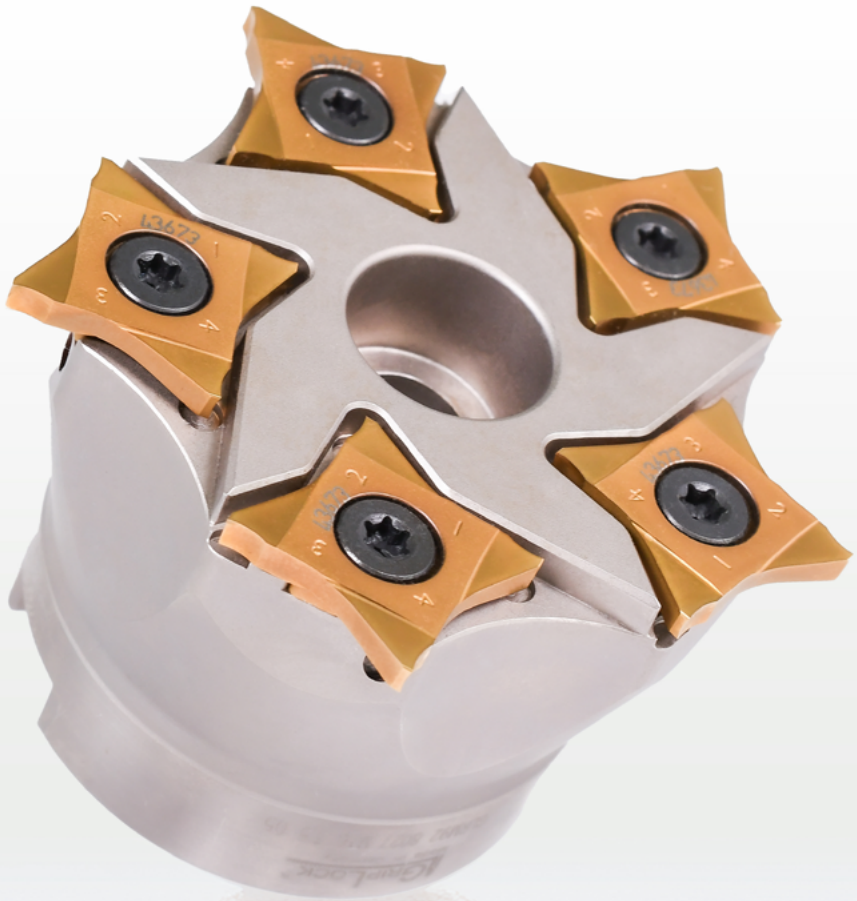
GripLock® ROTATION



Circular milling and plunge tools



GLR | GripLock Rotation



GripLock
Rotation/MIlling

Spirit of Perfection®

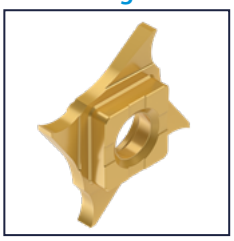
Made in Germany

KEMMER
HARTMETALLWERKZEUGE

GLR M92 MULTICUT circular milling — 4 edges

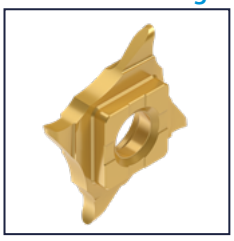
Circular milling inserts for shank end mills D28 | Type SINGLE

Slot milling



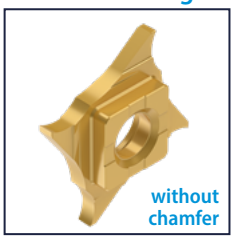
OFQ16L..P..S p. 7

Full radius milling



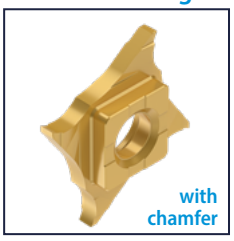
OFQ16L..R..P..S p. 7

Precision milling



OFQ16L..P35S p. 8

Precision milling



OFQ16L..P..S p. 8

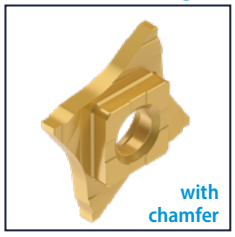
Circular milling inserts for shank end mills and milling heads D 52-80 | Type MULTI

Precision milling



OFQ16L..P35S p. 9

Precision milling



OFQ16L..P..S p. 9

Shank end mills and milling heads

Shank end mills D28



GLR M92..28..SW p. 10

Shank end mills D52



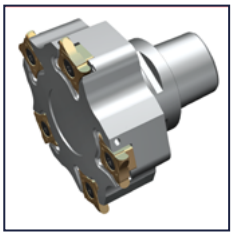
GLR M92..52..SW p. 10

Milling heads D52-80



GLR M92..M p. 11

Circular milling tools and plunge tools TAILORMADE p. 12

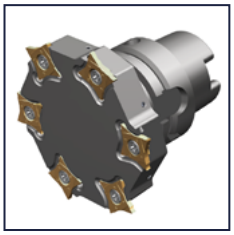


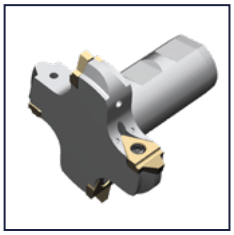


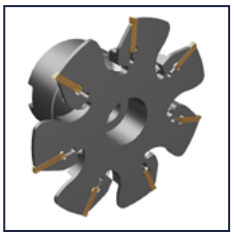


GripLock® TAILORMADE



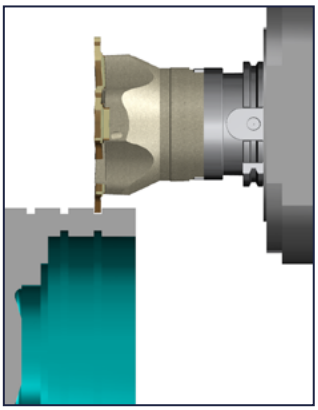
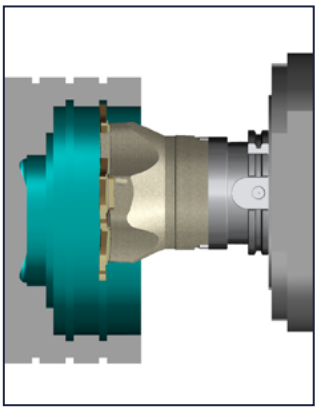
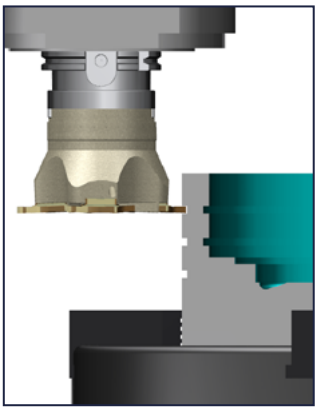
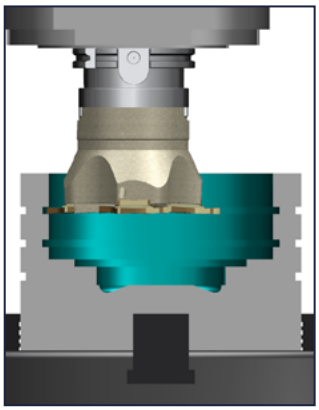






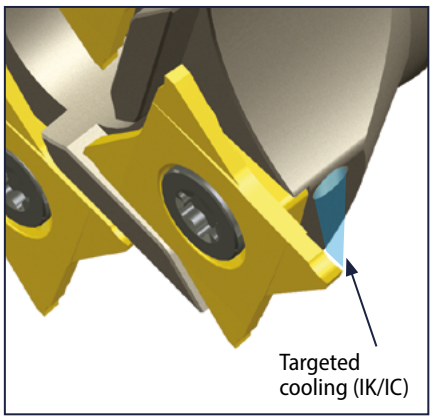
GLR M92 Q MULTICUT circular milling - Introduction

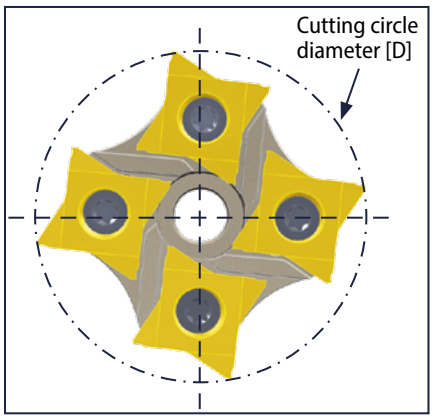
- Large selection of circular milling inserts and tools for milling applications
- Straight profiles, precision-or radius form
- Multi-cutting systems with high efficiency
- Internal and external machining
- Extensive options for customized holders or special circular insert solutions

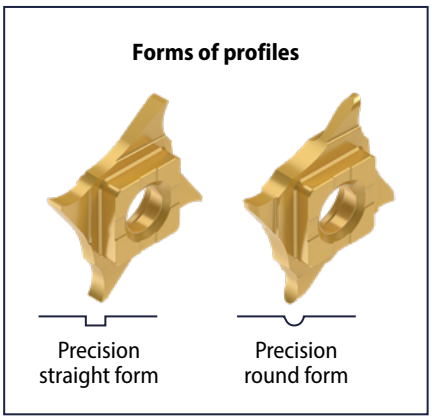
Horizontal machining GLR M92		Vertical machining GLR M92	
			
Circular milling EXTERNAL	Circular milling INTERNAL	Circular milling EXTERNAL	Circular milling INTERNAL

GLR M92 Q MULTICUT circular milling - System advantages and Explanations

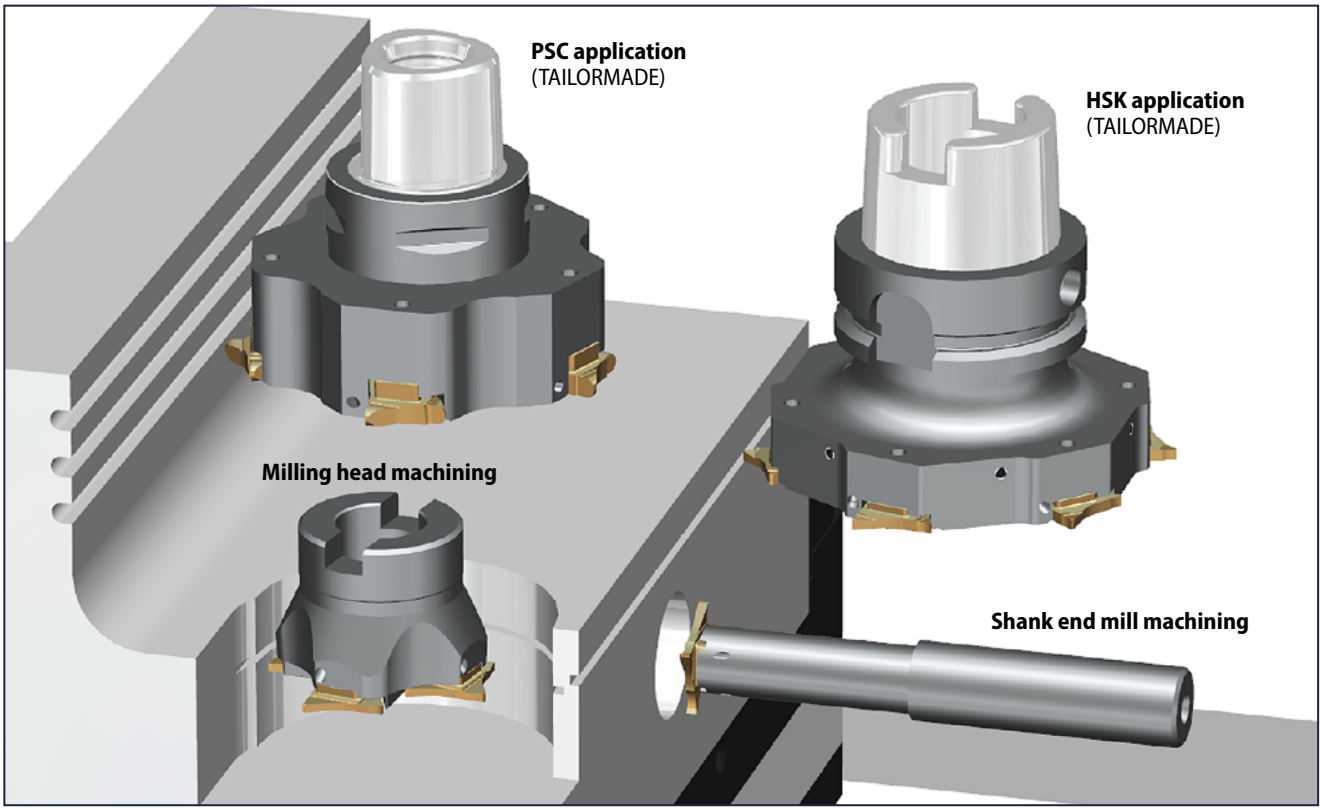
- Perfect power and form actuated clamping.
- Reinforced solidity of inserts
- Reinforced area of the cutting edge
- High efficiency. In case a cutting edge is damaged all other edges can be used independently (MULTI Version)
- One insert pocket for many inserts and different operations



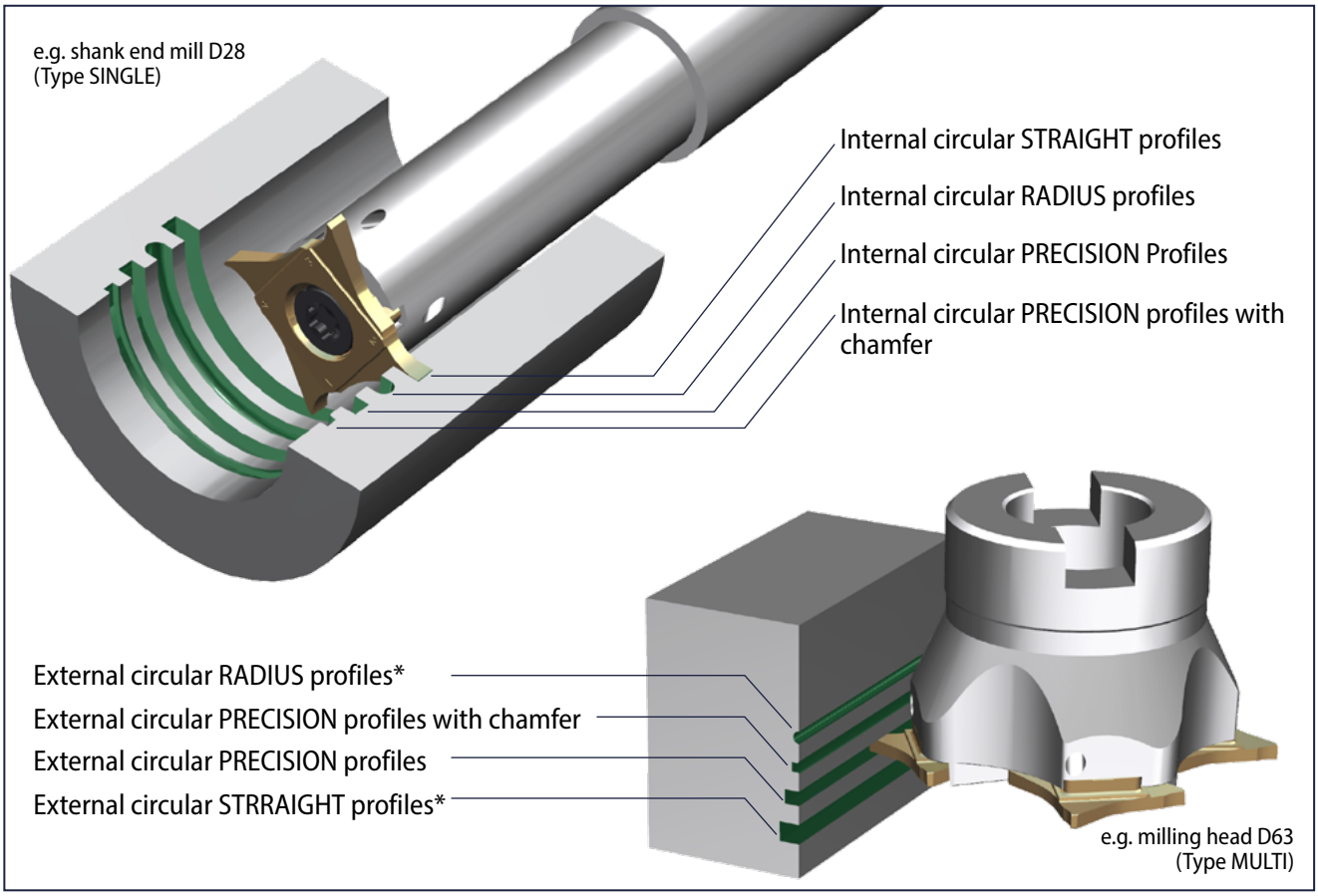




GLR M92 Q MULTICUT circular milling - Applications



GLR M92 Q MULTICUT circular milling - Examples of profiles



* Shank end mill application D28

GLR M92 Q MULTICUT circular milling - Insert code and explaination

O F Q 16 L 000 000 P25 S NANOSPEED

- O: Top rake
- F: 4 edges
- Q: Insert system: square and vertical
- 16: Inside diameter Ø 16 (pocketsize))
- L: Left hand insert
- 000: Cutting width
- 000: Corner radius
- P25: Cutting depht in 0,1 mm
- S: Insert type **S**INGLE / **M**ULTI
- NANOSPEED: Coating

Insert type S (SINGLE)



SINGLE VERSION (S)

For use on shank end mills with **ONE insert pocket**

Highly positive chip breaker.

All 4 edges performing at the same time (per cut).

Insert type M (MULTI)



MULTI VERSION (M)

For use on shank end mills and milling heads with **MULTIPLE insert pockets**.

Slightly positive or neutral chip breaker.

ONE edge is performing (per insert & pocket seat).

Circumferential cutting edge diameter D = 28 mm



Fitting tools from page 10

Circumferential cutting edge diameter D >= 52 mm



Fitting tools from page 10 - 11

General information when combining circular inserts and tools

Application: left handed insert

Only left handed inserts fit into the shank end mills and millling heads.

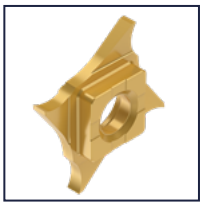
Application = clockwise / right hand rotation (CW)

Insert pocket:

16L (MULTI VERSION)
S16 (SINGLE VERSION)

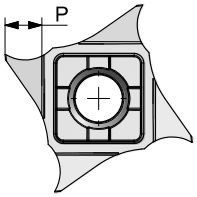


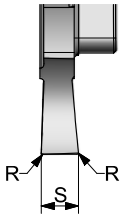
Inserts for circular milling for shank end mills with D = 28 mm

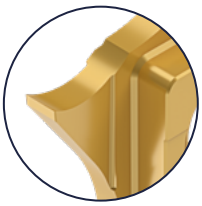


OFQ16L..P..S

SINGLE VERSION (S)





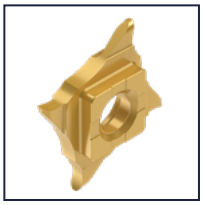


PRODDES	IDNR	IIC	IH	PDPT	REL/RER	CW	CWUD	CWLD
WG400 Ref.	KM NANOSPEED	pocket size		P	R	S	S+	S-
	ID-Nr.							
OFQ16L 050 010 P25 S	43091	S16	L	2,5	0,10	0,50	0,05	-0,05
OFQ16L 100 010 P35 S	43092	S16	L	3,5	0,10	1,00	0,05	-0,05
OFQ16L 150 015 P35 S	43093	S16	L	3,5	0,15	1,50	0,05	-0,05
OFQ16L 200 015 P35 S	43094	S16	L	3,5	0,15	2,00	0,05	-0,05
OFQ16L 250 015 P35 S	43095	S16	L	3,5	0,15	2,50	0,05	-0,05
OFQ16L 300 015 P35 S	43096	S16	L	3,5	0,15	3,00	0,05	-0,05

Inserts for circular milling of straight profiles up to 3 mm.
Highly positive chip breaker.

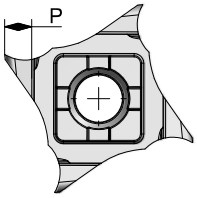
Designed for shank end mills D28 with ONE insert pocket.

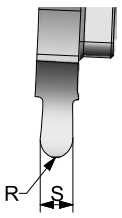
Full radius inserts for shank end mills with D = 28 mm



OFQ16L..R..P..S

SINGLE VERSION (S)







PRODDES	IDNR	IIC	IH	PDPT	CRE	CW	CWUD	CWLD
WG400 Ref.	KM NANOSPEED	pocket size		P	R	S	S+	S-
	ID-Nr.							
OFQ16L 100 R050 P35 S	43110	S16	L	3,5	0,50	1,00	0,05	0,00
OFQ16L 150 R075 P35 S	43111	S16	L	3,5	0,75	1,50	0,05	0,00
OFQ16L 200 R100 P35 S	43112	S16	L	3,5	1,00	2,00	0,05	0,00
OFQ16L 250 R125 P35 S	43113	S16	L	3,5	1,25	2,50	0,05	0,00
OFQ16L 300 R150 P35 S	43114	S16	L	3,5	1,50	3,00	0,05	0,00

Inserts for circular milling of radius profiles up to R 1,5 mm..
Highly positive chip breaker.

Designed for shank end mills D28 with ONE insert pocket.

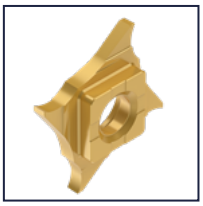
Fitting tools





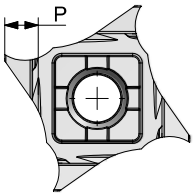
p. 16 p. 10

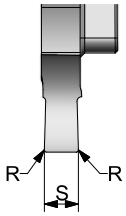
Precision inserts for circular milling DIN 471 for shank end mills D = 28 mm without chamfer



OFQ16L..P..S

SINGLE VERSION (S)







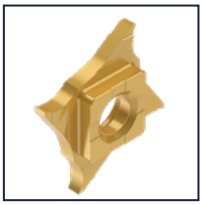
PRODDES	IDNR	IIC	IH	PDPT	REL/RER		CW	CWUD	CWLD
WG400 Ref.	KM NANOSPEED	pocket size		P	R		S	S+	S-
	ID-Nr.								
OFQ16L 130 010 P35 S	43115	S16	L	3,5	0,10	1,30	1,44	0,00	-0,05
OFQ16L 160 010 P35 S	43116	S16	L	3,5	0,10	1,60	1,74	0,00	-0,05
OFQ16L 185 015 P35 S	43117	S16	L	3,5	0,15	1,85	1,99	0,00	-0,05
OFQ16L 215 015 P35 S	43118	S16	L	3,5	0,15	2,15	2,29	0,00	-0,05
OFQ16L 265 015 P35 S	43119	S16	L	3,5	0,15	2,65	2,79	0,00	-0,05
OFQ16L 315 015 P35 S	43120	S16	L	3,5	0,15	3,15	3,29	0,00	-0,05

Inserts for circular milling of precision profiles up to 3,29 mm for milling circlip groove profiles.
Highly positive chip breaker.

Designed for shank end mills D28 with ONE insert pocket.

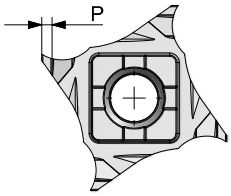
Also suitable for producing grooves in accordance with DIN 471 outer groove and DIN 472 inner groove.

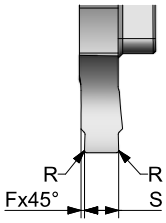
Precision inserts for circular milling DIN 471 for shank end mills D = 28 mm with chamfer



OFQ16L..P..S

SINGLE VERSION (S)







PRODDES	IDNR		IH	CHWTL / CHWTR	PDPT	REL/RER		CW	CWUD	CWLD
WG400 Ref.	KM NANOSPEED	pocket size		F	P	R		S	S+	S-
	ID-Nr.									
OFQ16L 110 010 P050 S	43121	S16	L	0,15	0,50	0,10	1,10	1,24	0,00	-0,05
OFQ16L 130 010 P067 S	43122	S16	L	0,15	0,67	0,10	1,30	1,44	0,00	-0,05
OFQ16L 160 010 P100 S	43123	S16	L	0,15	1,00	0,10	1,60	1,74	0,00	-0,05
OFQ16L 185 015 P125 S	43124	S16	L	0,20	1,25	0,15	1,85	1,99	0,00	-0,05
OFQ16L 215 015 P150 S	43125	S16	L	0,20	1,50	0,15	2,15	2,29	0,00	-0,05
OFQ16L 265 015 P150 S	43126	S16	L	0,20	1,50	0,15	2,65	2,79	0,00	-0,05
OFQ16L 265 015 P175 S	43127	S16	L	0,20	1,75	0,15	2,65	2,79	0,00	-0,05

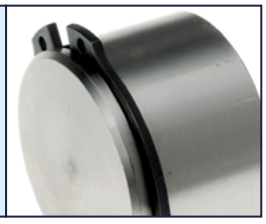
Inserts for circular milling of precision profiles up to 2,79 mm, with chamfer, for milling circlip groove profiles.

Highly positive chip breaker.

Designed for shank end mills D28 with ONE insert pocket.

Also suitable for producing grooves in accordance with DIN 471 outer groove and DIN 472 inner groove.

Application:
Circlip groove profiles

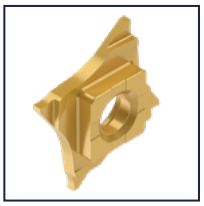


Fitting tools

Tech. Section p. 16

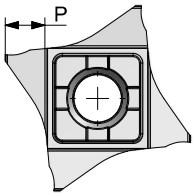
p. 10

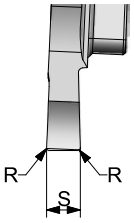
Precision circular milling inserts for milling heads without chamfer



OFQ16L..P..M

MULTI VERSION (M)







PRODDES	IDNR		IH	PDPT	REL/RER		CW	CWUD	CWLD
WG400 Ref.	KM NANOSPEED	pocket size		P	R		S	S+	S-
	ID-Nr.								
OFQ16L 130 010 P55 M	43097	16L	L	5,5	0,10	1,30	1,44	0,00	-0,05
OFQ16L 160 010 P55 M	43098	16L	L	5,5	0,10	1,60	1,74	0,00	-0,05
OFQ16L 185 015 P55 M	43099	16L	L	5,5	0,15	1,85	1,99	0,00	-0,05
OFQ16L 215 015 P55 M	43100	16L	L	5,5	0,15	2,15	2,29	0,00	-0,05
OFQ16L 265 015 P55 M	43101	16L	L	5,5	0,15	2,65	2,79	0,00	-0,05
OFQ16L 315 015 P55 M	43102	16L	L	5,5	0,15	3,15	3,29	0,00	-0,05

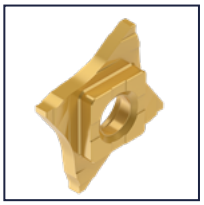
Inserts for circular milling of precision profiles up to 3,29 mm for milling locking groove profiles.
Positive chip breaker.

Designed for shank end mills and milling heads with MULTI inserts pockets.

Remark: **Cutting depth of toolholder ≥ Cutting depth of inserts!**

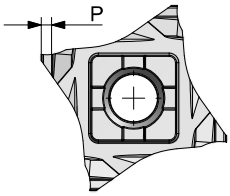
S+/S- marks the tolerance per edge.
The total value for the run is a combination milling tool + insert

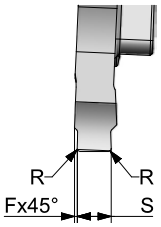
Precision circular milling inserts for milling heads with chamfer

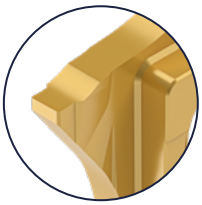


OFQ16L..P..M

MULTI VERSION (M)







PRODDES	IDNR	IIC	IH		PDPT	REL/RER		CW	CWUD	CWLD
WG400 Ref.	KM NANOSPEED	pocket size		F	P	R		S	S+	S-
	ID-Nr.									
OFQ16L 110 010 P050 M	43103	16L	L	0,15	0,50	0,10	1,10	1,24	0,00	0,05
OFQ16L 130 010 P067 M	43104	16L	L	0,15	0,67	0,10	1,30	1,44	0,00	0,05
OFQ16L 160 010 P100 M	43105	16L	L	0,15	1,00	0,10	1,60	1,74	0,00	0,05
OFQ16L 185 015 P125 M	43106	16L	L	0,20	1,25	0,15	1,85	1,99	0,00	0,05
OFQ16L 215 015 P150 M	43107	16L	L	0,20	1,50	0,15	2,15	2,29	0,00	0,05
OFQ16L 265 015 P150 M	43108	16L	L	0,20	1,50	0,15	2,65	2,79	0,00	0,05
OFQ16L 265 015 P175 M	43109	16L	L	0,20	1,75	0,15	2,65	2,79	0,00	0,05

Inserts for circular milling of precision profiles up to 2,79 mm for milling locking groove profiles.
Positive chip breaker.

Designed for shank end mills and milling heads with MULTI inserts pockets.

Remark: **Cutting depth of toolholder ≥ Cutting depth of inserts!**

S+/S- marks the tolerance per edge.
The total value for the run is a combination milling tool + insert

Fitting tools



p. 16



p. 10



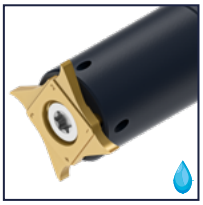
p. 11

GLR M92 Q MULTICUT circular milling - Code for shank end mills and milling heads

GLR M92 28 20 SW 16 3 04

- GLR — System designation GripLock Rotation
- M92 — Clamping System M92
- 28 — Edge diameter
- 20 — Shaft diameter / Location whole diameter
- SW — Type of milling cutter: Slot cutter = T, Milling head = M, Shank end mills = S (Additional for Weldon clamping = W) e.g. SW = shank end mill with Weldon attachment.
- 16 — Inner circle Ø 16 (pocket size)
- 3 — Max. cutting depth = P
- 04 — Amount of edges in action

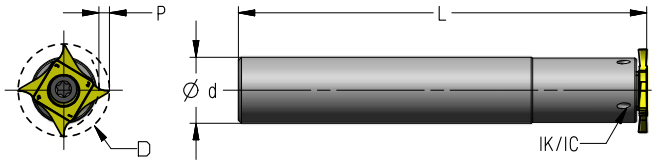
Shank end mills with internal coolant



GLRM92 28..SW..

SINGLE VERSION (S)

Schaftfräser mit einem Plattensitz

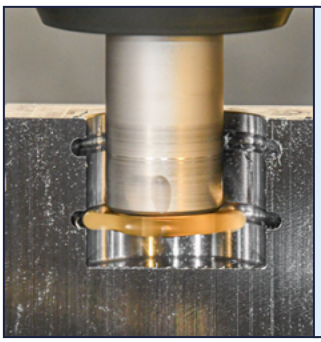


PRODDES	IDNR		DC	DCONMS		APMX	ZEFP	OAL	
WG600 Ref.	ID-Nr.	pocket size	D	Ø d	insert pockets	P	Z	L	
GLR M92 28 20 SW 16 3.5 04	41052	S16	28	20	1	3.5	4	125	23

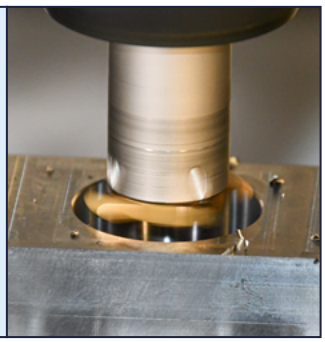
Suitable for inserts listed on page 7 - 8 (SINGLE Version).

Fitting inserts

Tech. Section p. 16 | p. 7 | p. 7 | p. 8



Internal milling operations with D28 shank mill (short extension)

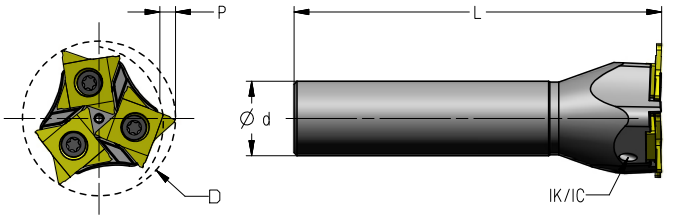




GLRM92 52..SW..

MULTI VERSION (M)

Shank end mill with more than one insert pocket



PRODDES	IDNR		DC	DCONMS		APMX	ZEFP	OAL	
WG600 Ref.	ID-Nr.	pocket size	D	Ø d	insert pockets	P	Z	L	
GLR M92 52 25 SW 16 3.5 03	41053	16L	52	25	3	3.5	3	125	23

Only LH inserts fits on shank end mills and milling heads.

The dimension P defines the maximum penetration depth of the tool.
The real penetration depth depends on the insert which is used.
(P dimension of the insert)!

Suitable for inserts listed on page 9 (MULTI Version).

Fitting inserts

Tech. Section p. 16 | p. 9 | p. 9

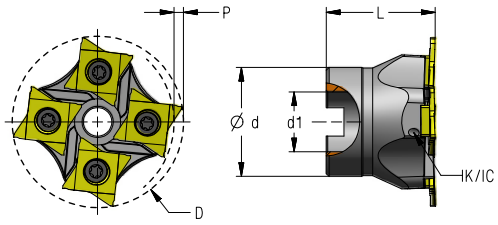
Milling heads with internal coolant



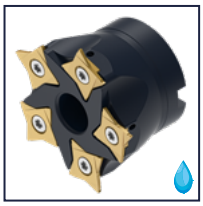
GLRM92..M..

MULTI VERSION (M)

Milling head with 3 insert pockets



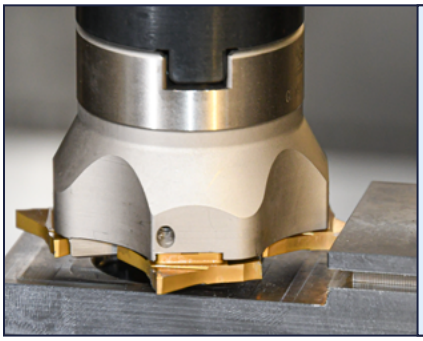
Milling head with 5 insert pockets



PRODDES	IDNR		DC	DHUB	DCONMS		APMX	ZEFP	OAL	
WG600 Ref.	ID-Nr.	pocket size	D	Ø d	Ø d1	insert pockets	P	Z	L	
GLR M92 52 16 M 16 3.5 03	41054	16L	52	32	16	3	3.5	3	40	23
GLR M92 63 22 M 16 4.5 04	41055	16L	63	40	22	4	4.5	4	40	23
GLR M92 80 27 M 16 5.5 05	41056	16L	80	55	27	5	5.5	5	50	23

The dimension P defines the maximum penetration depth of the tool.
The real penetration depth depends on the insert which is used.
(P dimension of the insert)!

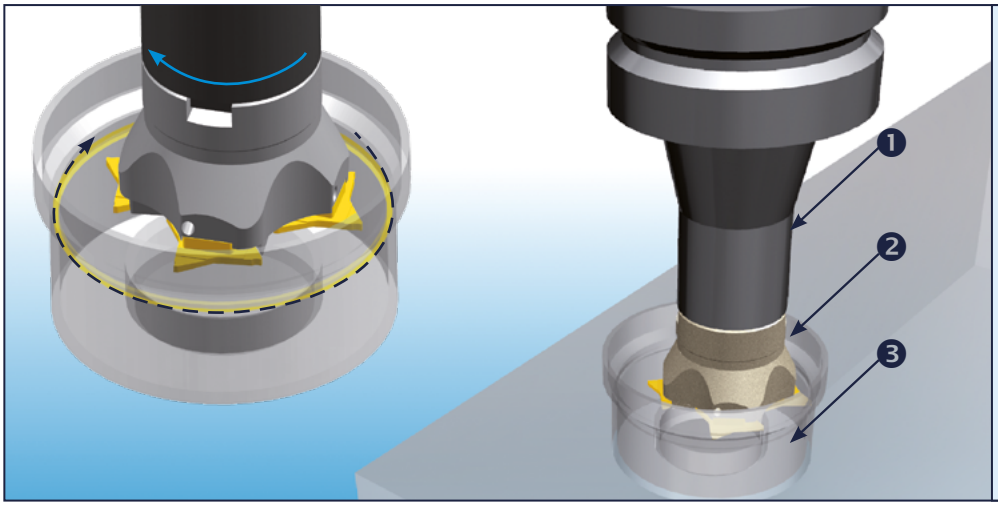
Suitable for inserts listed on page 9 (MULTI Version).



External milling operation with milling head GLR M92 63 22

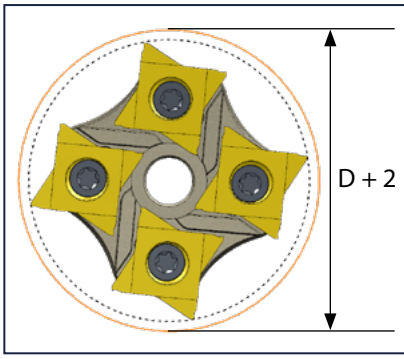
External milling operation with milling head GLR M92 52 16





Example of use: Internal milling with MC4 milling head

1. Milling head fixture (e.g. HSK)
2. Milling head MC4
3. Component



Attention please!

When machining the inside of profiles, always observe the cutting edge circumference diameter D!

The diameter of a milling tool must always be smaller than the inside diameter or the bore diameter of the part, which has to be machined. As a general guideline for internal profiles, a safety margin of +2 mm will be recommended.

Fitting inserts



p. 16

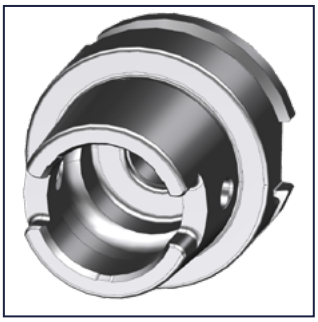


p. 9

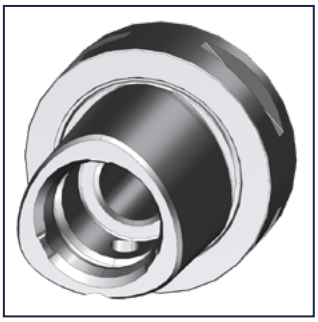


p. 9

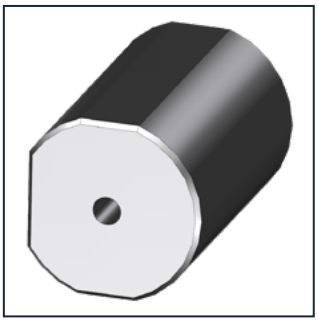
Customized circular milling toolholders and plunge tools



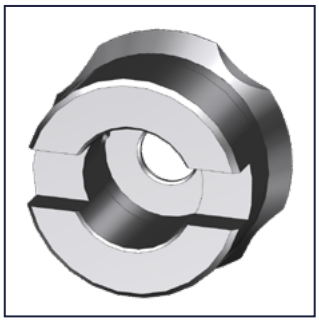
HSK



PSC



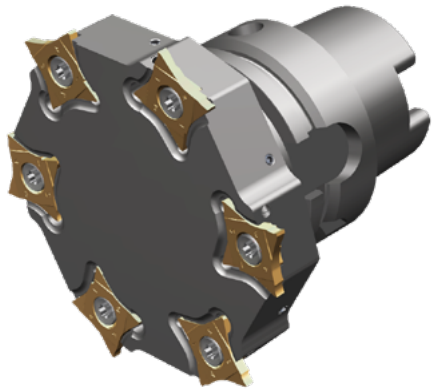
Round shank/
WELDON



MK

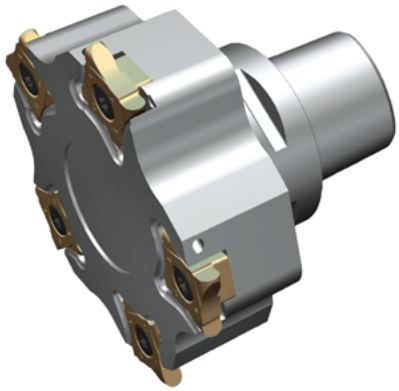
Examples and possibilities for customized circular milling toolholders

**Solutions with MULTICUT System
(4 edges up to profiles of 3,5mm)**



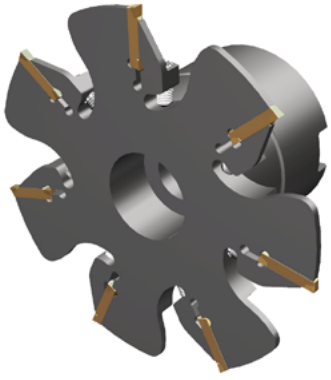
HSK interface for grooving profile

**Solutions with MULTICUT EXTENDED System
(4 edges up to profiles of 6,5mm)**



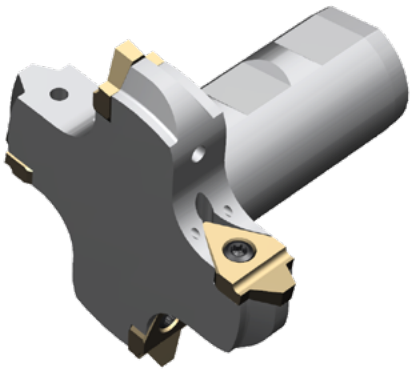
PSC interface with radius profile

**Solution with TWIN P92 System
(TWO EDGES)**



Cutter with interface for milling heads

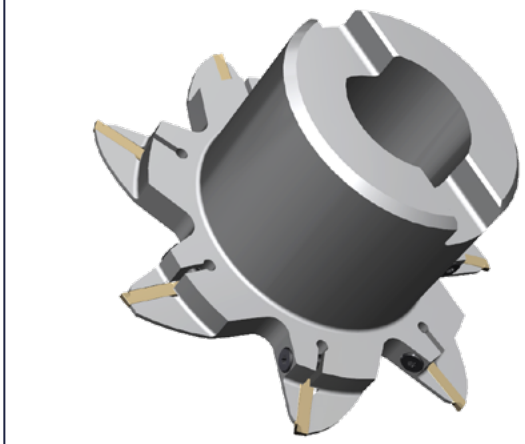
**Solutions with F92 Profile System
(PROFILE CUTTING)**



Profile cutter with F92

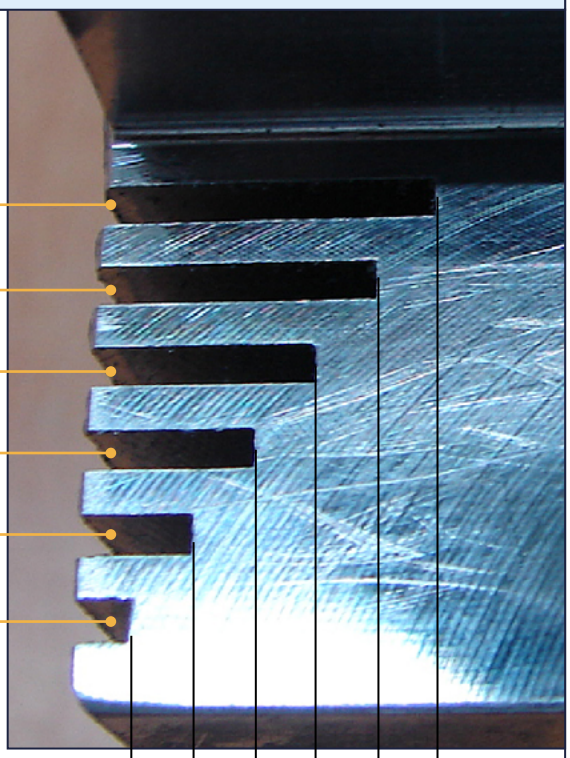
Examples of circular milling application with P92 TWIN TAILORMADE

TAILORMADE milling cutter, clamped
Profile width = 1,5 mm | Interface Ø = 32 | No. of teeth = 7 | Circumferential- Ø = 110 mm





Machining part and cutting data



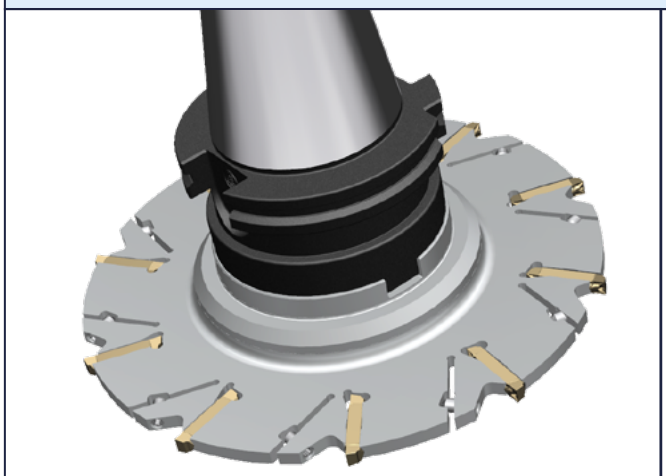
n = 462 U/min | Vfz = 513 m/min | (fz = 0,185)
n = 462 U/min | Vfz = 513 m/min | (fz = 0,185)
n = 462 U/min | Vfz = 625 m/min | (fz = 0,225)
n = 462 U/min | Vfz = 625 m/min | (fz = 0,225)
n = 462 U/min | Vfz = 890 m/min | (fz = 0,32)
n = 462 U/min | Vfz = 890 m/min | (fz = 0,32)

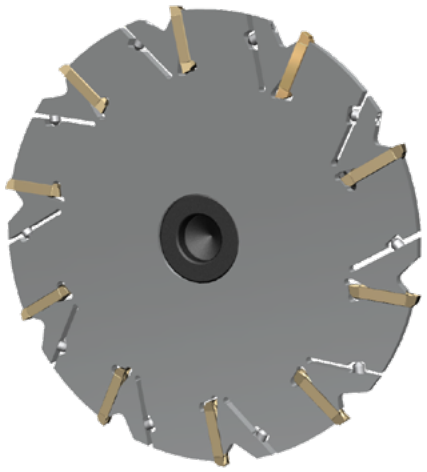
- Machine: Vertical centre
- External cooling
- SK40 spindle interface
- Material: C45

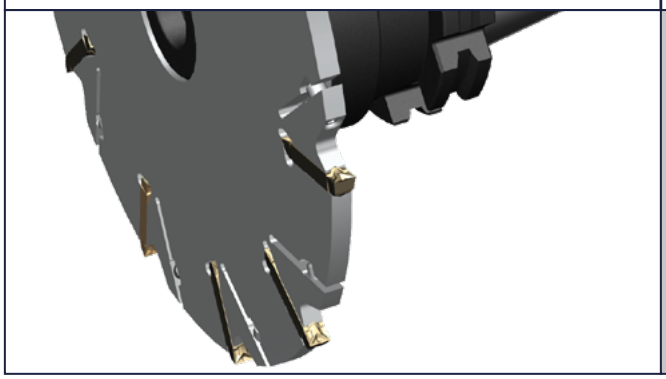
Depth of profile = 2 mm
Depth of profile = 4 mm
Depth of profile = 6 mm
Depth of profile = 8 mm
Depth of profile = 10 mm
Depth of profile = 12 mm

Examples of circular milling application with P92 TWIN TAILORMADE

TAILORMADE milling cutter, clamped
Profile width = 6 mm | Interface Ø = 40 | No. of teeth = 10 | Circumferential- Ø = 200 mm



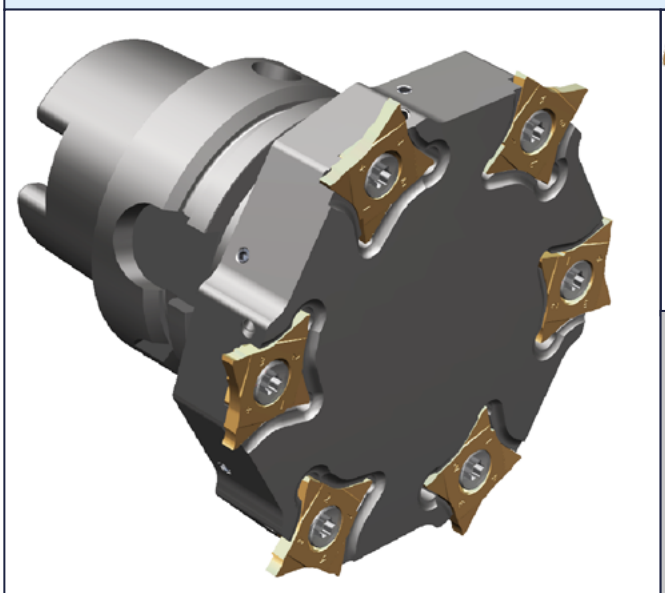


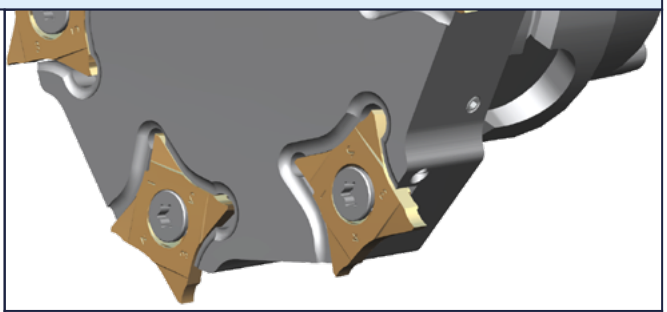


- Machine: Centre
- External cooling
- SK50 spindle interface
- Material: tool steel, div.

Examples of circular milling application M92 HSK

TAILORMADE milling cutter, clamped
Profile width = 3 mm | Interface Ø = 63 | No. of teeth = 6 | Circumferential- Ø = 110 mm

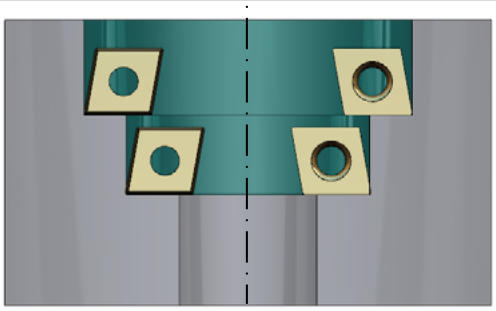
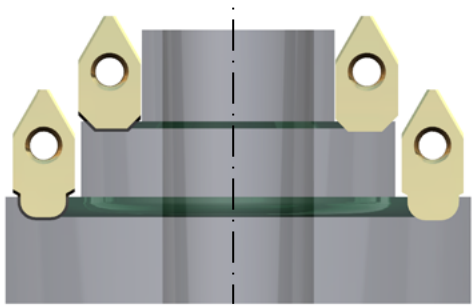




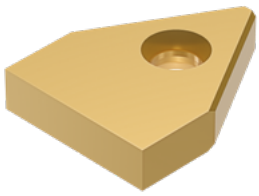
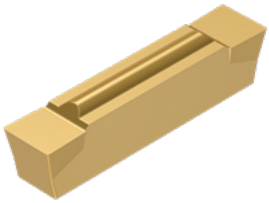
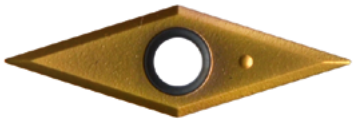
- Machine: MULTI TASKING centre
- Internal cooling
- HSK 63 interface
- Material: tool steel

Examples and use for customized plunge tools

Machining with plunge tools is a classic drilling and countersinking process.
Specially arranged inserts generate external or internal profiles along a centre axis, which reduce machining times and optimizes processes.

INTERNAL PLUNGE MACHINING	EXTERNAL PLUNGE MACHINING
	

Insert systems which are available for customized tools and plunge tool applications:

F92 Profile cutting	P92 TWIN System	ISO Inserts
		

Examples for customized plunge tools





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sonder@kemmerhmw.de

Are you looking for support with your next project, or do you want to perfect your processes with customized solutions?

We will be happy to support you with an ideal solution for your requirements!

Important information for an enquiry:

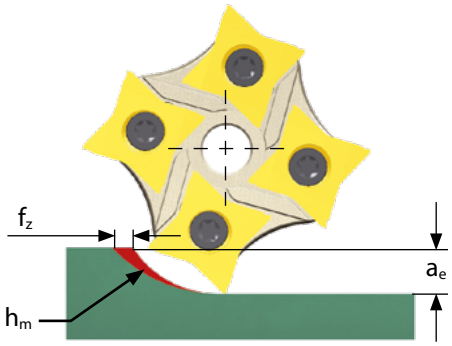
- Component dimensions/drawing (diameter ranges, tolerances)
- Interface to the machine or holder
- Material specifications
- Required insert systems and tolerance (ISO plunge tools)

Scan for the enquiry form

Technical section GLR MULTICUT circular milling

Recommended cutting values

type of milling tool	Insert type	Feed per tooth f_z in [mm] min (less stable) - max (very stable)			Thickness of chip [mm] h_m min (less stable) - max (very stable)		
	OFQ16L...P...S	0,04	-	0,22	0,02	-	0,07
	OFQ16L...P...M	0,11	-	0,20	0,06	-	0,14



Drawing: dimensions for groove milling

Calculation

Average chip thickness	Feed per tooth
$h_m = f_z \cdot \sqrt{\frac{a_e}{D}}$ [mm]	$f_z = h_m \cdot \sqrt{\frac{D}{a_e}}$ [mm]

General starting guide values for the chip thickness h_m

P 0,06 mm **K** 0,08 mm **M** 0,03 mm **N** 0,08 mm



General guide values for the cutting speed v_c

P 120 - 350 m/min **K** 60 - 200 m/min **M** 90 - 200 m/min **N** 300 - 600 m/min

Formulas

Cutting speed	Feed per tooth
$V_c = \frac{D \cdot \pi \cdot n}{1000}$ [$^{m}/_{min}$]	$f_z = \frac{V_f}{n \cdot z}$ [mm]

Revolution	Feed speed
$n = \frac{Vc \cdot 1000}{D \cdot \pi}$ [min^{-1}]	$V_f = f_z \cdot z \cdot n$ [$^{mm}/_{min}$]

Caption

V_c = Cutting speed
f_z = Feed per tooth
n = Revolution
V_f = Feed speed
h_m = Average chip thickness
a_e = Cutting depth
D = Tool diameter
z = Amount of cutting edges in action
π = Basic circle dimension = 3,14

Overview of geometries GLR MULTICUT circular milling

Profile forms				Ref.
Insert type SINGLE | Use insert pocket S16				
 P...S	●			page 7
 R...P35S		●		page 7
 P35S	●			page 8
 P...000 S			●	page 8
Insert type MULTI | Use insert pocket 16L				
 P55M	●			page 9
 P...000 M			●	page 9

Tailor made insert profiles GLR MULTICUT


e.g. chamfering

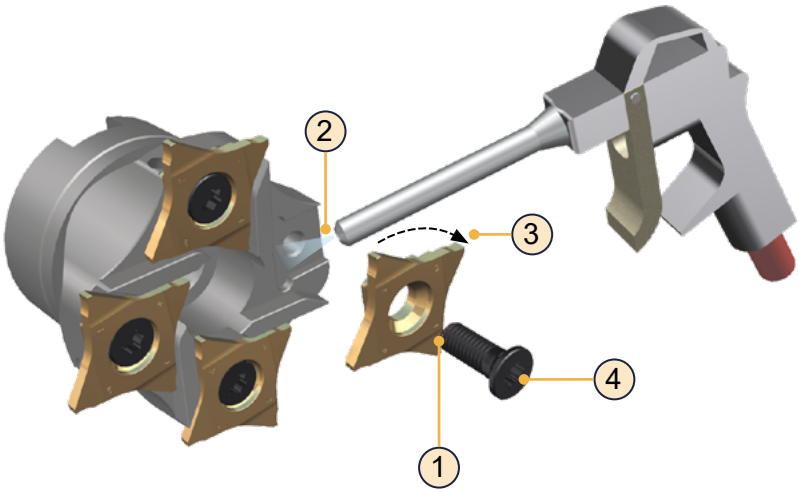

e.g. ¼ radius


e.g. V-profiling

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Changing the insert and cleaning GLR MULTICUT circular milling



1. Unfix insert and clamping screw
2. Blow out /clean the insert pocket
3. Turn insert to unused edge or change insert
4. Clamp insert
   Pay attention to the torque; s. page 18

Grades and coatings

Grade Ref./ Abbreviation	Recommended use	Structure	High wear resistance (universal usage)	High toughness (instable conditions)	Description
KM			X	(X)	Universally applicable substrate with high wear resistance and good toughness at the same time

Coating	Type	Structure	Layer thickness	Main application	Alternative application
NANOSPEED	Supernitrid PVD	TiAlN	3 µm	P M	N S K

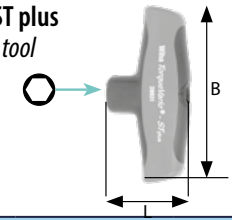
Spare parts

WG355 ET	ID-Nr.	Screw	ID-Nr.	Key	Recommended torque [Nm]
32	44188	M 8x20 1	14747	P6	14
35	34839	TXM 5x14 25	38549	TX25	7

Torque key and interchangeable blades



Torque VARIO ST plus
T-handle torque tool

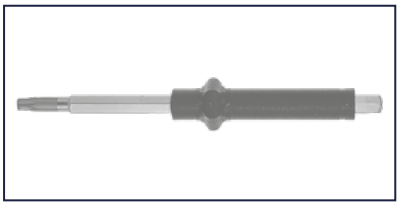




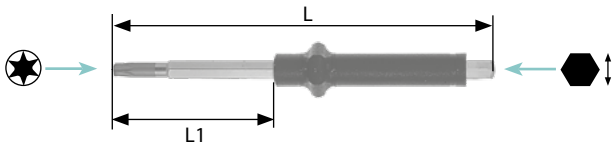
Torque Vario-S
Torque screwdriver



WG355 Ref.	Torque Nm	ID-Nr.	⬡	L	B	D	Interchangeable blades
Torque VARIO ST plus	5,0 - 14,0	43723	6	56	120	-	WT25
Torque Vario-S	1,0 - 5,0	43884	4	138	-	36	WT25



Torx-Interchangeable blades



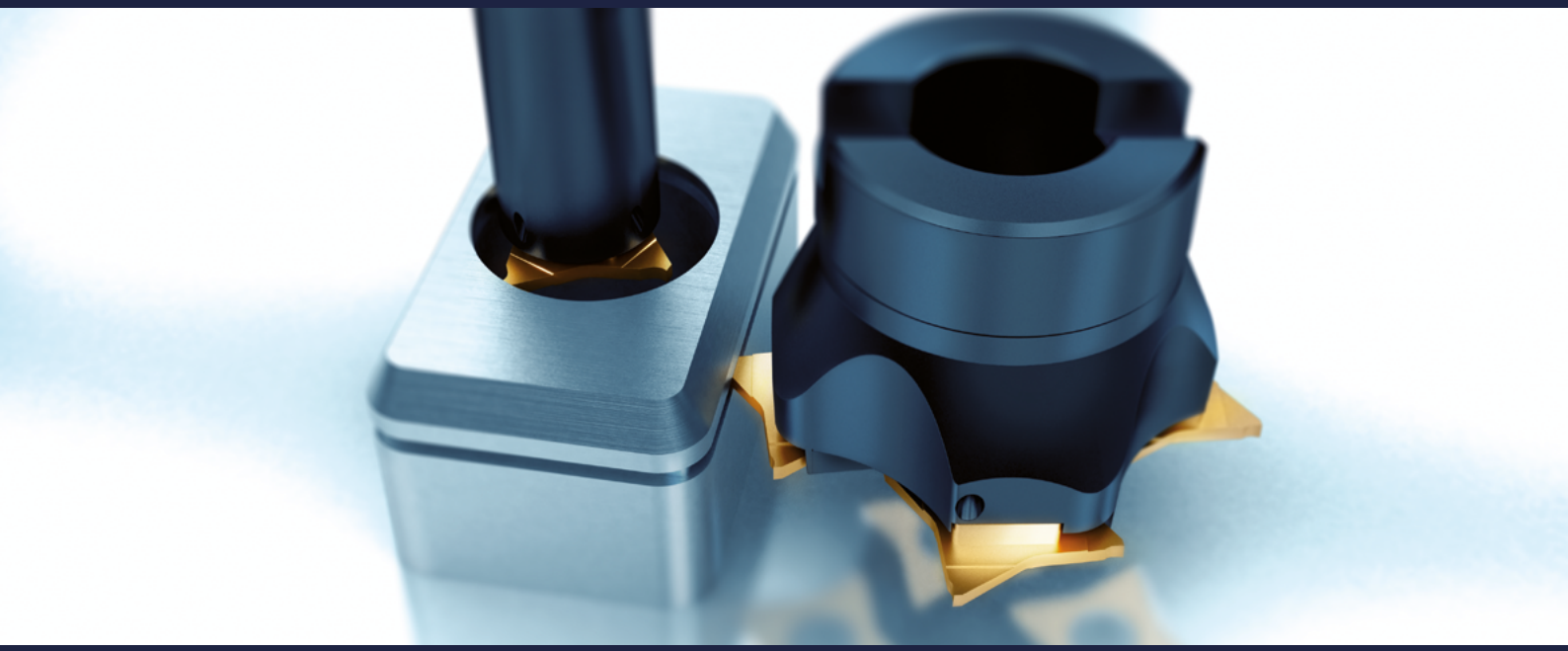
WG355 Ref.	ID-Nr.	✶	⬢↕	L	L1	max Nm	max in.lbs
WT25	43718	T25	6	130	53	15	132

Blade: High quality chrome-vanadium-molybdenum steel, through hardened. Wiha ChromTop® finish on tip for a perfect fit.
Colour-coding: Torx-iterchangeable blades: dark green.
Colour-coding: Hex interchangeable blades: red.

Application: For applications where recommended torque settings are important.

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HARTMETALLWERKZEUGE

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Hard material	**One edge**	**GLM**	**GLS**	**F92**	**Special solutions**
					

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