

GÜHRING



- drilling from \varnothing 0.16 mm; up to 80xD drilling depth
- highest precision reaming
- perfect surface milling
- threading tools for every application
- special tools made to measure

Tools for stainless steels

GÜHRING – YOUR WORLDWIDE PARTNER

Material classes and their application

Stainless or acid-resistant steels have a high chromium content of at least 10.5 %, giving them excellent corrosion resistance even against chemically aggressive substances. The chromium forms a layer of chromium dioxide on the surface, which prevents corrosion.

Stainless steels are divided into the groups of austenitic, martensitic, ferritic or ferritic-austenitic (duplex) steels. Depending on the field of application, nickel, molybdenum and other elements are alloyed to achieve the desired material properties.

- difficult to machine
- tensile strength $\leq 800 \text{ N/mm}^2$
- yield strength $\leq 400 \text{ N/mm}^2$

ferritic

Material examples:

1.4003 X2CrNi12 | 1.4016 X6Cr17 | 1.4021 X20Cr13
1.4509 X2CrTiNb18 | 1.4511 X2CrNb17

Areas of application:

Railroad car, appliance and vehicle construction, container construction, conveyor technology

Application examples:

Oil or energy processing systems, exhaust pipes, decorative ornaments, nitric acid tanks, hot water tanks, furnace components, nozzles, combustion chambers

- very difficult to machine
- tensile strength $\leq 1,000 \text{ N/mm}^2$
- yield strength $\leq 600 \text{ N/mm}^2$

ferritic-austenitic

Material examples:

1.4362 X2CrNiN23-4 | 1.4460 X3CrNiMoN27-5-2
1.4462 X2CrNiMoN22-5-3 | 1.4410 X2CrNiMoN25-7-4
1.4501 X2CrNiMoCuWN25-7-4

Areas of application:

Construction industry, chemical apparatus production, shipbuilding

Application examples:

Compressor impellers, tanks





ISO CODE

Stainless steel

- difficult to machine
- tensile strength $\leq 1,100$ N/mm²
- yield strength ≤ 300 N/mm²

austenitic

Material examples:

1.4301 X5CrNi18-10 (V2A) | 1.4541 X6CrNiTi18-10
1.4571 X6CrNiMoTi17-12-2 (V4A)

Areas of application:

Automotive industry, vehicle construction, container and appliance construction, construction industry, food industry, medical technology, sanitary facilities

Application examples:

Threaded fasteners, lines and pipes, nozzles, perforated discs, locking bolts, clock housing

- moderately difficult to machine
- tensile strength $\leq 1,500$ N/mm²
- yield strength $\leq 1,300$ N/mm²

martensitic

Material examples:

1.4057 X20CrNi17-2 | 1.4021 X20Cr13
1.4122 X39CrMo17-1 | 1.4313 X3CrNiMo13-4
1.4418 X4CrNiMo16-5-1

Areas of application:

Automotive industry, aviation, compressor construction, marine machinery, oil and gas industry, general mechanical engineering, medical technology

Application examples:

Surgical instruments, axles, pumps, valves





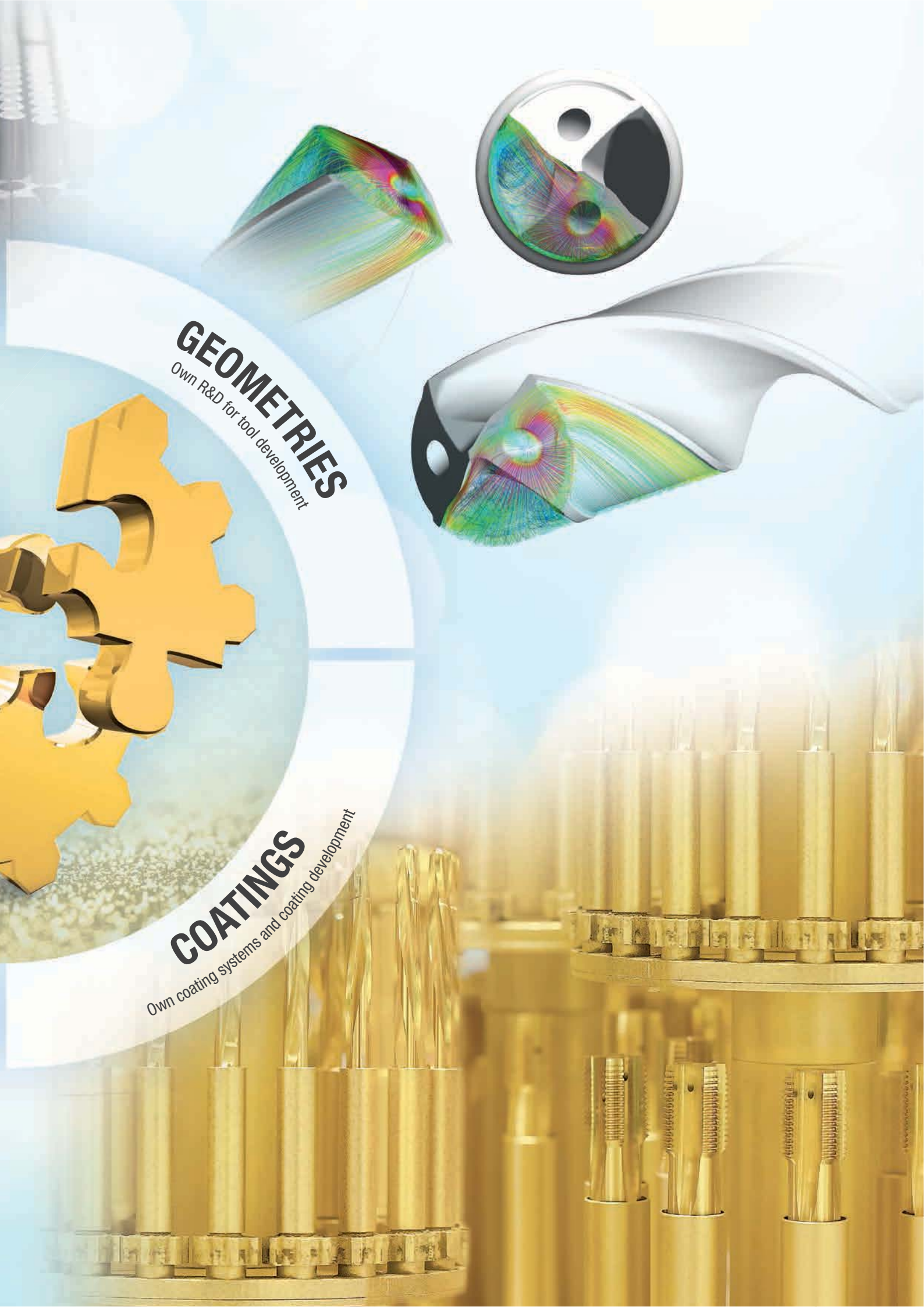
Our goal is to deliver the best raw materials for our in-house carbide tool production: This enables the Gühring Group to permanently advance its standard of quality and technological development by itself.

The large number of ultrafine and submicron substrates makes us the leading carbide manufacturer for stainless steel processing. The smallest grain sizes of 0.2 to 0.8 μm are therefore the ideal raw material for efficient stainless steel machining.

TOOL MATERIALS
Own carbide production

MACHINE & EQUIPMENT DIVISION
Own machine tool and equipment divisions



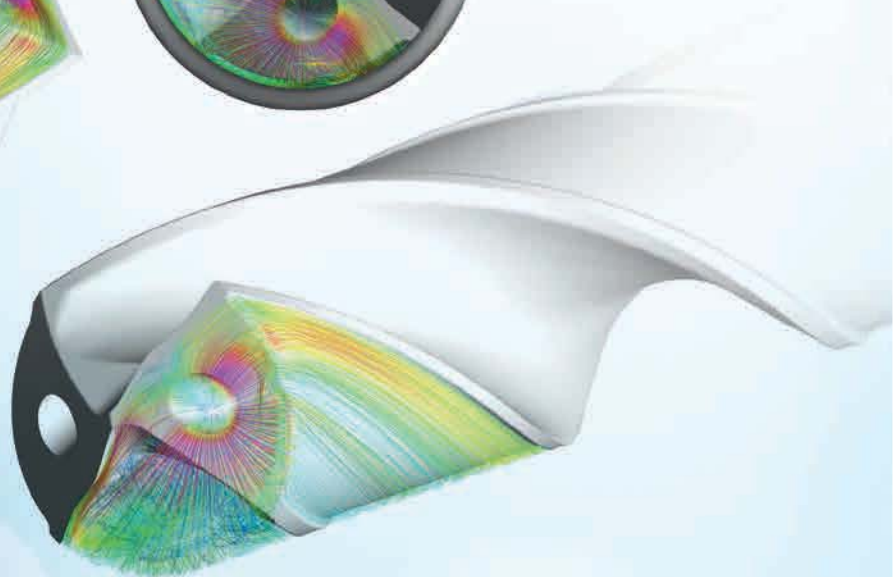
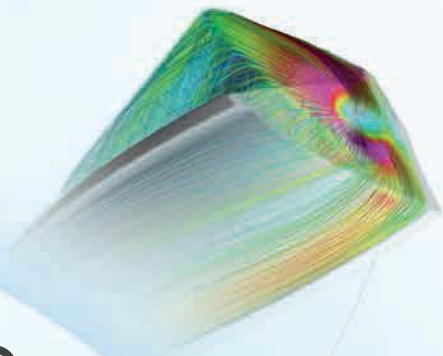


GEOMETRIES


Own R&D for tool development

COATINGS

Own coating systems and coating development



OPTIMUM TOOL SELECTION



SOLID CARBIDE DRILLING TOOLS

from page 8



INSERT DRILLING SYSTEM

from page 12



GUN DRILLS

from page 14



HSS/HSCO TWIST DRILLS

from page 16

Stainless steels are machined by tools with particularly sharp cutting edges. Their back taper and relief angle are designed in a way that ensures that the highly elastic deformation components do not cause the tool to jam during machining.

Very good cooling lubrication supports heat and chip removal and counteracts work hardening. High feed rates lead to optimum heat dissipation via the chips.

REAMERS

from page 18

MILLING CUTTERS

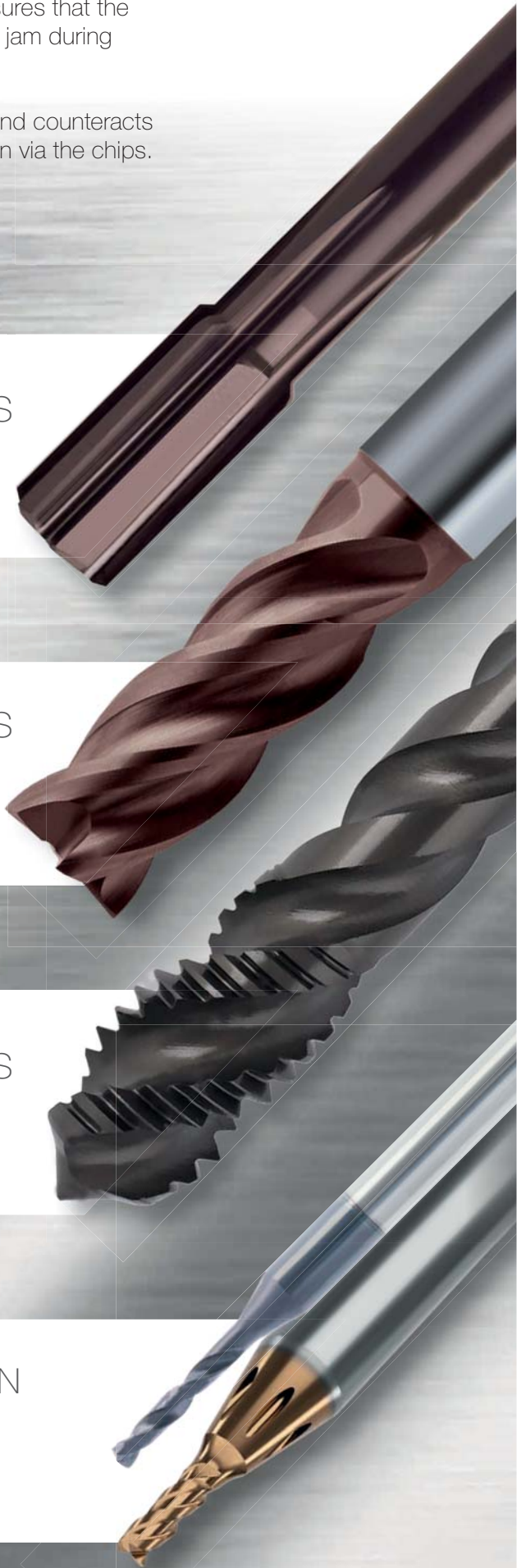
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THREADING TOOLS

from page 26

MICRO-PRECISION TOOLS

from page 28





RT 100 VA

This solid carbide drill has the perfect tool geometry for producing precise boreholes in stainless steel with the highest cutting performance and long tool life.

It is the optimum solution for use in the food industry, power plants, energy supply, shipbuilding and petrochemical industries.

Point grind

- point geometry designed as a 2-facet point grind with a straight cutting edge
- perfect corner protection
- short chip breakage due to adapted flute profile

Wear resistant coating

- high degree of hardness and good thermochemical resistance

Adapted surface quality

- optimum chip removal without chip jamming/chip blockage
- reduction of process forces by reducing friction between chips and the tool

Specially developed carbide

- perfect balance of hardness and fracture toughness

APPLICATION EXAMPLE

Component	Compensating bushing
Article no.	5526
Ø [mm]	8.2
Drilling depth [mm]	14
Material (no.)	X5CrNi18-10 (1.4301)
Hole type	Blind-hole
Cooling	Internal coolant
Lubricant	Soluble oil

	RT 100 VA	Competition
v_c [m/min]	60	60
f [mm/rev.]	0.25	0.25
TOOL LIFE ➤	157 m	99 m



RT 100 XF

- extreme feed rates and very high metal removal rates
- in-house high-end finishing for maximum performance
- reduced cycle times for difficult-to-machine materials and special applications in series production

Point grind

- protected by a negative chamfer along the side cutting edge, makes the cutting edge ultra-robust and durable. For exceptional performance.

Polished flutes

- reduce the heat input into the component. The chip flows faster; thermal changes such as hardening are avoided.

Double margin

- stabilizes very quickly, therefore optimizes hole alignment, ensures perfect drilling results using a standard RT 100 XF from 5xD upwards. The third and fourth support chamfers ensure excellent running smoothness.

The proven nanoFire coating system

- was developed by a specially designed pre- and post-treatment. This surface treatment smooths the coating and makes it significantly more robust.

Extremely hard, almost unbreakable:

- The carbide developed for the RT 100 XF performs a balancing act between hardness and toughness. Due to its special structure, this Gühring-created carbide grade has a re-sharpening effect. Breakages that normally accelerate tool wear no longer occur.

APPLICATION EXAMPLE

Component	<i>Perforated disc</i>
Article no.	5498
Ø [mm]	6.0
Drilling depth [mm]	22.6
Material (no.)	90MnCrV8 (1.2842)
Hole type	Through-hole
Cooling	Internal coolant
Lubricant	Soluble oil

	RT 100 XF	Competition
v_c [m/min]	90	80
f [mm/rev.]	0.3	0.25

TOOL LIFE >

105 m

80 m

RT 100 XF





P	M	K	N	S	H	Tool illustration	Drilling depth	Shank form	Type	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
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ExclusiveLine micro-precision drills without coolant ducts

•	•	•	○	○			4xD	Cyl	N	WN		VHM	A	0.500 - 3.000	6400
•	•	•	○	○			7xD	Cyl	N	WN		VHM	A	0.500 - 3.000	6401

ExclusiveLine micro-precision drills with coolant ducts

•	•	•	○	○			5xD	Cyl	N	WN		VHM	A	1.400 - 3.000	6405
•	•	•	○	○			8xD	Cyl	N	WN		VHM	A	1.400 - 3.000	6408
•	•	•	○	○			15xD	Cyl	N	WN		VHM	A	1.400 - 3.000	6412

Ratio drills RT 100 VA

•	•	•	•	•			3xD	HA	RT 100 VA	DIN 6537 K		VHM	a	3.000 - 20.000	5526
•	•	•	•	•			3xD	HE	RT 100 VA	DIN 6537 K		VHM	a	3.000 - 20.000	5528
•	•	•	•	•			3xD	HB	RT 100 VA	DIN 6537 K		VHM	a	3.000 - 20.000	6024
•	•	•	•	•			5xD	HA	RT 100 VA	DIN 6537 L		VHM	a	3.000 - 20.000	5580
•	•	•	•	•			5xD	HE	RT 100 VA	DIN 6537 L		VHM	a	3.000 - 20.000	5581
•	•	•	•	•			5xD	HB	RT 100 VA	DIN 6537 L		VHM	a	3.000 - 20.000	6025

Ratio drills RT 100 XF

•	○	○	○	○			5xD	HA	RT 100 XF	DIN 6537 L		VHM	F	3.000 - 20.000	5498
•	○	○	○	○			7xD	HA	RT 100 XF	WN		VHM	F	3.000 - 20.000	5499



HT 800 insert drilling system

With the new HT 800 WP interchangeable drilling system Gühring provides high-performance and cost-efficient holders for holes in the diameter range from 11.00 to 40.0 mm.

The HT 800 WP drilling system is therefore ideal for producing large, high-precision holes for applications in stainless steel processing in energy technology, steel construction, automotive engineering, mechanical engineering or the chemical and food industries.

Highly accurate and rigid insert seat

- insert change in the machine
- holder remains clamped
- tool change and re-setting not required
- increased process reliability and reduced set up time

Extended tool life

- interchangeable inserts perfectly adapted to the respective field of application in terms of cutting material, geometry and surface
- optimum machining results in stainless steel

Perfect cooling lubrication

- coolant ducts with maximum cross section
- exit from the flute

Optimal chip evacuation

- special flute cross section
- ultra-smooth surface finish

Rigid holders

- close diameter increases per holder sizes reduces wear
- improved workpiece surfaces
- better guidance of the tool increase the rigidity
- longer tool life

APPLICATION EXAMPLE

Component	Housing	
Article no.	4115/4108	
Ø [mm]	17.5	
Drilling depth [mm]	45	
Material (no.)	X10CrNiS18-9 (1.4305)	
Hole type	Through-hole	
Cooling	Internal coolant	
Lubricant	Soluble oil	
	HT 800	Competition
v_c [m/min]	55	50
f [mm/rev.]	0.16	0.12
TOOL LIFE >	37 m	25 m



P	M	K	N	S	H	Tool illustration	Drilling depth	Shank form	Type/Form	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
○	○	○	○	○	○				HT 800 WP	WN		VHM	α	11.00 - 40.00	4115
○	○	○	○	○	○		1xD	HE	HT 800 WP	WN			Ni	11.00 - 40.00	4105
○	○	○	○	○	○		1,5xD	HE	HT 800 WP	WN			Ni	11.00 - 40.00	4106
○	○	○	○	○	○		3xD	HE	HT 800 WP	WN			Ni	11.00 - 40.00	4107
○	○	○	○	○	○		5xD	HE	HT 800 WP	WN			Ni	11.00 - 40.00	4108
○	○	○	○	○	○		7xD	HE	HT 800 WP	WN			Ni	11.00 - 40.00	4109
○	○	○	○	○	○		10xD	HE	HT 800 WP	WN			Ni	11.00 - 31.99	4110

Centre drills without flat

○	○	○	○	○	○			Cyl	A	WN		VHM	○	0.50 - 6.30	736
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90° NC spotting drills

○	○	○	○	○	○			HB	N	WN		VHM	F	4.000 - 20.000	6027
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120° NC spotting drills

○	○	○	○	○	○			HB	N	WN		VHM	F	3.000 - 20.000	6028
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142° NC spotting drills

○	○	○	○	○	○			HB	N	WN		VHM	F	4.000 - 20.000	6029
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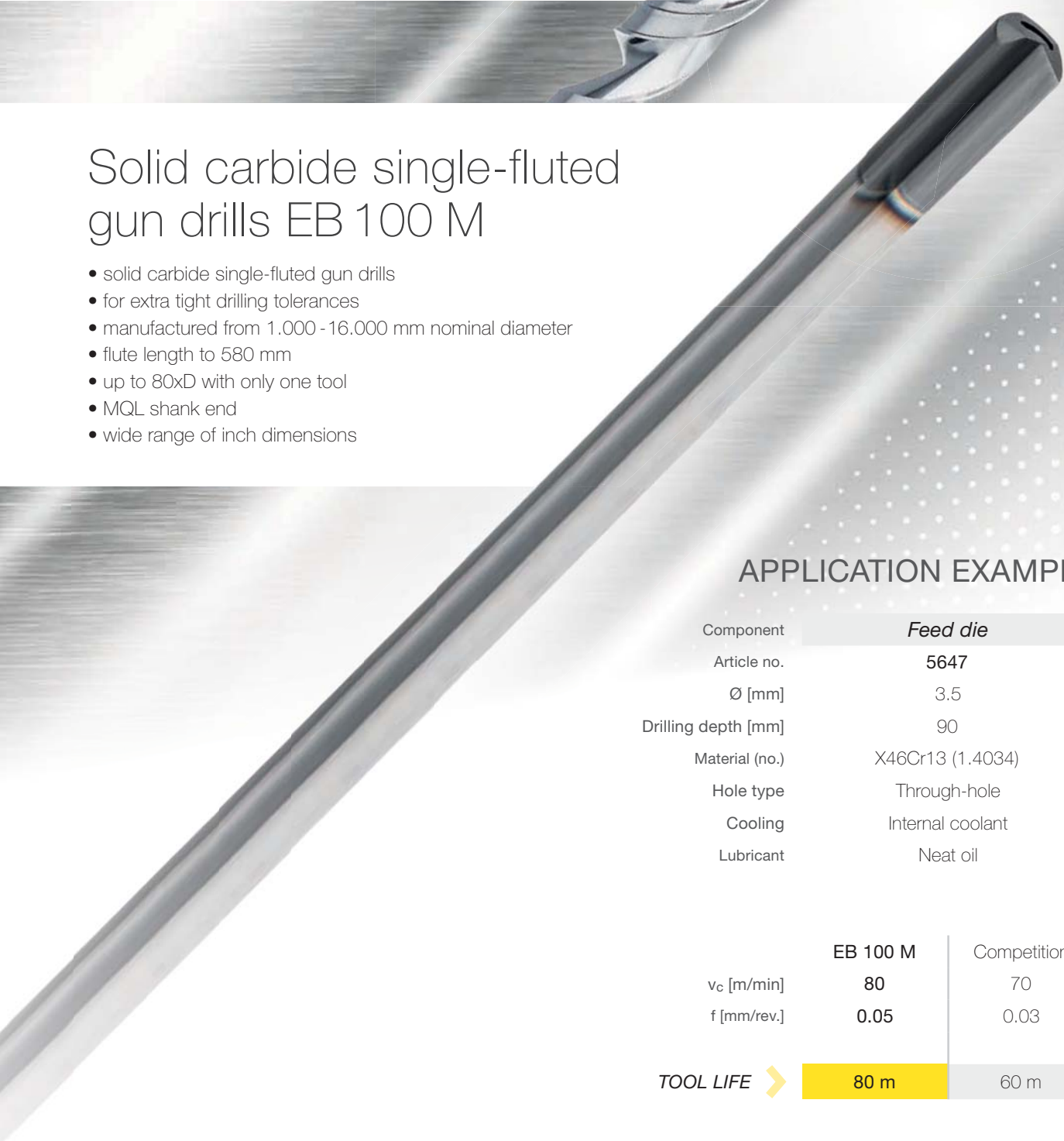
Solid carbide spiral deep hole drills RT 100 T

- for highest cutting speeds and feed rates
- drilling depths from 15xD to 40xD
- nominal diameter from 3.000 - 16.000 mm
- optimal tool stability and cooling
- long tool life with reduced machining times
- special solutions up to 50xD



Solid carbide single-fluted gun drills EB 100 M

- solid carbide single-fluted gun drills
- for extra tight drilling tolerances
- manufactured from 1.000 - 16.000 mm nominal diameter
- flute length to 580 mm
- up to 80xD with only one tool
- MQL shank end
- wide range of inch dimensions



APPLICATION EXAMPLE

Component	<i>Feed die</i>	
Article no.	5647	
Ø [mm]	3.5	
Drilling depth [mm]	90	
Material (no.)	X46Cr13 (1.4034)	
Hole type	Through-hole	
Cooling	Internal coolant	
Lubricant	Neat oil	
	EB 100 M	Competition
v_c [m/min]	80	70
f [mm/rev.]	0.05	0.03
TOOL LIFE >	80 m	60 m



P	M	K	N	S	H	Tool illustration	Drilling depth	Shank form	Type	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
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Spiral-fluted deep hole drills RT 100 T

●	●	○	○	○	○		15xD	HA	RT 100 T	WN		VHM	A	3.000 - 16.000	6509
●	●	○	○	○	○		20xD	HA	RT 100 T	WN		VHM	A	3.000 - 16.000	6511
●	●	○	○	○	○		25xD	HA	RT 100 T	WN		VHM	A	3.000 - 16.000	6512
●	●	○	○	○	○		30xD	HA	RT 100 T	WN		VHM	A	3.000 - 14.000	6513
●	●	○	○	○	○		40xD	HA	RT 100 T	WN		VHM	A	3.000 - 10.000	6514

Single-fluted gun drills

EB 100 M

●	●	○	○	○	○		25xD	HA	EB 100 M	WN		VHM	a	1.000 - 16.000	5646
●	●	○	○	○	○		50xD	HA	EB 100 M	WN		VHM	a	1.000 - 10.000	5647
●	●	○	○	○	○		75xD	HA	EB 100 M	WN		VHM	a	1.000 - 7.144	5648

EB 80

○	●	○	○	○	○		20xD	HA	EB 80	WN		HM	C	3.969 - 16.000	5639
○	●	○	○	○	○		30xD	HA	EB 80	WN		HM	C	3.969 - 16.000	5640
○	●	○	○	○	○		40xD	HA	EB 80	WN		HM	C	3.969 - 16.000	5641
○	●	○	○	○	○		60xD	HA	EB 80	WN		HM	C	3.969 - 15.950	5669
○	●	○	○	○	○		80xD	HA	EB 80	WN		HM	C	3.969 - 15.950	5642

EB 800 with indexable inserts

●	○	○	○	○	○		30xD	HB	EB 800	WN		HM	S	12.000 - 31.900	5644
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Outer inserts for single-fluted gun drills EB 800

○	●	○	○	○	○				EB 800	WN		HM	a	12.000 - 52.000	5706
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Guide pads for single-fluted gun drills EB 800

○	●	○	○	○	○				EB 800	WN		HM	a	12.000 - 52.000	5707
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Inner inserts for single-fluted gun drills EB 800

○	●	○	○	○	○				EB 800	WN		HM	a	40.001 - 52.000	5668
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Universal drills GU 500 PM

The GU 500 PM impresses with efficient machining and a long tool life. The drill can be used for all types of stainless steel.



4-facet point grind
for excellent self-centering and especially dimensionally accurate holes

Low feed forces
and torque values thanks to precision ground geometry

118° point angle,
thus longer main cutting edges, reduced surface pressure, less wear, longer tool life

Optimal chip evacuation
thanks to round flute geometry

High performance and wear resistance
thanks to powder metallurgic steel and multilayer coating

High-precise clamping and drilling
thanks to the HA shank with tolerance h6

APPLICATION EXAMPLE

Component	<i>Perforated plate roller</i>	
Article no.	6005 (3xD)	
Ø [mm]	2.5	
Drilling depth [mm]	5.0	
Material (no.)	X2CrMnNiN22 (1.4162)	
Hole type	Through-hole	
Cooling	External cooling	
Lubricant	Soluble oil	
	GU 500 PM	Competition
v_c [m/min]	15	15
f [mm/rev.]	0.075	0.075
TOOL LIFE >	24 m	18 m



P	M	K	N	S	H	Tool illustration	Drilling depth	Shank form	Type/Form	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
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Twist drills with reinforced straight shank

•	•	•	•	•	•		~3xD	HA	GU 500 PM	WN		HSS-E-PM	F	1.000 - 20.000	6005
•	•	•	•	•	•		~5xD	HA	GU 500 PM	WN		HSS-E-PM	F	2.000 - 20.000	6006

Stub drills

•	•	•	•	•	•		~3xD	Cyl	GU 500 DZ	DIN 1897		HSCO	S	1.000 - 14.290	5520
•	•	•	•	•	•		~3xD	Cyl	VA	DIN 1897		HSCO	S	1.000 - 13.000	572
•	•	•	•	•	•		~3xD	Cyl	GV 120	DIN 1897		HSCO	S	0.500 - 15.500	659
•	•	•	•	•	•		~3xD	Cyl	GV 120	DIN 1897		HSCO	F	1.000 - 13.000	2461

Jobber drills

•	•	•	•	•	•		~5xD	Cyl	GU 500 DZ	DIN 338		HSCO	S	1.000 - 14.290	5519
•	•	•	•	•	•		~5xD	Cyl	VA	DIN 338		HSCO	S	1.000 - 13.000	629
•	•	•	•	•	•		~5xD	Cyl	Ti	DIN 338		HSCO	○	0.200 - 19.000	605
•	•	•	•	•	•		~5xD	Cyl	N	DIN 338		M42	F	1.000 - 16.000	1199
•	•	•	•	•	•		~5xD	Cyl	Ti	DIN 338		HSCO	F	0.400 - 15.000	2458

Taper shank twist drills

•	•	•	•	•	•		~3xD	MK	GV 120	WN		HSCO	S	10.500 - 31.000	663
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Centre drills without flat

•	•	•	•	•	•			Cyl	N	DIN 333		HSCO	F	0.500 - 4.000	6503
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90° NC spotting drills

•	•	•	•	•	•			HB	N	WN		HSCO	F	3.000 - 20.000	1133
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120° NC spotting drills

•	•	•	•	•	•			HB	N	WN		HSCO	F	3.000 - 20.000	1135
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90° Countersinks

•	•	•	•	•	•			Cyl	C	DIN 335		HSCO	A	6.300 - 40.000	5500
•	•	•	•	•	•			3	C	DIN 335		HSCO	A	6.300 - 40.000	5501



HR 500 High-performance reamer

The HR 500 solid carbide reamer operates with the highest cutting values and achieves a very high bore quality. As a result, it often enables significant savings in process costs. It also ensures a very high level of process reliability.

With the HR 500 high-performance reamers, you will find the ideal tool solution for all diameters from 2.97- 76.00 mm.

Unequal flute spacing
for very smooth running
with high cutting values

Low wear
and better surfaces thanks
to internal cooling

**Particularly suitable for
machining stainless steels**
special, super and
titanium alloys

Thanks to **nanoA coating**,
smooth surfaces, high hardness
and oxidation resistance

APPLICATION EXAMPLES

Component	<i>Lever</i>		<i>Flange</i>	
Article no.	1685		1686	
Ø [mm]	16		10	
Drilling depth [mm]	19		25	
Material (no.)	X20CrNi17-2 (1.4057)		X6CrNiMoTi17-12-2 (1.4571)	
Hole type	Blind-hole		Through-hole	
Cooling	Internal coolant		Internal coolant	
Lubricant	Soluble oil		Soluble oil	
	HR 500 S	Competition	HR 500 D	Competition
v_c [m/min]	100	8	80	15
f [mm/rev.]	0.25	0.05	0.8	0.15
TOOL LIFE >	29 m	7 m	25 m	5 m



P	M	K	N	S	H	Tool illustration	Shank form	Type/Form	Hole type	Internal cooling	Tool material	Surface	d1/mm	Article no.
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for blind-holes and through-holes

High-performance reamers HR 500

•	•	•	•	•	•		HA	HR 500 D			VHM	a	2.000 - 20.000	1686
•	•	•	•	•	•		HA	HR 500 D			VHM	a	1.970 - 12.030	1676
•	•	•	•	•	•		HA	HR 500 TD			HM	a	14.000 - 42.000	1549
•	•	GG/	GGG60-80	•	•		HA	HR 500 G D			HM	a	22.000 - 40.000	1681
•	•	GG/	GGG60-80	•	•		-HA	HR 500 GT D			HM	a	41.000 - 76.000	1039
•	•	•	•	•	•		HA	HR 500 S			VHM	a	2.000 - 20.000	1685
•	•	•	•	•	•		HA	HR 500 S			VHM	a	1.970 - 12.030	1675
•	•	•	•	•	•		HA	HR 500 TS			HM	a	14.000 - 42.000	1548
•	•	GG/	GGG60-80	•	•		HA	HR 500 G S			HM	a	22.000 - 40.000	1680
•	•	GG/	GGG60-80	•	•		-HA	HR 500 GT S			HM	a	41.000 - 76.000	1038

HSK-A hydraulic chucks, extra length

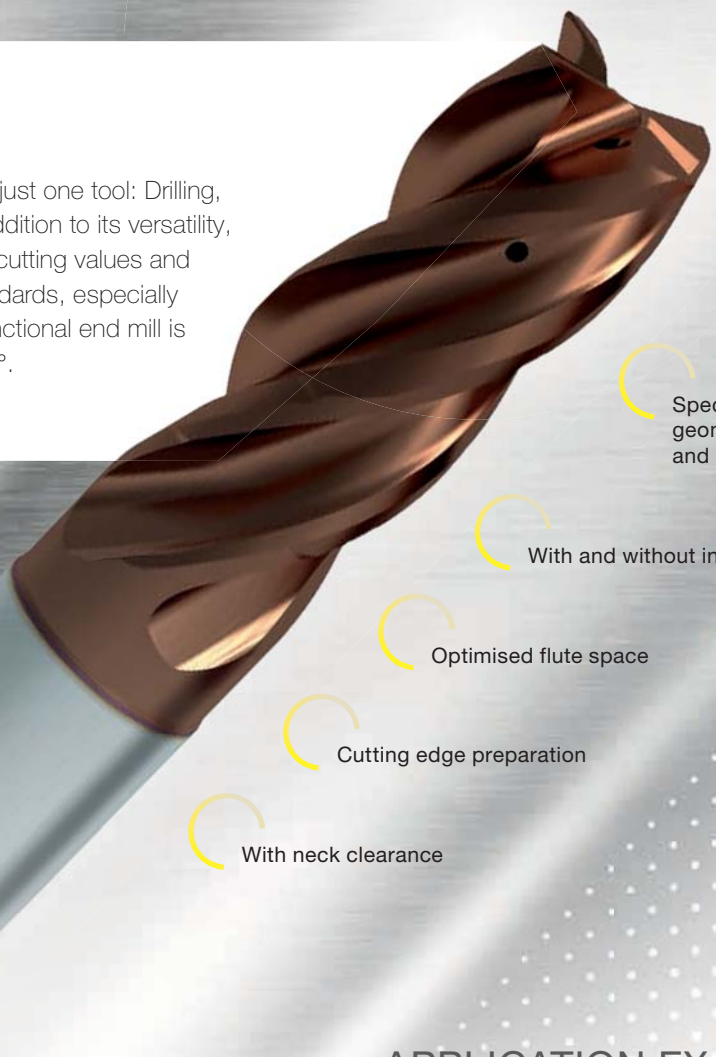
•	•	•	•	•	•		HSK-A					○	4290
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NC machine reamers

•	•	•	•	•	•		HA	B			VHM	a	3.000 - 20.000	6017
•	•	•	•	•	•		HA	B			VHM	a	0.980 - 12.050	6018

RF 100 Diver

The RF 100 Diver covers five operations with just one tool: Drilling, ramping, slotting, roughing and finishing. In addition to its versatility, the ratio end mill impresses with outstanding cutting values and tool life. The RF 100 Diver also sets new standards, especially when it comes to steep ramping: The multifunctional end mill is capable of plunging up to a ramp angle of 45°.



Special face geometry for drilling and ramping

With and without internal cooling

Optimised flute space

Cutting edge preparation

With neck clearance

APPLICATION EXAMPLES

Component	Stainless steel housing	Stainless steel housing
Article no.	3803	6736
Ø [mm]	16	9,7
Depth of cut a_p [mm]	12	20
Width of cut a_e [mm]	10	3
Material (no.)	X6CrNiMoTi17-12-2 (1.4571)	X8CrNiS18-9 (1.4305)
Milling style	Circular milling	Trochoidal milling
Cooling	External cooling	External cooling
Lubricant	Soluble oil	Soluble oil
	RF 100 VA	RF 100 Diver
v_c [m/min]	85	80
f [mm/rev.]	0.07	0.045
TOOL LIFE	28 m	60 m





P	M	K	N	S	H	Tool illustration	Z	Shank form	Type	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
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Allrounder

Ratio end mills RF 100 VA (4-fluted)

•	•	•	•	•			4	HA	N	DIN 6527 K		VHM	a	4.000 - 20.000	3804
•	•	•	•	•			4	HB	N	DIN 6527 K		VHM	a	4.000 - 20.000	3805
•	•	•	•	•			4	HA	N	DIN 6527 L		VHM	a	3.000 - 25.000	3800
•	•	•	•	•			4	HB	N	DIN 6527 L		VHM	a	3.000 - 25.000	3803
•	•	•	•	•			4	HA	N	WN		VHM	a	6.000 - 20.000	3806
•	•	•	•	•			4	HB	N	WN		VHM	a	6.000 - 20.000	3807

Ratio end mills RF 100 Diver (4-fluted)

•	•	•	•	•	•		4	HA	NH	DIN 6527 L		VHM	Y	4.000 - 20.000	6737
•	•	•	•	•	•		4	HB	NH	DIN 6527 L		VHM	Y	4.000 - 20.000	6736
•	•	•	•	•	•		4	HA	N	DIN 6527 L		VHM	Y	6.000 - 25.000	6801
•	•	•	•	•	•		4	HB	N	DIN 6527 L		VHM	Y	6.000 - 25.000	6802

Milling tools for slotting

Standard Ratio end mills RF 100 U (3-fluted)

•	•	•	•	•			3	HB	N	WN		VHM	R	3.000 - 20.000	6728
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Ratio end mills RF 100 Diver (3-fluted)

•	•	•	•	•			3	HA	NH	WN		VHM	Y	3.000 - 20.000	6797
•	•	•	•	•			3	HB	NH	WN		VHM	Y	3.000 - 20.000	6798
•	•	•	•	•			3	HA	NH	WN		VHM	Y	6.000 - 16.000	6799
•	•	•	•	•			3	HB	NH	WN		VHM	Y	6.000 - 16.000	6800

Mini slot drills (3-fluted)

•	•	•	•	•			3	HA/ HB	N	WN		VHM	F	0.300 - 20.000	3684
•	•	•	•	•			3	HA/ HB	N	WN		VHM	F	1.000 - 10.000	3686

RF 100 Speed

The RF 100 Speed features a high helix of 48° and an unequal cutting edge distribution for a smooth and quiet cutting operation. Chip breakers break the chips to be short, ensuring a friction-free chip evacuation. Particularly when machining very tough materials, the RF 100 Speed offers highly dynamic milling with a high cutting volume and stable process reliability.



Large face chip chambers and small transverse cutting edge for easy plunging and good chip removal

Stable cutting edge corner thanks to corner protection chamfer for long tool life

Optimised chip gullet deepened flute on front cutting edge area for improved chip evacuation

48° helix angle with unequal cutting edge partitioning for soft, quiet cut

Chip breaker for short chips the load on the machine is clearly reduced and the volume performance increased thanks to the light cut

RF 100
SPEED

APPLICATION EXAMPLES

Component	<i>Pump</i>	<i>Pump</i>
Article no.	6765	6878
Ø [mm]	12	16
Depth of cut a_p [mm]	8	22
Width of cut a_e [mm]	1.1	3.5
Material (no.)	X5CrNi18-10 (1.4301)	X8CrNiS18-9 (1.4305)
Milling style	HPC milling	Roughing
Cooling	External cooling	External cooling
Lubricant	Soluble oil	Soluble oil
	RF 100 Speed	RF 100 VA/NF
v_c [m/min]	200	135
f [mm/rev.]	0.13	0.032
TOOL LIFE ➤	55 m	31 m



P	M	K	N	S	H	Tool illustration	Z	Shank form	Type	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
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Milling cutters GTC

Ratio end mills RF 100 iMill with corner radius

○	●	●	●	●			4	HA	N	DIN 6527 L		VHM	Y	3.000 - 20.000	6964
○	●	●	●	●			4	HB	N	DIN 6527 L		VHM	Y	3.000 - 20.000	6965

Ratio end mills RF 100 Ti with corner radius

●	●	●	●	●			4	HA	N	DIN 6527 L		VHM	Z	6.000 - 25.000	6966
●	●	●	●	●			4	HB	N	DIN 6527 L		VHM	Z	6.000 - 25.000	6967

Ratio end mills RF 100 F

●	●	○	●	●			4	HB	NH	DIN 6527 L		VHM	R	4.000 - 20.000	6968
---	---	---	---	---	--	--	---	----	----	------------	--	-----	---	----------------	------

Multi-tooth end mills GH 100 U with corner radius

●	●	●	●	○			6	HB	NH	DIN 6527 L		VHM	R	6.000 - 20.000	6969
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Milling tools for dynamic milling

Ratio end mills RF 100 Speed

●	●	●	●	●			4	HA	NH	WN		VHM	A	3.000 - 20.000	6765
●	●	●	●	●			4	HB	NH	WN		VHM	A	3.000 - 20.000	6760
●	●	●	●	●			4	HA	NH	WN		VHM	A	3.000 - 20.000	6766
●	●	●	●	●			4	HB	NH	WN		VHM	A	3.000 - 20.000	6761

Milling tools for roughing

Ratio end mills RF 100 VA

●	●	●	○	○			4	HA	NF	DIN 6527 L		VHM	a	5.000 - 25.000	6877
●	●	●	○	○			4	HB	NF	DIN 6527 L		VHM	a	5.000 - 25.000	6878
●	●	●	○	○			4	HA	NF	WN		VHM	a	6.000 - 20.000	6879
●	●	●	○	○			4	HB	NF	DIN 6527 L		VHM	a	6.000 - 20.000	6880

RF 100 VA

- very smooth running and high metal removal rate
- for slotting, roughing, copying and finishing operations in steel and stainless materials
- large choice of dimensions and geometries

Stable cutting edge corner
thanks to large corner protection chamfer and face correction

Deep, round flutes
for optimal chip evacuation with reduced heat generation

Very smooth running
thanks to unequal helix angle and cutting edge distribution



available with flattened roughing profile geometry:
e.g. Art. no. 6877



ball nose option also available:
e.g. Art. no. 6707

APPLICATION EXAMPLES

Component	<i>Stainless steel block</i>	<i>Stainless steel block</i>	<i>Stainless steel block</i>
Article no.	6878	6710	3631
Ø [mm]	16	12	16
Depth of cut a_p [mm]	22	21	30
Width of cut a_e [mm]	3	0.2	0.35
Material (no.)	X5CrNi18-10 (1.4301)	X5CrNi18-10 (1.4301)	X5CrNi18-10 (1.4301)
Milling style	Roughing	Finishing	Finishing
Cooling	External cooling	External cooling	External cooling
Lubricant	Soluble oil	Soluble oil	Soluble oil
	RF 100 VA/NF	RF 100 SF	RF 100 SF
v_c [m/min]	135	140	70
f [mm/rev.]	0.032	0.05	0.03
TOOL LIFE ➤	31 m	12 m	20 m



P	M	K	N	S	H	Tool illustration	Z	Shank form	Type	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
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Milling tools for roughing

Standard Ratio end mills RF 100 U

•	•	•	○	○			4	HA	HRf	DIN 6527 L		VHM	Y	6.000 - 20.000	6970
•	•	•	○	○			4	HB	HRf	DIN 6527 L		VHM	Y	6.000 - 20.000	6971
•	•	•	○	○			4	HA	HRf	WN		VHM	Y	6.000 - 20.000	6972
•	•	•	○	○			4	HB	HRf	WN		VHM	Y	6.000 - 20.000	6973

Roughing end mills GS 40 (fine teeth)

•	•	•	•	○			3	B	NRf	DIN 844 K		HSS-E-PM	F	6.000 - 20.000	3668
•	•	•	•	○			4-6	B	NRf	DIN 844 K		HSS-E-PM	F	6.000 - 32.000	3660

Roughing end mills GS 80 (fine teeth)

•	•	•	•	○			3-6	B	NRf	DIN 844 K		HSS-E-PM	F	4.000 - 25.000	6756
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Milling tools for finishing

Ratio end mills Superfinish RF 100 SF

•	•	•	•	○			6	HB	NH	WN		VHM	R	8.000 - 20.000	6727
---	---	---	---	---	--	--	---	----	----	----	--	-----	---	----------------	------

Milling tools for copying

Ratio end mills RF 100 VA

•	•	○	•	•	○		4	HA	N	DIN 6527 L		VHM	a	4.000 - 25.000	6707
•	•	○	•	•	○		4	HB	N	DIN 6527 L		VHM	a	4.000 - 25.000	6708

HSC end mills High Feed HF 300

•	•	•	•	•	•		4	HA	H	WN		VHM	Y	3.000 - 16.000	6771
•	•	•	•	•	•		4	HA	H	WN		VHM	Y	3.000 - 16.000	6772

Tapping

- tools for universal use
- reduction of the variety of tools in operation
- higher cutting speeds with better chip quality
- long tool life and fewer tool changes



Thread forming

- tools for universal use
- reduction of the variety of tools in operation
- higher cutting speeds
- long tool life
- high thread quality
- thread depth > 3xD possible

Thread milling

- universally applicable for all VA materials
- thread depth to bottom of hole max. 0.5xP
- no workpiece waste in the event of tool breakage
- different tolerances can be produced with one tool
- right-hand and left-hand threads with one tool
- tools can be reground
- torque is much lower compared to thread drilling and forming

APPLICATION EXAMPLES

Component	<i>Turbo housing</i>	<i>Drive shaft</i>	<i>Pump housing</i>
Article no.	4218	4489	3541
Ø [mm]	M10	M12x1,25	M24
Thread depth a_p [mm]	19	15	30
Material (no.)	GX40CrNiSi25-20 (1.4848)	X5CrNi18-10 (1.4307)	X6CrNiMoTi17-12-2 (1.4571)
Hole type	Through-hole	Through-hole	Blind-hole
Cooling	External cooling	External cooling	Internal coolant
Lubricant	Soluble oil	Soluble oil	Soluble oil
	Taps	Fluteless taps	Thread milling cutters
v_c [m/min]	8	15	60
f [mm/rev.]	1.5	1.25	0.4
TOOL LIFE ➤	330 Threads	3000 Threads	1350 Threads



P	M	K	N	S	H	Tool illustration	Standard	Type	Shank form	Thread type	Internal cooling	Tool material	Surface	d1/mm	Article no.
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Taps for blind-holes

•	•	•	•	•	•		DIN 371/376	VA R45	Cyl	M		HSS-E	A	M2 - M30	393
•	•	•	•	•	•		DIN 374	VA R45	Cyl	MF		HSS-E	A	M6 x 0,75 - M24 x 1,5	394
•	•	•	•	•	•		DIN 5156	VA R45	Cyl	BSP		HSS-E	A	G 1/16 - G 1	395
•	•	•	•	•	•		~DIN 371/376	VA R45	Cyl	UNC		HSS-E	A	2 - 56 - 1 - 8	391
•	•	•	•	•	•		~DIN 371/374	VA R45	Cyl	UNF		HSS-E	A	2 - 64 - 1 - 12	392

Taps for through-holes

•	•	•	•	•	•		DIN 371/376	VA	Cyl	M		HSS-E	S	M2 - M30	4218
•	•	•	•	•	•		DIN 374	VA	Cyl	MF		HSS-E	S	M6 x 0,75 - M24 x 1,5	4219
•	•	•	•	•	•		DIN 5156	VA	Cyl	BSP		HSS-E	S	G 1/16 - G 1	4220
•	•	•	•	•	•		~DIN 371/376	VA	Cyl	UNC		HSS-E	S	2 - 56 - 1 - 8	4642
•	•	•	•	•	•		~DIN 371/374	VA	Cyl	UNF		HSS-E	S	2 - 64 - 1 - 12	4643

Fluteless taps for blind-holes and through-holes

•	•	•	•	•	•		~DIN 371/376	N	Cyl	M		HSS-E-PM	C	M1 - M20	4487
•	•	•	•	•	•		~DIN 374	N	Cyl	MF		HSS-E-PM	C	M8 x 1 - M20 x 1,5	4489
•	•	•	•	•	•		DIN 5156	N	Cyl	BSP		HSS-E-PM	C	G 1/8 - G 1/2	4493
•	•	•	•	•	•		~DIN 371/376	N	Cyl	UNC		HSS-E-PM	C	4 - 40 - 3/4 - 10	4491
•	•	•	•	•	•		~DIN 371/374	N	Cyl	UNF		HSS-E-PM	C	4 - 48 - 3/4 - 16	4492

Thread milling cutters for blind-holes and through-holes

•	•	•	•	•	≤ 55		WN	TMU SP	HA	M MF		VHM	C	> 10 - > 30	3541
•	•	•	•	•	≤ 65		WN	MTMH3-Z	HB	M MF		VHM	•	M2 - M16 x 1,5	4002
•	•	•	•	•	≤ 55		WN	SC MTM3 SP	HA	M		VHM	C	M1,6 - M20	4001
•	•	•	•	•	≤ 55		WN	MTM3 SP	HA	M		VHM	C	M1,6 - M20	4226
•	•	•	•	•	≤ 55		WN	MTM3 SP	HA	BSP		VHM	C	G1/16-G1/8 - G1-G2	4228
•	•	•	•	•	≤ 55		WN	MTM3 SP	HA	UNC UNF		VHM	C	UNF No 1 - UNF 5/8	4223



Micro-precision drilling tools

Example solid carbide ExclusiveLine micro-precision drills

The solid carbide ExclusiveLine micro drills, with and without internal cooling, enable high-performance machining of almost all materials, especially stainless steels and special alloys. With stable machine conditions and high machine performance, they showcase their full performance. The 2-facet point grind per cutting edge with ground cutting edge honing permits high cutting values and an optimal chip break.

Micro-precision milling tools

Example end mills

Copy milling programme with ball nose and corner radius for machining tempered and stainless steels. The micro-copy milling cutters guarantee accurate diameter tolerances and small radius tolerances in precision mould making. Homogeneous cutting edges ensure the finest surface finishes and further increase tool life.

Micro-precision reaming tools

Example solid carbide high-performance reamer HR 500

The blind-hole variant has a central coolant hole. The feed-through version has four decentralised coolant holes, which guide the chip safely forwards. The HR 500 solid carbide high-performance reamer also achieves outstanding cutting values and holes of a high quality, even in the micro range. As the only standard reamer with internal cooling from Ø 1.97 mm, it enables higher cutting values and a significantly longer tool life compared to other reamers.

APPLICATION EXAMPLES

Component	<i>Micro casing</i>	<i>Dentures</i>	<i>Clamping chuck</i>
Machining	Drilling	Milling	Reaming
Article no.	6412	3848	1685
Ø [mm]	1.8	2	2.0 H7
Drilling depth [mm]	29	-	12
Depth of cut a_p [mm]	-	variable	-
Material (no.)	AISI304 (1.4301)	X2CrNiMo18-15-3 (1.4441)	16MnCr5 (1.7131)
Cooling	Internal coolant with soluble oil	Dry machining	Internal coolant with soluble oil
	ExclusiveLine Micro-precision drill	GF 500 B	HR 500 S
v_c [m/min]	60	120	150
f_u [mm/rev.]	0.05		0.25
f_z [mm/tooth]	-	0.043	-
TOOL LIFE	87 m	288 m	33 m



RF 100 Microdiver

- plunging and milling with only one tool
- universal in every application
- extreme cutting values and very high cutting depths, which were previously not possible for micro-precision tools

Symmetrical drilling face
optimised for drilling and ramping operations, excellent cutting edge stability

The HiPims coating
achieves a very high surface quality for an optimal chip removal as well as perfect protection against wear and oxidation in dry and wet machining

Innovative flute form
very high tool stability
low-vibration cutting

GühroJet coolant ducts
guided cooling & lubrication directly in the cutting area effective chip removal

























New transition geometry
improves overall stability

New ultra fine carbide
optimum balance between hardness and toughness for micromachining applications



APPLICATION EXAMPLES

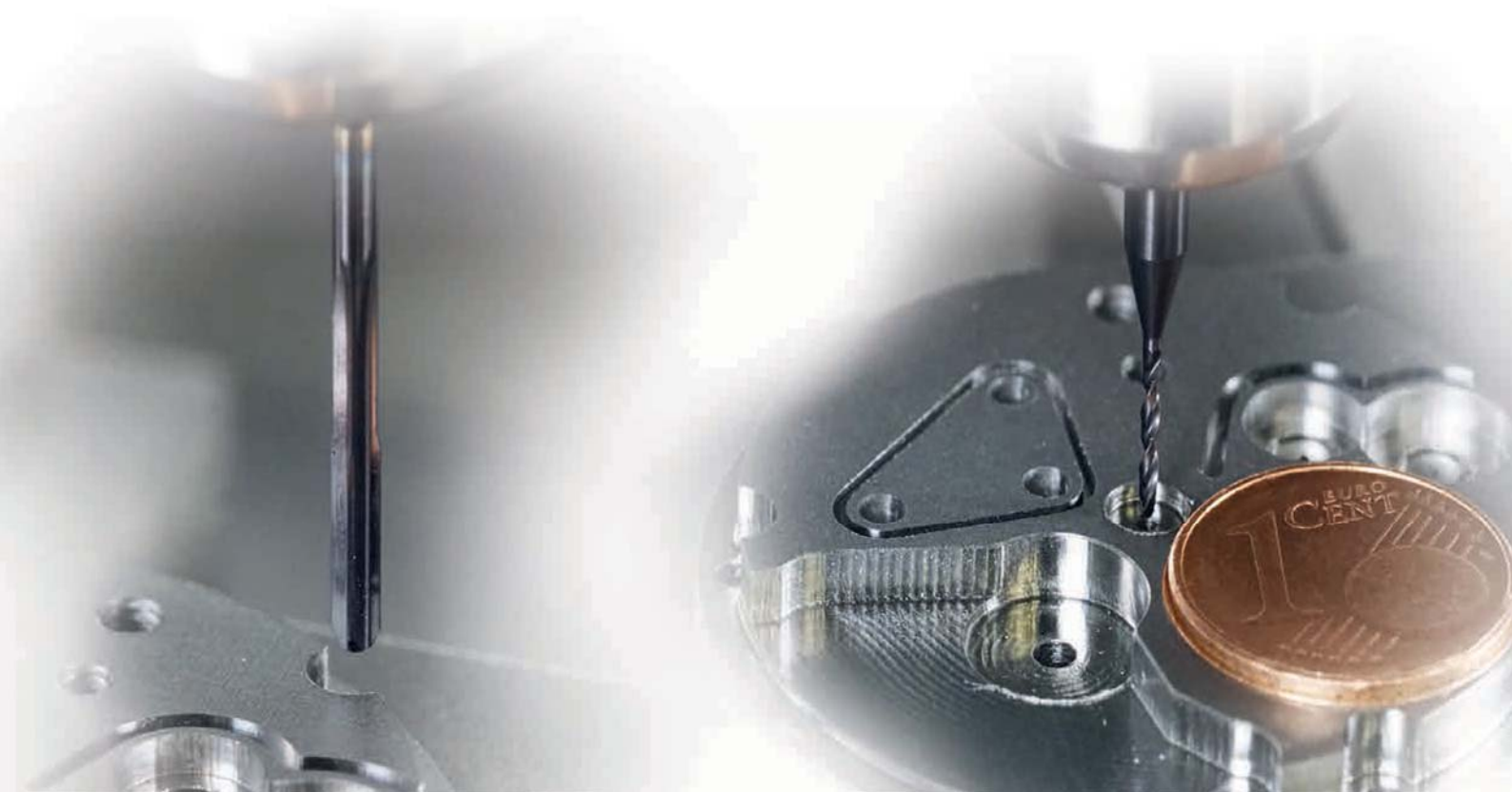
Component	<i>Impeller</i>	<i>Die plate</i>
Machining	Roughing	Slotting
Article no.	6808	6808
Ø [mm]	2	2.5
Depth of cut a_p [mm]	2.4	2.5
Width of cut a_e [mm]	1	2.5
Material (no.)	GX5CrNi19-10 (1.4308)	X5CrNiCuNb16-4 (1.4542)
Cooling	Internal coolant with soluble oil	Internal coolant with soluble oil
Machining volume [cm ³]	1.88	4.85
	RF 100 Microdiver	RF 100 Microdiver
v_c [m/min]	75	90
f_z [mm/tooth]	0.0219	0.0225
TOOL LIFE ➤	25 m	73,5 m

P	M	K	N	S	H	Tool illustration	Drilling depth/ Number of teeth	Shank form	Type/Form	Standard	Internal cooling	Tool material	Surface	d1/mm	Article no.
ExclusiveLine micro-precision drills															
•	•	•	○	○			4xD	Cyl	N	WN		VHM	A	0.500 - 3.000	6400
•	•	•	○	○			7xD	Cyl	N	WN		VHM	A	0.500 - 3.000	6401
•	•	•	○	○			5xD	Cyl	N	WN		VHM	A	1.400 - 3.000	6405
•	•	•	○	○			8xD	Cyl	N	WN		VHM	A	1.400 - 3.000	6408
•	•	•	○	○			15xD	Cyl	N	WN		VHM	A	1.400 - 3.000	6412
HSS-E-PM micro-precision drills															
•	•	•	•	○			~5xD	Cyl	N	DIN 1899		HSS-E-PM	S	0.160 - 1.900	660
Ratio end mills RF 100 Microdiver															
•	•	•	•	○				Cyl	NH	WN		VHM	X	0.790 - 3.175	6808
•	•	•	•	○				Cyl	NH	WN		VHM	X	1.000 - 3.175	6809
Mini slot drills (3-fluted)															
•	•	○	•	•				HA/HB	N	WN		VHM	F	0.300 - 20.000	3684
•	•	○	•	○				HA/HB	NH	WN		VHM	F	1.000 - 10.000	3686





P	M	K	N	S	H	Tool illustration	Drilling depth/ Number of teeth	Shank form	Type/Form	Standard	Internal cooling	Tool material	Surface	d/mm	Article no.
●	●	●	●	●	○			HA	N	DIN 6537L		VHM	F	0.500 - 20.000	3679
●	○	●	●	○	○			HA	NH	WN		VHM	A	1.400 - 12.000	6716
●	●	●	○	●	●			HA	NH	WN		VHM	Y	0.500 - 12.000	3856
●	●	●	○	●	●			-HA	N	WN		VHM	Y	0.500 - 12.000	3865
●	○	●	●	●	52			HA	B	WN		VHM	○	0.980 - 3.030	1427
●	●	○	○	○	63			HA		WN		VHM	a	2.000 - 3.000	1685
●	●	○	○	○	63			HA		WN		VHM	a	2.000 - 3.000	1686
●	●	○	○	○	63			HA		WN		VHM	a	1.970 - 3.030	1675
●	●	○	○	○	63			HA		WN		VHM	a	1.970 - 3.030	1676



Tips & tricks

Application notes for machining stainless steels when drilling:

Solid carbide drills

- for a good tool life, oil cooling or emulsion cooling with at least 8 % oil content is necessary
recommendation: Emulsion with > 10 % oil content
- pay attention to stable component clamping
- select a suitable tool holder

HSS drills

- use of cooling lubricant, e.g. high-performance cutting oil or an emulsion with > 10 % oil content
- choose a relatively low cutting speed, check the recommendations from GühringNavigator
- if necessary, chip removal cycles should be included in the drilling process to ensure secure chip breakage and chip removal
- select the shortest possible drilling tool
- achieve the best possible tool and workpiece clamping

Deep hole drills

- emulsion fat content > 10 %
- process monitoring to check tool life
- careful wear control to enable tool maintenance
- coordination of pre-machining (pilot or bushing), diameter and quality are crucial for the subsequent deep hole drilling process



Tips & tricks

Application notes for machining stainless steels during reaming:

Solid carbide reamers

- reduce cutting speed
- oil content of the emulsion > 10% applies for all processing styles
- if necessary, use the spiral point HR 500 T
- diameter < 6 mm: 0.1-0.2 mm pre-machining diameter
- diameter > 6 mm: 0.2 mm pre-machining diameter
- check the pre-drilling tool regularly



Efficient milling with the right strategies

GTC Milling strategy (Gühring Trochoidal Cutting)

These milling strategies belong to the state-of-the-art and most effective application methods for current solid carbide milling tools. When applied, a very high metal removal rate ensures a considerable increase in productivity. Very high cutting parameters can be achieved even with less powerful machines or unstable machining conditions. With difficult-to-machine materials or unfavourable diameter-length-ratios of the tools a massive increase of process reliability can be achieved.



GTC Milling strategie

Maximum tool utilisation

- utilisation of entire cutting edge length
- full power delivery
- increased tool life
- balanced wear

Modification of cutting distribution

- low cutting widths a_e
- high cutting depths a_p

High process reliability

- low tool wrapping
- improved thermal conditions at tool cutting edge
- low mechanical stress

Maximum metal removal rate

- saving time / machine costs



Foundations for economically efficient milling

Peripheral requirements

Applicable in every material group

- - easy to machine materials = increase in productivity
 - difficult to machine materials = increase in process reliability

High-dynamic machining centres

- short acceleration distances
- higher speed range
- small to medium tool diameters







Heavy machines

- stable feed axes
- high spindle torque
- medium to large tool diameters

Unstable to stable workpiece clamping

- stable = vibration-free machining = maximum metal removal rate
- unstable = reduction of radial forces = increased process reliability

General recommendation for tool cooling

Steel			<ul style="list-style-type: none"> • avoid thermal shock
Cast iron		Dry machining, compressed air, MQL:	<ul style="list-style-type: none"> • dissipate machining temperature via chip • supporting chip evacuation
Hardened			
Stainless			<ul style="list-style-type: none"> • cooling of tool cutting edge
Special alloy		Soluble oil, neat oil:	<ul style="list-style-type: none"> • preventing built-up edge • supporting chip evacuation
Non-ferrous metals		Soluble oil, neat oil:	<ul style="list-style-type: none"> • preventing built-up edge • supporting chip evacuation

Exceptions for material ranges

When **coolant** is not available the cutting speed (v_c) and/or the radial feed (a_e) should be reduced. The resulting reduced temperature reduces the risk of thermal shock.

If there are **chip evacuation problems** the application of coolant should be taken into consideration, poor evacuation of chips can lead to massive tool wear and even tool breakage.

When **heat is being generated due to poor chip evacuation**, it should be checked if through coolant is available. By using a specifically directed “coolant jet”, coolant can be supplied where congested without hitting the cutting area. Alternatively, the application of coolant for the entire machining operation is recommended.

Other notes

Finishing

The application of coolant is principally an advantage as a better surface finish can be achieved.

Very long tools

Coolant can result in a smoother process, as the lubricant has a vibration-reducing effect.

Alignment of coolant

- as accurate as possible in the cutting area from at least three directions
- no flushing back of small chips to the cutting area

Solid carbide Milling cutters with internal cooling

- optimal chip evacuation, very good cutting edge cooling, very effective against built-up edges
- to be recommended especially for larger tool diameters and tough materials

Peripheral cooling/Gührojet

Best external option: Optimal tool cooling and chip evacuation thanks to the direct route from coolant exit to cutting area














GÜHROJET



Multi-functional tooling systems for end machining

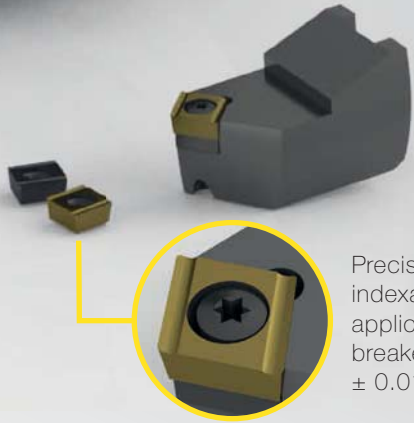
- precision-ground ISO indexable inserts with application-oriented chip breaker (turning accuracy ± 0.013 mm)
- two to four adjustable clamping holders in combination with a pilot drill or step drill allow for complete machining in a matter of seconds

-  External chamfering
-  Internal chamfering
-  Facing
-  Centering
-  Drilling
-  Face boring
-  Turning
-  Face turning
-  Form turning
-  Radius operations
-  Turning



Our clamping holders are axially and radially adjustable, via adjusting screws, making the machining of different workpiece diameters possible with only one tool.

Two to four axially and radially adjustable clamping holders in combination with a centre or step drill perform the complete machining in seconds. Tool heads with five clamping holders or more are available on request.



Precision ground ISO indexable inserts with application oriented chip breaker (index accuracy ± 0.013 mm).

FIELDS OF APPLICATION

- machining of pipes, shafts and housings
- machining bars
- stud machining
- facing and centring as preparation for turning between centres



Gühring a complete supplier

The programme of grooving tools continues to grow rapidly



SYSTEM 104

New cutting inserts; new items with a corner radius R 0.1 mm with D_{\min} 4 mm for boring and profiling; new clamping holders for Star long turning machines



SYSTEM 106

New GV type for pre-cutting; new clamping holders for Star long turning machines



SYSTEM 108

New GA cutting inserts, axial grooving; GG, thread turning; GN, slot grooving; new clamping holders for Star and Citizen machines; holders with polygon and HSK-T shank; new holders for slot grooving



SYSTEM 110

Additional clamping holders as standard; new holders with square shank and for slotting



SYSTEM 305

Extended selection of type GE grooving inserts with additional grooving widths and corner radii; new type GG cutting inserts for thread cutting for small helix angles < 1 mm as well as for UNC/UNF and Whitworth threads; new clamping holder with square shank of size $\frac{1}{2}$ inch



SYSTEM 222

New program with two usable cutting edges and an insert length from 22 mm for cutting off with a width of 3 mm; application in steel materials; extensive range of clamping holders with and without IC

Made to measure – customer-specific special tools

In addition to our comprehensive standard range, we also pay particular attention to special tools. Gühring offers customer-specific special tools for every machining task. After all, growing demands and ever more complex machining tasks call for intelligent tool solutions. This is where our in-depth knowledge of tools and our decades of consulting expertise as a manufacturer come into play.





DRILLING

MILLING

THREADING

REAMING

COUNTERSINKING / DE-BURRING

DEEP HOLE DRILLING

PCD / PCBN

GROOVING SYSTEMS

END MACHINING

CLAMPING SYSTEMS

SPECIAL TOOLS

SERVICES



since 1898

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