seat machining.



		Semifinish	Finish
Workpiece		**Cylinder head** car	**Cylinder head** car
Material		(DIN) ■ Al Si 6 Cu 4	(DIN) ■ Al Si 6 Cu 4
Tool		**Multistep-fineboring tool**	**Multistep-fineboring tool**
Number of teeth		2 / 2	2 / 2
Insert		standard	standard
Cutting grade		PCD	PCD
Cutting speed	m/min	(Ø 12) 390	(Ø 12,4) 350
Number of revolutions	min^{-1}	10.350	8.989
Feed rate	mm/min	2.900	1.798
Feed rate per tooth	mm	0,14	0,1
Depth of cut	mm	0,5	0,2
Coolant		yes, internal	yes, internal

Cylinder head
Axial grooving

Fine machining with PCD guide pads.



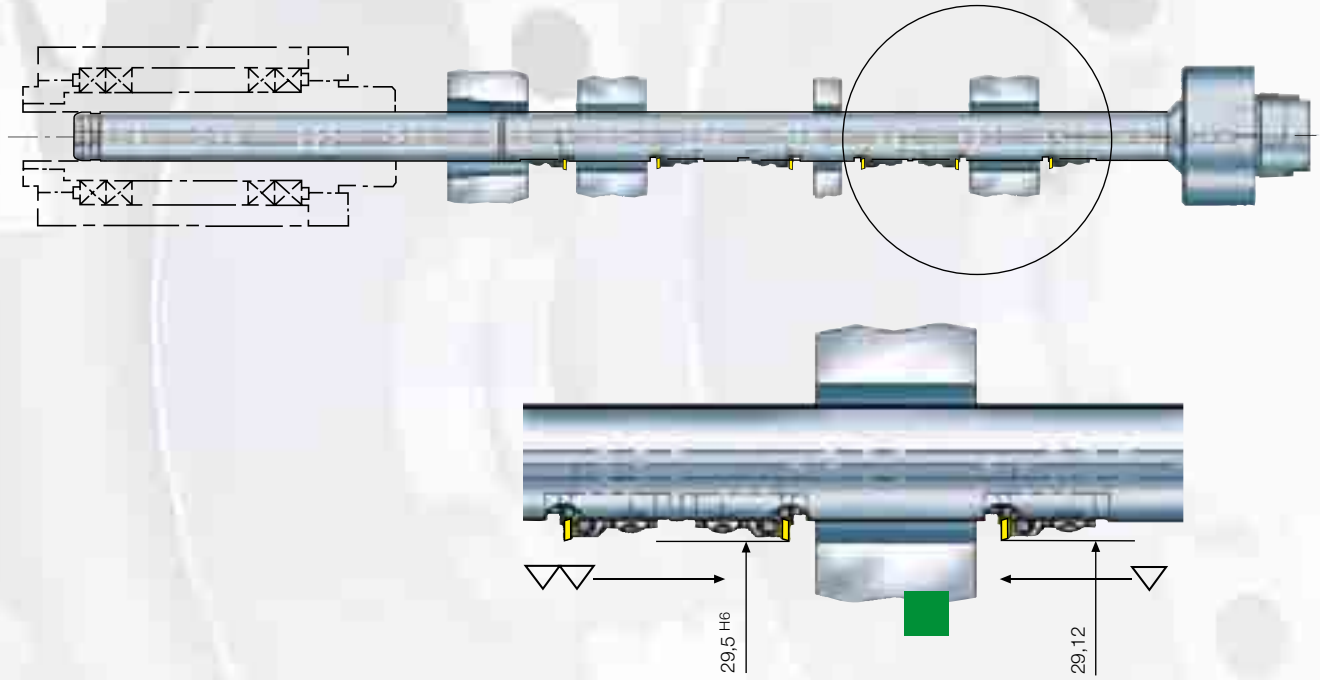
Workpiece		**Cylinder head**
Material		Al
Tool		**Reaming tool**
Number of teeth		1
Insert		standard
Cutting grade		PCD
Cutting speed	m/min	800
Number of revolutions	min^{-1}	9.795
Feed rate	mm/min	980
Feed rate per tooth	mm	0,1
Depth of cut	mm	0,3
Coolant		yes, internal

Cylinder crankcase

Cylinder crankcase

Balance shaft bore

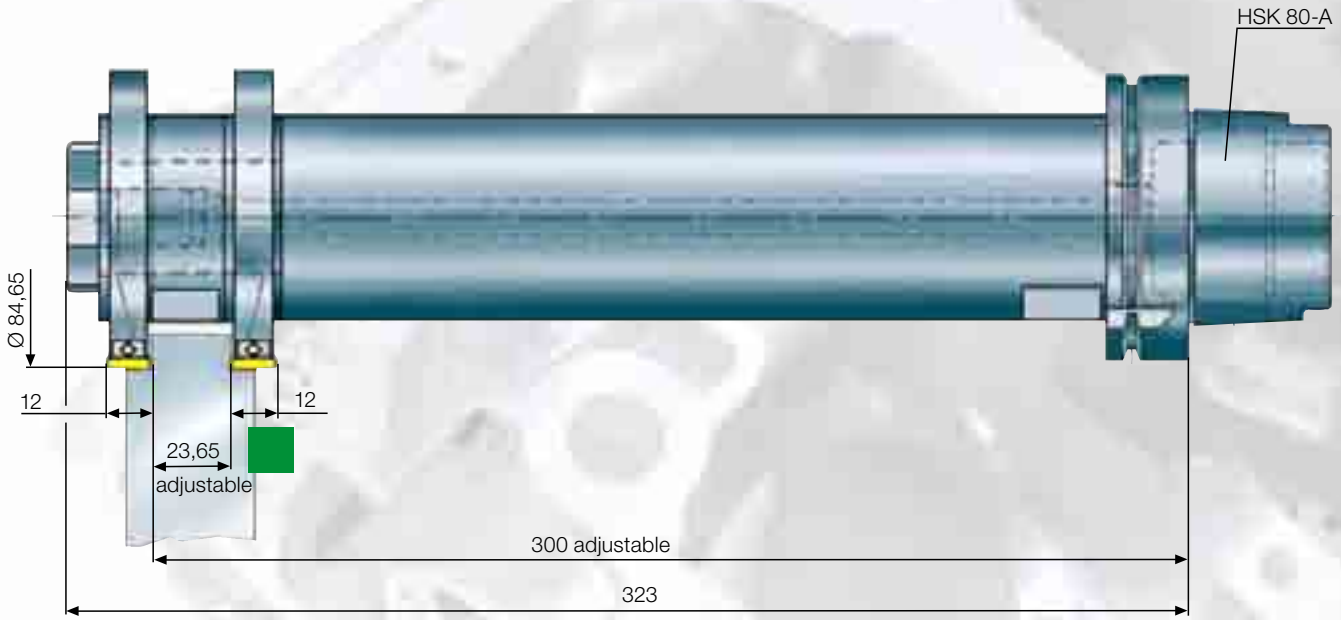
Rough and finish machining, reverse bearing, 3 journals.
All inserts adjustable.



Workpiece		**Cylinder crankcase** car
Material		(DIN) ■ Al Si 9 Cu 3
Tool		**Line boring with cartridges**
Number of teeth		3x ▽ 3x ▽▽ 6 effective 1
Insert		standard
Cutting grade		PCD
Cutting speed	m/min	280
Number of revolutions	min^{-1}	3.022
Feed rate	mm/min	362 / 242
Feed rate per tooth	mm	(roughing) 0,12
Feed rate per tooth	mm	(finishing) 0,08
Depth of cut	mm	0,5
Coolant		yes, internal

Cylinder crankcase
Bearing width

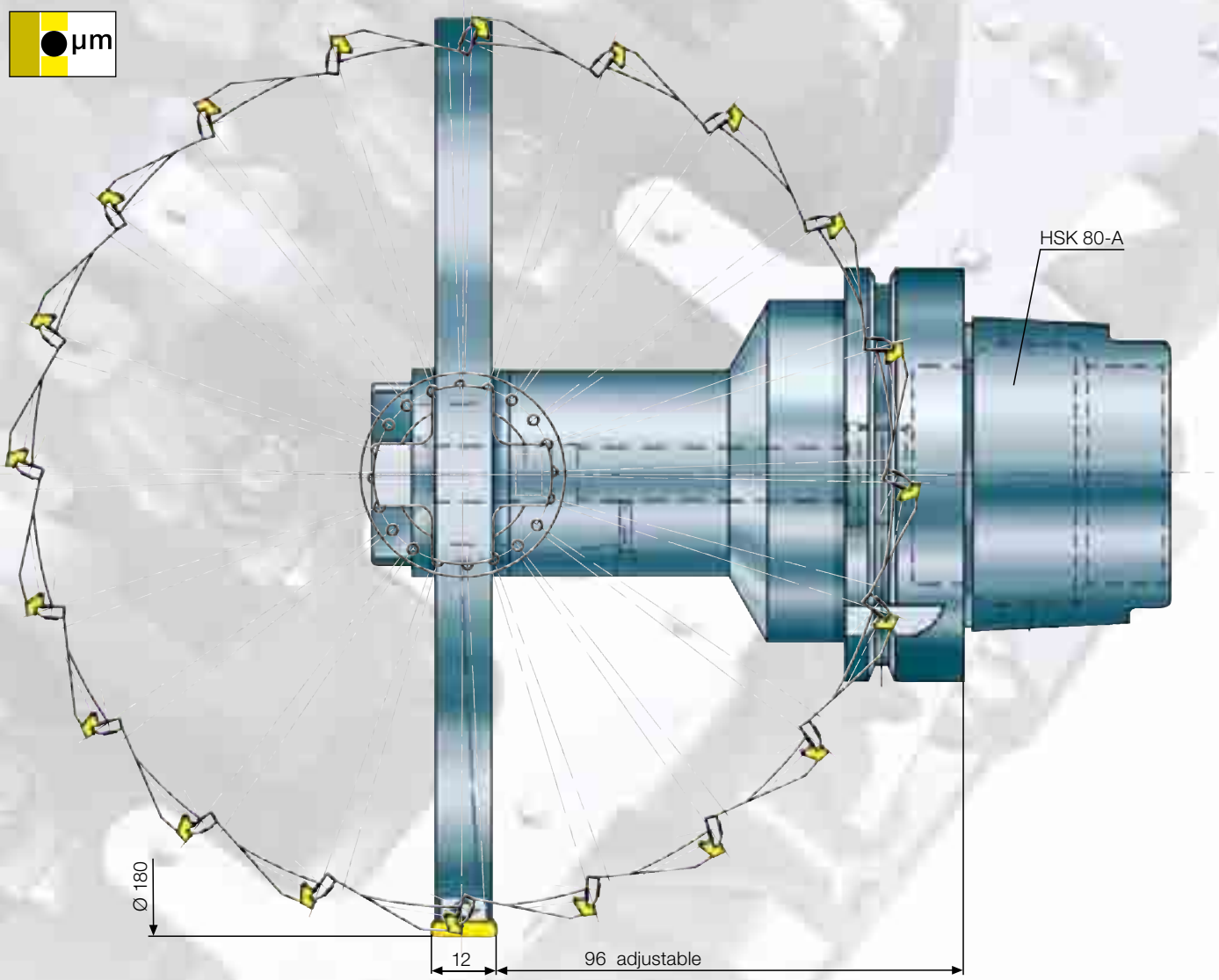
Milling of the bearing width. Width adjustable.



Workpiece		**Cylinder crankcase** car
Material		(DIN) ■ GK - Al Si 17 Cu 4 Mg
Tool		**Gang milling cutter**
Number of teeth		2 x 7
Insert		standard
Cutting grade		PCD
Cutting speed	m/min	780
Number of revolutions	min^{-1}	2.922
Feed rate	mm/min	2.864
Feed rate per tooth	mm	0,14
Depth of cut	mm	2
Coolant		yes, internal

Cylinder crankcase
Bearing clearance

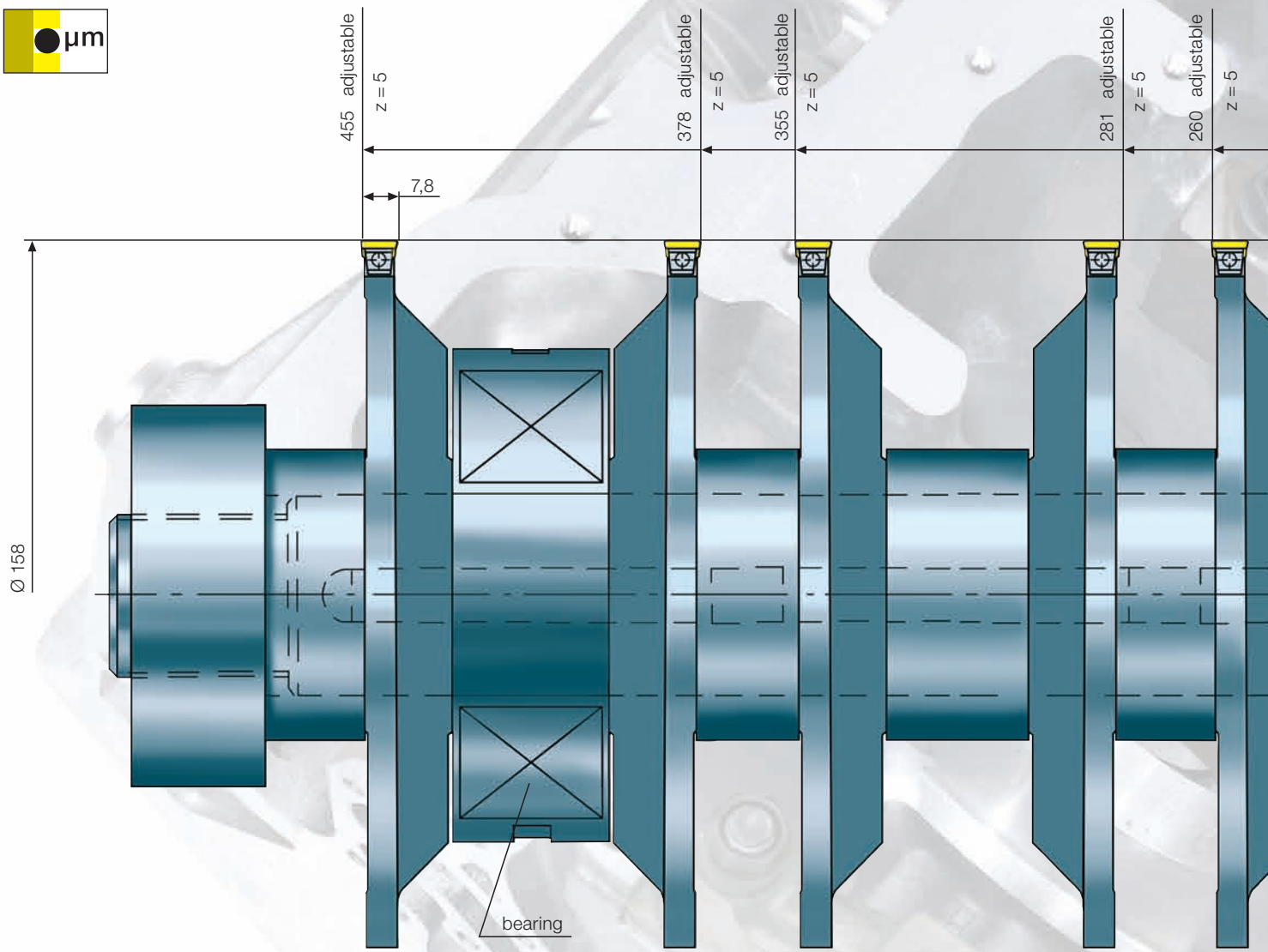
Milling of the bearing clearance. Face run-out adjustable.



Workpiece		**Crankcase** car
Material		(DIN) GK - Al Si 17 Cu 4 Mg
Tool		**Side milling cutter**
Number of teeth		20
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	850
Number of revolutions	min^{-1}	1.504
Feed rate	mm/min	4.210
Feed rate per tooth	mm	0,14
Depth of cut	mm	-5
Coolant		yes, internal

Cylinder crankcase
Bearing width

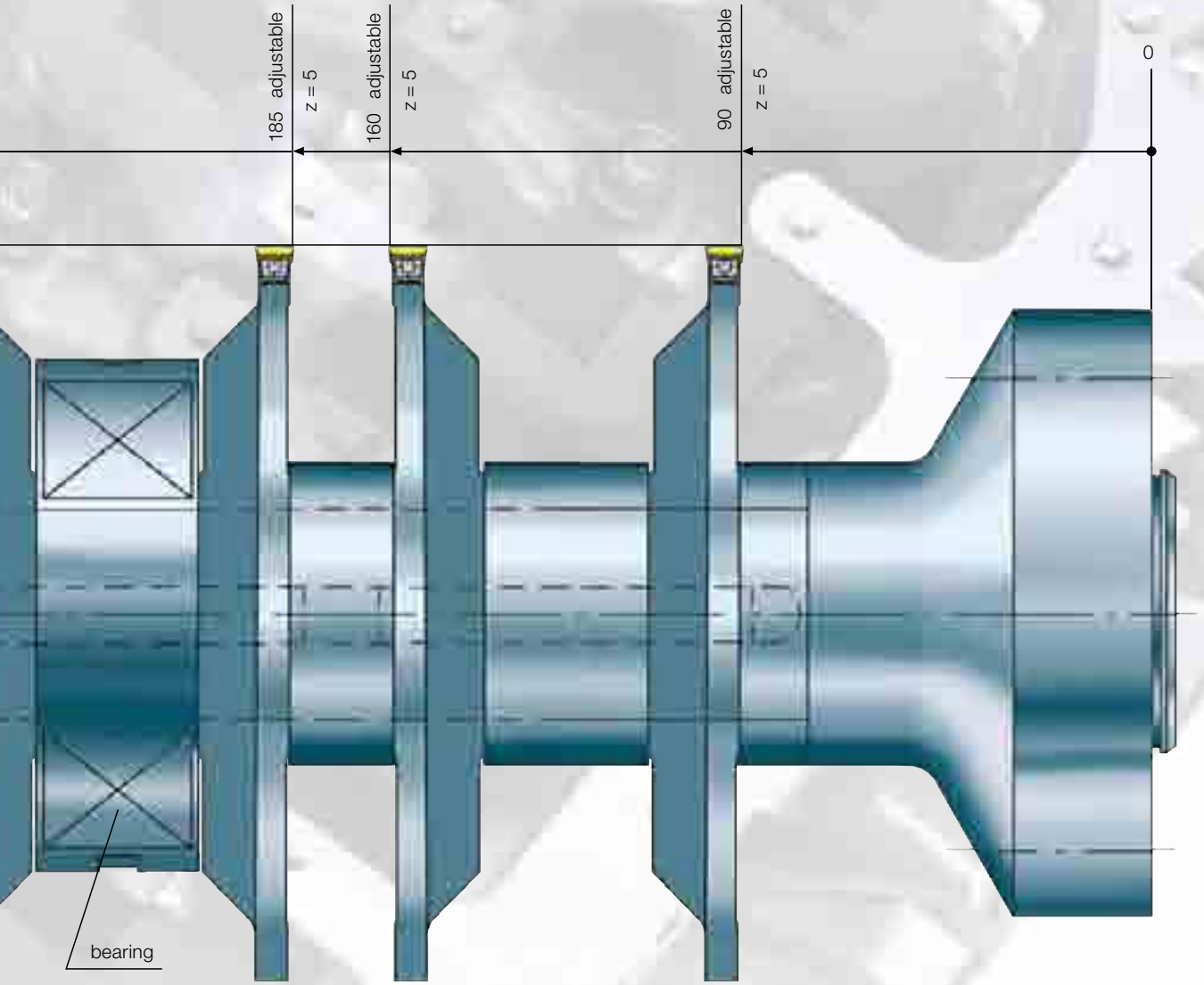
Milling of the bearing width.
Face run-out and milling cutters adjustable to each other.



Workpiece		**Cylinder crankcase**
Material		(DIN) GD - Al Si 9
Tool		**Gang milling cutter**
Number of teeth		5 per cutter
Insert		standard
Cutting grade		PCD / K10
Cutting speed	m/min	500
Number of revolutions	min^{-1}	1.008
Feed rate	mm/min	353
Feed rate per tooth	mm	0,07
Depth of cut	mm	-5
Coolant		yes, external

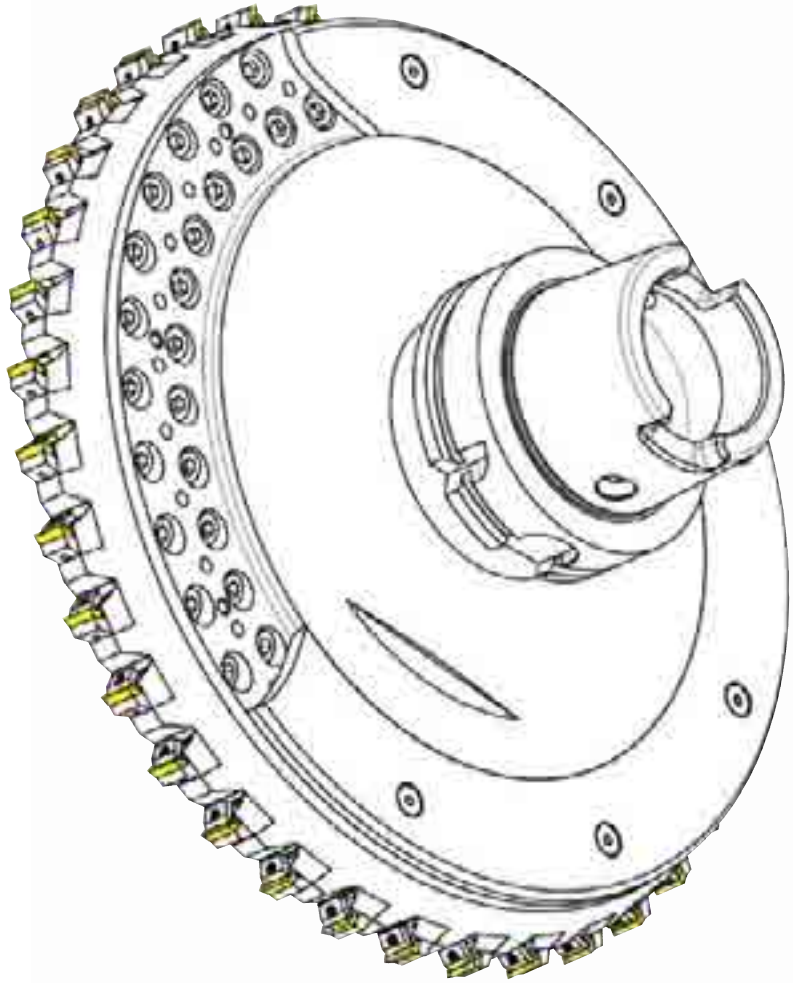
Cylinder crankcase

Bearing width



Cylinder crankcase
Sealing surface

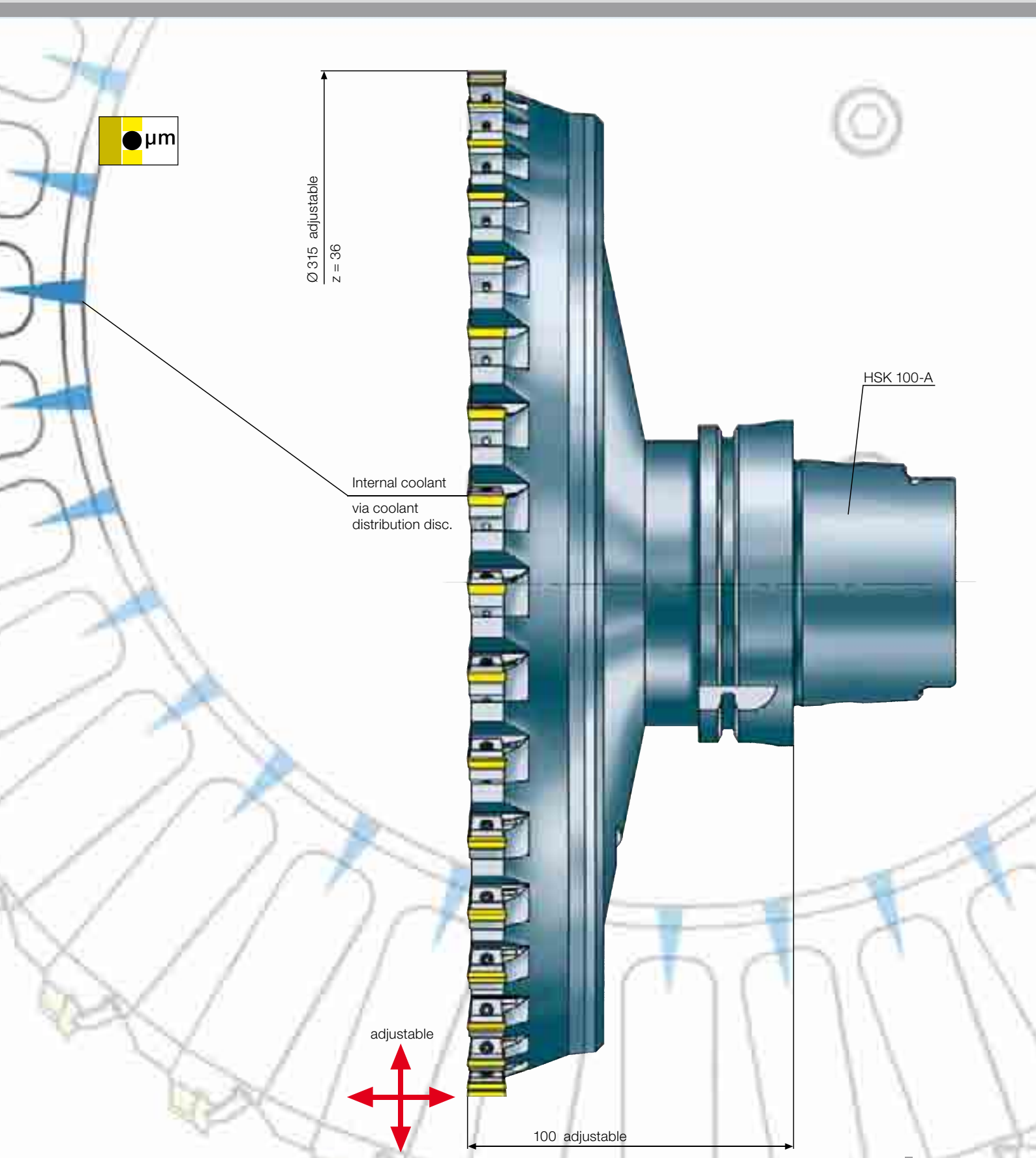
Milling of the sealing surface.
Aluminium crankcase with cast iron liners. All inserts adjustable.



Workpiece		**Cylinder crankcase**	**Cylinder crankcase**
Material		(DIN) GD - Al Si 9	(DIN) GD - Al Si 9 / GG25
Tool		**Face milling cutter**	**Face milling cutter**
Number of teeth		36	36
Insert		standard	standard
Cutting grade		PCD	carbide coated
Cutting speed	m/min	3.000	320
Number of revolutions	min^{-1}	3.033	323
Feed rate	mm/min	10.919	1.744
Feed rate per tooth	mm	0,1	0,15
Depth of cut	mm	0,5	0,5
Coolant		yes, internal	yes, internal
Surface finish		R_Z 2	R_Z 6

Cylinder crankcase

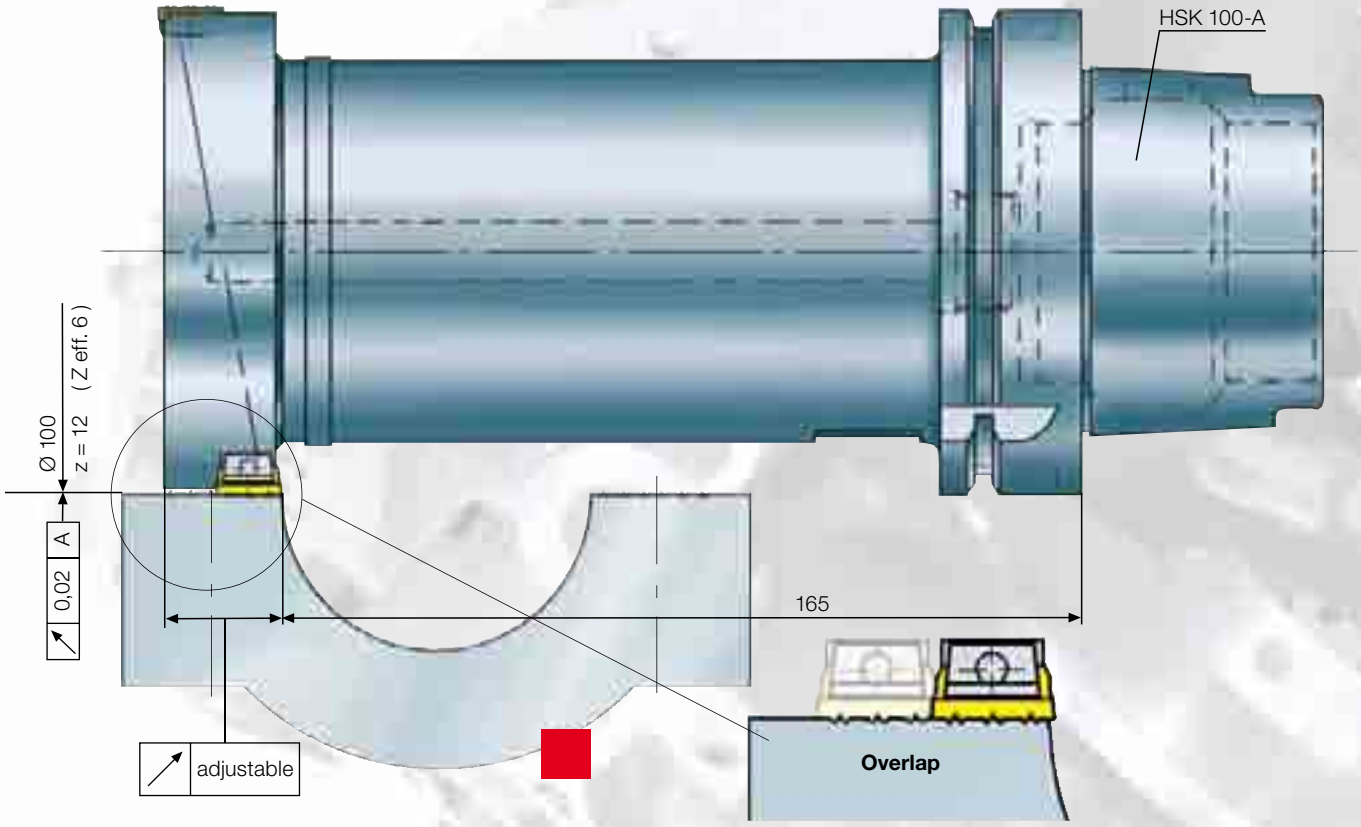
Sealing surface



Cylinder crankcase
Bearing cap

Form milling cutter to machine bearing caps.
Transition of the insert profile adjustable.

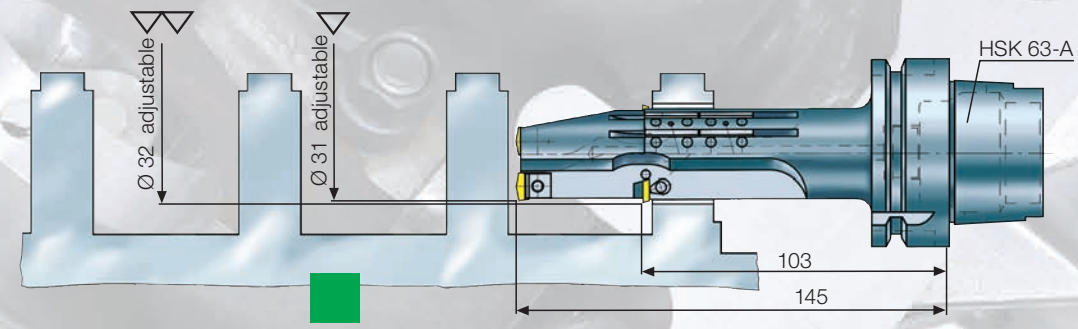
µm



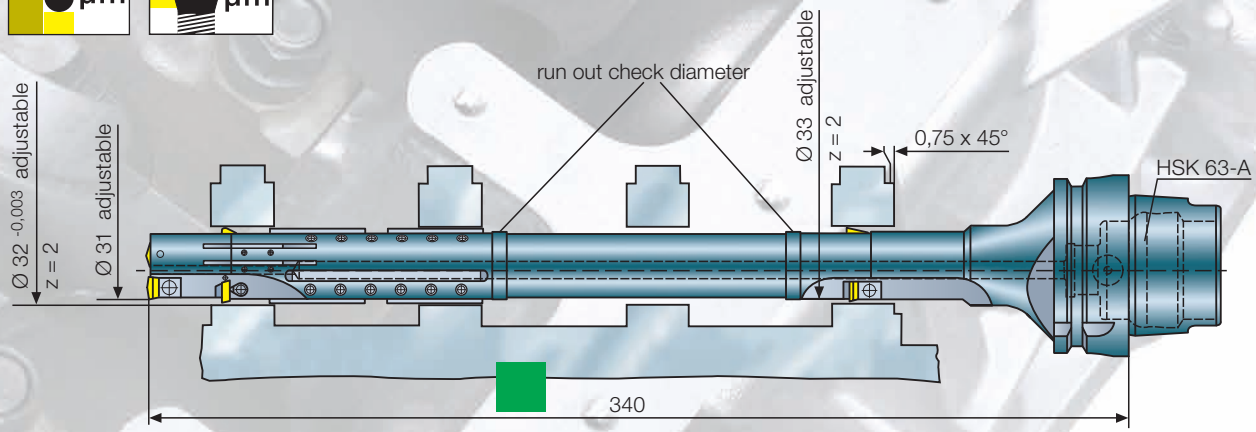
Workpiece		**Crankshaft bearing cap** car
Material		(DIN) ■ GGG 40
Tool		**Form milling cutter**
Number of teeth		2 x 6
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	240
Number of revolutions	min^{-1}	765
Feed rate	mm/min	460
Feed rate per tooth	mm	0,1
Depth of cut	mm	1
Coolant		yes, internal

Cylinder crankcase
Ventilation bore

Pilot tool with guide pads (drilling in the solid material).



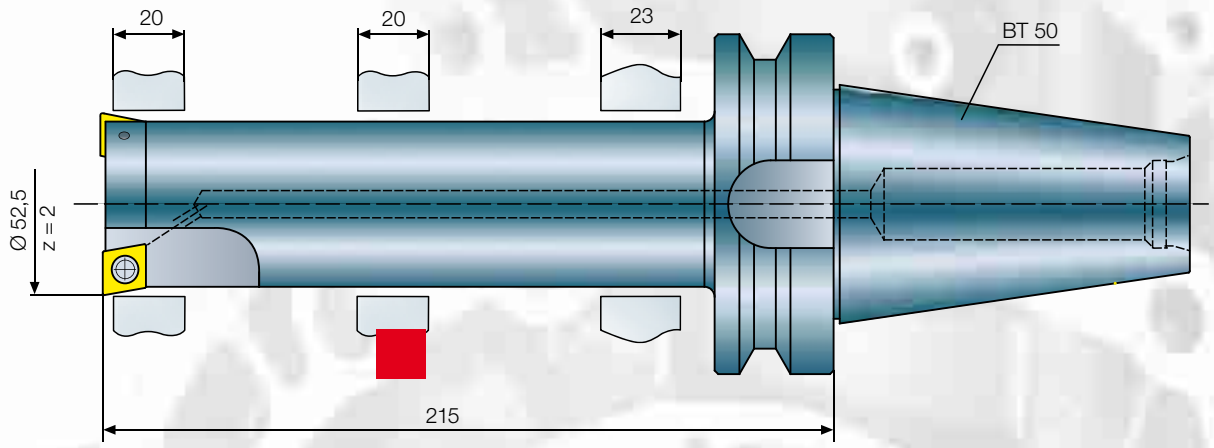
Finish tool with guide pads (drilling in the solid material).



		Pilot- and finish tool
Workpiece		**Ventilation bore**
Material		(DIN) GK - Al Si 17 Cu 4 Mg
Tool		**Drilling- and fineboring tool**
Number of teeth		(drilling) effective 1 / (counterboring) 2
Insert		according to customer specification
Cutting grade		K10 / PCD
Cutting speed	m/min	320
Number of revolutions	min^{-1}	3.287
Feed rate	mm/min	460
Feed rate per tooth	mm	0,07
Depth of cut	mm	into the solid material / 0,5
Coolant		yes, internal

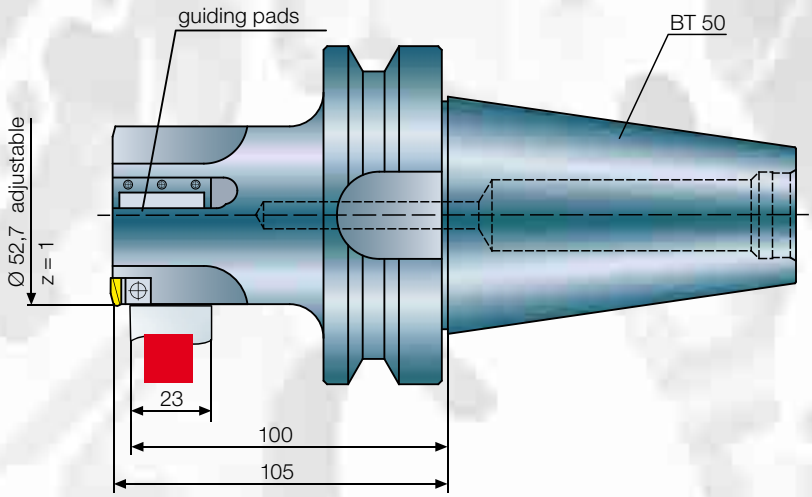
Cylinder crankcase
Crankshaft bore

Operation 1: Pre-machining from 2 sides.



Operation 2: Pilot bore

µm

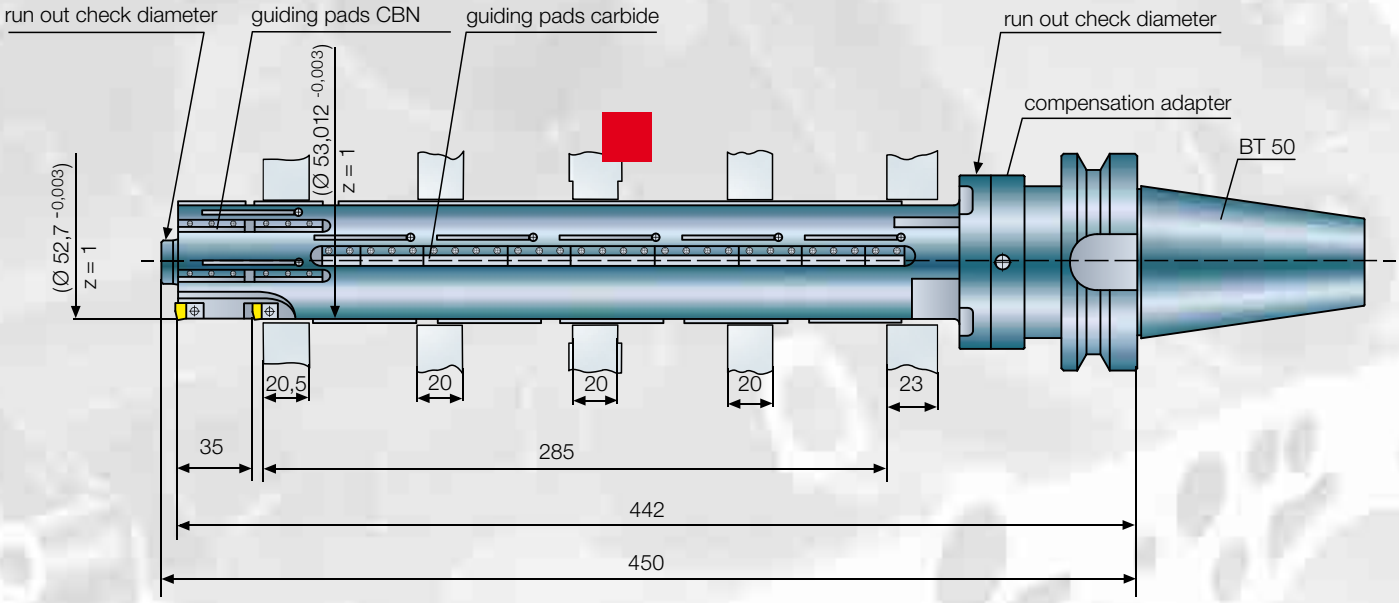


		Operation 1	Operation 2
Workpiece		**Engine block**	**Engine block**
Material		(DIN) ■ GG	(DIN) ■ GG
Tool		**Counterboring tool**	**Fineboring tool**
Number of teeth		2	1
Insert		ISO-standard	standard
Cutting grade		carbide coated	carbide coated
Cutting speed	m/min	150	135
Number of revolutions	min^{-1}	900	800
Feed rate	mm/min	350	80
Feed rate per tooth	mm	0,2	0,1
Depth of cut	mm	2,5	0,1
Coolant		yes, internal	yes, internal

Cylinder crankcase

Crankshaft bore

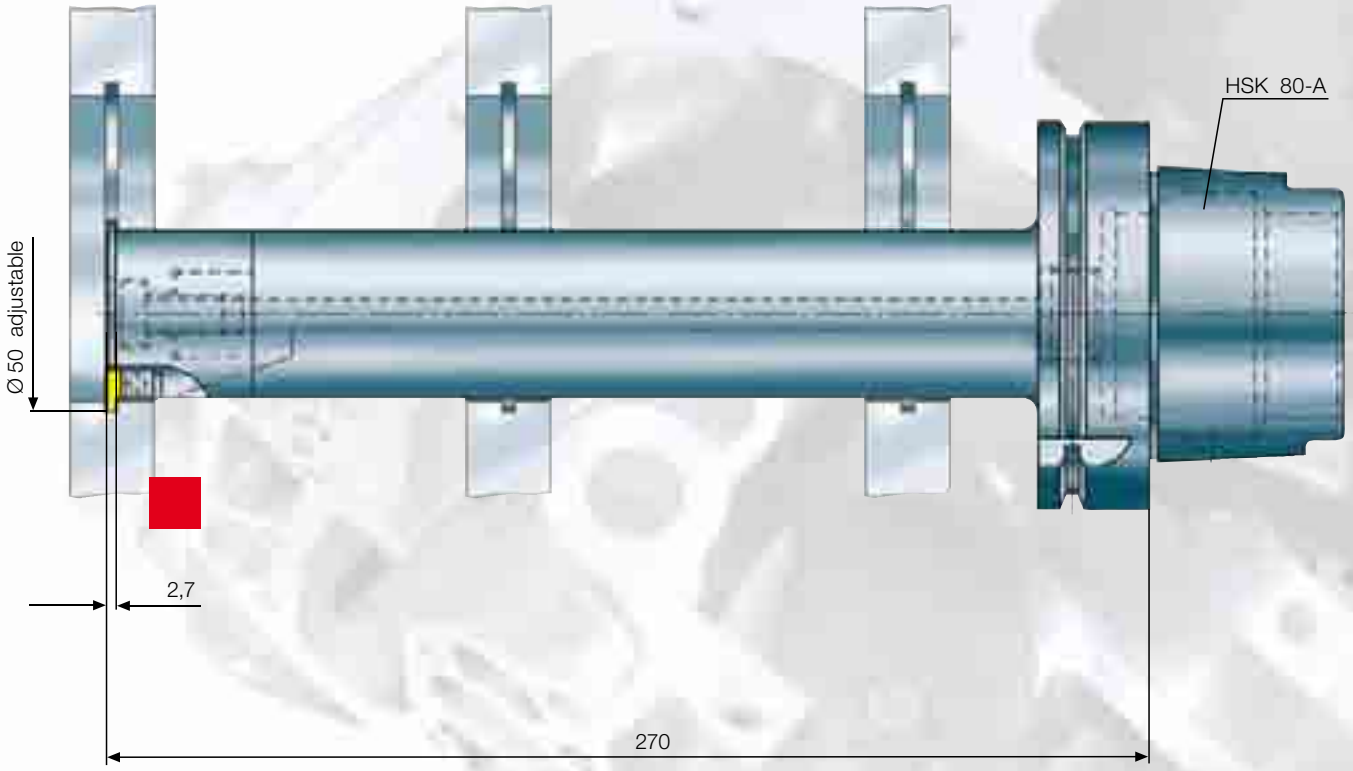
Operation 3: Finish-machining



		Operation 3
Workpiece		**Engine block**
Material		(DIN) ■ GG
Tool		**Fineboring tool**
Number of teeth		1 / 1
Insert		standard
Cutting grade		carbide coated
Cutting speed	m/min	238
Number of revolutions	min^{-1}	1400
Feed rate	mm/min	136
Feed rate per tooth	mm	0,1
Depth of cut	mm	0,1
Coolant		yes, internal

Cylinder crankcase
Positioning groove

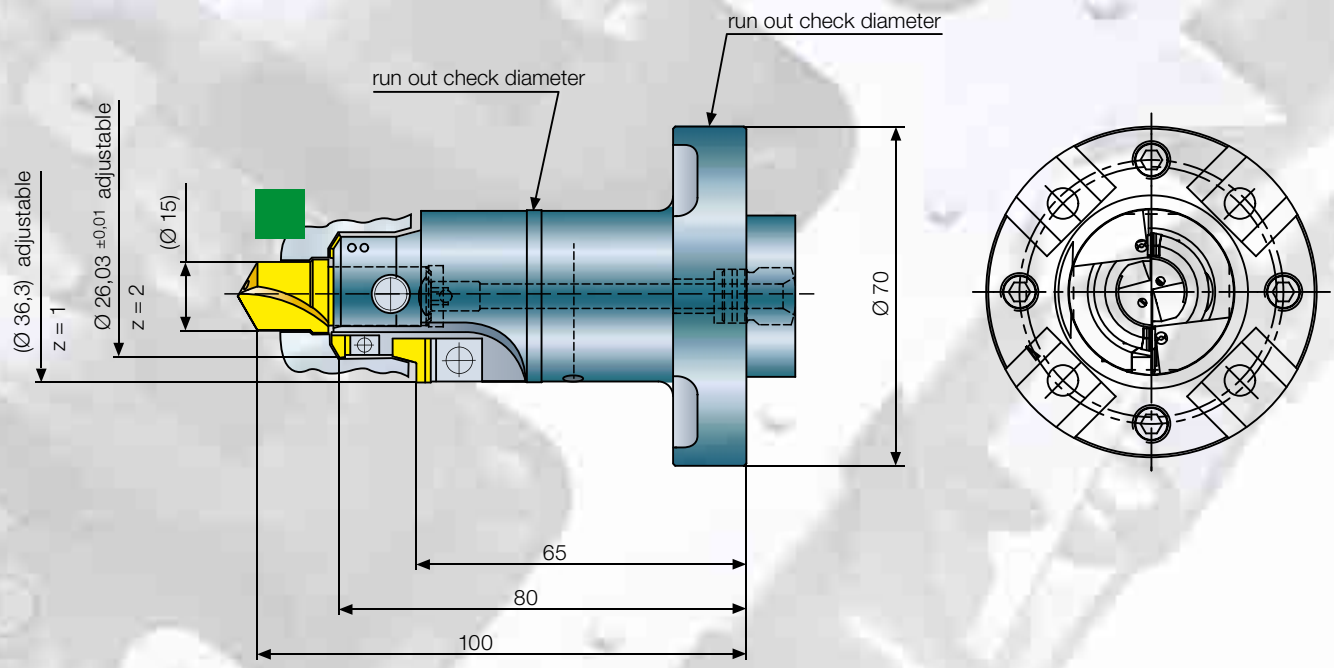
Milling of the positioning grooves in circular machining.
All inserts are adjustable in the diameter.



Workpiece		**Cylinder crankcase**
Material		(DIN) ■ GGG 40
Tool		**Form milling cutter**
Number of teeth		5
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	180
Number of revolutions	min^{-1}	1.147
Feed rate	mm/min	573
Feed rate per tooth	mm	0,1
Depth of cut	mm	-5
Coolant		yes, internal

Cylinder crankcase
Connecting boring

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

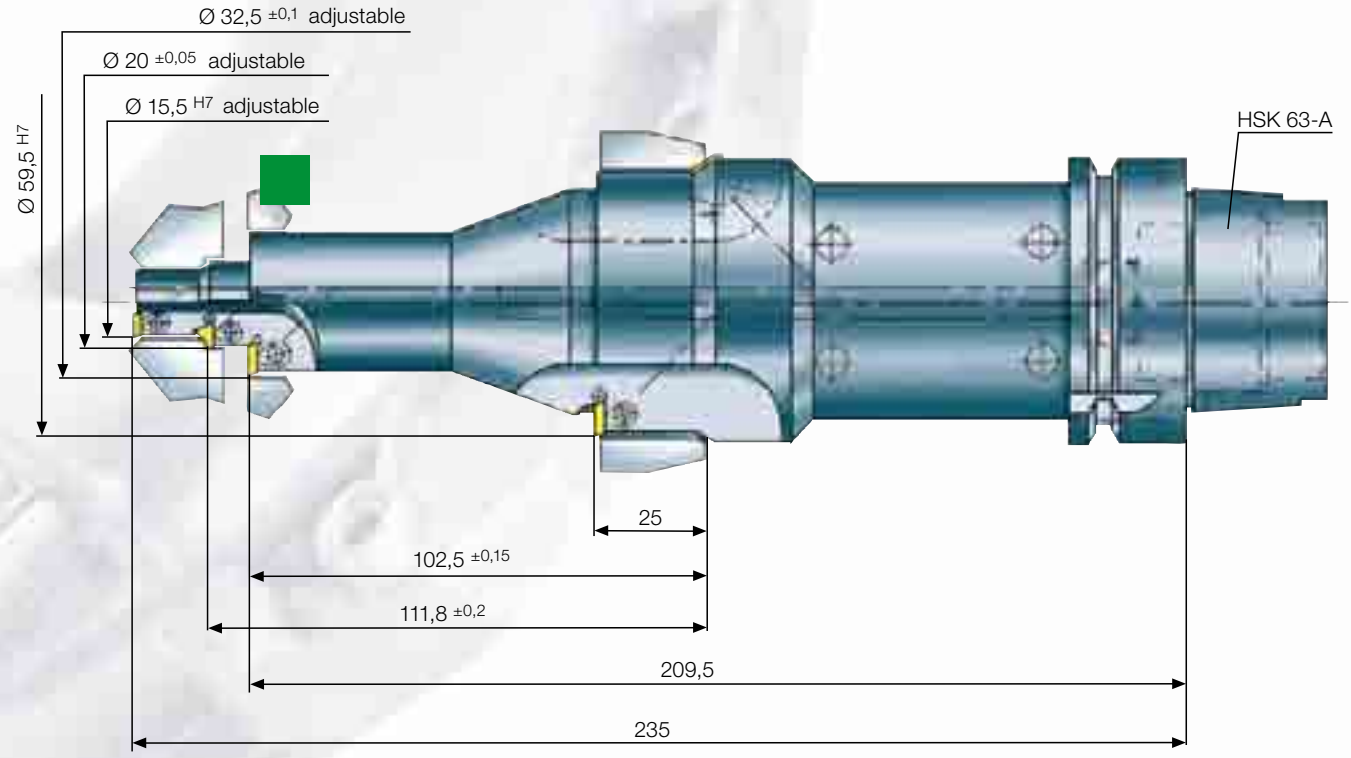


Workpiece			**Cylinder crankcase**
Material			Al
Tool			**Drilling- and fineboring tool**
Number of teeth			2 / 2 / 1
Insert			according to customer specification
Cutting grade			PCD
		drilling	fineboring
Cutting speed	m/min	193	470
Number of revolutions	min^{-1}	4.150	4.150
Feed rate	mm/min	2.490	1.000
Feed rate per tooth	mm	0,3	0,12
Depth of cut	mm	ins Volle	5,5
Coolant		yes, internal	yes, internal

Gearbox case

Gearbox case
Bearing seats

Combination tool for machining various contours on the workpiece.

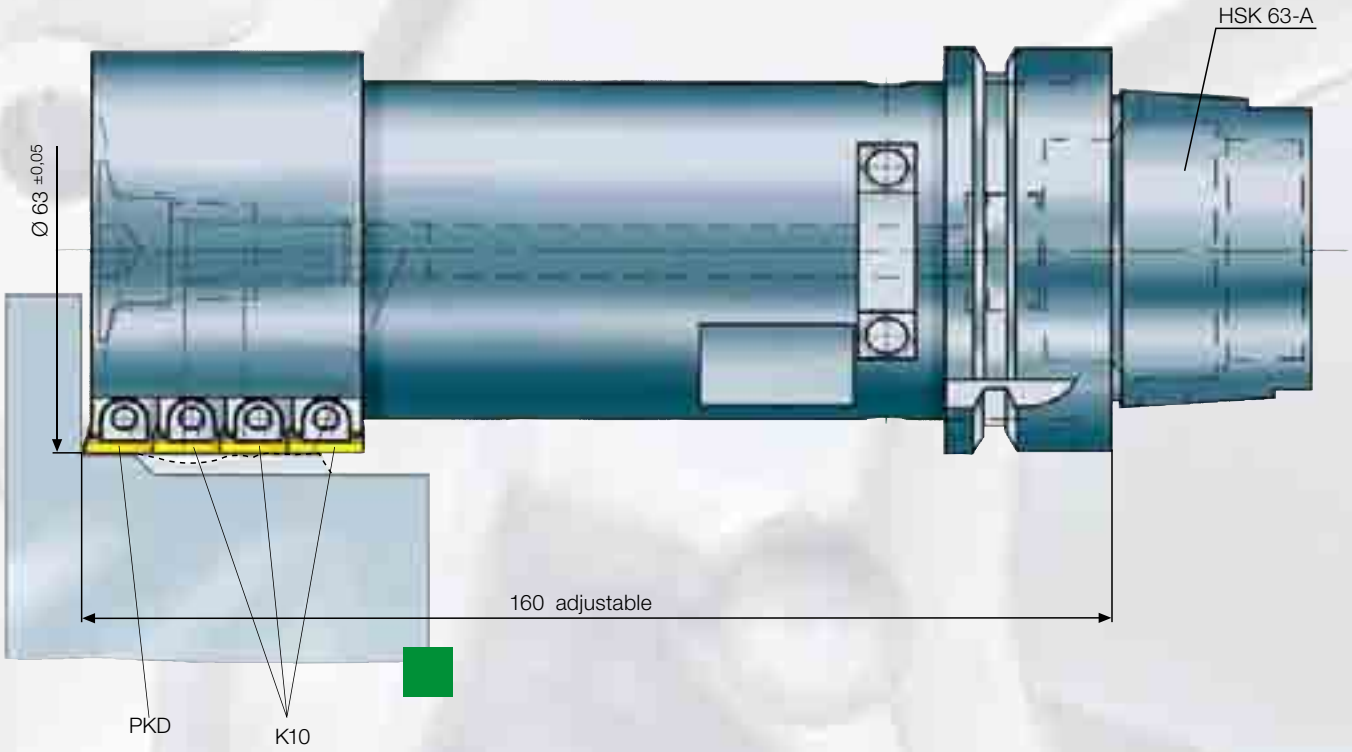


Workpiece		**Gearbox case**
Material		(DIN) ■ Al Si 9
Tool		**Multistep-fineboring tool**
Number of teeth		effective 1
Insert		standard / according to customer specification
Cutting grade		PCD
Cutting speed	m/min	(Ø 32,5) 450
Number of revolutions	min^{-1}	4.410
Feed rate	mm/min	662
Feed rate per tooth	mm	0,15
Depth of cut	mm	-2
Coolant		yes, internal

Gearbox case
Various milling operations

Complete milling operation of the cast contours, in 95 % only PCD-inserts (a_p 4 mm) are used, carbide-inserts for “control cut” only.

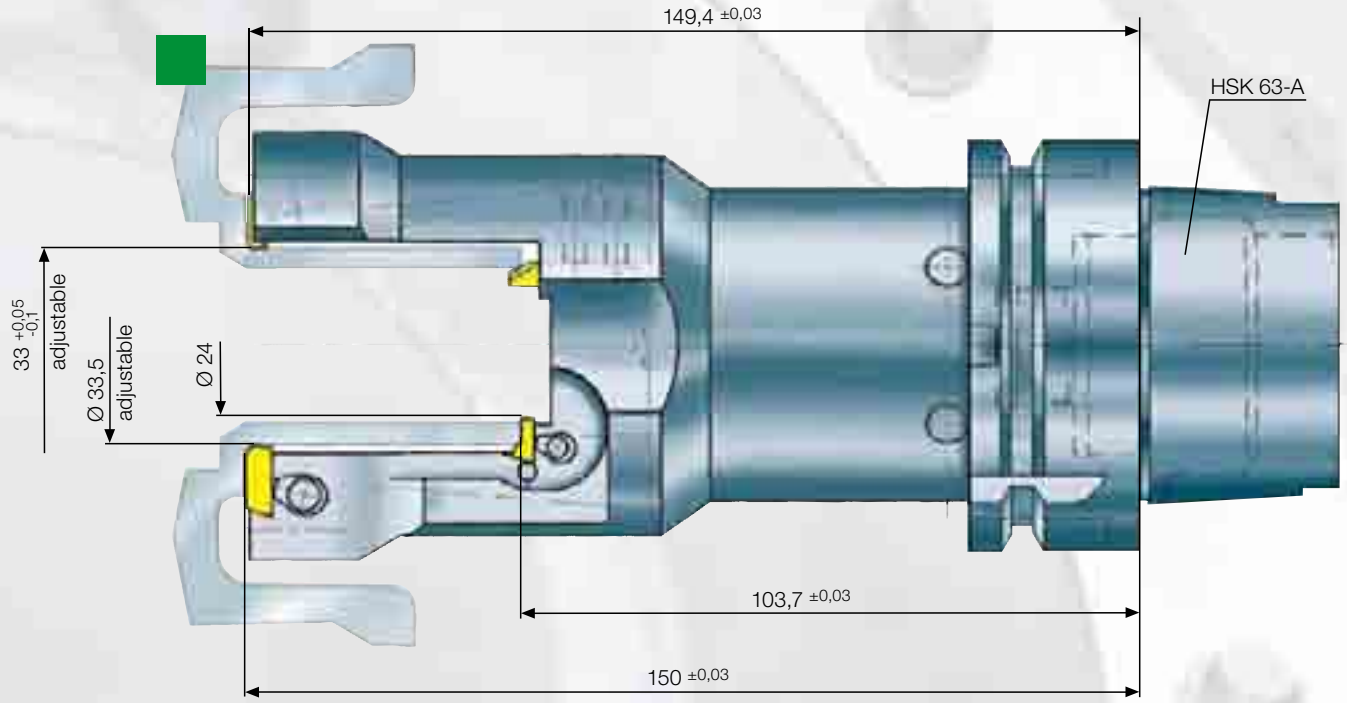
µm



Workpiece		**Gearbox case** car
Material		(DIN) ■ Al Si 9 Cu
Tool		**Multi tooth cutter**
Number of teeth		24 / effective 6
Insert		standard
Cutting grade		PCD / K10
Cutting speed	m/min	1.500
Number of revolutions	min^{-1}	7.583
Feed rate	mm/min	5.460
Feed rate per tooth	mm	0,12
Depth of cut	mm	4-40
Coolant		yes, internal

Gearbox case
Connecting shank

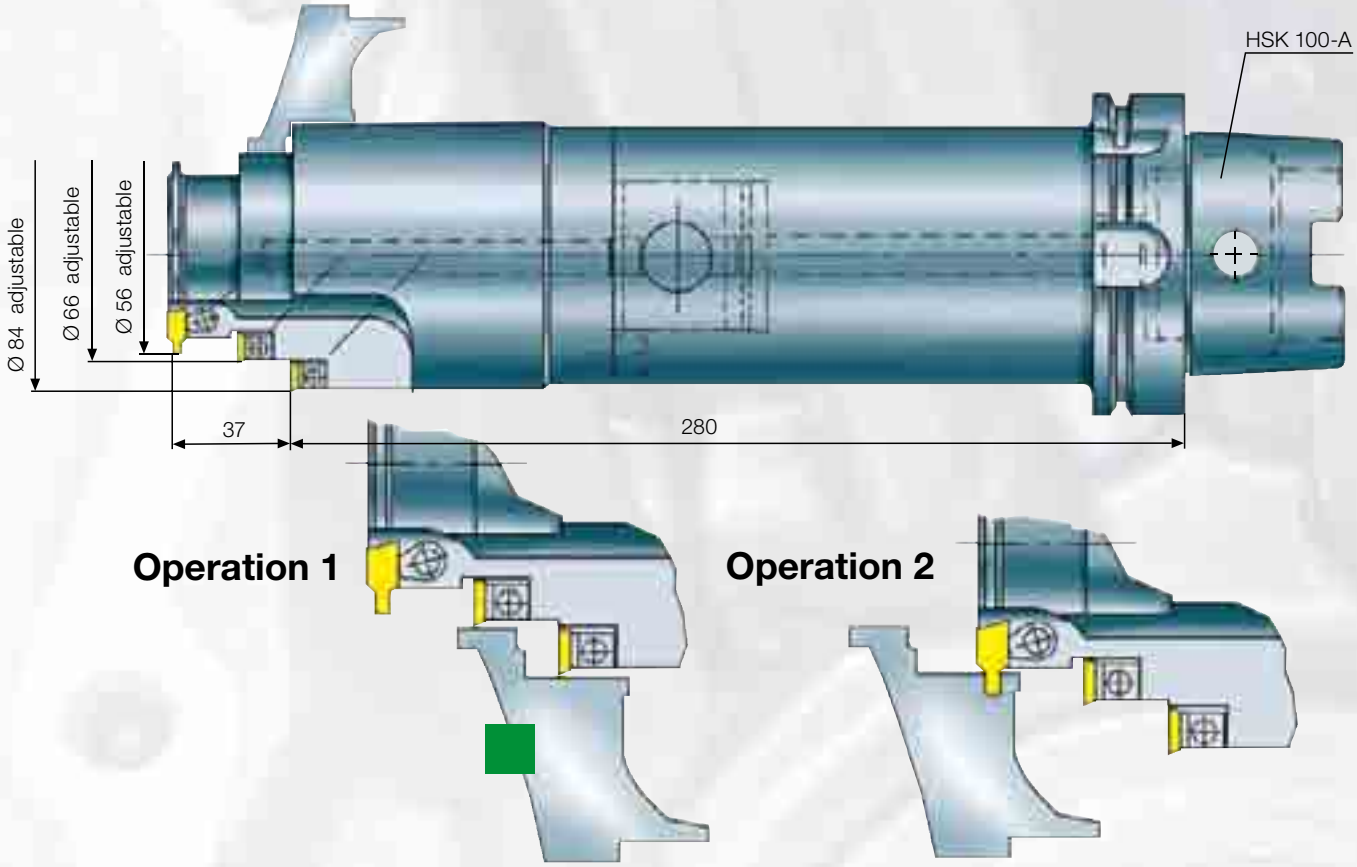
Roughing and finishing in one pass, over turning of a connecting shank.
All inserts adjustable.



Workpiece		**Connecting shank**
Material		(DIN) ■ GD - Al Si 9 Cu 3
Tool		**Fineboring tool**
Number of teeth		effective 1 per Ø
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	(Ø 33,5) 400
Number of revolutions	min^{-1}	3.802
Feed rate	mm/min	380
Feed rate per tooth	mm	0,1
Depth of cut	mm	2 / -3
Coolant		yes, internal

Gearbox case
Bearing seats

Combination tool for fineboring and circular milling.



Operation 1

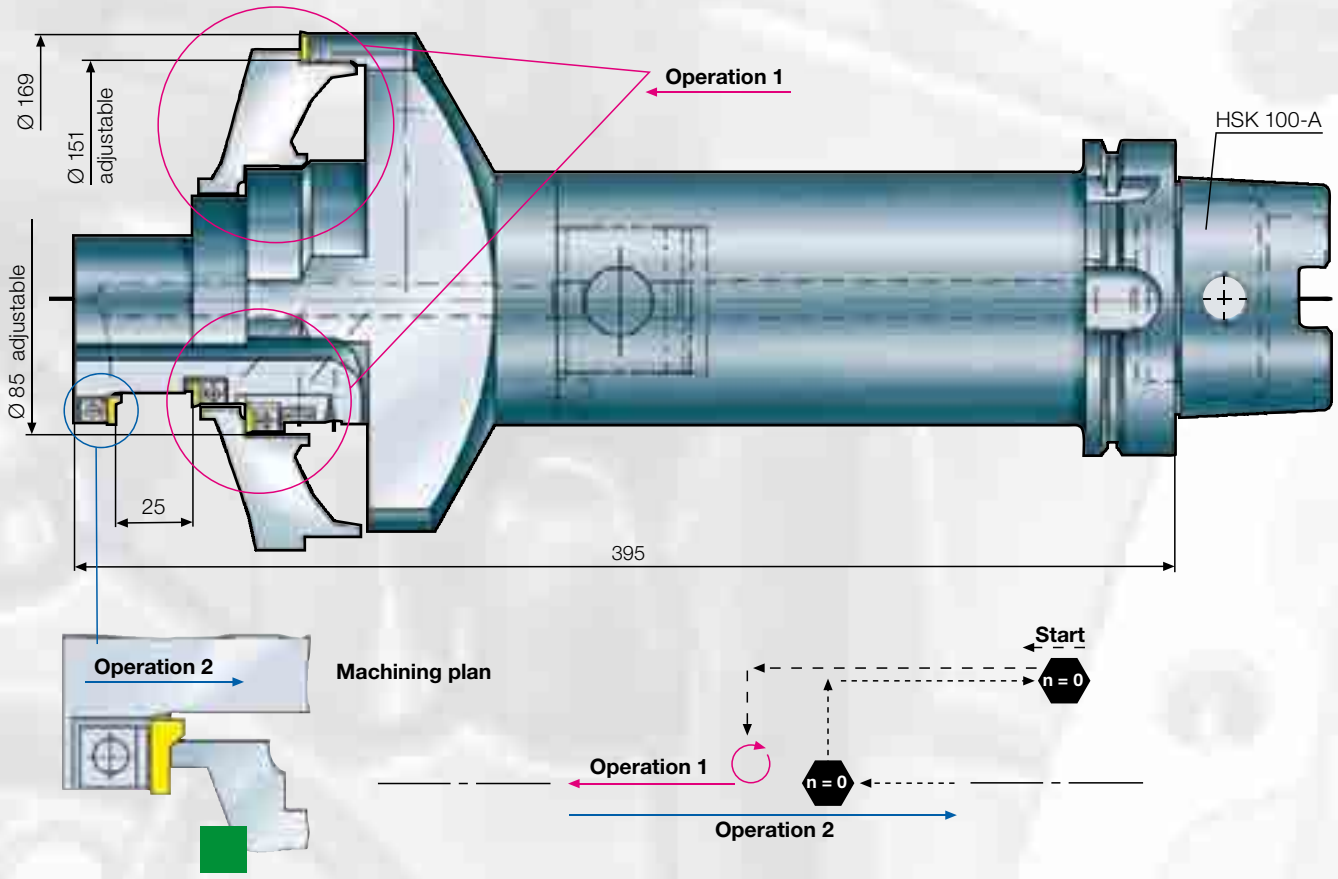
Operation 2

Workpiece			**Gearbox case**
Material			(DIN) ■ Al Si 9
Tool			**Fineboring- and circular milling tool**
Number of teeth			3 per Ø
Insert			according to customer specification
Cutting grade			PCD
		fineboring	milling
Cutting speed	m/min	450	517
Number of revolutions	min^{-1}	1.706	2.940
Feed rate	mm/min	409	1.058
Feed rate per tooth	mm	0,08	0,12
Depth of cut	mm	-4	-4
Coolant		yes, internal	yes, internal

Gearbox case
Bearing seats

Combination tool for forward and backward fineboring and for over turning of outside diameter.

µm



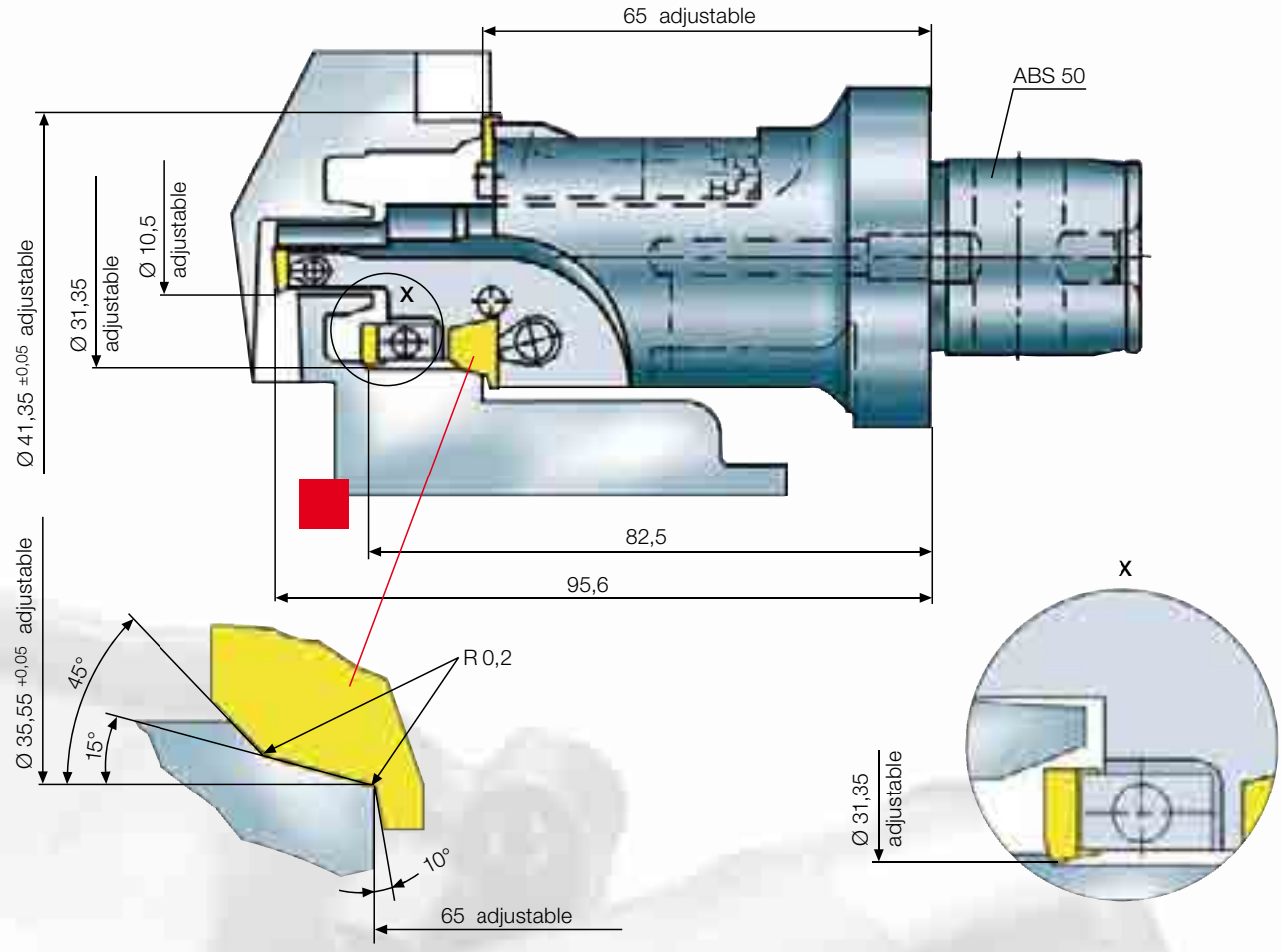
Workpiece		**Gearbox case**
Material		(DIN) ■ Al Si 9
Tool		**Fineboring tool**
Number of teeth		5 / effective 1
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	(Ø 85) 450
Number of revolutions	min^{-1}	1.686
Feed rate	mm/min	202
Feed rate per tooth	mm	0,12
Depth of cut	mm	-2
Coolant		yes, internal

Machining of pump housing

e.g.
Oil-pump
Injection pump

Oil-pump
Pump cavity

Combination tool. All diameters adjustable.

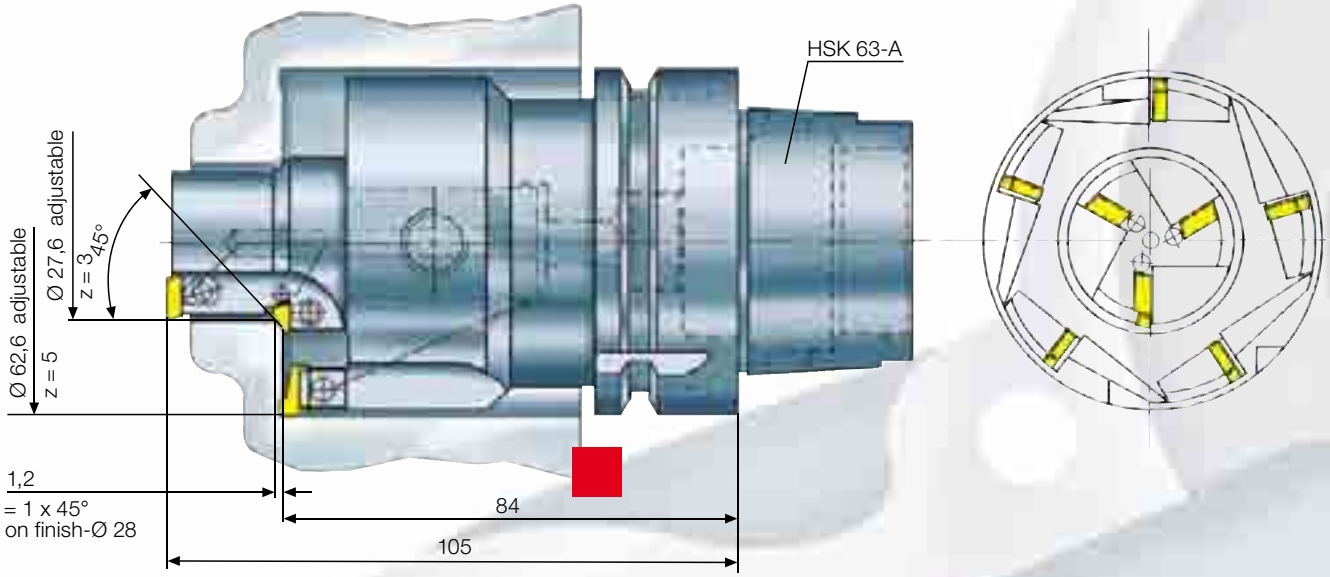


Workpiece		**Pump housing**
Material		(DIN) ■ GGG 40
Tool		**Multistep-fineboring tool**
Number of teeth		4 / effective 1
Insert		standard / according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 41,35) 197
Number of revolutions	min^{-1}	1.516
Feed rate	mm/min	227
Feed rate per tooth	mm	0,15
Depth of cut	mm	-3
Coolant		yes, internal

Oil-pump
Pump cavity

Operation1
Fineboring tool for rough machining of the pump cavity.
Operation 2
Step-milling cutter for simultaneous milling of the sealing surfaces.
Distance (Dim. 49) µm-accurate adjustable.
Operation 3
Fine machining of both diameters with CBN.

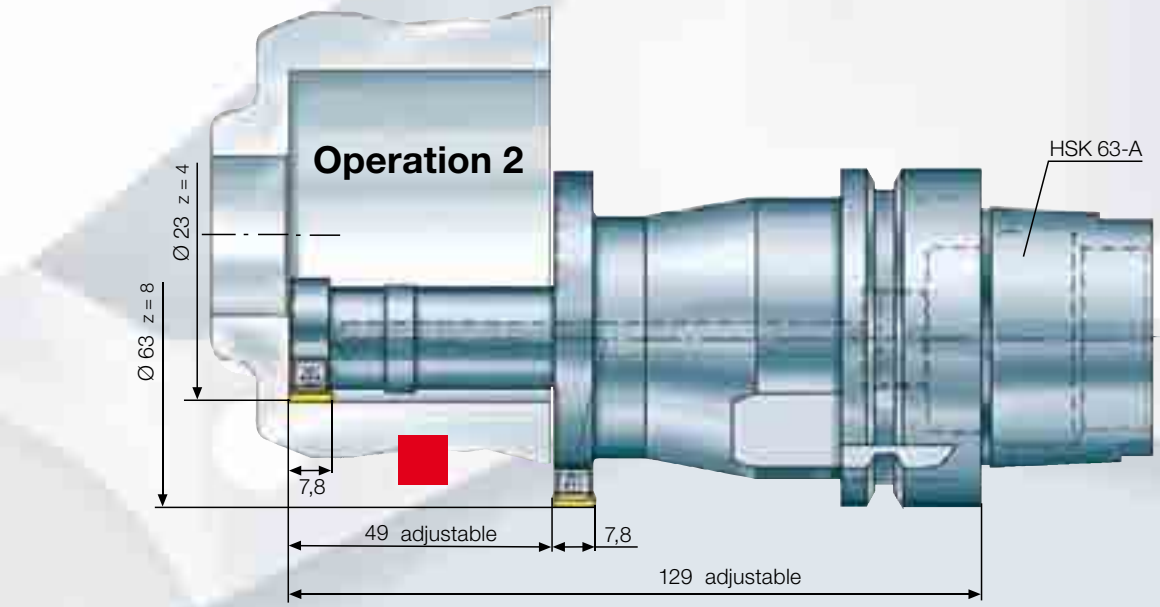
Operation 1

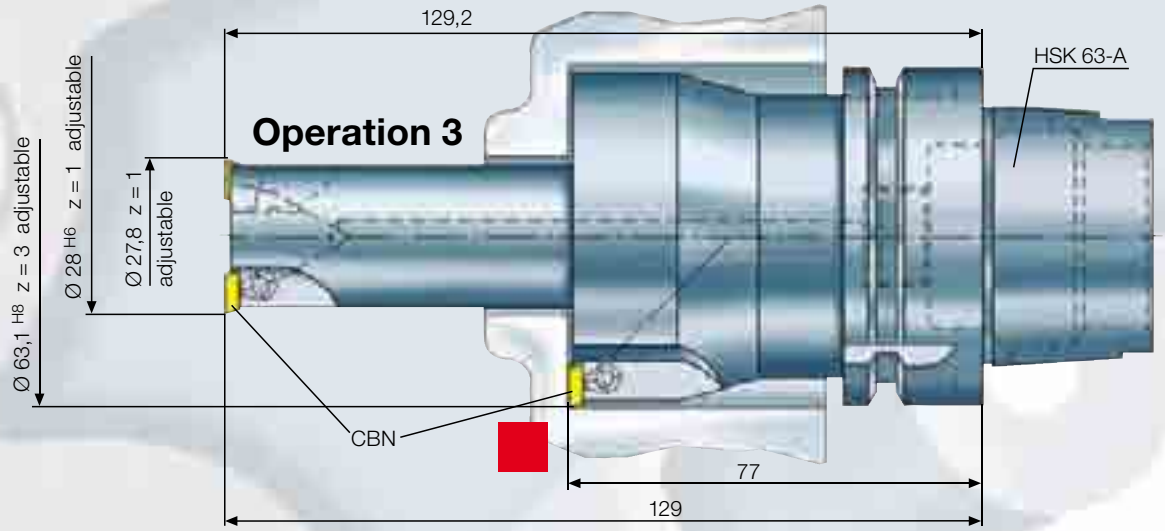


		Operation 1
Workpiece		**Oil-pump housing**
Material		(DIN) ■ GG 25
Tool		**Multistep-fineboring tool**
Number of teeth		(Ø 27,6) 3 (Ø 62,6) 5
Insert		standard / according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 27,6) 108 (Ø 62,6) 242
Number of revolutions	min^{-1}	1.230
Feed rate	mm/min	554
Feed rate per tooth	mm	(Ø 27,6) 0,15 (Ø 62,6) 0,09
Depth of cut	mm	-3
Coolant		yes, internal

Oil-pump

Pump cavity

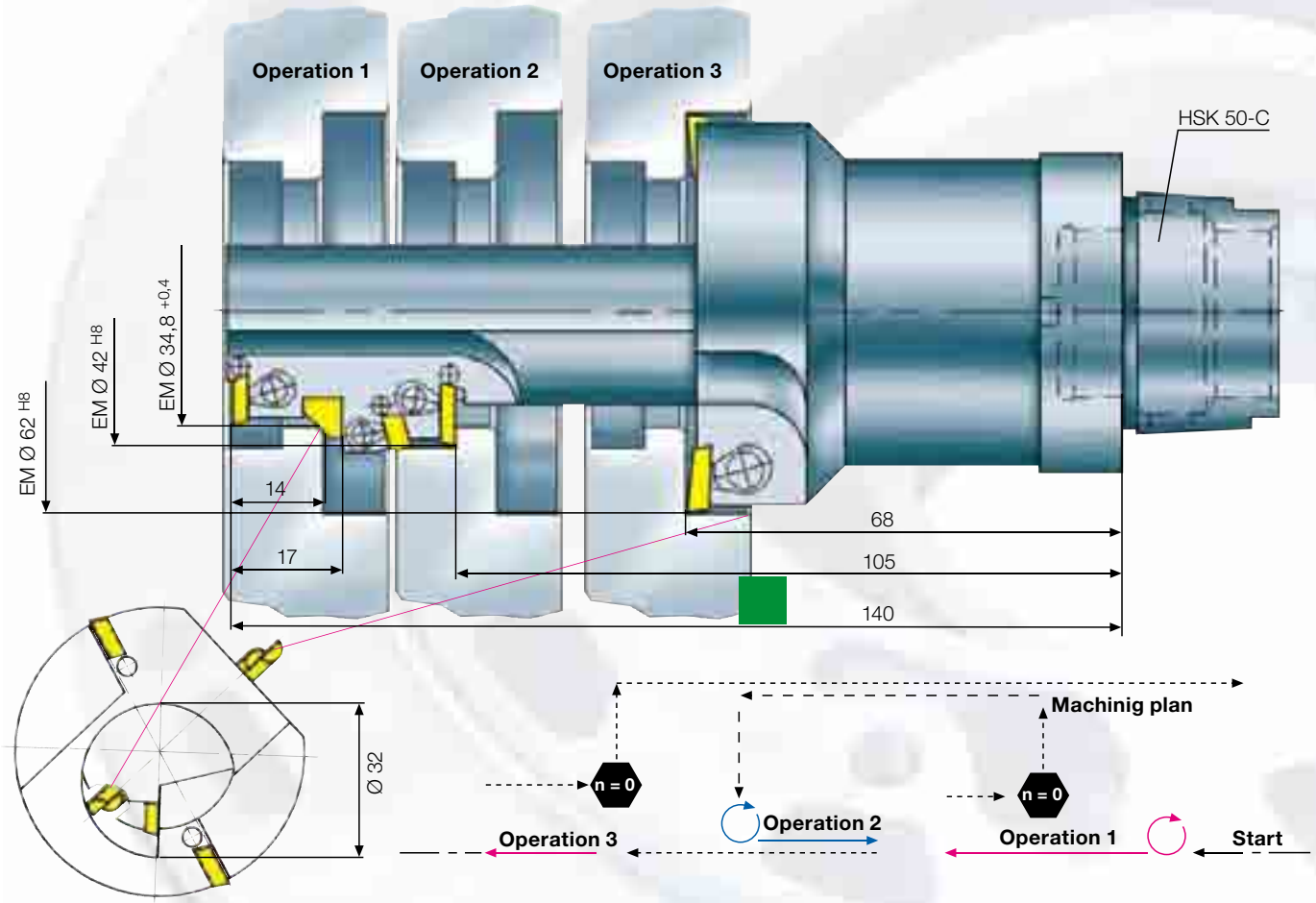




		Operation 2	Operation 3
Workpiece		**Oil-pump housing**	**Oil-pump housing**
Material		(DIN) ■ GG 25	(DIN) ■ GG 25
Tool		**Step milling cutter**	**Multistep-fineboring tool**
Number of teeth		4 / 8	(1x ▽ / 1x ▽▽) 1 + 1 / 3
Insert		standard	standard
Cutting grade		carbide coated	CBN
Cutting speed	m/min	(Ø 23) 92 (Ø 63) 250	240
Number of revolutions	min^{-1}	1.264	(Ø 28) 2.730 (Ø 63) 1.213
Feed rate	mm/min	606	(Ø 28) 273 (Ø 63) 364
Feed rate per tooth	mm	(Ø 23) 0,12 (Ø 63) 0,06	0,1
Depth of cut	mm	~ 2	0,2
Coolant		yes, internal	yes, internal

Oil-pump

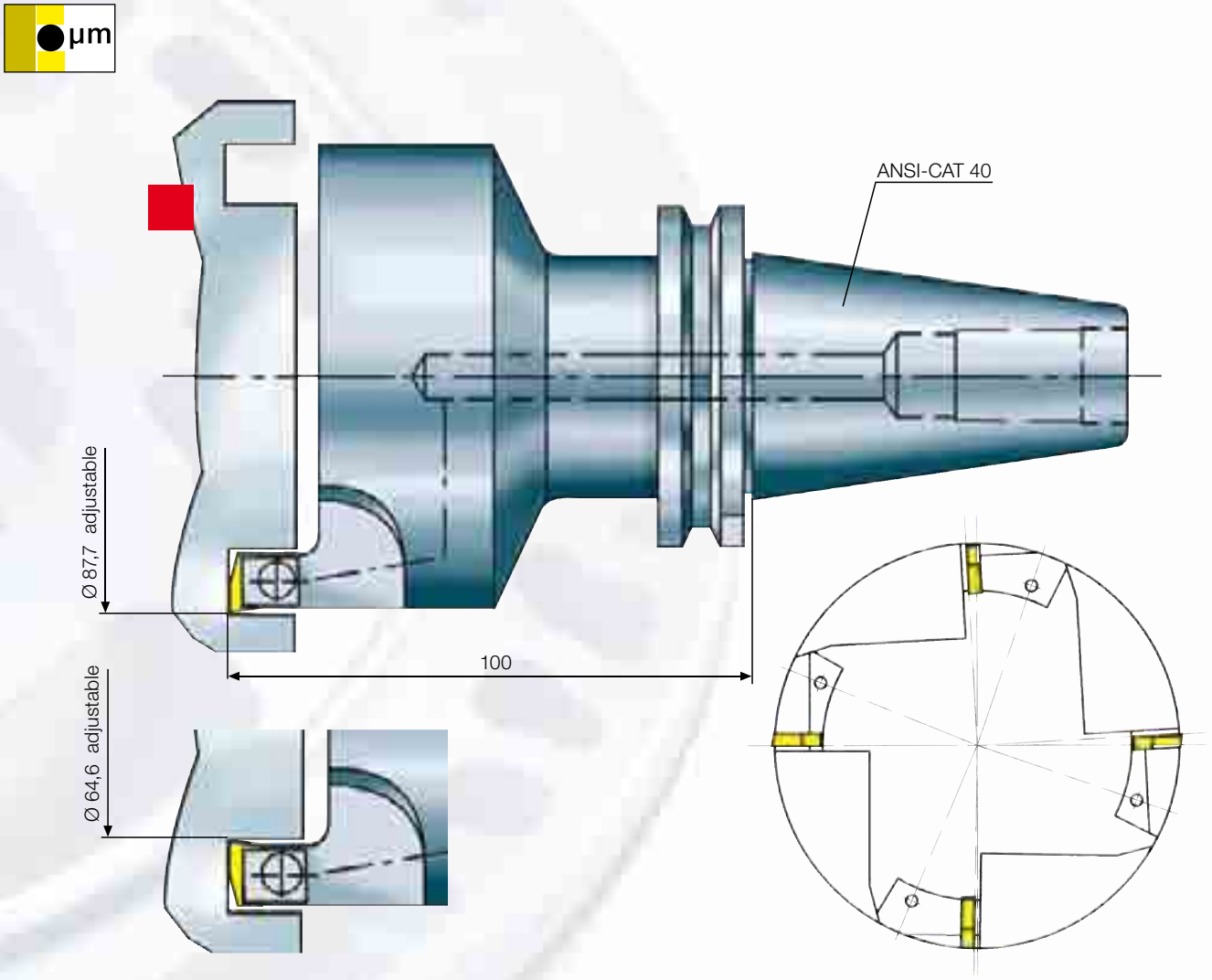
Combination tool for 6 machining steps.
All inserts adjustable.



Workpiece		**Oil-pump housing**
Material		(DIN) GD - Al Si 9 Cu 3
Tool		**Forward and backward fineboring tool**
Number of teeth		7 / effective 1
Insert		standard / according to customer specification
Cutting grade		PCD / K10
Cutting speed	m/min	(Ø 62) 467
Number of revolutions	min^{-1}	2.400
Feed rate	mm/min	288
Feed rate per tooth	mm	0,12
Depth of cut	mm	0,5
Coolant		yes, external

Oil-pump
Rotor clearance

Inside and outside diameter adjustable.

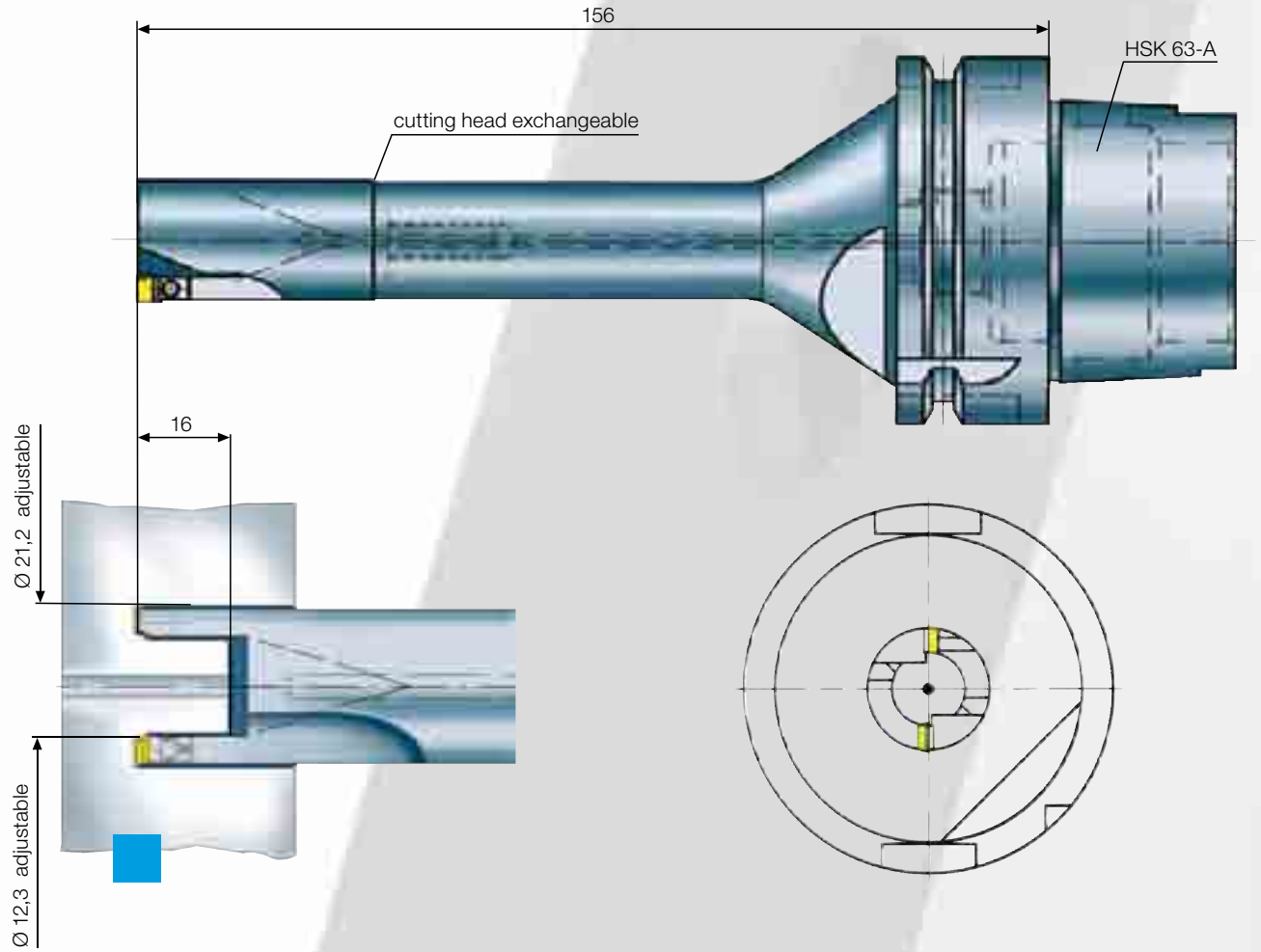


Workpiece		**Oil-pump housing** for automatic gearbox
Material		(DIN) ■ GG 25
Tool		**Fineboring- / plunging tool**
Number of teeth		2 x 2
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	220
Number of revolutions	min^{-1}	800
Feed rate	mm/min	160
Feed rate per tooth	mm	0,1
Depth of cut	mm	~12, entire cutting width
Coolant		yes, internal

Injection pump
Axial grooving

Plunging tool with adjustable inserts.

µm

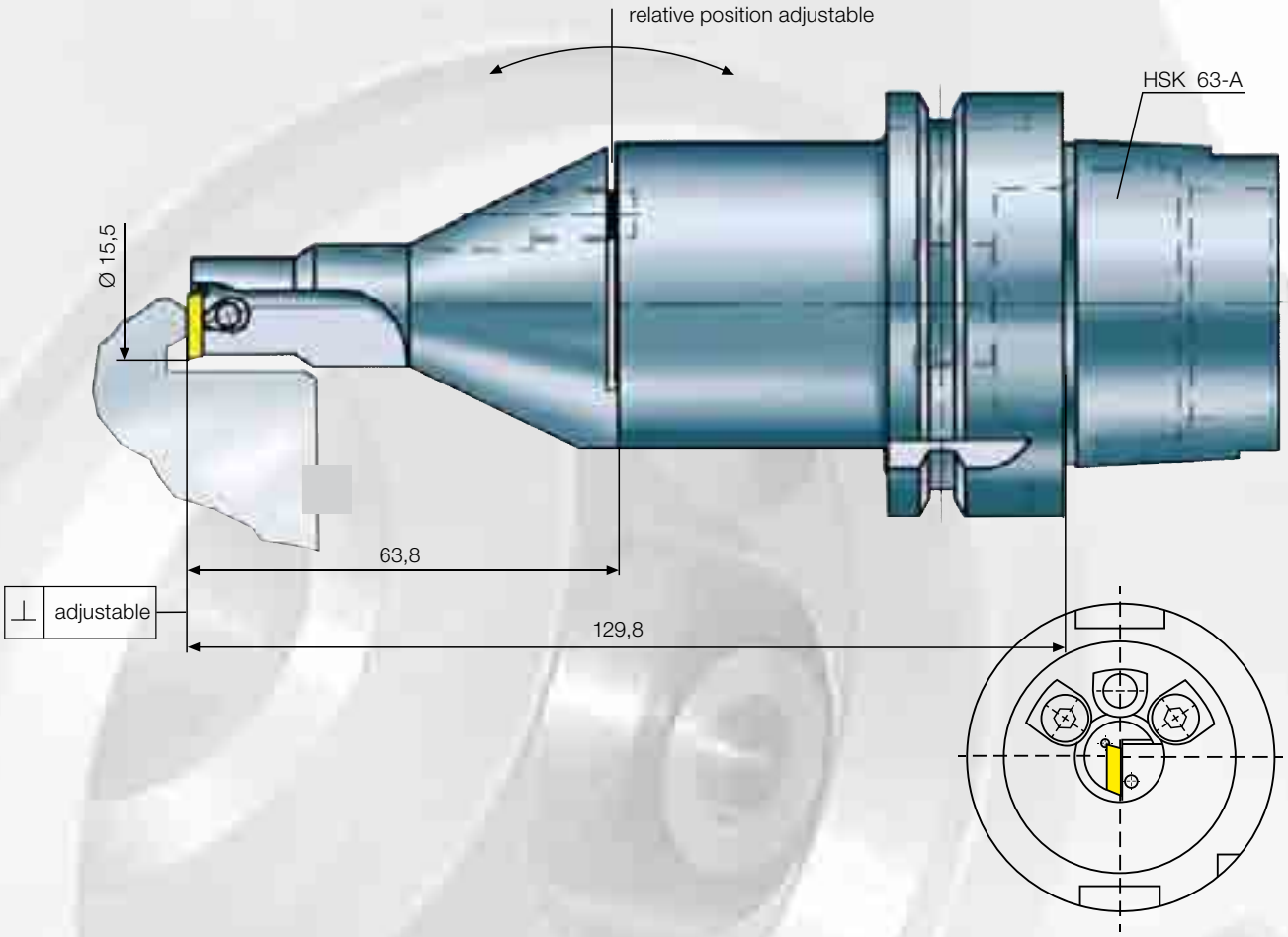


Workpiece		**Injection pump**
Material		(DIN) ■ 20 Mn Cr 5
Tool		**Axial plunging tool**
Number of teeth		2 / effective 1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 21,2) 121
Number of revolutions	min^{-1}	1.820
Feed rate	mm/min	146
Feed rate per tooth	mm	0,08
Depth of cut	mm	full cut
Coolant		yes, internal

Injection pump
Sealing surface, hard machining

Hard machining of the sealing surface.
Relative position of the cutting edge adjustable.

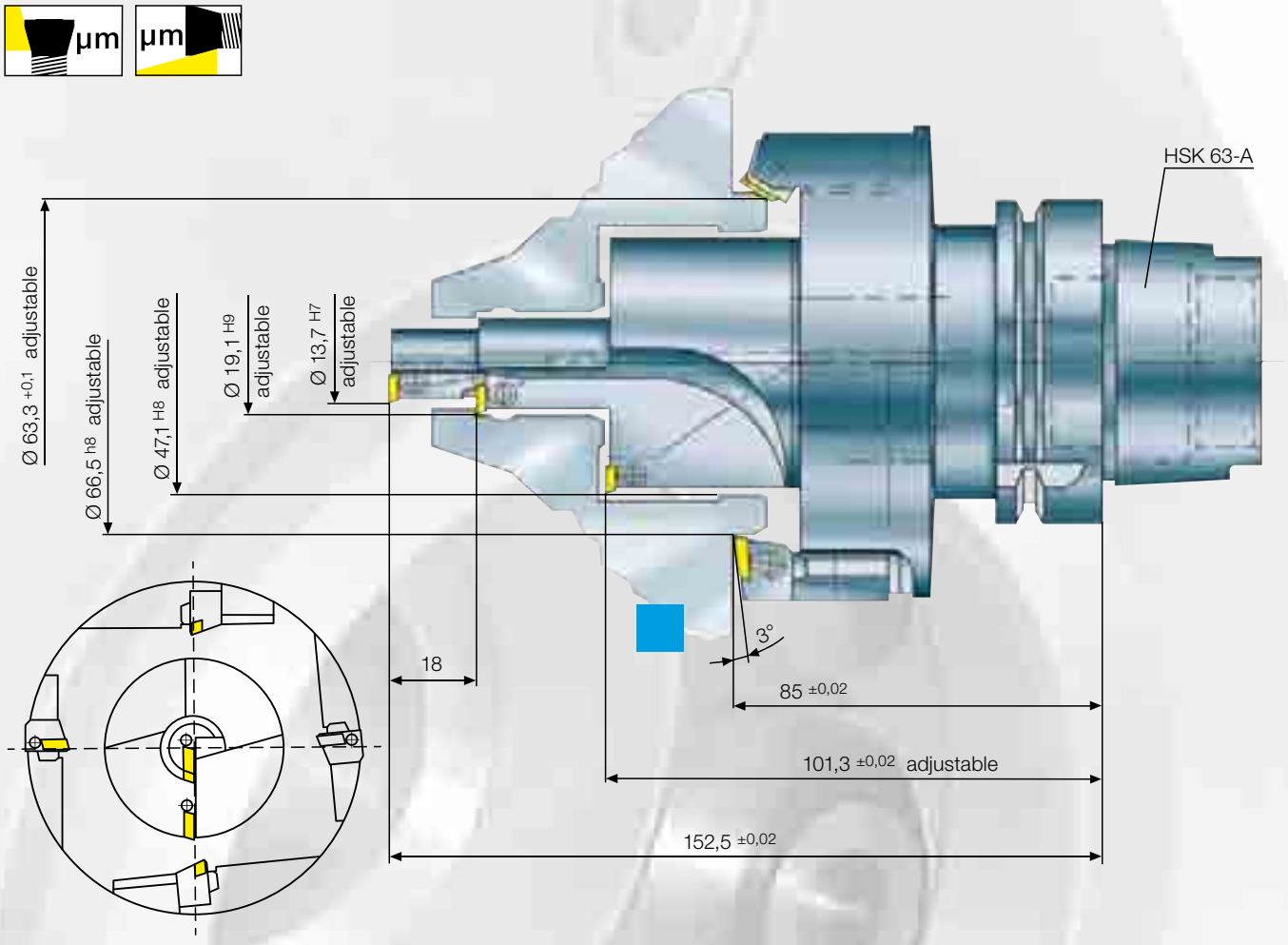
µm



Workpiece		**Injection pump**
Material		60-62 HRC (DIN) 20 Mn Cr 5
Tool		**Fineboring tool**
Number of teeth		1
Insert		according to customer specification
Cutting grade		CBN
Cutting speed	m/min	195
Number of revolutions	min^{-1}	4.000
Feed rate	mm/min	100
Feed rate per tooth	mm	0,025
Depth of cut	mm	0,2
Coolant		yes, internal

Injection pump
Cam cavity

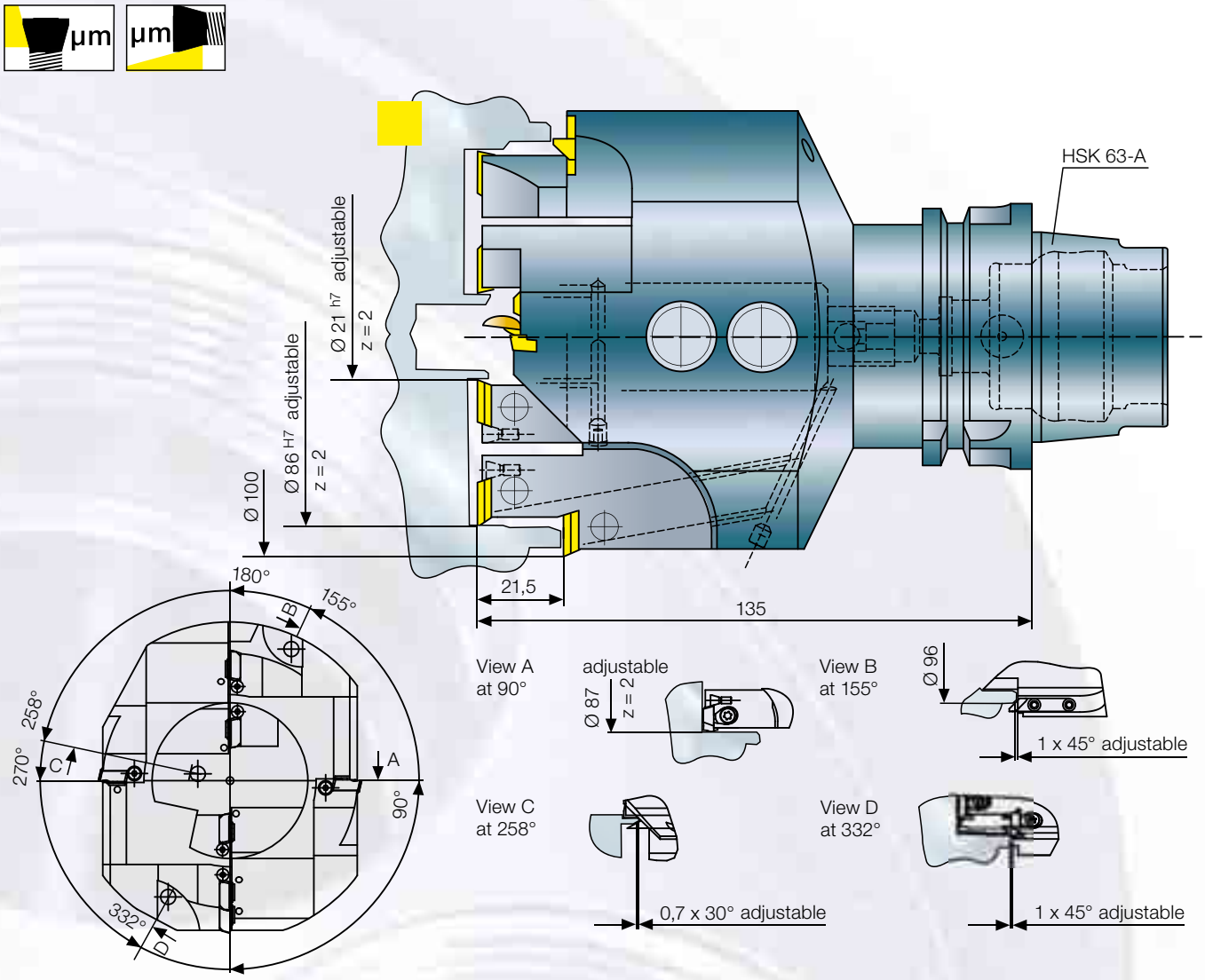
Combination tool for 5 machining steps.



Workpiece		**Injection pump**
Material		(DIN) ■ 20 Mn Cr 5
Tool		**Multistep-fineboring tool**
Number of teeth		7 / effective 1 / (Ø 66,5 + Ø 63,3) z = 2
Insert		standard / according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 13,7) 37 (Ø 66,5) 180
Number of revolutions	min^{-1}	860
Feed rate	mm/min	130
Feed rate per tooth	mm	(Ø 13,7) 0,15 (Ø 66,5) 0,075
Depth of cut	mm	(Ø 13,7) 0,5 (Ø 66,5) 0,5 -1,5
Coolant		yes, internal

Stainless steel pump

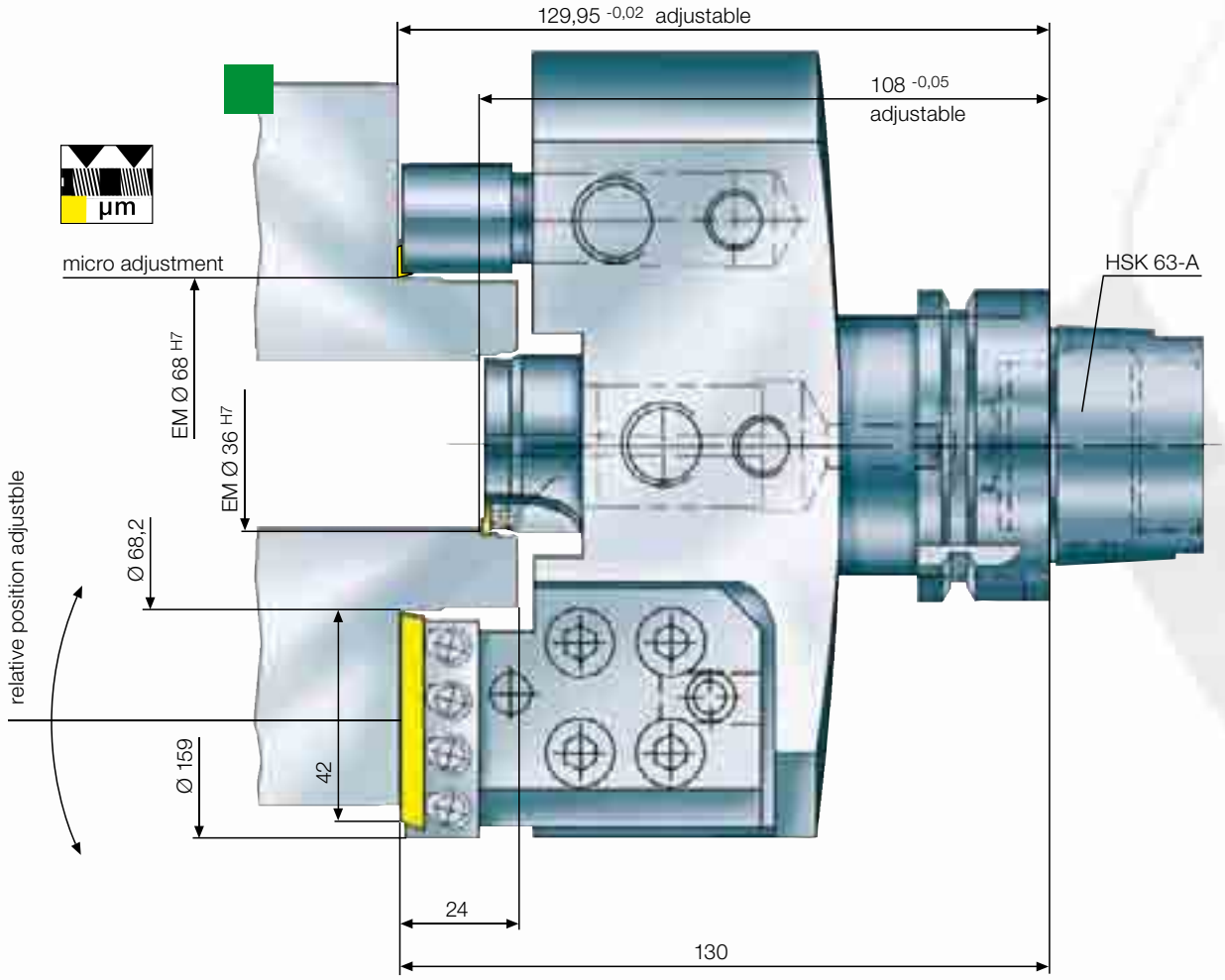
Combination tool. All diameters adjustable.



Workpiece		**Stainless steel pump**
Material		(DIN) X2CrNi 19-11
Tool		**Multistep-fineboring tool**
Number of teeth		2 / 2 / 2 / 1 / 1 / 1 / 1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	25-100
Number of revolutions	min^{-1}	360
Feed rate	mm/min	18
Feed rate per tooth	mm	0,025
Depth of cut	mm	0,4
Coolant		yes, internal

Injection pump
Flange machining

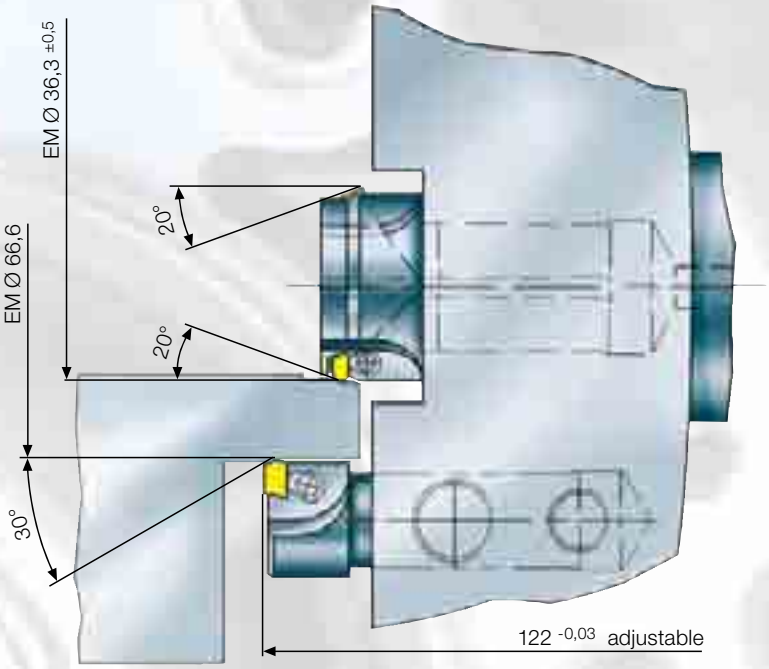
Combination tool for 6 machining steps.
Cartridges for different types of workpieces. Inserts adjustable in diameter.

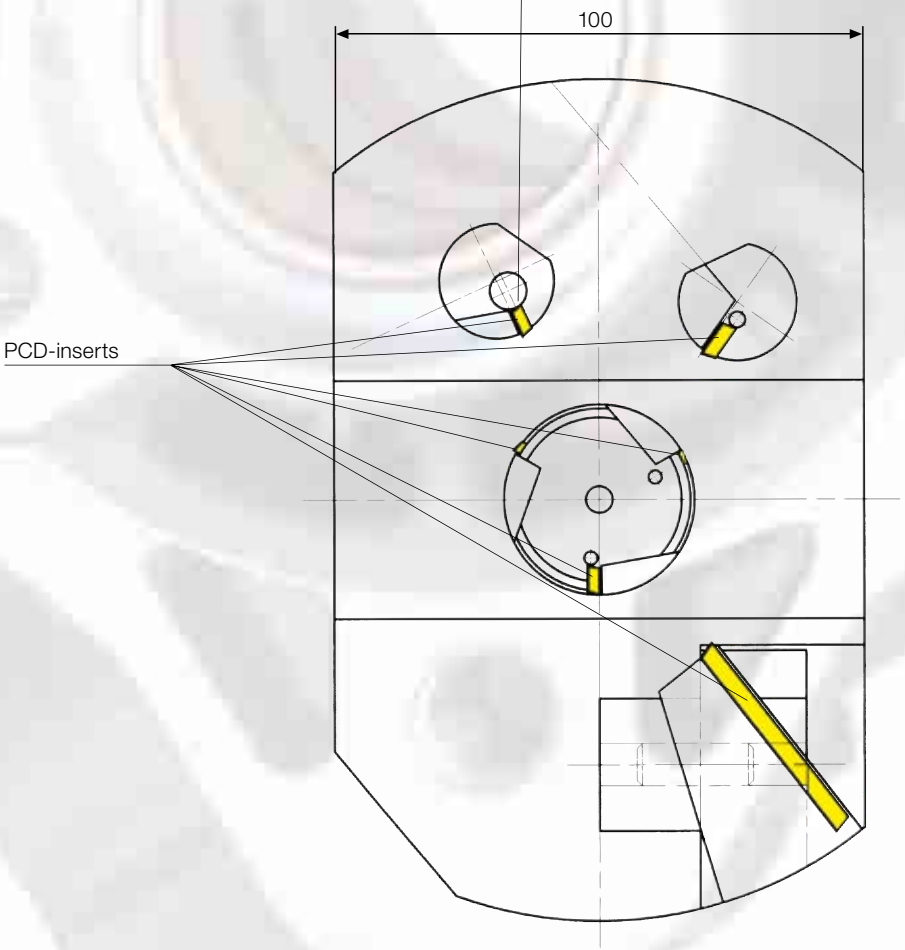


Workpiece		**Radial piston pump**
Material		(DIN) ■ GD - Al Si 12 Cu
Tool		**Fineboring tool**
Number of teeth		6 / effective 1
Insert		according to customer specification
Cutting grade		PCD / K10
Cutting speed	m/min	(Ø 68) 641
Number of revolutions	min^{-1}	3.004
Feed rate	mm/min	360
Feed rate per tooth	mm	0,12
Depth of cut	mm	-4
Coolant		yes, internal

Injection pump
Flange machining

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.



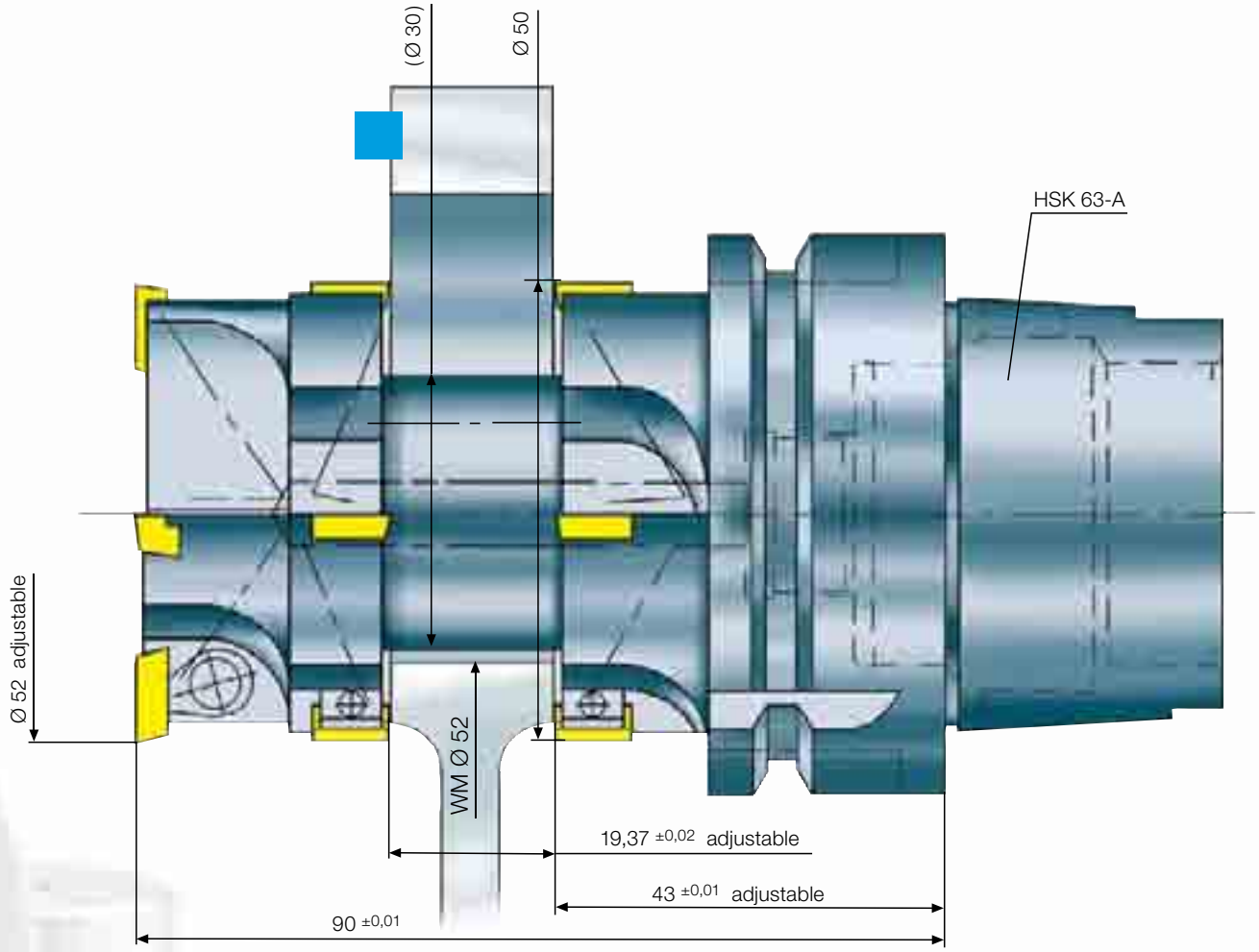


Various automotive components

e.g.
Connecting rod
Camshaft, crankshaft
Frame
Gearshift fork, housing
Starter housing, main brake cylinder
Steering housing, balance shaft housing
Motor bracket, drive flange
Brake caliper

Connecting rod
Large bearing bore

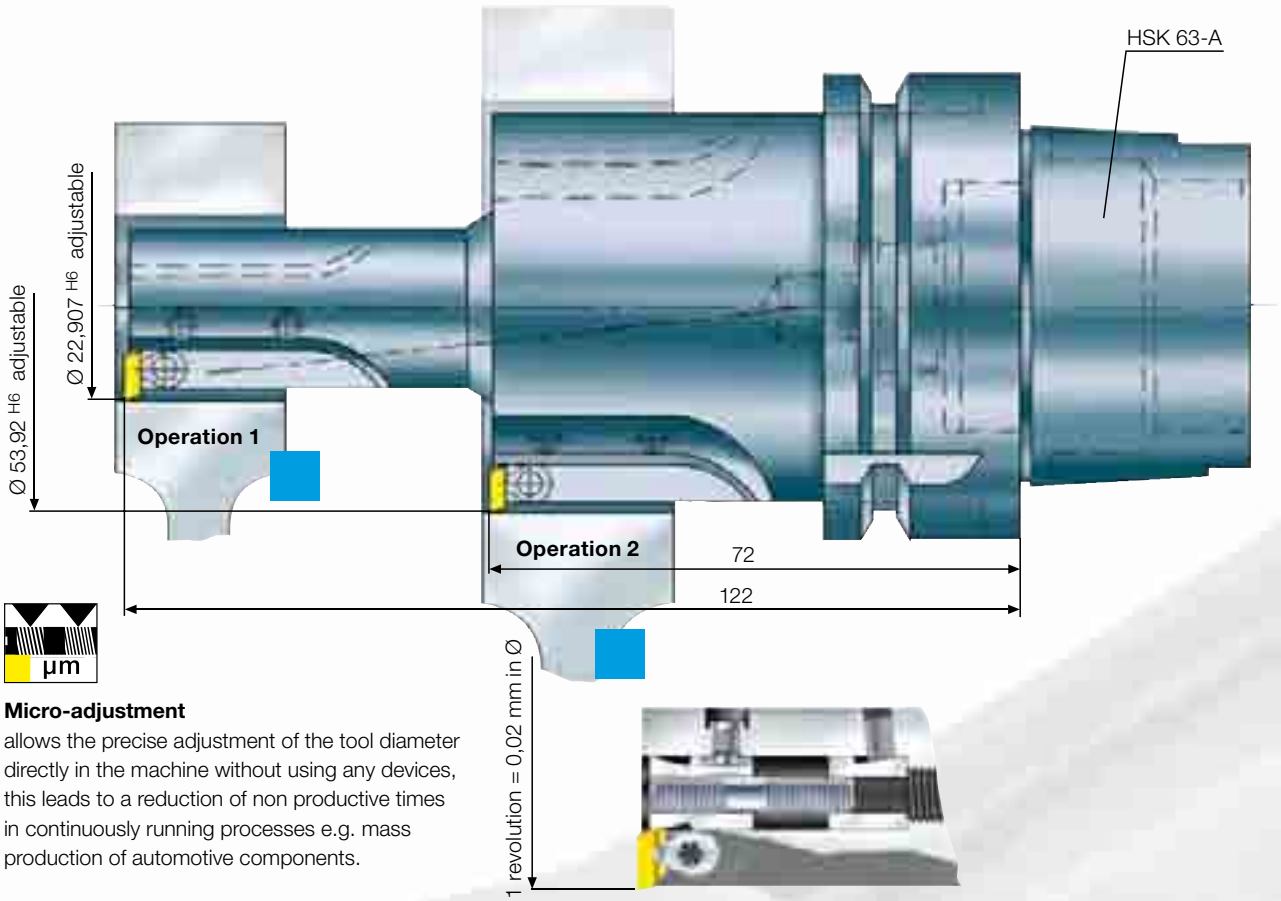
Combination tool for counterboring of the bearing bore followed by circular milling of the connecting rod width.



Workpiece		**Sintersteel connecting rod**
Material		(DIN) ■ Sint C70 (sintersteel metal)
Tool		**Fineboring and milling cutter tool**
Number of teeth		per 4
Insert		standard
Cutting grade		carbide coated
Cutting speed	m/min	85
Number of revolutions	min^{-1}	540
Feed rate	mm/min	(fineboring) 216 (milling) 216
Feed rate per tooth	mm	0,1
Depth of cut	mm	5
Coolant		yes, internal

Connecting rod
Large and small bearing bore

Machining of large and small bearing bore with one tool.
Inserts adjustable with micro-adjustment.

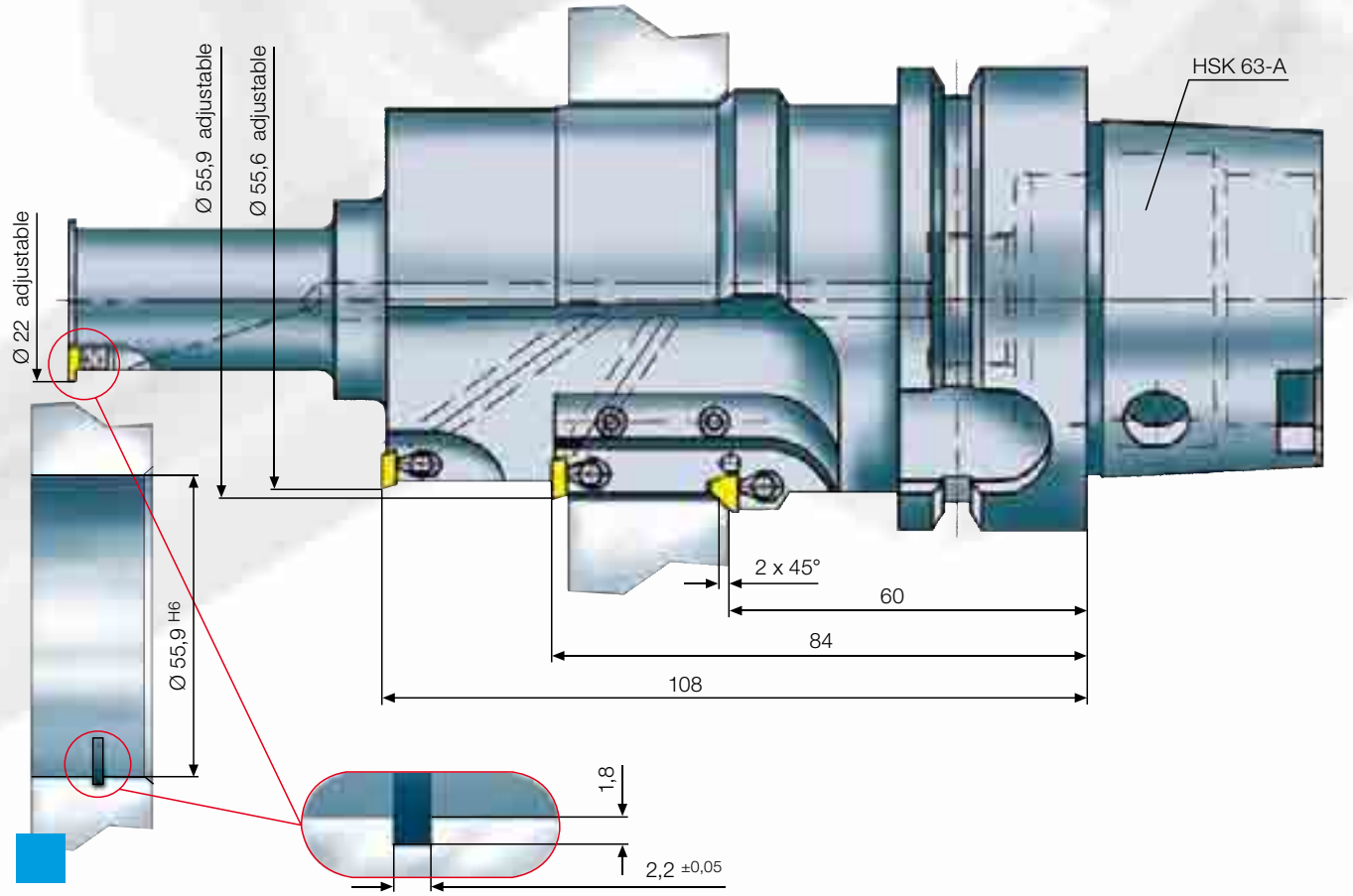


Micro-adjustment
allows the precise adjustment of the tool diameter directly in the machine without using any devices, this leads to a reduction of non productive times in continuously running processes e.g. mass production of automotive components.

Workpiece			**Connecting rod**
Material			(DIN) ■ Sint D11 (sintersteel metal)
Tool			**Fineboring tool with micro-adjustment**
Number of teeth			per 1
Insert			according to customer specification with wiper geometry
Cutting grade			Cermet
Cutting speed	m/min	(Ø 53,92) 203	(Ø 22,907) 203
Number of revolutions	min^{-1}	1.200	2.822
Feed rate	mm/min	216	508
Feed rate per tooth	mm	0,18	0,18
Depth of cut	mm		0,4
Coolant			yes, internal
Surface finish			R_a 0,8

Connecting rod
Large bearing bore

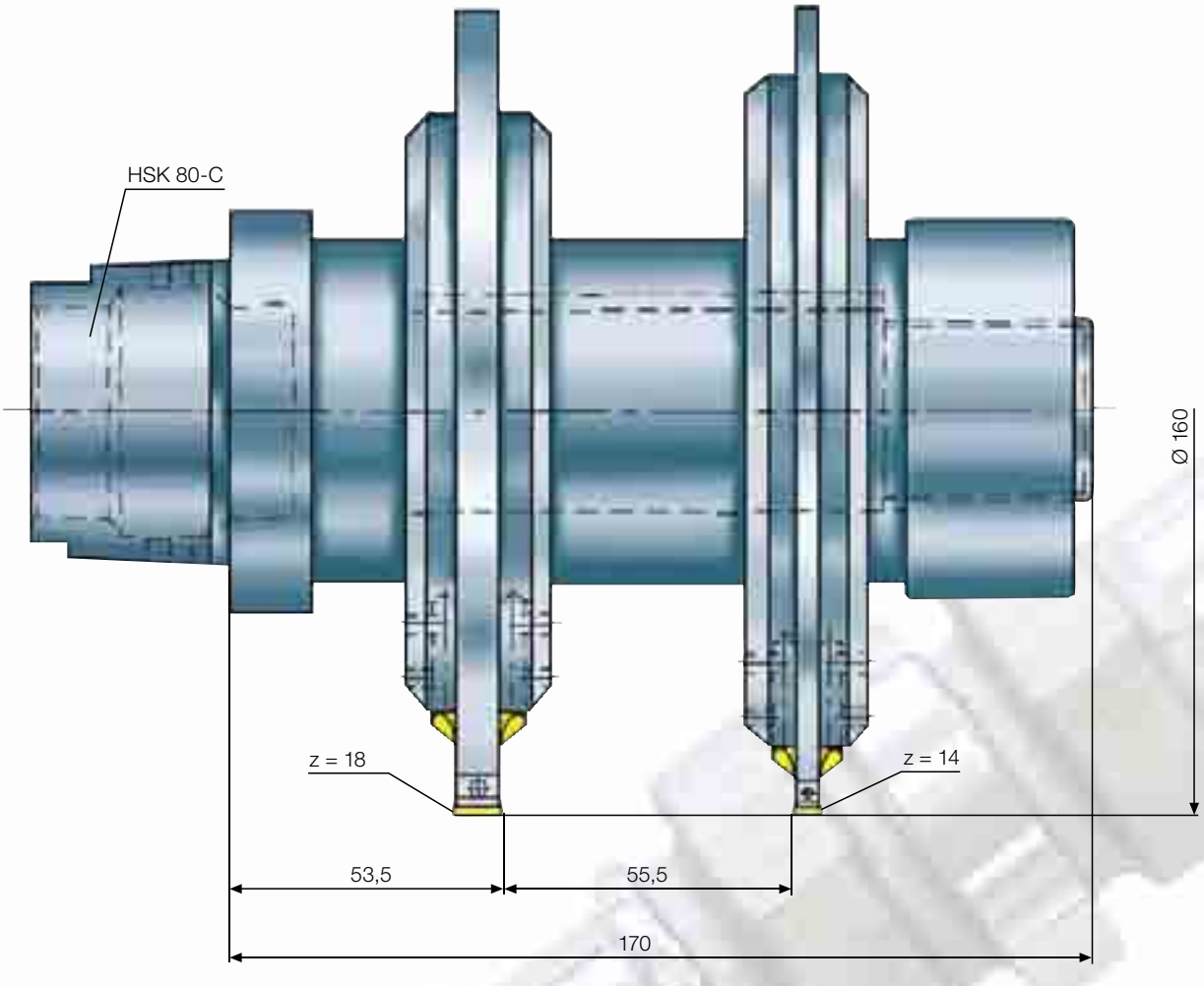
Machining in 3 steps: Semifinish 3 cutting edges,
finish + chamfer 1 cutting edge, milling. All inserts adjustable.



Workpiece		**Connecting rod**
Material		(DIN) ■ Sint C70 (sintersteel metal)
Tool		**Milling cutter and multistep-fineboring tool with micro-adjustment**
Number of teeth		3 / 1
Insert		according to customer specification
Cutting grade		Cermet
Cutting speed	m/min	207
Number of revolutions	min^{-1}	1.180
Feed rate	mm/min	531 / 177
Feed rate per tooth	mm	0,15 ▽▽ / 0,15 ▽▽▽
Depth of cut	mm	▽▽ 0,5
Coolant		yes, internal

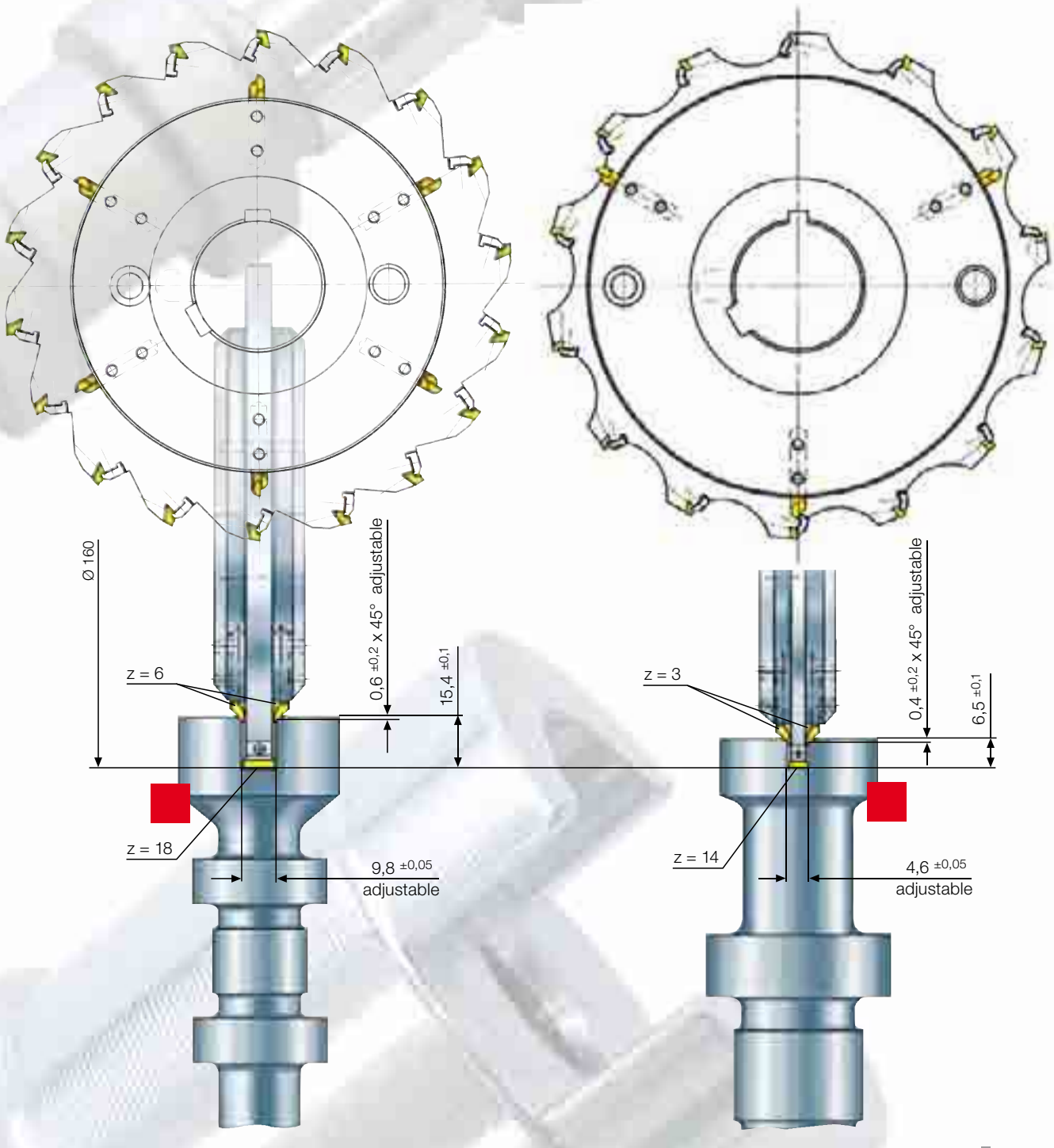
Camshaft
Drive slot

Machining of 2 types of camshafts.



Workpiece		**Camshaft** car
Material		(DIN) ■ GGG 40
Tool		**Gang milling cutter**
Number of teeth		18 / 14
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	80
Number of revolutions	min^{-1}	160
Feed rate	mm/min	z = 18 / 173 / z = 14 / 135
Feed rate per tooth	mm	0,06
Depth of cut	mm	z = 18 / 16 / z = 14 / 7
Coolant		yes, external

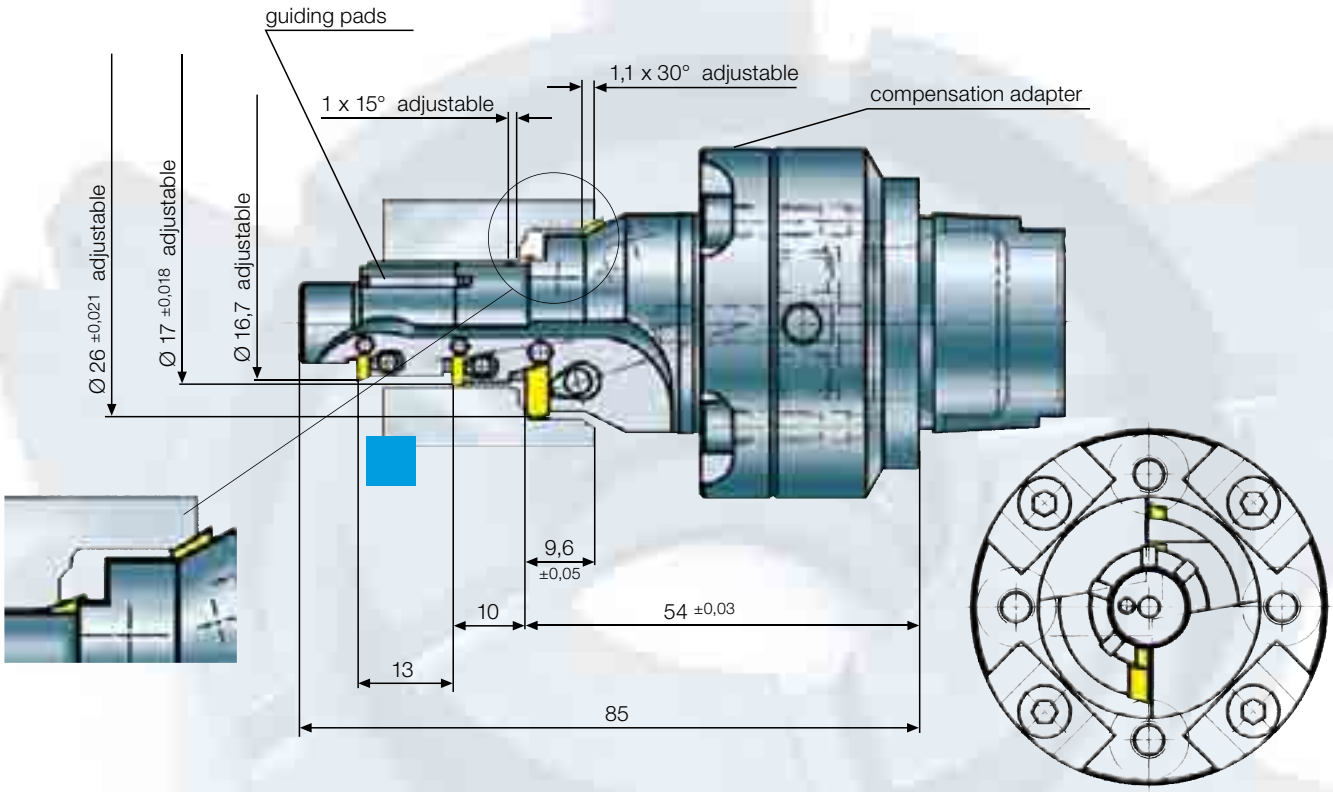
µm


Ø 160
z = 6
0,6 ±0,2 x 45° adjustable
15,4 ±0,1
z = 18
9,8 ±0,05
adjustable
z = 3
0,4 ±0,2 x 45° adjustable
6,5 ±0,1
z = 14
4,6 ±0,05
adjustable

Camshaft regulator

Simultaneous machining of diameter and chamfers.
Inserts are adjustable in diameter.

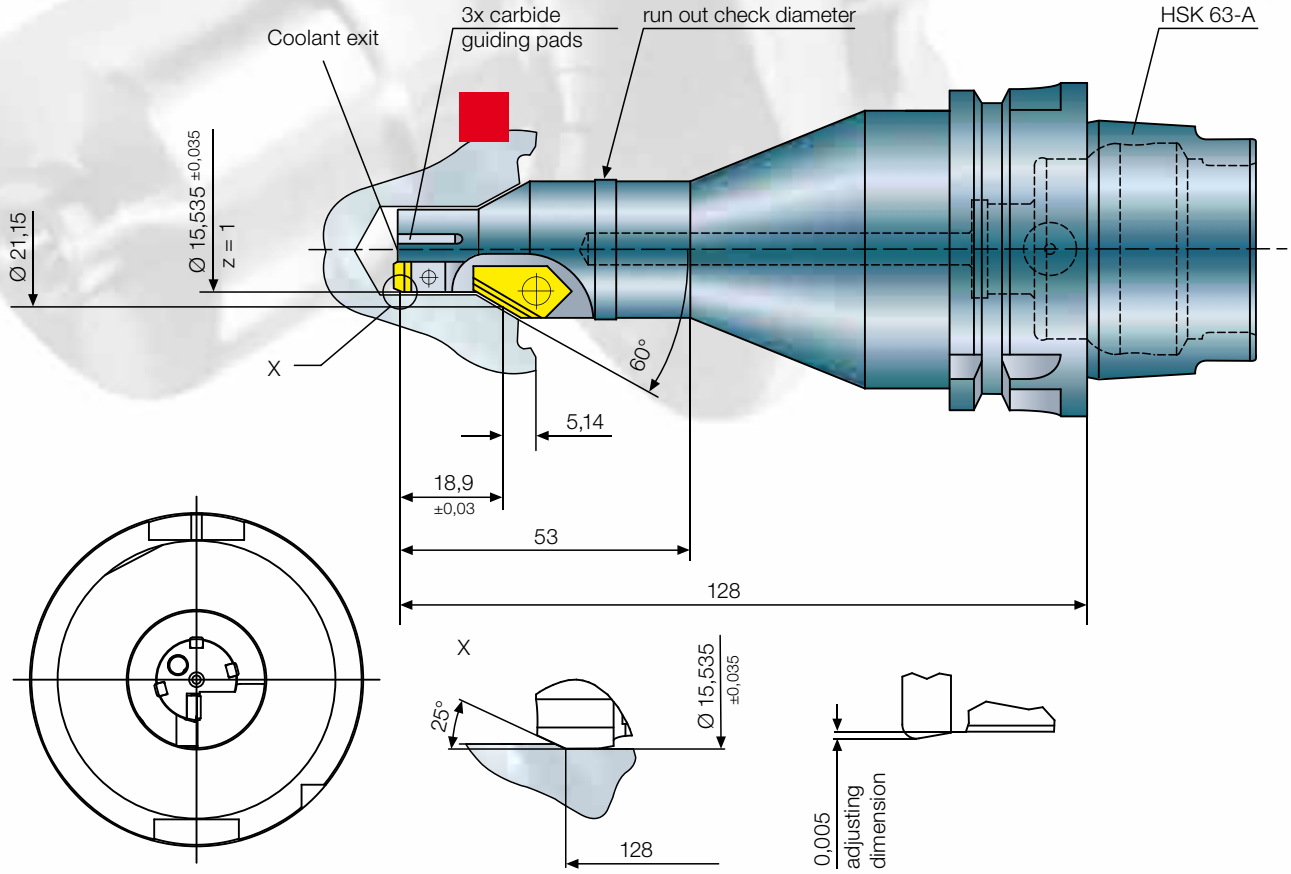
µm



Workpiece		**Camshaft regulator**
Material		(DIN) ■ Sint D11 (sintersteel metal)
Tool		**Multistep-fineboring tool with guiding pads**
Number of teeth		5 / effective 1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 26) 280
Number of revolutions	min^{-1}	3.430
Feed rate	mm/min	274
Feed rate per tooth	mm	0,08
Depth of cut	mm	-2
Coolant		yes, internal

Fineboring tool with carbide guide pads for machining of the flange bore.

µm

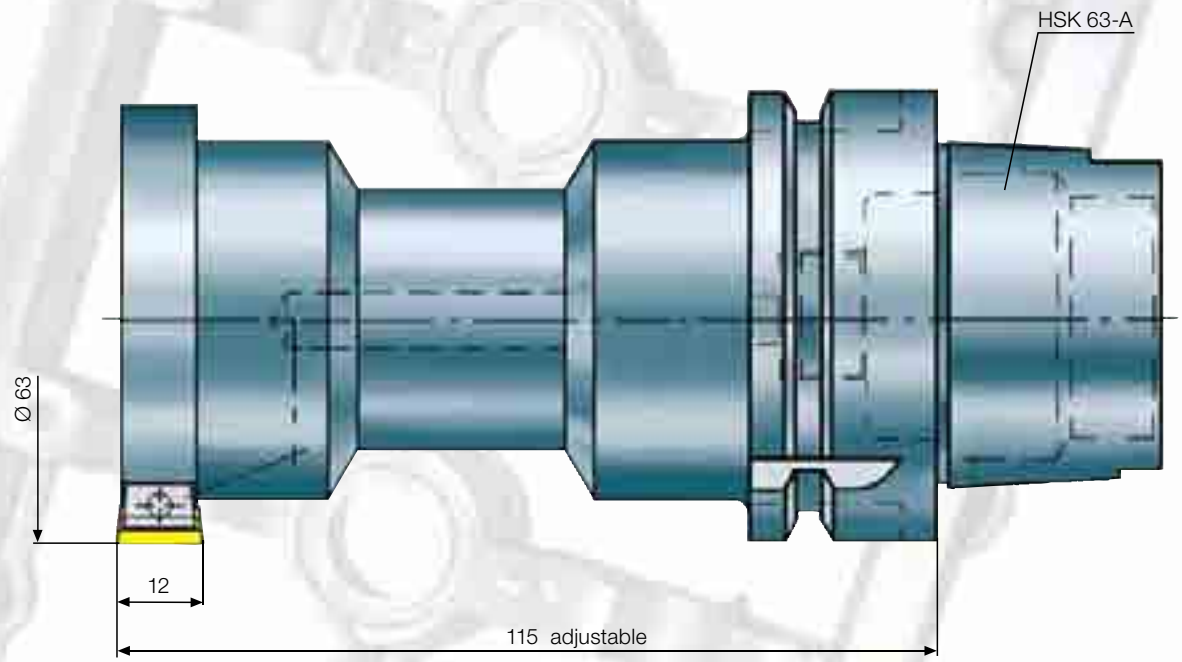


Workpiece		**Crankshaft**
Material		(DIN) ■ GGG 60
Tool		**Fineboring and chamfer tool**
Number of teeth		1 / 1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	80
Number of revolutions	min^{-1}	1.470
Feed rate	mm/min	220
Feed rate per tooth	mm	0,12
Depth of cut	mm	0,15
Coolant		yes, internal

Frame

Milling of the sealing surface.
All inserts axially adjustable.

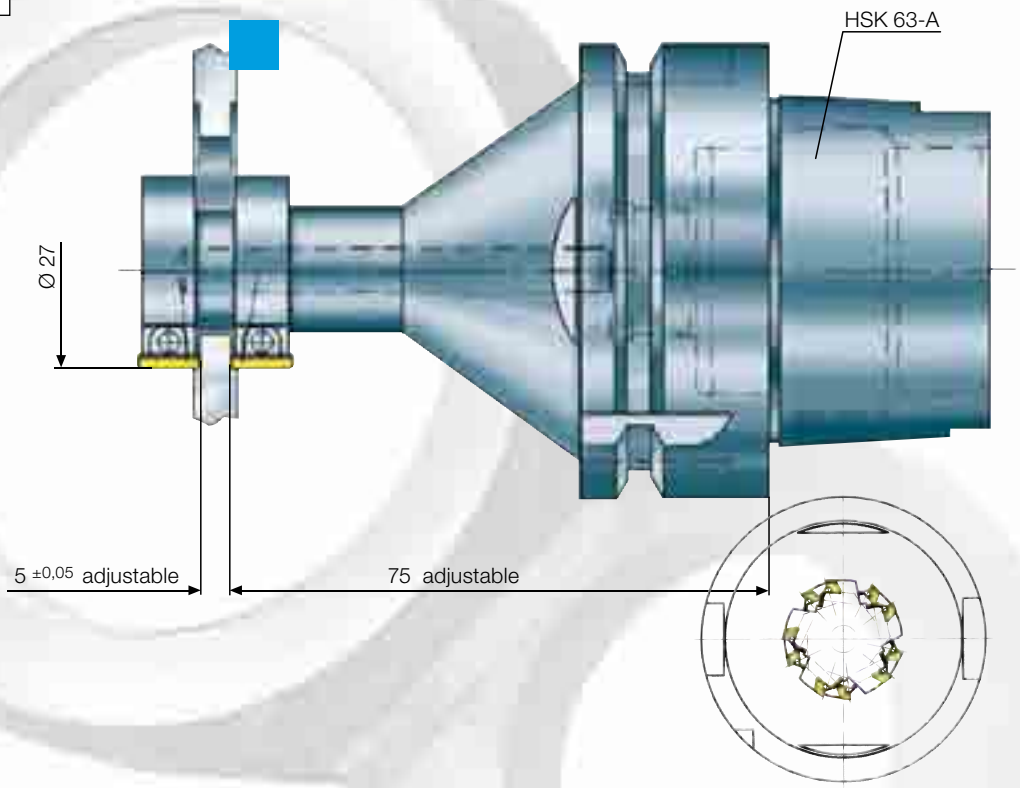
µm



Workpiece		**Frame**
Material		(DIN) ■ Al Si 12 Cu
Tool		**Face milling cutter**
Number of teeth		8
Insert		standard
Cutting grade		PCD
Cutting speed	m/min	3.560
Number of revolutions	min^{-1}	18.000
Feed rate	mm/min	23.040
Feed rate per tooth	mm	0,16
Depth of cut	mm	/
Coolant		yes, internal
Surface requirement		(sealing surface) R_Z 10 - 25

Gearshift fork

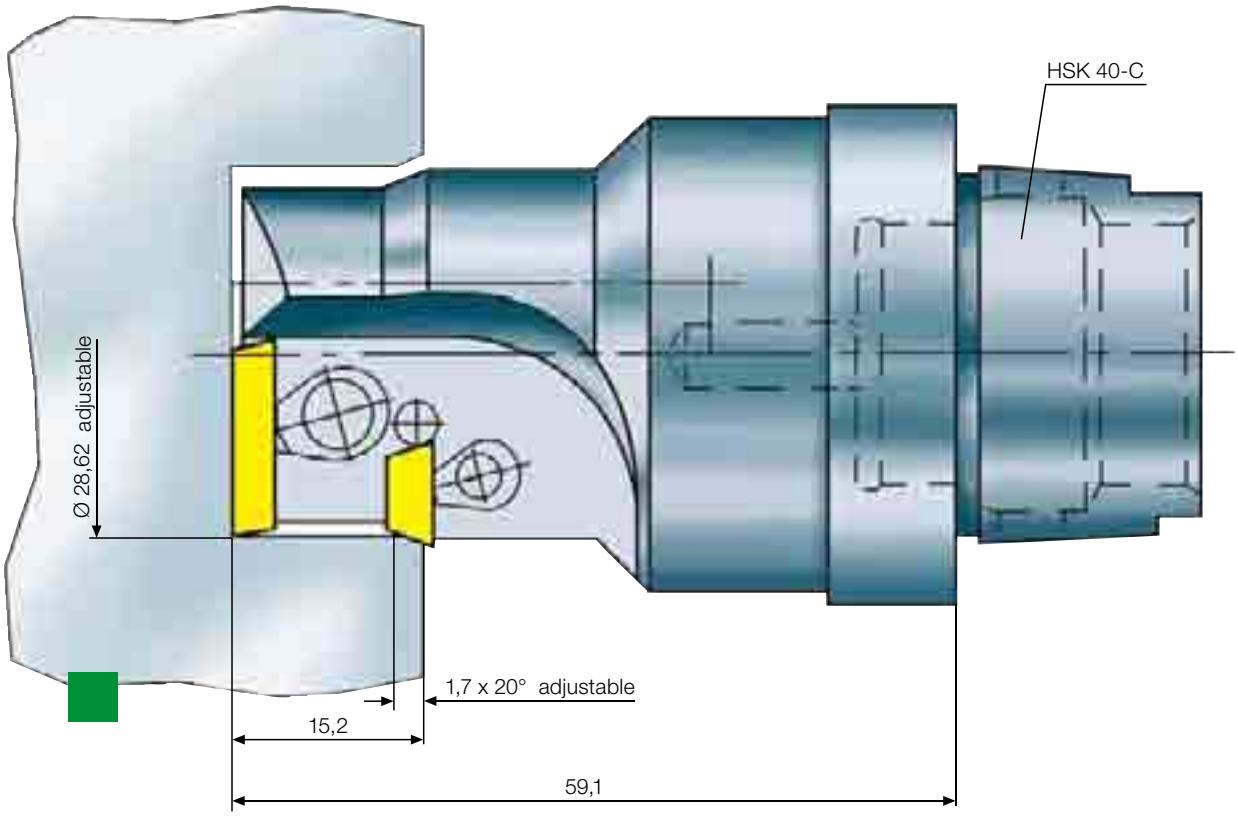
Very unstable component, requires low cutting forces of the tool.
Machining of the two ring surfaces in one cut.
Inserts interchangeable among each other thus both cutting edges of the inserts can be used. All inserts adjustable.



Workpiece		**Gearshift fork**
Material		(DIN) ■ C 35 - 520 N/mm²
Tool		**Gang milling cutter (monoblock)**
Number of teeth		10 / 5 effective
Insert		standard
Cutting grade		carbide coated
Cutting speed	m/min	120
Number of revolutions	min^{-1}	1.415
Feed rate	mm/min	707
Feed rate per tooth	mm	0,1
Depth of cut	mm	both sides 0,6
Coolant		yes, internal

Housing

Machining of the bottom across to the centre.
Diameter and chamfer adjustable.

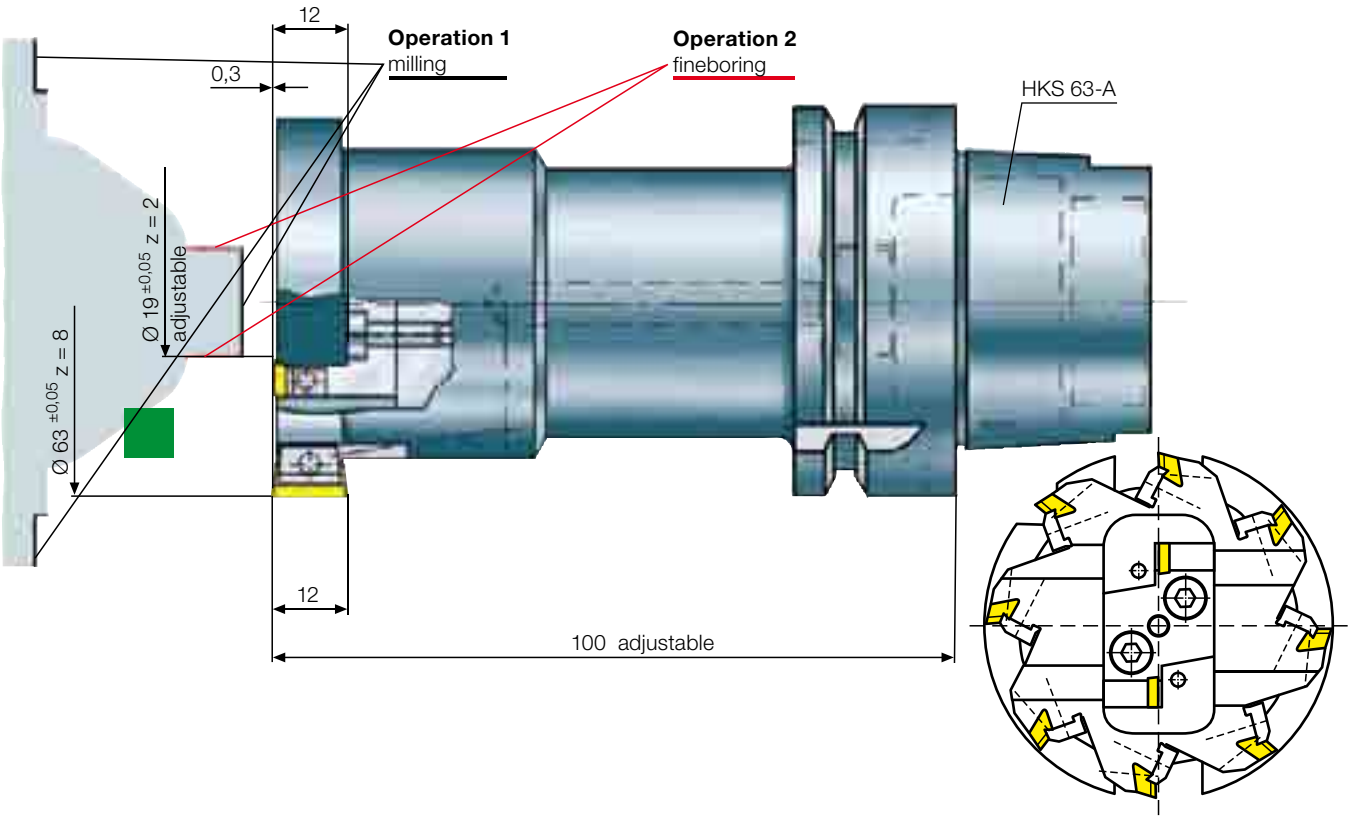


Workpiece		**Housing**
Material		(DIN) ■ GD - Al Si
Tool		**Drilling and chamfering tool**
Number of teeth		2 / effective 1
Insert		according to customer specification
Cutting grade		PCD / K10
Cutting speed	m/min	944
Number of revolutions	min^{-1}	10.500
Feed rate	mm/min	840
Feed rate per tooth	mm	0,08
Depth of cut	mm	15
Coolant		yes, internal

Starter housing

Milling and overturning of a stud with one tool. Face runout of the milling cutter and diameter of the fineboring tool are adjustable.

µm



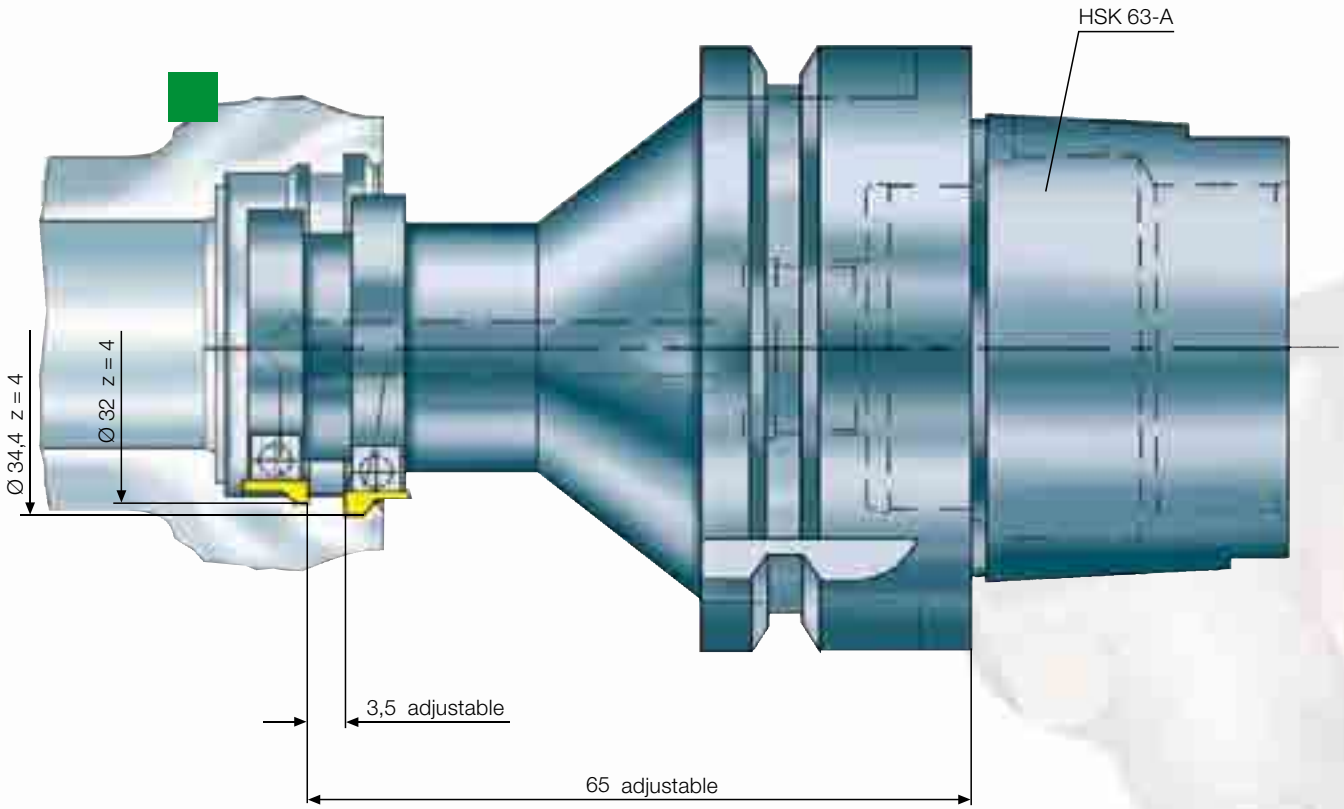
Workpiece		**Starter housing**	
Material		(DIN) ■ GD Al Si 12	
Tool			**Milling- and overturning tool**
		milling	fineboring
Number of teeth		8	2
Insert		standard / acc. to customer spec.	standard / acc. to customer spec.
Cutting grade		PCD	PCD
Cutting speed	m/min	(Ø 63) 1.800	(Ø 19) 543
Number of revolutions	min^{-1}	9.100	9.100
Feed rate	mm/min	8.736	2.184
Feed rate per tooth	mm	0,12	0,12
Depth of cut	mm	0,8	0,8
Coolant		yes, internal	yes, internal

Main brake cylinder

Main bore

Milling of the two sealing grooves in one cut.
Distance of the grooves adjustable.

µm

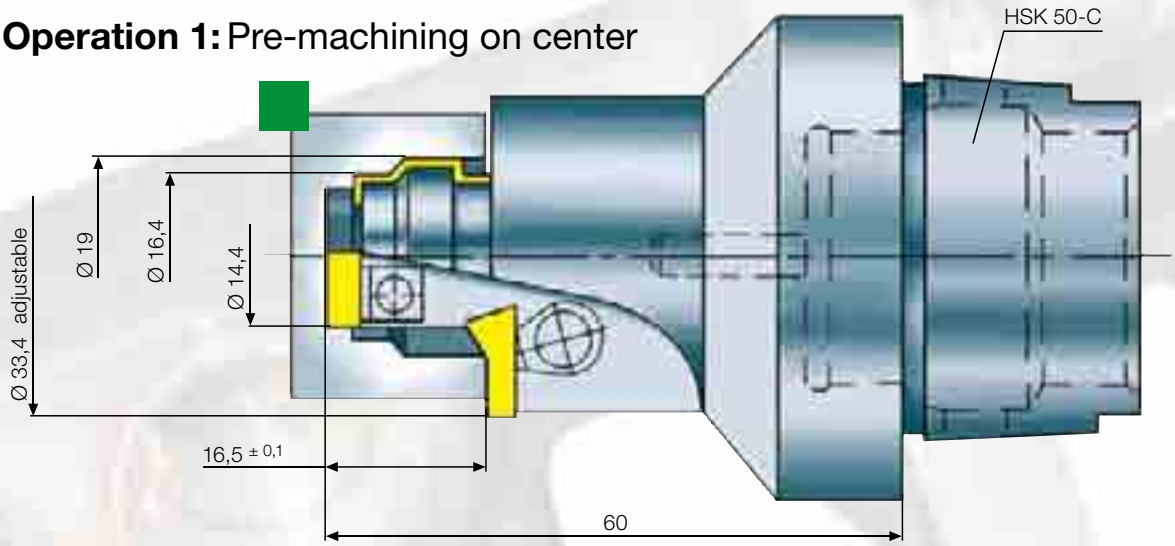


Workpiece		**Main brake cylinder**
Material		(DIN) ■ Al Si 12
Tool		**Circular milling cutter**
Number of teeth		8 / effective 4
Insert		according to customer specification
Cutting grade		K10
Cutting speed	m/min	800
Number of revolutions	min^{-1}	7.406
Feed rate	mm/min	1.482
Feed rate per tooth	mm	0,05
Depth of cut	mm	ca. 2
Coolant		yes, internal

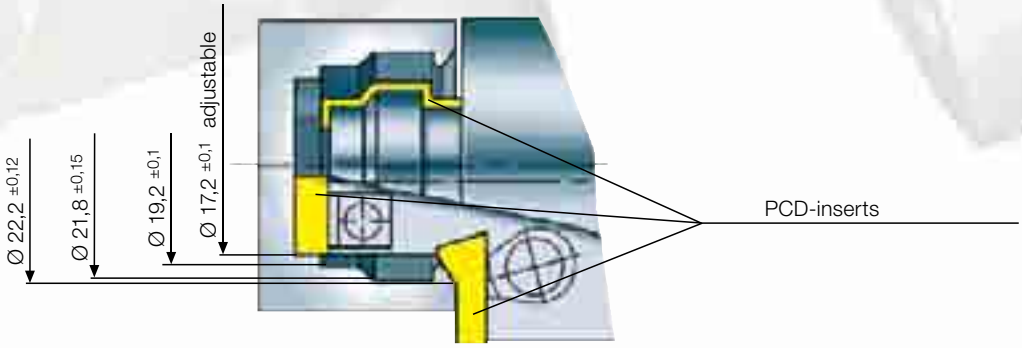
Main brake cylinder
Connecting boring

Drilling, fineboring, chamfering and circular milling.
All inserts adjustable.

Operation 1: Pre-machining on center



Operation 2: Chamfering and circular milling



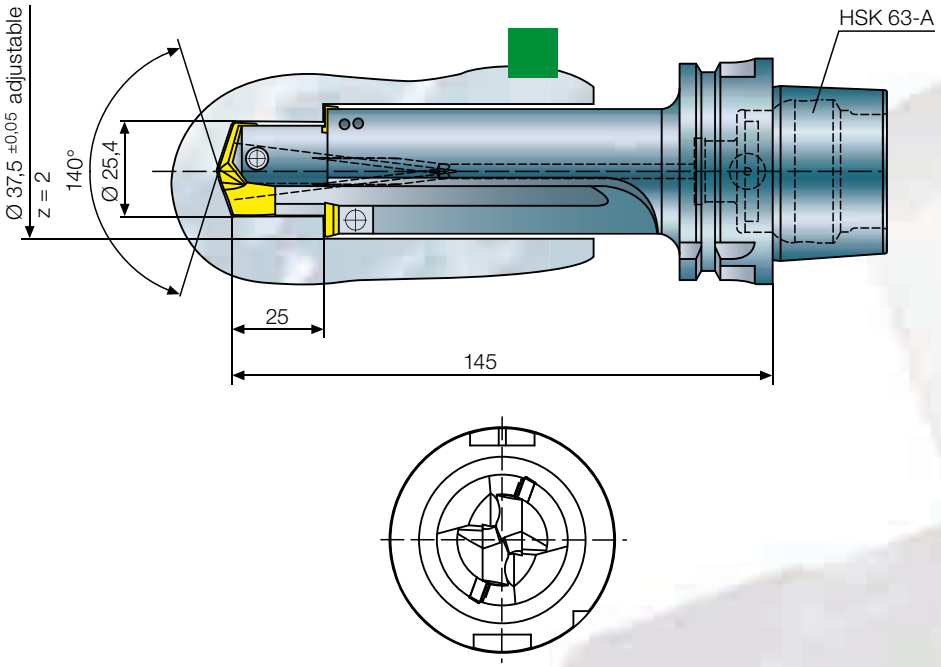
Workpiece			**Main brake cylinder**
Material			(DIN) ■ Al Si 12
Tool			**Drilling- and cicular milling tool**
Number of teeth			3 / effective 1
Insert			according to customer specification
Cutting grade			PCD
		milling	fineboring
Cutting speed	m/min	(Ø 19) 569	(Ø 19) 569
Number of revolutions	min^{-1}	9.535	9.535
Feed rate	mm/min	572	1.144
Feed rate per tooth	mm	0,06	0,12
Depth of cut	mm	-16,5	-16,5
Coolant		yes, internal	yes, internal

Main brake cylinder

Main bore

Operation 1: Pilot bore
Operation 2: with Gühring standard tool (without figure)

µm

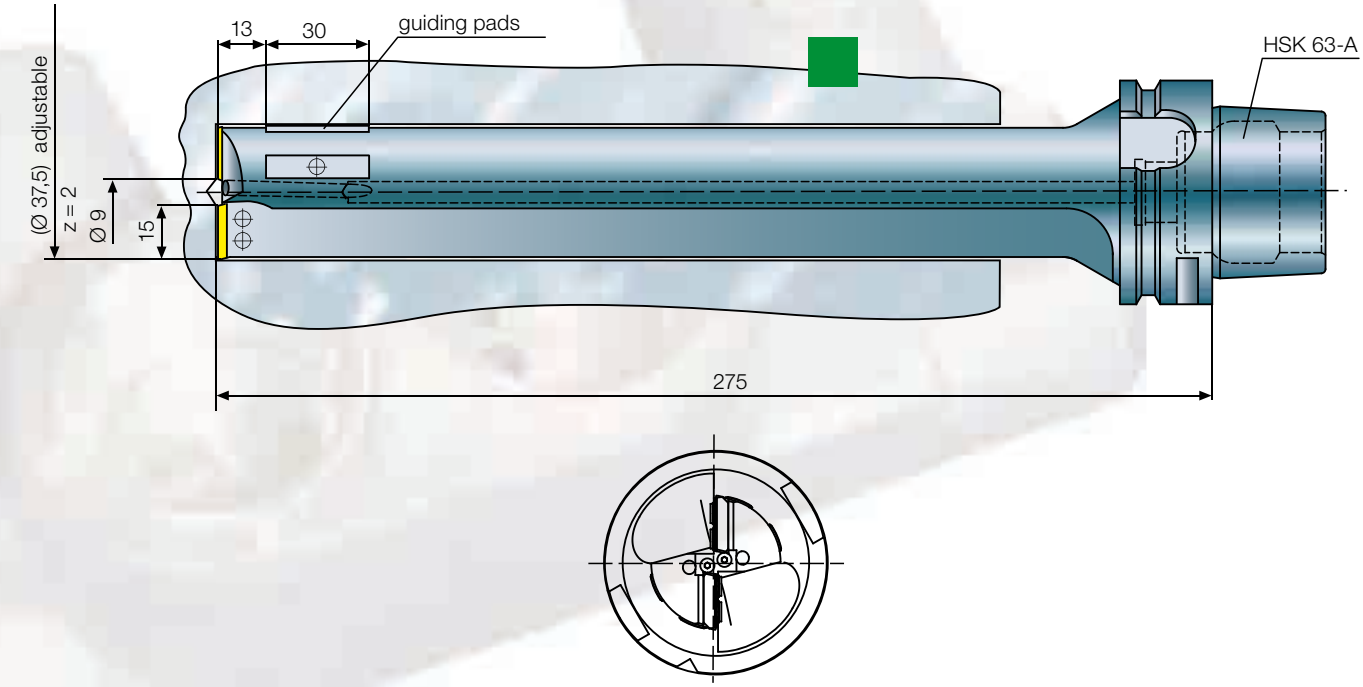


Workpiece		**Brake cylinder**
Material		(DIN) ■ Al Mg Mn
Tool		**Drilling- and fineboring tool**
Number of teeth		2 / 2
Insert		standard
Cutting grade		carbide
Cutting speed	m/min	120
Number of revolutions	min^{-1}	1.600
Feed rate	mm/min	600
Feed rate per tooth	mm	0,2
Depth of cut	mm	into the solid material
Coolant		yes, internal

Main brake cylinder

Main bore

Operation 3:
Finishing with adjustable inserts and guide pads.



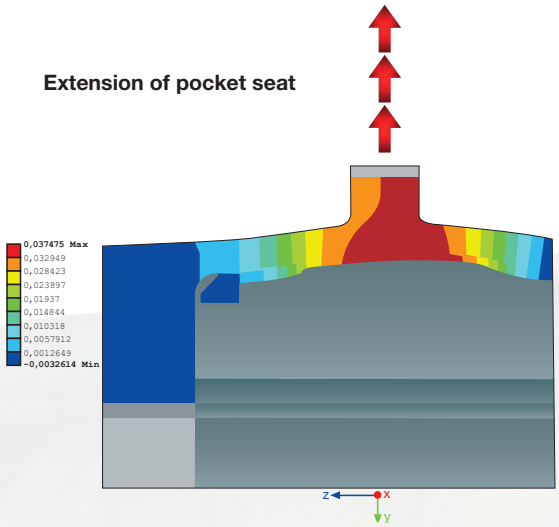
Workpiece		**Brake cylinder**
Material		(DIN) ■ Al Mg Mn
Tool		**Fineboring tool**
Number of teeth		2
Insert		according to customer specification
Cutting grade		carbide / PCD
Cutting speed	m/min	180
Number of revolutions	min^{-1}	1.600
Feed rate	mm/min	480
Feed rate per tooth	mm	0,15
Depth of cut	mm	6,05
Coolant		yes, internal

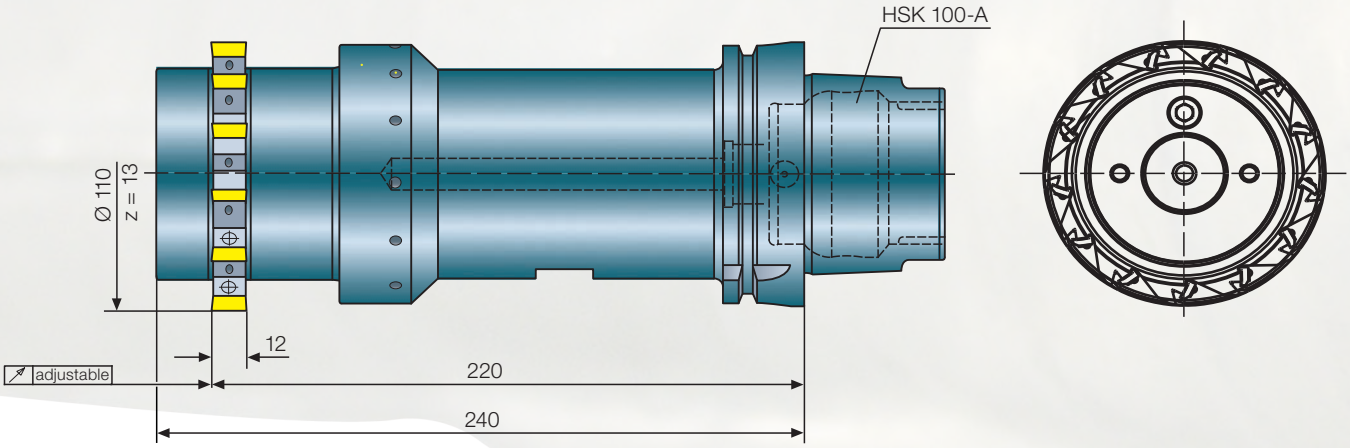
Steering housing

Hydraulically adjustable reamer.

µm

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

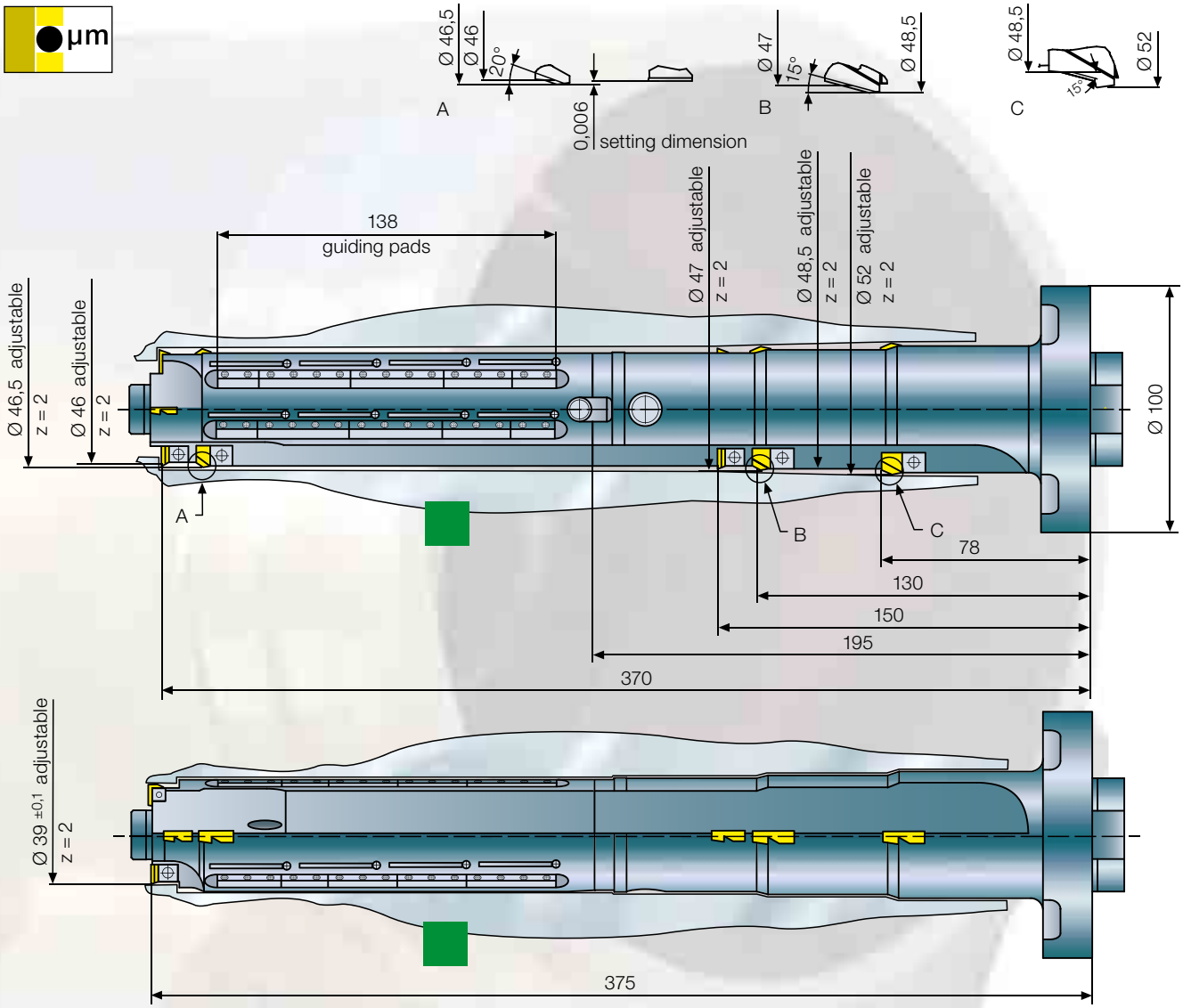




Workpiece		**Steering housing**
Material		(DIN) ■ GGG 50
Tool		**Reaming tool**
Number of teeth		13
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	160
Number of revolutions	min^{-1}	500
Feed rate	mm/min	1.300
Feed rate per tooth	mm	0,2
Depth of cut	mm	0,25
Coolant		yes, internal

Steering housing

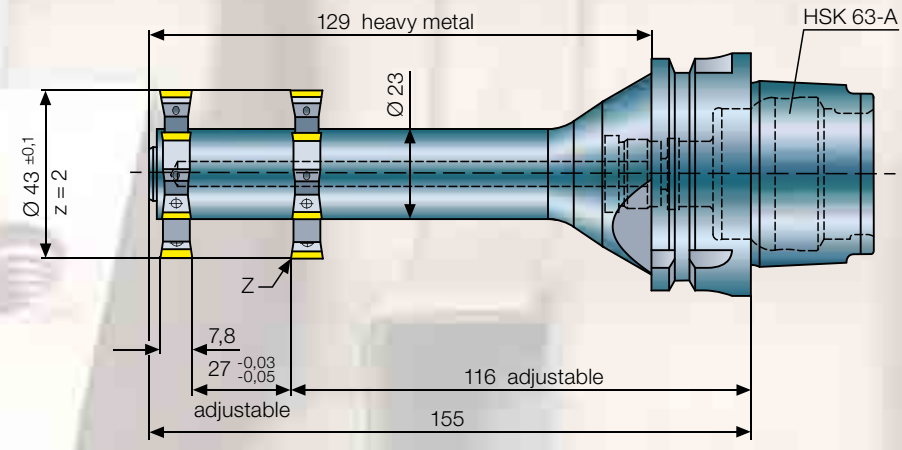
Multistep-fineboring tool with guide pads for machining of the main bore.

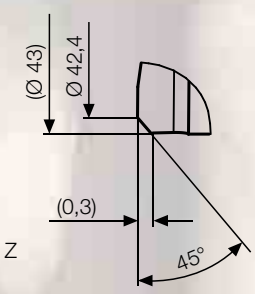


Workpiece		**Steering housing**
Material		Al
Tool		**Multistep-fineboring tool**
Number of teeth		12 / effective 2
Insert		standard / according to customer specification
Cutting grade		PCD
Cutting speed	m/min	280
Number of revolutions	min^{-1}	1.700
Feed rate	mm/min	510
Feed rate per tooth	mm	0,15
Depth of cut	mm	2
Coolant		yes, internal

Balance shaft housing

Milling cutter for the thrust bearing seat.

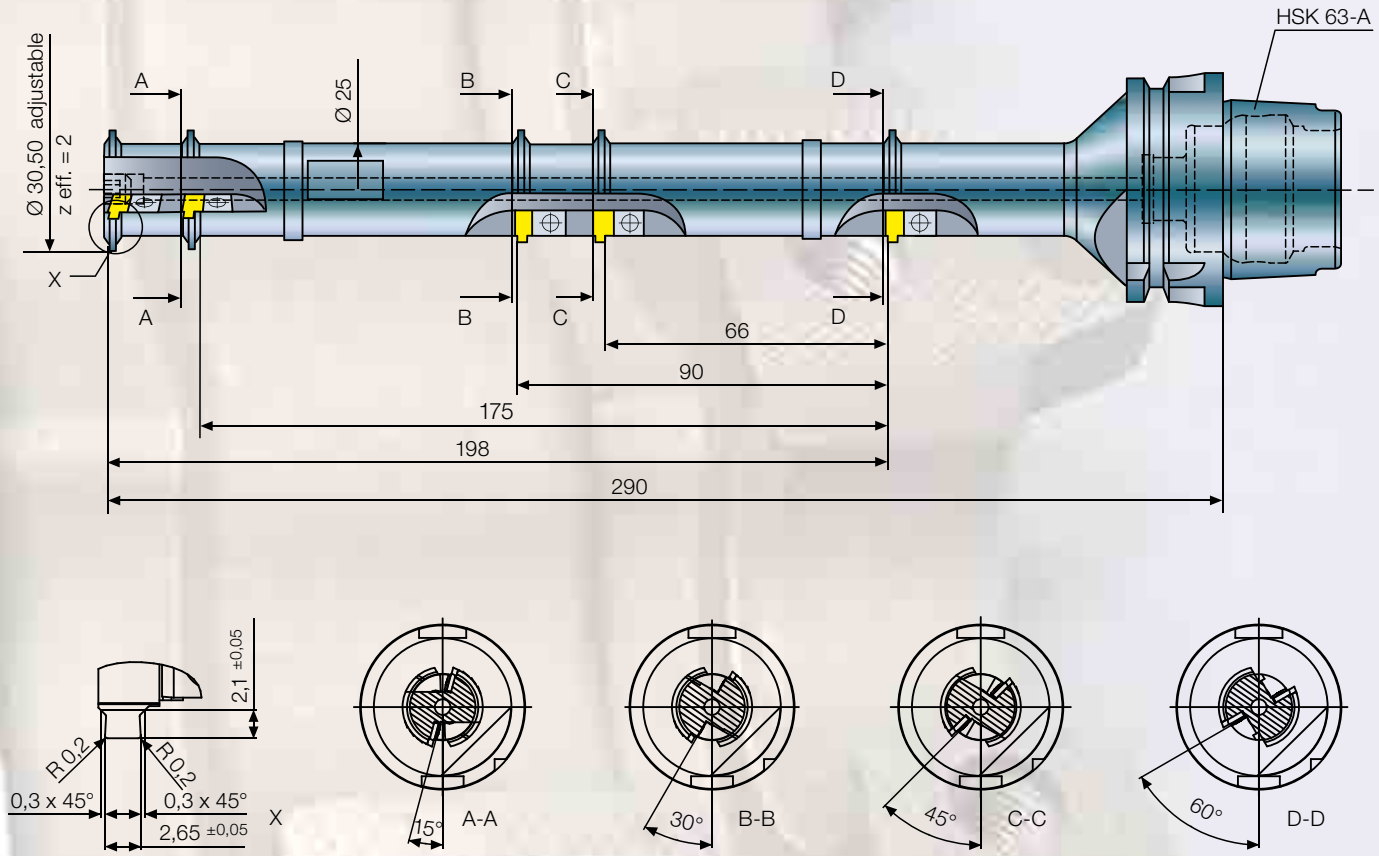




Workpiece		**Balance shaft housing**
Material		(DIN) ■ GG 25
Tool		**Gang milling cutter**
Number of teeth		2 / 2
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	270
Number of revolutions	min^{-1}	2.000
Feed rate	mm/min	600
Feed rate per tooth	mm	0,15
Depth of cut	mm	0,2
Coolant		yes, internal

Balance shaft housing

Circular milling cutter for machining of the grooves.

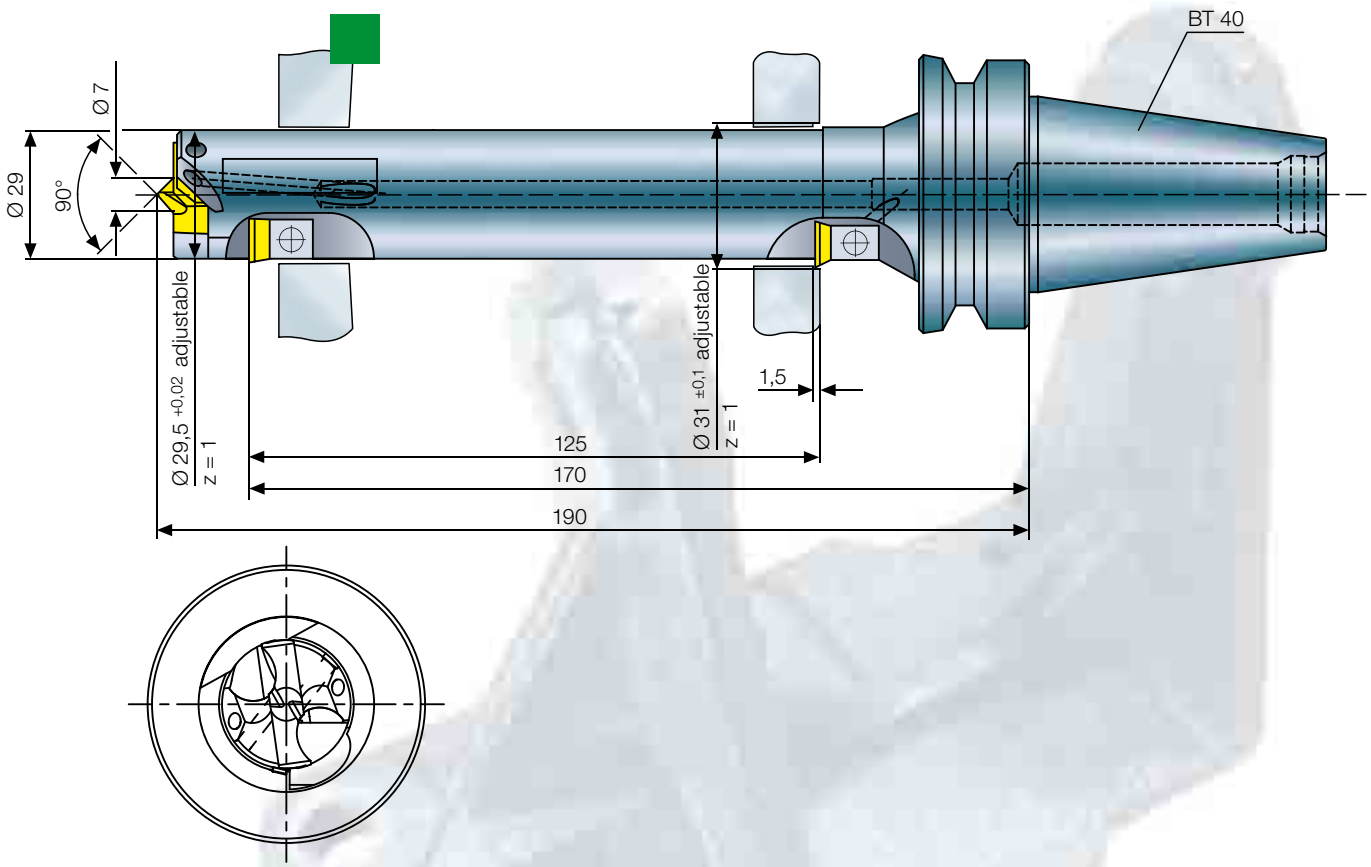


Workpiece		**Balance shaft housing**
Material		(DIN) ■ Al
Tool		**Circular milling cutter**
Number of teeth		2 / 2 / 2 / 2 / 2
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	490
Number of revolutions	min^{-1}	5.000
Feed rate	mm/min	500
Feed rate per tooth	mm	0,1
Depth of cut	mm	0,5 - 1,0
Coolant		yes, internal

Motor bracket

Combination tool for drilling and finishing.

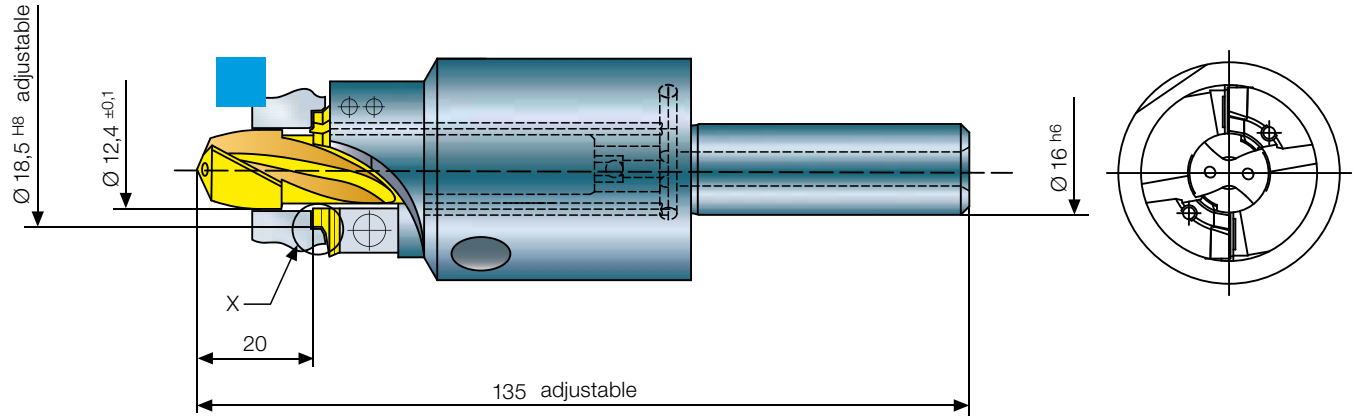
µm

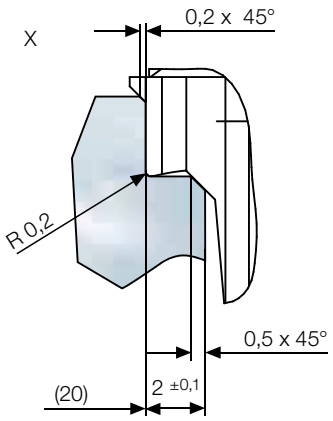


Workpiece			**Motor bracket**
Material			GAlSi 13/14
Tool			**Drilling- and fineboring tool**
Number of teeth			2 / 1 / 1
Insert			standard
Cutting grade			PCD
		drilling	fineboring
Cutting speed	m/min	425	425
Number of revolutions	min^{-1}	4.500	4.500
Feed rate	mm/min	1.300	1.000
Feed rate per tooth	mm	0,15	0,2
Depth of cut	mm	into the solid material	1,0
Coolant		yes, internal	yes, internal

Drive flange

Drilling, fineboring and chamfering tool.



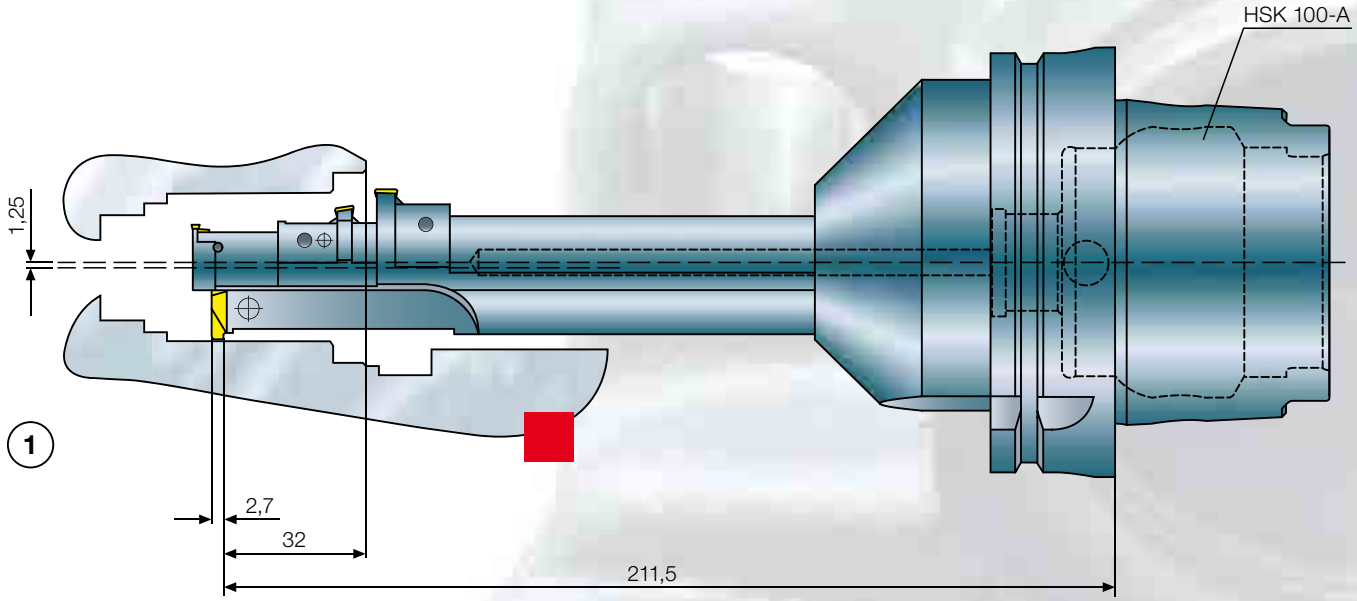


Workpiece			**Drive flange**
Material			(DIN) Ck 45
Tool			**Drilling- and fineboring tool**
Number of teeth			2
Insert			according to customer specification
Cutting grade			carbide coated
		drilling	fineboring
Cutting speed	m/min	71	141
Number of revolutions	min^{-1}	1.850	2.500
Feed rate	mm/min	444	400
Feed rate per tooth	mm	0,12	0,08
Depth of cut	mm	into the solid material	3,0
Coolant		yes, internal	yes, internal

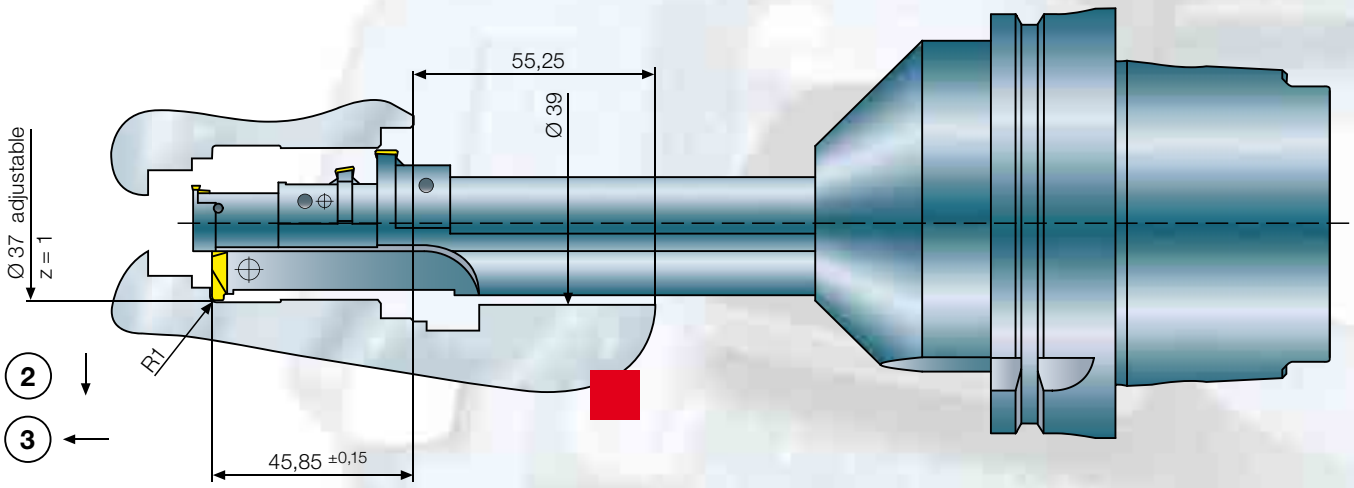
Brake caliper

Interpolation turning tool.

1.Step → Positioning 1,25 mm ex centre

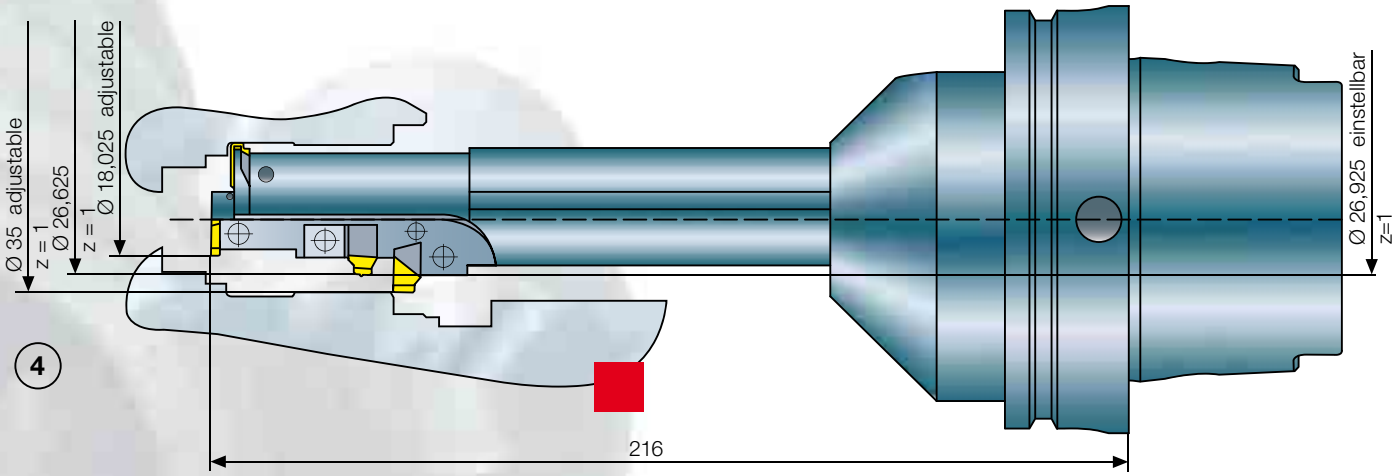


2.Step → Entering by interpolation to nominal diameter
3.Step → countersinking Ø 37 mm

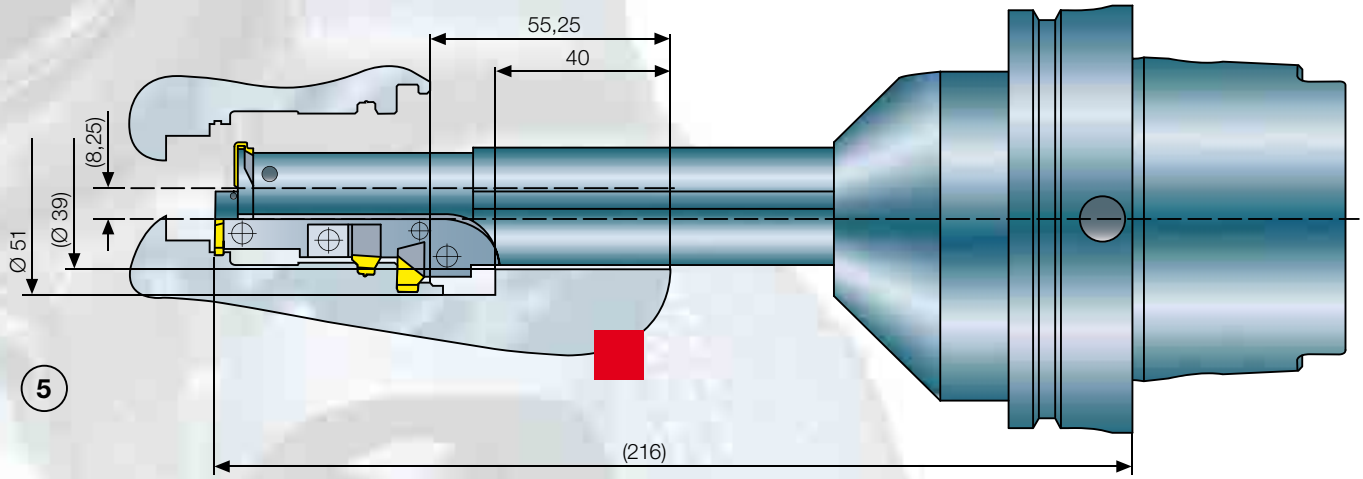


Brake caliper

4.Step → Positioning



5.Step → Interpolation turning of 3 slots / grooves



Workpiece		**Brake caliper**
Material		(DIN) ■ GGG 45
Tool		**Interpolation turning tool**
Number of teeth		4/1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	70
Number of revolutions	min^{-1}	615
Feed rate	mm/min	75
Feed rate per tooth	mm	0,12
Depth of cut	mm	0,75
Coolant		yes, internal

General engineering

Various components

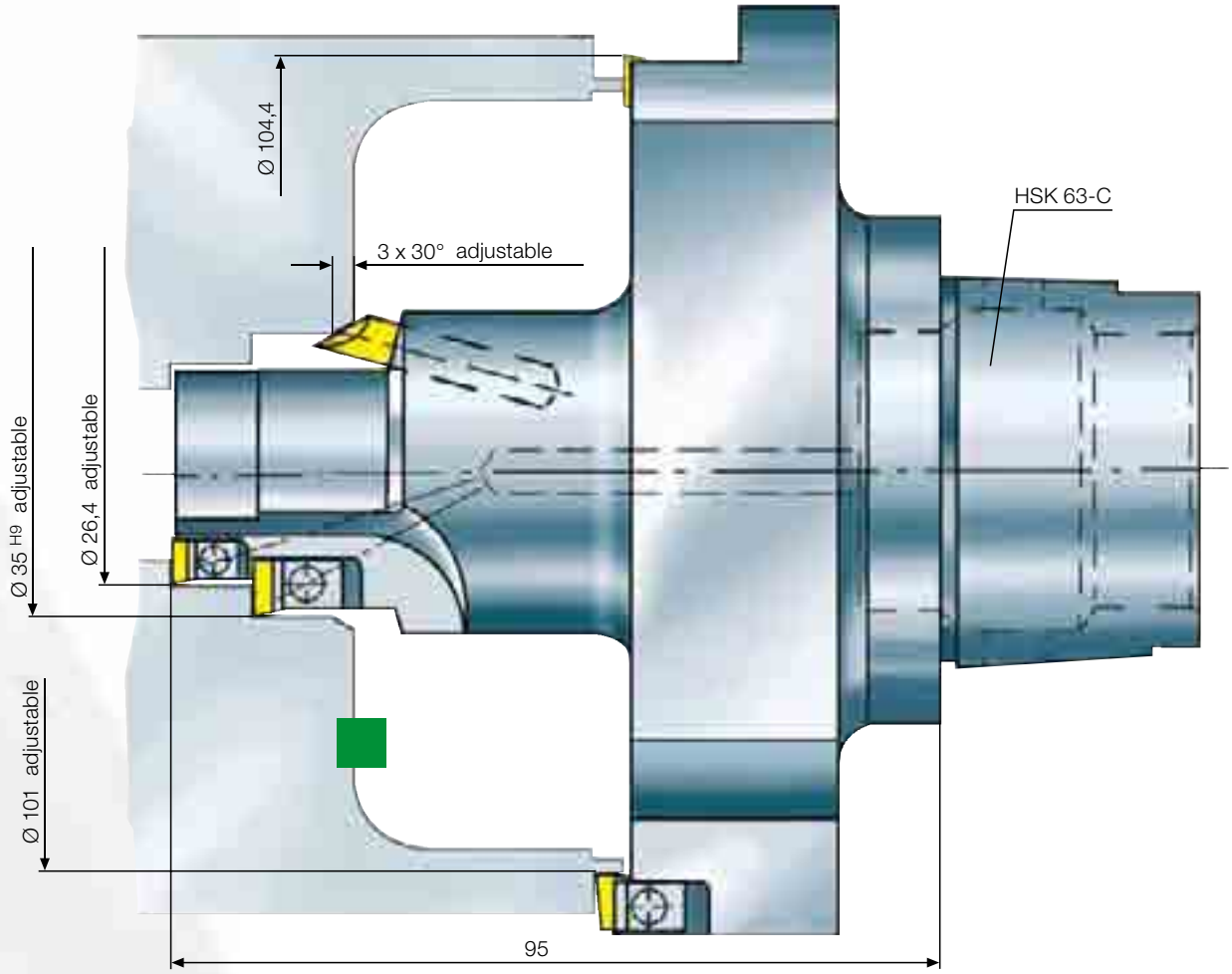
e.g.
Electric industry
Hydraulic industry
Wind energy industry
End processing
Compressor industry

Right angle grinder-housing

Bearing seats

Combination tool for 5 machining steps.
All inserts adjustable.

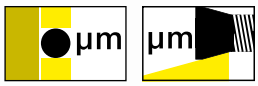
µm



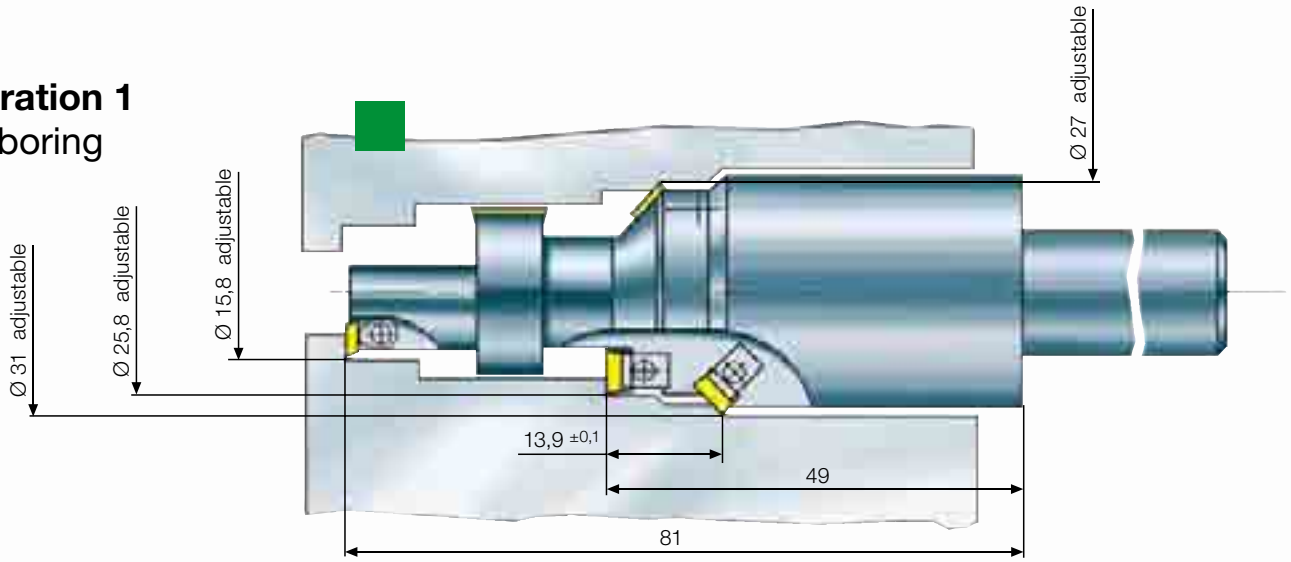
Workpiece		**Right angle grinder-housing**
Material		(DIN) ■ Magnesium
Tool		**Fineboring tool**
Number of teeth		5 / effective 1
Insert		standard / according to customer specification
Cutting grade		PCD / K10
Cutting speed	m/min	(Ø 101) 2.548
Number of revolutions	min^{-1}	7.750
Feed rate	mm/min	1.086
Feed rate per tooth	mm	0,14
Depth of cut	mm	-3
Coolant		yes, internal

Right angle grinder-housing
Bearing seats

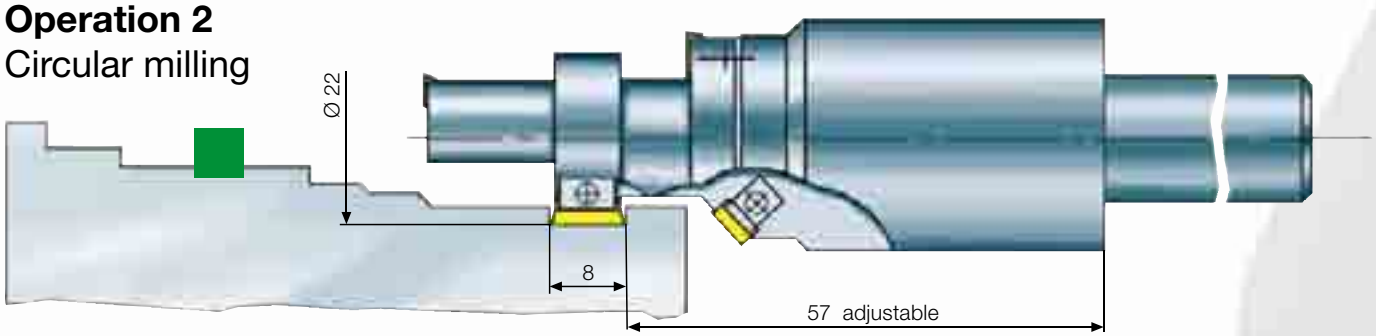
Combination tool for fineboring and circular milling.
Fine drilling diameter and milling cutter adjustable.



Operation 1
Fineboring



Operation 2
Circular milling

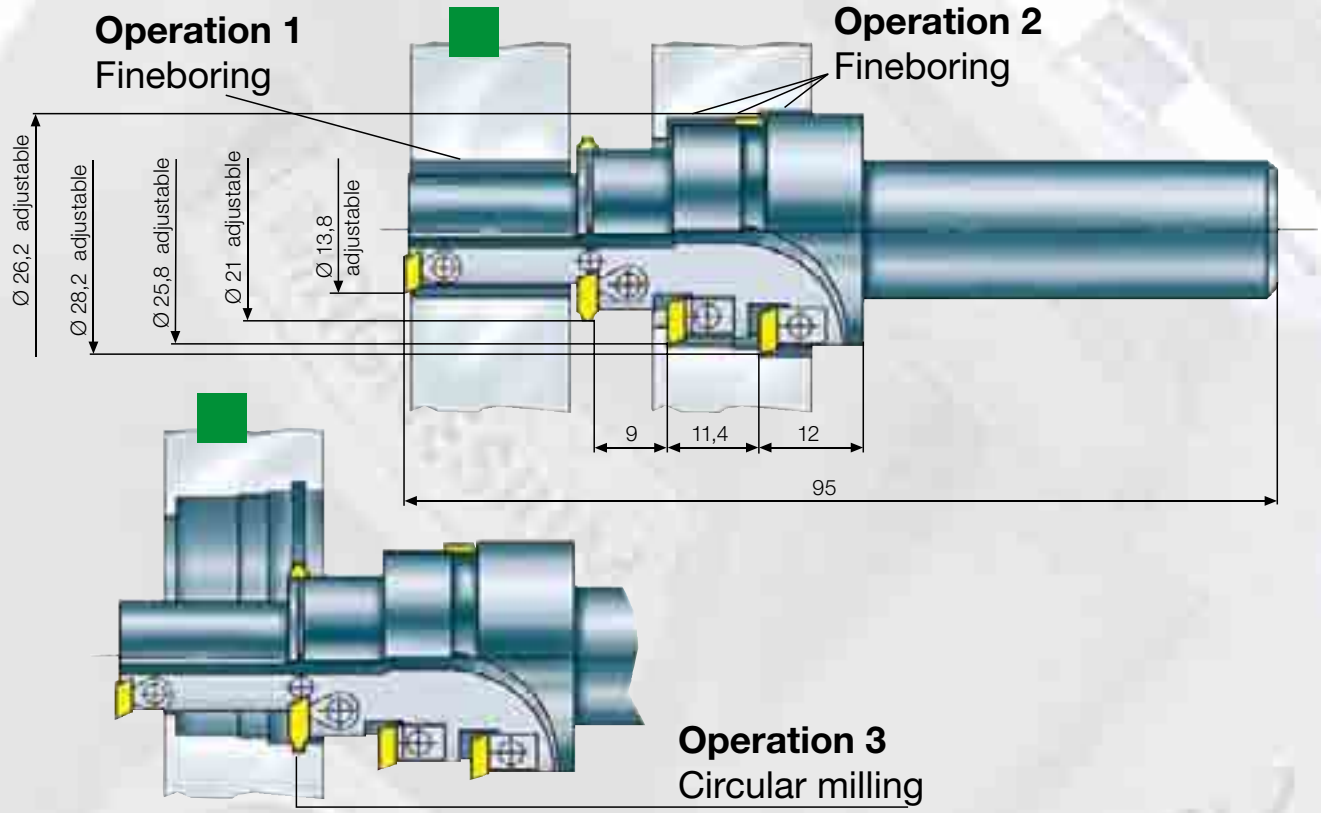


Workpiece			**Right angle grinder-housing**
Material			(DIN) ■ Magnesium
Tool			**Multistep-fineboring and circular milling cutter**
Number of teeth			5 / effective 1
Insert			standard / according to customer specification
Cutting grade			PCD
		fineboring	milling
Cutting speed	m/min	(Ø 31) 1.022	(Ø 22) 725
Number of revolutions	min^{-1}	10.500	10.500
Feed rate	mm/min	1.260	840
Feed rate per tooth	mm	0,12	0,08
Depth of cut	mm	0,8	8
Coolant		yes, internal	yes, internal

Right angle grinder-housing

Bearing seats

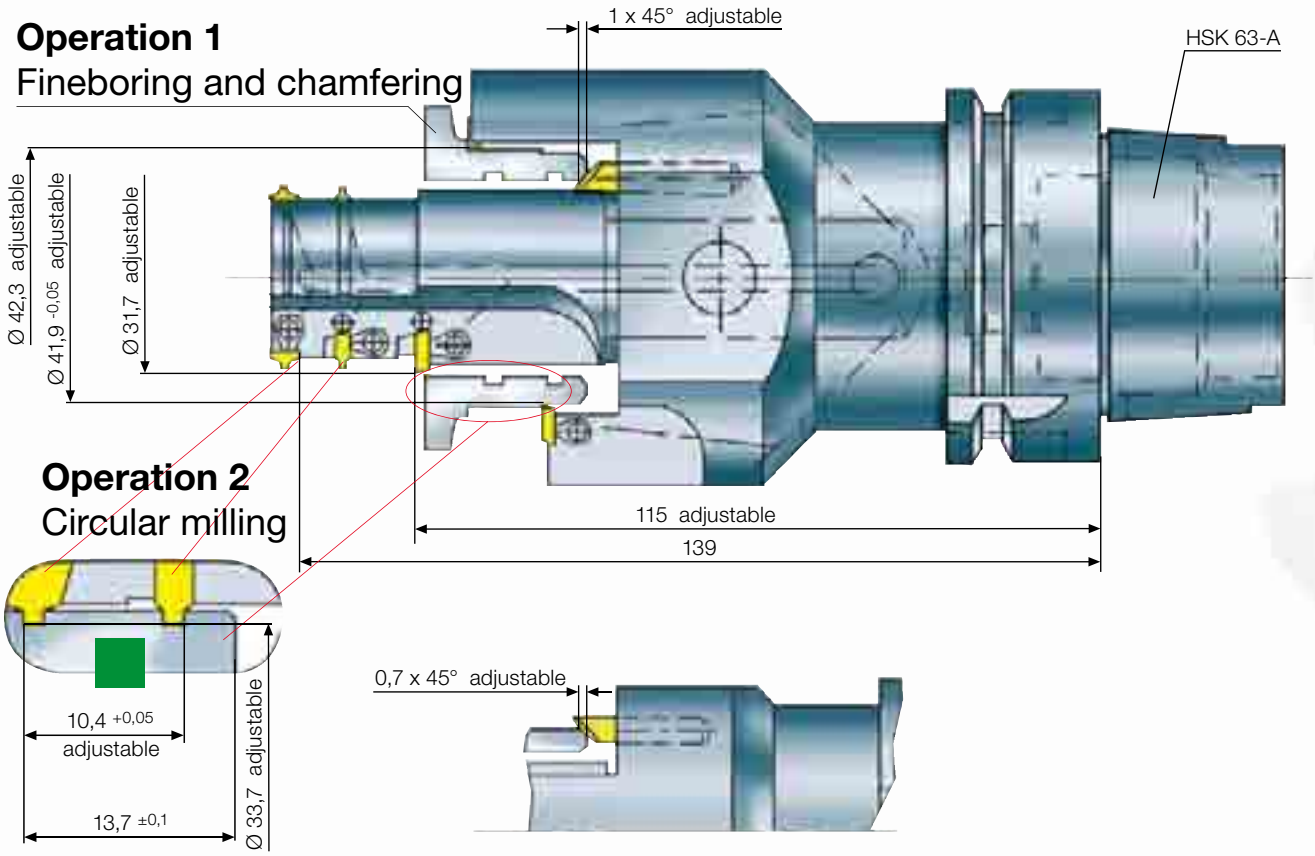
Combination tool for fineboring and circular milling.
Fine drilling diameter and milling cutter adjustable.



Workpiece		**Right angle grinder-housing**
Material		(DIN) ■ Magnesium
Tool		**Multistep-fineboring and circular milling cutter**
Number of teeth		6 / effective 1
Insert		standard / according to customer specification
Cutting grade		PCD
Cutting speed	m/min	(Ø 28,2) 997
Number of revolutions	min^{-1}	10.577
Feed rate	mm/min	(fineboring) 846 (milling) 1.692
Feed rate per tooth	mm	0,08
Depth of cut	mm	0,5
Coolant		yes, internal

Guide bushing

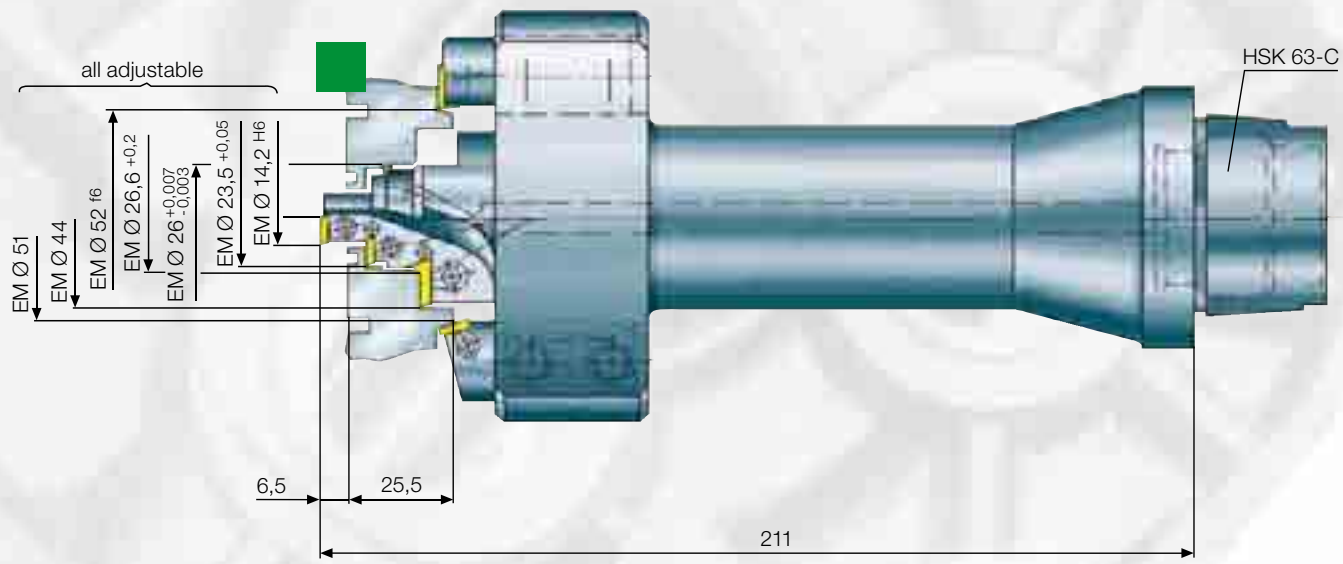
Combination tool for fineboring, chamfering and milling.
Middle part exchangeable for different types of components.
All inserts adjustable.



Workpiece		**Guide bushing** for drilling hammer
Material		(DIN) ■ GD - Al Si 9 Cu 3
Tool		**Fineboring-, chamfering- and circular milling tool**
Number of teeth		(fineboring) 8 / effective 1 per Ø / (milling) 8 / effective 2 per Ø
Insert		standard / according to customer specification
Cutting grade		PCD / K10
Cutting speed	m/min	(Ø 31,7) 750 (Ø 42,3) 1.000
Number of revolutions	min^{-1}	7.530
Feed rate	mm/min	978
Feed rate per tooth	mm	(milling) 0,065 0,13
Depth of cut	mm	2 - 3
Coolant		yes, internal

Gearbox case

Combination tool for 6 machining steps.
All inserts adjustable.
Exchangeable cartridges for different types of housings.

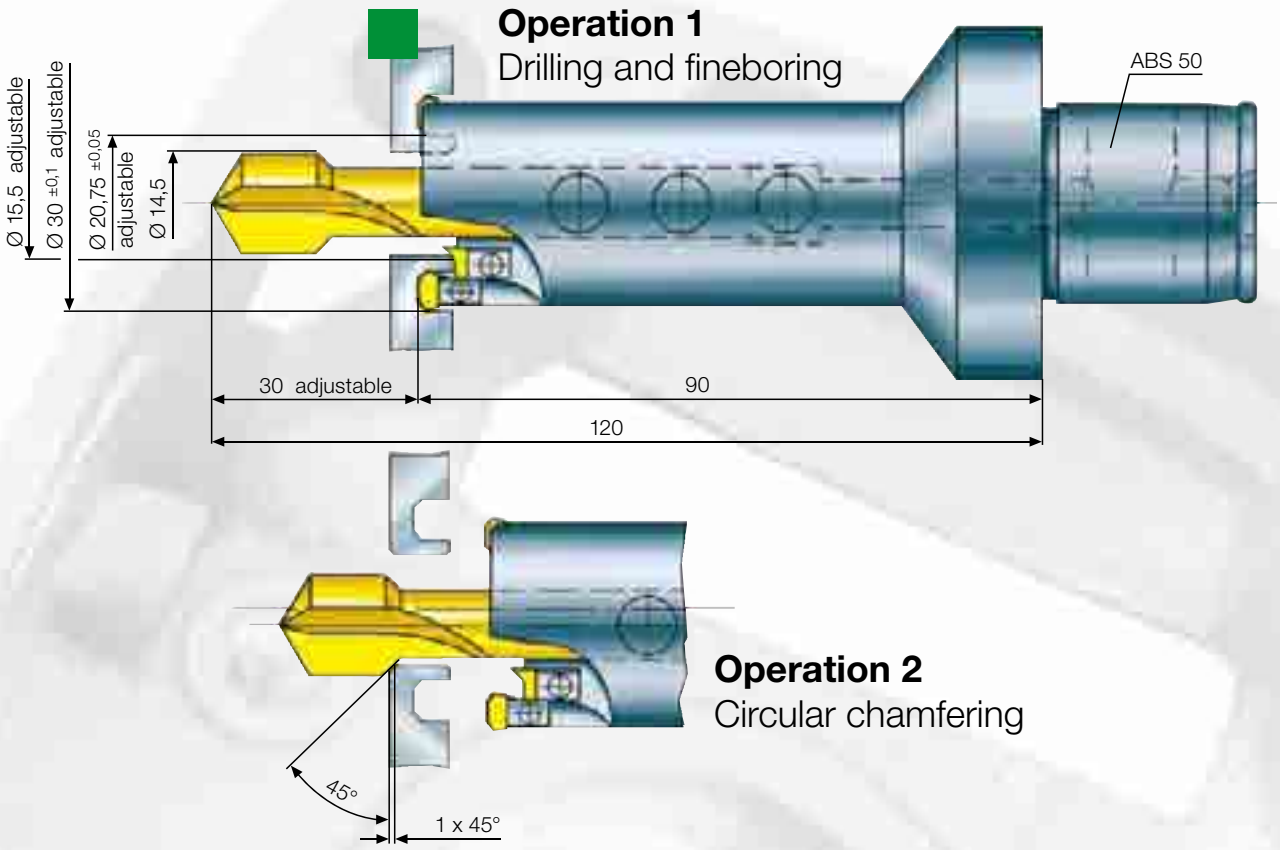


Workpiece		**Gearbox case** for hand drilling machine
Material		(DIN) ■ GD - Al Si 9 Cu 3
Tool		**Fineboring-, chamfering- and face tool**
Number of teeth		6 / effective 1 per Ø
Insert		standard / according to customer specification
Cutting grade		PCD / K10
Cutting speed	m/min	800
Number of revolutions	min^{-1}	4.900
Feed rate	mm/min	735
Feed rate per tooth	mm	- 0,15
Depth of cut	mm	0,5
Coolant		yes, internal

Drilling machine housing

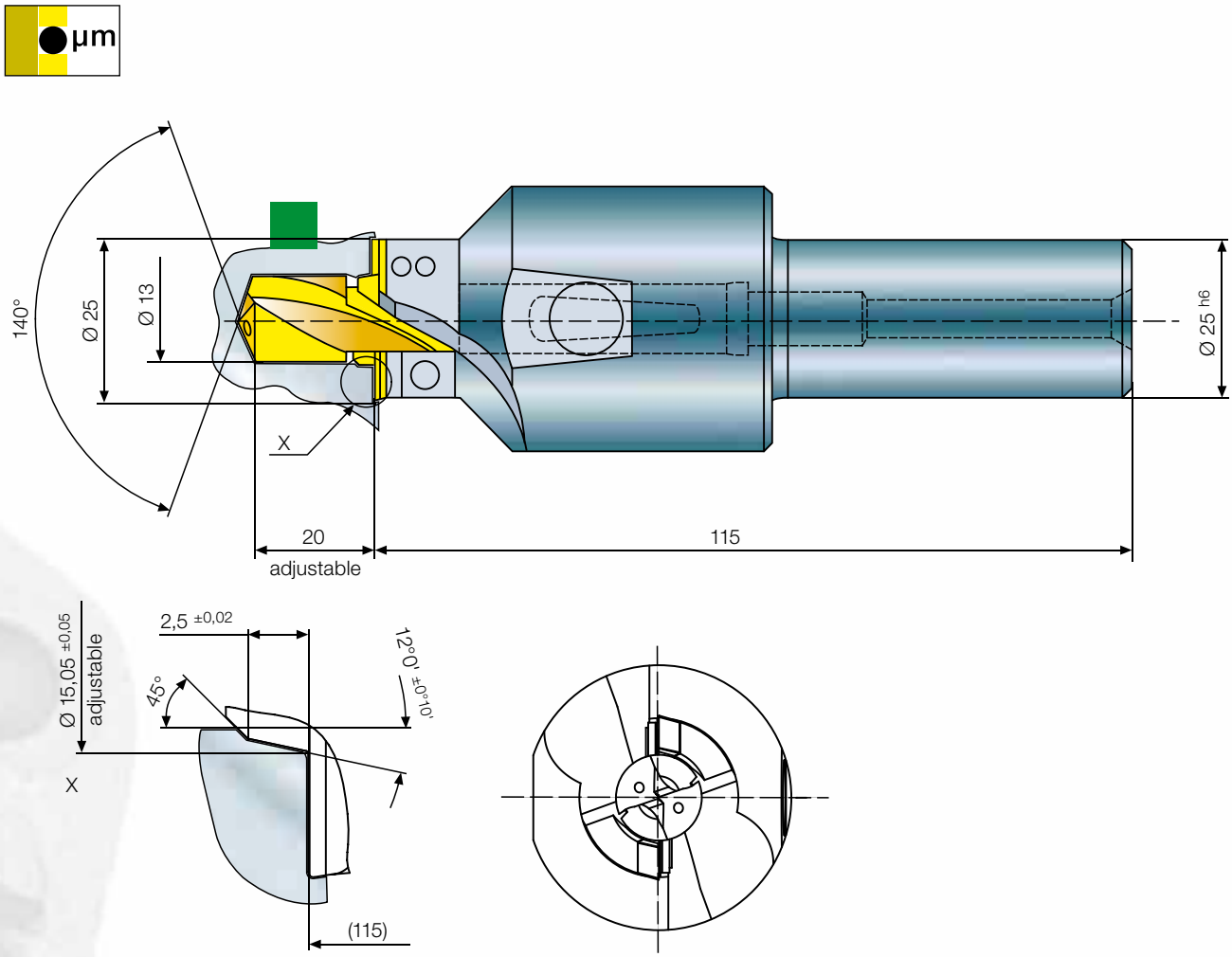
Combination tool for 5 machining steps.
Diameter of the chamfer and the facegroove adjustable.

µm



Workpiece			**Cap** for hand drilling machine
Material			(DIN) ■ Al Si 12
Tool			**Drilling- and fineboring tool**
		drilling and chamfering	fineboring and chamfering
Number of teeth		2 / 2	1 / 1 / 1
Insert		acc. to customer specification	acc. to customer specification
Cutting grade		carbide coated	carbide coated
Cutting speed	m/min	(Ø 14,5) 160	(Ø 30) 331
Number of revolutions	min^{-1}	3.514	3.514
Feed rate	mm/min	1.054	246
Feed rate per tooth	mm	0,15	0,07
Depth of cut	mm	7,25	4,9
Coolant		yes, internal	yes, internal

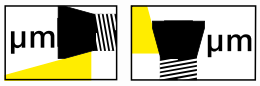
Drilling-, chamfering- and fineboring in one tool.

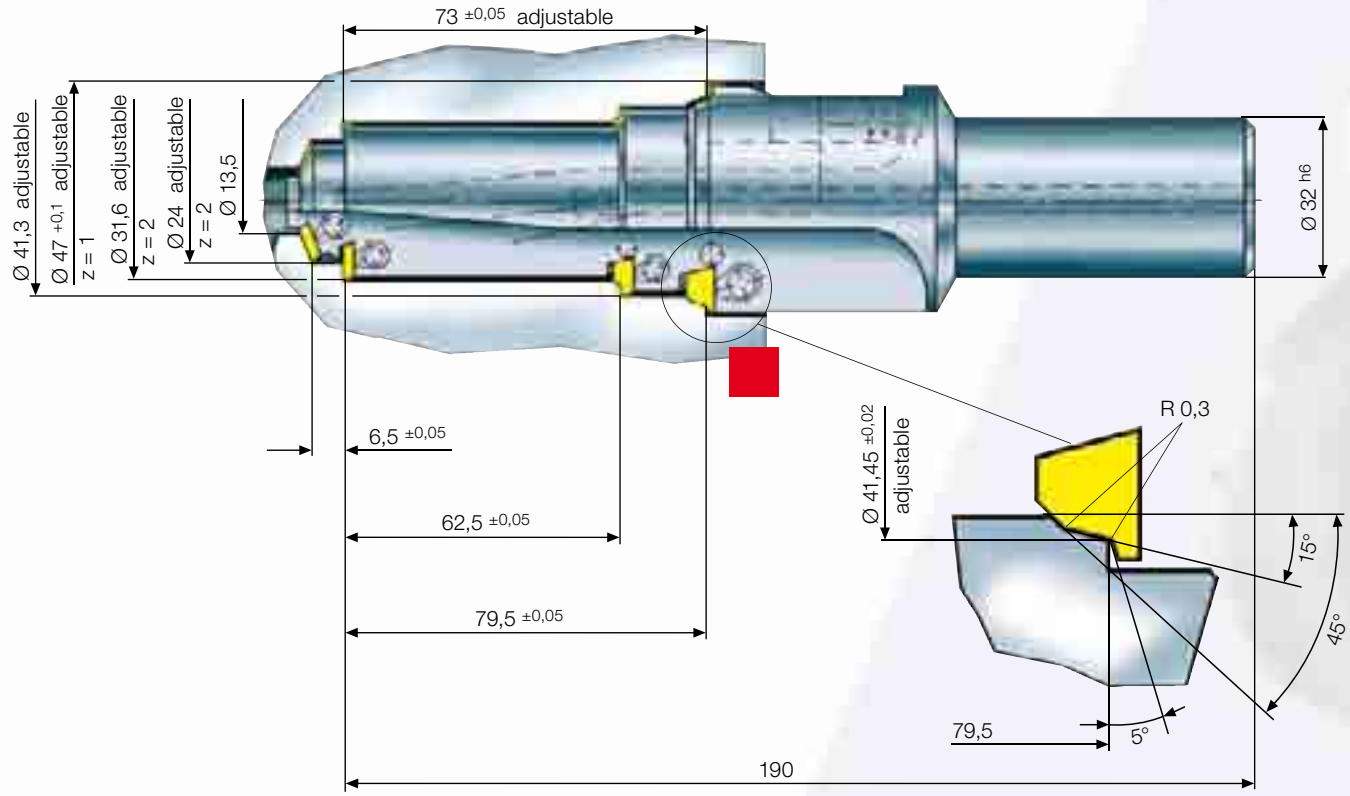


Workpiece			**Hydraulic component**
Material			Al
Tool			**Drilling- and fineboring tool**
Number of teeth			2 / 2
Insert			according to customer specification
Cutting grade			K10
		drilling	fineboring
Cutting speed	m/min	374	374
Number of revolutions	min^{-1}	4.750	4.750
Feed rate	mm/min	3.600	855
Feed rate per tooth	mm	0,38	0,09
Depth of cut	mm	into the solid material	1,3
Coolant		yes, internal	yes, internal

Hydraulic industry
Connection holes

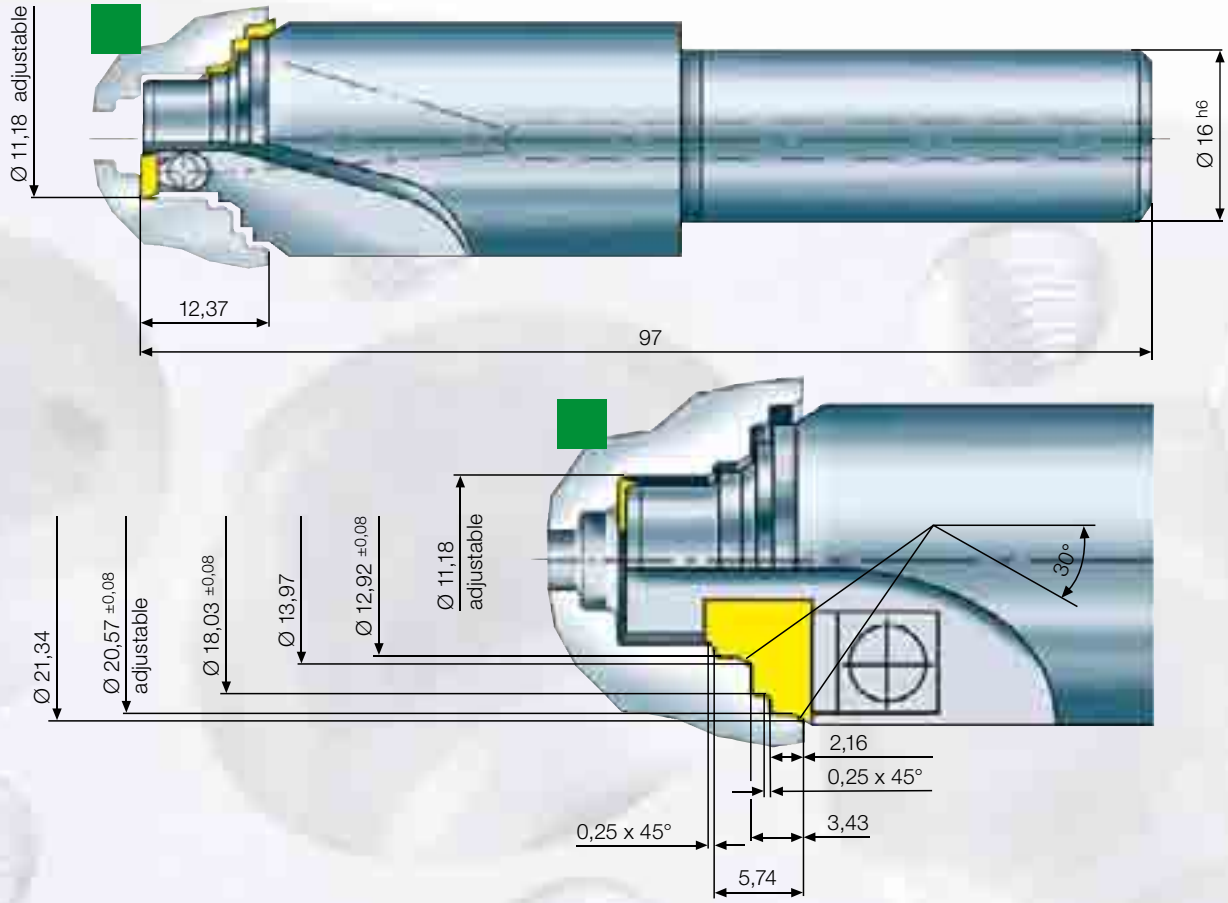
Tool for hydraulic connection.
All diameters adjustable.





Workpiece		**Valve block**
Material		(DIN) ■ GGG 50
Tool		**Multistep-fineboring tool**
Number of teeth		8 / effective 2
Insert		standard / according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 47) 180
Number of revolutions	min^{-1}	1.220
Feed rate	mm/min	244
Feed rate per tooth	mm	(Ø 47 / Ø 41) 0,1
Depth of cut	mm	- 5
Coolant		yes, internal

Multistep-fineboring tool for hydraulic connection.
PCD-form inserts with 5 steps. All diameters adjustable.

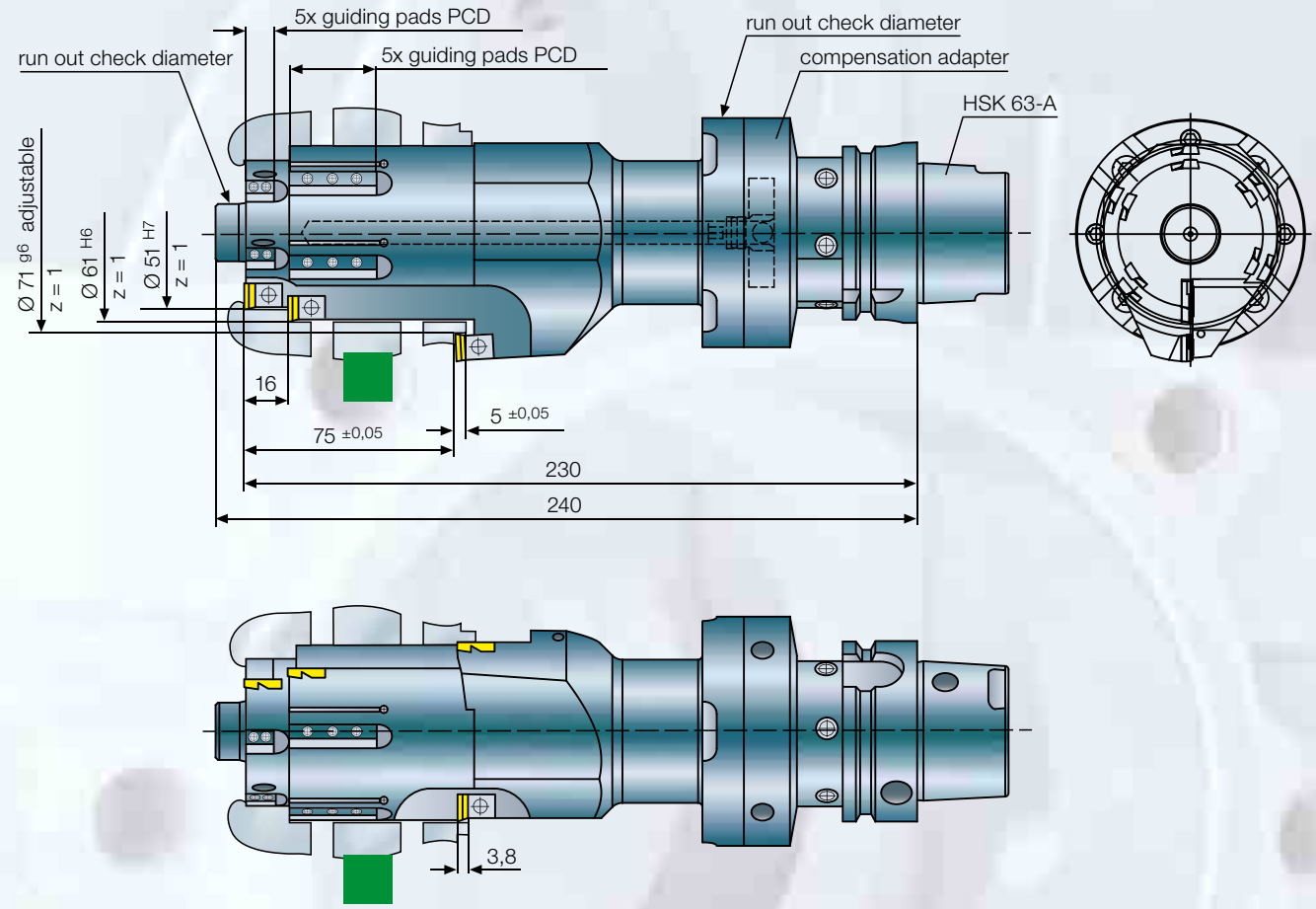


Workpiece		**Valve block**
Material		(DIN) GD Al Si 9
Tool		**Finboring- and chamfering tool**
Number of teeth		2 / effective 1
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	(Ø 21,34) 700
Number of revolutions	min^{-1}	10.500
Feed rate	mm/min	1.050
Feed rate per tooth	mm	0,1
Depth of cut	mm	- 5
Coolant		yes, internal

Bearing bracket
Housing

Multistep-fineboring tool with PCD guide pads.
All inserts adjustable.

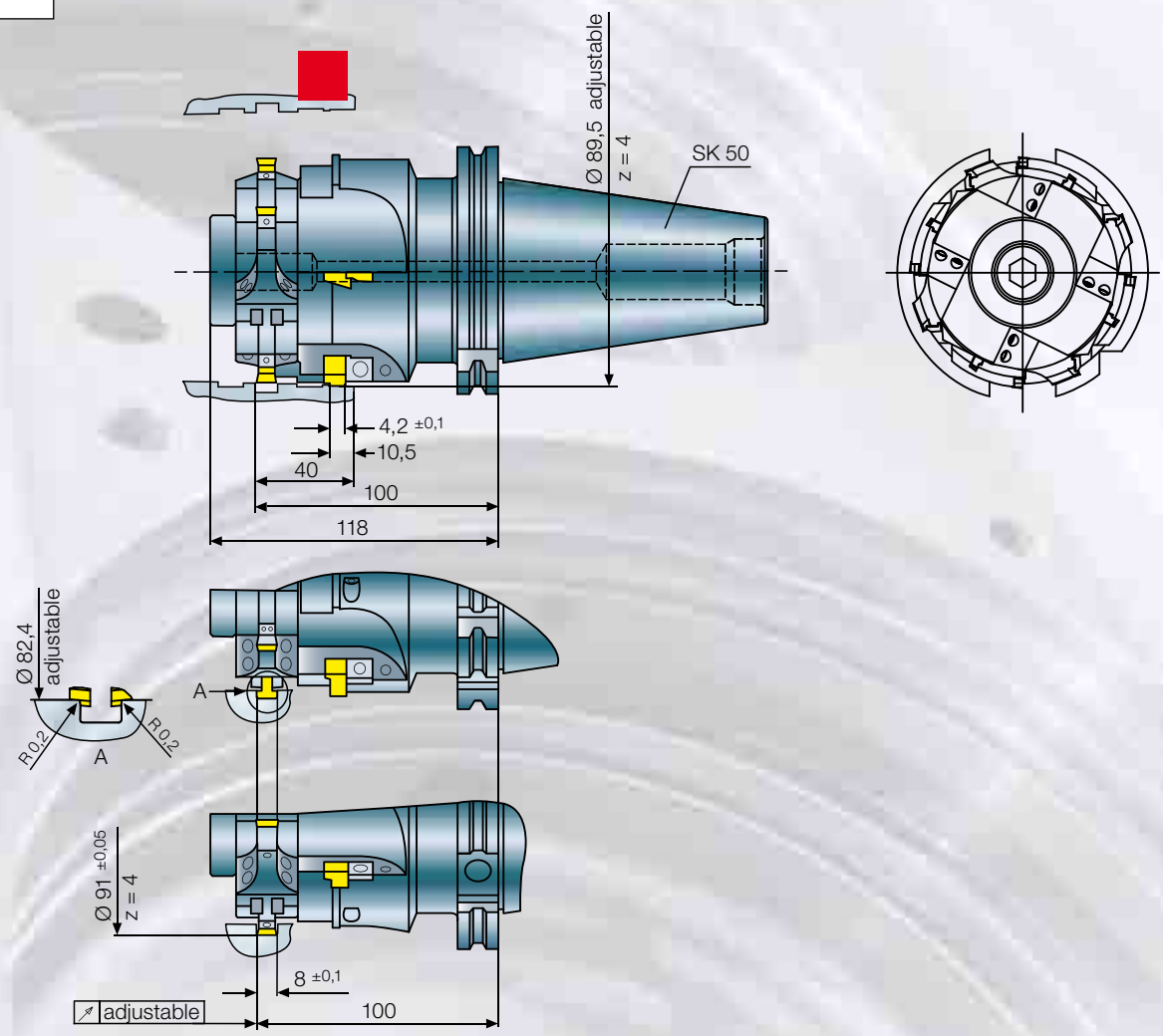
µm



Workpiece		**Housing**
Material		(DIN) ■ Al Si 11 Cu 2 (Fe)
Tool		**Multistep-fineboring tool**
Number of teeth		4 / effective 1
Insert		standard
Cutting grade		PCD
Cutting speed	m/min	600
Number of revolutions	min^{-1}	3.080
Feed rate	mm/min	308
Feed rate per tooth	mm	0,1
Depth of cut	mm	0,2
Coolant		yes, internal

Brake component
for wind power housing

Multistep circular milling cutter for machining of the grooves.

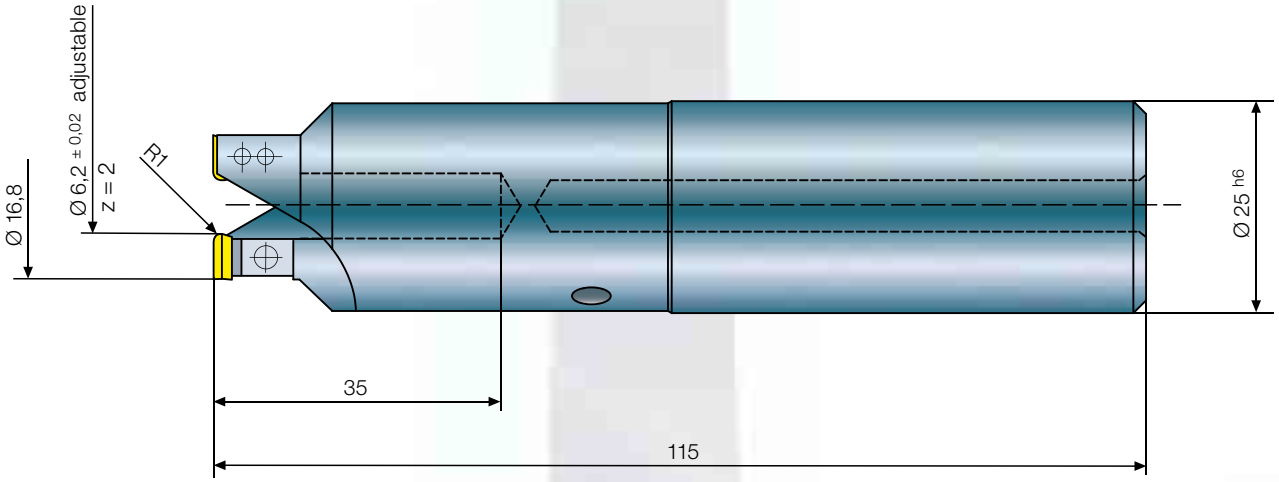


Workpiece		**Brake component** for wind power housing
Material		(DIN) ■ GGG 40
Tool		**Circular milling cutter**
Number of teeth		16 / effective 4
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	95
Number of revolutions	min^{-1}	336
Feed rate	mm/min	148
Feed rate per tooth	mm	0,11
Depth of cut	mm	4
Coolant		yes, internal

Fuel distributor

End machining tool with adjustable inserts.

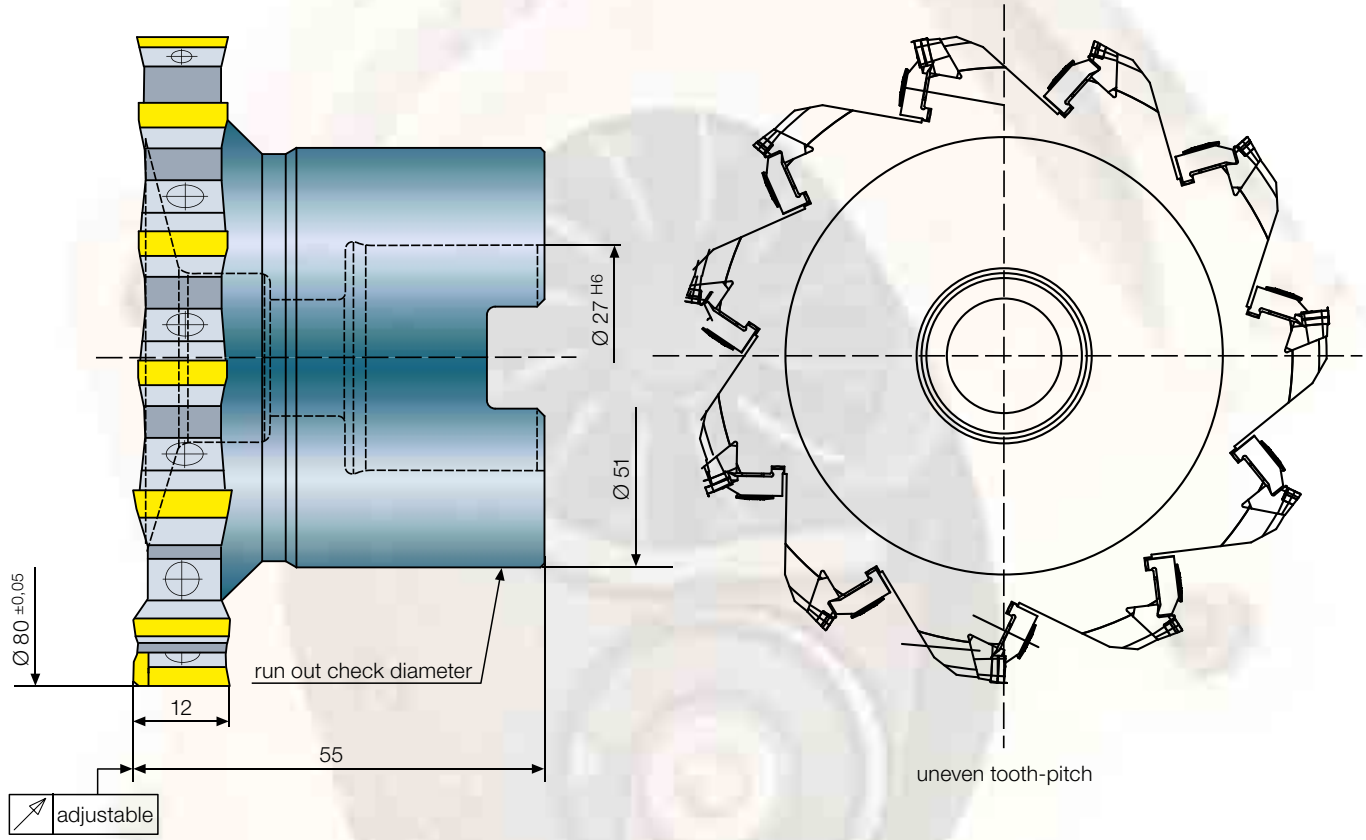
µm



Workpiece		**Fuel distributor**
Material		(DIN) Ti Al 6V4
Tool		**Axial plunging tool**
Number of teeth		2
Insert		according to customer specification
Cutting grade		carbide
Cutting speed	m/min	48
Number of revolutions	min^{-1}	2.486
Feed rate	mm/min	150
Feed rate per tooth	mm	0,03
Depth of cut	mm	0,25
Coolant		yes, internal

Compressor housing

CBN-High feed-Finish milling.

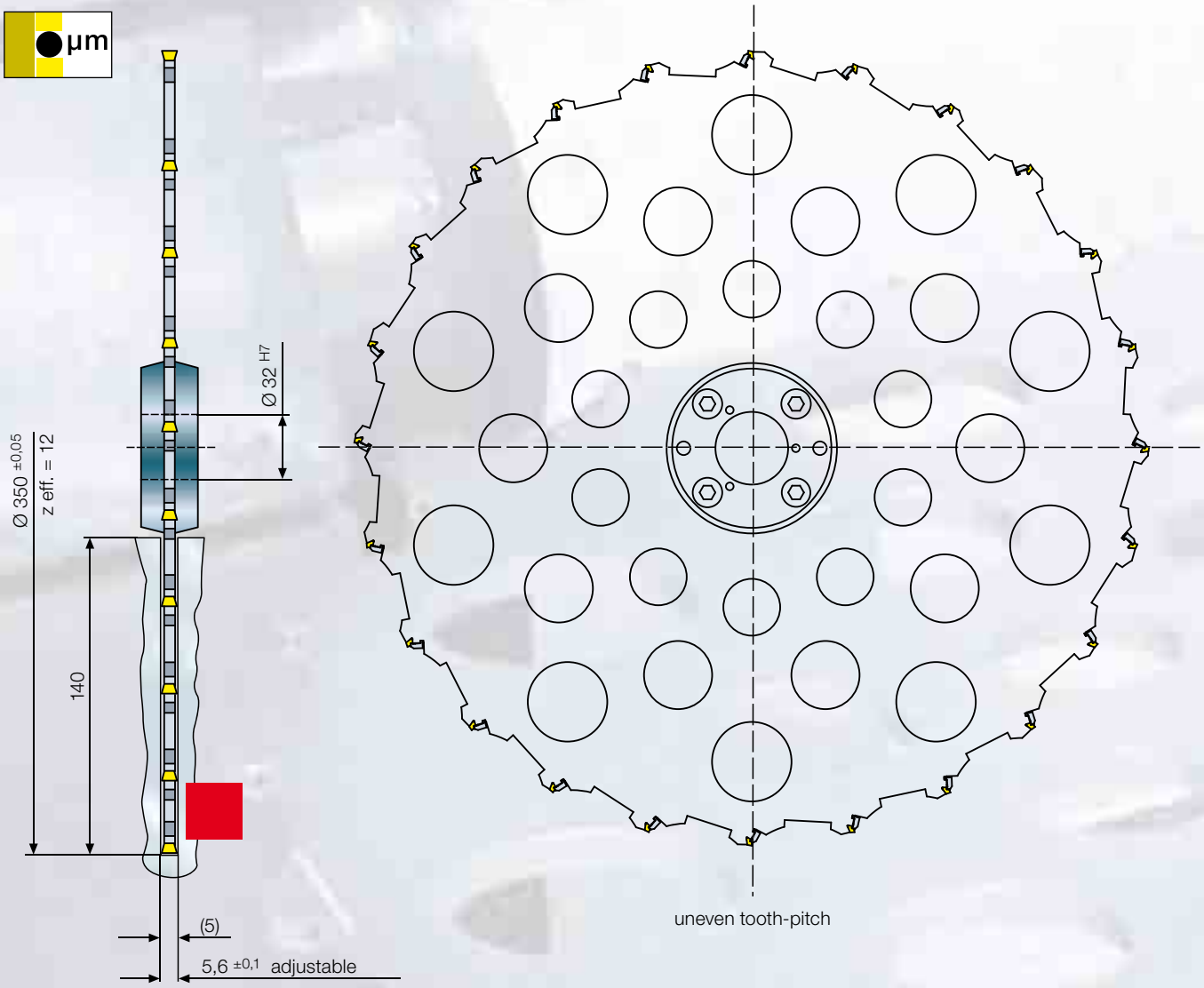


Workpiece		**Compressor housing**
Material		(DIN) ■ GG 25
Tool		**Put on milling cutter**
Number of teeth		8 / 3
Insert		according to customer specification
Cutting grade		CBN8 / CBN mixed assembly
Cutting speed	m/min	1.200
Number of revolutions	min^{-1}	4.775
Feed rate	mm/min	7.162
Feed rate per tooth	mm	0,136
Depth of cut	mm	0,10
Coolant		yes, internal

Rotor shaft

Rotor for turbine

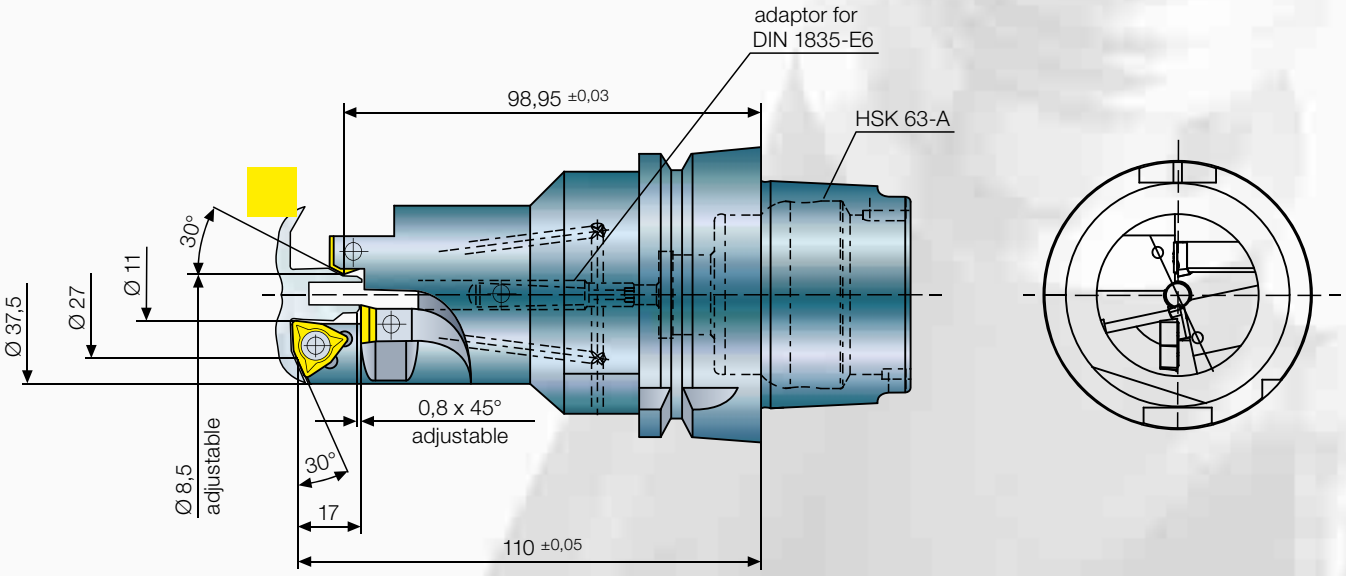
Milling of the grooves from the rotor.



Workpiece		**Rotor for turbine**
Material		(DIN) ■ GGG 50
Tool		**Side milling cutter**
Number of teeth		12 / 12
Insert		according to customer specification
Cutting grade		PCD
Cutting speed	m/min	80
Number of revolutions	min^{-1}	75
Feed rate	mm/min	88
Feed rate per tooth	mm	0,05
Depth of cut	mm	140
Coolant		yes, external

Connection housing

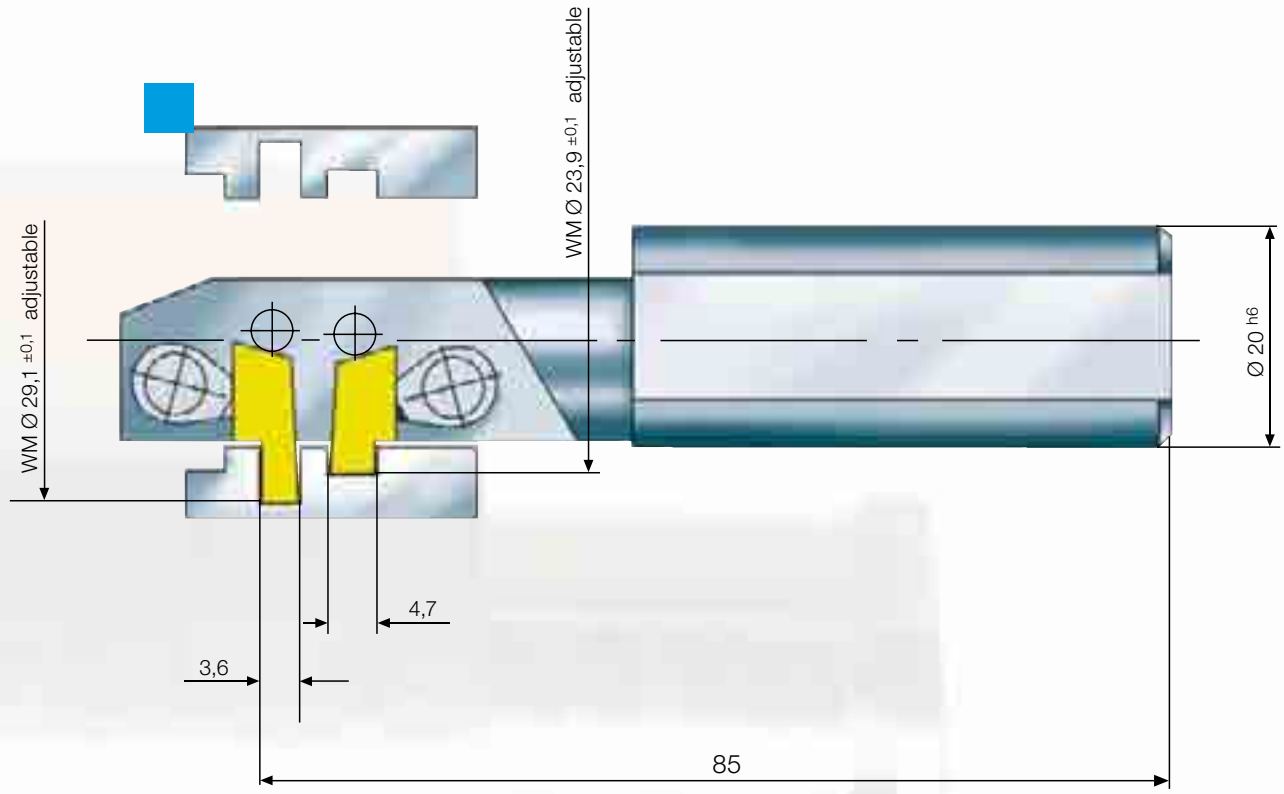
End machining tool with ISO- and adjustable inserts.



Workpiece		**Connection housing**
Material		1.4031
Tool		**Counterboring- and fineboring tool**
Number of teeth		1 / 1 / 1
Insert		ISO and according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	43 - 56
Number of revolutions	min^{-1}	1.600
Feed rate	mm/min	160
Feed rate per tooth	mm	0,1
Depth of cut	mm	-1,5
Coolant		yes, internal

Turning tools

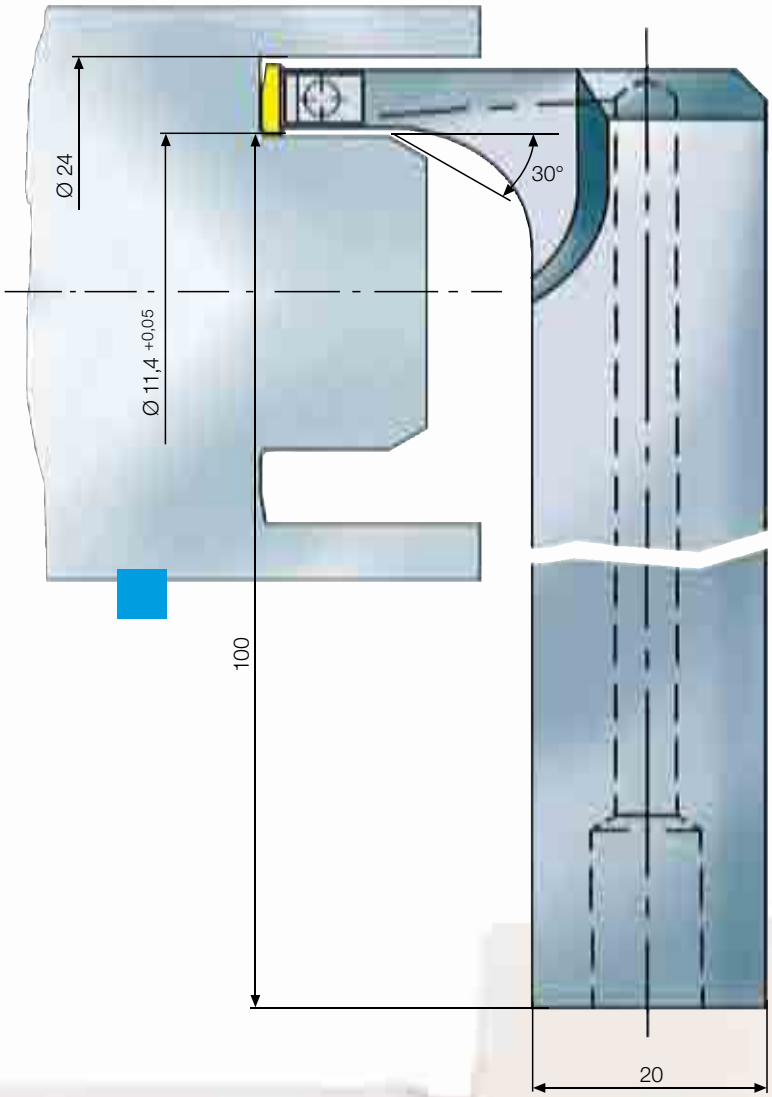
Grooving inserts adjustable towards each other.



Workpiece		**Camshaft regulator**
Material		(DIN) ■ Sint D 11 (sintersteel metal)
Tool		**Plunging tool for turning machines**
Number of teeth		2 / effective 1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 29,1) 220
Number of revolutions	min^{-1}	2.408
Feed rate	mm/min	241
Feed rate per tooth	mm	0,1
Depth of cut	mm	~ 4,5
Coolant		yes, internal

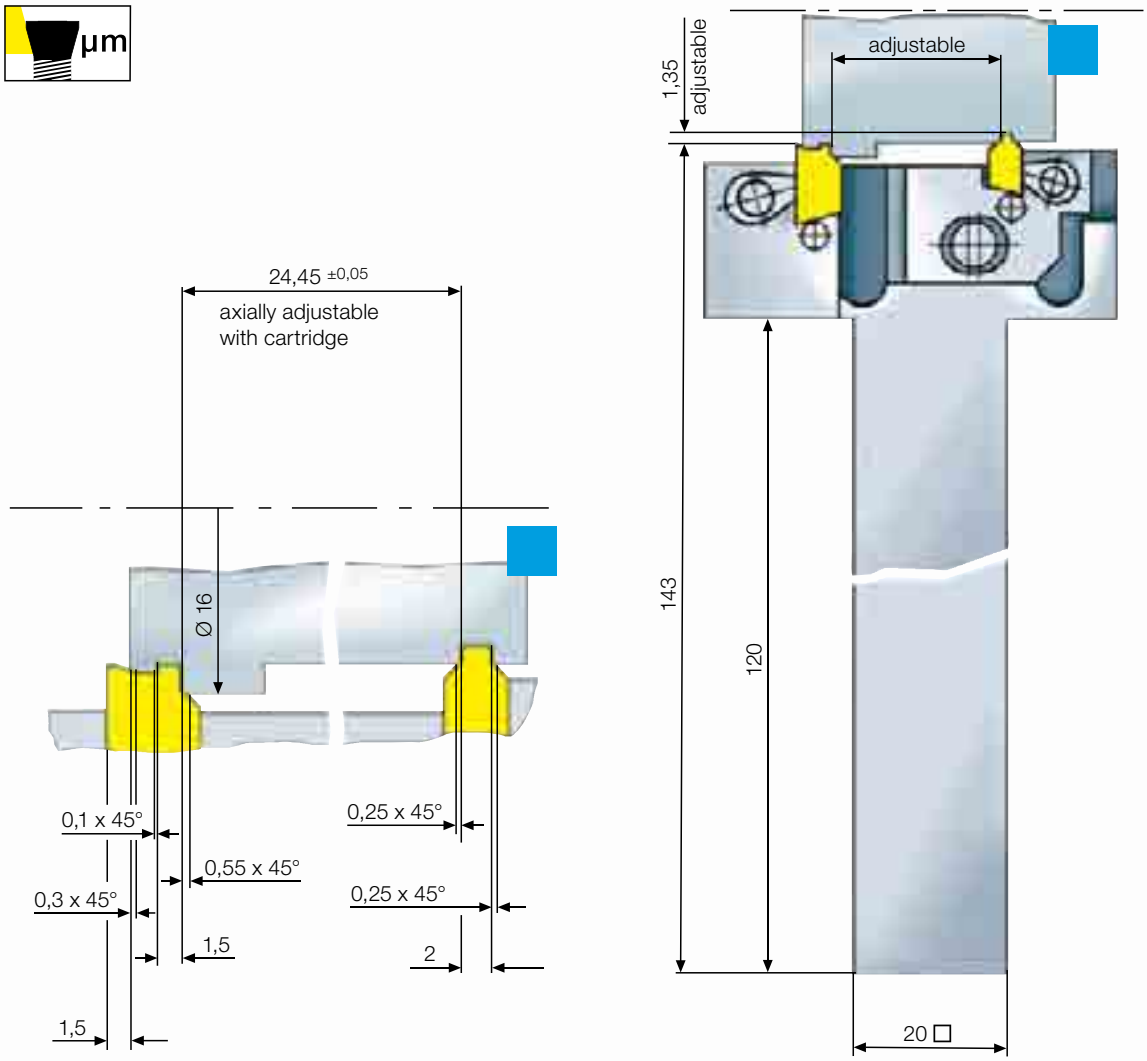
Turning tools

Finish machining chamfer 30° and Ø 11,4 $^{+0,05}$.



Workpiece		**Case**
Material		(DIN) 9 S Mn 28 K
Tool		**Plunging tool**
Number of teeth		1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	(Ø 11,4) 95
Number of revolutions	min^{-1}	2.654
Feed rate	mm/min	318
Feed rate per tooth	mm	0,12
Depth of cut	mm	- 1
Coolant		yes, internal

Plunge turning - profil recess.
Recesses adjustable towards each other.



Workpiece		**Profil shaft**
Material		(DIN) ■ 9 S Mn 28 K
Tool		**Plunging tool**
Number of teeth		2 / effective 1
Insert		according to customer specification
Cutting grade		carbide coated
Cutting speed	m/min	120
Number of revolutions	min^{-1}	764
Feed rate	mm/min	76
Feed rate per tooth	mm	0,1
Depth of cut	mm	2
Coolant		yes, external

HOLLFELDER-GÜHRING CUTTING TOOLS

Wertachstraße 27 • D - 90451 Nürnberg • Germany
Telefon +49 (0) 911 / 64 19 22-0 • Fax +49 (0) 911 / 64 19 22-10
E-Mail: info@hollfelder-guehring.de • Internet: www.hollfelder-guehring.de

Inquiry form for special tooling

Customer : _____ Date : _____

Contact person : _____ Phone : _____

Street : _____ Fax : _____

Town/Postal code: _____ E-Mail : _____

Workpiece : _____ Drawingnumber : _____

Material : _____ Hardness/tensile strength: _____

Machining :
☐ Into solid ☐ Pre cast ☐ Pre bored
☐ Blind hole ☐ Through hole
☐ Continous cut ☐ Interrupted cut ☐ Highly interrupted cut
☐ Others _____

Required surface finish : Ra = _____ Rz = _____ Others : _____

Stock : _____ mm ☐ In radius ☐ In diameter a_p = _____ a_e = _____

Fixture : ☐ Stable ☐ Instable ☐ Very instable

Interference : ☐ No ☐ Yes => if yes _____ mm

Machine : ☐ MC ☐ Transferline ☐ Lathe ☐ Turn / milling center ☐ 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 and end milling cutter ☐ Disc milling cutter Others : _____

Shank style / Form : _____ Size : _____

Tool balanced : ☐ No ☐ Yes => if yes, balancing grade G _____ at _____ 1/min

Necessary cutting data: v_c = _____ m/min f= _____ mm/U ☐ mm/Z ☐ mm/min

Coolant: ☐ Internal ☐ External ☐ Without
☐ Emulsion ☐ Oil ☐ Mist Coolant ☐ Dry

Remarks : _____

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. We increase your productivity with our extensive experience and specific know-how.

Call us, we will also meet your requirement!

The result is economical, precise and of high quality.

HOLLFELDER
GÜHRING
CUTTING TOOLS

. . . precise . . . flexible . . . innovative

HOLLFELDER-GÜHRING CUTTING TOOLS
Wertachstraße 27 • D - 90451 Nürnberg • Germany
Telefon + 49 (0) 911 / 64 19 22-0 • Fax + 49 (0) 911 / 64 19 22-10
E-Mail: info@hollfelder-guehring.de • Internet: www.hollfelder-guehring.de

HOLLFELDER-GÜHRING CUTTING TOOLS
Wertachstraße 27 • D - 90451 Nürnberg • Germany
Telefon + 49 (0) 911 / 64 19 22-0 • Fax + 49 (0) 911 / 64 19 22-10
E-Mail: info@hollfelder-guehring.de • Internet: www.hollfelder-guehring.de