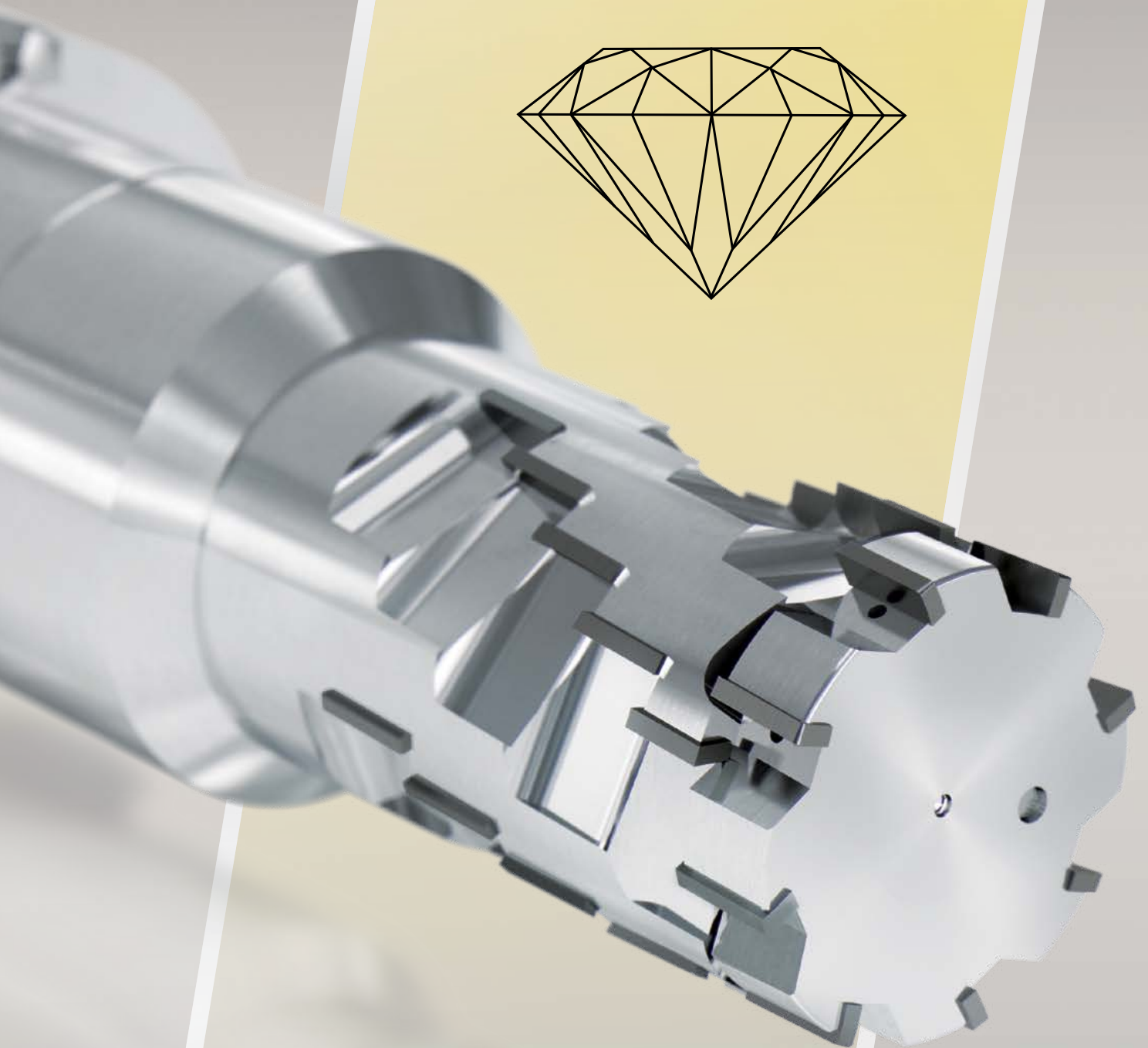
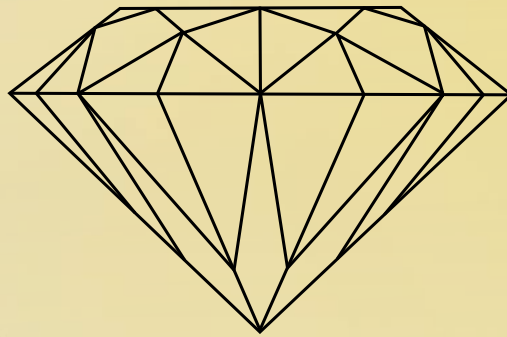


GUHRING

PCD/CBN TECHNOLOGY



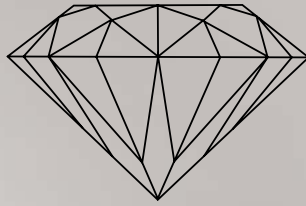
ENGLISH



Intelligent solutions
for complex
machining tasks

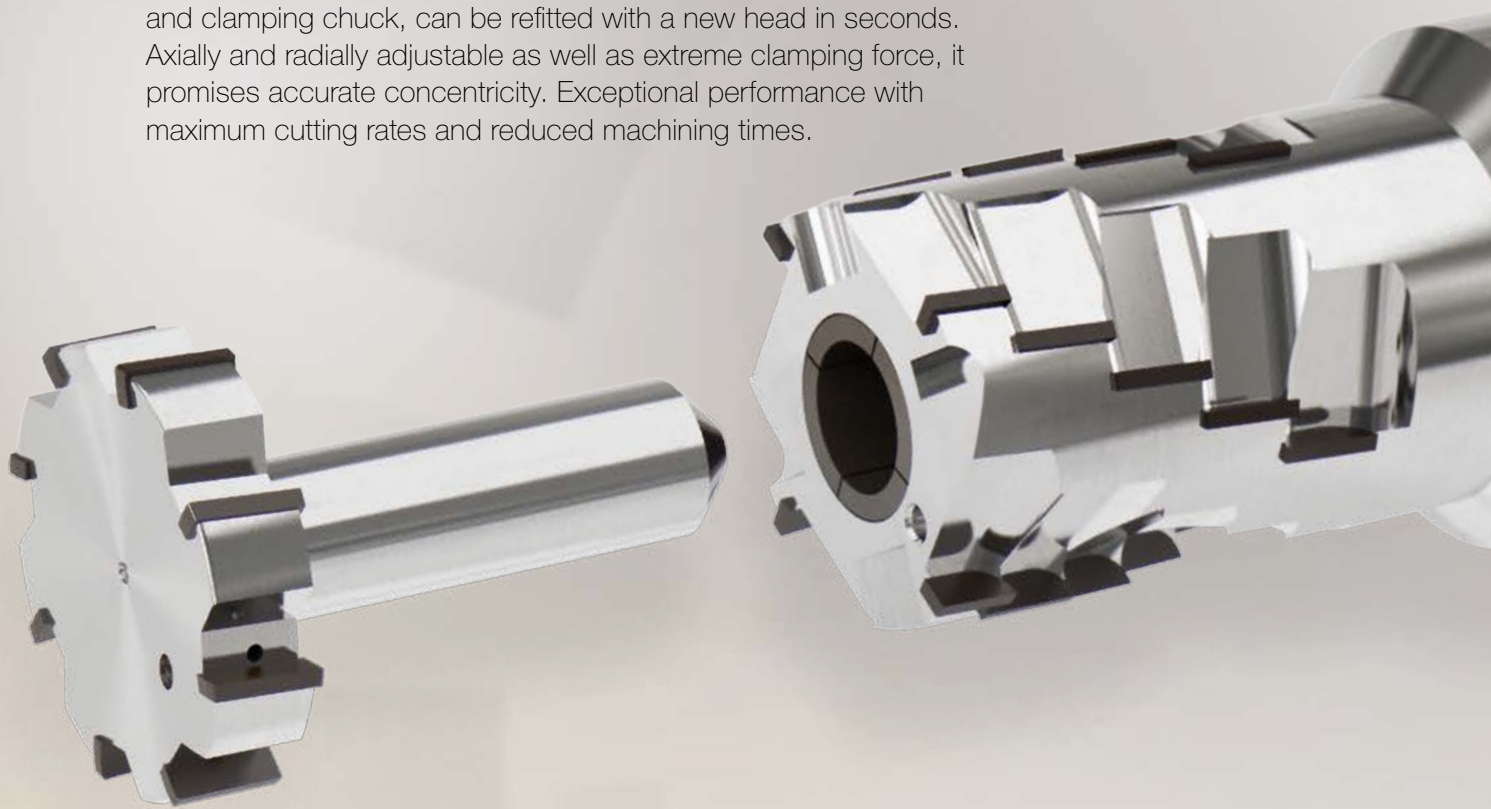


INTERCHANGEABLE HEAD MILLING CUTTER



Flexible, wear-resistant, highly accurate:

The interchangeable head milling cutter, consisting of cutting head and clamping chuck, can be refitted with a new head in seconds. Axially and radially adjustable as well as extreme clamping force, it promises accurate concentricity. Exceptional performance with maximum cutting rates and reduced machining times.



This publication may not, in part or whole, be reproduced.

The publishers cannot be held responsible for any errors, omissions or changes of any kind. All products marked with "DIN", deviating from the dimensions listed in the catalogue, can be delivered, as long as they are in conformity with the DIN standard form.

Printed in Germany

Guehring KG
P.O. Box 10 02 47
D-72423 Albstadt

Herderstraße 50-54
D-72458 Albstadt

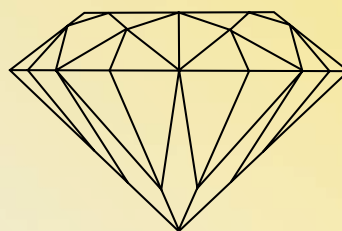
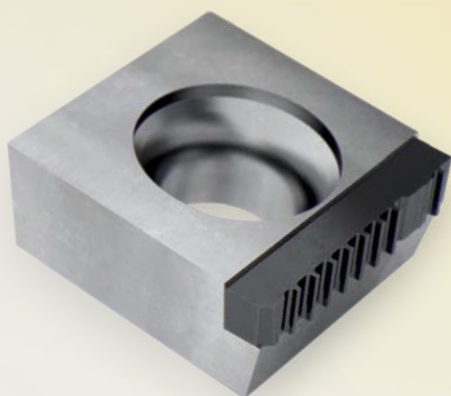
Tel.: +49 74 31 17-0
Fax: +49 74 31 17-21 279

Internet: www.guehring.de
E-Mail: info@guehring.de

With Guhring's roughing tool cylinder bore surfaces are mechanically roughened for a high tensile strength of thermally sprayed coatings.



ROUGHING TOOL



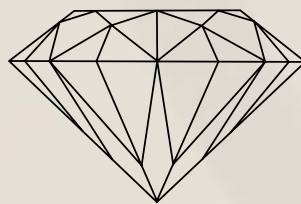
High-performance tool material combined with innovative technologies

Longstanding expertise

The development and manufacture of PCD/CBN tools has counted to Guhring's core activities for more than 30 years. At Guhring production facilities all over the world innovative complex tools with PCD/CBN cutting edges are produced for highly specialised machining operations.

More performance, less tooling

PCD/CBN complex tools from Guhring guarantee short cycle times and high feed rates with consistent quality, exact repeatability and accuracy. High wear-resistance results in long tool life and permits efficient cutting data. High process reliability and accurate machining of difficult-to-machine materials is ensured. PCD/CBN complex tools combine several tools into one – therefore considerably reducing the manufacturing process.



PCD/CBN TECHNOLOGY

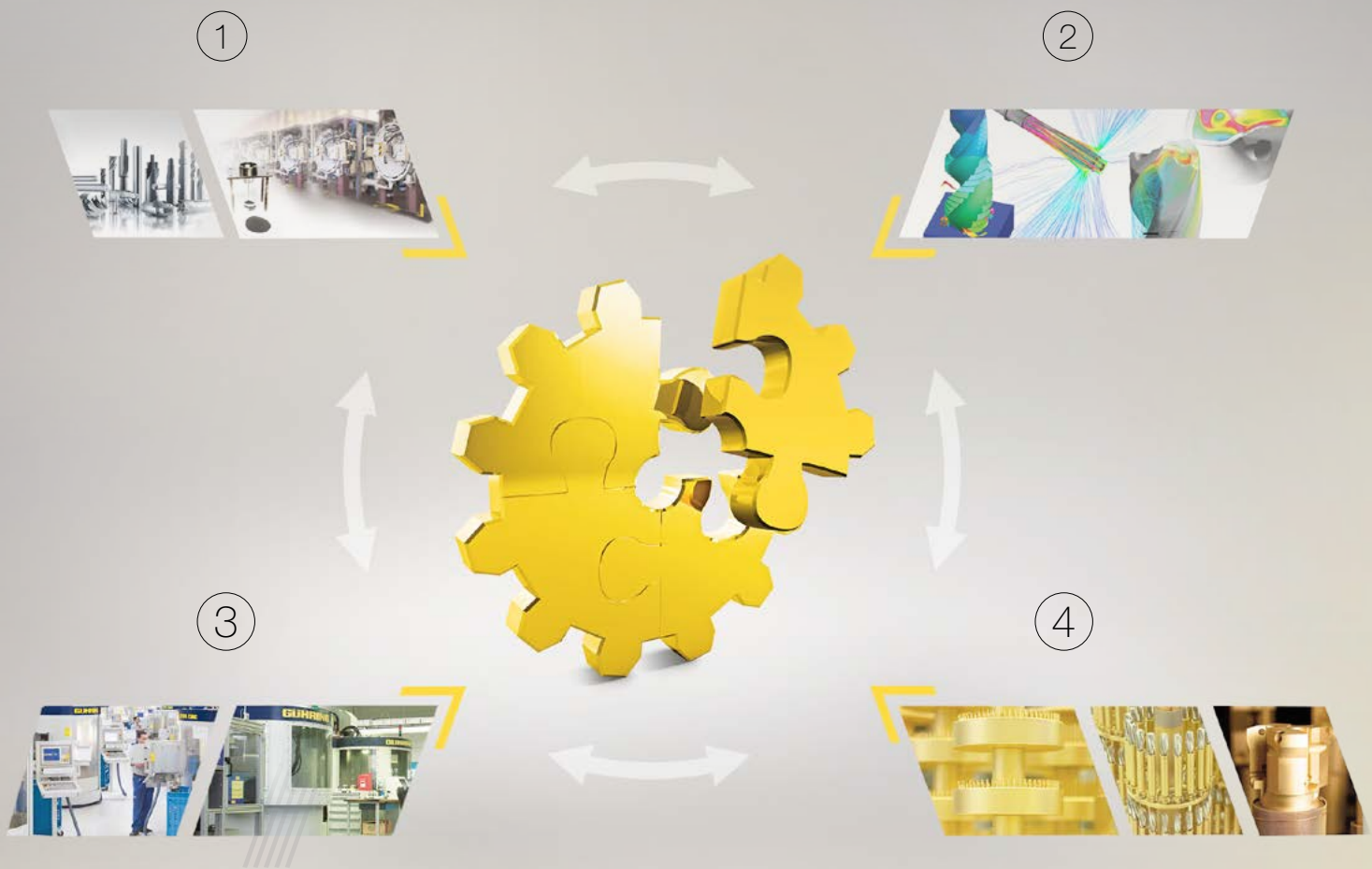




WATER JACKET BORE



Optimal co-ordination of all tool parameters thanks to own R&D sectors



Everything from one supplier – comprehensive and global

Approximately 500 employees world-wide develop, produce and distribute innovative PCD/CBN tools at Guhring. Many of our customers value the many years of know-how in the conception of PCD/CBN special tools that we manufacture according to individual requirements and design for customers in the automotive industry, the aerospace industry or the mechanical engineering industry.

A world-wide net of production centres develops and produces Guhring PCD/CBN high-tech tools for all important global markets. With many years of know-how, Guhring provides support to its customers from process design to tool application for series production. Experts are internationally active looking after customers on-site. Production, service and contact persons are available world-wide from one supplier.

8

SALES COMPANIES

8

PRODUCTION PLANTS



Own carbide production

Own machine construction

Own coating plants

Highest quality standards world-wide



AUTOMOTIVE

01



MOTOR

Page 10

Cylinder head
Cylinder head cover
Crankcase

Page 12
Page 20
Page 24

02



DRIVE

Page 32

Gear
Valve housing

Page 34
Page 37

03



ANCILLARY COMPONENTS

Page 38

Pump housing
Turbocharger

Page 40
Page 42

04



AXLES AND STEERING

Page 44

Wheel carrier
Axle uprights
Steering column
Joint machining

Page 46
Page 48
Page 50
Page 52

05



BRAKES

Page 54

Brake caliper
Brake cylinder
Brake disc

Page 56
Page 58
Page 60

06



SPECIAL SOLUTIONS

Page 62



AEROSPACE LIGHTWEIGHT CONSTRUCTION

Page 70



07

STANDARD TOOLS AND ISO INSERTS

Page 78



08

TECHNICAL SECTION

MQL Basics
Values for cutting speeds
Modules 6x6 and 4x4
Setting and handling notes

Page 114
Page 118
Page 119
Page 128



09



AUTON

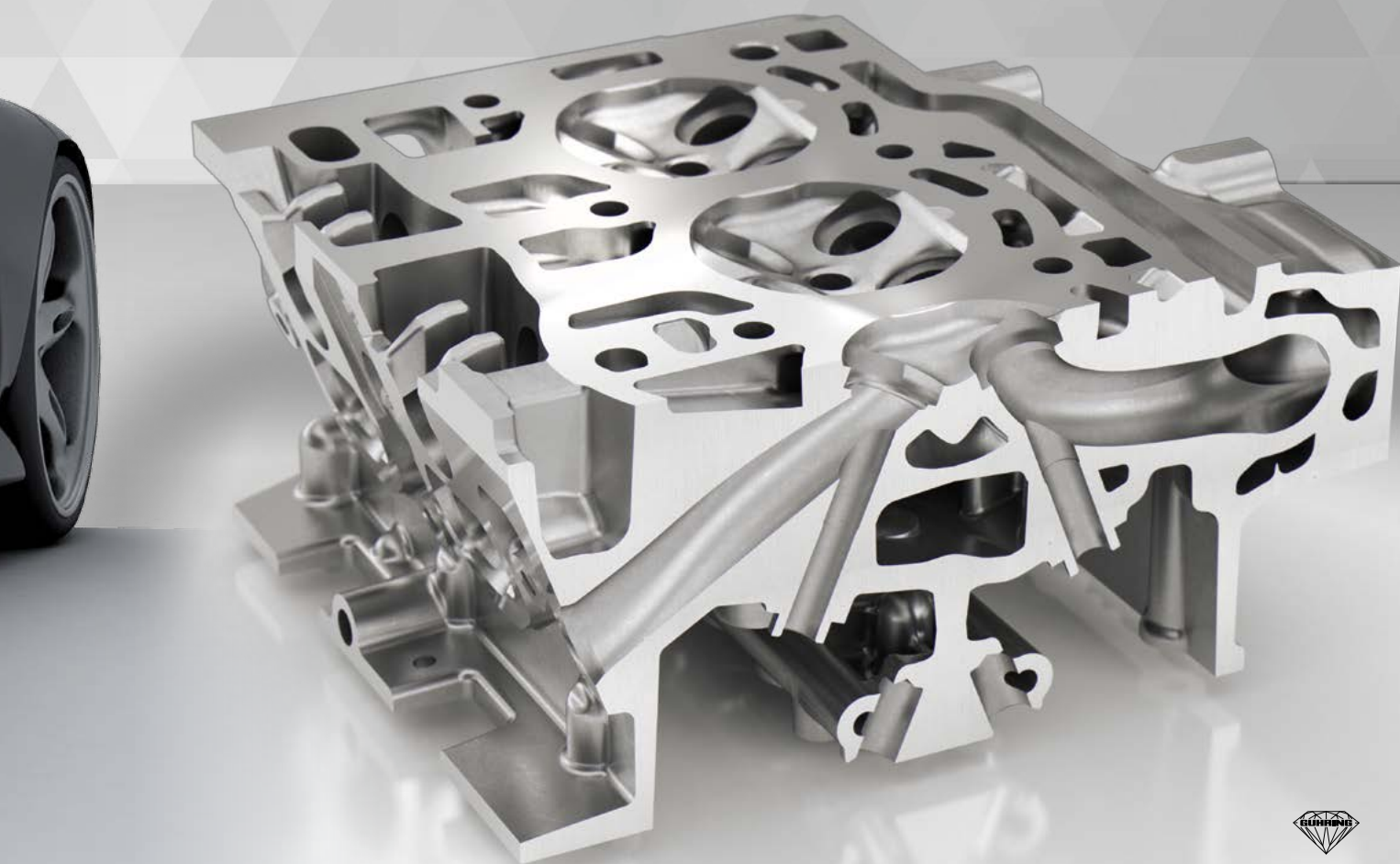
SPECIAL REQUIREMENTS,
PRECISE SOLUTIONS



MOTIVE

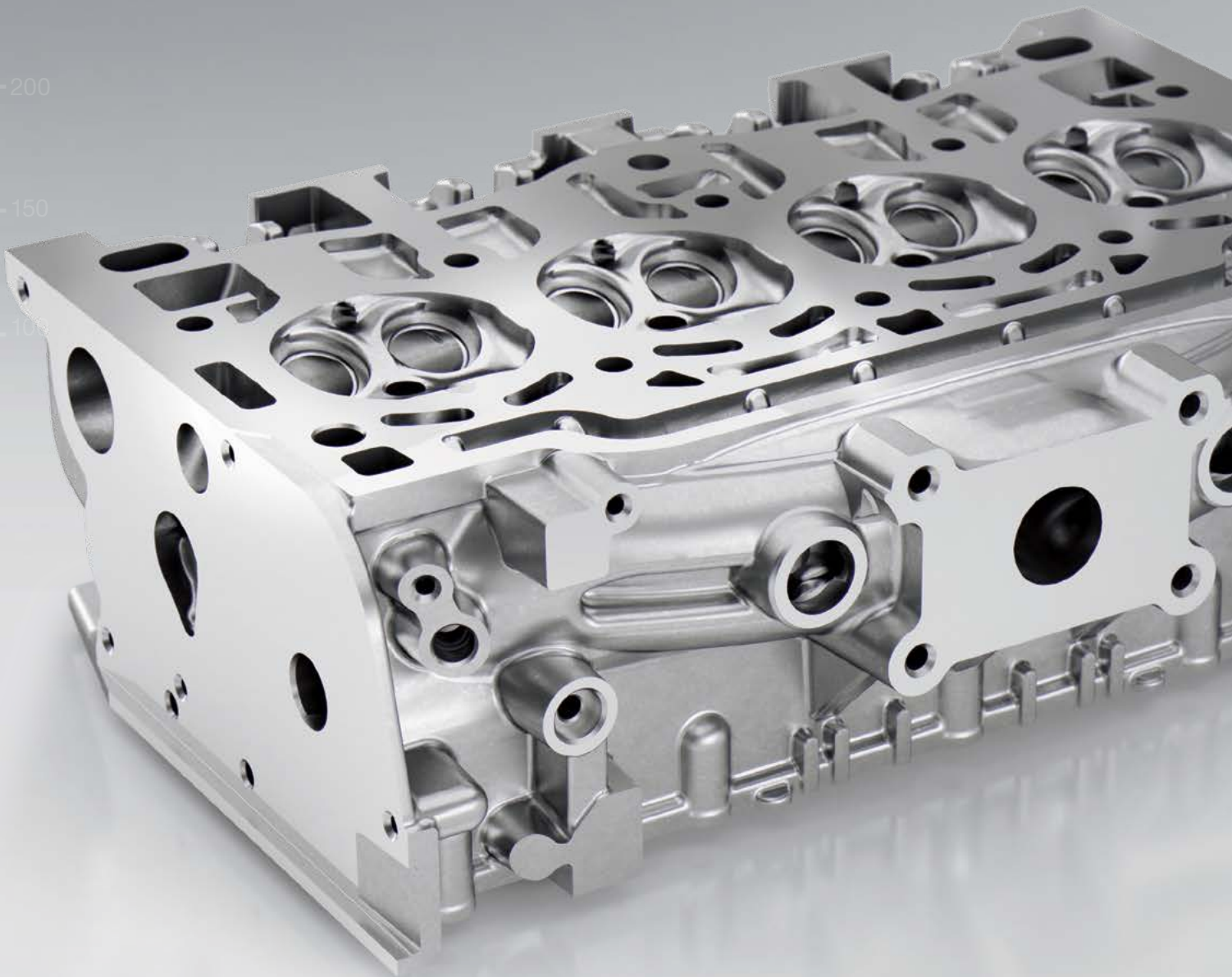
Modern automotive manufacturing relies on the application of high specification materials that are sometimes difficult to machine. Typical components such as engine blocks, cylinder heads or transmission housings put special demands such as wear-resistance and accuracy and – fields of application ideally suited to PCD complex tools from Guhring.

On the following pages we present some tooling solutions developed by us for the engine and other automotive components, transmissions and chassis parts.



MOTOR

CYLINDER HEAD



HIGHEST PERFORMANCE THANKS TO HIGHLY ACCURATE MACHINING

Guhring designs and manufactures PCD tools for all machining tasks related to modern high performance engines. Machining components such as the cylinder head or crank case requires many closely positioned holes, the machining of which generates high temperatures. Due to such heat there is a risk of deformation of the precision holes. Guhring's PCD tools possess special cutting edge geometries. The risk of deformation is significantly reduced and accurate holes guaranteed.



MOTOR Cylinder head

01

WATER JACKET BORE

This system for chip evacuation is ideally suited for holes when chips are not permitted to enter inside the workpiece. The special geometry of the water jacket drill ensures the chips are directed away from the workpiece. Contamination of the cylinder head is, therefore, greatly reduced.



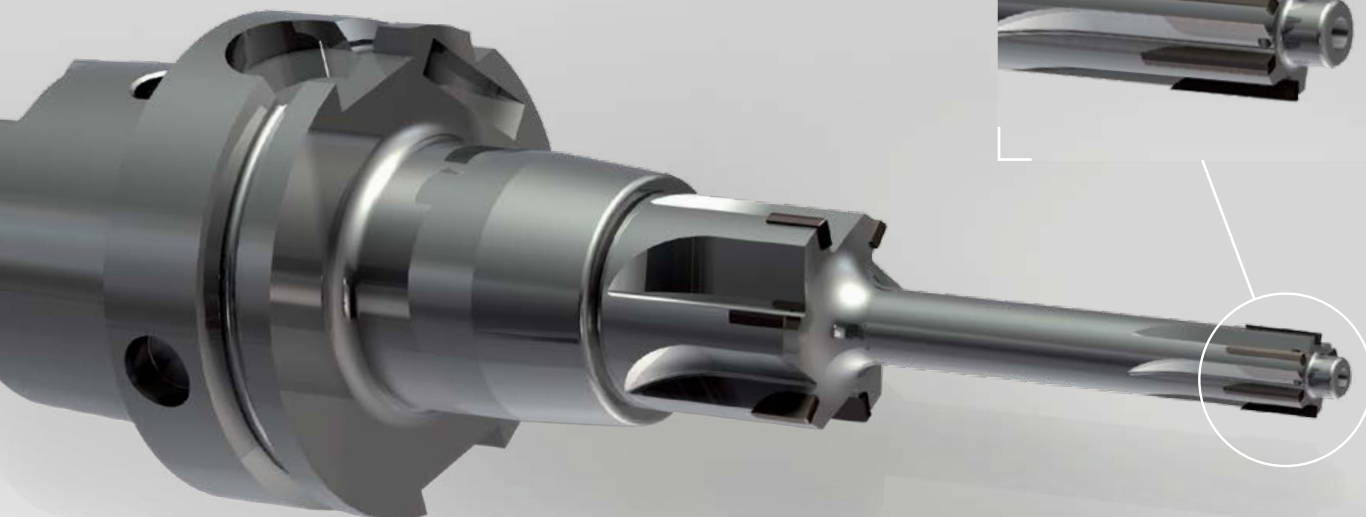
GUHRING

Water jacket bore



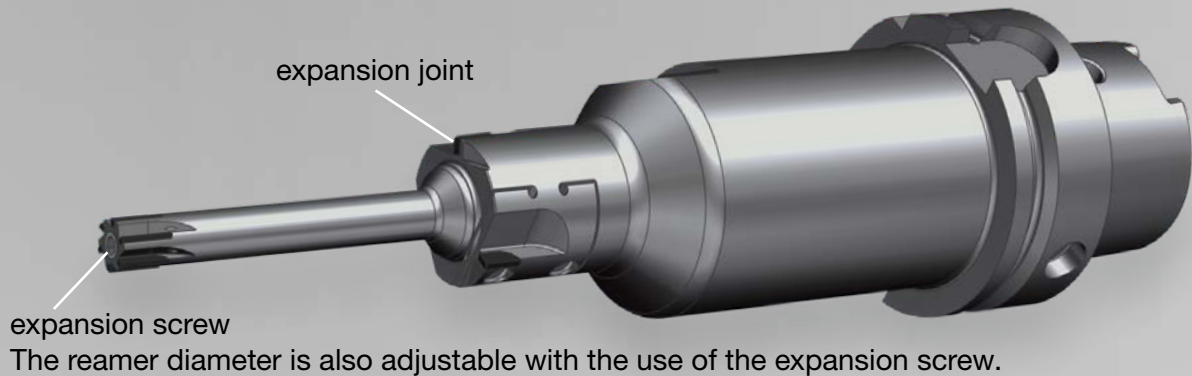
FINISH MACHINING OF VALVE SEAT INSERT AND VALVE GUIDE PARENT METAL

This solid carbide version offers highest rigidity and is resistant against erosion from abrasive materials. Not adjustable.



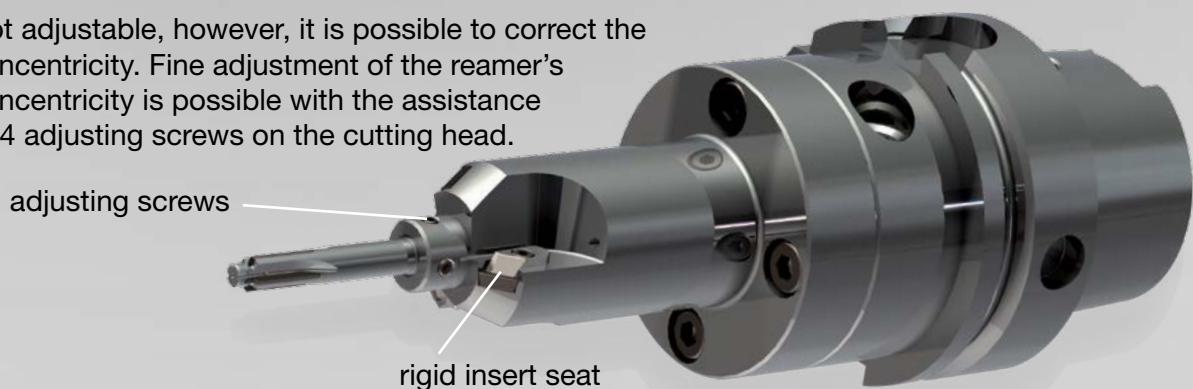
FINISH MACHINING OF VALVE SEAT INSERT AND VALVE GUIDE PARENT METAL

The diameter is adjustable with the use of the expansion joint.



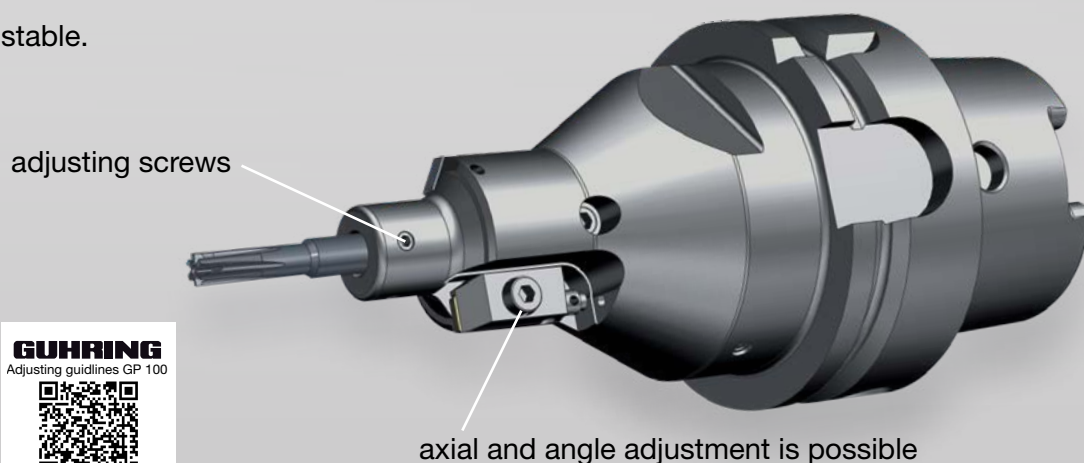
FINISH MACHINING OF VALVE TRAIN GUIDE / INSERT

Not adjustable, however, it is possible to correct the concentricity. Fine adjustment of the reamer's concentricity is possible with the assistance of 4 adjusting screws on the cutting head.



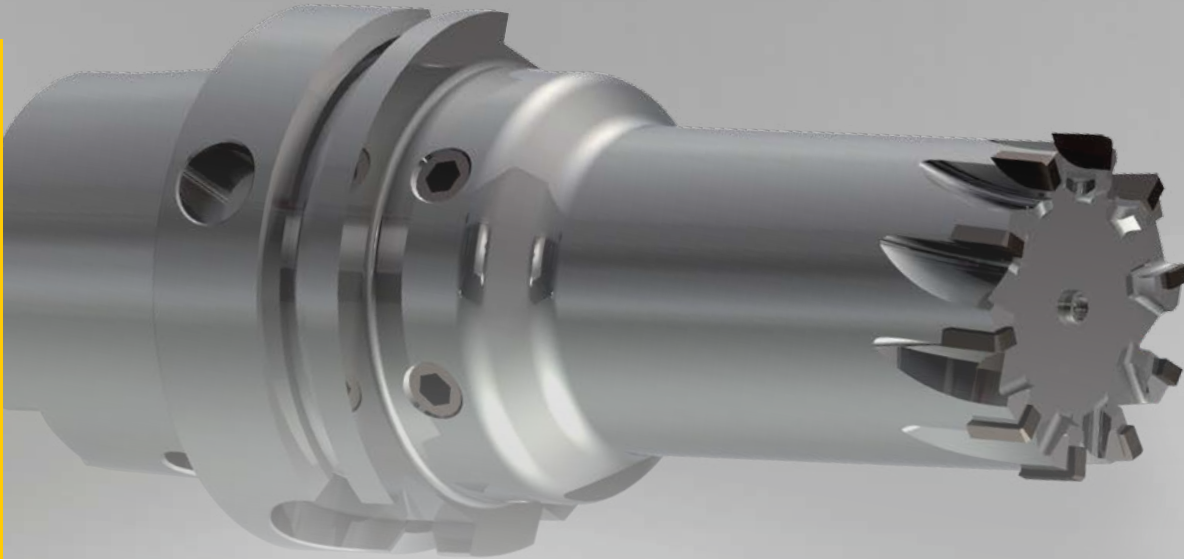
FINISH MACHINING OF VALVE TRAIN GUIDE / INSERT

Adjustable.



MOTOR Cylinder head

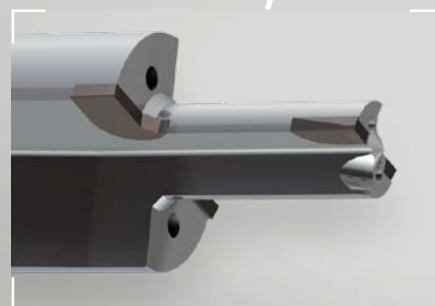
CONTROL CUTS



SPRING SEAT TOOL

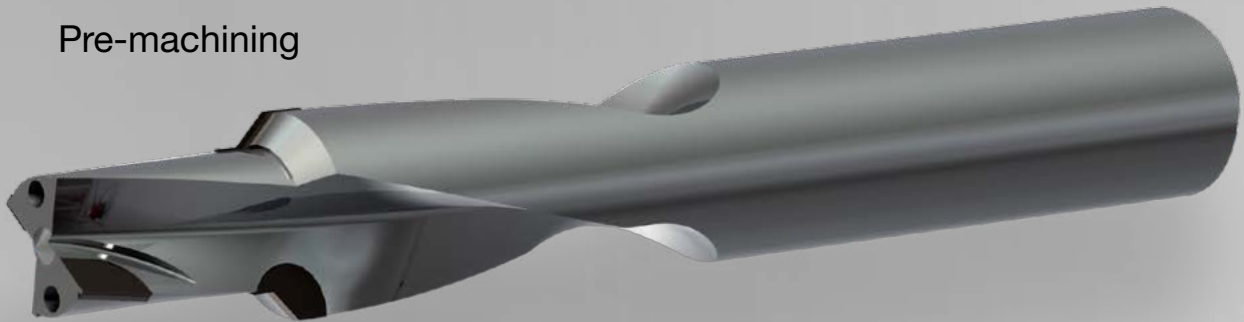


This tooling concept combines several tool types and hence reduces the machining time for the spring seat considerably. The application of 1-shot versions must always be individually checked for every machining process.



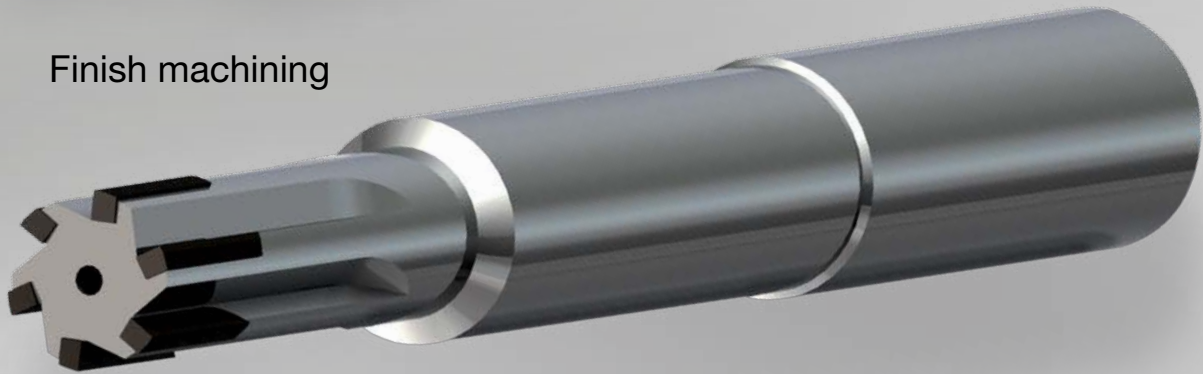
HVA MACHINING

Pre-machining



The PCD-tipped option is also available as a solid carbide tool.

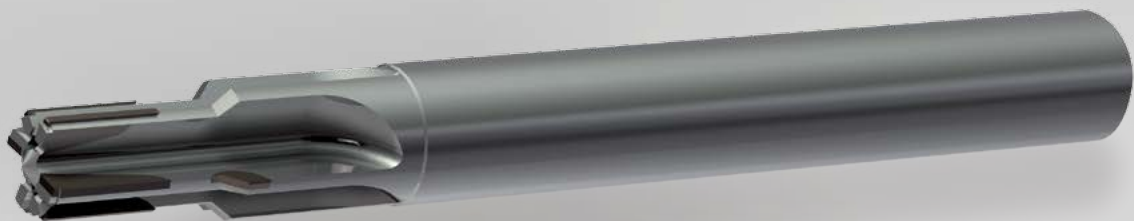
Finish machining



The specially developed cutting edge geometry as well as the arrangement of the cutting edges provide optimal accuracy and short cycle times while maintaining consistent quality.

HVA MACHINING

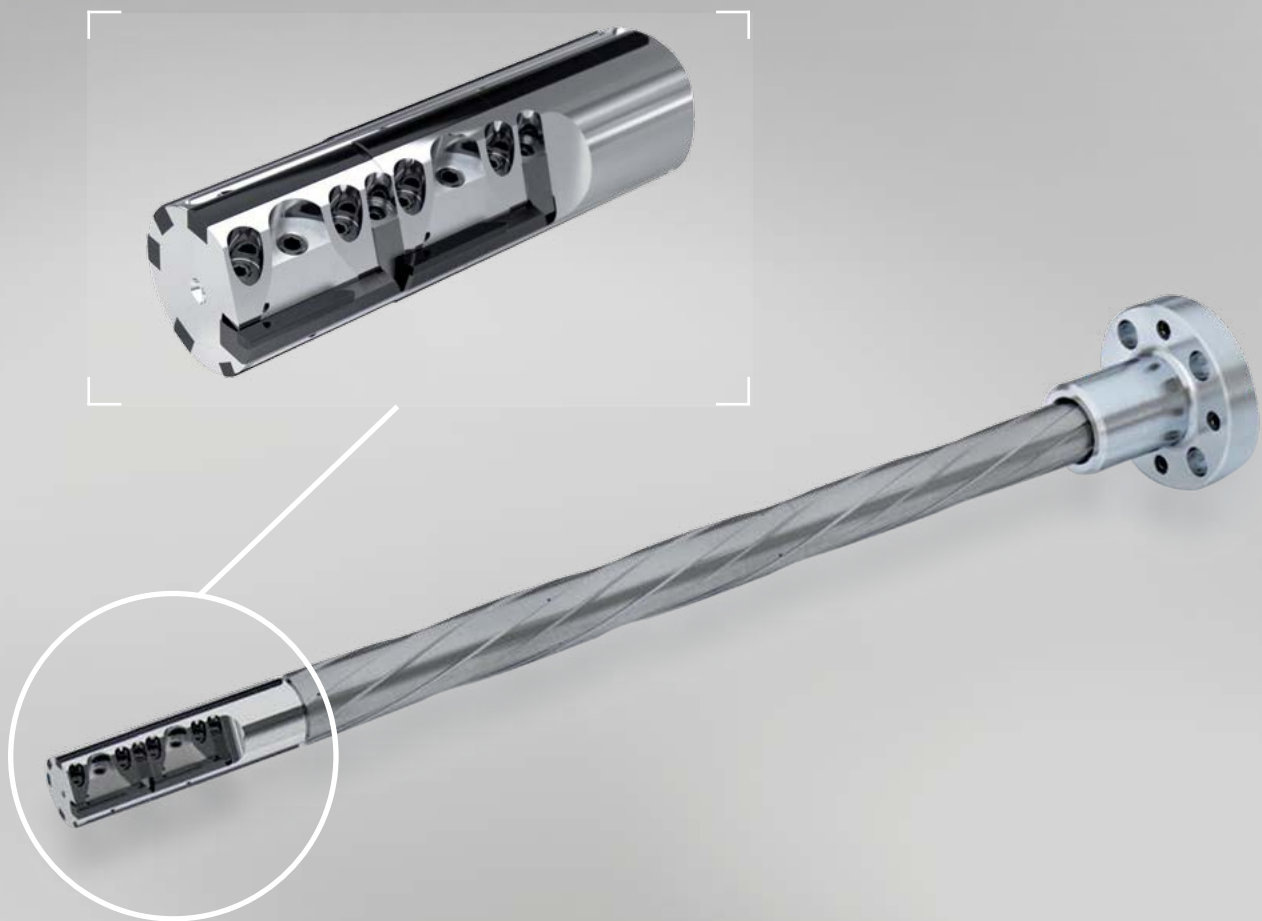
This 1-shot version combines the pre- and finish machining for the hydraulic valve compensation bore. The application of 1-shot versions must always be individually checked for every machining process.



MOTOR Cylinder head

CAMSHAFT BEARING TOOL Z=1

PCD reamer for machining camshaft bearing seats in aluminium cylinder heads. The possibility of axial and radial adjustment of the cutting edges guarantees an individual adaptation to the machining task. With the user-friendly setting philosophy the cutting edges can be adjusted effortlessly from one side. In addition to this product, the adjusting device EV-600 is also available from Guhring to perform the radial and axial fine adjustment of the tool.



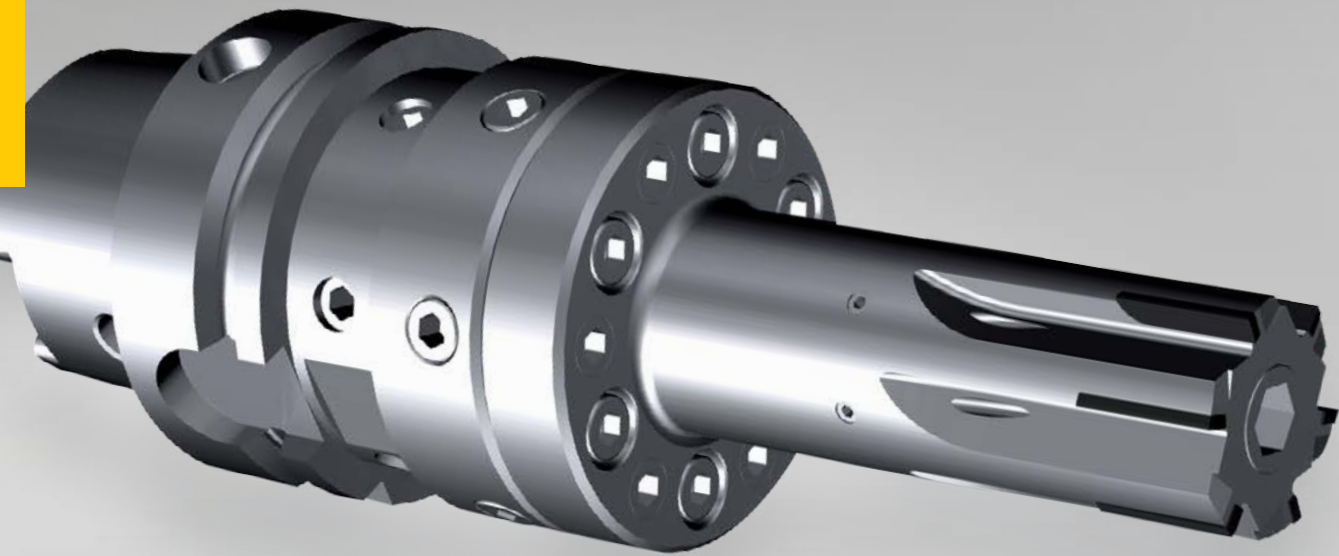
CAMSHAFT BEARING TOOL Z=6

The application of a spiral solid carbide shank guarantees not only rigidity but also perfect guidance.
The cutting edge diameter can be re-adjusted via expansion screw.



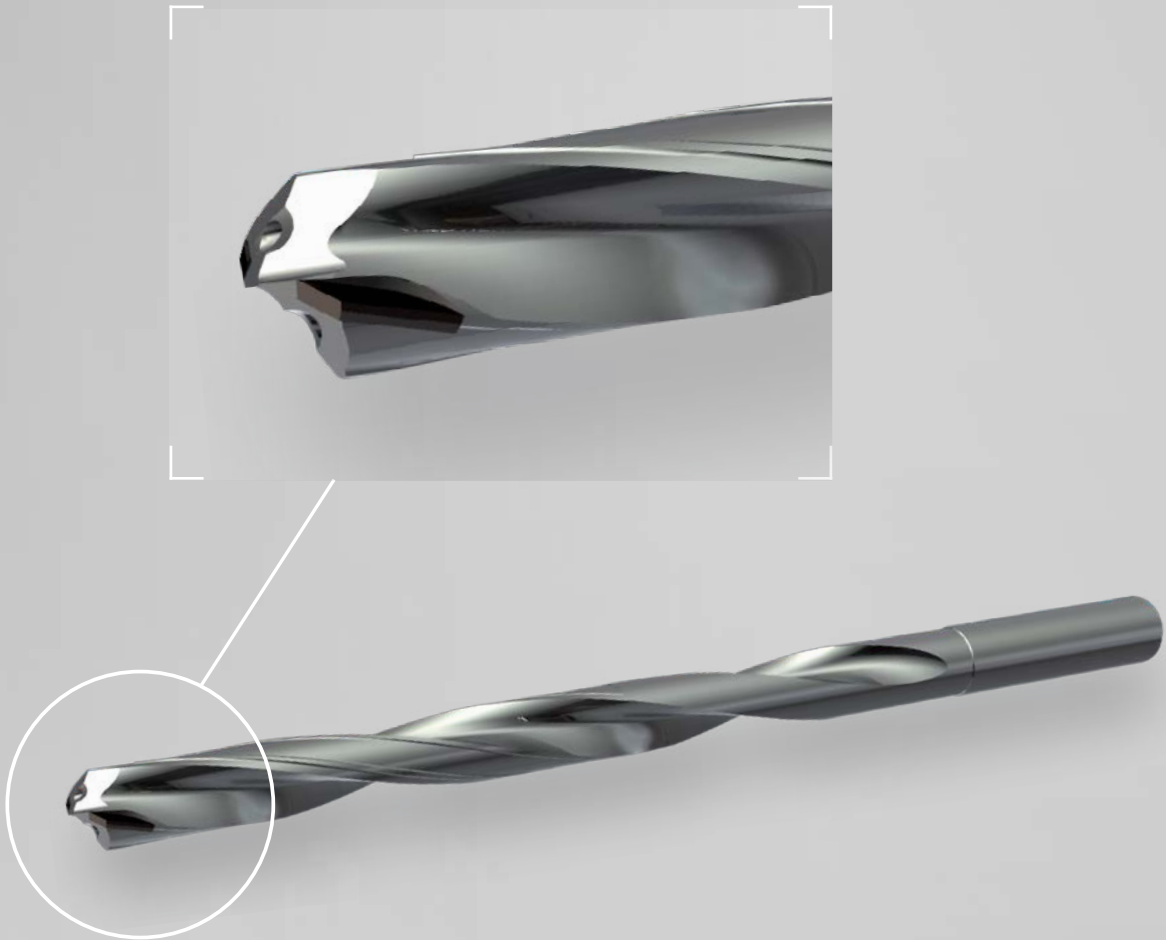
FINISH MACHINING TAPPET BUCKET BORES

Thanks to the specially added cutting edge geometry it is possible to use a multi-fluted tool to accurately ream a hole with an interrupted cut. The cycle time compared to a single-fluted tool is reduced enormously.



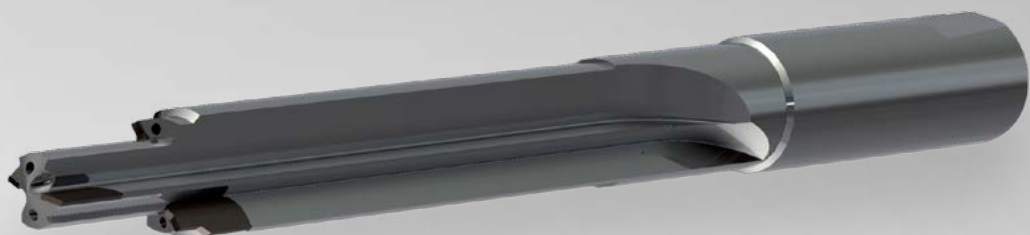
FASTENING BORE

Very high feed rates can be achieved with process reliability thanks to the optimised chip space geometry.

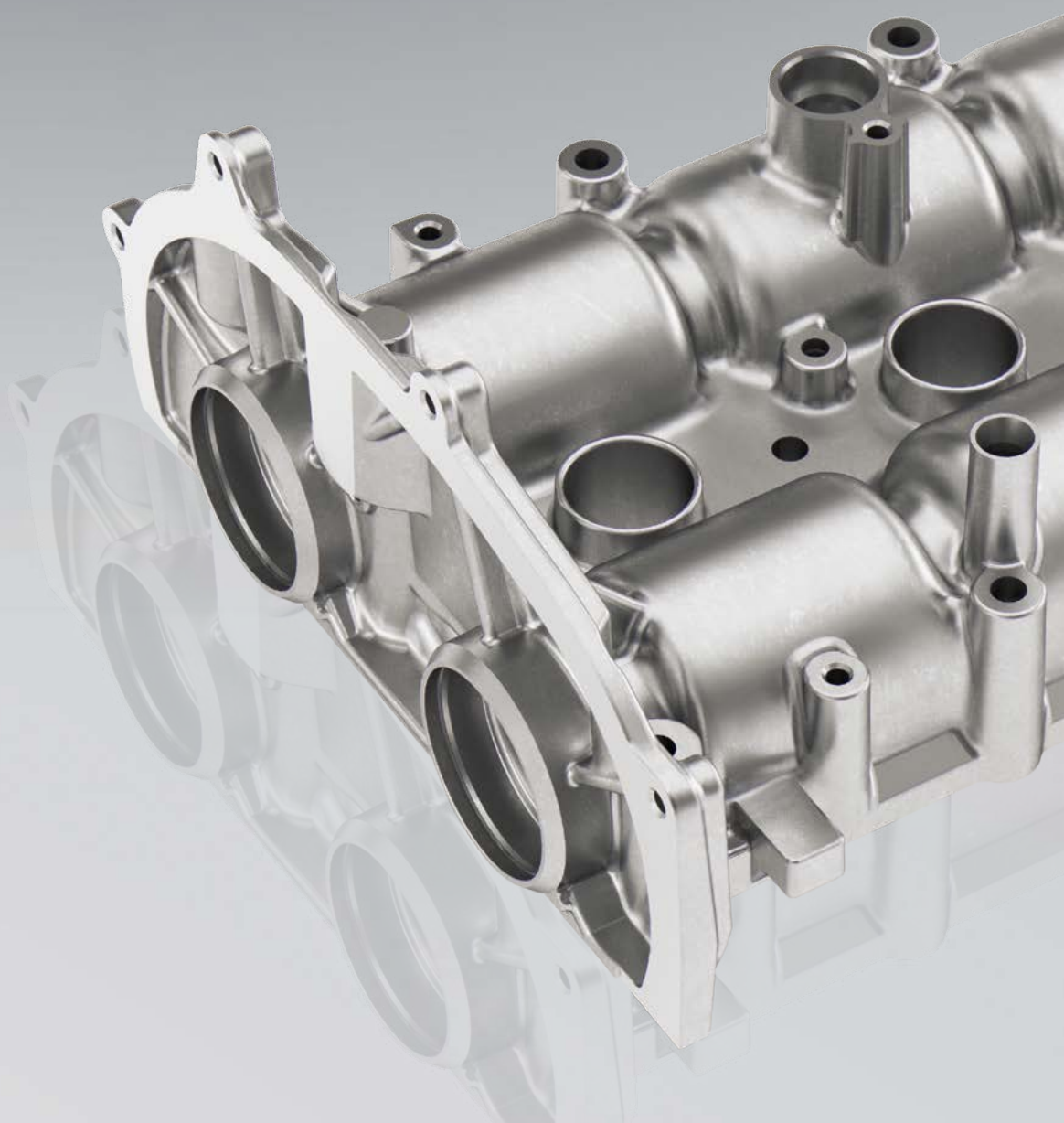


SPARK PLUG BORE

1-shot versions combine several tools into one and reduce the machining times.
The application of 1-shot version must always be individually checked for every machining process.



MOTOR

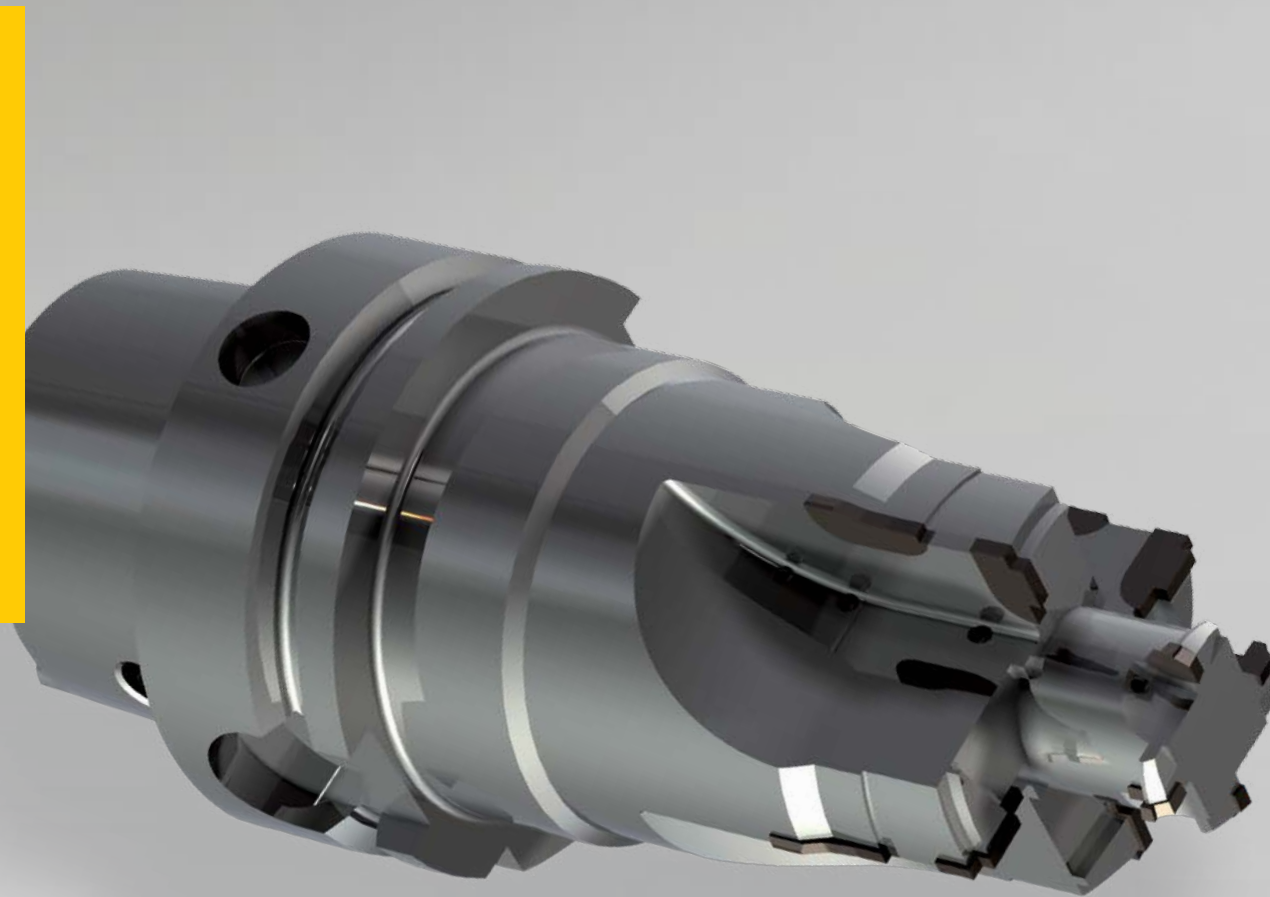


CYLINDER HEAD COVER



MOTOR Cylinder head cover

COMBINATION TOOL FOR CAMSHAFT BEARING KEYWAY



CONNECTION BORE



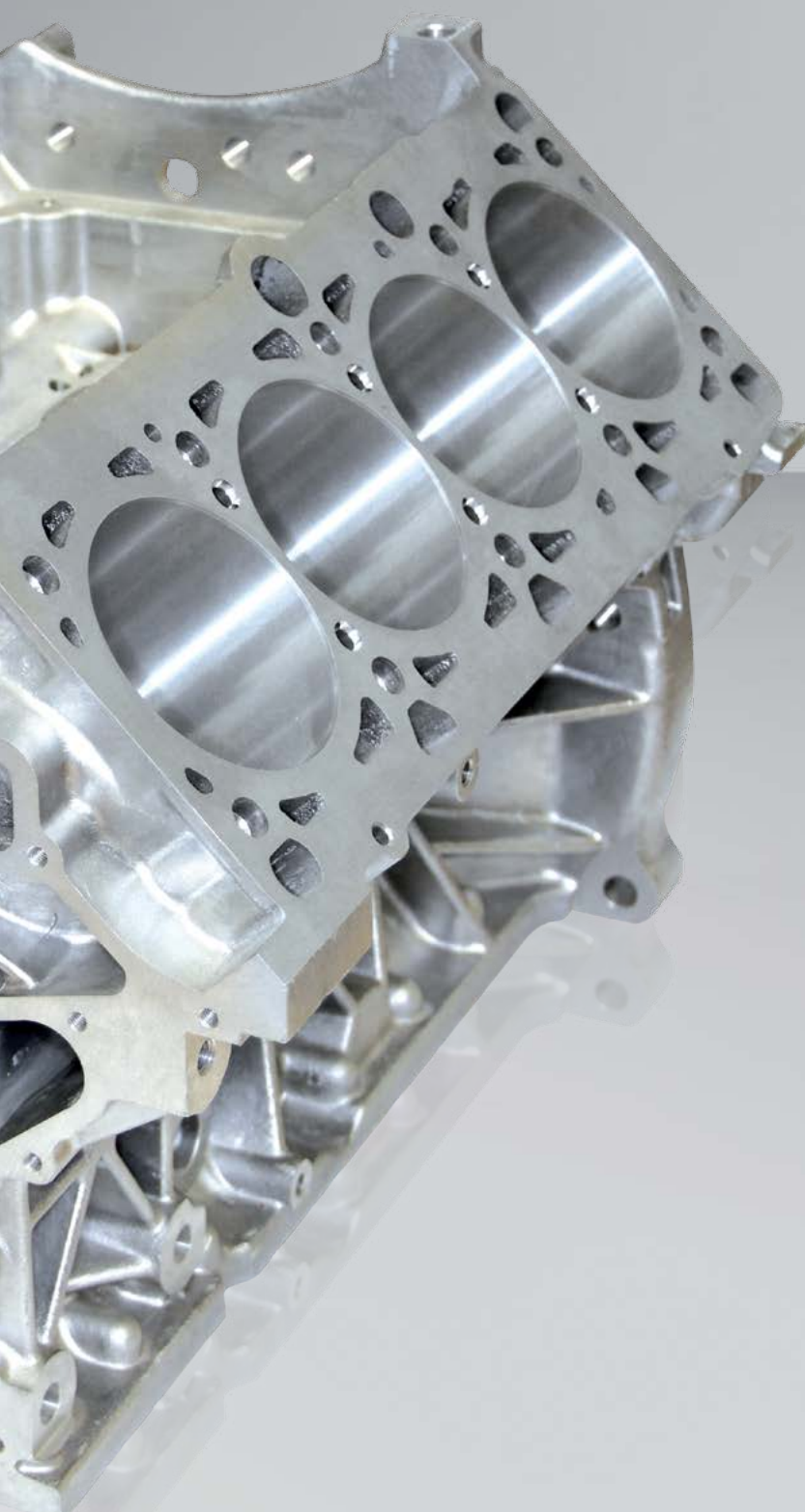
OIL DIPSTICK BORE



MOTOR



CRANKCASE

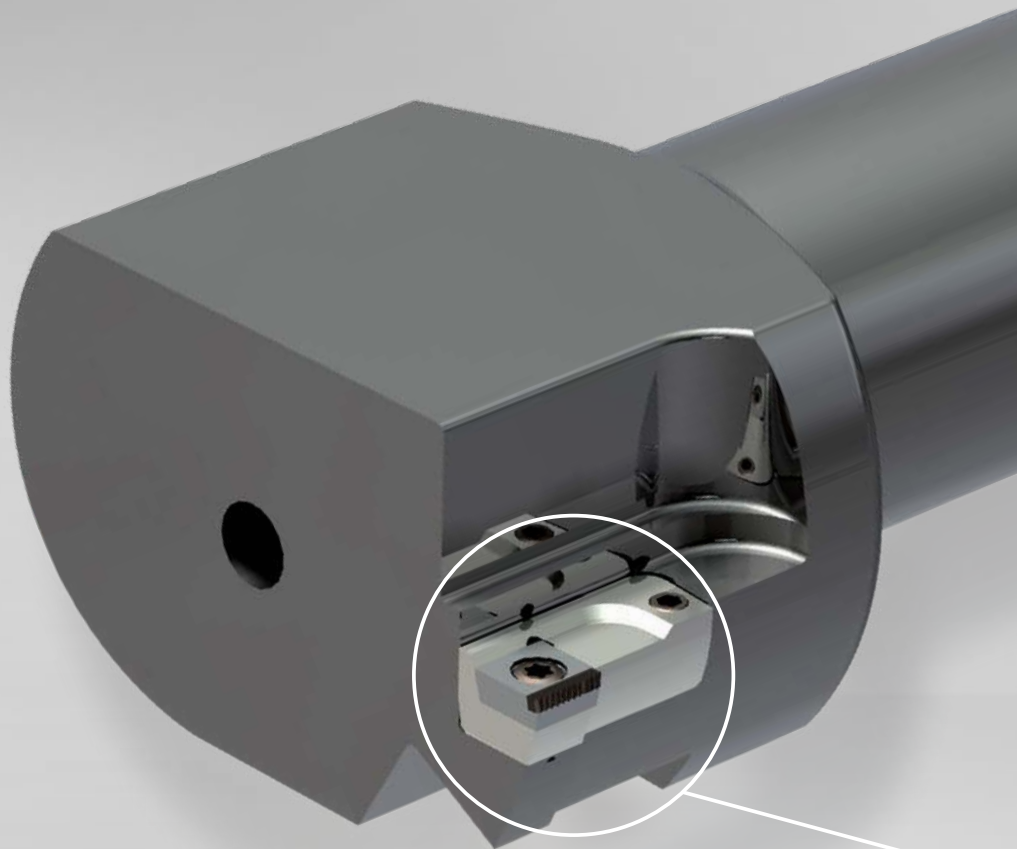


ROUGHING TOOL

Innovative production of diesel and petrol engines

The thermal coating of the aluminium surface of cylinder bore surfaces makes the engines lighter and more efficient.

In co-operation, Guhring has developed a roughing tool for this process with which the high-tensile strength of the thermally sprayed coating is achieved. The cutting edge geometry is individually designed and manufactured for the customer dependent on the required profile depth.

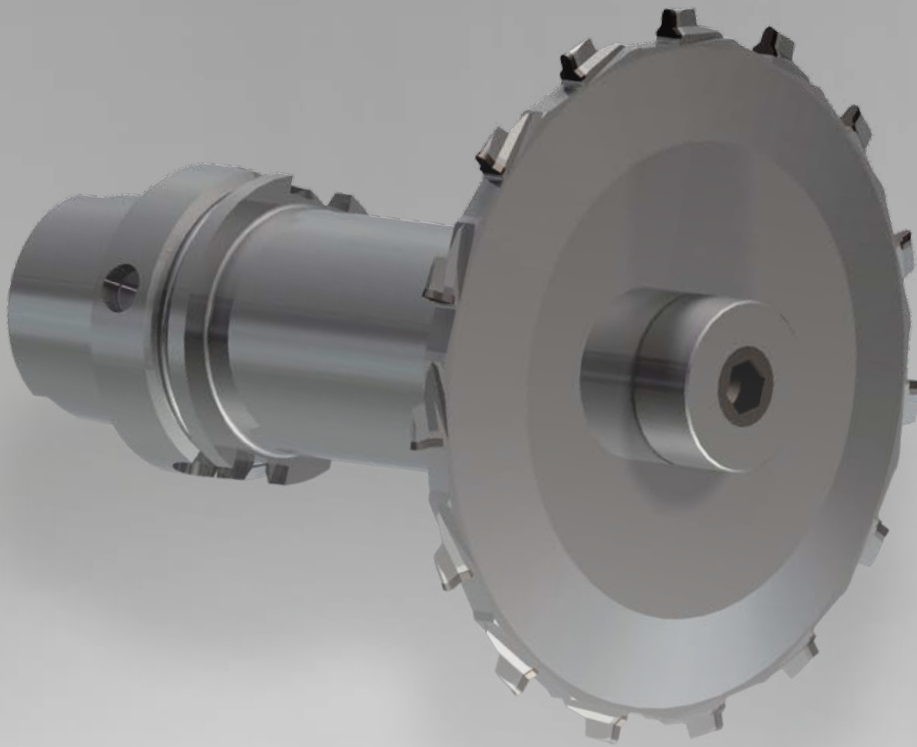




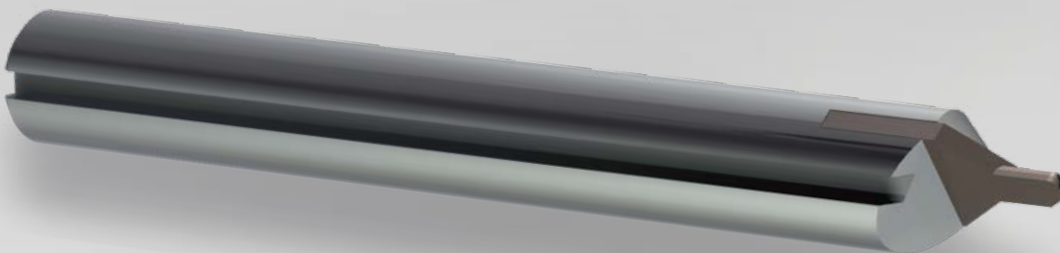
The special cutting edge geometry produces a surface finish geometry similar to a dovetail on the aluminium cylinder bore surface. The result is a high-tensile strength of the thermal coating.



RELIEF GROOVE



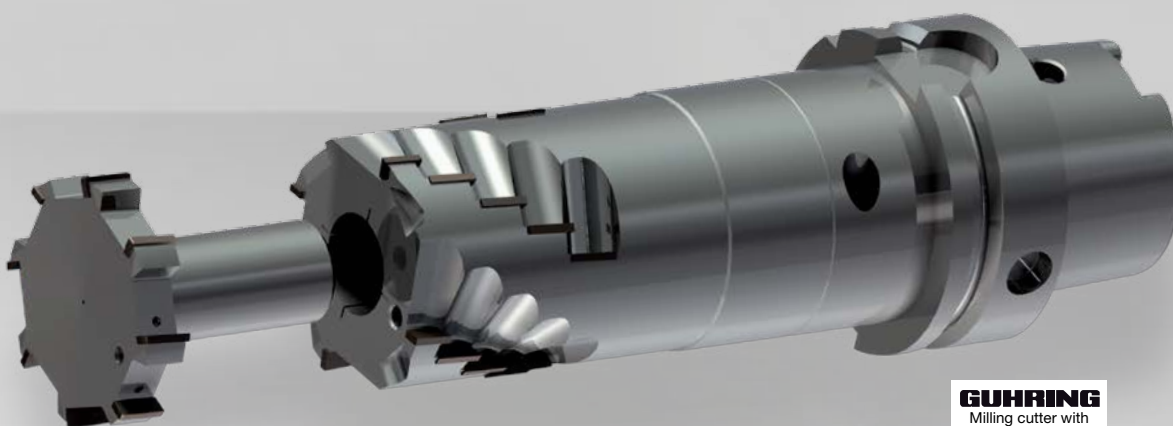
SEALING GROOVE MILLING CUTTER Ø 2 MM



THRUST BEARING



MILLING – CONTROL CUTS



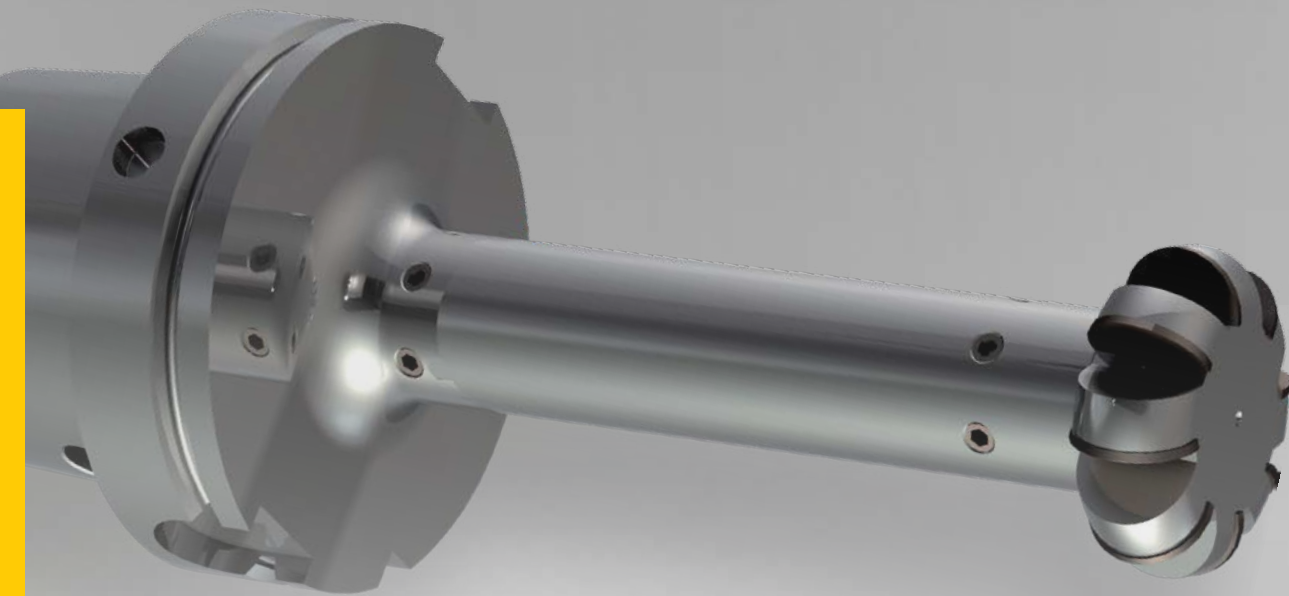
For further information see page 67.



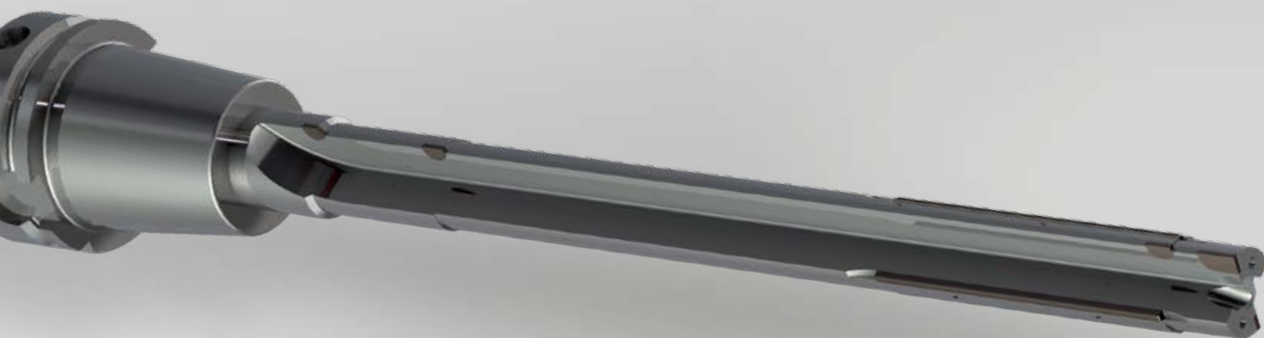
MOTOR Crankcase

01

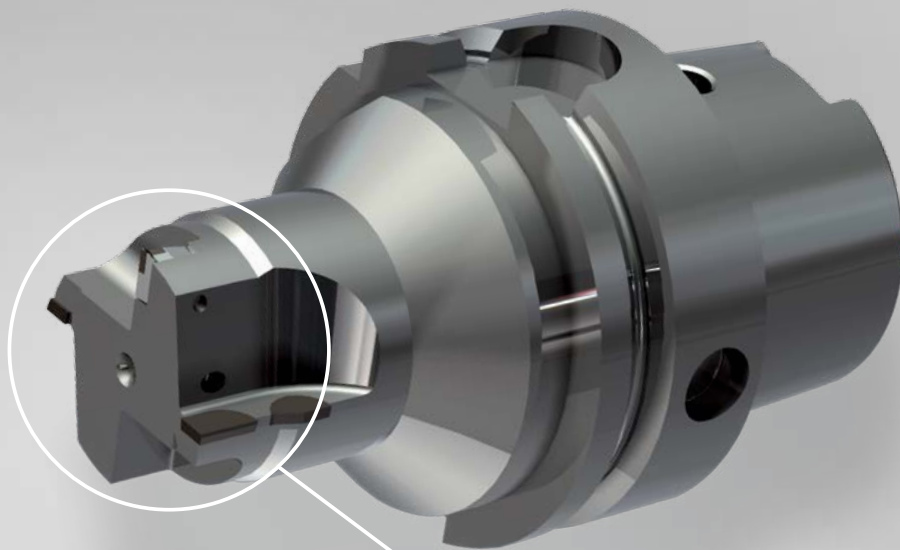
PULSATION WINDOW



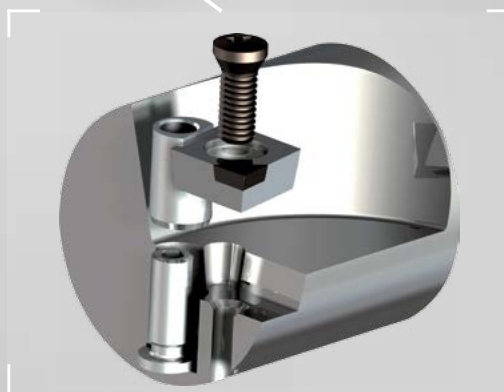
PRE-MACHINING BALANCE SHAFT BORE



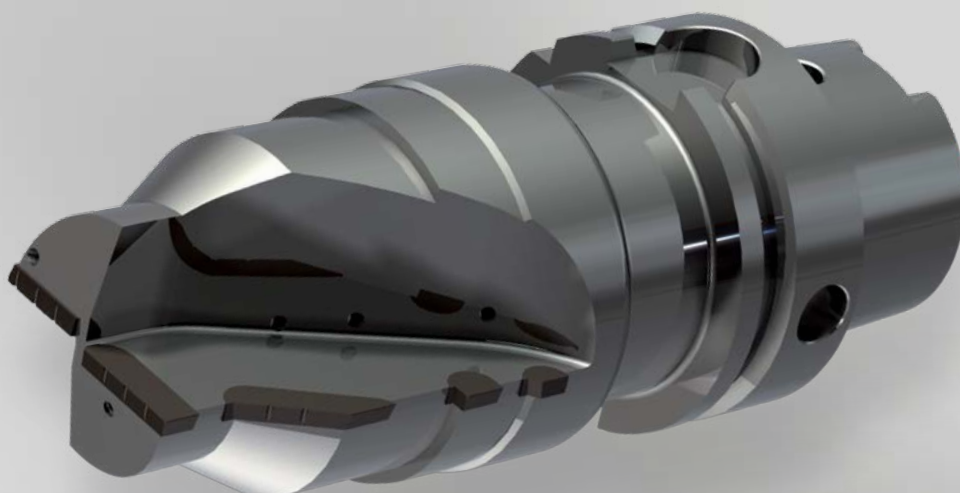
WATER JACKET BORE



The required hole roughness is achieved via threaded wedge adjustment (TWA). The roughing insert can be adjusted independently of the diameter.



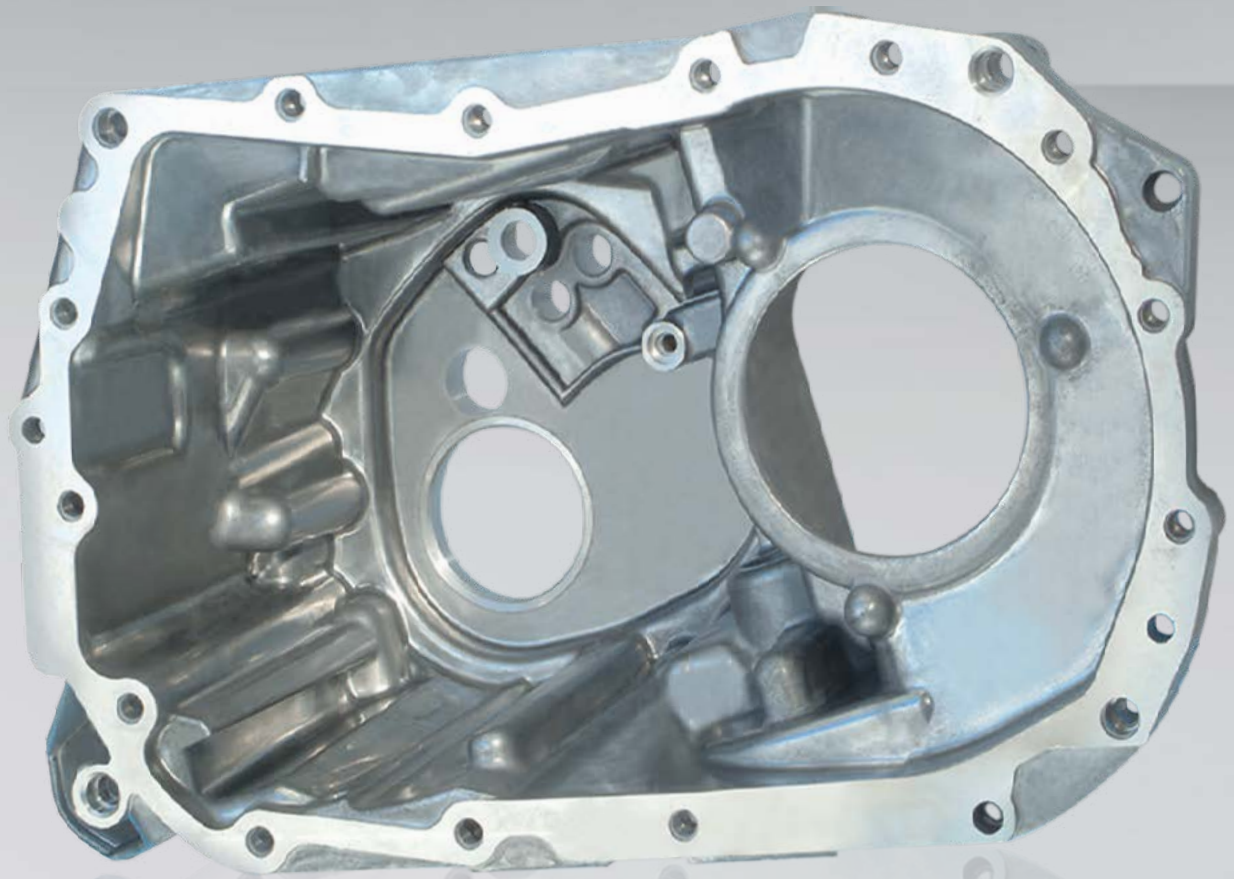
THERMOSTAT BORE

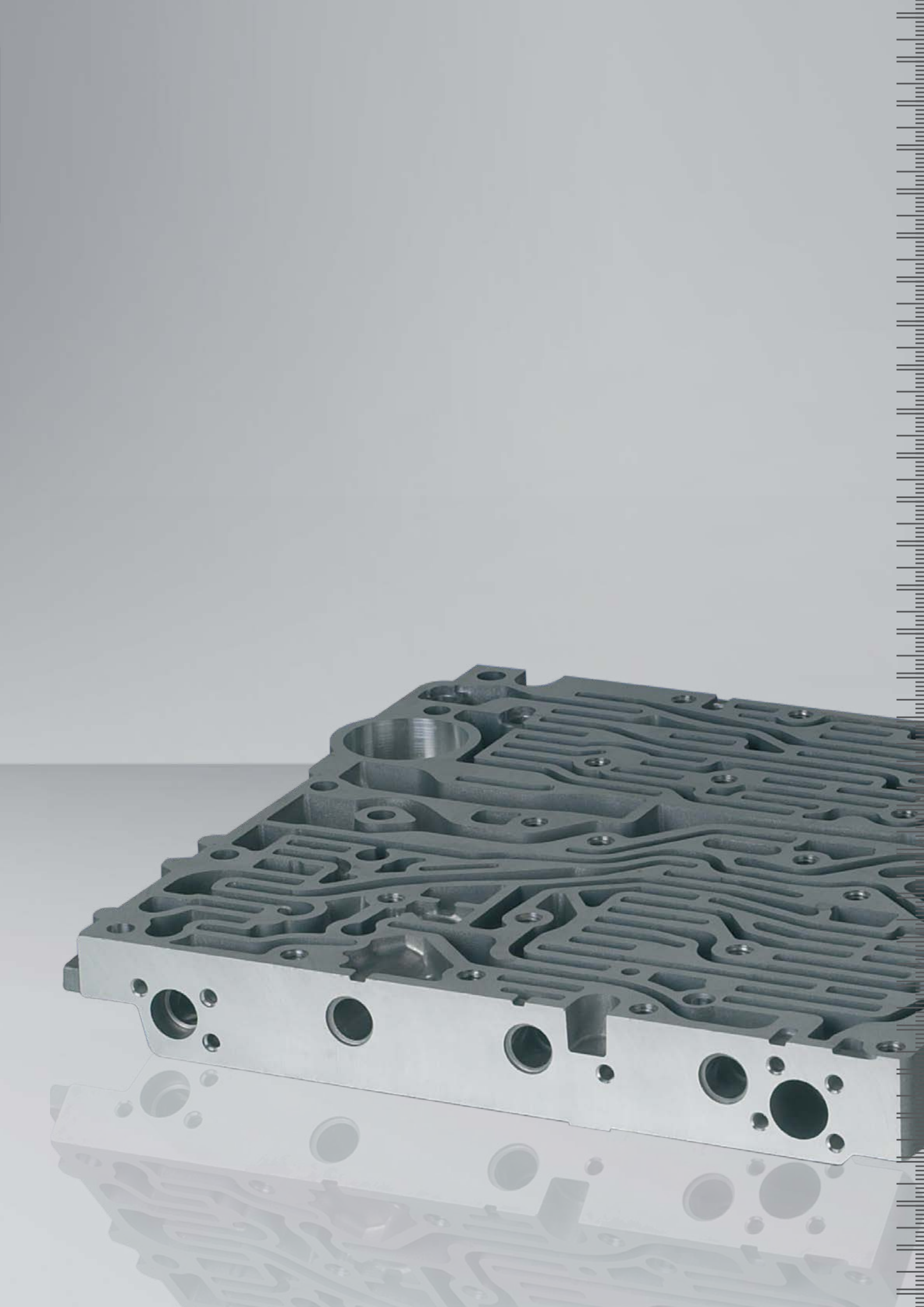


DRIVE

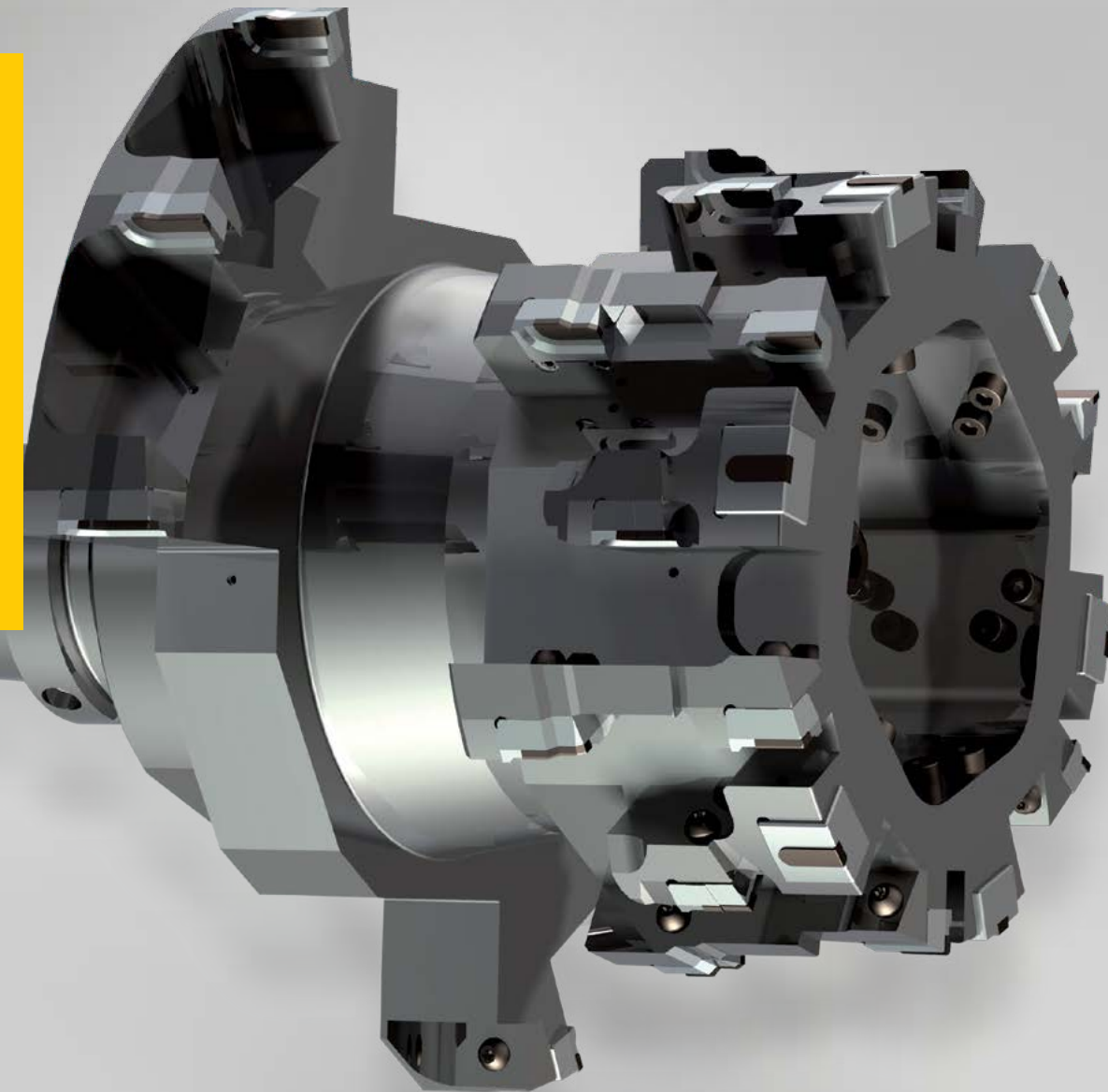
ACCURATE MACHINING

Independent of diameter and complexity all PCD tools from Guhring meet the highest demands on reliability and accuracy. This is especially important for machining the transmission. When being machined the thin-walled material of the transmission housing is liable to suffer vibrations making the machining process more difficult and endangering the accuracy. To counteract vibration, PCD tools possess special cutting edge properties – for guaranteed process reliable machining.





MAIN DRIVE SHAFT BORE Ø 280 MM



With this system a very light maximum permitted weight < 18 kg was achieved (with a diameter of 280 mm).

The tool is supplied according to the requirements of the customer.

The facts at a glance:

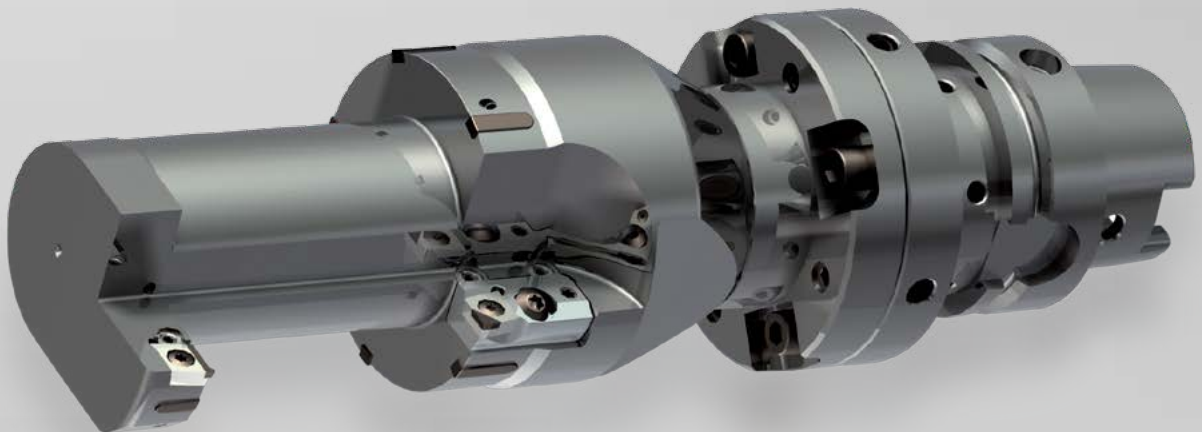
- Lightweight design for finish machining (transmission housing)
- Tolerances to IT6
- Low weight
- Low tilting moment
- Every diameter with $z=6$
- On customer request all diameters can be supplied adjustable.
Hence minor adjustments can be carried out without a problem.



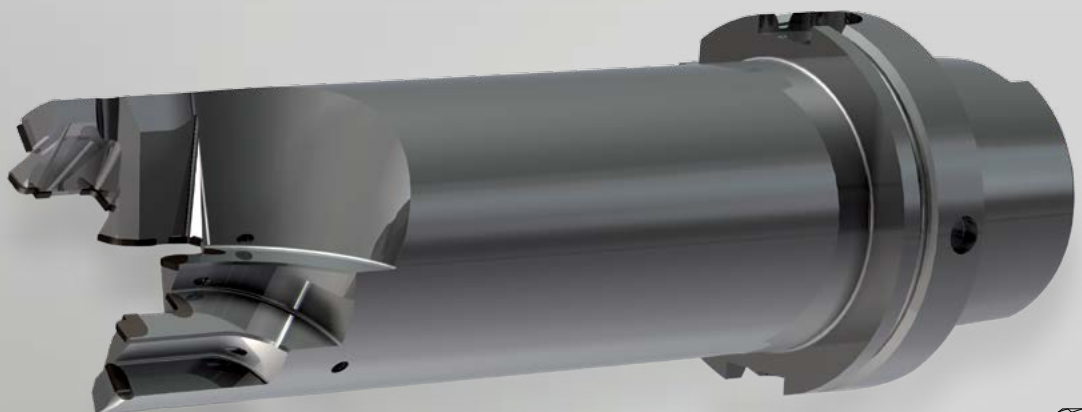
SAFETY CUT BELL HOUSING



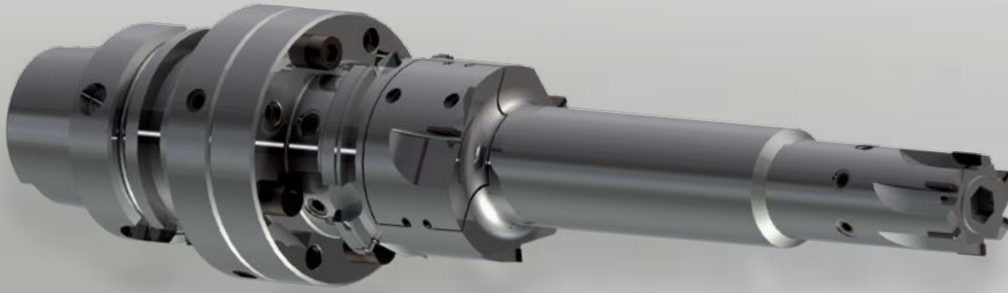
MAIN BEARING BORE FRONT AND REAR



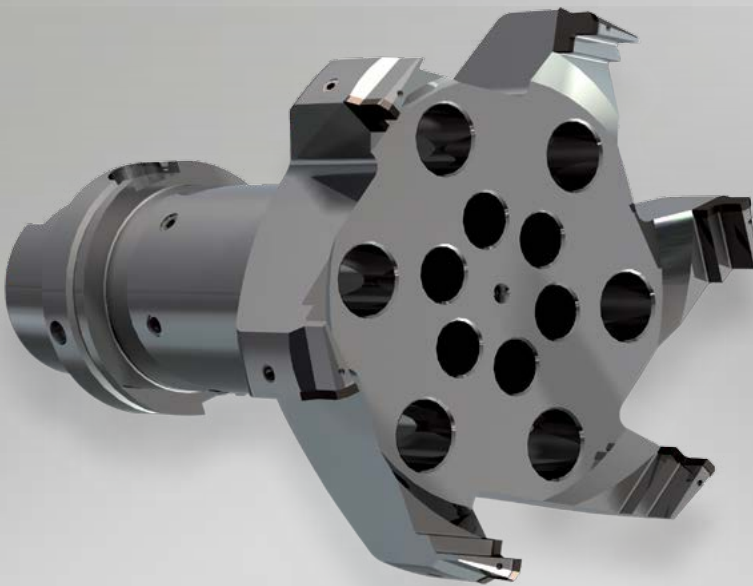
PINTLE MACHINING



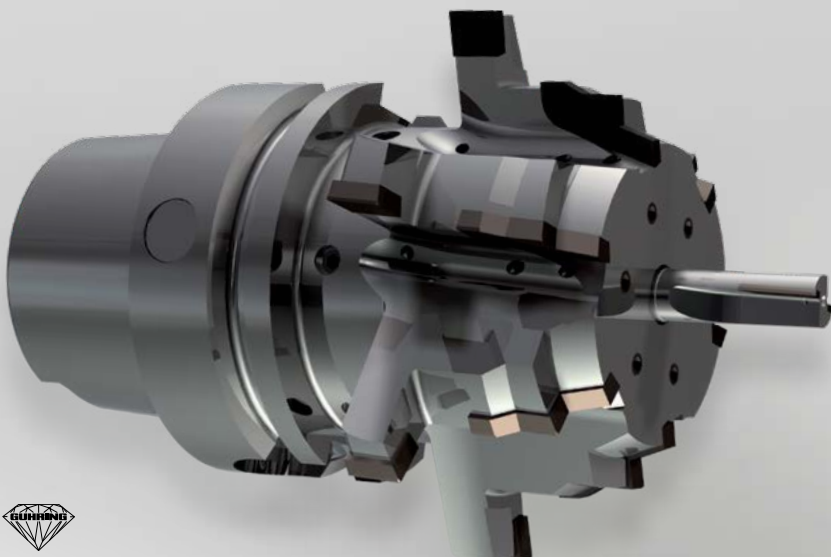
AUXILIARY DRIVE



OUTPUT SIDE SEALING GROOVE

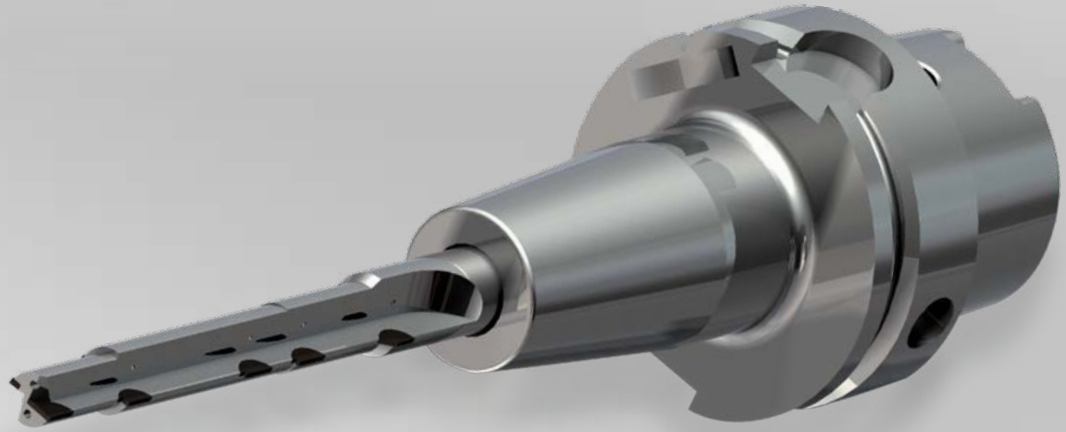


COMBINATION DRILLING, REAMING, MILLING



DRIVE Valve housing

PILOT DRILLING



PRE-MACHINING

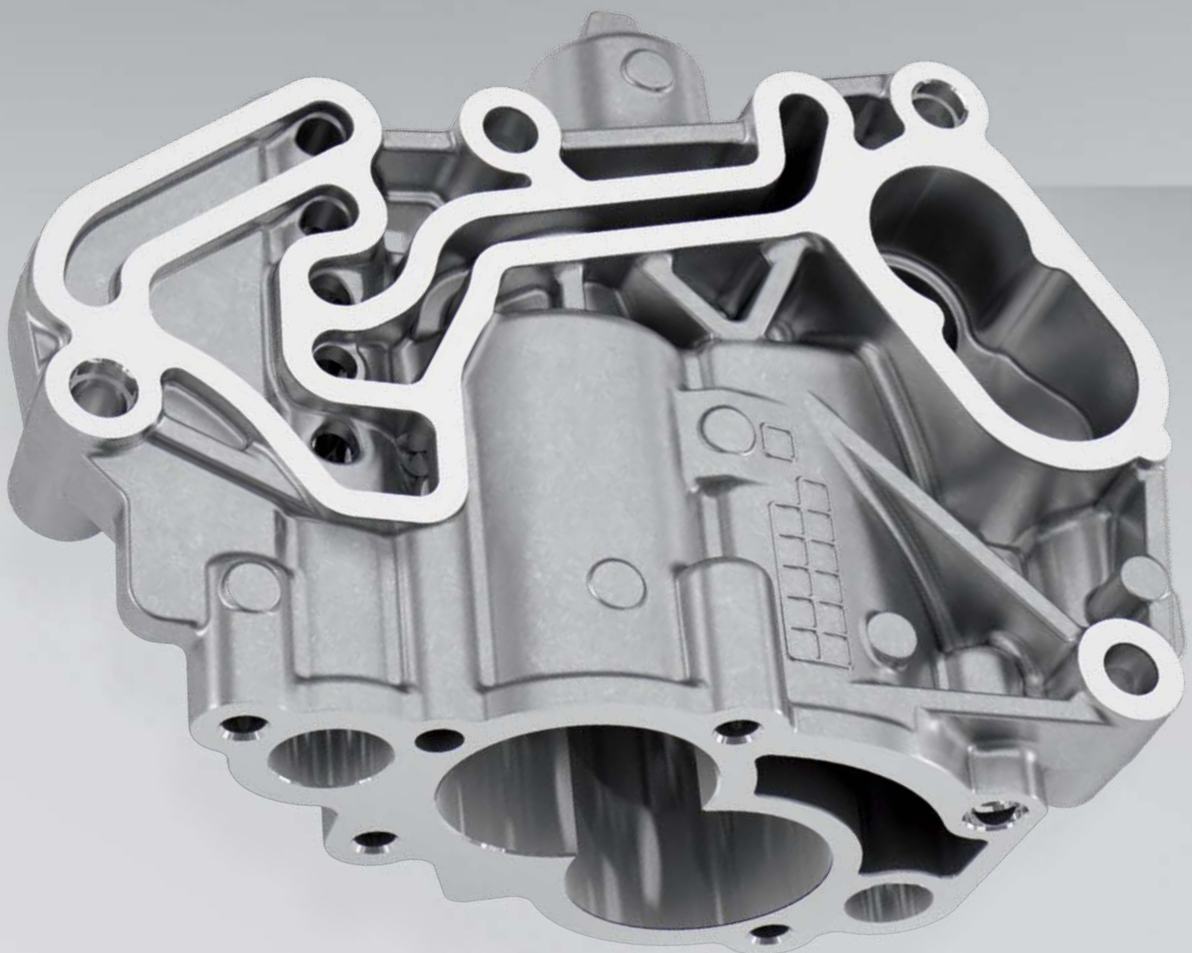


FINISH MACHINING



ANCILLARY C

MACHINING IN PERFECTION



OMPONENTS

Ancillary components – a far reaching and broad term.

According to general definition, ancillary components are assembly units not directly mounted to the engine block.

Ancillary components are also an important part of the engine, i.e. the cylinderhead performs a very important function.

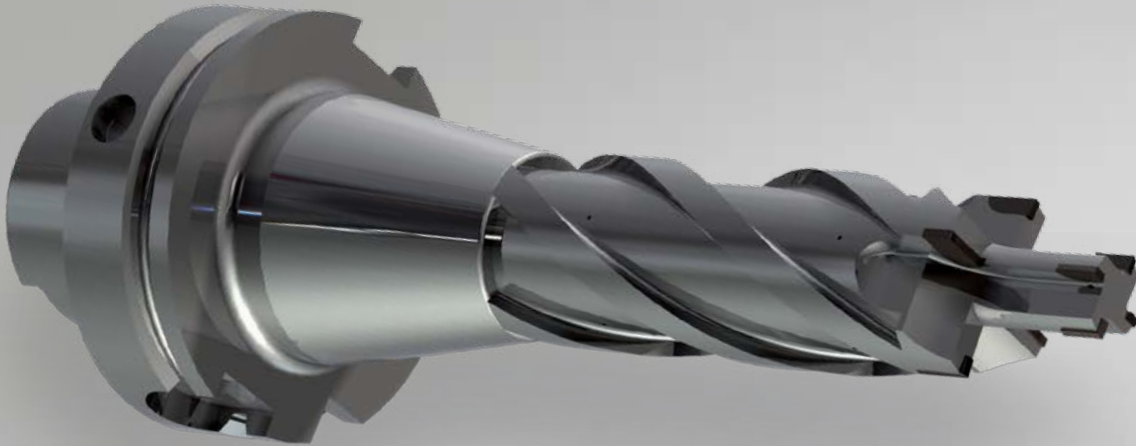
Ancillary components are, for example, starter motor, radiator, alternator, pump housing, turbocharger, fan, carburetor etc. Therefore, the machining of these components also requires maximum precision.

Because with an engine every part and every component is important no matter how minute and unspectacular they appear.

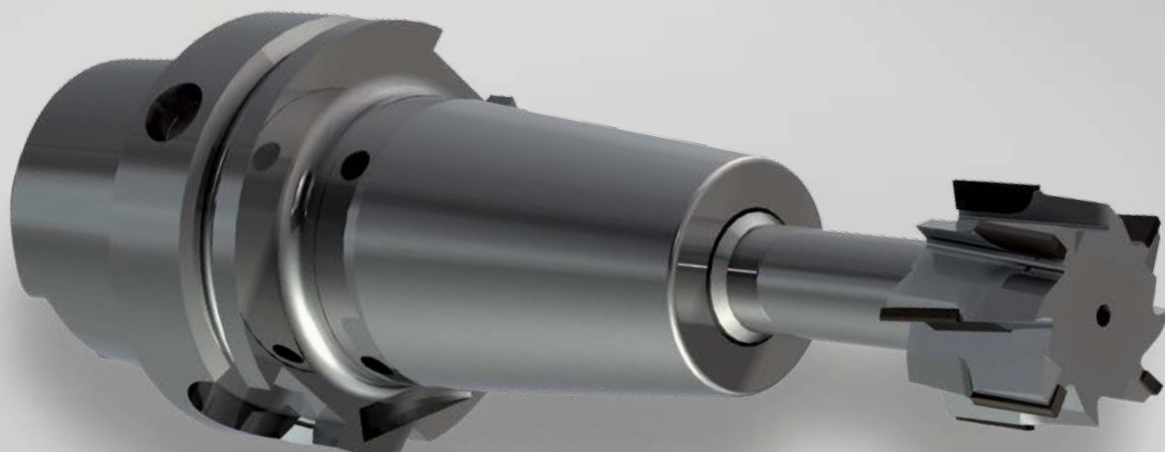
ANCILLARY COMPONENTS

Pump housing

FINISH MACHINING MAIN OIL BORE



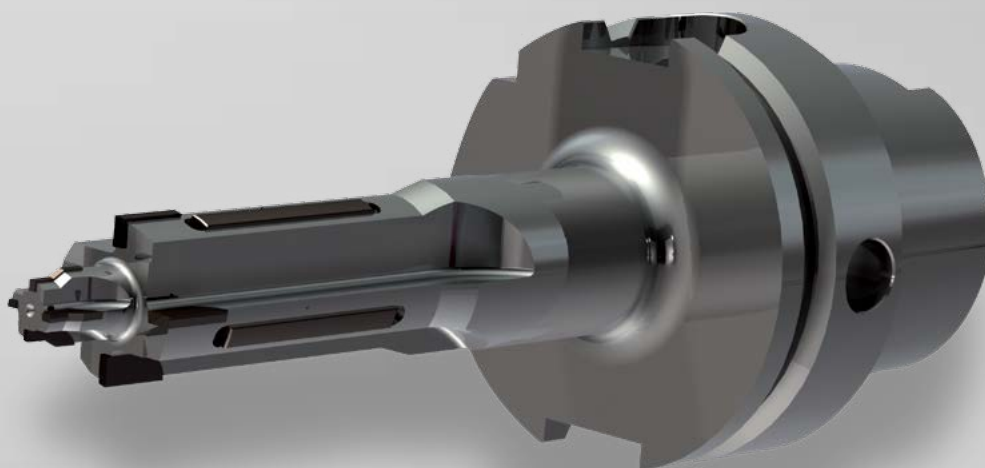
GROOVE MAIN OIL BORE



OVER TURNING JOURNAL, FINISH MACHINING BEARING BORE



PRE-MACHINING MAIN OIL BORE



CONTROL BORE



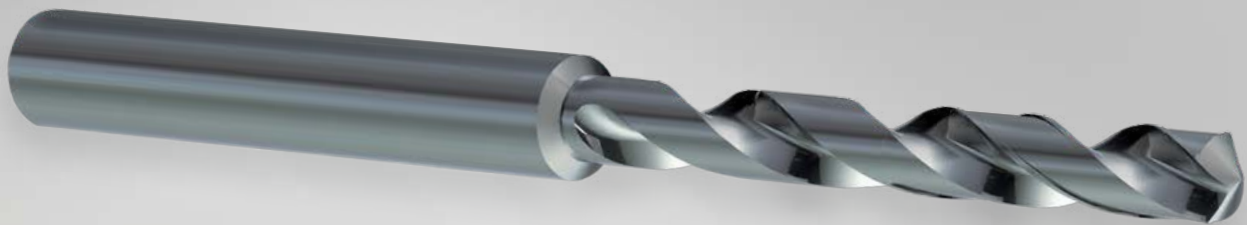
ANCILLARY COMPONENTS

Turbocharger / Compressor wheel

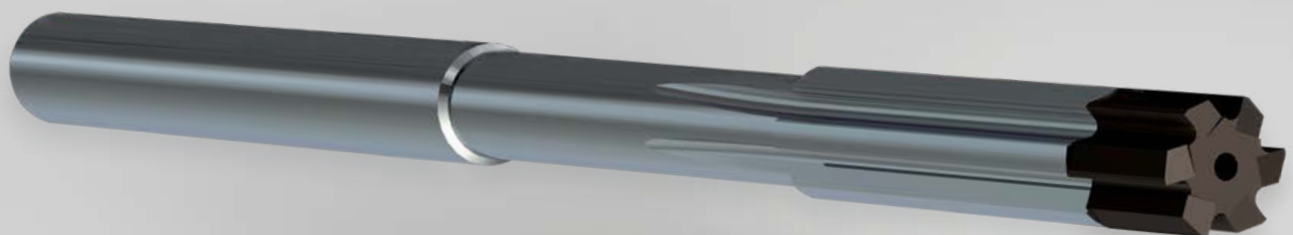
PILOT DRILLING SHAFT BORE



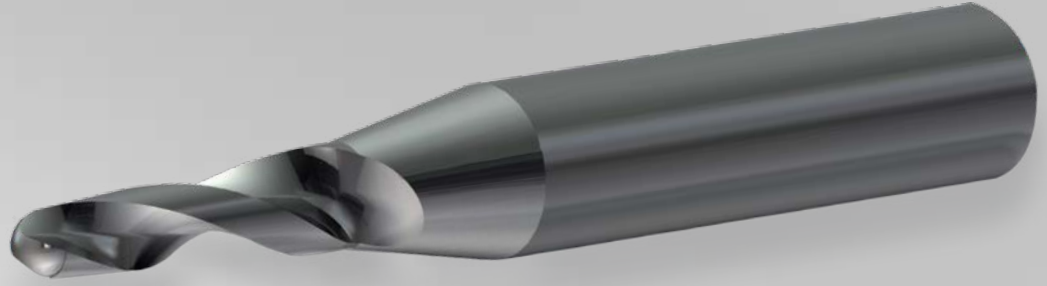
PRE-MACHINING SHAFT BORE



REAMING SHAFT BORE



BLADE MACHINING



AXLES AND

INNOVATIVE SOLUTIONS FOR SPECIAL REQUIREMENTS

Automotive components relating to axles and steering are kinetically exposed to high stresses. The quality and accuracy requirements when machining them is accordingly high. Aluminium wrought alloys are especially tough and soft and are therefore applied to withstand these stresses and to ensure a certain flexibility. However, when machining aluminium lengthy chips are created. Guhring's PCD tools guarantee an optimal chip breaker ability and, therefore, a better swarf evacuation.



STEERING

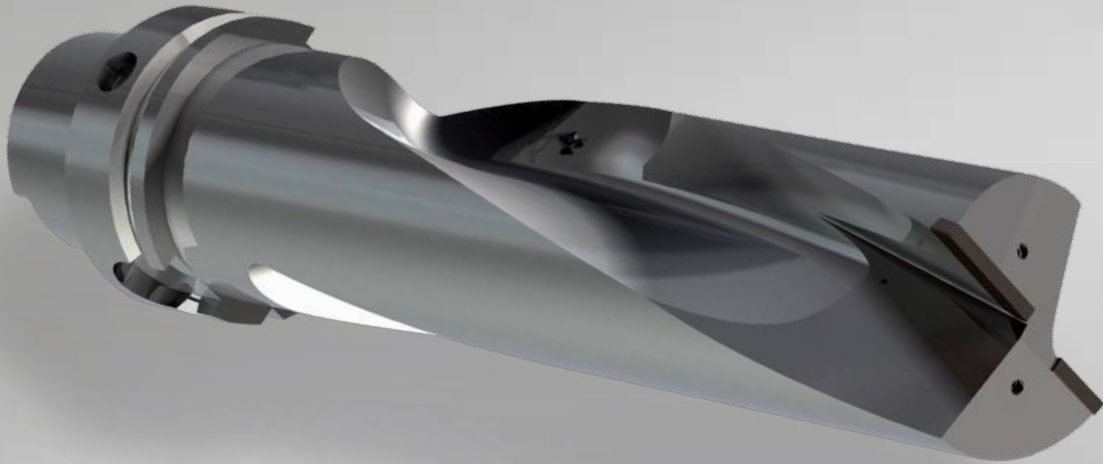


AXLES AND STEERING

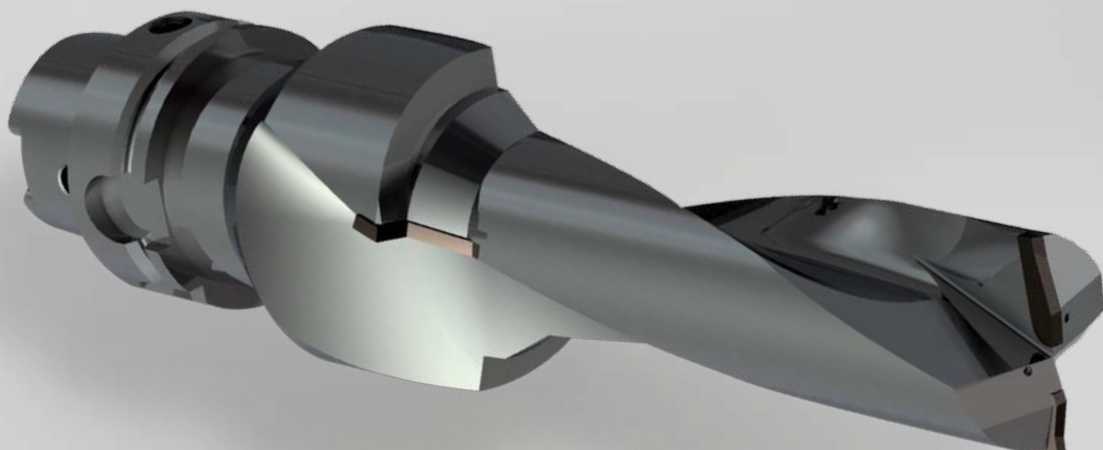
Wheel carrier

04

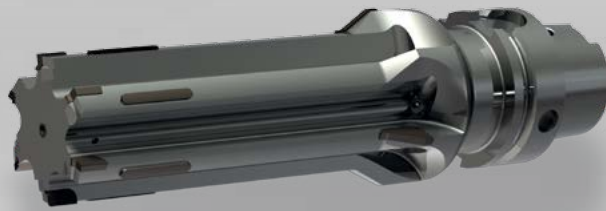
DRILLING MAIN BORE



MAIN BORE THROUGH DRILLING AND PARALLEL LANDS



REAMING MAIN BORE



REAMING AND MILLING HUB BORES



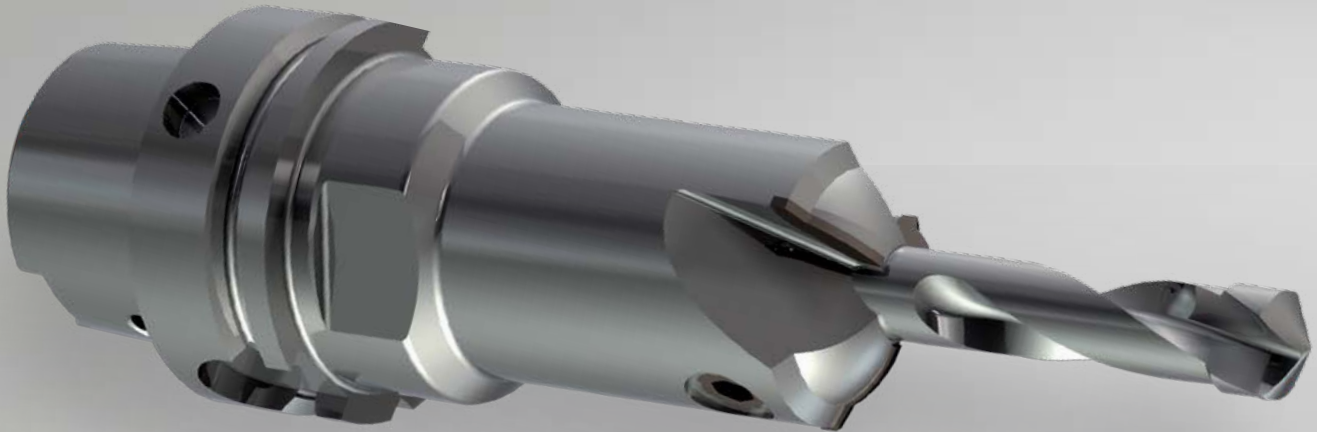
CONTROL CUTS



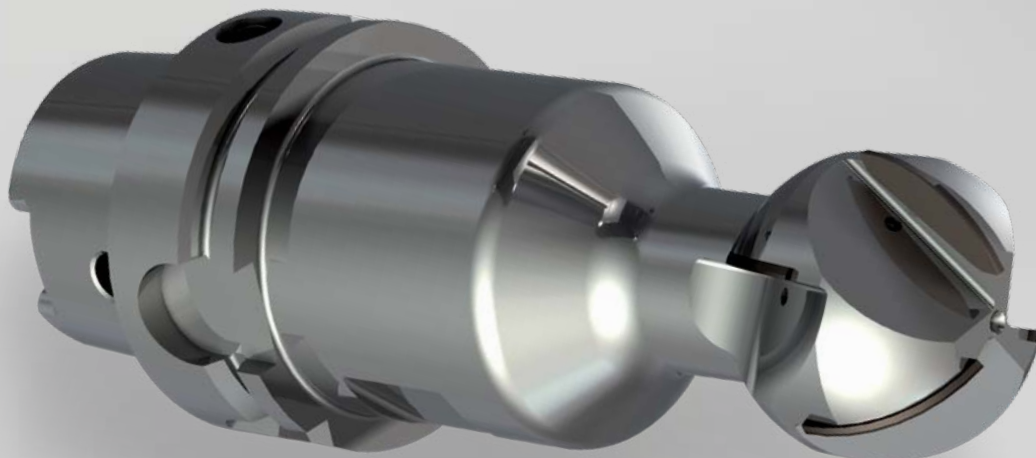
AXLES AND STEERING

Axle uprights

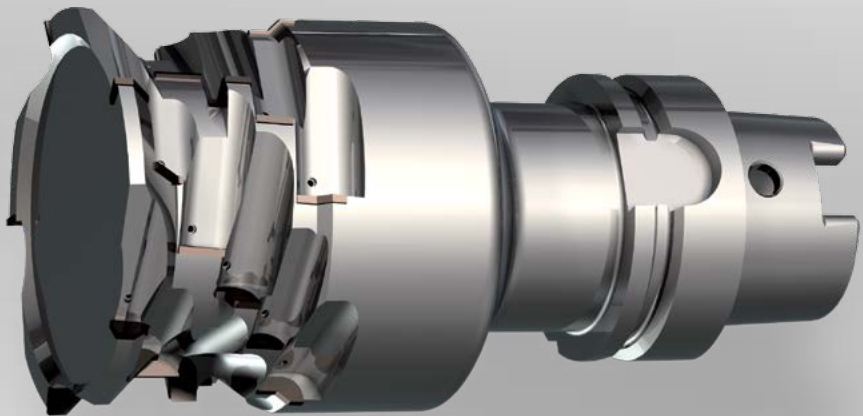
SPHERICAL BORE



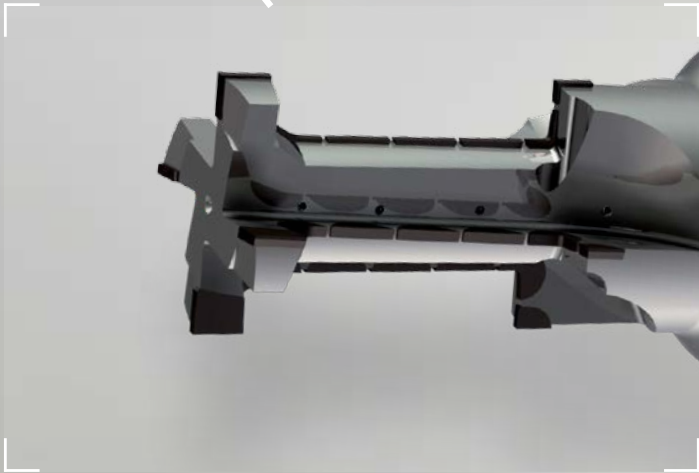
SPHERICAL MILLING CUTTER



MAIN BORE



BORE FOR RUBBER BUSHING



Drilling, profile and surface milling



AXLES AND STEERING

Steering column

SEAL CONNECTION



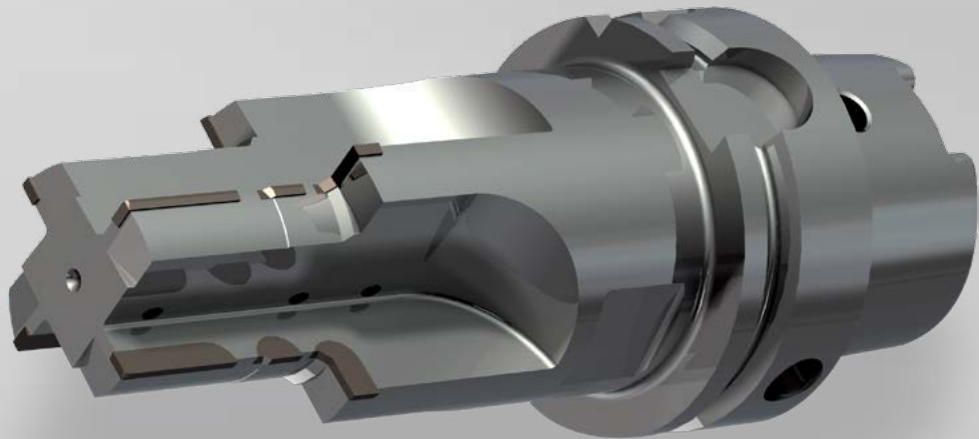
SERVO GEAR UNIT BORE



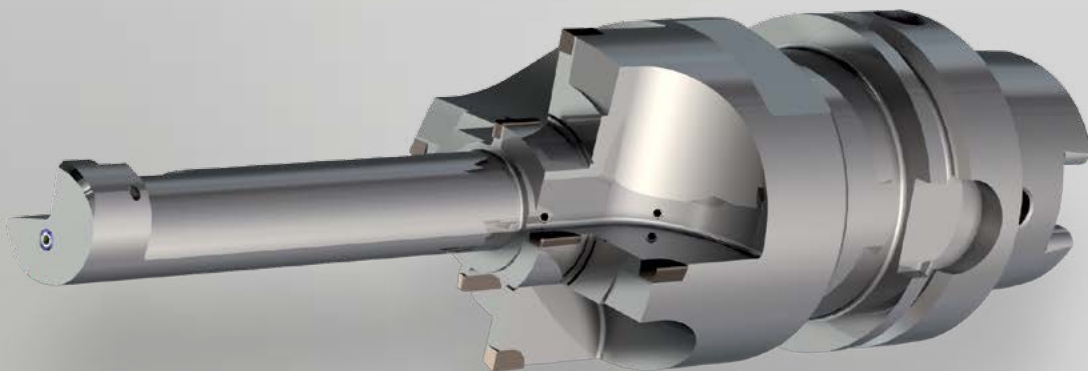
MAIN BORE



PINION BORE



STEERING SPINDLE BORE



AXLES AND STEERING

Joint machining

HARD MACHINING

High Performance Milling with Guhring PCBN ball track mills



SOFT MACHINING

Solid carbide or CBN tipped ball track mills



BRAKES

SAFETY THANKS
TO HIGHEST ACCURACY



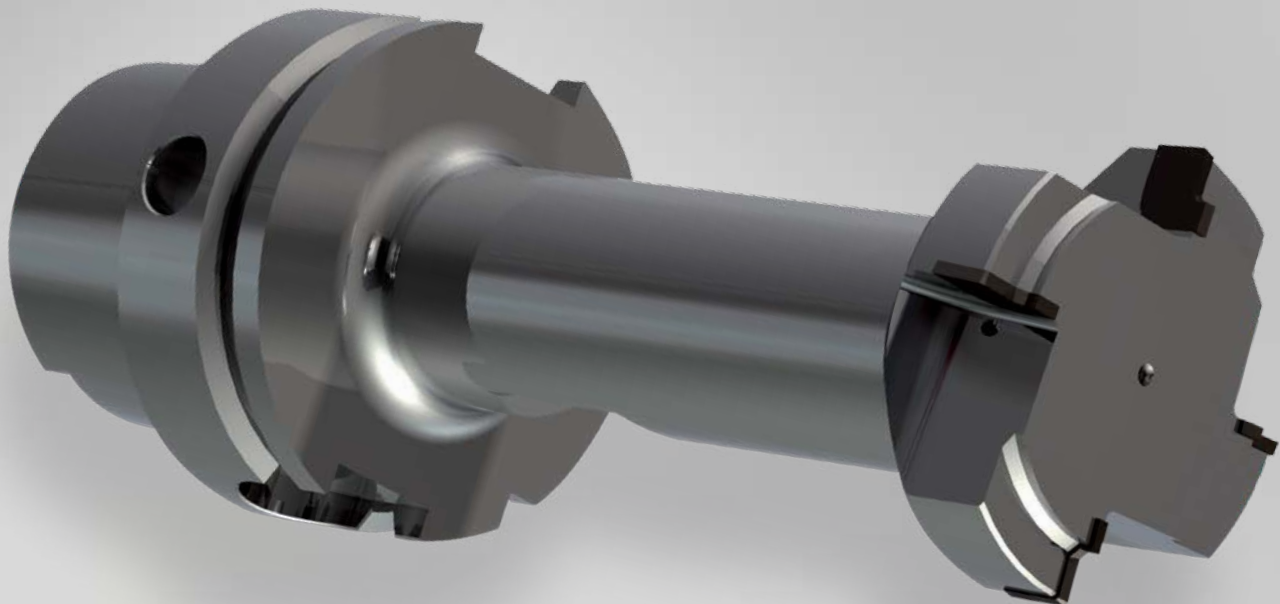
Components of the braking system in automotive manufacturing are exposed to particularly heavy loads. They must consistently withstand the effect of high forces and must not show any signs of wear. For these components therefore especially wear-resistant and robust materials are applied – that are again difficult to machine. Where cast iron was previously applied, today aluminium is almost exclusively used as workpiece material in order to manufacture lighter and therefore more energy efficient components. These tough materials can be perfectly machined with PCD tools from Guhring. They guarantee the machining of safety relevant components to the highest accuracy.



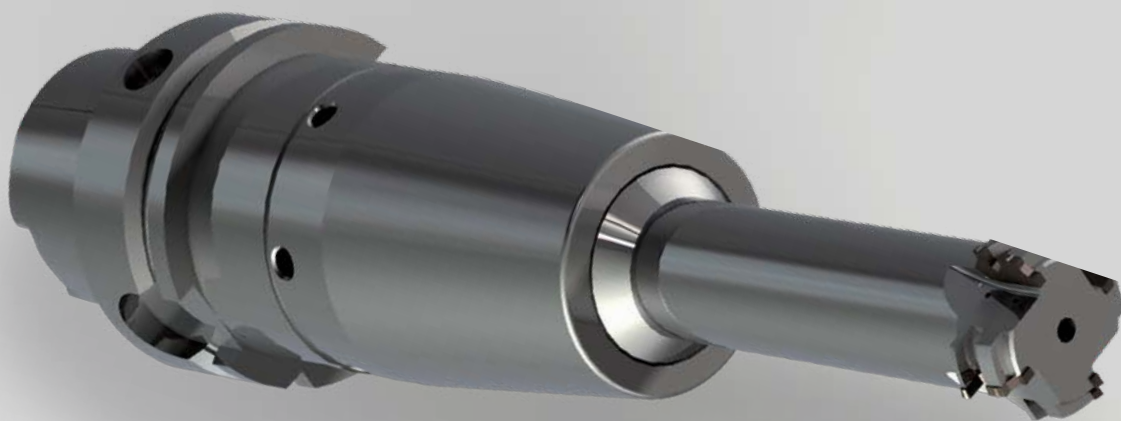
BRAKES Brake caliper

05

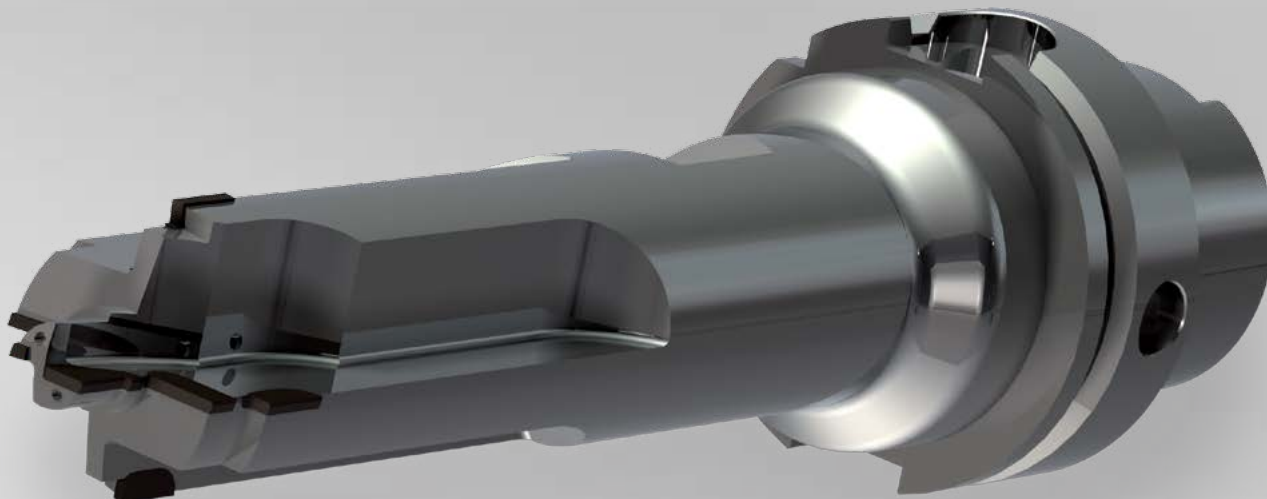
PROTECTIVE CAP COLLAR



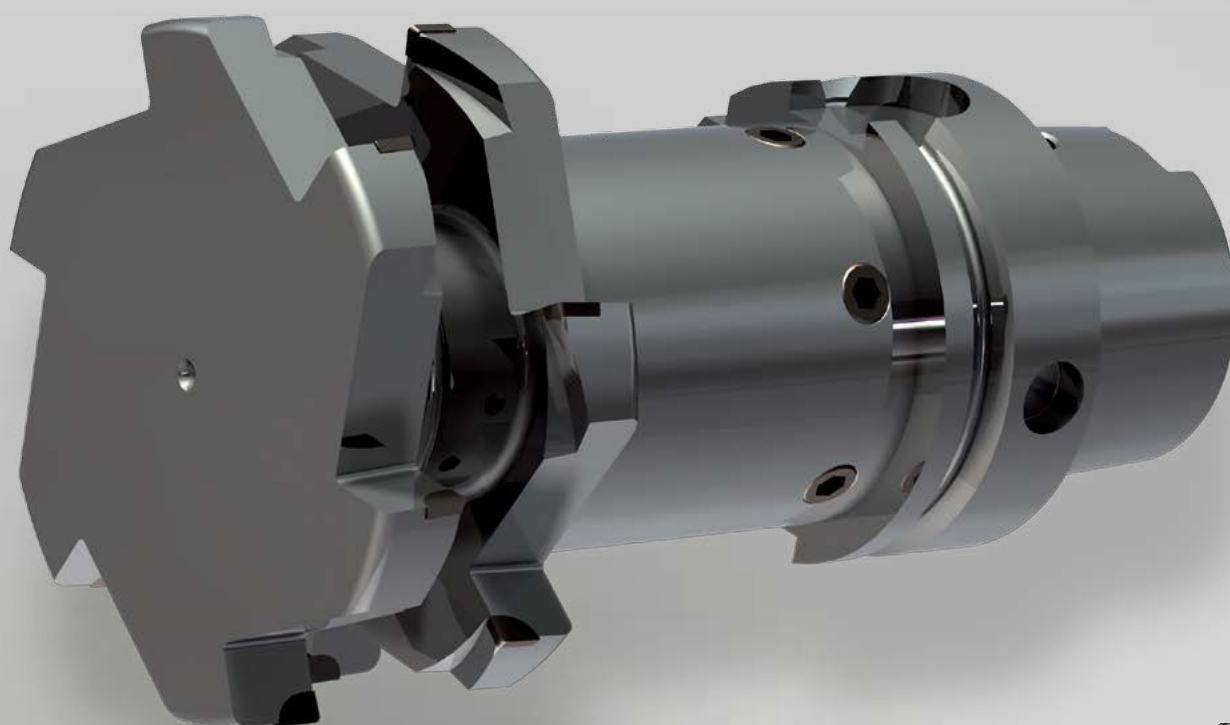
SEAL RING GROOVE



SPRING CAP BORE

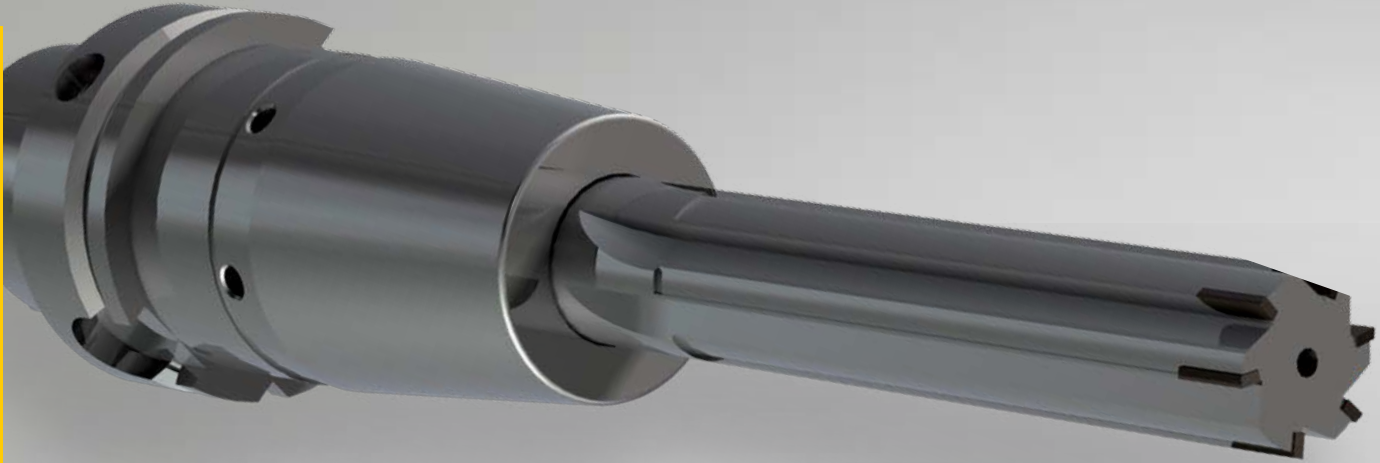


FASTENING SURFACES

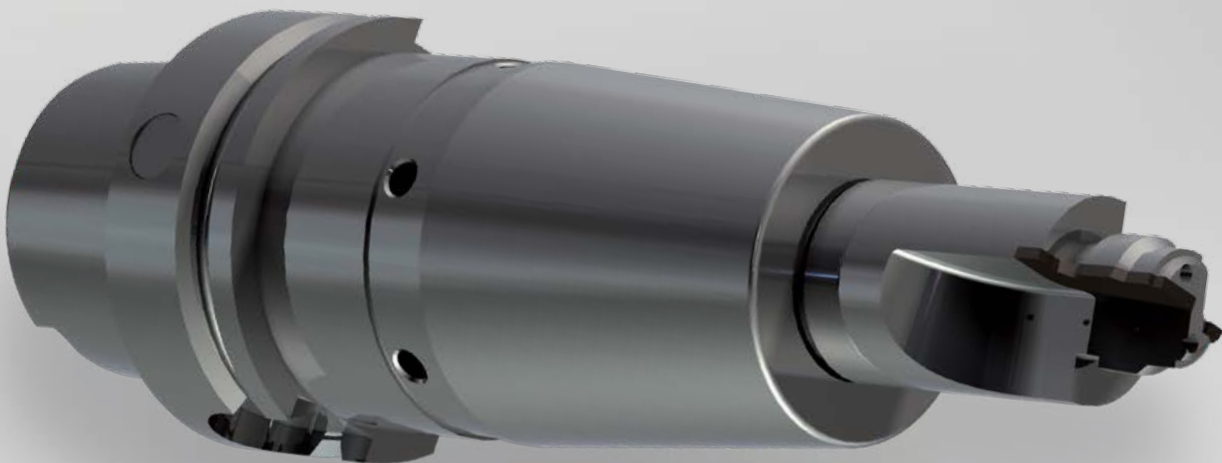


BRAKES Brake cylinder

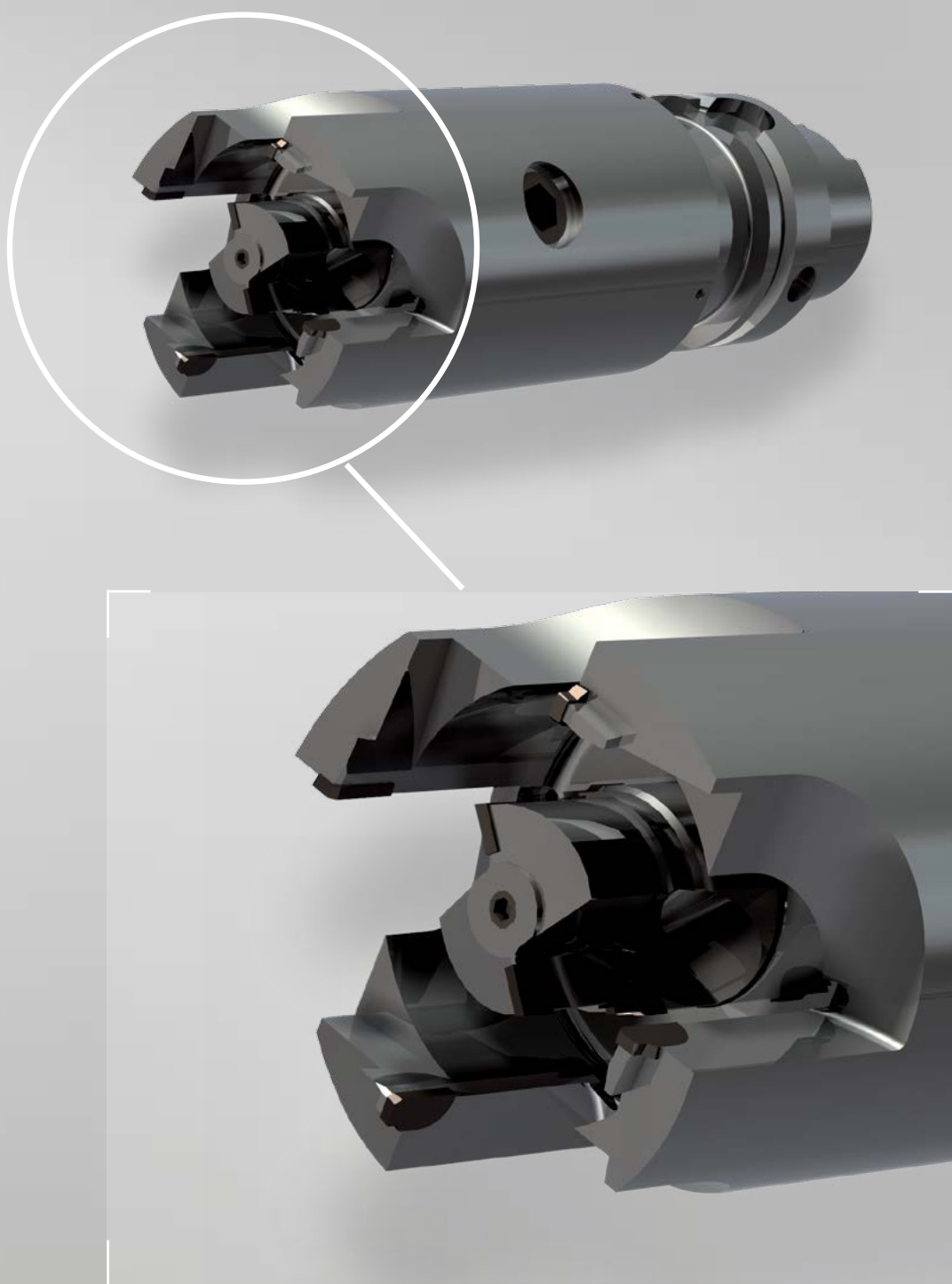
MAIN BORE



OIL INLET CONNECTION



PILOT DRILLING AND MAIN CONNECTION



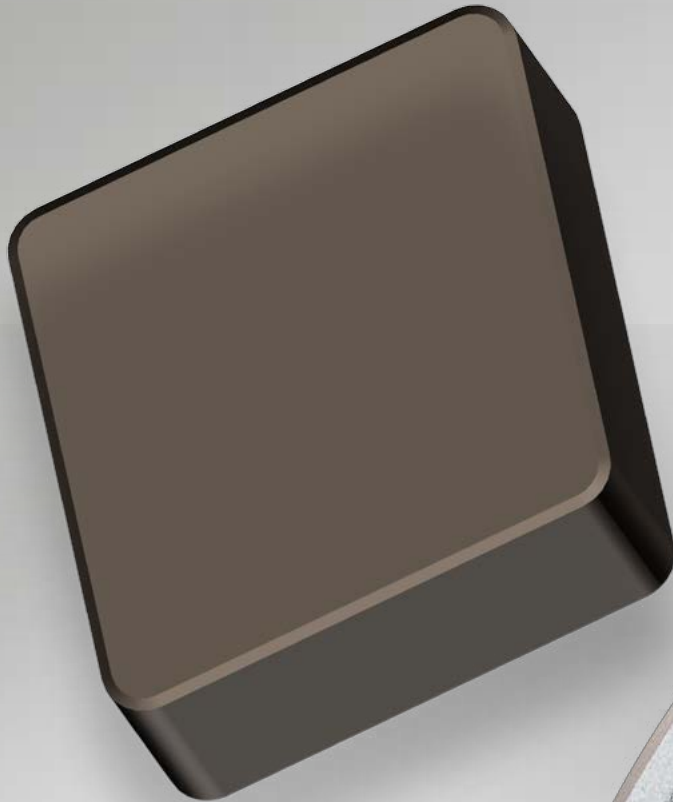
combined internal and external machining



BRAKES Brake disc

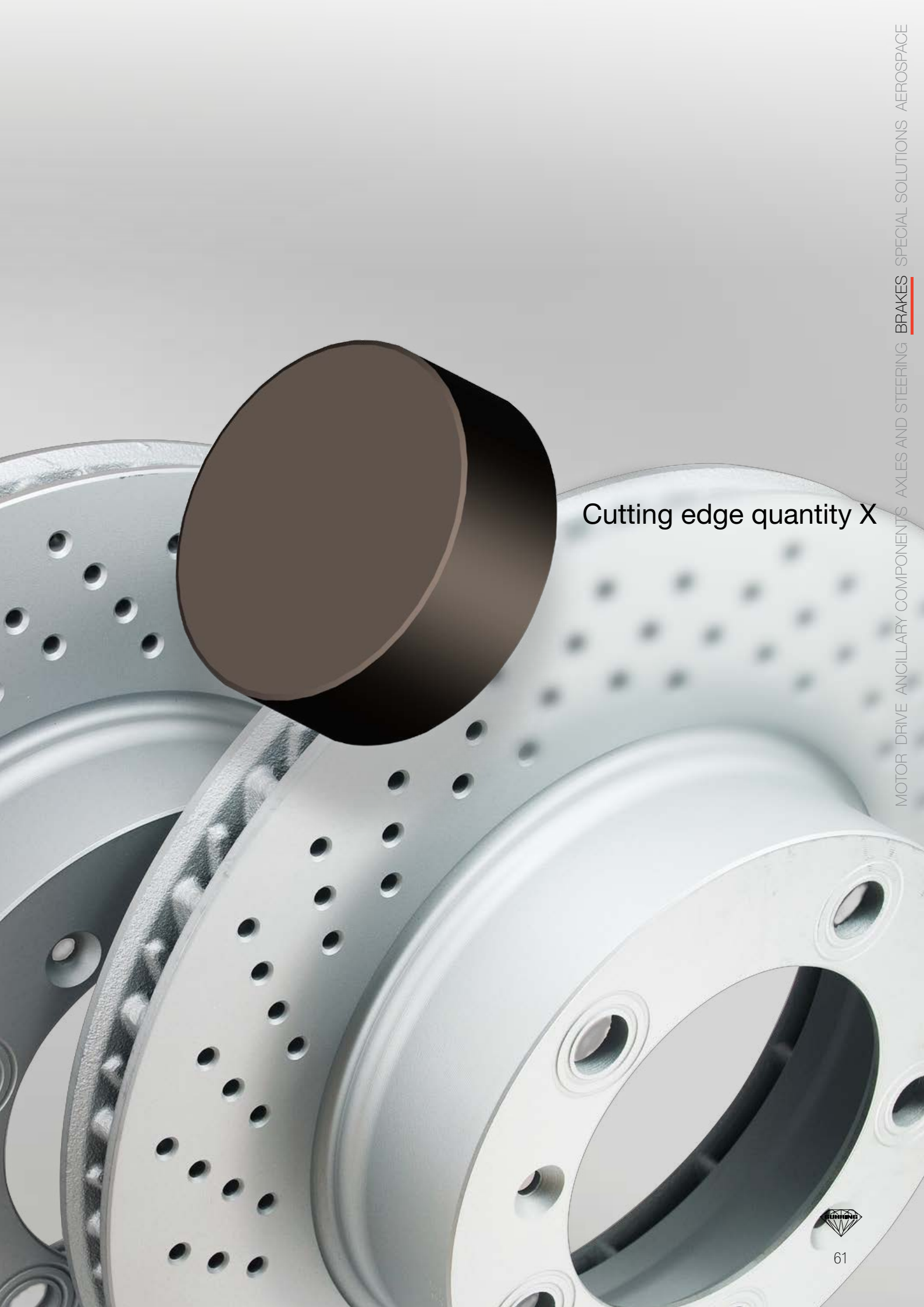
SOLID CBN INDEXABLE INSERTS

Machining:	brake discs/rolls
Material to be machined:	GG/hardened steels
Holding in:	clamping holder
Cooling:	soluble oil or dry machining



8 Cutting edge corners





Cutting edge quantity X



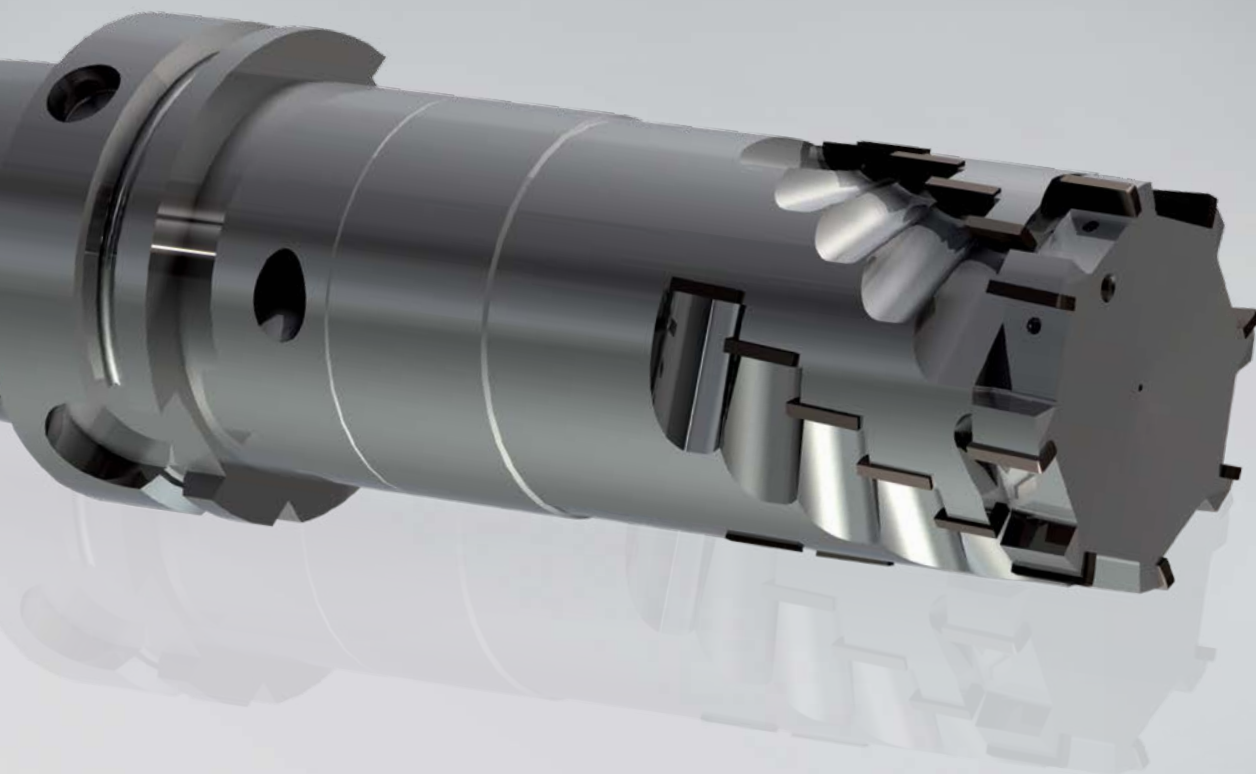
SPECIAL S

SPECIAL SOLUTIONS FOR INDIVIDUAL REQUIREMENTS

Whether simultaneous machining of internal and external contours, the combination of several operating steps or special holes where no chips are allowed to enter inside the workpiece: For any machining task Guhring has an individual solution.

Complex tools from Guhring combine multiple machining steps into one tooling solution and thus save tools and tool change time.

Furthermore, Guhring has developed innovative tools in order to enable the use of PCD cutting edges for applications that so far this high-performance material has not been available for, as for example, PCD head-tipped reamers from Ø 2.5 mm.



OLUTIONS

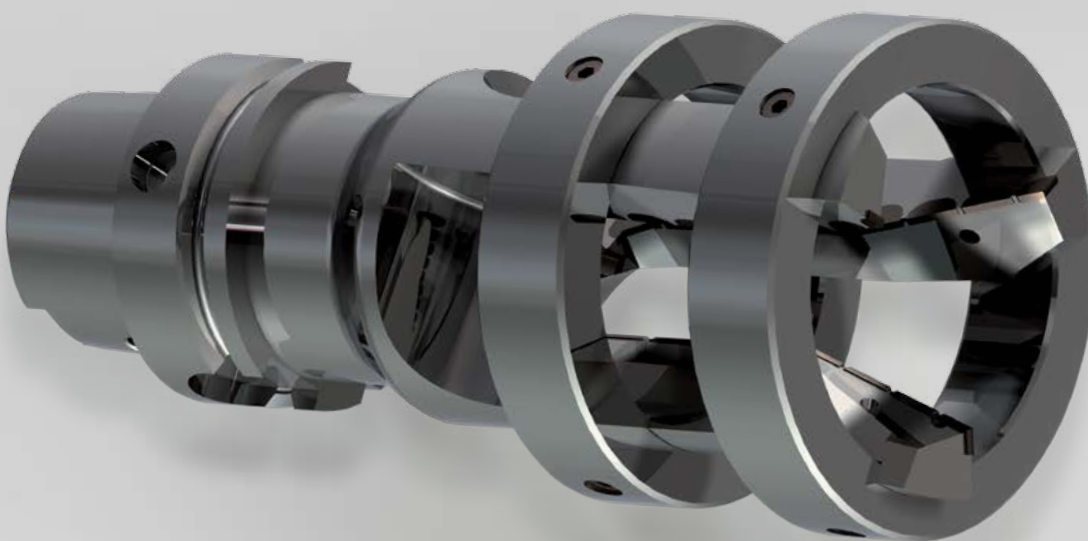


CONTOUR GANG HOB



Form inserts can be individually replaced.

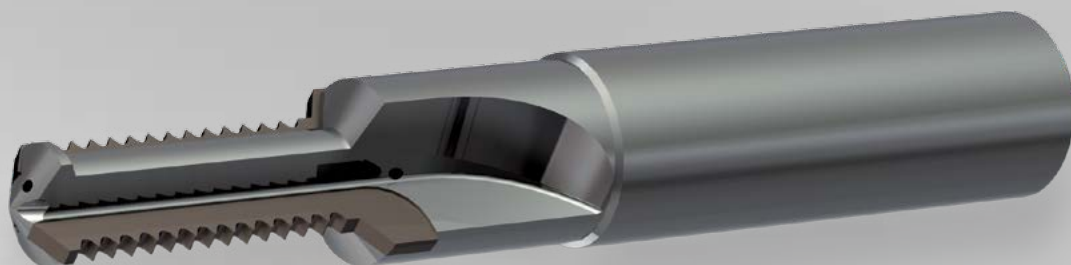
BELL MILLING CUTTER WITH EXTERNAL RING



Bell milling cutter with external ring for rigidity:
Ensuring maximum speed and quality.

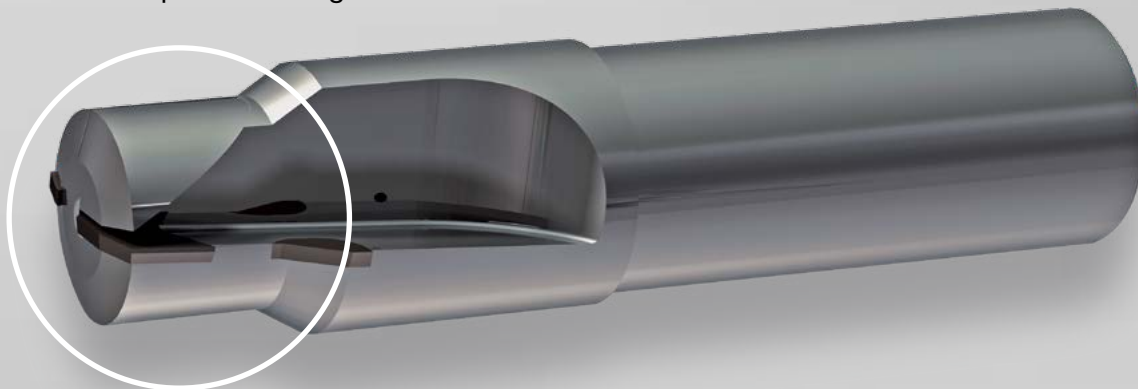


THREAD MILLING CUTTER



WATER JACKET BALL

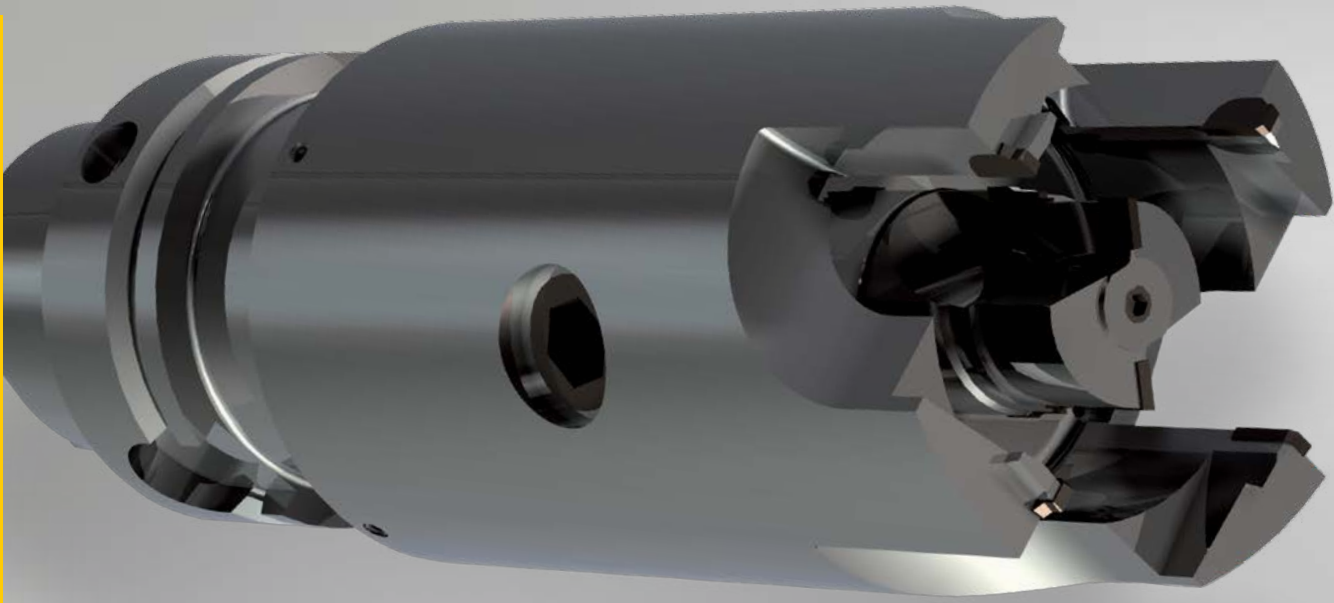
The risk of blocking the hole with chips is drastically minimised thanks to specially formed wedges and optimal cooling.



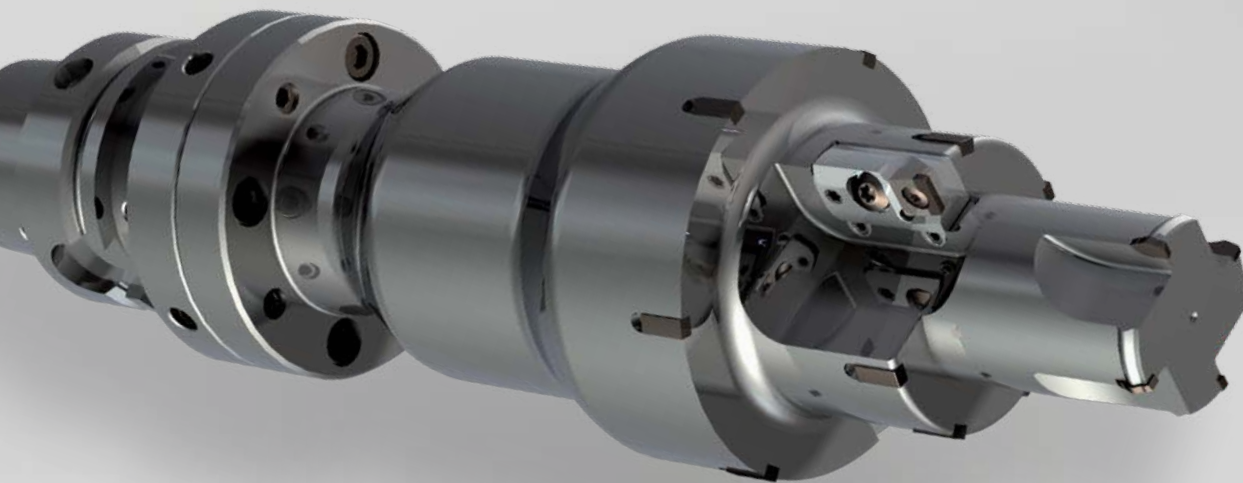
SPECIAL SOLUTIONS

06

INTERNAL AND EXTERNAL MACHINING



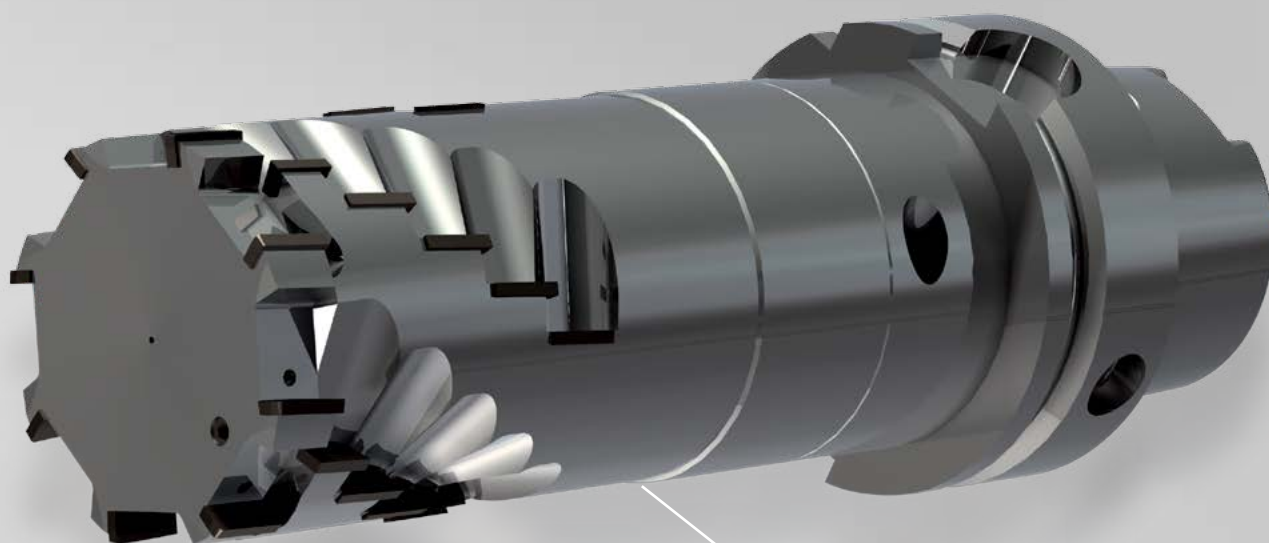
REAMERS COMBINED WITH INSERT MILLING CUTTERS



MILLING CUTTER WITH INTERCHANGEABLE HEAD

The two-piece milling cutter consists of an interchangeable head and a chuck. Instead of replacing the complete milling cutter, the head can be replaced in seconds when required.

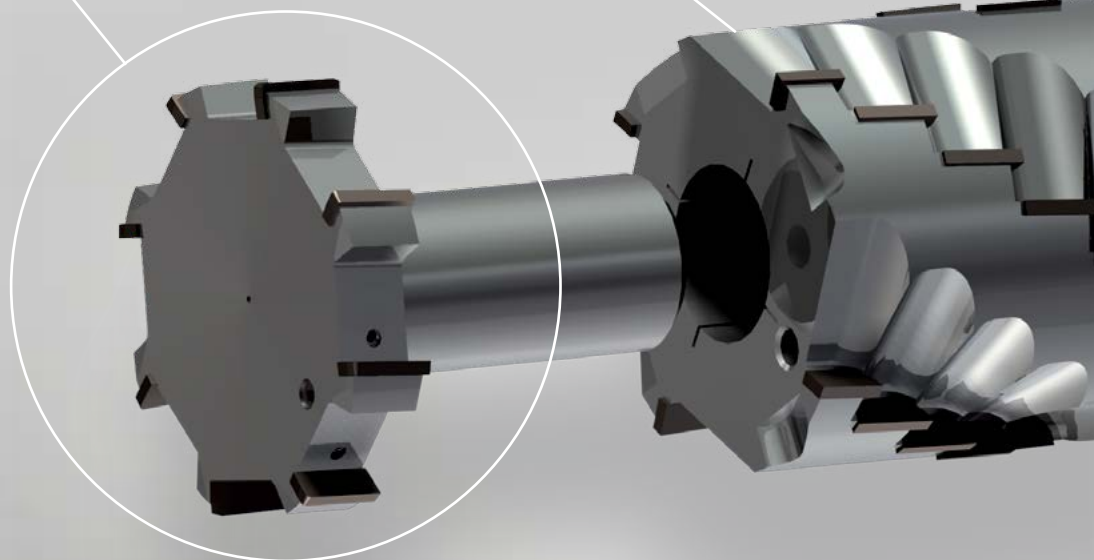
A locating pin prevents the cutting edges of the milling head coming into contact with the basic body and the risk of edge damage. Accurate concentricity is ensured thanks to axial and radial adjustment as well as the extreme clamping force. tool and workpiece wear is minimised.



Interchangeable head

Basic body

GUHRING
Milling cutter with
interchangeable head

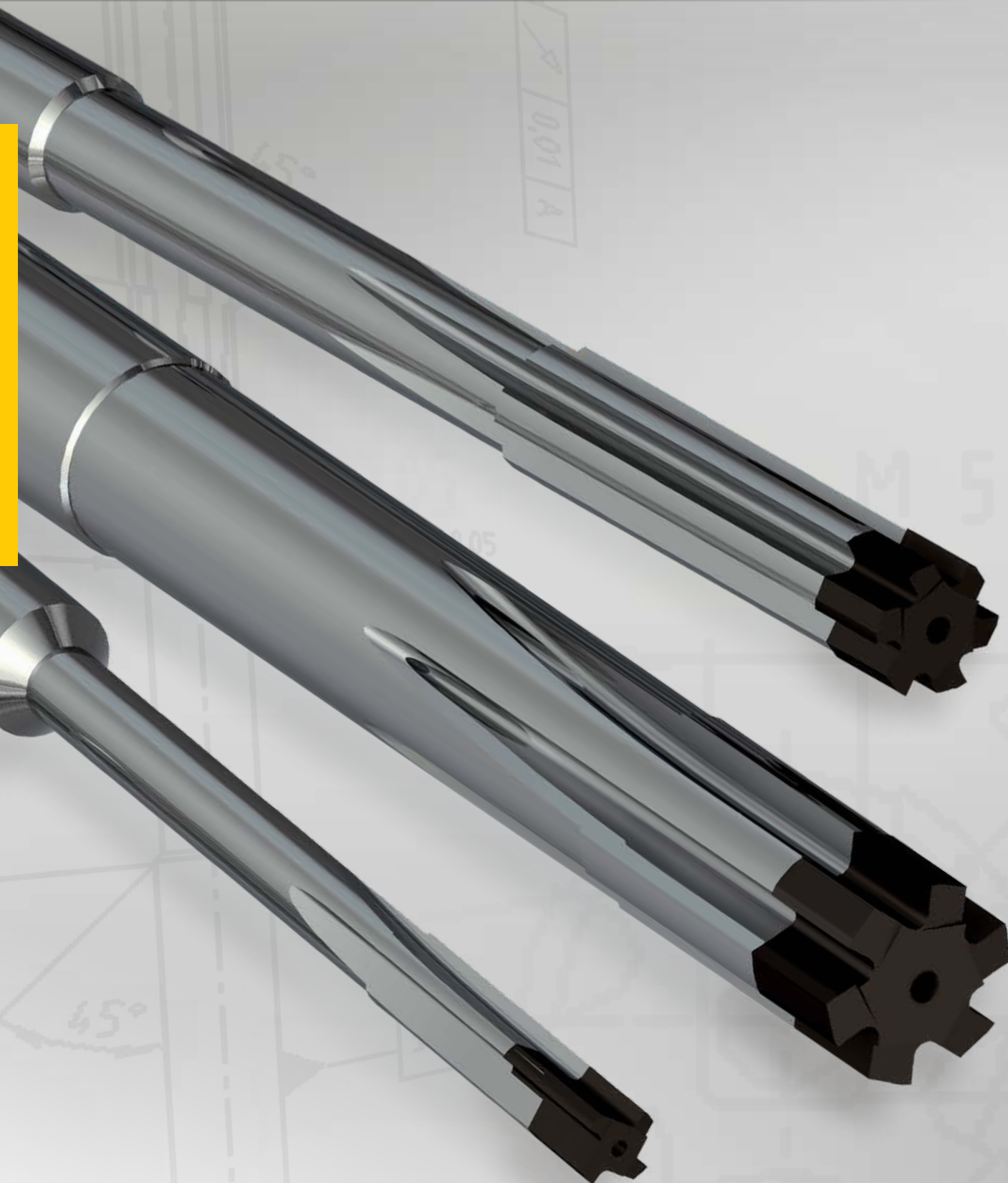


Possible from Ø 32 mm to Ø 100 mm.
The head performs the main machining function.



SPECIAL SOLUTIONS

PCD/CBN REAMERS



PCD/CBN reamers:

Small diameters with multiple cutting edges

Up to now, the miniaturisation of multi-fluted reamers with PCD or CBN cutting edges has set the manufacturers difficult boundaries. However, these have now been crossed by Guhring and makes the machining of small diameters possible with the highest accuracy ($\geq IT6$) and a large number of cutting edges.

With immediate effect, Guhring now supplies PCD- or CBN-tipped reamers from

- **Ø 2.0 mm with 4 cutting edges**
- **Ø 3.0 mm with 6 cutting edges**

For the machining of blind holes the tools have a central coolant duct. The reamers for the machining of through holes have the coolant ducts exiting parallel to the cutting edge. This way, even in the smallest holes an optimal supply of coolant to the cutting edges with conventional cooling as well as with minimal quantity lubrication and an effective evacuation of the chips from the hole is ensured.

The combination of the small diameters, the large number of cutting edges and the effective internal cooling offers the user maximum performance for superfinishing small blind hole and through hole diameters with PCD- or CBN-tipped reaming tools!



AEROSPACE LIGHTWEIGHT

ECONOMICALLY MACHINING COMPOSITES

Composites, especially the way they are applied in the aerospace industry, convince with highest flexibility, stability, strength and low weight. Their properties, however, are found to have a tendency to delaminate that makes them difficult to machine.

PCD tools prevent the delamination of abrasive materials thanks to their extremely sharp and wear-resistant diamond cutting edges.

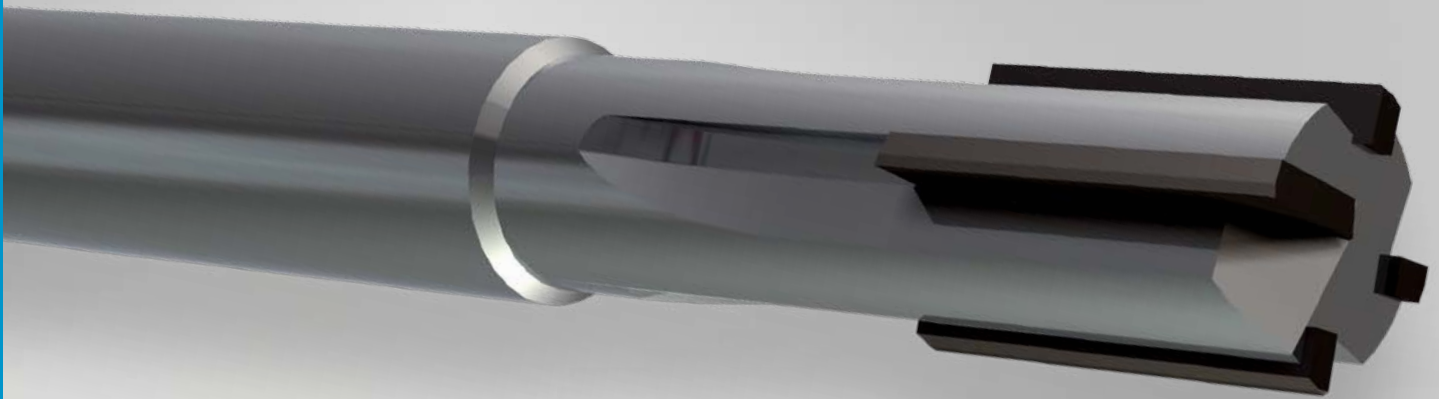


CONSTRUCTION

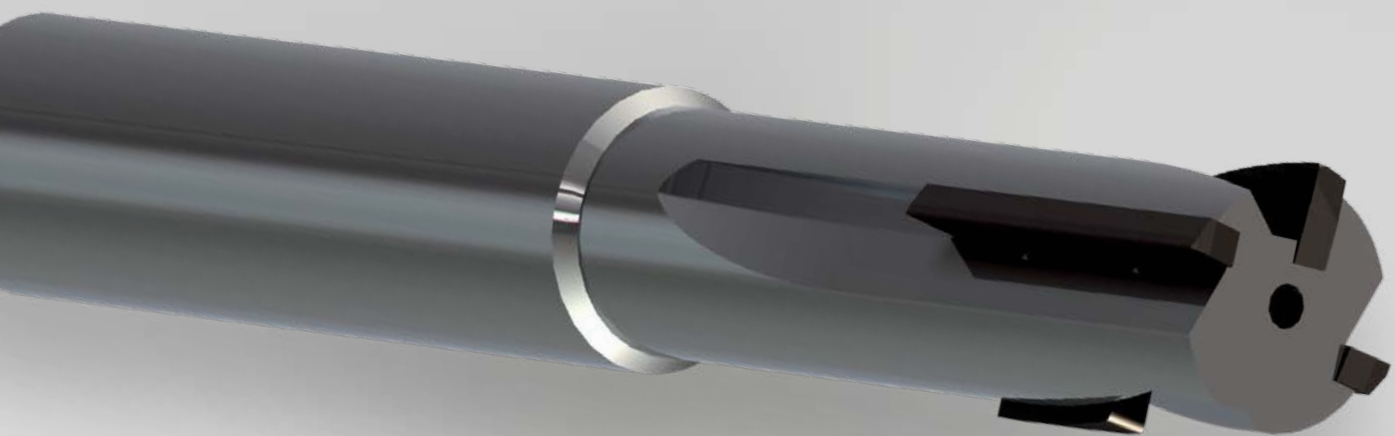


AEROSPACE LIGHTWEIGHT CONSTRUCTION

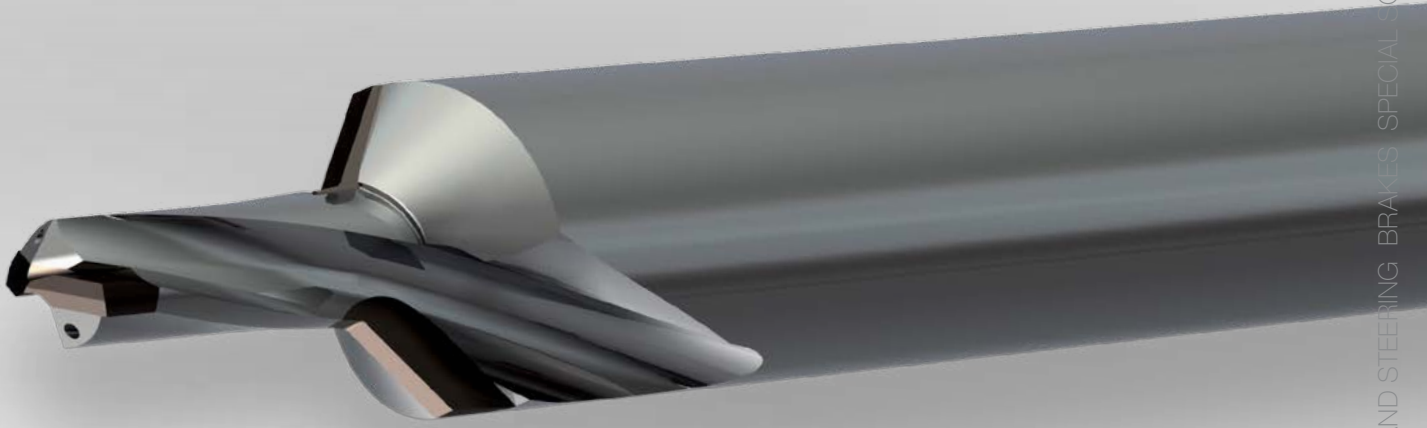
UPPER-LOWER SHELL MACHINING
ROUGHING AND FINISHING CUT



COMPRESSION MILLING CUTTER

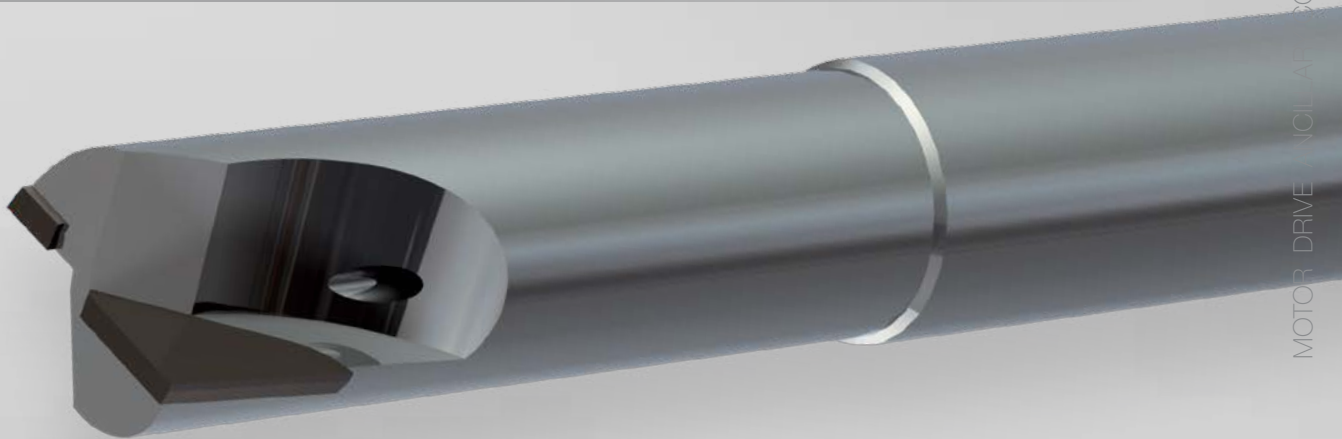


COUNTERSUNK-HEAD RIVET DRILL

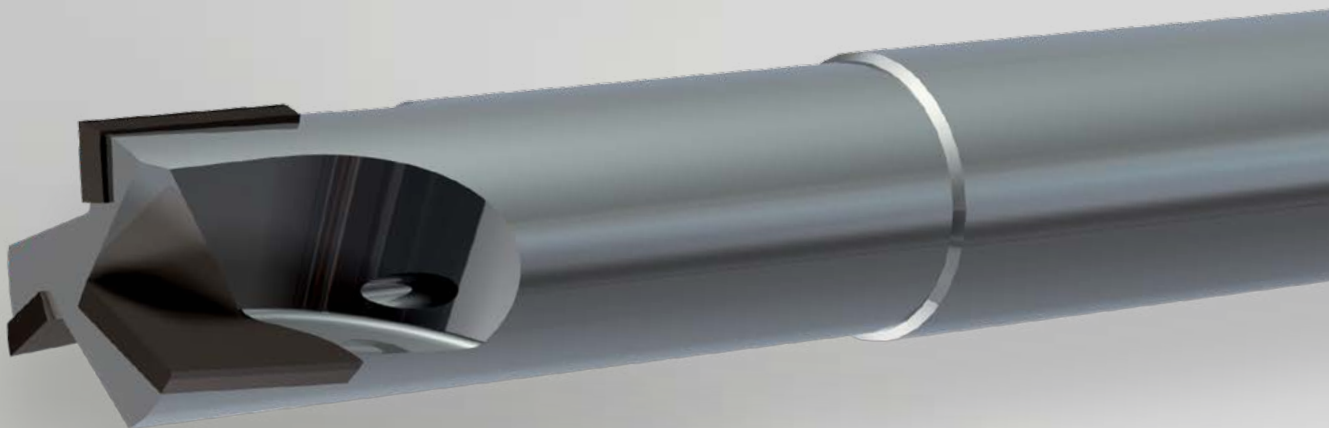


Ø 4 mm – 20 mm standard.
Smaller diameters are available on request.

SLOT DRILL (2-FLUTED)

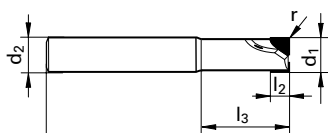


SLOT DRILL (3-FLUTED)



Slot drills (2-fluted)

	Guhring no.	5492
	Standard	Guhring std.
	Tool material	PCD
	Surface	bright
	Shank design	HA
	Helix	0°
	Cooling	axial
	Discount group	110

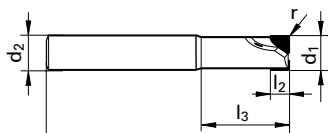


d1	d2	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm		
4.000	6.000	51.00	6.00	15.00	36.00	2	4,000
5.000	6.000	51.00	8.00	15.00	36.00	2	5,000
6.000	6.000	57.00	8.00	21.00	36.00	2	6,000
8.000	8.000	63.00	8.00	27.00	36.00	2	8,000
8.000	8.000	63.00	12.00	27.00	36.00	2	8,001
10.000	10.000	72.00	8.00	32.00	40.00	2	10,000
10.000	10.000	72.00	16.00	32.00	40.00	2	10,001
12.000	12.000	83.00	8.00	38.00	45.00	2	12,000
12.000	12.000	83.00	16.00	38.00	45.00	2	12,001
14.000	14.000	83.00	8.00	38.00	45.00	2	14,000
14.000	14.000	83.00	16.00	38.00	45.00	2	14,001
16.000	16.000	100.00	12.00	52.00	48.00	2	16,000
16.000	16.000	100.00	20.00	52.00	48.00	2	16,001
18.000	18.000	100.00	12.00	52.00	48.00	2	18,000
18.000	18.000	100.00	20.00	52.00	48.00	2	18,001
20.000	20.000	100.00	12.00	50.00	50.00	2	20,000
20.000	20.000	100.00	20.00	50.00	50.00	2	20,001

[illegible]

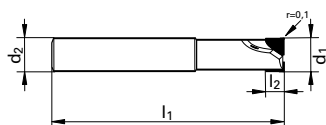
Slot drills (2-fluted)

	Guhring no.	5493
	Standard	Guhring std.
	Tool material	PCD
	Surface	bright
	Shank design	DZ
	Helix	0°
	Cooling	axial
	Discount group	110

[illegible]

Slot drills (2- and 3-fluted)

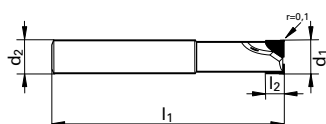
Guhring no.	3867
Standard	Guhring std.
Tool material	PCD
Surface	bright
Type	DL100
Shank design	HA
Helix	0°



d1	d2	l1	l2	Z	Code no.
inch	inch	inch	inch		
1/4	1/4	2 1/2	3/4	2	6.350
3/8	3/8	3	3/4	2	9.520
1/2	1/2	3	1	2	12.700
3/4	3/4	4	1	2	19.050

Availability
on request
on request
on request
on request

Guhring no.	3870
Standard	Guhring std.
Tool material	PCD
Surface	bright
Type	DL100
Shank design	HA
Helix	0°

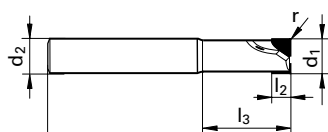


d1	d2	l1	l2	Z	Code no.
inch	inch	inch	inch		
3/8	3/8	3	1/2	3	9.520
1/2	1/2	3	1/2	3	12.700
3/4	3/4	3	1/2	3	19.050
1	1	4	1	3	25.400

Availability
on request
on request
on request
on request

Slot drills (3-fluted)

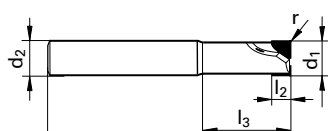
Guhring no.	5495
Standard	Guhring std.
Tool material	PCD
Surface	bright
Shank design	HA
Helix	0°
Cooling	axial
Discount group	110



d1	d2	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm		
14.000	14.000	83.00	8.00	38.00	45.00	3	14,000
14.000	14.000	83.00	16.00	38.00	45.00	3	14,001
16.000	16.000	100.00	12.00	52.00	48.00	3	16,000
16.000	16.000	100.00	20.00	52.00	48.00	3	16,001
18.000	18.000	100.00	12.00	52.00	48.00	3	18,000
18.000	18.000	100.00	20.00	52.00	48.00	3	18,001
20.000	20.000	100.00	12.00	50.00	50.00	3	20,000
20.000	20.000	100.00	20.00	50.00	50.00	3	20,001

Availability
●
●
●
●
●
●
●

Guhring no.	5496
Standard	Guhring std.
Tool material	PCD
Surface	bright
Shank design	DZ
Helix	0°
Cooling	axial
Discount group	110



d1	d2	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm		
14.000	14.000	100.00	8.00	38.00	62.00	3	14,000
14.000	14.000	100.00	16.00	38.00	62.00	3	14,001
16.000	16.000	150.00	12.00	52.00	98.00	3	16,000
16.000	16.000	150.00	20.00	52.00	98.00	3	16,001
18.000	18.000	150.00	12.00	52.00	98.00	3	18,000
18.000	18.000	150.00	20.00	52.00	98.00	3	18,001
20.000	20.000	150.00	12.00	50.00	100.00	3	20,000
20.000	20.000	150.00	20.00	50.00	100.00	3	20,001

Availability
●
●
●
●
●
●
●

STANDARD TOOLS AND ISO

HIGH-TECH EX-STOCK

The focus of Guhring's PCD production is customer and application specific special solutions.

Furthermore, standard tools with PCD cutting edges are available with immediate effect for conventional machining tasks or industrial solutions. The ISO-insert program also includes standard PCD inserts as well as short clamping holders for the cost-effective re-tipping of complex tools.

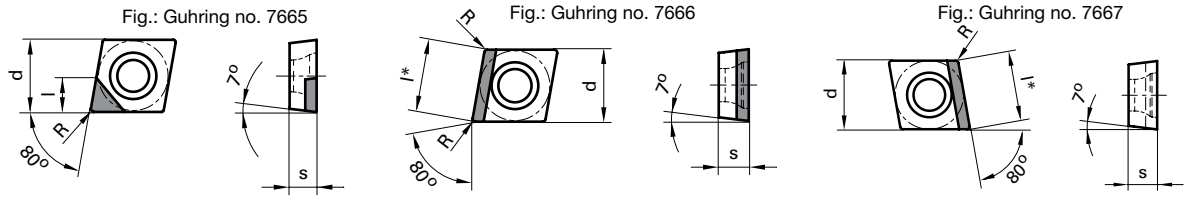


INSERTS


ISO indexable inserts PCD/CBN.....	page	80
ISO inserts for machining valve seat	page	86
Short clamping holders KV400.....	page	87
Threaded key adjustment unit	page	90
Indexable insert description	page	92
Tool materials PCD and CBN	page	96
Application recommendations for inserts.....	page	97
Cutting recommendations for inserts	page	98
Milling cutters	page	100
PF 1000 G face milling cutter	page	104
PF 1000 face milling cutter.....	page	105



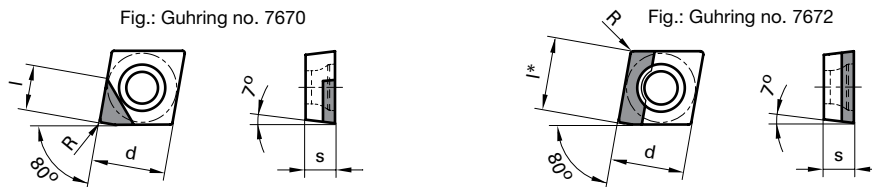
ISO indexable inserts, PCD-tipped, form C




* l: theoretical cutting point

Order no. = Guhring no. + code no.	ISO code	d mm	s mm	R mm	l/l* mm		Availability
7665 62,020	CCGW 060202 FN-AS	6.350	2.380	0.20	3.00	6128 2,501	●
7665 62,040	CCGW 060204 FN-AS	6.350	2.380	0.40	3.00	6128 2,501	●
7665 93,020	CCGW 09T302 FN-AS	9.525	3.970	0.20	4.00	6128 3,500	●
7665 93,040	CCGW 09T304 FN-AS	9.525	3.970	0.40	4.00	6128 3,500	●
7666 62,020	CCGW 060202 FL-AL	6.350	2.380	0.20	6.45	6128 2,501	●
7666 62,040	CCGW 060204 FL-AL	6.350	2.380	0.40	6.45	6128 2,501	●
7666 93,020	CCGW 09T302 FL-AL	9.525	3.970	0.20	9.67	6128 3,500	●
7666 93,040	CCGW 09T304 FL-AL	9.525	3.970	0.40	9.67	6128 3,500	●
7666 124,040	CCGW 120404 FL-AL	12.700	4.760	0.40	12.90	6128 5,001	●
7666 124,080	CCGW 120408 FL-AL	12.700	4.760	0.80	12.90	6128 5,001	●
7667 62,020	CCGW 060202 FR-AL	6.350	2.380	0.20	6.45	6128 2,501	●
7667 62,040	CCGW 060204 FR-AL	6.350	2.380	0.40	6.45	6128 2,501	●
7667 93,020	CCGW 09T302 FR-AL	9.525	3.970	0.20	9.67	6128 3,500	●
7667 93,040	CCGW 09T304 FR-AL	9.525	3.970	0.40	9.67	6128 3,500	●

ISO indexable inserts, PCD-tipped, form C, finishing geometry



* l: theoretical cutting point

Order no. = Guhring no. + code no.	ISO code	d mm	s mm	R mm	l/l* mm		Availability
7670 62,020	CCGW 060202 FL-AS	6.350	2.380	0.20	3.75	6128 2,501	●
7670 62,040	CCGW 060204 FL-AS	6.350	2.380	0.40	3.75	6128 2,501	●
7670 93,020	CCGW 09T302 FL-AS	9.525	3.970	0.20	5.64	6128 3,500	●
7670 93,040	CCGW 09T304 FL-AS	9.525	3.970	0.40	5.64	6128 3,500	●
7672 62,020	CCGW 060202 FL-AL	6.350	2.380	0.20	6.45	6128 2,501	●
7672 62,040	CCGW 060204 FL-AL	6.350	2.380	0.40	6.45	6128 2,501	●
7672 93,020	CCGW 09T302 FL-AL	9.525	3.970	0.20	9.67	6128 3,500	●
7672 93,040	CCGW 09T304 FL-AL	9.525	3.970	0.40	9.67	6128 3,500	●

ISO indexable inserts, PCD-tipped, form S

Fig.: Guhring no. 7674

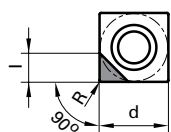


Fig.: Guhring no. 7675

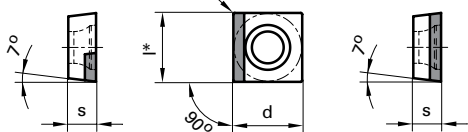


Fig.: Guhring no. 7676

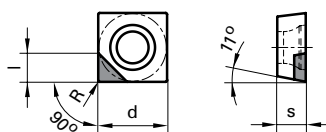
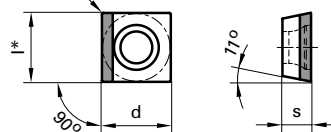



Fig.: Guhring no. 7677



* l: theoretical cutting point

Order no. = Guhring no. + code no.	ISO code	d mm	s mm	R mm	l/* mm		Availability
7674 93,020	SCGW 09T302 FN-AS	9.525	3.970	0.20	4.00	6128 3,500	●
7676 93,020	SPGW 09T302 FN-AS	9.525	3.970	0.20	4.00	6128 3,500	●
7675 93,020	SCGW 09T302 FN-AL	9.525	3.970	0.20	9.67	6128 3,500	●
7677 93,020	SPGW 09T302 FN-AL	9.525	3.970	0.20	9.67	6128 3,500	●

ISO indexable inserts, PCD-tipped, form T

Fig.: Guhring no. 7664

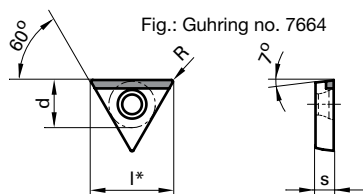
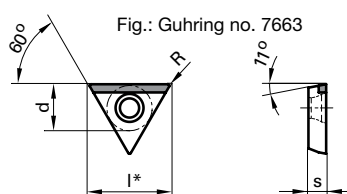



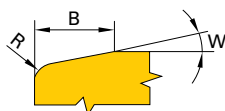
Fig.: Guhring no. 7663



* l: theoretical cutting point

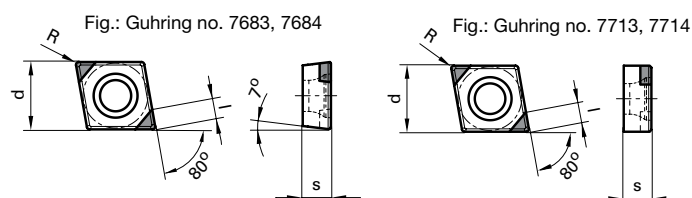
Order no. = Guhring no. + code no.	ISO code	d mm	s mm	R mm	l/* mm		Availability
7664 112,020	TCGW 110202 FN-AL	6.350	2.380	0.20	11.00	6128 2,501	●
7664 163,020	TCGW 16T302 FN-AL	9.525	3.970	0.20	16.50	6128 3,500	●
7663 92,020	TPGW 090202 FN-AL	5.560	2.380	0.20	9.60	6128 2,200	●


Cutting edge geometry



Type	Edge rounding R	Negative land width B	Negative land angle W
Type A	no	-	-
Type B	no	0,20	20°
Type C	yes	-	-
Type D	yes	0,10	10°
Type E	yes	0,10	20°
Type F	yes	0,13	15°
Type G	yes	0,15	20°
Type H	yes	0,13	25°
Type I	yes	0,20	20°

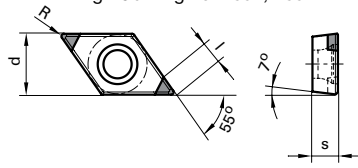
ISO indexable inserts, CBN-tipped, form C, with screw clamping




Order no. = Guhring no. + code no.		ISO code	Tool material	Cutting edge geometry	d mm	s mm	R mm	l mm		Availability
7683	62,040	CCGW 060204 TN-DS	CBN 1023	Type B	6.350	2.380	0.40	2.43	6128 2,501	●
7683	93,040	CCGW 09T304 TN-DS	CBN 1023	Type B	9.525	3.970	0.40	2.82	6128 3,500	●
7684	62,040	CCGW 060204 TN-DS	CBN 2028	Type B	6.350	2.380	0.40	2.43	6128 2,501	●
7684	93,040	CCGW 09T304 TN-DS	CBN 2028	Type B	9.525	3.970	0.40	2.82	6128 3,500	●
7713	62,040	CNGW 060204 TN-DS	CBN 1023	Type B	6.350	2.380	0.40	2.43	6128 2,501	●
7713	93,040	CNGW 09T304 TN-DS	CBN 1023	Type B	9.525	3.970	0.40	2.82	6128 3,500	●
7714	62,040	CNGW 060204 TN-DS	CBN 2028	Type B	6.350	2.380	0.40	2.43	6128 2,501	●
7714	93,040	CNGW 09T304 TN-DS	CBN 2028	Type B	9.525	3.970	0.40	2.82	6128 3,500	●

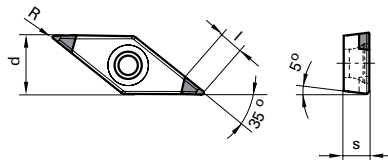
ISO indexable inserts, CBN-tipped, form D, with screw clamping


Fig.: Guhring no. 7691, 7692



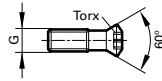
Order no. = Guhring no. + code no.		ISO code	Tool material	Cutting edge geometry	d mm	s mm	R mm	l mm		Availability
7691	72,020	DCGW 070202 TN-DS	CBN 1023	Type B	6.350	2.380	0.20	2.90	6128 2,501	●
7691	72,040	DCGW 070204 TN-DS	CBN 1023	Type B	6.350	2.380	0.40	2.90	6128 2,501	●
7691	113,040	DCGW 11T304 TN-DS	CBN 1023	Type B	9.525	3.970	0.40	3.00	6128 3,500	●
7691	113,080	DCGW 11T308 TN-DS	CBN 1023	Type B	9.525	3.970	0.80	2.50	6128 3,500	●
7692	72,020	DCGW 070202 TN-DS	CBN 2028	Type B	6.350	2.380	0.20	2.90	6128 2,501	●
7692	72,040	DCGW 070204 TN-DS	CBN 2028	Type B	6.350	2.380	0.40	2.90	6128 2,501	●
7692	113,040	DCGW 11T304 TN-DS	CBN 2028	Type B	9.525	3.970	0.40	3.00	6128 3,500	●
7692	113,080	DCGW 11T308 TN-DS	CBN 2028	Type B	9.525	3.970	0.80	2.50	6128 3,500	●

ISO indexable inserts, CBN-tipped, form V, with screw clamping



Order no. = Guhring no. + code no.		ISO code	Tool material	Cutting edge geometry	d mm	s mm	R mm	l mm		Availability
7717	164,040	VBMW 160404 TN-DSWiper	CBN 1023	Type D	9.525	4.760	0.40	4.00	6128 3,500	●
7718	164,040	VBMW 160404 TN-DSWiper	CBN 2028	Type D	9.525	4.760	0.40	4.00	6128 3,500	●
7719	164,080	VBMW 160408 TN-DS	CBN 1023	Type D	9.525	4.760	0.80	3.30	6128 3,500	●
7719	164,120	VBMW 160412 TN-DS	CBN 1023	Type D	9.525	4.760	1.20	2.40	6128 3,500	●
7720	164,080	VBMW 160408 TN-DS	CBN 1023	Type G	9.525	4.760	0.80	3.30	6128 3,500	●
7720	164,120	VBMW 160412 TN-DS	CBN 1023	Type G	9.525	4.760	1.20	2.40	6128 3,500	●
7721	164,080	VBMW 160408 TN-DS	CBN 2028	Type D	9.525	4.760	0.80	3.30	6128 3,500	●
7721	164,120	VBMW 160412 TN-DS	CBN 2028	Type D	9.525	4.760	1.20	2.40	6128 3,500	●
7722	164,080	VBMW 160408 TN-DS	CBN 2028	Type G	9.525	4.760	0.80	2.40	6128 3,500	●
7722	164,120	VBMW 160412 TN-DS	CBN 2028	Type G	9.525	4.760	1.20	2.40	6128 3,500	●

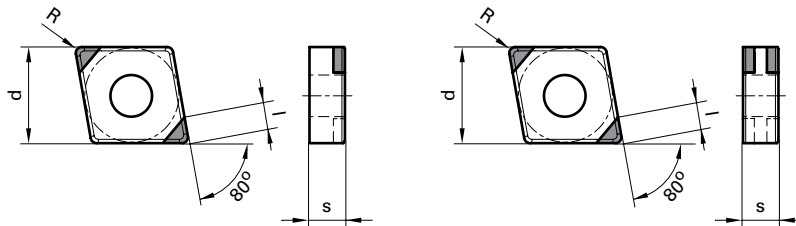
Clamping screws for ISO indexable inserts



Order no. = Guhring no. + code no.		Screw	Torx	Tightening torque max. in Ncm	Availability
6128	2,200	M 2.2 x 5.0	T6	101	●
6128	2,500	M 2.5 x 5.3	T7	128	●
6128	2,501	M 2.5 x 6.5	T7	128	●
6128	2,502	M 2.5 x 5.7	T7	128	●
6128	3,500	M 3.5 x 10.0	T15	345	●
6128	3,501	M 3.5 x 12.0	T15	345	●
6128	3,502	M 3.5 x 8.5	T15	345	●
6128	3,503	M 3.5 x 8.0	T15	345	●
6128	4,000	M 4.0 x 13.5	T15	515	●
6128	4,001	M 4.0 x 8.4	T15	515	●
6128	4,002	M 4.0 x 10.8	T15	515	●
6128	4,003	M 4.0 x 0.5 x 11.0	T15	515	●
6128	4,004	M 4.0 x 9.5	T20	515	●
6128	4,005	M 4.0 x 0.5 x 9.0	T15	515	●
6128	4,500	M 4.5 x 11.0	T15	760	●
6128	4,501	M 4.5 x 7.5	T15	760	●
6128	4,502	M 4.5 x 11.0	T20	760	●
6128	5,000	M 5.0 x 17.0	T20	1020	●
6128	5,001	M 5.0 x 11.0	T20	1020	●

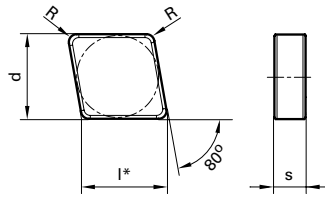
Tightening torque is for screws of strength grade 12.9 and results from a 90% yield point utilisation and is based on a mean friction value of 0.14μ.

ISO indexable inserts, CBN-tipped, form C, with hole clamping, with solid carbide body



Order no. = Guhring no. + code no.		ISO code	Tool material	Cutting edge geometry	d mm	s mm	R mm	l mm	Availability
7685	124,080	CNMA 120408 TN-DS	CBN 1023	Type B	12.70	4.760	0.80	3.33	●
7685	124,120	CNMA 120412 TN-DS	CBN 1023	Type B	12.70	4.760	1.20	3.25	●
7686	124,080	CNMA 120408 TN-DS	CBN 2028	Type B	12.70	4.760	0.80	3.33	●
7686	124,120	CNMA 120412 TN-DS	CBN 2028	Type B	12.70	4.760	1.20	3.25	●
7687	124,080	CNMA 120408 TN-LS	CBN 1023	Type B	12.70	4.760	0.80	3.33	●
7687	124,120	CNMA 120412 TN-LS	CBN 1023	Type B	12.70	4.760	1.20	3.25	●
7688	124,080	CNMA 120408 TN-LS	CBN 2028	Type B	12.70	4.760	0.80	3.33	●
7688	124,120	CNMA 120412 TN-LS	CBN 2028	Type B	12.70	4.760	1.20	3.25	●

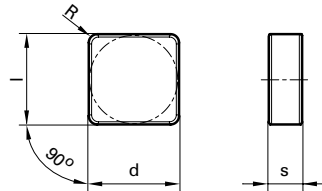
ISO indexable inserts, solid CBN, form C



* l: theoretical cutting point

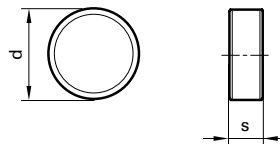
Order no. = Guhring no. + code no.		ISO code	Tool material	Cutting edge geometry	d mm	s mm	R mm	l* mm	Availability
7689	94,080	CNGN 090408 TN-S	CBN 3018	Type B	9.525	4.760	0.80	9.67	●
7689	94,120	CNGN 090412 TN-S	CBN 3018	Type B	9.525	4.760	1.20	9.67	●
7689	124,120	CNGN 120412 TN-S	CBN 3018	Type B	12.70	4.760	1.20	12.90	●
7689	124,160	CNGN 120416 TN-S	CBN 3018	Type B	12.70	4.760	1.60	12.90	●

ISO indexable inserts, solid CBN, form S



Order no. = Guhring no. + code no.		ISO code	Tool material	Cutting edge geometry	d mm	s mm	R mm	l mm	Availability
7690	94,080	SNGN 090408 TN-S	CBN 3018	Type B	9.525	4.760	0.80	9.525	●
7690	94,120	SNGN 090412 TN-S	CBN 3018	Type B	9.525	4.760	1.20	9.525	●
7690	124,120	SNGN 120412 TN-S	CBN 3018	Type B	12.70	4.760	1.20	12.70	●
7690	124,160	SNGN 120416 TN-S	CBN 3018	Type B	12.70	4.760	1.60	12.70	●

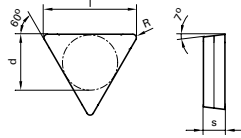
ISO indexable inserts, solid CBN, form R



Order no. = Guhring no. + code no.		ISO code	Tool material	Cutting edge geometry	d mm	s mm	R mm	l mm	Availability
7715	124,000	RNGN 120400 TN-S	CBN 3018	Type B	12.70	4.760	-	-	●

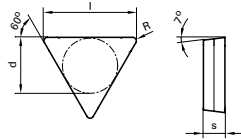
ISO inserts for machining valve seat

ISO full-face inserts, CBN, form T, for machining valve seats, for GP 100 system



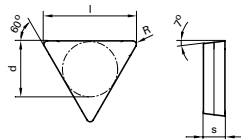
Order no. = Guhring no. + code no.	ISO code	Tool material	Surface	Cutting edge geometry	d mm	s mm	R mm	l mm	Availability
7703 61,020	TCCN 060102 FN-F	CBN 1023	○ bright	Type A	3.968	1.590	0.20	6.876	●
7703 61,040	TCCN 060104 FN-F	CBN 1023	○ bright	Type A	3.968	1.590	0.40	6.876	●
7704 61,020	TCCN 060102 FN-F	CBN 2028	○ bright	Type A	3.968	1.590	0.20	6.876	●
7704 61,040	TCCN 060104 FN-F	CBN 2028	○ bright	Type A	3.968	1.590	0.40	6.876	●
7678 61,020	TCCN 060102 EN-F	CBN 1023	Ⓢ TiN	Type C	3.968	1.590	0.20	6.876	●
7678 61,040	TCCN 060104 EN-F	CBN 1023	Ⓢ TiN	Type C	3.968	1.590	0.40	6.876	●
7705 92,040	TCCN 090204 EN-F	CBN 1024	Ⓢ TiN	Type C	5.556	2.380	0.40	9.525	●
7706 92,040	TCCN 090204 EN-F	CBN 2026	Ⓢ TiN	Type C	5.556	2.380	0.40	9.525	●
7679 61,020	TCCN 060102 EN-F	CBN 2028	Ⓢ TiN	Type C	3.968	1.590	0.20	6.876	●
7679 61,040	TCCN 060104 EN-F	CBN 2028	Ⓢ TiN	Type C	3.968	1.590	0.40	6.876	●
7679 92,040	TCCN 090204 EN-F	CBN 2028	Ⓢ TiN	Type C	5.556	2.380	0.40	9.525	●
7707 61,020	TCCN 060102 SN-F	CBN 1023	Ⓢ TiN	Type E	3.968	1.590	0.20	6.876	●
7707 61,040	TCCN 060104 SN-F	CBN 1023	Ⓢ TiN	Type E	3.968	1.590	0.40	6.876	●
7708 61,020	TCCN 060102 SN-F	CBN 2028	Ⓢ TiN	Type E	3.968	1.590	0.20	6.876	●
7708 61,040	TCCN 060104 SN-F	CBN 2028	Ⓢ TiN	Type E	3.968	1.590	0.40	6.876	●
7680 61,020	TCCN 060102 SN-F	CBN 1023	Ⓢ TiN	Type I	3.968	1.590	0.20	6.876	●
7680 61,040	TCCN 060104 SN-F	CBN 1023	Ⓢ TiN	Type I	3.968	1.590	0.40	6.876	●
7709 92,040	TCCN 090204 SN-F	CBN 1024	Ⓢ TiN	Type I	5.556	2.380	0.40	9.525	●
7710 92,040	TCCN 090204 SN-F	CBN 2026	Ⓢ TiN	Type I	5.556	2.380	0.40	9.525	●
7681 61,020	TCCN 060102 SN-F	CBN 2028	Ⓢ TiN	Type I	3.968	1.590	0.20	6.876	●
7681 61,040	TCCN 060104 SN-F	CBN 2028	Ⓢ TiN	Type I	3.968	1.590	0.40	6.876	●
7681 92,040	TCCN 090204 SN-F	CBN 2028	Ⓢ TiN	Type I	5.556	2.380	0.40	9.525	●

ISO full-face inserts, PCD, form T, for machining valve seats, for GP 100 system



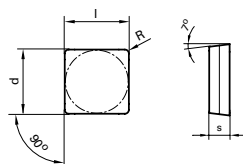
Order no. = Guhring no. + code no.	ISO-Code	Tool material	Surface	Cutting edge geometry	d mm	s mm	R mm	l mm	Availability
7712 61,020	TCCN 060102 FN-F	PCD	○ bright	Type A	3.968	1.590	0.20	6.876	●
7712 61,040	TCCN 060104 FN-F	PCD	○ bright	Type A	3.968	1.590	0.20	6.876	●

Solid carbide ISO inserts, form T, for machining valve seats, for GP 100 system



Order no. = Guhring no. + code no.	ISO-Code	Tool material	Surface	Cutting edge geometry	d mm	s mm	R mm	l mm	Availability
7711 61,020	TCCN 060102 FN-S	Solid carbide	○ bright	Type A	3.968	1.590	0.20	6.876	●
7711 61,040	TCCN 060104 FN-S	Solid carbide	○ bright	Type A	3.968	1.590	0.20	6.876	●

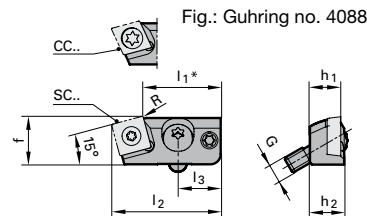
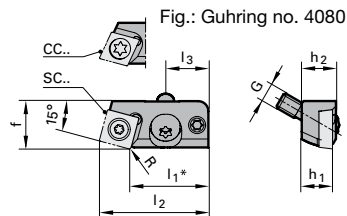
ISO full-face inserts, CBN, form S, for GP 100 system



Order no. = Guhring no. + code no.	ISO code	Tool material	Surface	Cutting edge geometry	d mm	s mm	R mm	l mm	Availability
7716 61,020	SCGN 060102 SN-F	CBN 2028	○ bright	Type I	6.35	1.590	0.20	6.35	●

Short clamping holders KV400

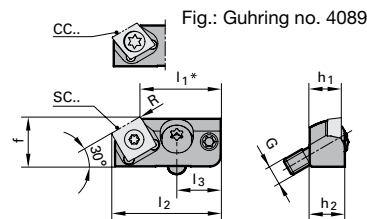
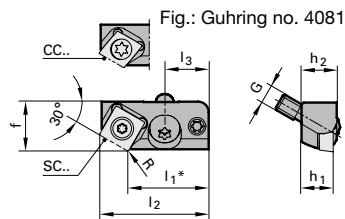
15°



* l: theoretical cutting point

Order no. = Guhring no. + code no.	Size	f mm	for indexable insert	l1* mm	l2 mm	l3 mm	G mm	h1 mm	h2 mm	R	Dmin	Availability
4080 6,000 06	06	9.5	CC..0602..	18.0	24.04	9.85	M3.5	6.3	7.3	0.2	31.0	●
4080 9,000 09	09	14.0	SC..09T3..	23.0	31.83	12.5	M5	9.0	10.0	0.4	41.0	●
4080 12,000 12	12	19.0	SC..1204..	30.0	41.89	16.1	M6	10.5	11.5	0.4	49.0	●
4088 6,000 06	06	9.5	CC..0602..	18.0	24.04	9.85	M3.5	6.3	7.3	0.2	31.0	●
4088 9,000 09	09	14.0	SC..09T3..	23.0	31.83	12.5	M5	9.0	10.0	0.4	41.0	●
4088 12,000 12	12	19.0	SC..1204..	30.0	41.89	16.1	M6	10.5	11.5	0.4	49.0	●

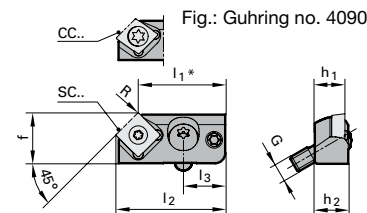
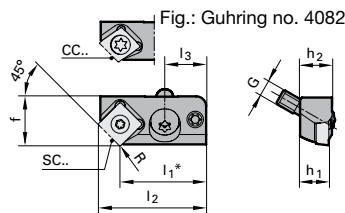
30°



* l: theoretical cutting point

Order no. = Guhring no. + code no.	Size	f mm	for indexable insert	l1* mm	l2 mm	l3 mm	G mm	h1 mm	h2 mm	R	Dmin	Availability
4081 6,000 06	06	9.5	CC..0602..	18.0	23.43	9.85	M3.5	6.3	7.3	0.2	26.0	●
4081 9,000 09	09	14.0	SC..09T3..	23.0	30.96	12.5	M5	9.0	10.0	0.4	36.0	●
4081 12,000 12	12	19.0	SC..1204..	30.0	40.71	16.1	M6	10.5	11.5	0.4	42.0	●
4089 6,000 06	06	9.5	CC..0602..	18.0	23.43	9.85	M3.5	6.3	7.3	0.2	26.0	●
4089 9,000 09	09	14.0	SC..09T3..	23.0	30.96	12.5	M5	9.0	10.0	0.4	36.0	●
4089 12,000 12	12	19.0	SC..1204..	30.0	40.71	16.1	M6	10.5	11.5	0.4	42.0	●

45°



* l: theoretical cutting point

Order no. = Guhring no. + code no.	Size	f mm	for indexable insert	l1* mm	l2 mm	l3 mm	G mm	h1 mm	h2 mm	R	Dmin	Availability
4082 6,000 06	06	9.5	CC..0602..	19.5	23.97	9.85	M3.5	6.3	7.3	0.2	26.0	●
4082 9,000 09	09	15.0	SC..09T3..	26.0	32.57	12.5	M5	9.0	10.0	0.4	36.0	●
4082 12,000 12	12	20.0	SC..1204..	34.0	42.81	16.1	M6	10.5	11.5	0.4	42.0	●
4090 6,000 06	06	9.5	CC..0602..	19.5	23.97	9.85	M3.5	6.3	7.3	0.2	26.0	●
4090 9,000 09	09	15.0	SC..09T3..	26.0	32.57	12.5	M5	9.0	10.0	0.4	36.0	●
4090 12,000 12	12	20.0	SC..1204..	34.0	42.81	16.1	M6	10.5	11.5	0.4	42.0	●

Short clamping holders KV400

Fig.: Guhring no. 4083

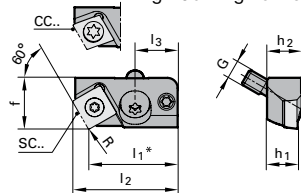
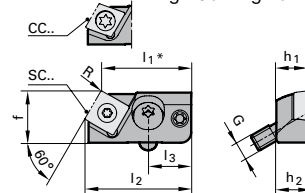


Fig.: Guhring no. 4091



* l: theoretical cutting point

60°

Order no. = Guhring no. + code no.	Size	f mm	for indexable insert	l1* mm	l2 mm	l3 mm	G mm	h1 mm	h2 mm	R	Dmin	Availability
4083 6,000 06	06	9.5	CC..0602..	19.5	22.72	9.85	M3.5	6.3	7.3	0.2	26.0	●
4083 9,000 09	09	15.0	SC..09T3..	26.0	30.76	12.5	M5	9.0	10.0	0.4	36.0	●
4083 12,000 12	12	20.0	SC..1204..	34.0	40.35	16.1	M6	10.5	11.5	0.4	42.0	●
4091 6,000 06	06	9.5	CC..0602..	19.5	22.72	9.85	M3.5	6.3	7.3	0.2	26.0	●
4091 9,000 09	09	15.0	SC..09T3..	26.0	30.76	12.5	M5	9.0	10.0	0.4	36.0	●
4091 12,000 12	12	20.0	SC..1204..	34.0	40.35	16.1	M6	10.5	11.5	0.4	42.0	●

Fig.: Guhring no. 4084

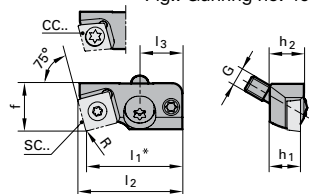
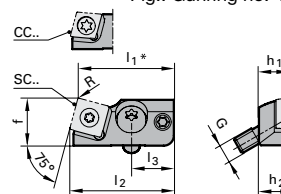


Fig.: Guhring no. 4092



* l: theoretical cutting point

75°

Order no. = Guhring no. + code no.	Size	f mm	for indexable insert	l1* mm	l2 mm	l3 mm	G mm	h1 mm	h2 mm	R	Dmin	Availability
4084 6,000 06	06	9.5	CC..0602.. R/N	20.0	21.76	9.85	M3.5	6.3	7.3	0.2	31.0	●
4084 9,000 09	09	14.0	SC..09T3.. L/N	28.0	30.66	12.5	M5	9.0	10.0	0.4	41.0	●
4084 12,000 12	12	19.0	SC..1204.. L/N	36.0	39.48	16.1	M6	10.5	11.5	0.4	49.0	●
4092 6,000 06	06	9.5	CC..0602.. L/N	20.0	21.76	9.85	M3.5	6.3	7.3	0.2	31.0	●
4092 9,000 09	09	14.0	SC..09T3.. R/N	28.0	30.66	12.5	M5	9.0	10.0	0.4	41.0	●
4092 12,000 12	12	19.0	SC..1204.. R/N	36.0	39.48	16.1	M6	10.5	11.5	0.4	49.0	●

Fig.: Guhring no. 4085

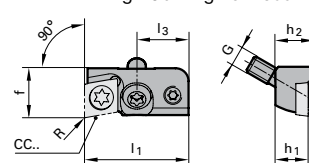
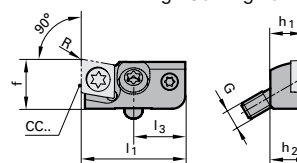


Fig.: Guhring no. 4093



90°

Order no. = Guhring no. + code no.	Size	f mm	for indexable insert	l1 mm	l2 mm	l3 mm	G mm	h1 mm	h2 mm	R	Dmin	Availability
4085 6,000 06	06	9.5	CC..0602.. L/N	20.0	—	9.85	M3.5	6.3	7.3	0.2	26.0	●
4085 9,000 09	09	14.0	CC..09T3.. L/N	28.0	—	12.5	M5	9.0	10.0	0.4	36.0	●
4085 12,000 12	12	19.0	CC..1204.. L/N	36.0	—	16.1	M6	10.5	11.5	0.4	42.0	●
4093 6,000 06	06	9.5	CC..0602.. R/N	20.0	—	9.85	M3.5	6.3	7.3	0.2	26.0	●
4093 9,000 09	09	14.0	CC..09T3.. R/N	28.0	—	12.5	M5	9.0	10.0	0.4	36.0	●
4093 12,000 12	12	19.0	CC..1204.. R/N	36.0	—	16.1	M6	10.5	11.5	0.4	42.0	●

Fig.: Guhring no. 4086

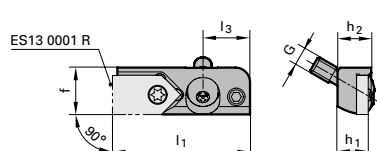
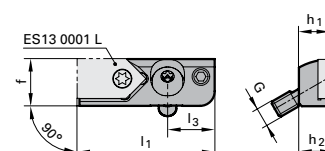


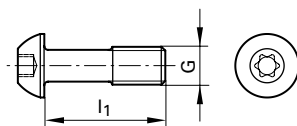
Fig.: Guhring no. 4094



for special
insert blanks

Order no. = Guhring no. + code no.	Size	f mm	for indexable insert	l1 mm	l2 mm	l3 mm	G mm	h1 mm	h2 mm	R	Dmin	Availability
4086 13,000 13	13	16.0	ES13 0001 N	47.0	—	16.1	M6	10.5	11.5	—	42.0	●
4094 13,000 13	13	16.0	ES13 0001 N	47.0	—	16.1	M6	10.5	11.5	—	42.0	●

Clamping screws for short clamping holders KV 400



Order no. = Guhring no. + code no.		Size	G	l ₁ mm	Torx	Tightening torque max. in Ncm	Availability
4059	3,501	06	M3.5	10.0	T 15	345	●
4059	5,001	09	M 5	14.7	T 20	900	●
4059	6,001	12	M 6	17.5	T 25	1300	●

Threaded pins for short clamping holders KV 400

Fig.: Guhring no. 4060

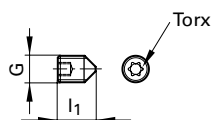
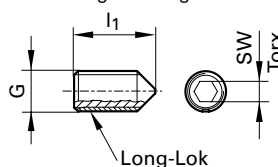
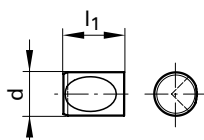


Fig.: Guhring no. 1689



Order no. = Guhring no. + code no.		Size	G	l ₁ mm	Torx	Availability
4060	3,501	06	M3.5x0.35	5	T 7	●
1689	5,003	09	M 5	6.0	T 15	●
1689	6,001	12	M6	8.0	SW 3	●

Adjustment screws for short clamping holders KV 400



Order no. = Guhring no. + code no.		Size	d mm	l ₁ mm	Availability
4058	3,502	06	3.5	6.2	●
4058	5,002	09	5.0	7.0	●
4058	6,002	12	6.0	8.7	●

Threaded key adjustment unit for direct installation of inserts

The threaded key adjustment enables the realisation of close stepped tools for finishing operations. A particular advantage is the simple adjustment possibility of the indexable inserts for the adjustment range 0.30 mm in diameter with every design. Depending on the insert position it is possible to carry out an axial as well as a radial adjustment,

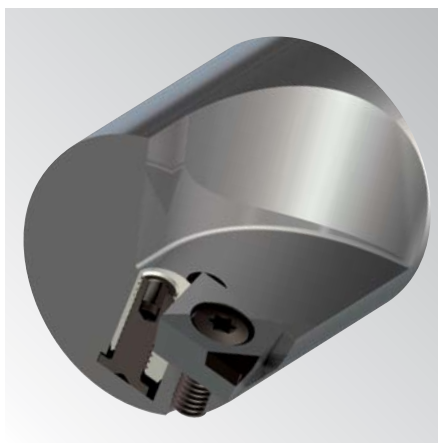
herewith adjusting the overall length as well as the diameter. Per right hand turn, the fine adjustment forces the insert into the adjustment direction.

Due to the small dimensions it is possible to produce tools from diameter 16.0 mm with insert size 06 (see table). Different basic insert forms can be applied, i.e. triangular, rhombic or square.

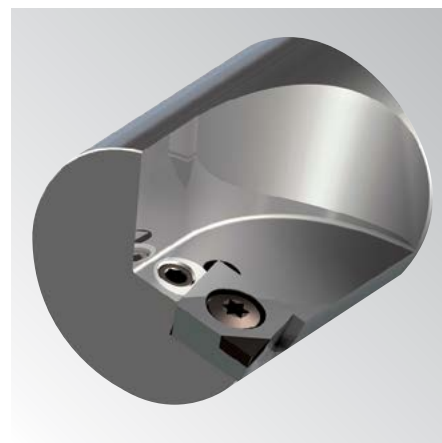
No. of edges	from tool Ø		
	index. insert 06	index. insert 09	index. insert 12
1	Ø 16 mm	Ø 29 mm	Ø 36 mm
2	Ø 23 mm	Ø 33 mm	Ø 44 mm
3	Ø 30 mm	Ø 44 mm	Ø 60 mm



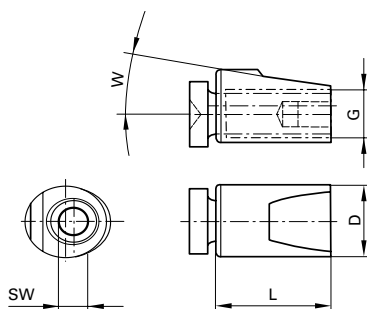
Easy:
The installation and fine adjustment...



...of a single fluted tool with indexable inserts...



...via threaded key.



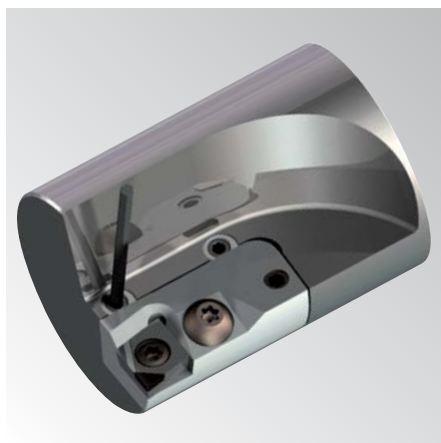
Order no. = Guhring no. + code no.		Size	for indexable inserts	D mm	G	L mm	W °	SW	Availability
4007	4,501	06	CC..06.. / SC..06..	4.5	M 3	5.5	7	1.5	●
4007	4,502	06	CP..06.. / SP..06..	4.5	M 3	5.5	11	1.5	●
4007	6,001	09	CC..09T3.. / SC..09T3.. / TC..1102..	6.0	M4x0.5	9.3	7	2.0	●
4007	6,002	09	CP..09T3.. / SP..09T3.. / TP..1102..	6.0	M4x0.5	9.3	11	2.0	●
4007	9,001	12	CC..1204.. / SC..1204.. / TC..16T3..	9.0	M6x0.5	12.7	7	3.0	●
4007	9,002	12	CP..1204.. / SP..1204.. / TP..16T3..	9.0	M6x0.5	12.7	11	3.0	●
4007	6,003	09	TC..0902..	6.0	M4x0.5	7.7	7	2.0	●
4007	6,004	09	TP..0902..	6.0	M4x0.5	5.8	11	2.0	●

Threaded key adjustment unit for KV 400 short clamping holders

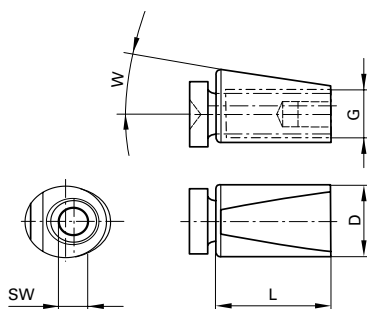
The combination of threaded key installation system, applying several adjustment and cartridge solution inserts in one machining cycle. offers the complete fine adjustment for diameter, length and tapering. Under ideal application conditions, stepped precision holes with quality IT7 can be produced with the direct as well as the cartridge

The resulting minimum machining diameters can be taken from the following table.

Short clamping holder size	No. of edges	D min for short clamping holders Guhring no.					
		4080	4081	4082	4083	4084	4085
		4088 15°	4089 30°	4090 45°	4091 60°	4092 75°	4093 90°
06	1	31	26	26	26	31	26
	2	31	29	29	29	31	29
	3	36	36	36	36	36	36
09	1	41	36	36	36	41	36
	2	41	41	42	42	41	41
	3	51	51	53	53	51	51
12	1	49	42	42	42	49	42
	2	55	55	57	57	55	55
	3	71	71	73	73	71	71


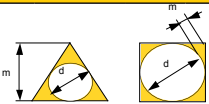

































Cartridge type installation:
The fine adjustment is located outside the cartridge with threaded key adjustment.



Order no. = Guhring no. + code no.	Size	for short clamping holder KV 400	D mm	G	L mm	W °	SW	Availability
4007 4,500	06	Size 06	4.5	M 3	5.5	11	1.5	●
4007 6,000	09	Size 09	6.0	M4x0.5	9.3	11	2.0	●
4007 9,000	12	Size 12	9.0	M6x0.5	12.7	11	3.0	●

Indexable insert description to DIN ISO 1832:2005-11

Insert form			Clearance angle		Tolerance					Insert type		Insert size / I/C diameter /									
																					
De-scrip-tion	Angle	Form	De-scrip-tion	Angle	Tolerance class in relation to inscribed circle		Limit dimensions			De-scrip-tion	Form	Size	Form	C	D	E	H	M	O		
A	85°		A	3°	A	-	0.025	0.005	0.025	A		03	I/C edge l. x)				6.350 3.666		7.940 3.288		
B	82°		B	5°	C	-	0.025	0.013	0.025	B		04	I/C edge l. x)	4.760 4.833	3.970 4.853	4.760 4.928	7.940 4.583	4.760 4.772	9.525 3.945		
C	80°										C		05	I/C edge l. x)	5.560 5.646	4.760 5.811	5.560 5.756	9.525 5.499	5.560 5.574	12.700 5.261	
D	55°				C	7°	E	-	0.025	0.025	0.025	F		06	I/C edge l. x)	6.350 6.448	5.560 6.788	6.350 6.574		6.350 6.366	15.875 6.576
E	75°		F	-			0.013	0.005	0.025	G		07	I/C edge l. x)		6.350 7.752		12.700 7.332	7.940 7.957	19.050 7.891		
H	120°		G	15°			G	-	0.025	0.025	0.130	H		08	I/C edge l. x)	7.940 8.060		7.940 8.218			
K	55°				H	-	0.013	0.013	0.025	J		09	I/C edge l. x)	9.525 9.672	7.940 9.691	9.525 9.861	15.875 9.165	9.525 9.548			
L	90°				J	4.76 - 9.25 12.7 15.875-19.05 25.4	0.050 0.080 0.100 0.130	0.005	0.025	K		10	I/C edge l. x)							25.400 10.521	
M	86°		F	25°	K	4.76 - 9.25 12.7 15.875-19.05 25.4	0.050 0.080 0.100 0.130	0.013	0.025	L		11	I/C edge l. x)		9.525 11.628		19.050 10.999				
O	135°				L	4.76 - 9.25 12.7 15.875-19.05 25.4	0.050 0.080 0.100 0.130	0.025	0.025	M		12	I/C edge l. x)	12.700 12.896				12.700 12.731			
P	108°				M	4.76 - 9.25 12.7 15.875-19.05 25.4	0.050 0.080 0.100 0.130	0.080 0.130 0.150 0.180	0.130	N		13	I/C edge l. x)			12.700 13.148				31.75 13.151	
R			N	0°	N	4.76 - 9.25 12.7 15.875-19.05 25.4	0.050 0.080 0.100 0.130	0.080 0.130 0.150 0.180	0.025	T		14	I/C edge l. x)		12.700 15.504			15.875 15.914			
S	90°				U	4.76 - 9.25 12.7 15.875-19.05 25.4	0.080 0.130 0.180 0.250	0.130 0.200 0.270 0.380	0.130	U		15	I/C edge l. x)	15.875 16.120		15.875 16.435					
T	60°				X	Special design			X		16	I/C edge l. x)									
V	35°		O	others						W		17	I/C edge l. x)								
W	80°										X	Special design	19	I/C edge l. x)	19.050 19.826	15.875 19.380	19.050 19.722		19.050 19.097		
C					C		G					W		09							

Exceptions

M+N form D	4.76 - 9.25 12.7 15.875 - 19.05 25.4	0.050 0.080 0.100 -	0.110	as above
M+N form V	6.35 7.94 9.525	0.050	0.160	as above

x) mathematical, theoretical value for a corner radius of 0.00 mm see also DIN 4988

Hole diameter/countersink diameter			
Diameter		Indexable insert with cylindrical hole to DIN 4988 insert type A, G, M	
Inner Circle	d1	d2	d1
4.760	2.150	2.700	-
5.560	2.500	3.300	-
6.000	2.800	3.750	-
6.350	2.800	3.750	2.260
7.940	3.400	4.500	-
8.000	3.400	4.500	-
9.525	4.400	6.000	3.810
10.000	4.400	6.000	-
12.000	4.400	6.000	-
12.700	5.500	7.500	5.160
15.875	5.500	7.500	6.350
16.000	5.500	7.500	-
19.050	6.500	9.000	7.940
20.000	6.500	9.000	-
25.000	8.600	12.000	-
25.400	8.600	12.000	9.120

edge length						
	P	R	S	T	V	W
						5.560 2.716
	6.350 4.614		4.760 4.760			6.350 4.344
	7.940 5.765		5.560 5.560			7.938 5.430
	9.525 6.920	6.350 6.00*)	6.350 6.350	3.970 6.876	3.970 6.921	9.525 6.515
		7.940	7.938 7.938			
		8.00*)		4.760 8.245	4.760 8.299	12.700 8.687
	12.700 9.227	9.525	9.525 9.525	5.560 9.630	5.560 9.694	
		10.00*)				15.875 10.859
	15.875 11.534			6.350 10.999	6.350 11.071	
		12.700 12.00*)	12.700 12.700			
	19.050 13.841			7.938 13.749	7.938 13.839	19.050 13.031
		15.875	15.875 15.875			
		16.00*)		9.525 16.498	9.525 16.606	
						25.400 17.375
		19.050	19.050 19.050			

Insert thickness	
Description	s mm
01	1.59
T1	1.98
02	2.38
03	3.18
T3	3.97
04	4.76
05	5.56
06	6.35
07	7.94
09	9.52
12	12.7
T3	

Cutting edge corner	
Description	Radius mm
00	sharp point / indication for round insert inch
M0	Indication for round insert metric
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
04	

Cutting edge corner design	
Description	Form
F	sharp
E	rounded
T	chamfer-red
S	chamfer-red + rounded
K	double chamfer-red
P	double chamfer-red + rounded
F	

Cutting direction	
Description	Form
R	right-hand
L	left-hand
N	neutral
R	

Fitting form	
Corner fitting (choice) S = short cutting edge	
AS	1 corner on one side e.g. C insert (1 cutting edge)
BS	2 corners on one side e.g. V insert (2 cutting edges)
CS	3 corners on one side e.g. T insert (3 cutting edges)
DS	4 corners on one side e.g. S insert (4 cutting edges)
KS	1 corner on two sides e.g. C insert (2 cutting edges)
LS	2 corners on two sides e.g. D insert (4 cutting edges)
MS	3 corners on two sides e.g. T insert (6 cutting edges)
NS	4 corners on two sides e.g. S insert (8 cutting edges)
Shank fitting (choice) L = long cutting edge	
AL	One cutting edge along the entire length
Entire surface	
S	Solid
F	Full-face
AS	

*) = Size to ISO 1832:2005-11 table A.2.
Round cutting inserts "metric" design.
Distinction see column cutting edge corner
(M0 = metric, 00 = inch)

	Planar chamfer
Setting angle Kr of main cutting edge in feed direction	Clearance angle of planar chamfer
A 45°	A 3°
D 60°	B 5°
E 75°	C 7°
F 85°	D 15°
P 90°	E 20°
Z *	F 25°
	G 30°
	N 0°
	P 11°
	Z *

*Special design

Note:
Overview is for information only.
No liability is accepted for the correctness of the contents.
Is not subject to modification.
Definitive data can be found in the respective standards.









Indexable insert description to ANSI (inch dimensions)

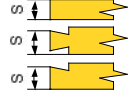
Insert form			Clearance angle		Tolerance				Insert type		Insert size						
Description	Angle	Form	Description	Angle	Tolerance class	Limit dim. (inch/mm)			Description	Form	Size	IC		C	D	E	H
						B±	A±	T±			inch	mm					
A	85°		A	3°	A	0.0002" 0.005	0.0010" 0.025	0.0010" 0.025	A		1.25	5/32"	3.969	4.030	4.845	4.109	2.292
B	82°				B	0.0002" 0.005	0.0010" 0.025	0.0050" 0.125	B		1.5	3/16"	4.763	4.836	5.815	4.931	2.750
C	80°		B	5°	C	0.0005" 0.013	0.0010" 0.025	0.0010" 0.025	C		1.75	7/32"	5.556	5.642	6.783	5.752	3.208
D	55°		C	7°	D	0.0005" 0.013	0.0010" 0.025	0.0050" 0.125	F		2	1/4"	6.350	6.448	7.752	6.574	3.666
E	75°				E	0.0010" 0.025	0.0010" 0.025	0.0010" 0.025	G		2.5	5/16"	7.938	8.060	9.691	8.218	4.583
H	120°		D	15°	F	0.0002" 0.005	0.0005" 0.013	0.0010" 0.025	H		3	3/8"	9.525	9.672	11.628	9.861	5.499
K	55°		E	20°	G	0.0010" 0.025	0.0010" 0.025	0.0050" 0.125	J		4	1/2"	12.700	12.896	15.504	13.148	7.332
L	90°				H	0.0005" 0.013	0.0005" 0.013	0.0010" 0.025	M		5	5/8"	15.875	16.120	19.380	16.435	9.165
M	86°		F	25°	J	0.0002" 0.005	*	0.0010" 0.025	N		6	3/4"	19.050	19.826	23.256	19.722	10.999
O	135°		G	30°	K	0.0010" 0.025	*	0.0010" 0.025	Q		8	1"	25.400	24.878	29.909	25.364	14.145
P	108°				L	0.0010" 0.025	*	0.0010" 0.025	R		10	1 1/4"	31.750	32.240	38.760	32.870	18.331
R			N	0°	M	*	*	0.0050" 0.125	T								
S	90°		P	11°	N	*	*	0.0010" 0.025	U								
T	60°				U	*	*	0.0050" 0.125	W								
V	35°		O	other	X	Special design			X								
W	80°																
C			C		G				W								

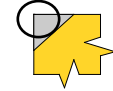
Edge length in mm

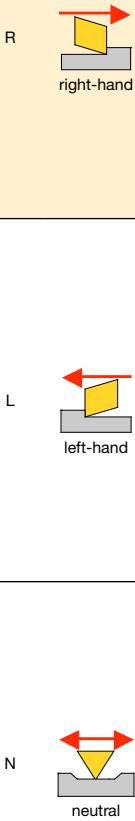
Extended tolerance specifications *

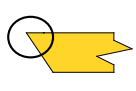
Insert form	Clear.-angle	Tolerance	3/16"	7/32"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1/ "
C, E, H, M, O, P, S, T, R, W	A	J, K, L, M, N	0.002" 0.051	0.002" 0.051	0.002" 0.051	0.002" 0.051	0.002" 0.051	0.003" 0.076	0.004" 0.102	0.004" 0.102	0.005" 0.127	0.006" 0.152
		U	0.003" 0.076	0.003" 0.076	0.003" 0.076	0.003" 0.076	0.003" 0.076	0.005" 0.127	0.007" 0.178	0.007" 0.178	0.010" 0.254	0.010" 0.254
	B	M, N	0.003" 0.076	0.003" 0.076	0.003" 0.076	0.003" 0.076	0.003" 0.076	0.005" 0.127	0.006" 0.152	0.006" 0.152	0.007" 0.178	0.008" 0.203
		U	0.005" 0.127	0.005" 0.127	0.005" 0.127	0.005" 0.127	0.005" 0.127	0.008" 0.203	0.011" 0.279	0.011" 0.279	0.015" 0.381	0.015" 0.381
D	A	J, K, L, M, N, U	0.002" 0.051	0.002" 0.051	0.002" 0.051	0.002" 0.051	0.002" 0.051	0.003" 0.076	0.004" 0.102	0.004" 0.102	0.004" 0.102	0.004" 0.102
	B	M, N, U	0.004" 0.102	0.004" 0.102	0.004" 0.102	0.004" 0.102	0.004" 0.102	0.006" 0.152	0.007" 0.178	0.007" 0.178	0.007" 0.178	0.007" 0.178

/ I/C diameter / edge length							
M	O	P	R	S	T	V	W
							
3.979	1.644	2.884	3.969	3.969	6.875	6.920	2.715
4.775	1.973	3.461	4.763	4.763	8.250	8.304	3.258
5.570	2.301	4.037	5.556	5.556	9.623	9.687	3.801
6.366	2.630	4.614	6.350	6.350	10.999	11.071	4.344
7.957	3.288	5.765	7.938	7.938	13.749	13.839	5.430
9.548	3.945	6.920	9.53	9.53	16.498	16.606	6.515
12.731	5.261	9.227	12.700	12.700	21.997	22.142	8.687
15.914	6.576	11.534	15.875	15.875	27.496	27.677	10.859
19.097	7.891	13.841	19.050	19.050	19.050	32.996	13.031
24.560	10.148	17.800	25.400	25.400	42.435	42.714	17.375
31.828	13.151	23.068	31.750	31.750	54.993	55.354	21.718
4							

Insert thickness		
		
Description	s inch	s mm
1	1/16"	1.59
1.2	5/64"	1.98
1.5	3/32"	2.38
2	1/8"	3.175
2.5	5/32"	3.97
3	3/16"	4.763
3.5	7/32"	5.56
4	1/4"	6.35
5	5/16"	7.938
6	3/8"	9.53
3		

Cutting edge corner		
		
Description	Radius	
	inch	mm
0	0"	0
0.2	0.004"	0.102
0.5	0.008"	0.203
1	1/64"	0.397
2	1/32"	0.798
3	3/64"	1.191
4	1/16"	1.588
5	5/64"	1.984
6	3/32"	2.381
7	7/64"	2.778
8	1/8"	3.175
1		

Cutting direction	
	
Description	
R	right-hand
L	left-hand
N	neutral
R	

Cutt. edge corner design	
	
Description	Form
F	sharp
E	rounded
T	chamfered
S	chamfered + rounded
K	double chamfered
P	double chamfered + rounded
F	

Comparison insert thickness		
Descr. ANSI	Descr. ISO	s mm
1	01	1.59
1.2	T1	1.98
1.5	02	2.38
2	03	3.18
2.5	T3	3.97
3	04	4.76
3.5	06	5.56
4	05	6.35
5	07	7.94

Comparison ANSI ISO - Radius		
Descr. ANSI	Descr. ISO	Radius mm
0	00	0
0.5	02	0.2
1	04	0.4
2	08	0.8
3	12	1.2
4	16	1.6
5	20	2.0
6	24	2.4
7	28	2.8

Tool materials PCD and CBN

It is not only the extreme hardness of superhard tool materials but also their high heat-resistance which enables highest cutting rates and increased productivity. One disadvantage is however their low toughness.

Economical application is only possible on extremely rigid machines and for a specific range of application.

Guhring description	Classification	Range of application, characteristics	Average grain size	Diamond content
PCD	Fine grain	Aluminium and AlSi-alloys <10%Si, magnesium alloys, brass, copper, bronze, wood composite materials, excellent cutting edge quality, high abrasion resistance, excellent surface qualities	2-4 µm	appr. 90 %
	Medium grain	Guhring standard grade AlSi-alloys <14%Si, copper alloys, graphite and graphite composite materials, wood composite materials, unsintered ceramic and carbide (<15% binding metal content) excellent abrasion resistance, good surface qualities	5-10 µm	appr. 92 %
	Coarse grain	Roughing and finishing applications AlSi-alloys >14%Si and other abrasive machining applications, MMC, sintered ceramic and carbide (<15% binding metal content), extreme abrasion resistance, high shock resistance, long tool life with acceptable to good surface quality	25 µm	appr. 94 %
	Mixed grain	Abrasive machining applications (i.e.: >14% AlSi-alloys, MMC, composite materials) highest wear resistance, excellent shock resistance, extreme abrasion resistance with good edge roughness, long tool life with very good surface quality	2-4 µm+ 25 µm	appr. 95 %
CBN 10..	Low CBN-content	CBN tool material with carbide base for finishing machining of, for example, case hardened steels, heat-treatable steels, tool steels, grey cast iron, suitable for continuous and interrupted cut applications (especially hard turning) with a chip removal <0.5mm, high pressure resistance, low thermal conductivity, excellent abrasion resistance, chemical stability, good shock toughness for high removal rates, excellent surface finish and long tool life	2 µm	50-65 % CBN-content
CBN 20..	High CBN-content with carbide base	CBN tool material with carbide base for the machining of, for example, pearlitic grey cast iron (> 45 HRC), hardened steel, tool and structural profile steels, powder metallurgic Fe-sinter materials, alloys on Ni/Cr basis (nickel base alloys - "Super-alloys") thermal sprayed alloy & hard coatings on Co-, Ni- und Fe-basis, suitable for continuous and interrupted cut applications with a medium chip removal (typical 0.5 - 1.5mm) high thermal conductivity, high break toughness, high surface qualities	2 µm	80-95 % CBN-content
CBN 30..	High CBN-content without carbide base	Solid CBN tool material without carbide base for rough machining of pearlitic grey cast iron, chilled cast iron (> 45 HRC), hardened steels with high break toughness, excellent wear resistance, very good chemical hardness, high specific removal rate For application in tool holders, drilling and boring tools, recessing tools as well as cutter heads with clamping element and negative rake angle geometry	15 µm	80-95 % CBN-content

Carbide application

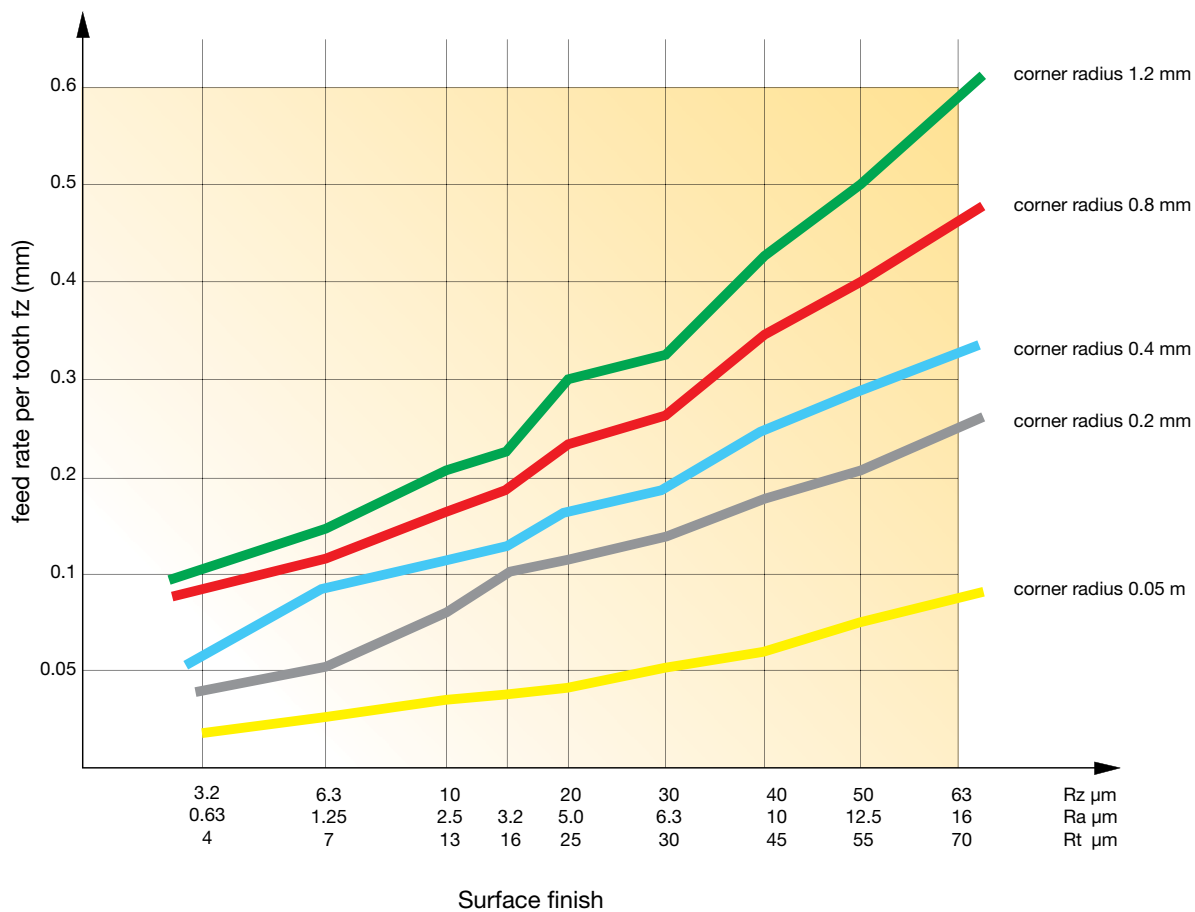
Cutting material grade	Carbide grade	Coating	Colour	Coating structure	Coating hardness	Application range
K10	K10	uncoated	-	-	-	aluminium and cast materials
K10-S	K10	TiN	golden yellow	single-layer	2300 HV	universal
K10-O	K10	AlTiN	blue anthracite	single-layer	3400 HV	HSC machining
K10-Proton	K10	TiAlN	blue violet	multi-layer	3400 HV	cast materials
K20-A	K20	TiAlN	grey	single-layer	3200 HV	universal
P10	P10	uncoated	-	-	-	unalloyed steels
P40	P40	uncoated	-	-	-	unalloyed steels
P40-S	P40	TiN	golden yellow	single-layer	2300 HV	steel materials
P40-O	P40	AlTiN	blue anthracite	single-layer	3400 HV	steel materials
P40-Proton	P40	TiAlN	blue violet	multi-layer	3400 HV	steel and cast materials

Guide values for surface finish



In order to select the right feedrate per tooth (f_z) please pay also attention to the table below „Guide values for surface finish“.

Wiper geometries lead in many cases to better surface finish and higher feed rates along with a constant high accuracy.

Guide values for surface finish relative to feedrate and corner radius





Cutting recommendations for inserts

Cutting groups	Material groups	Composition / Structure	Tensile strength RM (MPa)	Hardness HB HRC	K10 bright	K10 	K10 	K10 Proton	K20 
1.1	unalloyed steel Cast steel Machining steel	C=0,1 -0,25 annealed, long chip.	420	125					120 - 180
1.2		C=0,1 -0,25 annealed, short chip.	420	125					120 - 180
2.1		C=0,25 -0,55 annealed, long chip.	620	190					120 - 180
2.2		C=0,25 -0,55 annealed, short chip.	640	190	-	-	-	-	120 - 180
3		C=0,25 -0,55 tempered	850	250					120 - 180
4		C=0,25 -0,8 annealed	915	270					120 - 180
5		C=0,25 -0,8 tempered	1020	300					120 - 180
6	Low-alloy steel Cast steel Machining steel	annealed	610	180					90 - 140
7		tempered	930	275					90 - 140
8		tempered	1020	300	-	-	-	-	90 - 140
9		tempered	1190	350					90 - 140
10	High-alloy steel Cast steel	annealed	680	200					70 - 110
11	High-alloy tool steel	hardened and tempered	1100	325	-	-	-	-	70 - 110
12 - 13	Stainless steel and cast steel	ferritic/martensitic annealed	680	200	-	-	-	-	60 - 90
		martensitic	810	240	-	-	-	-	60 - 90
14.1	Stainless steel	austenitic quenched	610	180	-	40 - 60	40 - 80	40 - 80	80 - 220
14.2		austenitic/ferritic (duplex)	880	260	-	40 - 60	40 - 80	40 - 80	80 - 220
15	Grey cast iron	perlitic/ferritic		180	80 - 140	80 - 140	100 - 200	100 - 200	60 - 200
16		perlitic (martensitic)		260	80 - 140	80 - 140	100 - 200	100 - 150	60 - 200
17	Cast iron with nodular cast iron	perlitic		160	60 - 100	80 - 120	80 - 140	80 - 140	100 - 170
18		perlitic		250	60 - 100	80 - 120	80 - 140	80 - 140	100 - 170
19	Malleable cast	ferritic		130	-	60 - 120	80 - 140	80 - 140	60 - 100
20		perlitic		230	-	60 - 120	80 - 140	80 - 140	60 - 100
21	Aluminium	not heat treatable		60	80 - 400	100 - 500	-	-	-
22	Forging alloys	heat treatable/ heat treated		100	80 - 400	100 - 500	-	-	-
23	Aluminium Casting alloys	<12% Si not heat treatable		75	80 - 400	100 - 500	-	-	-
24		<12% Si heat treatable/ heat treated		90	80 - 400	100 - 500	-	-	-
25		>12% Si not heat treatable		130	80 - 400	100 - 500	-	-	-
26	Copper	machined alloys, Pb>1%		110	80 - 300	100 - 300	-	-	-
27	Copper alloys (bronze, brass)	CuZn, CuSnZn		90	80 - 300	100 - 300	-	-	-
28		Cu, lead free copper/electrolyte copper		100	80 - 300	100 - 300	-	-	-
29	Non metallic materials	Duroplastic			-	-	-	-	-
30		Reinforced materials			-	-	-	-	-
31	Heat resistand alloys	Fe-based annealed		200		30 - 80	30 - 90	30 - 100	40 - 100
32		heat treated		230		30 - 80	30 - 90	30 - 100	40 - 100
33		Ni- or Co-based annealed		250		30 - 80	30 - 90	30 - 100	40 - 100
34		heat treated		350		30 - 80	30 - 90	30 - 100	40 - 100
35		cast		320		30 - 80	30 - 90	30 - 100	40 - 100
36	Titanium alloys	Pure titanium	400		-	-	-	-	40 - 100
37		Alpha-beta alloys	1050		-	-	-	-	40 - 100
38	Hardened steels			50 - 62	-	-	-	-	-
39				50 - 62	-	-	-	-	-

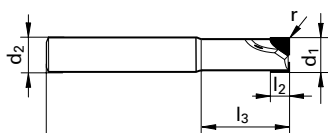
t = dry machining

n = wet machining

Cutting speed v_c in m/min												
	P10 bright	P10 bright	P40 	P40 	P40 Proton	CBN 1023	CBN 1024	CBN 1026	CBN 2026	CBN 2028	CBN 3018	PCD Grain middle
	80 - 120	60 - 100	100 - 140	120 - 160	100 - 160							
	80 - 120	60 - 100	100 - 140	120 - 160	100 - 160							
	80 - 120	60 - 100	100 - 140	120 - 160	90 - 150							
	80 - 120	60 - 100	100 - 140	120 - 160	100 - 160	-	-	-	-	-	-	-
	80 - 120	60 - 100	100 - 140	120 - 160	90 - 150							
	80 - 120	60 - 100	100 - 140	120 - 160	80 - 140							
	80 - 120	60 - 100	100 - 140	120 - 160	75 - 120							
	-	-	90 - 130	60 - 100	90 - 140							
	-	-	90 - 130	60 - 100	60 - 110	-	-	-	-	-	-	-
	-	-	90 - 130	60 - 100	60 - 110							
	-	-	90 - 130	60 - 100	60 - 110							
	-	-	60 - 100	60 - 100	60 - 110	-	-	-	-	-	-	-
	-	-	60 - 100	60 - 100	50 - 90							
	-	-	40 - 80	40 - 80	40 - 90	-	-	-	-	-	-	-
	-	-	40 - 80	40 - 80	40 - 90							
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	200 - 600	200 - 600	200 - 600	200 - 600	200 - 600	750 - 1100 t	-
	-	-	-	-	-	200 - 600	200 - 600	200 - 600	200 - 600	200 - 600	750 - 1100 t	-
	-	-	-	-	80 - 130	-	-	-	-	-	-	-
	-	-	-	-	-							
	-	-	-	-	90 - 150	-	-	-	-	-	-	-
	-	-	-	-	80 - 140							
	-	-	-	-	-	-	-	-	-	-	-	900 - 3000
	-	-	-	-	-	-	-	-	-	-	-	900 - 3000
	-	-	-	-	-	-	-	-	-	-	-	600 - 2400
	-	-	-	-	-	-	-	-	-	-	-	600 - 2000
	-	-	-	-	-	-	-	-	-	-	-	300 - 700
	-	-	-	-	-	-	-	-	-	-	-	400 - 1300
	-	-	-	-	-	-	-	-	-	-	-	400 - 1300
	-	-	-	-	-	-	-	-	-	-	-	400 - 1300
	-	-	-	-	-	-	-	-	-	-	-	200 - 1000
	-	-	-	-	-	-	-	-	-	-	-	200 - 1000
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	100 - 140 t	120 - 180 t	120 - 180 t	120 - 180 n	120 - 180 n	-	-
	-	-	-	-	-	110 - 240 t	180 - 280 t	180 - 280 t	180 - 230 n	180 - 280 n	-	-

Slot drills (2-fluted)

	Guhring no.	5492
	Standard	Guhring std.
	Tool material	PCD
	Surface	bright
	Type	
	Shank design	HA
	Helix	0°
	Cooling	axial
	Discount group	110

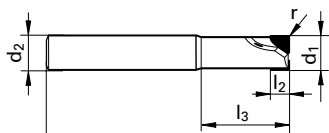


d1	d2	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm		
4.000	6.000	51.00	6.00	15.00	36.00	2	4.000
5.000	6.000	51.00	8.00	15.00	36.00	2	5.000
6.000	6.000	57.00	8.00	21.00	36.00	2	6.000
8.000	8.000	63.00	8.00	27.00	36.00	2	8.000
8.000	8.000	63.00	12.00	27.00	36.00	2	8.001
10.000	10.000	72.00	8.00	32.00	40.00	2	10.000
10.000	10.000	72.00	16.00	32.00	40.00	2	10.001
12.000	12.000	83.00	8.00	38.00	45.00	2	12.000
12.000	12.000	83.00	16.00	38.00	45.00	2	12.001
14.000	14.000	83.00	8.00	38.00	45.00	2	14.000
14.000	14.000	83.00	16.00	38.00	45.00	2	14.001
16.000	16.000	100.00	12.00	52.00	48.00	2	16.000
16.000	16.000	100.00	20.00	52.00	48.00	2	16.001
18.000	18.000	100.00	12.00	52.00	48.00	2	18.000
18.000	18.000	100.00	20.00	52.00	48.00	2	18.001
20.000	20.000	100.00	12.00	50.00	50.00	2	20.000
20.000	20.000	100.00	20.00	50.00	50.00	2	20.001

[illegible]

Slot drills (2-fluted)

	Guhring no.	5493
	Standard	Guhring std.
	Tool material	PCD
	Surface	bright
	Type	
	Shank design	DZ
	Helix	0°
	Cooling	axial
	Discount group	110



d1	d2	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm		
4.000	6.000	70.00	6.00	15.00	55.00	2	4.000
5.000	6.000	70.00	8.00	15.00	55.00	2	5.000
6.000	6.000	75.00	8.00	21.00	54.00	2	6.000
8.000	8.000	100.00	8.00	27.00	73.00	2	8.000
8.000	8.000	100.00	12.00	27.00	73.00	2	8.001
10.000	10.000	100.00	8.00	32.00	68.00	2	10.000
10.000	10.000	100.00	16.00	32.00	68.00	2	10.001
12.000	12.000	100.00	8.00	38.00	62.00	2	12.000
12.000	12.000	100.00	16.00	38.00	62.00	2	12.001
14.000	14.000	100.00	8.00	38.00	62.00	2	14.000
14.000	14.000	100.00	16.00	38.00	62.00	2	14.001
16.000	16.000	150.00	12.00	52.00	98.00	2	16.000
16.000	16.000	150.00	20.00	52.00	98.00	2	16.001
18.000	18.000	125.00	12.00	52.00	73.00	2	18.000
18.000	18.000	125.00	20.00	52.00	73.00	2	18.001
18.000	18.000	150.00	20.00	52.00	98.00	2	18.002
18.000	18.000	150.00	12.00	52.00	98.00	2	18.003
20.000	20.000	150.00	12.00	50.00	100.00	2	20.000
20.000	20.000	150.00	20.00	50.00	100.00	2	20.001

[illegible]

Slot drills (3-fluted)

	Guhring no.	5495
	Standard	Guhring std.
	Tool material	PCD
	Surface	bright
	Type	
	Shank design	HA
	Helix	0°
	Cooling	axial
	Discount group	110

NEW



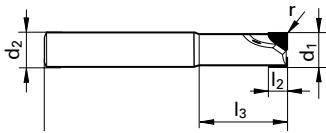
d1	d2	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm		
14.000	14.000	83.00	8.00	38.00	45.00	3	14.000
14.000	14.000	83.00	16.00	38.00	45.00	3	14.001
16.000	16.000	100.00	12.00	52.00	48.00	3	16.000
16.000	16.000	100.00	20.00	52.00	48.00	3	16.001
18.000	18.000	100.00	12.00	52.00	48.00	3	18.000
18.000	18.000	100.00	20.00	52.00	48.00	3	18.001
20.000	20.000	100.00	12.00	50.00	50.00	3	20.000
20.000	20.000	100.00	20.00	50.00	50.00	3	20.001

[illegible]

Slot drills (3-fluted)

	Guhring no.	5496
	Standard	Guhring std.
	Tool material	PCD
	Surface	bright
	Type	
	Shank design	DZ
	Helix	0°
	Cooling	axial
	Discount group	110

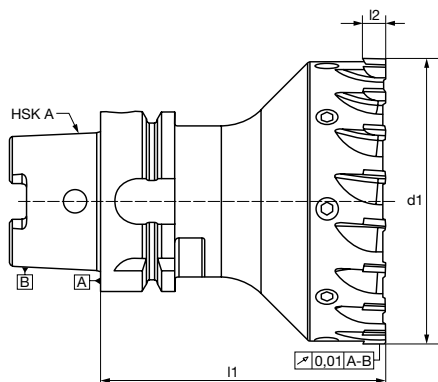
NEW



d1	d2	l1	l2	l3	l4	Z	Code no.
mm	mm	mm	mm	mm	mm		
14.000	14.000	100.00	8.00	38.00	62.00	3	14.000
14.000	14.000	100.00	16.00	38.00	62.00	3	14.001
16.000	16.000	150.00	12.00	52.00	98.00	3	16.000
16.000	16.000	150.00	20.00	52.00	98.00	3	16.001
18.000	18.000	150.00	12.00	52.00	98.00	3	18.000
18.000	18.000	150.00	20.00	52.00	98.00	3	18.001
20.000	20.000	150.00	12.00	50.00	100.00	3	20.000
20.000	20.000	150.00	20.00	50.00	100.00	3	20.001

[illegible]

Guhring no.	3016
Standard	Guhring std.
Tool material	PCD-tipped
Surface	bright
Type	PF 1000 G
Cutting direction	right-hand
Discount group	110



d1	HSK-A	l1	l2	Z	Code no.
mm		mm	mm		
32.000	63	100.00	8.00	8	32.000
40.000	63	100.00	8.00	10	40.000
50.000	63	100.00	8.00	12	50.000
63.000	63	100.00	8.00	14	63.000
80.000	63	100.00	8.00	16	80.000
100.000	63	100.00	8.00	18	100.000
125.000	63	100.00	8.00	22	125.000

[illegible]

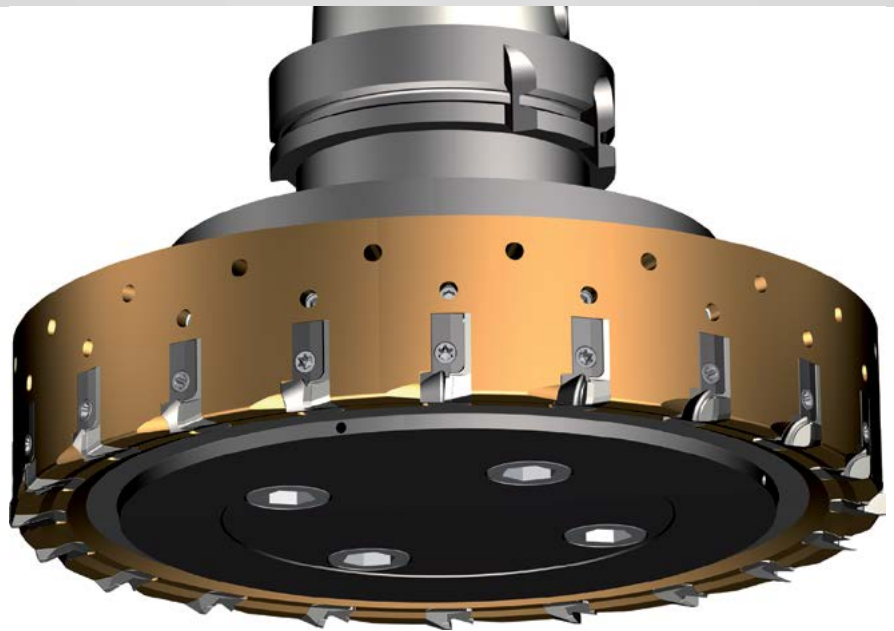
PF 1000 face milling cutter

A unique solution offering outstanding performance, quality and economic efficiency

Guhring's PF 1000 face milling cutter is the ideal tool for the economic high speed machining of non-ferrous metals such as aluminium, aluminium-alloys and copper.

The face milling cutter is available in diameters from 63 to 250 mm and holds 3 to 20 PCD milling inserts, depending on diameter.

For the PF 1000 face milling cutter to satisfy the extreme demands of HSC, Guhring has developed several leading technical innovations. They include the following:



Innovative clamping screw locator

The utility patented steel ring for locating the clamping screws is shrunk into the milling body and provides the face milling cutter with exceptional rigidity allowing extremely high maximum revolutions, for example 26,875 rev./min. for a diameter of 100 mm.

Integrated threads for PCD milling inserts

The threads for locating the PCD milling inserts are integrated in the clamping wedges. Therefore, clamping threads or threaded inserts are not required in the milling body, uneven clamping through the wedging effect no longer occurs. The internal screwhead reduces the centrifugal forces and concentrates the mass near to the rotational axis.

Integrated chip defectors

The steel chip defectors integrated in the clamping wedge provide optimal protection for the milling body and guarantee extremely long tool life.

Utility patented wedge clamping

The positive fit of the utility patented wedge clamping guarantees a secure clamping of the PCD milling insert even at extreme speeds and therefore above average milling quality and performance.

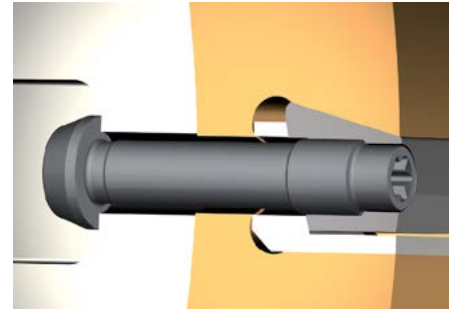
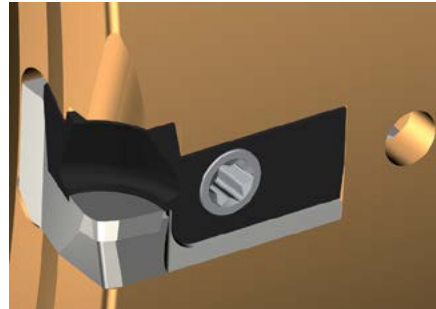
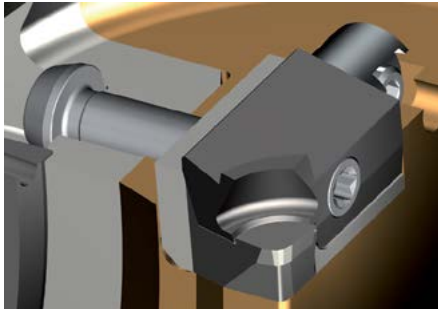


Diagram 1:

Feed rate for example $f=0.1$ mm/tooth

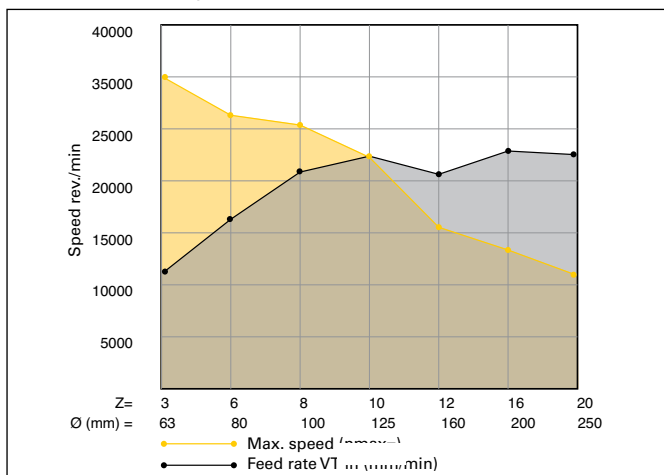
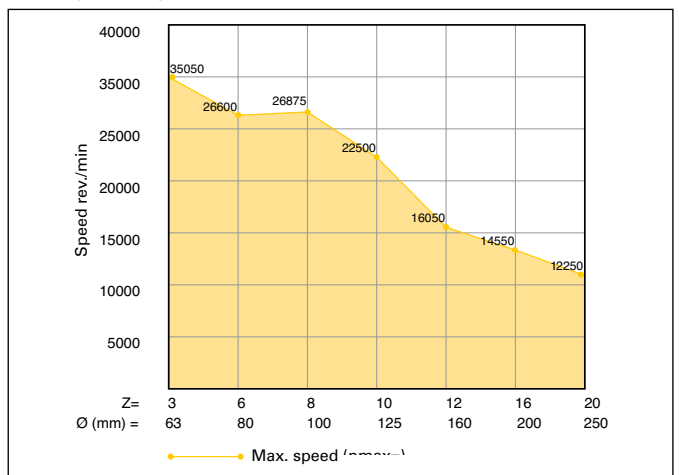


Diagram 2:

Max. speed dependent on tool diameter



PF 1000 face milling cutter

Many sophisticated individual solutions provide a unique system for HSC milling of non-ferrous metals such as aluminium and copper, including the following:

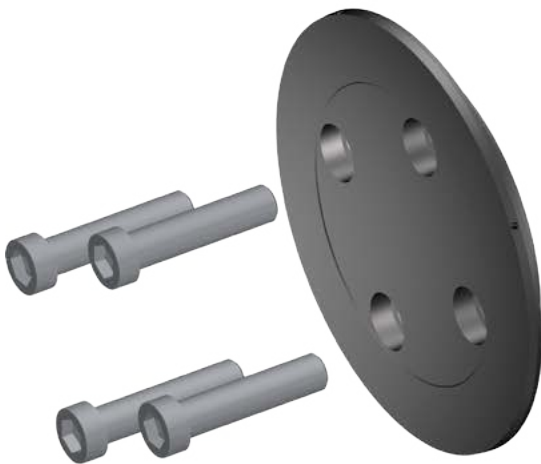
Utility patented, axial wedge adjustment

for the adjustment of the PCD milling insert of up to 1 mm via a 15° wedge, provides very accurate setting possibilities. The adjusters are precisely integrated into the milling cutter body.

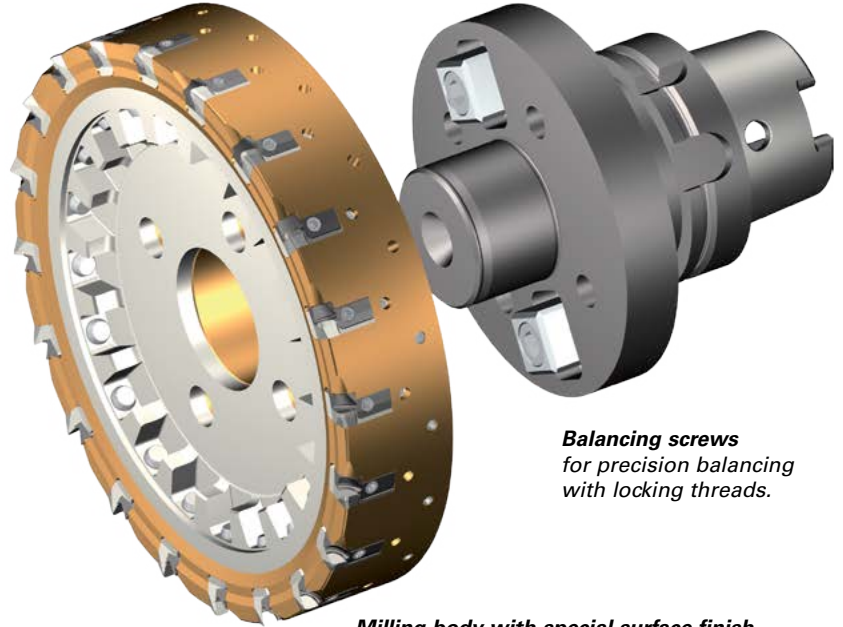
Milling arbor:

from Guhring's GM 300 range, specially optimised with an increased bearing surface for Ø 200 mm and Ø 250 mm face milling cutters.

A high-tensile aluminium clamping disc from face milling cutter diameter 160 mm ensures a perfect fit of the milling body even at highest speeds and also includes an optimised central coolant delivery for minimal quantity lubrication (MQL).



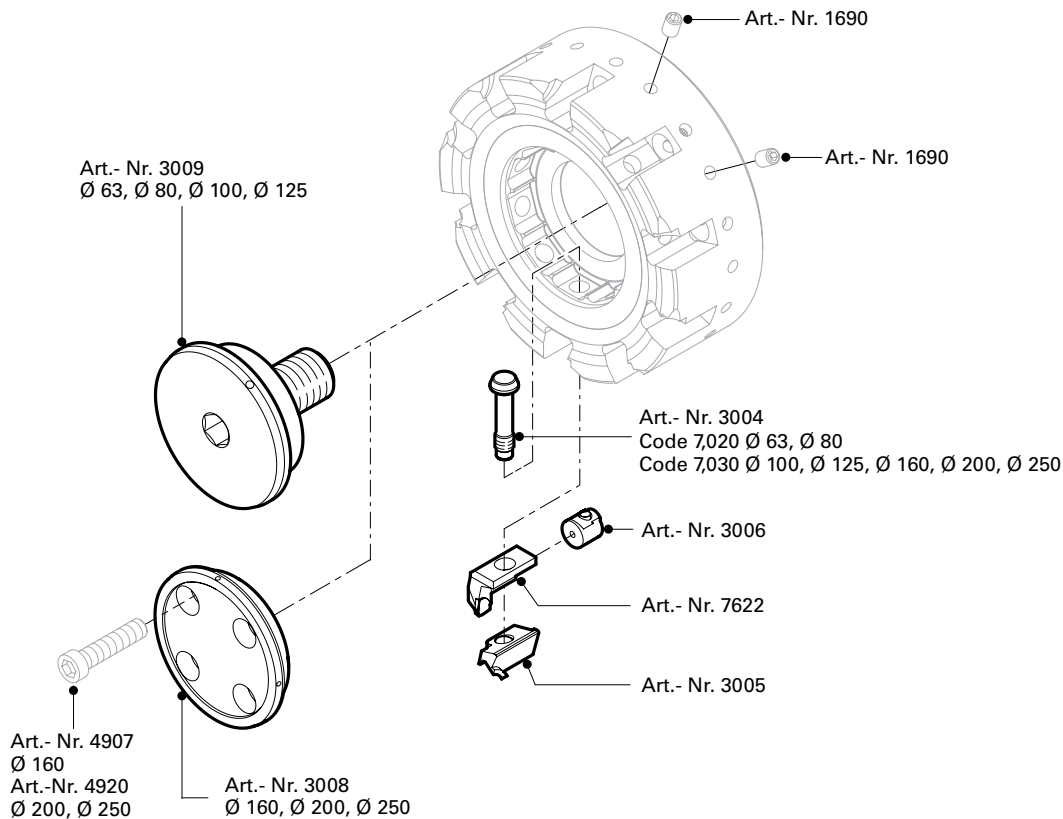
High-tensile, high-quality screws ensure secure clamping of the milling body to the milling arbor.



Balancing screws for precision balancing with locking threads.

Milling body with special surface finish

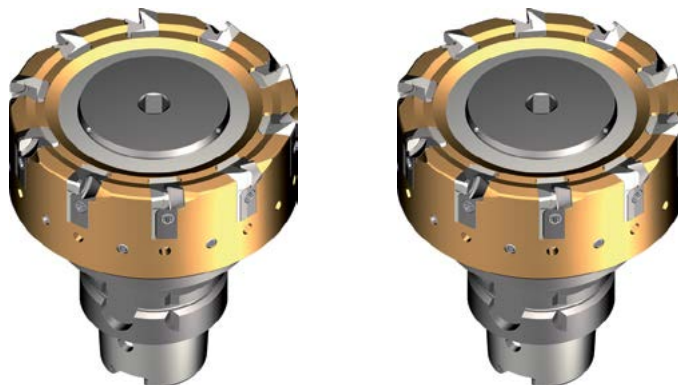
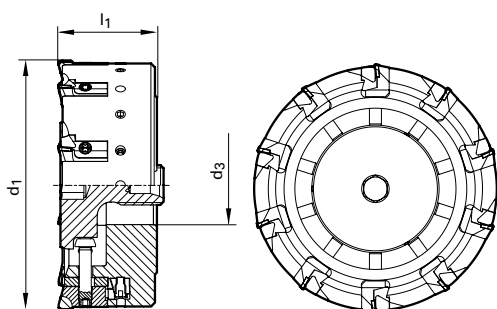
produced in high-tensile aluminium for reasons of reducing mass from Ø 100 mm. This reduces the forces on the machine spindle bearings for high speed machining. The utility patented, steel ring for locating the clamping screws is shrunk into the milling body.



HSC-Face milling cutters adjustable

Chuck is not included!

Guhring no.	3000	3001
Standard	Guhring std.	
Tool material	PCD	CBN
Surface	bright	bright
Type	PF 1000	PF 1000
Cutting direction	rh	rh
Discount group	114	114



d1	d3	l1	Z	Code
mm	mm	mm		

63.000	22.000	100.00	3	63.000
80.000	27.000	100.00	6	80.000
100.000	32.000	150.00	10	100.000
125.000	40.000	150.00	10	125.000
160.000	40.000	150.00	12	160.000
200.000	60.000	150.00	16	200.000
250.000	60.000	150.00	20	250.000

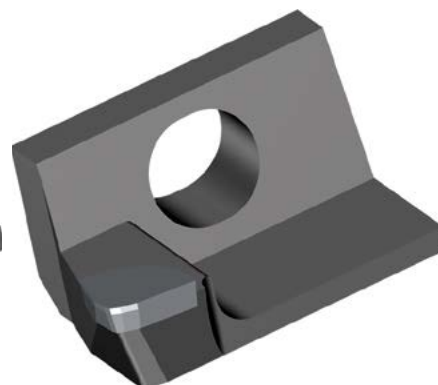
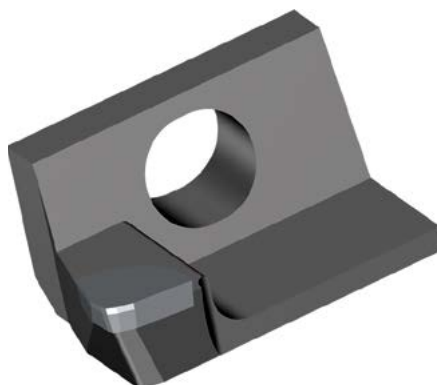
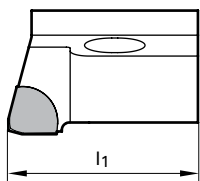
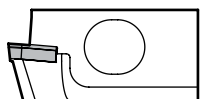
Availability

on request	on request
on request	on request
on request	on request
on request	on request
on request	on request
on request	on request
on request	on request

Dimensions with a higher number of teeth (Z) are available on request.

Face milling insert

Guhring no.	7622	7623
Standard	Guhring std.	
Tool material	PCD	CBN
Surface	bright	bright
Cutting direction	rh	rh
Discount group	114	114



d1	Code
mm	
25.00	75,000

Availability
● on request

Basic holders

Guhring no.	3002	3003
Standard	Guhring std.	
Discount group	114	114

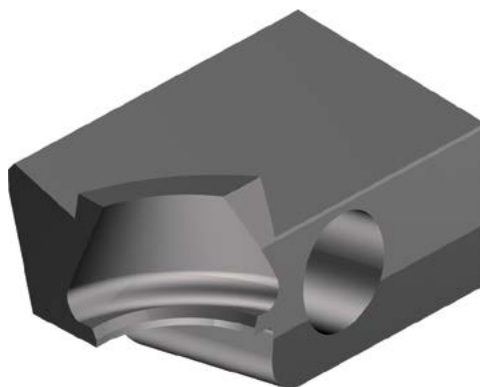


d1	d3	outer Ø	l1
mm	mm	mm	mm
63.000	22.000	61.800	43.10
80.000	27.000	78.800	48.10
100.000	32.000	98.500	48.10
125.000	40.000	123.500	48.10
160.000	40.000	158.500	61.10
200.000	60.000	198.500	61.10
250.000	60.000	248.500	61.10

Availability
● ●
● ●
● ●
● ●

Clamping wedge

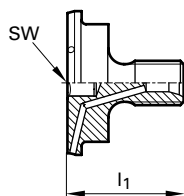
Guhring no.	3005
Standard	Guhring std.
Discount group	114



Code	Availability
7,000	●

Retention screws

Guhring no.	3009
Standard	Guhring std.
Discount group	114



G	l1	SW	Code	Availability
	mm			
M10	44.50	6.00	63,000	●
M12	49.50	8.00	80,000	●
M16	52.60	10.00	100,000	●
M20	52.50	12.00	125,000	●

Clamping discs

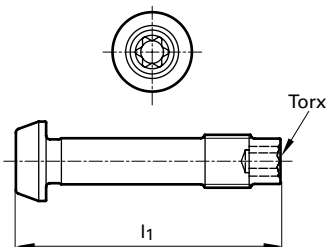
Guhring no.	3008
Standard	Guhring std.
Discount group	114



Code	Availability
160,000	●
200,000	●
250,000	●

Adaptors

Guhring no.	3004
Standard	Guhring std.
Discount group	114



Torx	l1	Code	Availability
	mm		
T25	23.50	7,020	●
T25	35.00	7,030	●

Adjustment units

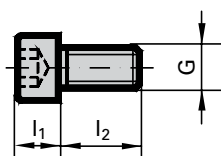
Guhring no.	3006
Standard	Guhring std.
Discount group	114



Code	Availability
11,000	●

Hexagon socket clamping screws

Guhring no.	4920	4907
Standard	DIN 6912	DIN EN ISO 4762
Discount group	114	114



G	l1	l2	SW	Code	Availability
	mm	mm			
M12	12.00	65.00	10.00	12,650	●
M16	10.00	70.00	14.00	16,700	●

Hexagon socket sets

Guhring no.	4916
Standard	Guhring std.
Discount group	114

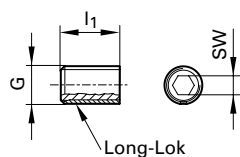


Drive	L	SW	Code
inch	mm		
1/2	90.00	6.00	6,038
1/2	90.00	8.00	8,048
1/2	140.00	10.00	10,060
1/2	140.00	12.00	12,000
1/2	60.00	14.00	14,000

Availability
●
●
●
●

Locking threaded pins

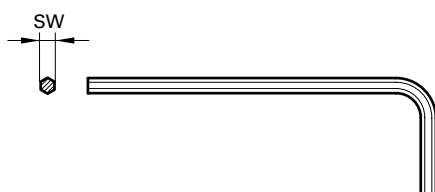
Guhring no.	1690
Standard	Guhring std.
Discount group	114



G	L	SW	Code
	mm		
M6	8,00	3,00	6,001
M6	12,00	3,00	6,002

Availability
●
●

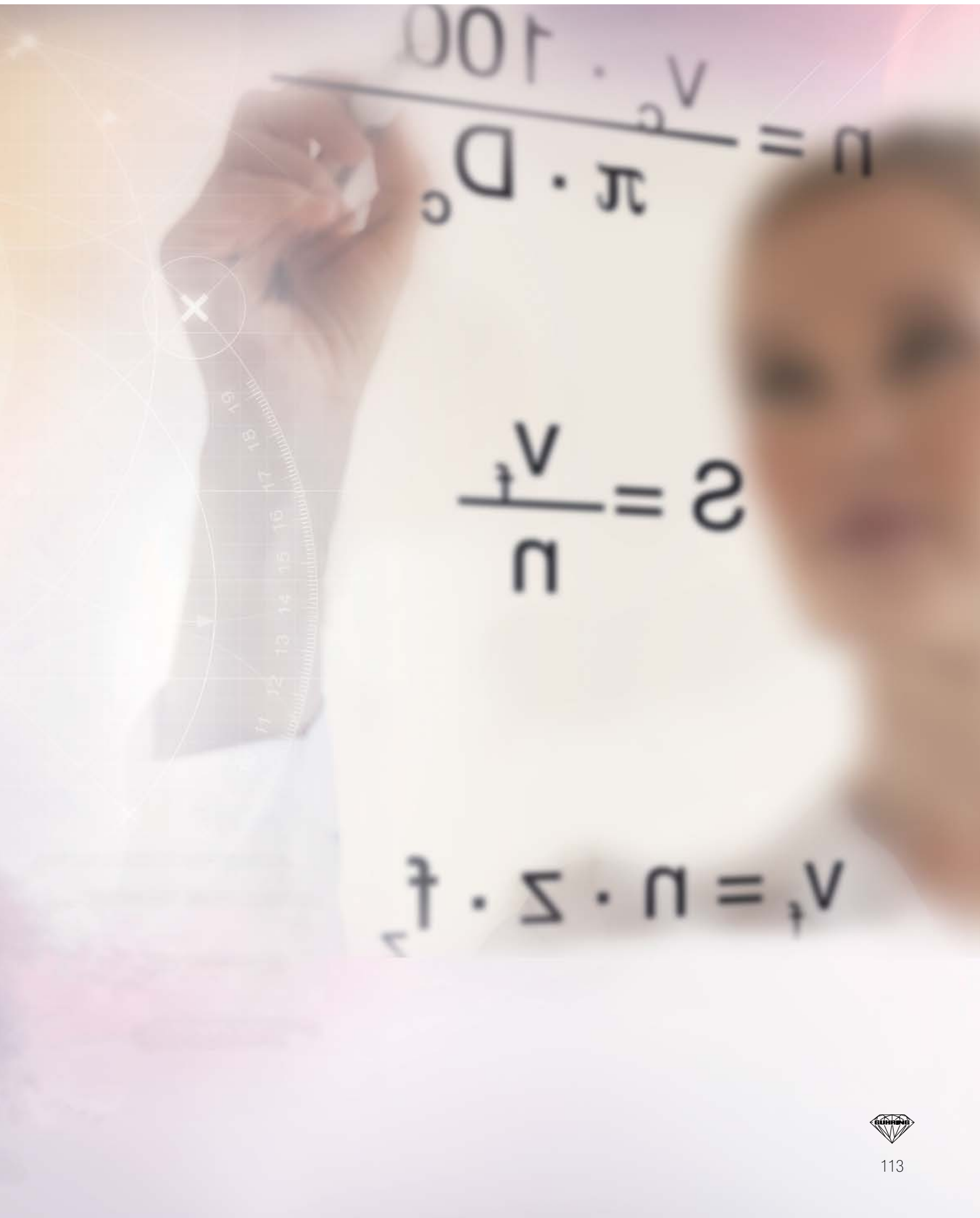
Guhring no.	4921
Standard	Guhring std.
Discount group	114



SW	Code
3,00	3,000

Availability
●

TECHNICAL SECTION



What is Minimum Quantity Lubrication (MQL)?

Minimal quantity lubrication (MQL) works with an air lubrication mixture (aerosol). A minimum quantity of cooling lubricant is applied directly on the effective area of the tool or workpiece. This minimises the friction heat while machining

or dissipates it via the chip respectively. In comparison to conventional wet machining, minimal quantity lubrication only uses low quantities of cooling lubricant (CL).

Motivation

As one of the pioneers of MQL technology we have an extensive knowledge of minimal quantity lubrication. Guhring standard MQL Chucks have been supplied a thousand fold throughout the world and are recognised by the automotive industry as ideal MQL solutions as either the one or two channel systems. Higher cutting speeds and longer tool life are possible thanks to adapted cooling as well as highest surface qualities thanks to the pure lubricant. Workpieces

and chips remain dry! Save the cost of de-greasing your workpieces as well as disposal of swarf and soluble oil.

Besides higher surface qualities and lower production costs, minimal quantity lubrication is especially of benefit to the environmental and health protection.

Advantages compared with conventional wet machining

Costs, health & environment

- reduction of cooling lubricant requirement
- reduction in component cleaning costs
- reduction in cooling lubricant disposal costs
- reduction in swarf disposal costs
- protection of environment and health through lower emissions

Tools & component quality

- reduction of thermal stresses at the tool point
- less tool wear
- effective chip evacuation from deep holes
- higher surface qualities
- Instant cooling lubricant delivery
- High compatibility
- Low process temperatures
- Less cooling lubrication requirement – high coolant effect
- Direct response without losses



Delivery with 1- and 2-channel systems

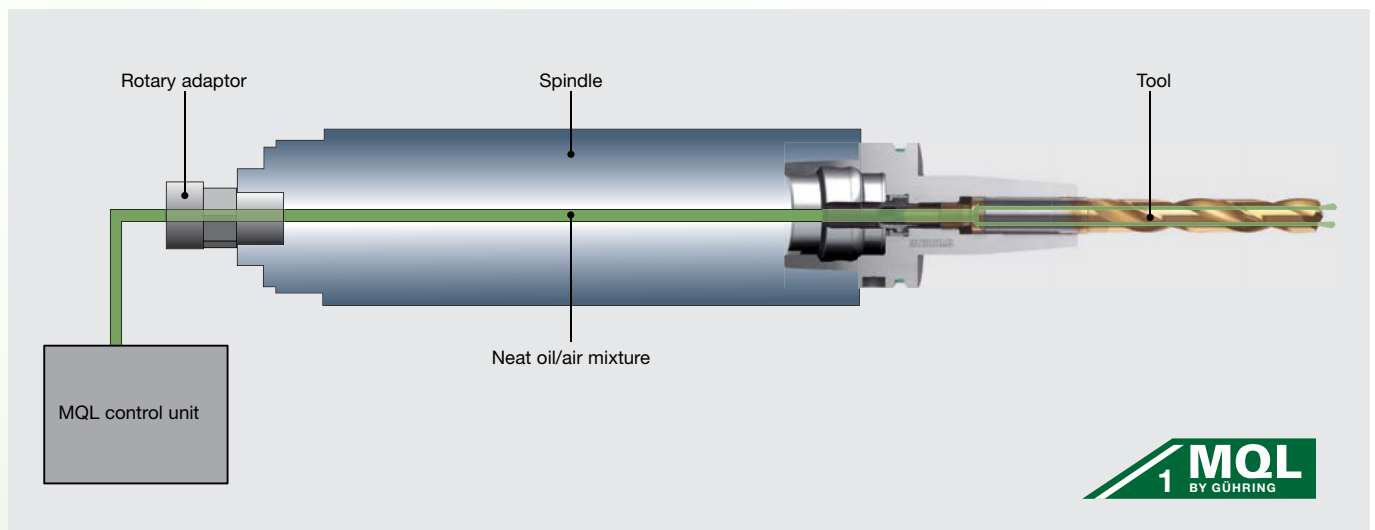
The provision of the MQL medium via the tool enables accurate delivery of the aerosol directly to the effective area. This ensures optimal delivery of the cooling lubricant independent of the accessibility of the machining location.

Thus, large drilling depths and high cutting speeds can be achieved. MQL systems with internal cooling lubricant delivery are divided into 1-channel and 2-channel systems.

1-channel MQL system

With a 1-channel system, the aerosol is mixed in an external MQL unit. The air-oil-mixture is transported directly to the

tool via the aerosol line, the rotary adaptor and the spindle. Only a supply line is required.

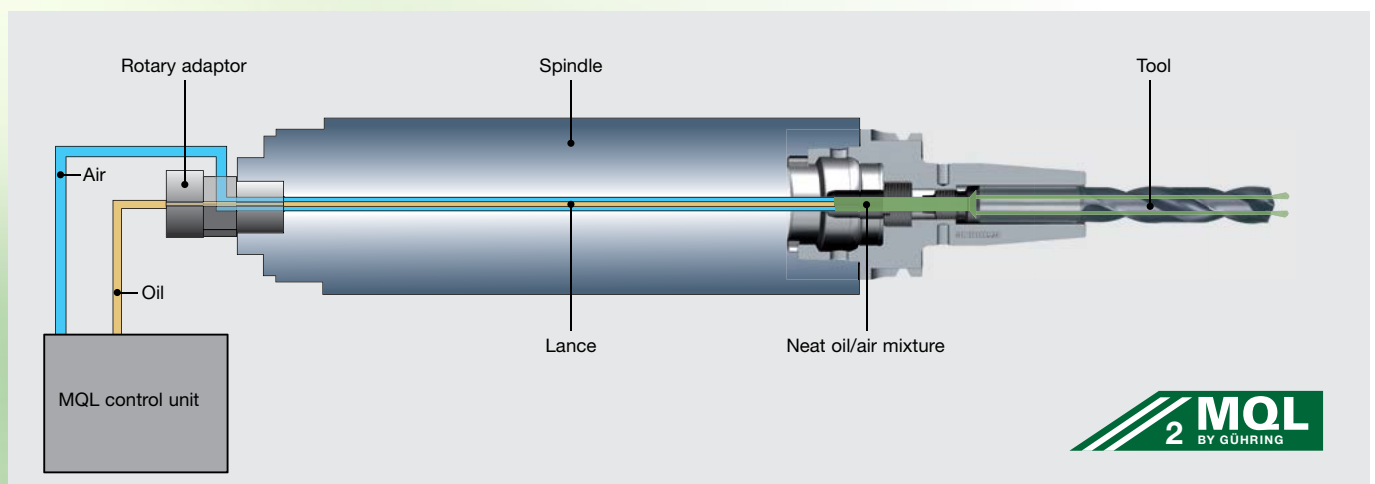


2-channel MQL system

With a 2-channel system cooling lubricant and air are separately transported via two channels through the tool spindle to the tool holder and then mixed there. A spindle mounted lance transports the oil and suppresses the centrifugal effect and therefore the possibility of de-mixing processes in the spindle. In comparison to the 1-channel system the spindle speed can be increased considerably.

An integrated quick valve system controls the optimal dosage of oil volume. Oil and air can be mixed in almost unlimited quantities with this system.

The route from the mixing chamber to the point of destination is only minimal resulting in a rapid response time and allowing a very quick alteration of the volume of neat oil.



Machine design to suit MQL

Because with MQL the heat generated from machining is not dissipated away from the workpiece and out of the machine by the cooling lubricant, the design of the machine must meet certain requirements in order to dissipate the heat.

Horizontal machine walls or pipelines should be avoided in order to prevent the build-up of chips. When designing the

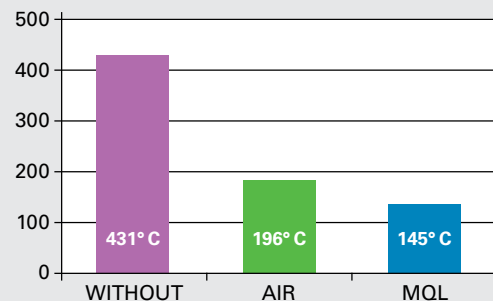
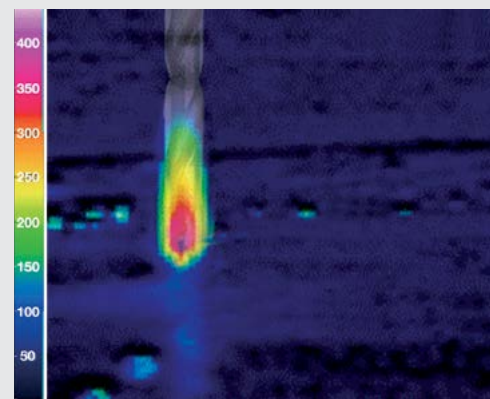
machine, cover panels should be planned to separate the various components. This way, a thermal separation can be ensured. Furthermore, the drive elements should be protected from metal swarf with cover panels.

Tools to suit MQL

The same applies for the tool geometry: tools must be designed so that

- heat generation is minimised during the machining process (i.e. through sharp cutting edges and a positive rake angle),
- friction is minimised (i.e. through a width reduction of the leading margins in comparison to the wet tool and increasing the back taper of the tool),
- heat transfer between chip and tool is reduced (i.e. through heat insulating hard coatings and polished tool surfaces to reduce the friction between chip and face),
- heat transfer between chip and workpiece is reduced (i.e. through improved chip evacuation from the hole or from the workpiece surface respectively),
- improved chip evacuation and therefore increased process reliability is provided by a MQL-suitable coating.

Thermographic examination at Guhring:
Comparison of tool temperatures



Coolant duct design

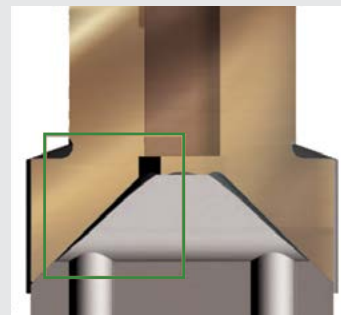
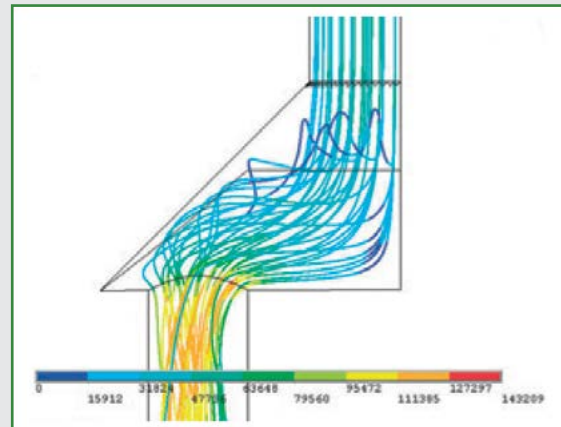
- polished flutes minimise friction between chip and tool
- spiral-fluted drilling tools facilitate chip evacuation
- burr-free coolant ducts for even flow resistance

Coolant delivery to suit MQL

The geometric design of the shank end is of main significance for a safe delivery of the lubricant. In order to guarantee efficiency and process reliability of the drilling tools the following basic requirements must be implemented:

- minimal dead areas that could lead to consolidation of coolant
- sealed coolant transfer surface between shank end and delivery screw preventing the escape of coolant in the clamping area of the chuck or in the internal areas of HSK (preventing swarf deposits that could lead to concentricity errors following the next tool change)

Flow pattern with low vortex formation



Flow conditions in the coolant duct connection slot at the point of the tapered transition

Flute design to suit MQL

The flute has the task to mould the chip in order to break it as small as possible. With minimal quantity lubrication and dry machining, it is extremely important to provide the chip with minimal frictional resistance in the rear area, in order to ensure a problem-free chip evacuation. This is aided by an optimised flute form as well as a specially polished flute surface.

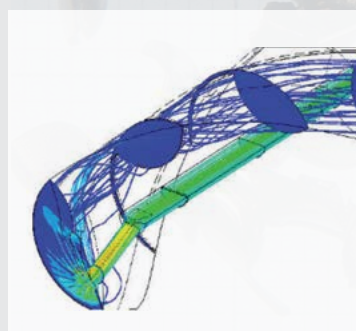
Flow speed comparison



The flow speed
in the flute with MQL
is 30.4 m/s.

The volume with MQL
is 6.960 l/h (std.litres air/h).

Tool Ø = 11.7 mm
Pressure at pump = 6 bar
Pressure at tool = 4 bar



The flow speed
In the flute with soluble oil
is 3.5 m/s.

The volume with soluble oil
is 600 l/h (std.litres air/h).

Tool Ø = 11.7 mm
Pressure at pump = 60 bar
Pressure at tool = 31 bar

Values for cutting speeds

Following you will find cutting rates for rotary machining. These are guide values and should serve as an orientation. The values can be further adapted following the initial assessment of the machining result in order to achieve optimal quality and cycle time.

Reaming allowance 0.3 mm – 2 mm

Material	Cutting speed v_c (m/min)	Cutting feed f_z (mm)
Al wrought alloys	200 - 400	0.05 - 0.25
Al cast alloys < 9 % Si	200 - 800	0.05 - 0.2
Al cast alloys up to 12 % Si	300 - 600	0.05 - 0.2
Al cast alloys up to 17 % Si	200 - 400	0.05 - 0.2
Magnesium wrought alloys	250 - 400	0.05 - 0.15

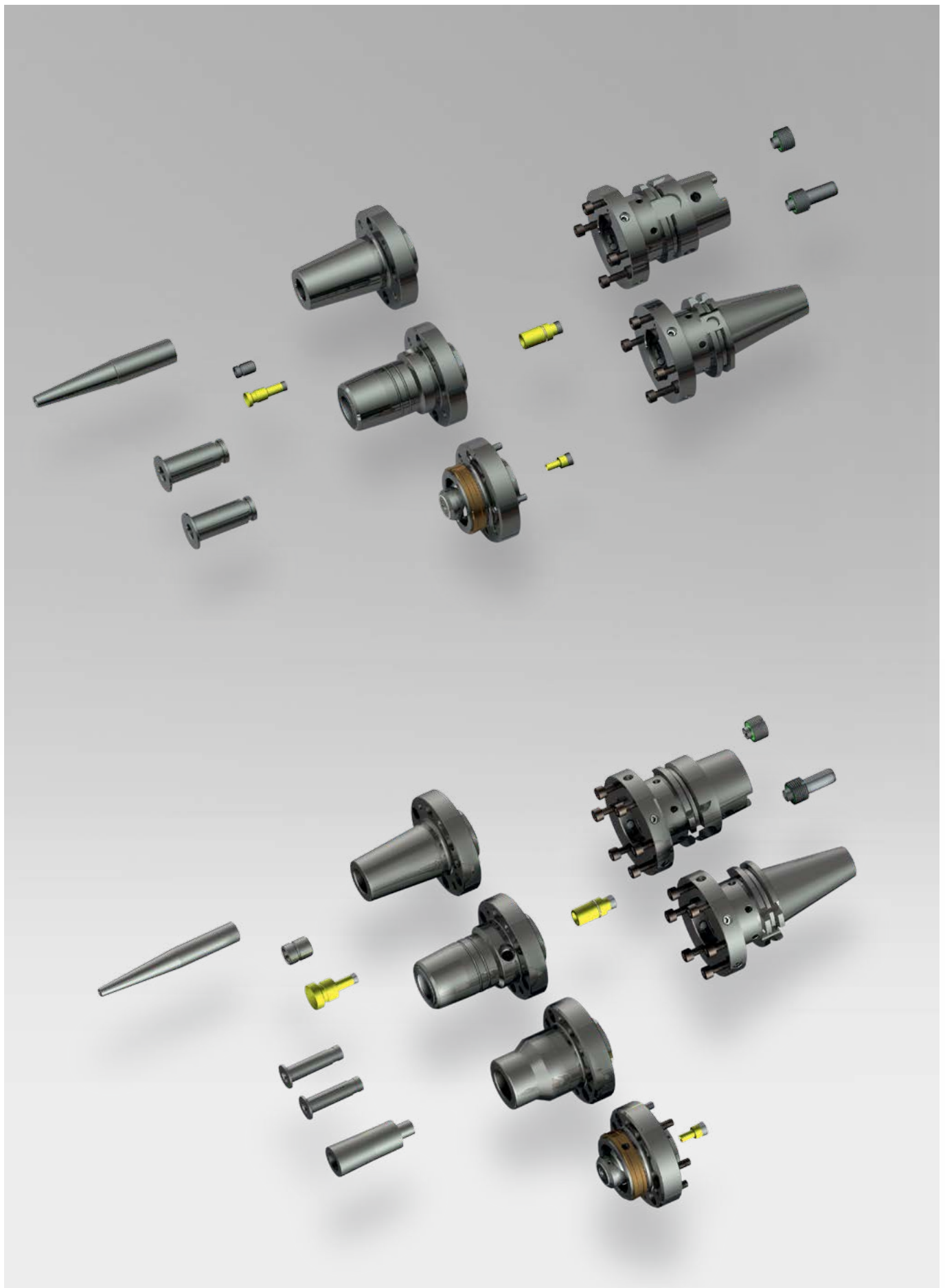
Drilling

Material	Cutting speed v_c (m/min)	Cutting feed f_z (mm)
Al wrought alloys	200 - 500	0.08 - 0.25
Al cast alloys < 9 % Si	350 - 800	0.08 - 0.15
Al cast alloys up to 12 % Si	350 - 800	0.08 - 0.15
Al cast alloys up to 17 % Si	200 - 400	0.08 - 0.15
Magnesium wrought alloys	400 - 600	0.05 - 0.15

Milling

Material	Cutting speed v_c (m/min)	Cutting feed f_z (mm)
Al wrought alloys	700 - 3000	0.05 - 0.3
Al cast alloys < 9 % Si	900 - 2500	0.05 - 0.25
Al cast alloys up to 12 % Si	900 - 2500	0.05 - 0.2
Al cast alloys up to 17 % Si	700 - 2000	0.05 - 0.2
Magnesium wrought alloys	700 - 2000	0.05 - 0.2

Module alignment adapter 4x4 and 6x6



Guhring modules Spot-on tool setting

Guhring modules 6x6 and 4x4 are the perfect solution for a quick, simple and μ -accurate setting of tools in highly precise manufacturing areas such as fine machining.

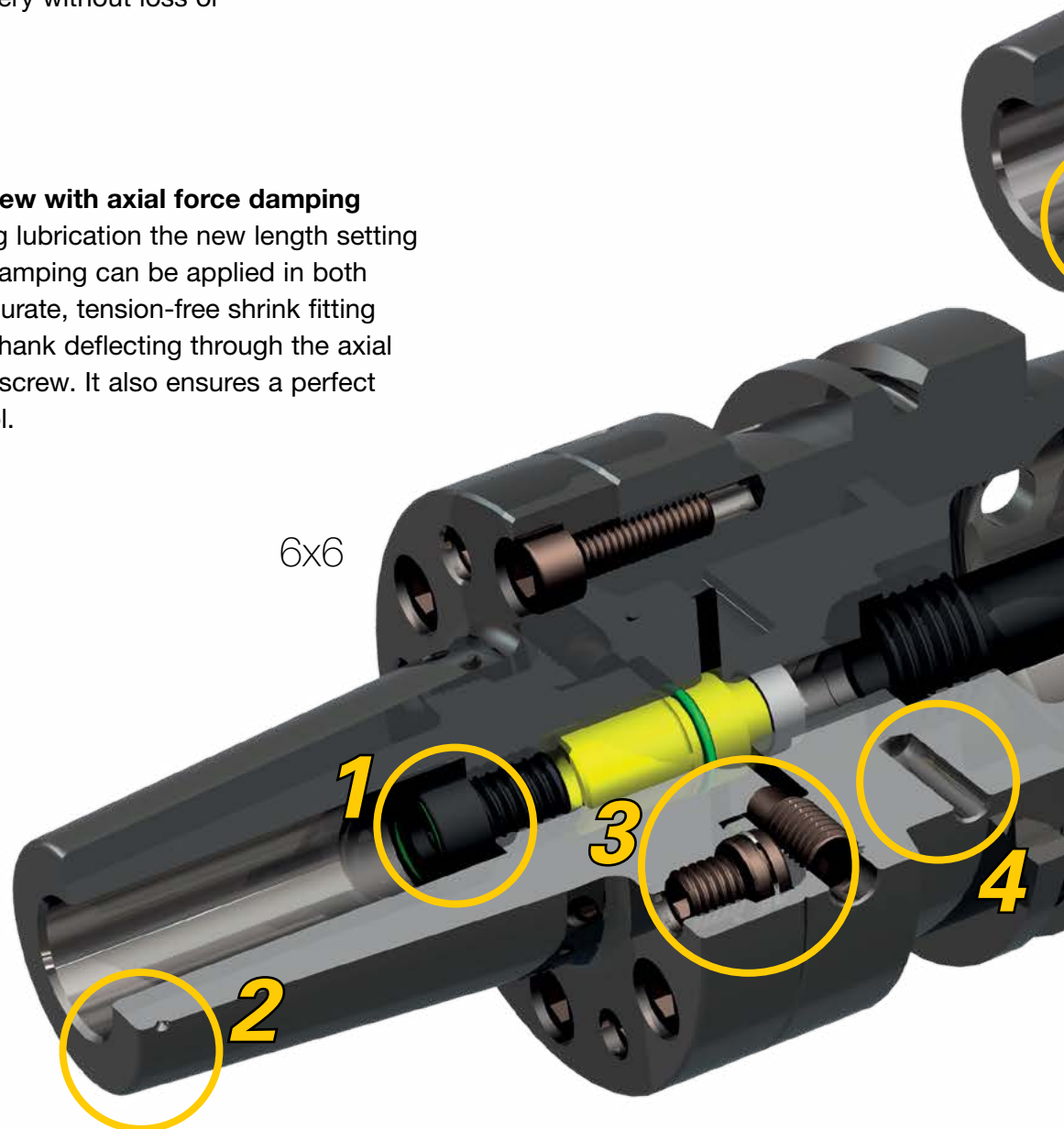
The advantages for the user:

- up to 70% time saving in “modular” tool pre-setting
- cost reduction
- highly accurate, wobble-free tool setting
- an extremely solid and rigid connection
- cooling lubricant delivery without loss or flow disruption

Whilst Module 4x4 is the market compatible solution the Guhring Module 6x6 is providing further opportunities for modular technology to satisfy the highest demands. On Guhring's Module 6x6 the setting screws for radial and axial setting sit much closer to each other than on conventional modules. This allows the elimination of errors in close proximity to the measuring point – even with 6-fluted tools with pinpoint accuracy!

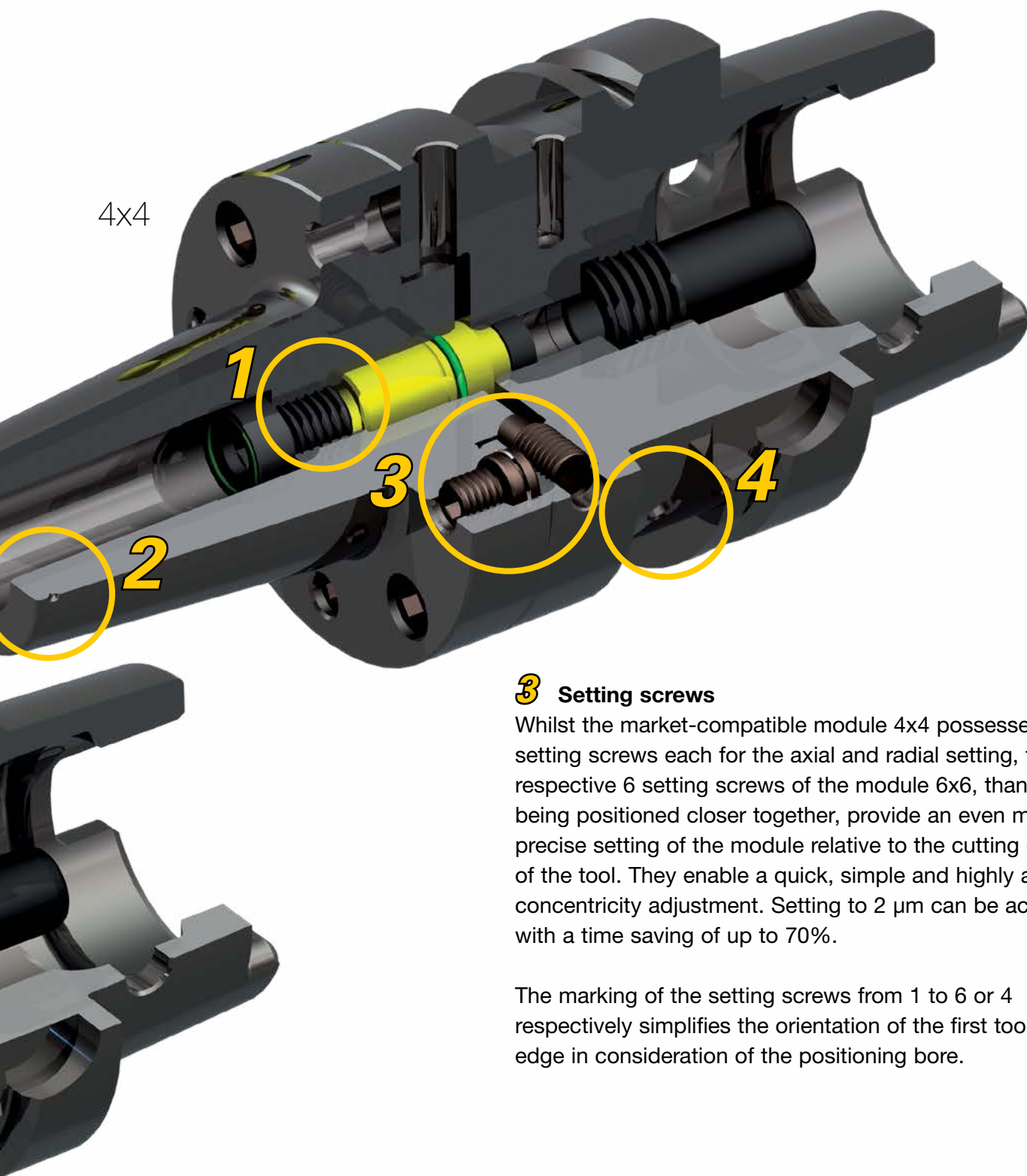
1 Length setting screw with axial force damping

For conventional cooling lubrication the new length setting screw with axial force damping can be applied in both modules. It ensures accurate, tension-free shrink fitting by preventing the tool shank deflecting through the axial pressure on the setting screw. It also ensures a perfect length setting of the tool.



2 Positioning mark

Both modules possess a positioning bore for the first tool cutting edge. It is in alignment with the first setting screws for the radial and axial setting of the module. This enables a quick and simple as well as optimal setting of the entire holder-module-tool system.



3 Setting screws

Whilst the market-compatible module 4x4 possesses 4 setting screws each for the axial and radial setting, the respective 6 setting screws of the module 6x6, thanks to being positioned closer together, provide an even more precise setting of the module relative to the cutting edges of the tool. They enable a quick, simple and highly accurate concentricity adjustment. Setting to 2 µm can be achieved with a time saving of up to 70%.

The marking of the setting screws from 1 to 6 or 4 respectively simplifies the orientation of the first tool cutting edge in consideration of the positioning bore.

4 Location bore for balancing screw

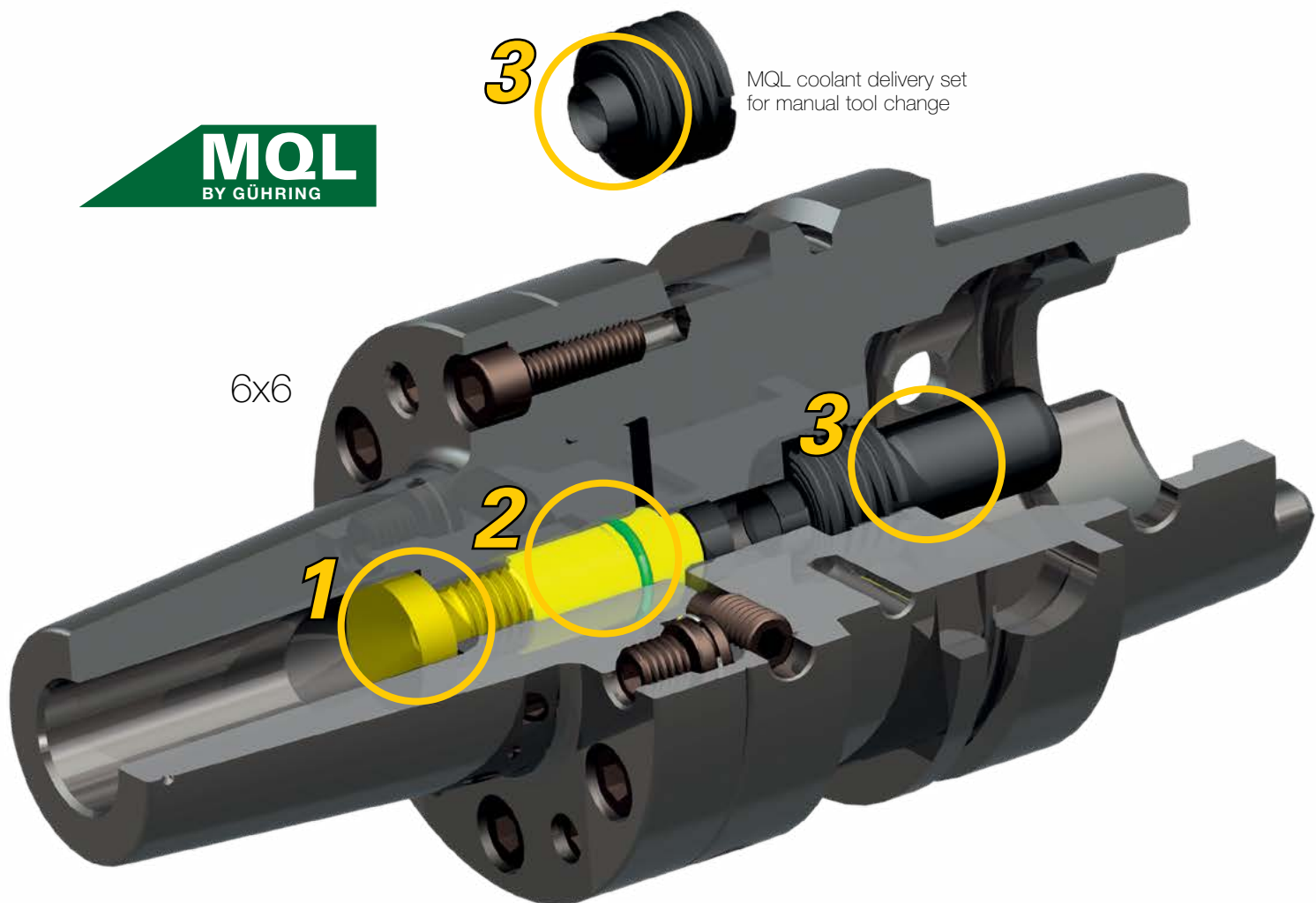
The module 6x6 as well as the module 4x4 possess 6 balancing bores. Thanks to being close to each other they enable a quick balancing in close proximity of the imbalance. The positioning of the balancing bores having a large effective diameter and thread depth provides a highly effective balancing capability.

Guhring modules

Optimal cooling lubricant delivery

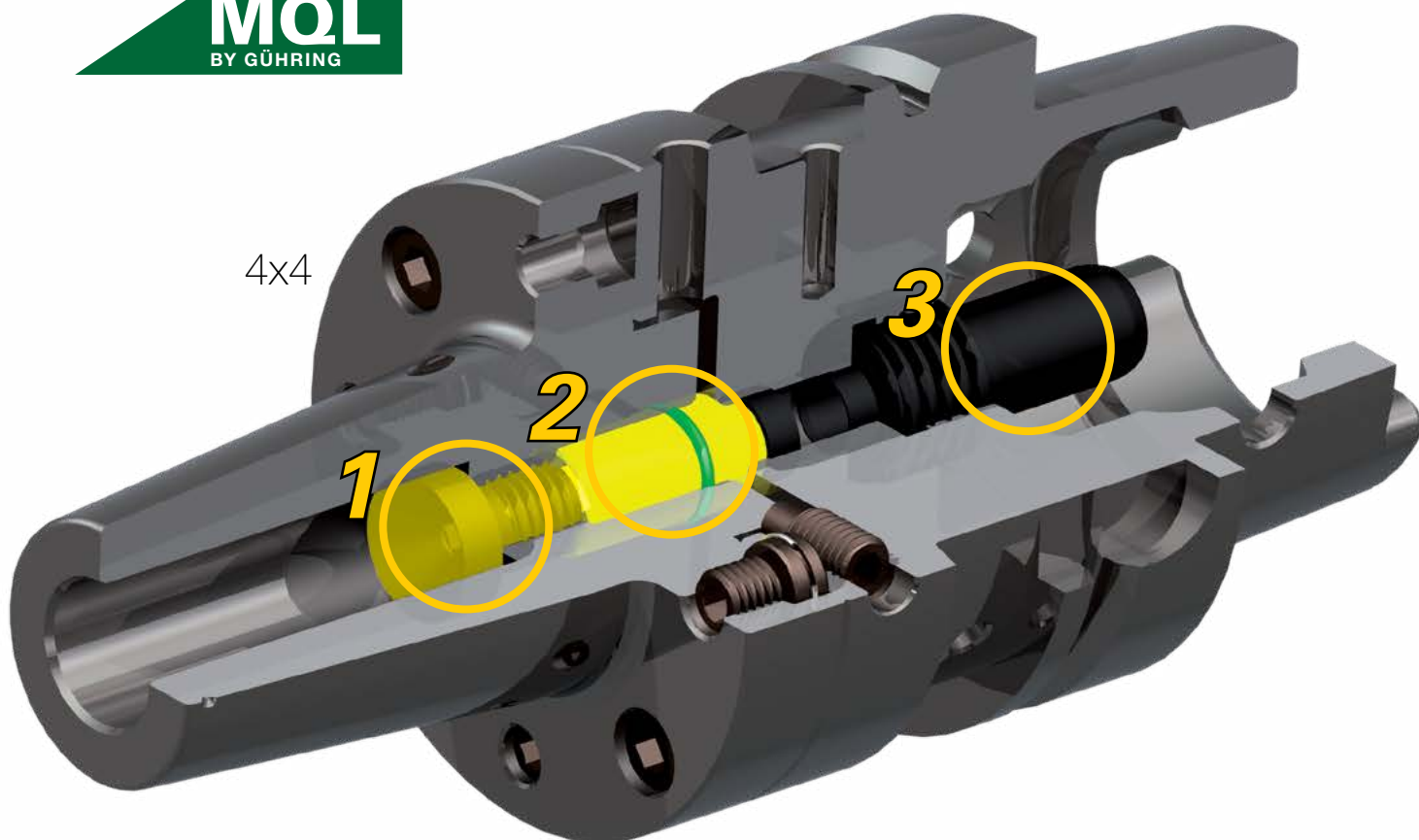
The modules 6x6 and 4x4 have both been designed for conventional cooling lubrication as well as minimal quantity lubrication (MQL). Whatever type of cooling lubrication the user

decides on, the delivery system components required are 100% compatible. Subsequently, it is possible to convert any modules in stock without a problem.



1 MQL length setting screw

The tool sits with its conical, MQL suitable shank end in the corresponding head shape of the MQL length setting screw. A sealing lip ensures a loss-free cooling lubricant delivery to the tool.



2 Delivery unit

The delivery unit feeds the cooling lubricant through the tool holder without dead areas. For this, it is fitted with an O-ring and a special sealing lip. Particularly with MQL machining, a loss-free coolant delivery in this area is decisive for an optimal delivery to the cutting edges.

3 MQL coolant delivery set (Guhring no. 4939 or 4940)

A loss-free cooling lubricant delivery between spindle and tool holder is provided by MQL coolant delivery sets 4939 for automatic and 4940 for manual tool change.

Coolant delivery set for conventional cooling lubrication (Guhring no. 4949)

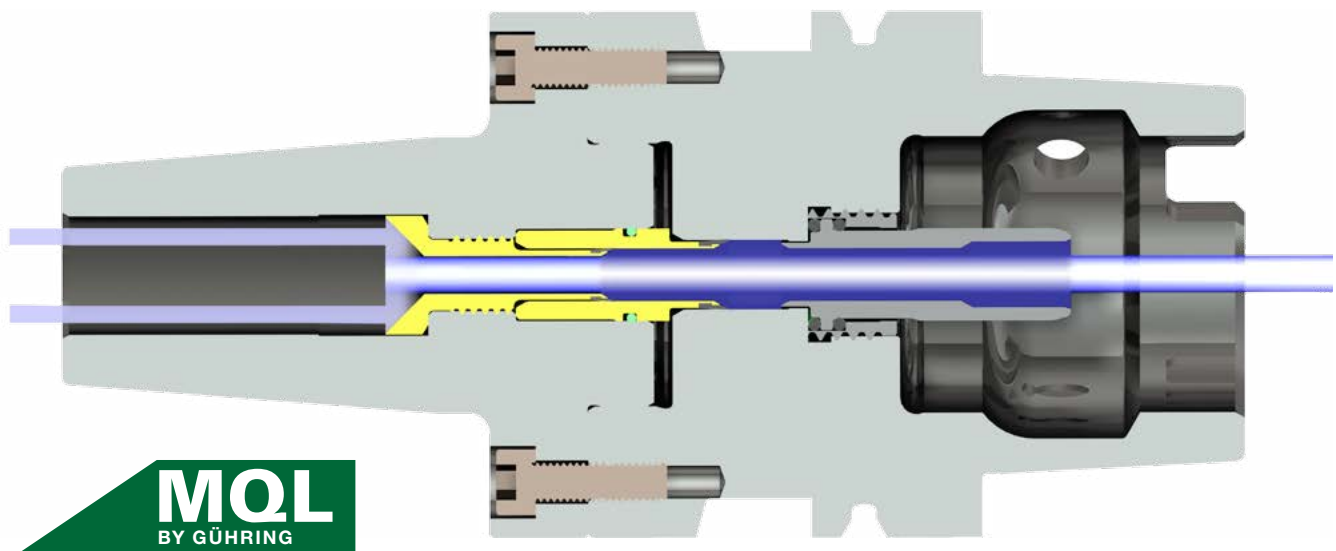
Alternatively, for conventional cooling lubrication the coolant delivery set 4949 is applied, that is 100% compatible with MQL coolant delivery sets.

Guhring modules MQL without loss

Particularly with minimal quantity lubrication (MQL) the tool is of vital importance for an optimum and reliable machining process. the loss- and flow disruption-free delivery of minimal cooling lubrication quantities to the cutting edge of

Guhring's delivery system: MQL length setting screw and intermediate sleeve

The cooling lubricant is supplied in a straight line without restriction or turbulence from the machine through the tool holder to the cutting edge. Guhring's delivery system can also be retro-fitted to other tool holders!



Guhring modules

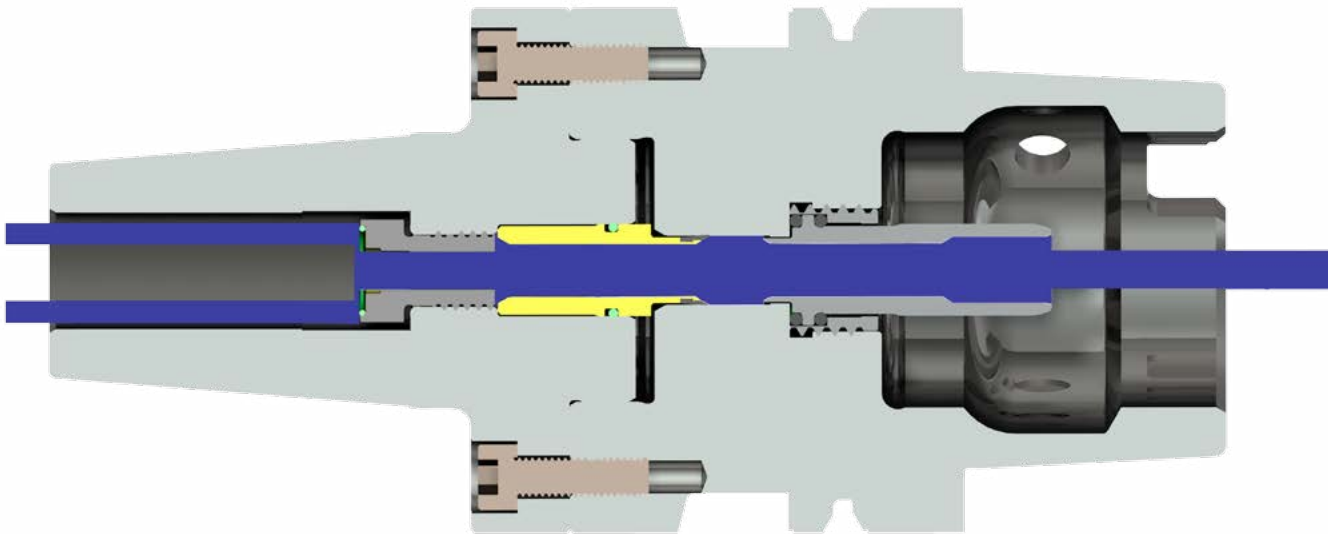
Loss-free conventional cooling lubricant delivery and hydraulic tension

The benefits of Guhring's Modules are not only the quick, simple and highly-accurate tool setting. But the optimal cooling lubricant delivery

without restriction or turbulence ensures a perfect machining result thanks to loss-free cooling and lubrication of the tool's cutting edges.

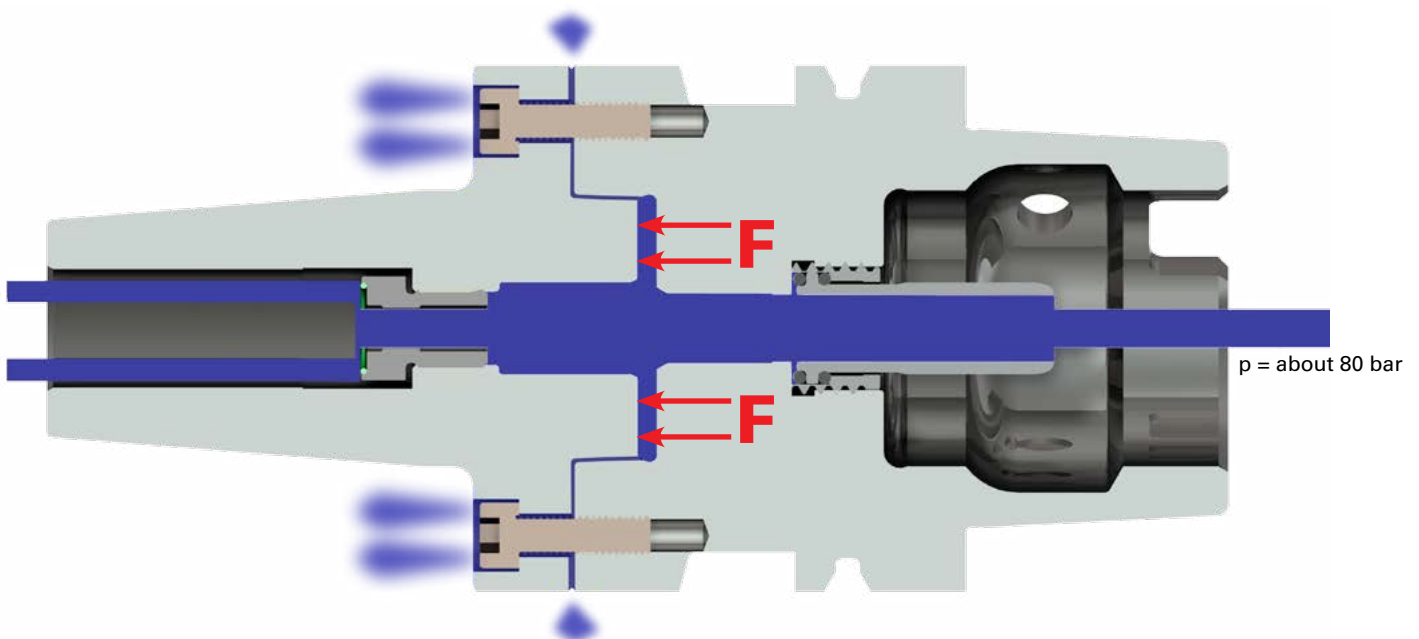
Guhring's delivery system for conventional cooling lubrication with intermediate sleeve

The cooling lubricant is supplied in a straight line without restriction or turbulence from the machine through the tool holder to the cutting edge.



Market conventional configuration without delivery system

The cooling lubricant deflects in the tool holder and the coolant exits into and from hollow areas in the holder. In addition, the cooling lubricant exerts force on the piston surfaces due to the high pressure of about 80 bar resulting in hydraulic tension and concentricity errors.



Guhring modules

Module 6x6 – the advantages at a glance

- quick and targeted μ -accurate setting thanks to the close proximity of axial and radial setting screws to the error measuring point. Ideal for 6-fluted tools with a perfect fit to the cutting edge.
- quick and targeted balancing thanks to 6 balancing bores and threads providing a high balancing capacity.
- optimal setting results with multi-flute PCD/CBN fine machining tools or Guhring's HR 500 high performance reamer with 6 cutting edges.
- especially rigid connection thanks to 6 fastening screws.
- accurate wobble setting and optimal rigidity thanks to a high pre-clamping torque.
- minimal 'settlement behaviour' offering highest accuracy over a long application period.
- universal and modular designed system with hydraulic chucks, shrink fit chucks or HPC clamping chucks as well as HSK or SK interface.
- available in combination with monolithic special tools.

Guhring modules

Module 4x4 – the advantages at a glance

- market compatible module
- extensive range, of modular design
- optimal cooling lubricant throughput with conventional cooling as well as with MQL (optional)
- hydraulic chucks and shrink fit chucks with increased insertion depth to current Guhring standard for conical shank ends and long MQL shank

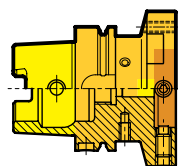


Perfect fit:
With module 6x6 the error measuring point is a max. 30° away from the next positioning bore. The same applies to the balancing bore.

Guhring modules

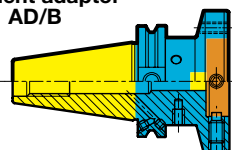
Module system summary 6x6 and 4x4

Alignment adaptor HSK-A



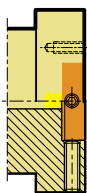
Alignment adaptor
Guhring no. 4723

SK alignment adaptor DIN 69871 AD/B



Alignment adaptor
Guhring no. 4725

Machine spindle Direct installation

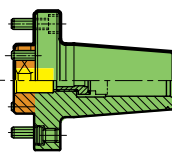


Module 6x6

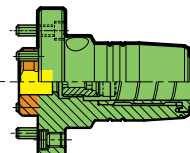


Intermediate tube
Guhring no. 4716

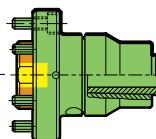
Module flange



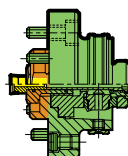
Shrink fit chucks
Guhring no. 4717



Hydraulic chucks
Guhring no. 4722

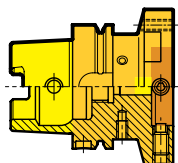


HPC clamping chucks
Guhring no. 4714



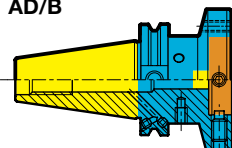
HSK adaptor (in front)
Guhring no. 4363

Alignment adaptor HSK-A



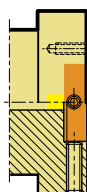
Alignment adaptor
Guhring no. 4297

SK alignment adaptor DIN 69871 AD/B



Alignment adaptor
Guhring no. 4724

Machine spindle Direct installation

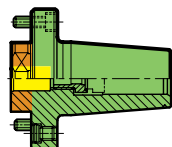


Module 4x4

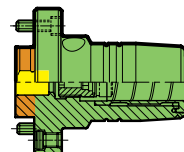


Intermediate tube
Guhring no. 4716

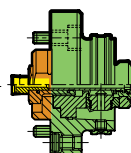
Module flange



Shrink fit chucks
Guhring no. 4760



Hydraulic chucks
Guhring no. 4360



HSK adaptor (in front)
Guhring no. 4713



1. ASSEMBLY AND ALIGNMENT OF HOLDER MODULE WITH RADIAL ADJUSTMENT

1.1 CLEAN TAPER AND PLANE SURFACES OF HOLDER MODULE AND HOLDER ADAPTER.

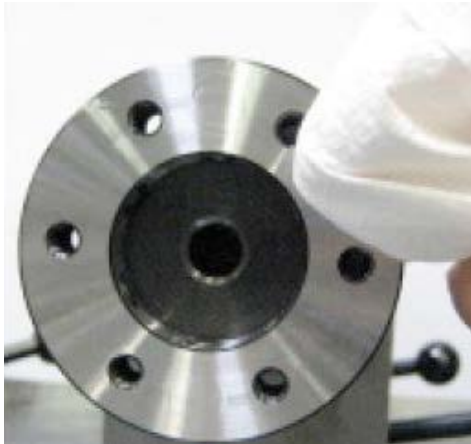


FIG. 1:
Holder module



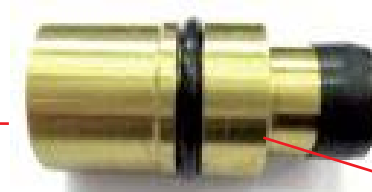
FIG. 2:
Holder adapter

ATTENTION

This assembly step is only necessary when Gühring module holders are applied. Why? Because only with Gühring module holders coolant leak tightness between holder module and holder adapter can be achieved via an intermediate sleeve.



Insert intermediate sleeve in holder module to limit stop of insertion hole.



Intermediate sleeve
incl. O-ring + sealing lip
TiN-coated



1) Initially lightly oil the sealing lip.
2) Carefully* insert sealing lip in central holder bore, then fit module in adapter.

*to avoid damage

Adjusting Guideline GM300 – Module Adapter 4 x 90° / 6 x 60°



1.2 FIT HOLDER MODULE. TIGHTEN FASTENING SCREWS TO 50% OF THE SPECIFIED TORQUE
(SEE TABLE PAGE 130).



© Guhring KG



© Guhring KG

1.3 POSITION DIAL GAUGE ON THE CONCENTRIC SETTING COLLAR (GROUND COLLAR ON THE
MODULE DIAMETER). TAKE THE HIGHEST MEASURING POINT AND "ZERO" THE DIAL GAUGE.



© Guhring KG

Adjusting Guideline GM300 – Module Adapter 4 x 90° / 6 x 60°



1.4 ROUGHLY ALIGN THE HOLDER MODULE (APPROX. 0.01 MM), LOOSEN ADJUSTING SCREWS AGAIN FOLLOWING ACTUATION.



© Guhring KG



© Guhring KG

1.5 TIGHTEN THE FASTENING SCREWS TO THE SPECIFIED TORQUE.



© Guhring KG

Module diameter	Fastening screw	Torque [Nm]
60	DIN 912-M5x16-12.9	8,7
70	DIN 912-M6x20-12.9	15
80	DIN 912-M6x20-12.9	15
100	DIN 912-M8x25-12.9	36
117	DIN 912-M8x25-12.9	36
140	DIN 912-M10x30-12.9	72



© Guhring KG

Adjust concentricity with the adjusting screws. Loosen adjusting screws again following actuation. Repeat the process until the concentricity error is $\leq 3 \mu\text{m}$. Once the concentricity has been adjusted lightly tighten the adjusting screws and re-check concentricity.



2. ALIGNMENT OF HOLDER MODULE TO ADJUST RUN OUT



© Guhring KG

- 2.1 To adjust run out the dial gauge is positioned at the front concentricity check point, cutting edge guide pads or at a suitable location. Carry out run out correction via the adjustment screws. Do not loosen the adjustment screws following actuation.
- 2.2 Once the run out is set to $\leq 3 \mu\text{m}$, re-check the concentricity on the module collar and correct if necessary. Should the concentricity require correction the run out must subsequently be checked again.

Adjusting Guideline Expansion joint fine boring tools



GENERAL

- all expansion joint tools are delivered pre-set if not specified otherwise.
- the countersunk head screws are screwed tight and sealed.
- with each new setting both setting screws must be **without** pre-tension.
- turn anti-clockwise to loosen the pre-tension..

ATTENTION

As a rule, the adjustment of the cutting edge with the setting screws 1 and 2 is performed **clockwise**.

DIAMETER ADJUSTMENT

1. First, turn adjusting screw 1 clockwise and adjust to approximately 10 μm **above** the diameter setting dimension (see FIG. 1 and FIG. 3)
2. Then via adjusting screw 2 reset the diameter, consciously set too large, play-free to the required setting dimension of the diameter (see FIG. 2 and FIG. 3). This "locks" the entire system.

FUNCTIONAL PRINCIPLE OF "EXPANSION JOINT/ROCKER"

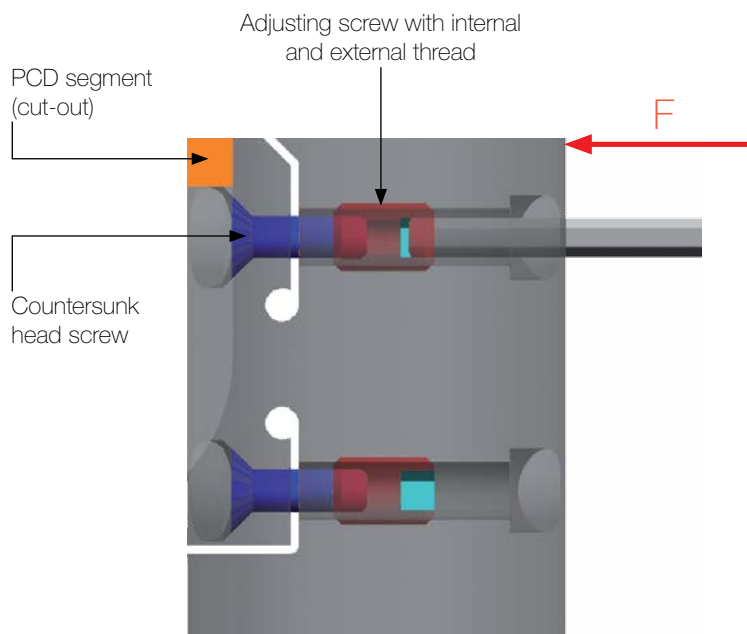


FIG. 1:
Adjusting screw 1 (above)
adjust clockwise / loosen anti-clockwise

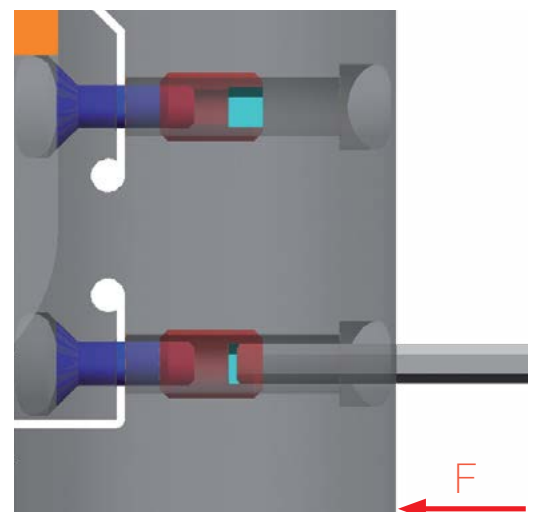


FIG. 2:
Adjusting screw 2 (below)
lock clockwise / loosen anti-clockwise



TORQUE

Diameter range [mm]	Adj. range per radius [μm]	Max. Torque [Nm]	SW [mm]
18 – 24	30	0,8	2
24 – 30	50	0,8	2
30 – 38	70	1,5	2,5
38 – 50	80	4	3
> 50	150	6	4

ATTENTION

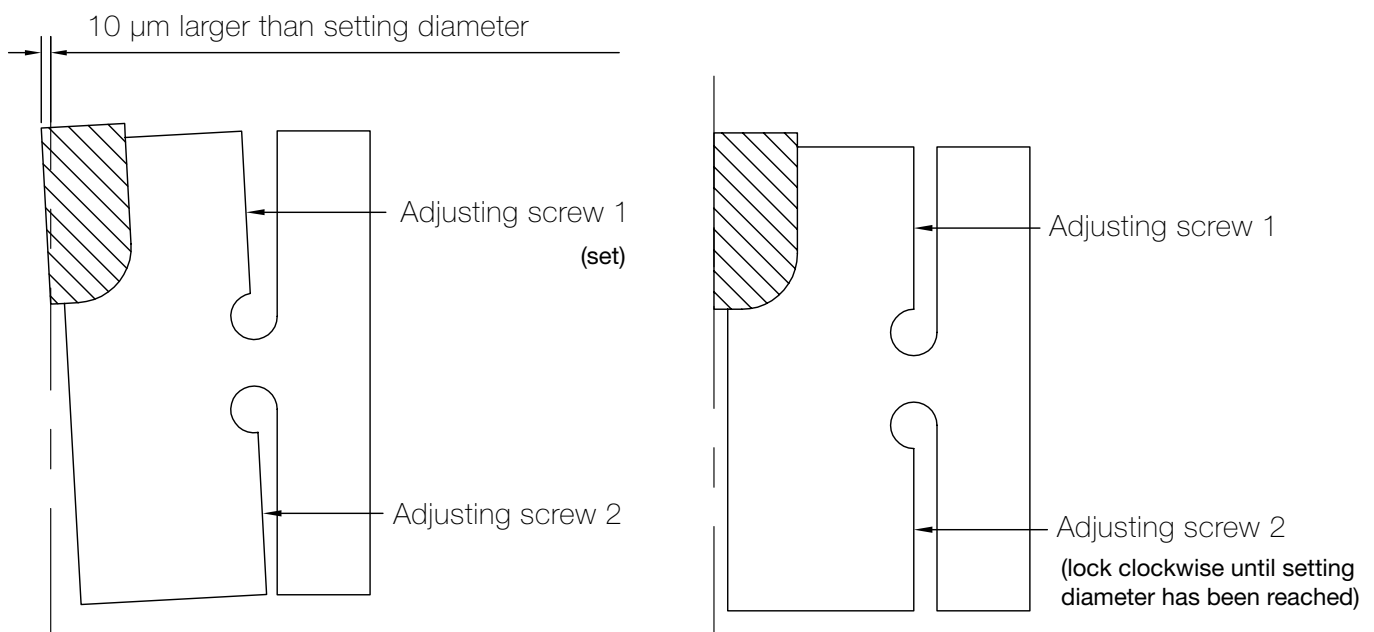
The indicated maximum torques per nominal size may not be exceeded or reduced when adjusting and locking the expansion adjustment due to potential damage.

The recommended adjusting ranges and max. torques are set out in the table.

* only if the guide values are adhered to is the perfect functioning of the tool ensured!!

ADJUSTING AND LOCKING DETAILS

FIG. 3



Adjusting Guideline Expansion Screw – MV1000



IN GENERAL

μm -accurate adjustment of the diameter is possible by turning the expansion screw.
The adjustment range is max. 0.02 mm.

For Reaming operations with PCD or CBN tipped tools, Guhring has developed a unique solution, opening up completely new possibilities regarding accuracy and economic efficiency. Reaming tools with these technologies offer the user the following clear competitive advantages:

- Simple, quick and highly accurate diameter setting for first and second step.
- Both tool diameters can be re-adjusted when tool is in clamped condition.
- Machining of through and blind holes thanks to the integrated expansion screw in the tool point.
- Highest feed rates thanks to several cutting edges.
- Reduction in machining times.
- Maximum accuracy and extreme tool life.

Coolant Delivery directly to the cutting edges via expansion screw

- Optimal coolant delivery to the cutting edges thanks to radial coolant exits in the expansion screw.
- Optimal tool lubrication.
- Optimal chip evacuation from the hole.



Adjusting Guideline

Variable Clamping Component – GP100



IN GENERAL

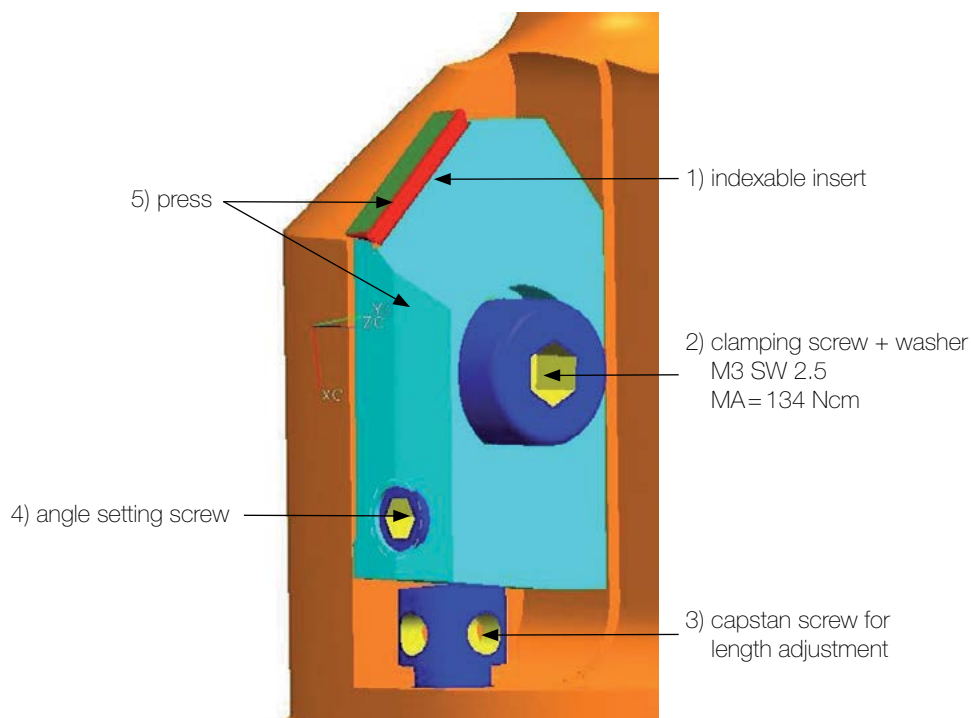
The angle to the center axis is manufactured 0.5° smaller than the corresponding nominal dimension and possesses a $+1^\circ$ adjustment range.

The clamping claw is adjustable in length by ± 0.2 mm from the nominal dimension.
Tools are supplied pre-set.

SET-UP/FITTING

When replacing the indexable insert (1) proceed as follows:

- Loosen length setting screw (4) and angle setting screw by half a turn.
- Loosen / dismantle clamping screw (2).
- Clean and assemble components, lightly oil clamping screw (2).
- Gently tighten clamping screw (2) (approx. 20 Ncm). While doing so, press indexable insert and clamping claw in direction of arrow with thumb and index finger.
- Angle setting to 0.1° ahead of nominal dimension.
- Length setting to 0.05 less than nominal dimension.
- Angle setting screw (4) to nominal dimension.
- Length setting (3) to nominal dimension.
- Tightening clamping screw (2) to 134 Ncm.



Graphic: GP100
© Guhring KG

Adjusting Guideline Threaded Wedge Adjustment (TWA) Indexable Inserts Installation



1. ASSEMBLY

- 1.1 Lightly lubricate the bottom and the walls of the location bore of the TWA as well as the thread of the setting screw with MOS2 assembly paste.
- 1.2 Locate the hexagonal key through the wedge into the setting screw and insert together into the base of the location bore of the adjustment unit (fig. 1).
- 1.3 Using the hexagonal key push the setting screw into the radial recess at the base of the bore and screw-in the wedge anticlockwise. When doing this the indexable insert contact surface on the wedge must be positioned towards the indexable insert seat (push the wedge from above onto the setting screw, so that the thread of the wedge can locate onto the setting screw). If when screwing in the wedge the collar of the setting screw "jams" in the location bore (noticeable through the setting screw being difficult to turn), push the entire adjustment unit fully into the location bore with the hexagonal key, if necessary resolve "jam" via clockwise rotation (fig. 2).
- 1.4 Lightly lubricate the indexable insert contact surface on the wedge with MOS2 assembly paste and screw in indexable insert in clockwise direction into the indexable insert seat with indexable insert clamping screw (lightly lubricate thread).
- 1.5 The disassembly is carried out in the reverse order.

2. OPERATION

- 2.1 Using a Torx key lightly tighten the indexable insert clamping screw in a clockwise direction to the smallest diameter setting (wedge and setting screw).
- 2.2 Adjust indexable insert to 0.05 mm of diameter before the final dimension: Insert the hexagonal key in the setting screw and adjust the diameter in clockwise direction (fig. 4). Then tighten the indexable insert clamping screw to the specified tightening torque.
- 2.3 Adjust the indexable insert to the final dimension.
- 2.4 If the diameter has already been exceeded, loosen the adjustment in anti-clockwise direction until the wedge noticeably loosens and re-adjust in clockwise direction. To do this the indexable insert clamping screw does not require loosening.
- 2.5 When replacing the indexable insert or when required lubricate the contact surfaces and the thread of the TWA adjustment unit with MOS2 assembly paste.

Adjusting Guideline Threaded Wedge Adjustment (TWA) Indexable Inserts Installation



3. TIGHTENING TORQUE INDEXABLE INSERT CLAMPING SCREW:

Thread Size	Torx Size	Tightening Torque [Ncm]
M 4 / M4 x 0.5	15	515
3.5	15	345
M 2.5	8	128
M 2.5 / M2.2	7	101

4. KEY SIZES OF THE TWA ADJUSTMENT UNITS/ADJUSTMENT TRAVEL OF THE INDEX. INSERTS:

Insert Size	Torque Size	in radius (at ¼ rotation of setting screw)
0602..	SW 1.5	0.015 mm with indexable insert with 7° clearance angle or 0.024 with indexable insert with 11° clearance angle
09T3..	SW 2.5	
1204..	SW 3.0	

Fig. 1: Assembly (s. No. 1.2)

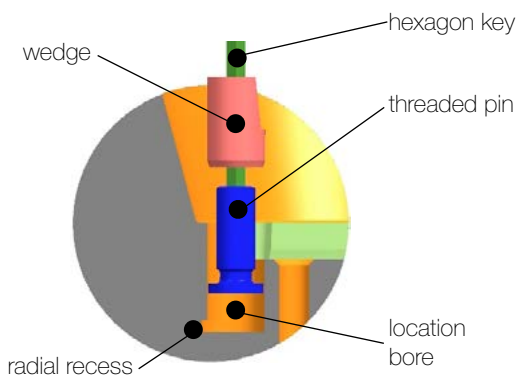


Fig. 2: Assembly (s. No. 1.3)

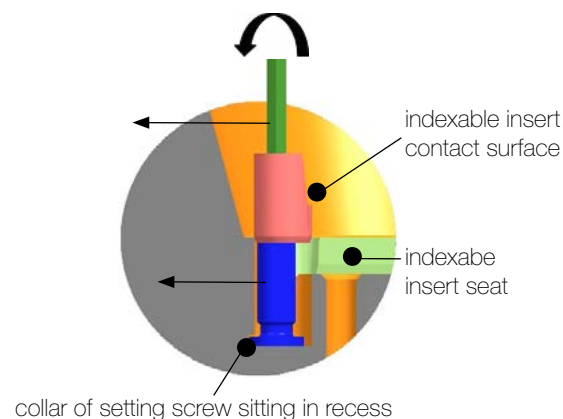


Fig. 3: Operation (s. No. 2.1)

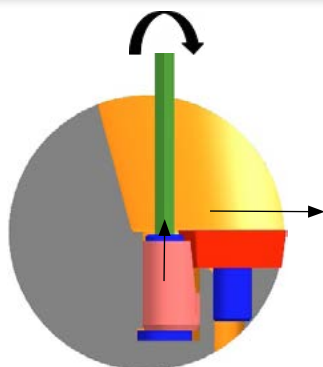
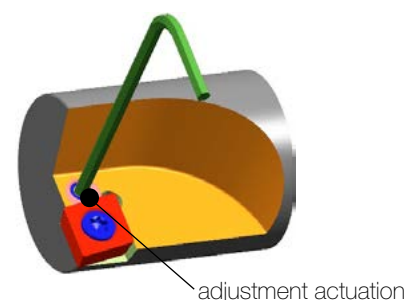


Fig. 4: Operation (s. No. 2.2)



Adjusting Guideline Threaded Wedge Adjustment (TWA) Cartridges Installation



1. ASSEMBLY

- 1.1 Lightly lubricate the bottom and the wall of the location bore of the TWA as well as the thread of the setting screw with MOS2 assembly paste.
- 1.2 Enter the hexagonal key through the wedge into the hexagonal socket of the setting screw and insert together into the location bore of the adjustment unit to the bottom of the bore. (fig. 1).
- 1.3 Using hexagonal key push setting screw into the radial recess at the bottom of the bore and screw-in the wedge anti-clockwise into the location bore to the block. In doing so the cartridge contact surface must be positioned opposite to the radial recess. Push the wedge from above onto the setting screw, so that the thread of the wedge can thread onto the setting screw (fig.2). If when screwing in the wedge the setting screw collar "jams" in the location bore (noticeable through the threaded pin being difficult to turn), press the entire adjustment unit into the location bore with the hexagonal key, if necessary resolve "jam" via clockwise rotation.
- 1.4 Lightly lubricate cartridge contact surface on the threaded key and the cartridge clamping screw thread with MOS2 assembly paste and screw in the cartridge clockwise into the cartridge seat with the cartridge clamping screw.
- 1.5 Screw in the indexable insert into the indexable insert seat of the cartridge (see tightening torque indexable insert clamping screws).
- 1.6 The disassembly is carried out in the reverse order.

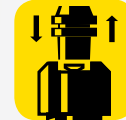
2. OPERATION

- 2.1 Using key lightly tighten the cartridge clamping screw in a clockwise direction to the smallest dia. setting.
- 2.2 Adjust taper or diameter respectively via the TWA adjustment (fig. 3), whilst doing so move to within 0.05 mm in diameter of the setting dimension of the indexable insert (if necessary loosen cartridge clamping screw again).
- 2.3 Using key tighten cartridge clamping screw in clockwise direction (see tightening torque for cartridge clamping screws).
- 2.4 Adjust indexable insert setting dimension via TWA adjustment, if the dimension is exceeded simply loosen the TWA again and re-adjust (fig. 4).
- 2.5 If required lubricate the contact surfaces and the thread of the TWA adjustment unit.

Adjusting Guideline

Threaded Wedge Adjustment (TWA)

Cartridges Installation



3.1 MAX. TIGHTENING TORQUE CARTRIDGE SCREWS:

Thread Size	Torque Size	Tightening Torque [Ncm]
M6	25	1.300
M5	20	900
M3.5	15	345

3.2 MAX. TIGHTENING TORQUE INDEX. INS. CLAMP. SCREWS:

Thread Size	Torque Size	Tightening Torque [Ncm]
M 4 / M4 x 0.5	15	515
3.5	15	345
M 2.5	8	128
M 2.5 / M2.2	7	101

4 KEY SIZES OF THE TWA ADJUSTMENT UNITS/TRAVEL OF CARTRIDGES:

Cartridges Size	Torque Size	Cartridges adjustment travel in radius
06	SW 1.5	0.024 mm at ¼ rotation of setting screw
09	SW 2.0	
12	SW 3.0	

axial adjustmentg: $\pm 0.3\text{mm}$ (all sizes)

Fig. 1: Assembly (s. No. 1.2)

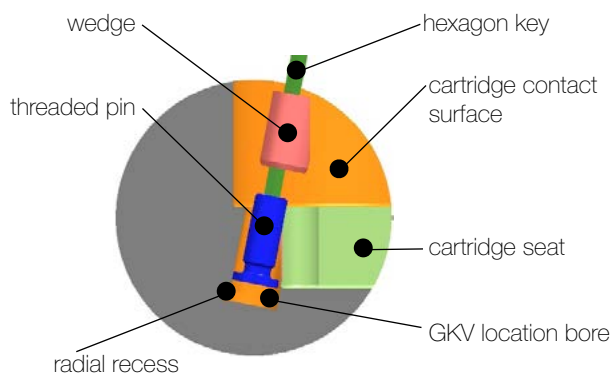


Fig. 2: Assembly (s. No. 1.3)

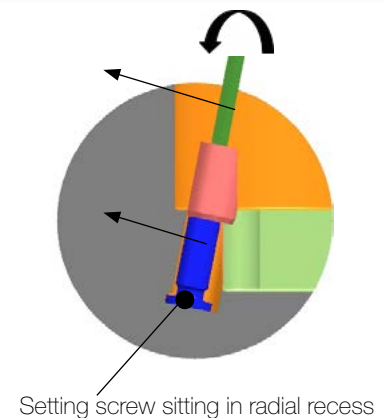


Fig. 3: Operation (s. No. 2.2)

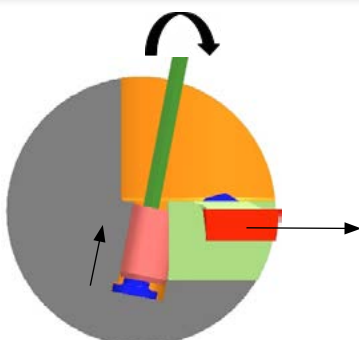
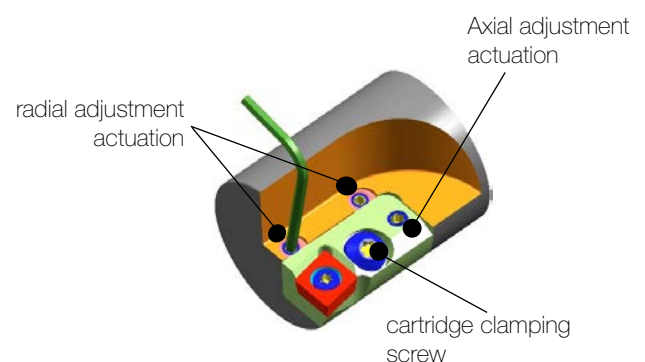


Fig. 4: Operation (s. No. 2.4)



Adjusting Guideline Face Milling Cutter – PF1000



1. ASSEMBLY OF ADJUSTMENT UNIT

- Grease thread and functional areas with Molykote® assembly paste G-N Plus.
- Screw the threaded pin into the adjustment bolt (from flat side) and insert into the sleeve (note correct side). (fig. 1)
- Aided by the supplied cylinder screw insert the adjustment unit into holder bore of the base body (if necessary turn threaded pin forwards or backwards) ensure the threaded pin is correctly aligned with the access bore.
- Engage the hexagon (SW3) of the threaded pin via the access bore and unscrew anti-clockwise to the stop. (fig. 2)

2. ASSEMBLY OF MILLING CUTTER INSERTS

- Insert cutter together with clamping wedge into the slot on the base body, to prevent misalignment of both components they must be pressed against the contact surfaces of the base body. (fig. 3)
- From the inner side, screw the spindle clockwise into the clamping wedge (Torx 25), grease the spindle thread and the contact surfaces of the spindle head beforehand with Molykote® assembly paste G-N Plus (fig. 4) **(don't use lubricant containing copper!)**.
- Assemble all inserts in the same way.

3. ASSEMBLY OF MILLING CUTTER HEAD TO MILLING ARBOR

(for tightening torques apply our torque wrench Guh. no. 4915)

- using the tightening screw (Guh. no. 3009) / clamping disc (Guh. no. 3008) screw the milling cutter head to the milling arbor observing tightening torques below:

Diameter	Torque size	Tightening torque
ø 63	SW 28	Ma = 40 Nm
ø 100	SW 10	Ma = 100 Nm
ø 160	SW 10	Ma = 120 Nm
ø 250	SW 14	Ma = 200 Nm

Diameter	Torque size	Tightening torque
ø 80	SW 8	Ma = 70 Nm
ø 125	SW 12	Ma = 160 Nm
ø 200	SW 14	Ma = 200 Nm

- For screwing together ø 63 apply the hexagonal special insert **Guh. no. 302921586**, for other sizes our hexagonal inserts **Guh. no. 4916**.
- Also grease the threads and the contact surfaces of the tightening / clamping screw head with the assembly paste;

4. ADJUSTING THE MILLING CUTTER INSERTS

For tightening torques apply our torque wrench Guh. no. 4915.

- With all inserts in axially deepest position, tighten spindle to approx. 3-4 Nm **(spindleTorx 25, apply Torx insert Guh. no. 4917).**
- Adjust all inserts using angle screwdriver SW 3 **(Guh. no. 4921)** by turning the threaded pin of the adjustment unit clockwise to 0.02 mm before the setting measurement.
- Tighten all inserts in turn to 16 Nm.
- Adjust all inserts to setting measurement within max 0.004 mm.



5. BALANCING THE MILLING CUTTER HEAD

- It is generally recommended to balance the milling arbor individually.
- Fine balance complete milling assembly with supplied balancing screws.

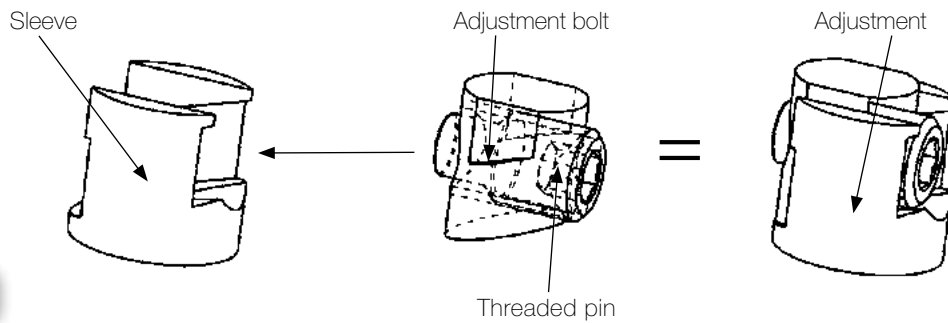


Fig. 1

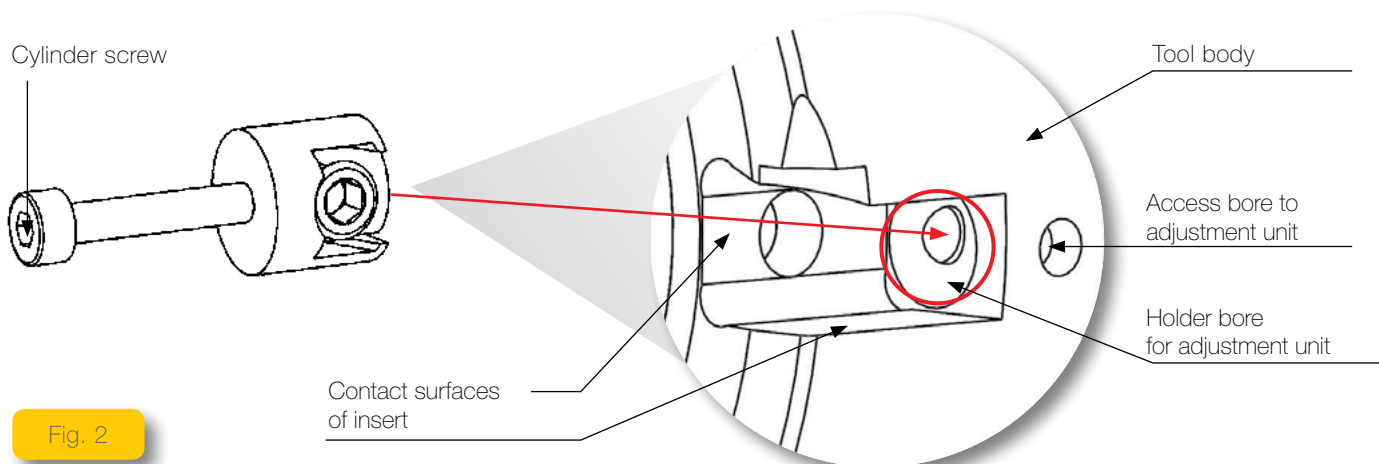


Fig. 2

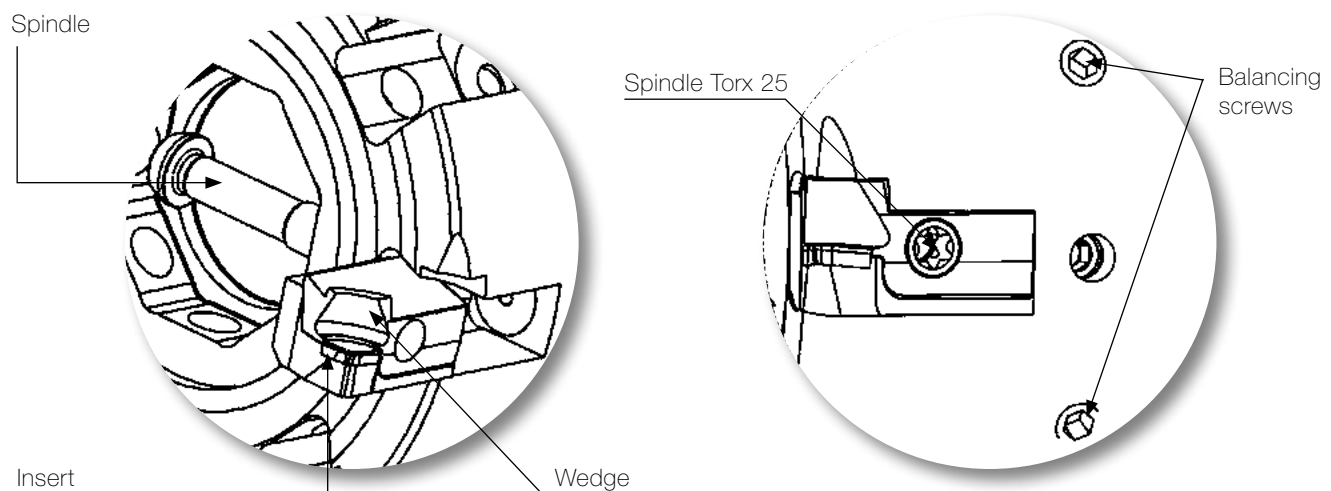


Fig. 3

Fig. 4

VIEW IN DETAILS

Adjusting Guideline Face Milling Cutter – PF1000 / Ø 63



1. ASSEMBLY OF ADJUSTMENT UNIT

- Grease thread and functional areas with Molykote® assembly paste G-N Plus.
- Screw the threaded pin into the adjustment bolt (from flat side) and insert into the sleeve (note correct side) (fig. 1).
- Using the supplied cylinder screw insert the adjustment unit into holder bore of the tool body (if necessary turn threaded pin forwards or backwards) ensure the threaded pin is correctly aligned with the access bore.
- engage the hexagon (SW3) of the threaded pin via the access bore and unscrew anti-clockwise to the stop (fig. 2).

2. ASSEMBLY OF MILLING CUTTER INSERTS

- Insert cutter together with clamping wedge into the slot on the base body, to prevent misalignment of both components they must be pressed against the contact surfaces of the base body (fig. 3).
- From the outer side, screw the spindle (lightly grease both threads with Molykote® assembly paste G-N Plus) anti-clockwise into the clamping wedge (fig. 4) until the spindle projects into the inside of the milling head base body by approx. 2 threads (fig. 5). Position the nut on this thread and screw the nut on by turning the spindle clockwise. Now screw the spindle in further anti-clockwise, whilst constantly re-positioning the nut clockwise (screwing onto the spindle) until the spindle towards the centre is level with the nut (the re-positioning of the nut can be simplified via the bores on the external diameter of the nut with the help of a small pen key or similar).
- Now lightly tighten the spindle clockwise. Assemble all inserts in the same way. When assembled correctly there must still be play between the nuts (fig. 6). The tightening screw **Guh. no. 3009** must be able to be guided centrally between the nuts without exerting force. Also the spindle on the outer side of the milling head must not protrude out of the clamping wedge.

3. ASSEMBLY OF MILLING CUTTER HEAD TO MILLING ARBOR

(for tightening torques apply our torque wrench Guh. no. 4915)

- Using the tightening screw, screw the milling cutter head onto the milling arbor, whilst observing the tightening torque: SW 28 → Ma = 40 Nm.
- Apply the hexagonal special insert **Guh. no. 302921586** for the tightening screw.
- Also grease the threads and the contact surfaces of the tightening / clamping screw head with the assembly paste.



4. ADJUSTING THE MILLING CUTTER INSERTS

(for tightening torques apply our torque wrench Guh. no. 4915)

- With all inserts in deepest axial position, tighten spindle to approx. 3-4 Nm **(spindleTorx 25, apply Torx insert Guh. no. 4917).**
- Adjust all inserts using angle screwdriver SW 3 **(Guh. no. 4921)** by turning the threaded pin of the adjustment unit clockwise to 0.02 mm before the setting measurement.
- Tighten all inserts in turn to 11 Nm.
- Adjust all inserts to setting measurement within max 0.004 mm.

5. DISASSEMBLY OF INSERTS

- Loosen tightening screw **Guh. no. 3009** (Code no. 63,000) anti-clockwise and unscrew.
- Loosen spindle screw connection (Torx 25) anti-clockwise, now unscrew the nut anti-clockwise (with the pen key) towards the centre of the spindle, whilst constantly re-positioning the spindle in clockwise direction (unscrewing from the clamping wedge).

6. BALANCING THE MILLING CUTTER HEAD

- It is generally recommended to balance the milling arbor **individually**.
- Fine balance complete milling assembly with supplied balancing screws.

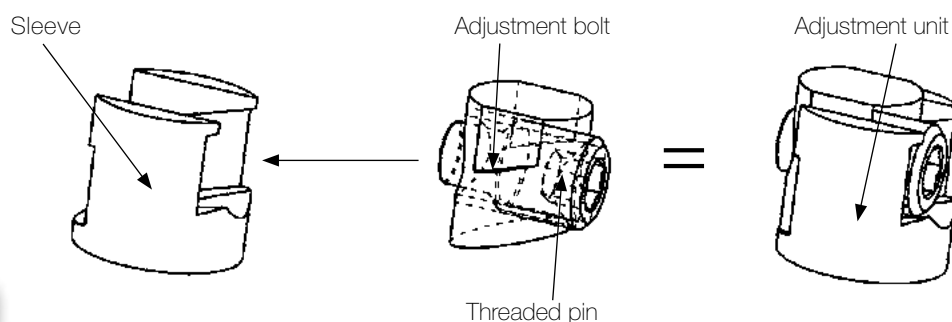


Fig. 1

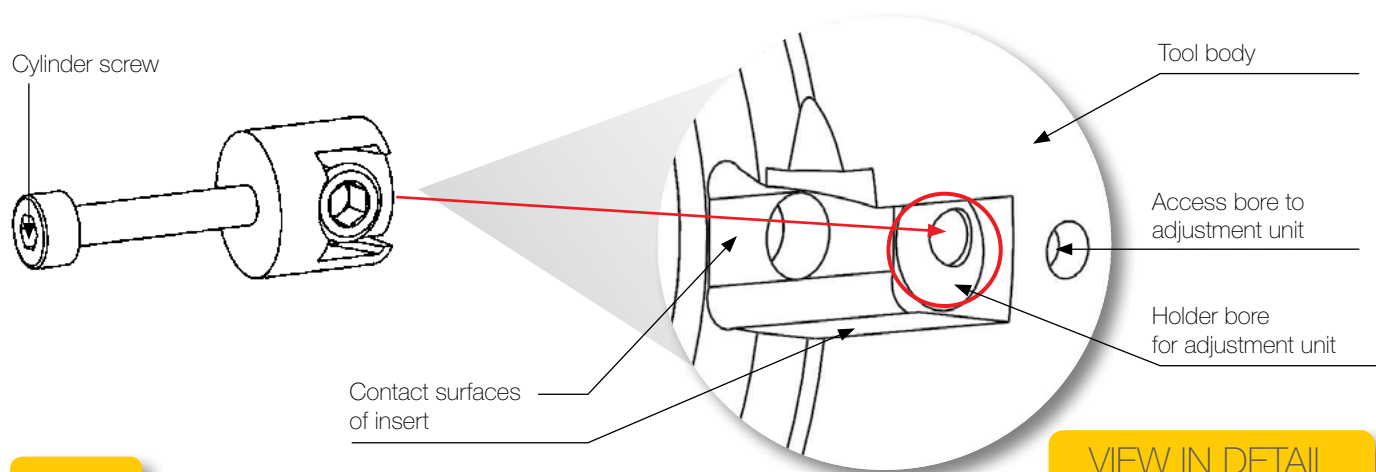


Fig. 2

Adjusting Guideline Face Milling Cutter – PF1000 / Ø 63

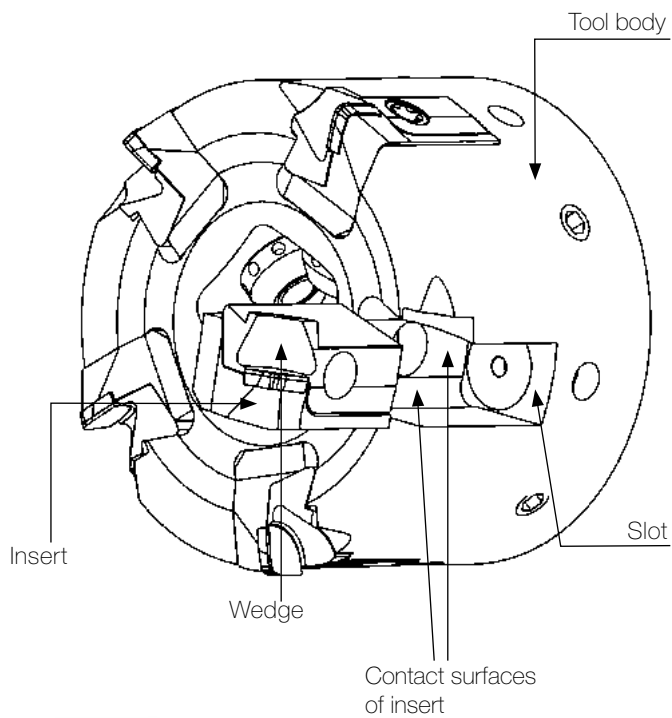


Fig. 3

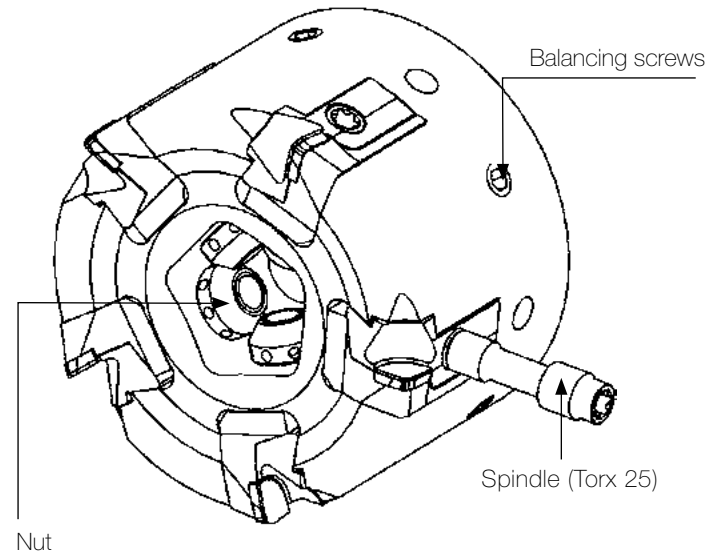


Fig. 4

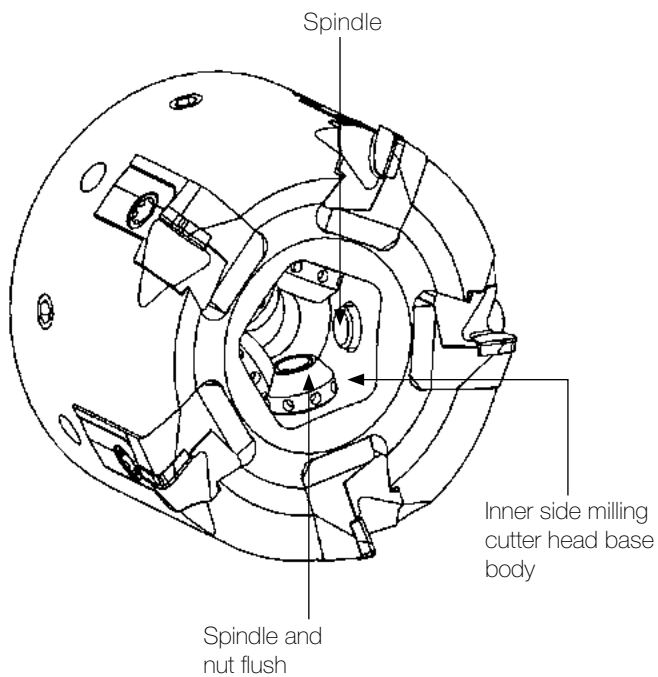


Fig. 5

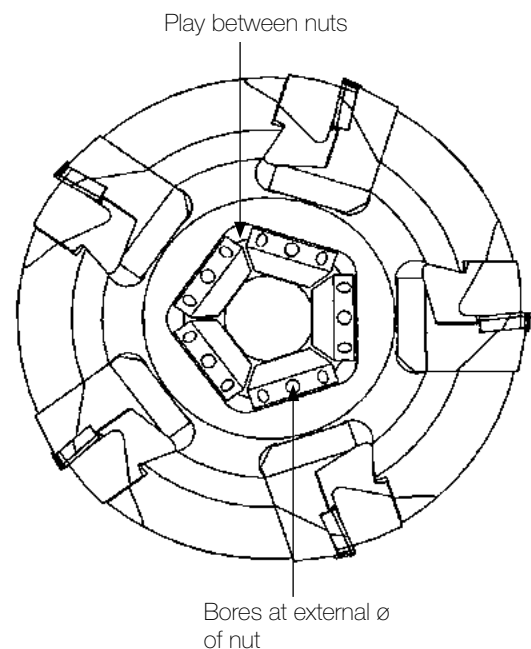
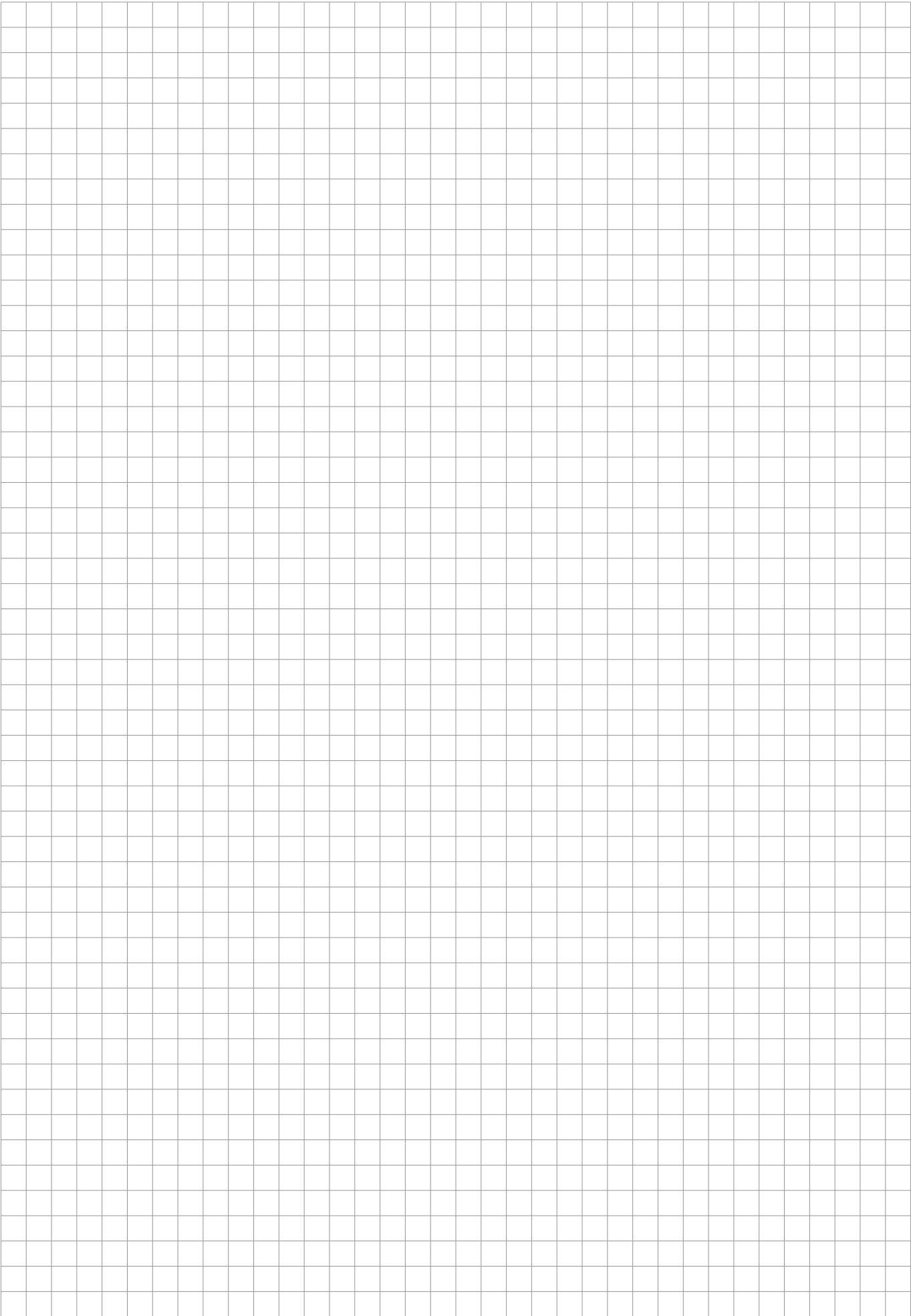


Fig. 6







GUHRING

PCD/CBN TECHNOLOGY



GUHRING KG

Telephone: +49 74 31 17 - 0 | Fax: +49 74 31 17 - 21 279

Herderstraße 50 - 54 | 72458 Albstadt | Germany | info@guehring.de | www.guehring.de

