



Gear Machining

TAEGUTEC **GEAR** Production

GEAR

TaeguTec
INDUSTRY 4.0

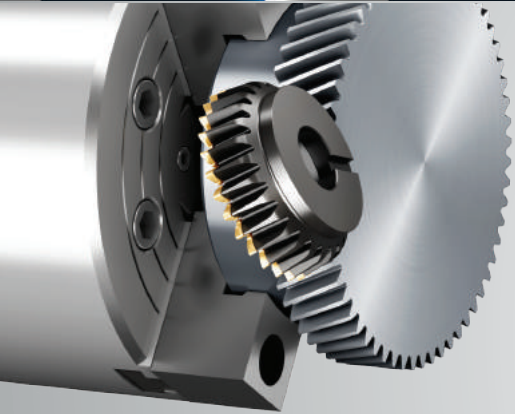
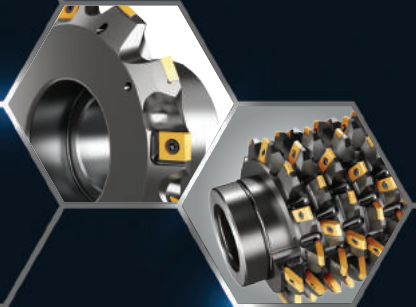
Machining

TaeguTec **GEAR** Machining Solutions



TaeguTec
Member IMC Group

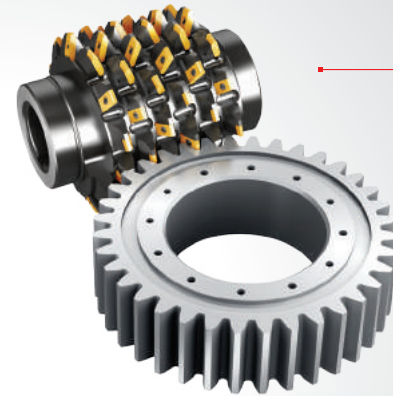
TAEGUTEC GEAR Production



GEARSKIVE TaeguTec

INDEXABLE

- Very high productivity on 5-axis machines with perfect synchronization between the two spindles
- Indexable type is mainly used for larger than Module 2.5
- Easy to apply and replace inserts



GEARHOB TaeguTec

- Quintessential machining method for external gears
- High productivity with indexable type hobs
- Smooth cutting due to helical layout

GEARGASH TaeguTec

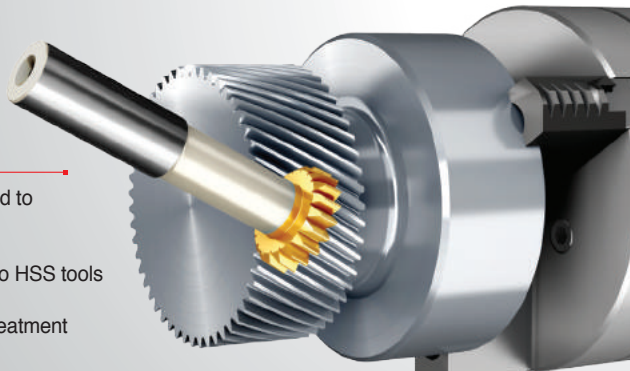
- Mass production for internal and external gears
- Mainly applied to wind power, construction machinery and shipbuilding industries



GEARSKIVE TaeguTec

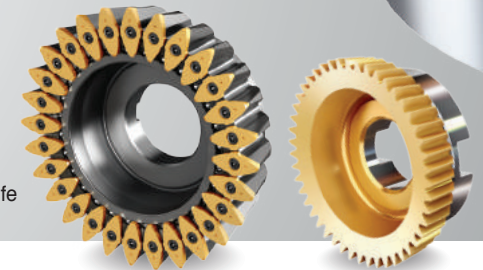
HEAD CHANGEABLE

- The head-changeable type is mainly applied to Module 0.4-2.5
- High-precision machining
- Higher productivity and tool life compared to HSS tools in machining high hardness materials
- Hard power skiving is possible after heat treatment



GEARSHAPE TaeguTec

- Mainly applied to internal gear machining
- Also applied to external gear machining with interference
- Conventional method, but highly flexible
- Compared to Solid HSS, it is more convenient to use, with better productivity and longer tool life



CONTENTS



GEARSKIVE

TaeguTec



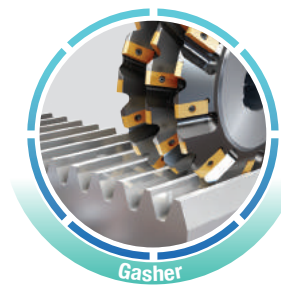
Head-changeable Power Skiving



Indexable Power Skiving



Advantages



GEARGASH

TaeguTec



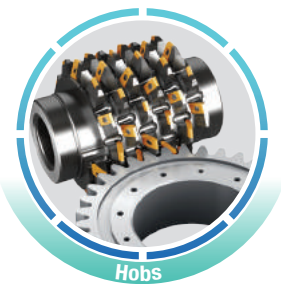
Flange Type Gashers



Worm Gear Gashers



Roughing and Finishing Double Helical Gear Cutters



GEARHOB

TaeguTec



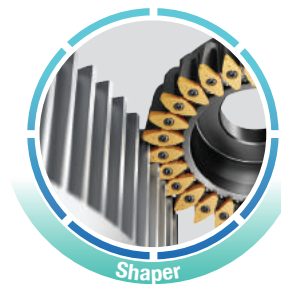
Monobody Hobs



Segment Hobs



Advantages



GEARSHAPE

TaeguTec



Indexable Shapers



Head-changeable Shapers



GEARGASH

TaeguTec



External



Internal



GEARGASH

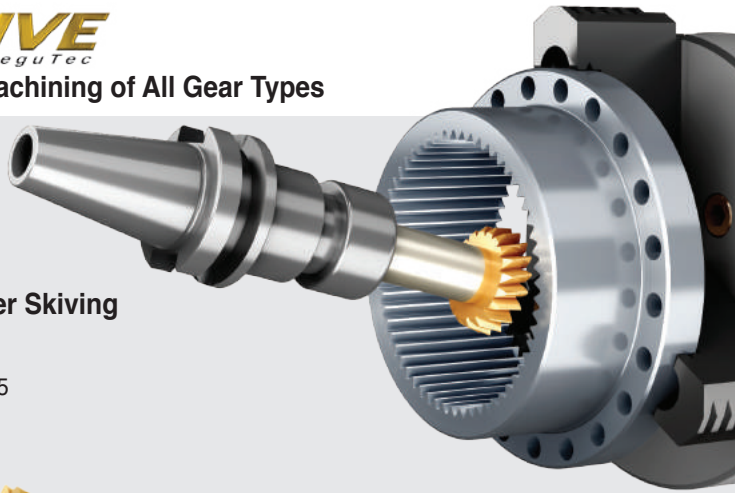
TaeguTec



Rotor Screw Gashers

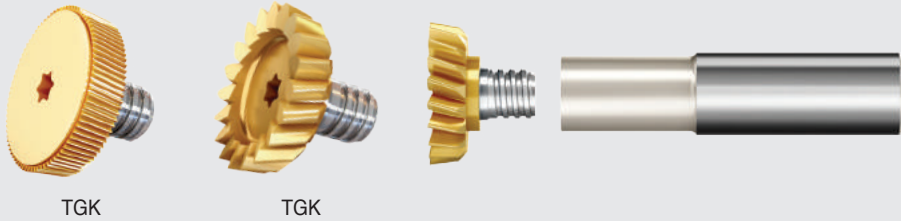


For Rough and Finish Machining of All Gear Types



Head-changeable Power Skiving

- Module range: 0.4 - 2.5
- Diameter range: Ø16.5 - Ø35
- Internal coolant from shank



TGK

TGK

Various shank options

Steel shanks



Tungsten shanks



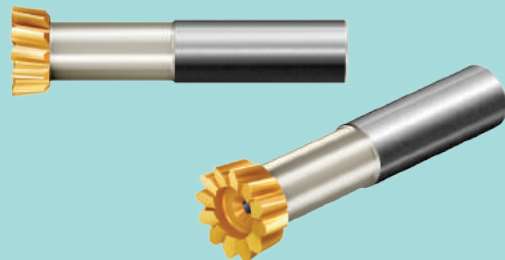
Carbide shanks



Solid Type Power Skiving

Module range: 0.3 - 6
Diameter range: Ø10 - Ø160

1. Shank Types



Indexable Power Skiving

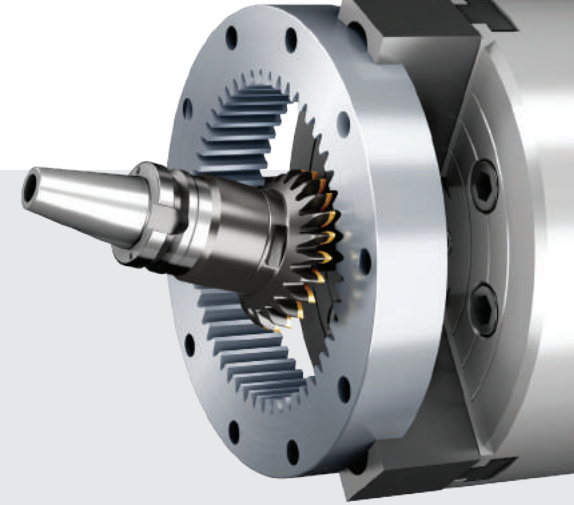
- Module range: 2.5 - 10
- Diameter range: Ø63 - Ø315
- Internal coolant



TGI-K...S
Insert with semi-topping

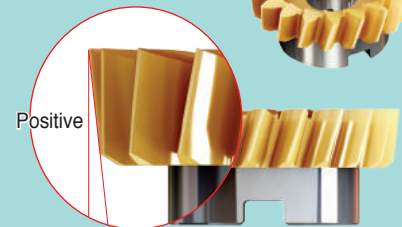


TGI-K
Insert without semi-topping



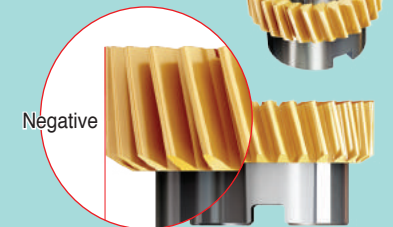
Type	External	Internal
Gear		
Spline		
Semi-topping		
Protuberance		

2. Bell Types



Positive

Conical



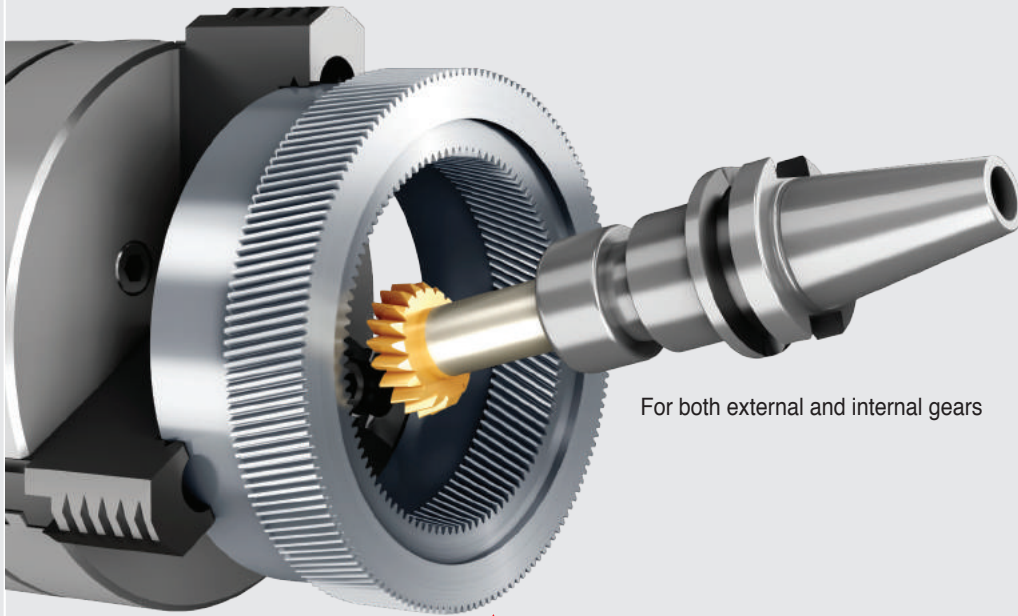
Negative

Cylindrical



01 Replaces Conventional Gear Machining

Power skiving replaces conventional gear machining like broaching, hobbing and shaping

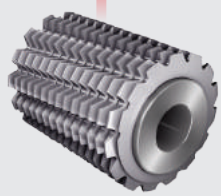


For both external and internal gears



Broaches

- Only for through-type gears
- Less flexible
- Difficult to handle



Hobs

- Only for external gears
- Unusable in close to shoulder machining



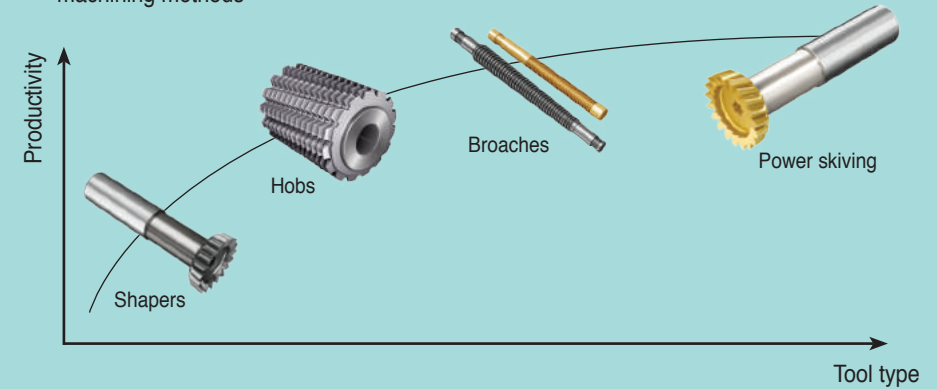
Shapers

- Mainly for internal gears
- Longer cycle time
- Not suited for machining hardened materials

Power skiving replaces most of the existing gear manufacturing processes

02 High Productivity

Power skiving reduces considerable cycle times when compared to conventional gear machining methods



03 One Machine for Turning, Milling and Gear Machining

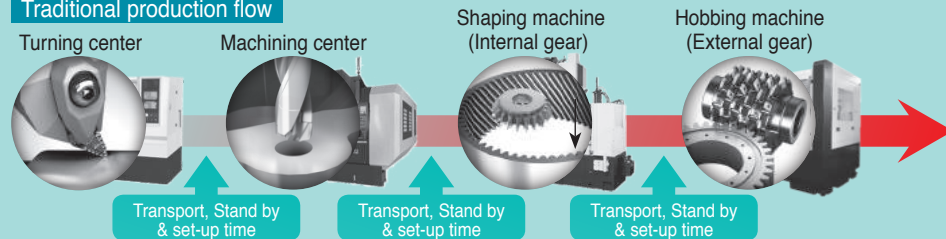
Complete gear component machining in a single set-up multitask machine that shortens production time, improves gear quality class while reducing handling and logistics costs

Production flow with power skiving



- When power skiving using a multitask machine: all cutting is done on one machine

Traditional production flow

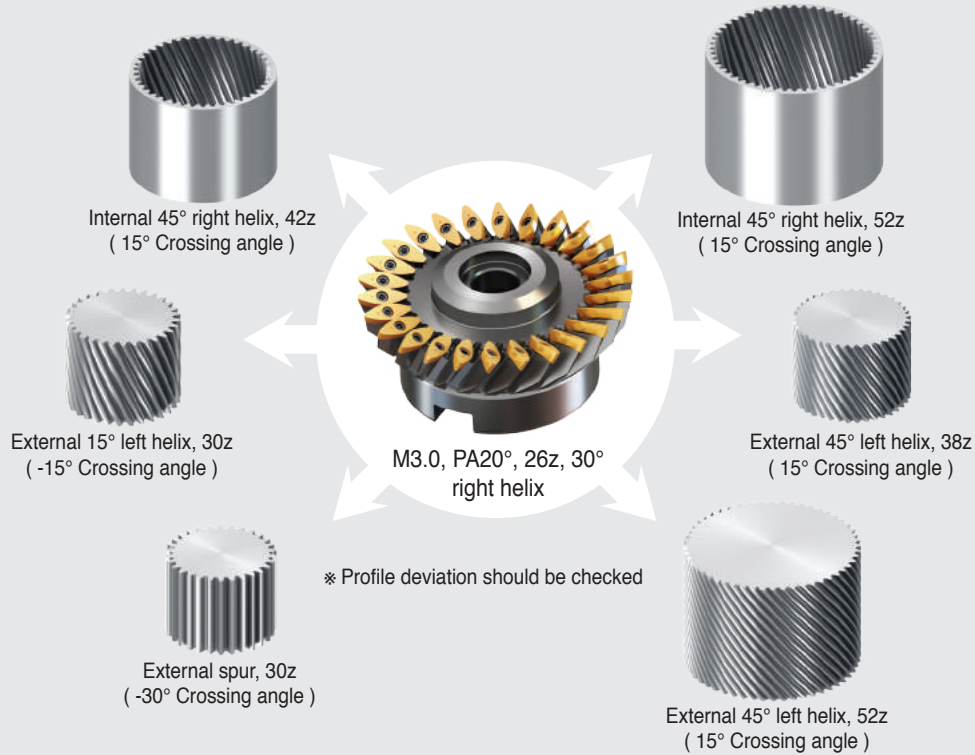


- Without power skiving: workpiece should be moved to 3-4 different machine types



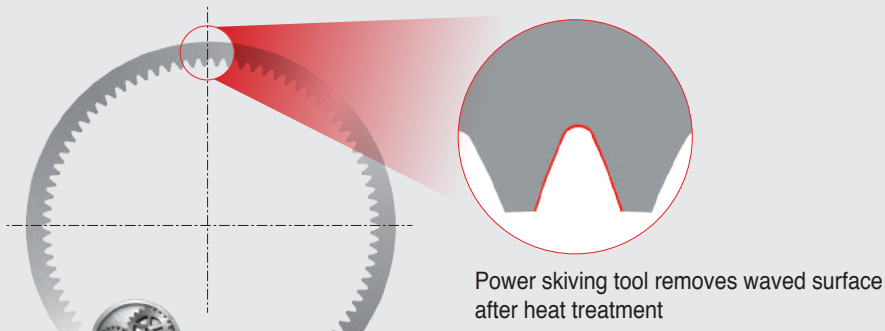
04 High Flexibility

Machining for various number of teeth, internal, external, spurs and helical gears



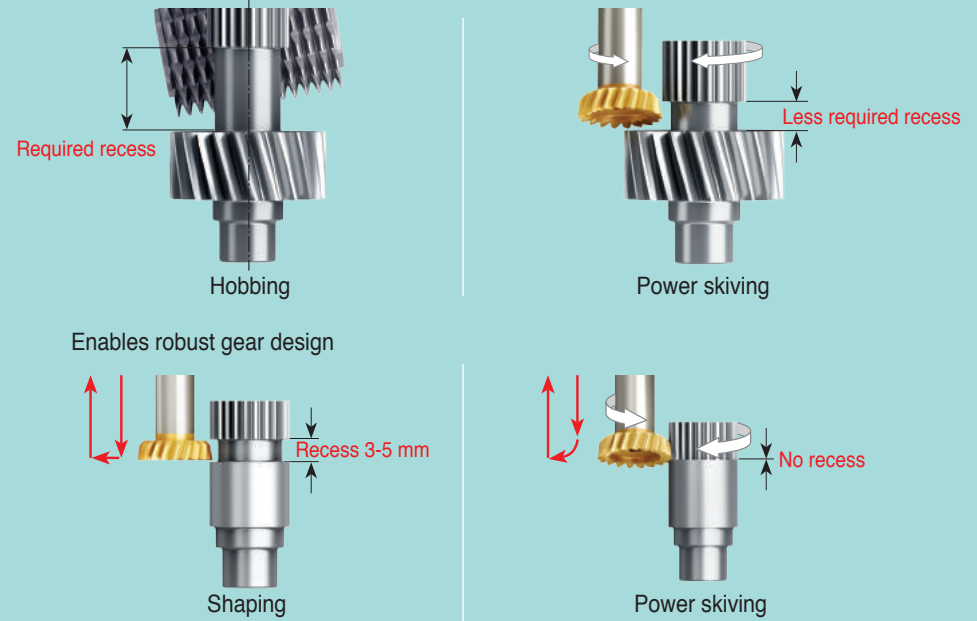
05 Hard Power Skiving for Internal Gears

Solid carbide power skiving tool machines finishing after heat treatment



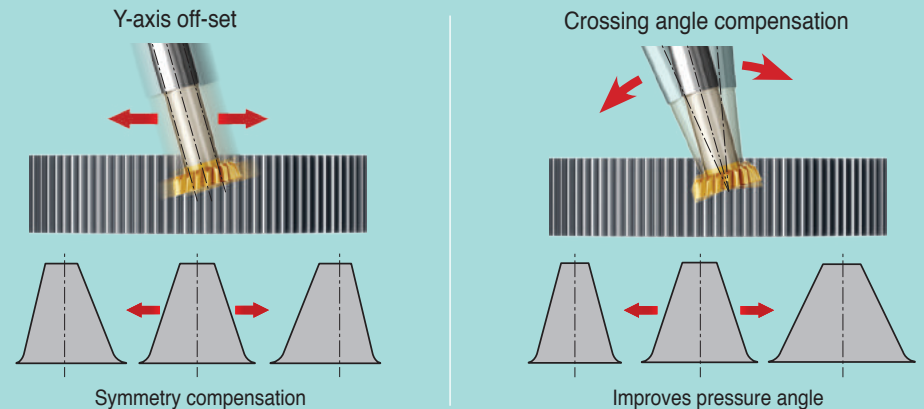
06 Less Interference When Machining

Enables compact and light gear design



07 Compensation of Angle Error

Symmetry compensation is possible through machine axis off-set

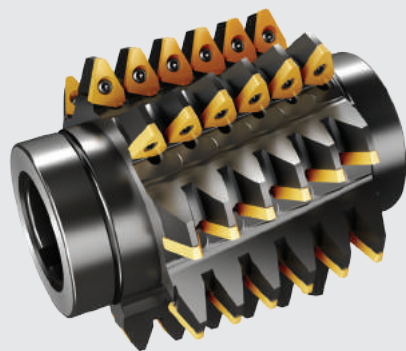


Monobody Hobs

Module range: 3 - 10

Diameter range: Ø80 - Ø220

- High-precision and great quality due to the monobody design
- Helical layout makes for smooth cutting
- High productivity



Laydown insert type

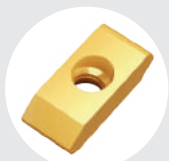


Tangential insert type



TGI-F

- High accuracy insert tolerance
- High productivity



TGI-R

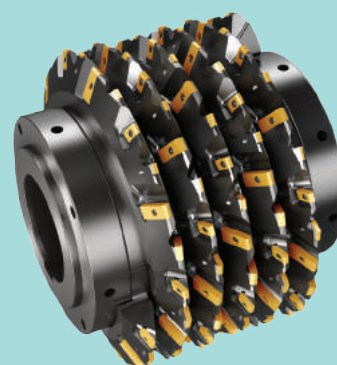
- Economical 4-cutting edge insert
- Low cutting load

Segment Hobs

Module range: 6 - 24

Diameter range: Ø160 - Ø550

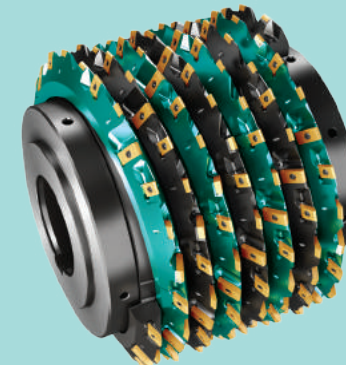
- Hobs extension and reduction is possible
- Helical layout enables smooth cutting
- High productivity



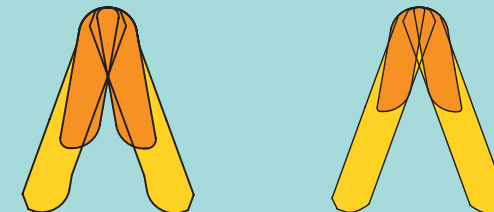
Single thread



- Hobs profile for finishing



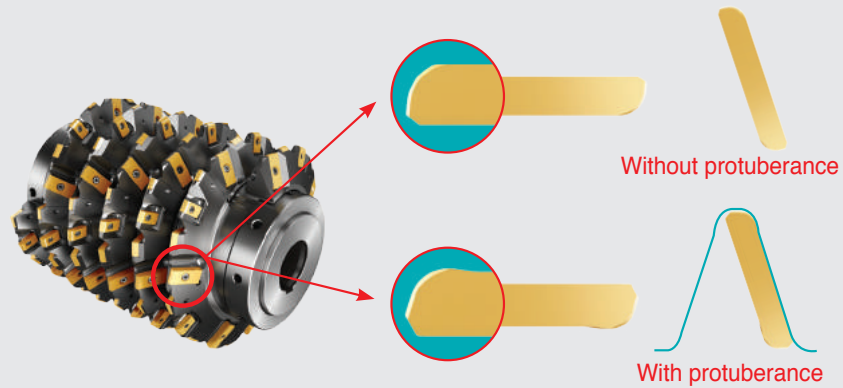
Multi threads



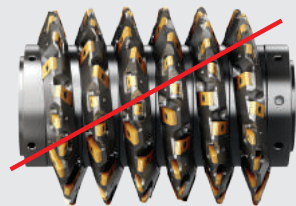
- Hobs profile for pre-shaving or pre-grinding



- Generate various profiles with inserts on one hob

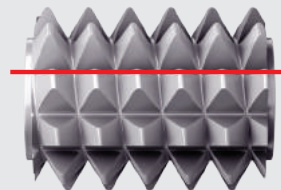


- Helical layout enables smooth cutting
- Lower cutting load with half effective over full effective solid type hobs



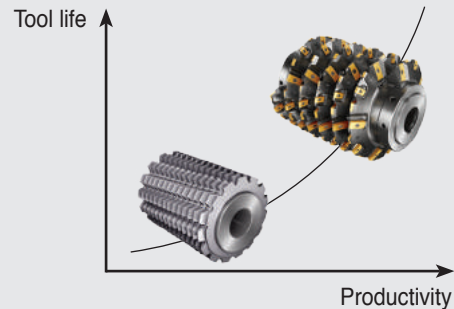
Indexable type hobs
(half effective)

Vs.

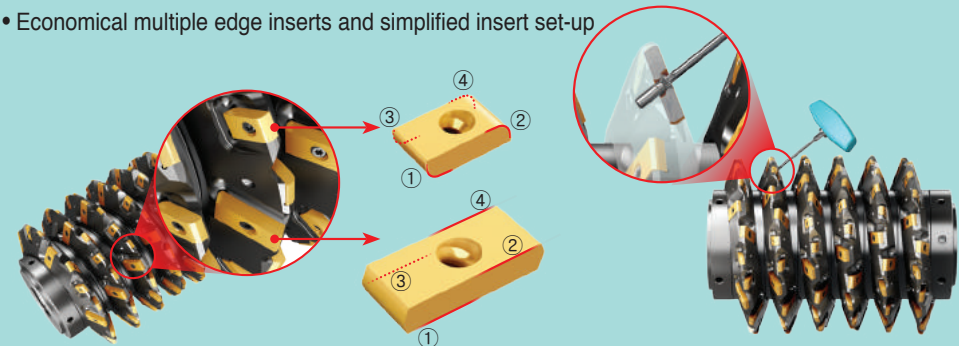


Solid type hobs
(full effective)

- Higher productivity compared to solid HSS hobs
- Longer tool life compared to solid HSS hobs



- Economical multiple edge inserts and simplified insert set-up

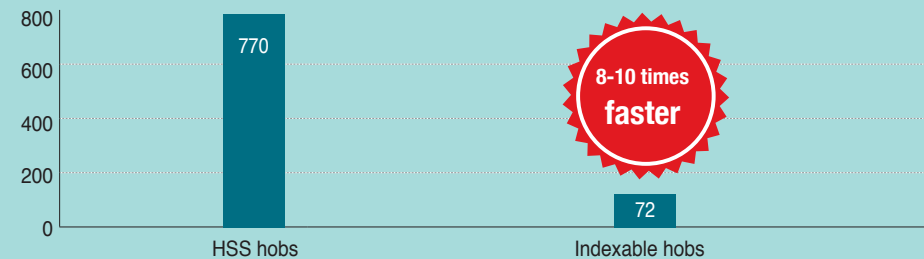


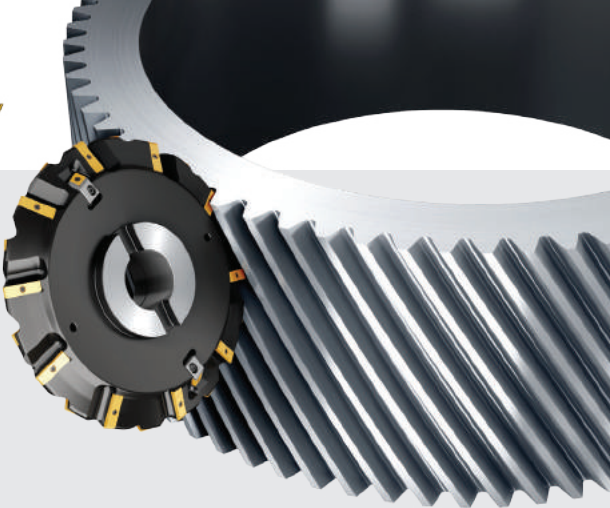
Case Study Hobs

	Conventional (HSS hobs)	TaeguTec (Indexable hobs)
Cutter	D100	TGHC D300-100N-M10-AY
V (m/min)	25	150
Feed (mm/WR*)	0.8	5
Effective teeth	9	7
Coolant	dry	dry
Running time (min)	770	72

* WR (workpiece revolution)

Running time (min)

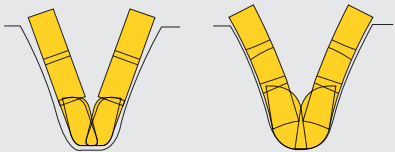




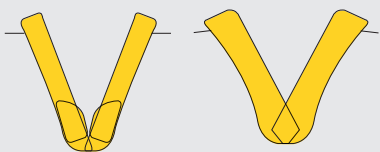
Disc Type Single Gashers

- For spurs and helical gears
- Long tool life due to high performance insert grades and geometries
- High-precision machining

External Gear Single Gashers



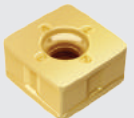
Roughing



Finishing



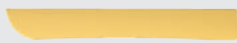
TGI-R



SNA

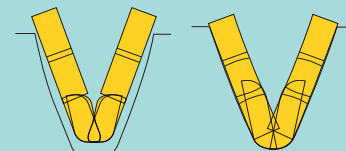
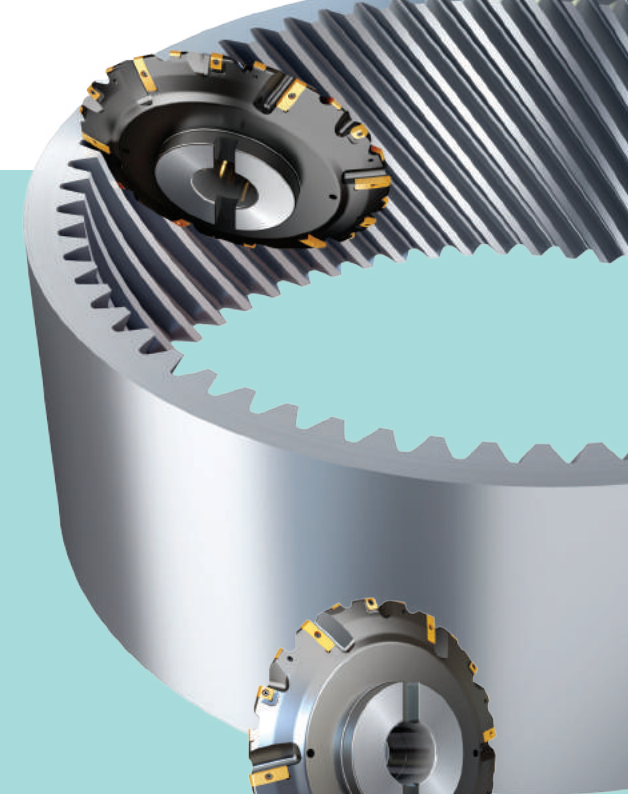


TGI-F

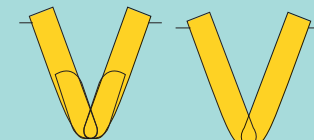


Depending on the cutter design, various insert type combinations are possible

Internal Gear Single Gashers



Roughing



Finishing



TGI-R



SNA



TGI-F



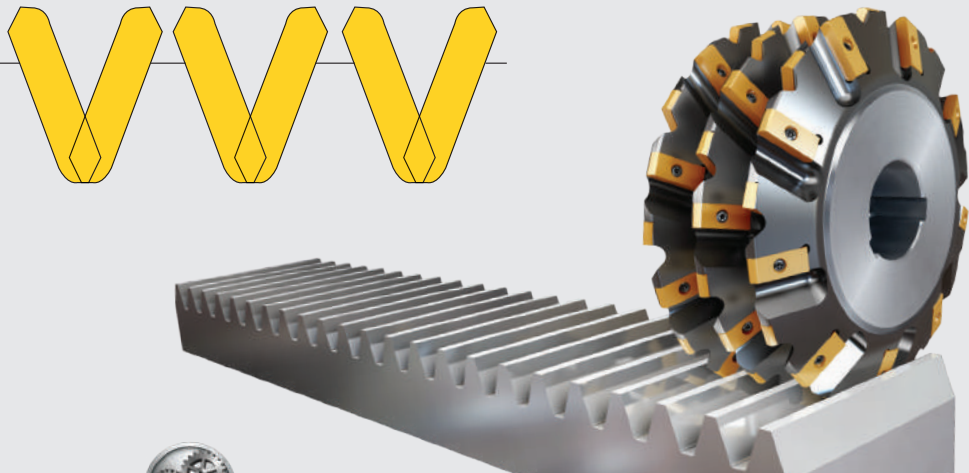
Flange Type Gashers

- For external spurs and helical gears
- Roughing and finishing applications
- Tangential and lay down solutions
- For the machining center
- Module 0.5 and up



Rack Gear Gashers

- High stability cutting performance due to optimized insert geometry and lay out
- Roughing and finishing of small modules: module 2 and up
- Smooth chip evacuation



Duplex Gear Gashers

- High metal removal rate solution
- For large internal and external gear wheels
- Tailor-made for special gear profiles



Worm Gear and Threading

- Roughing and finishing applications
- High productivity
- Head-changeable and indexable types
- High-precision profiles



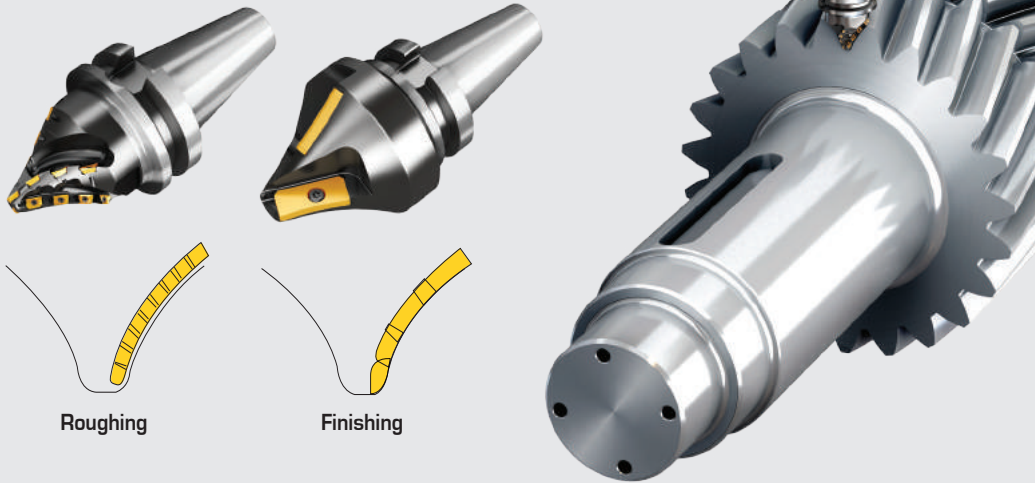
Indexable type

Head-changeable



Double Helical Gear Cutters

- Special endmill type cutters to resolve the interference between the right and left helix gears
- Helical cutting edge design for smooth cutting in roughing applications
- Coated insert type cutters for increased productivity



Spline/Spur Gear Cutters

- Very stable cutting due to optimized insert geometry and lay out
- Roughing and finishing of small modules: module 1 and up
- Smooth chip evacuation

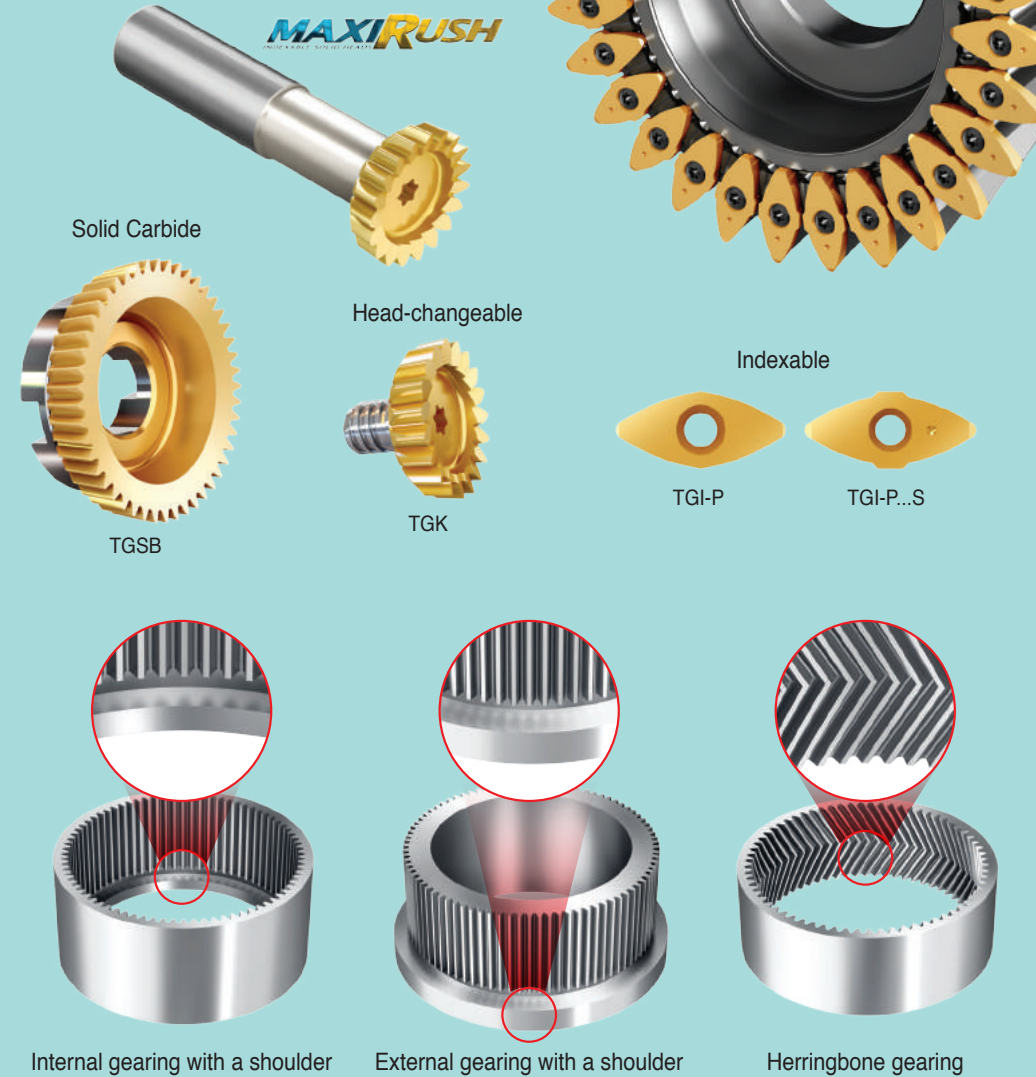
MAXIRUSH
INDEXABLE SOLID CARBIDE

MAXISLOT
INDEXABLE SOLID CARBIDE



Shaper Cutters

- For roughing and finishing applications
- High productivity
- High-precision involute curve profiles



Rotor Screw Gashers

- Roughing and semi-finishing applications
- Indexable inserts on both male and female gashers
- Minimum profile deviation due to the optimized design



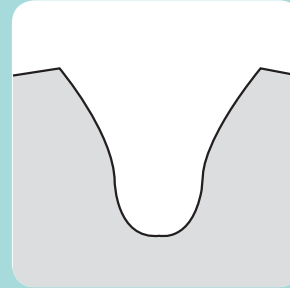
Female Gashers	Male Gashers
 SNB 13-CV Double-sided convex insert (4-cutting edges)	 SNA 13-CC Double-sided concave insert (4-cutting edges)
	 LNA 13-ML L-type tangential insert (4-cutting edges)
 SNA 13-ML Tangential insert (8-cutting edges)	 ZNHW TOP-SLOT insert (4-cutting edges)



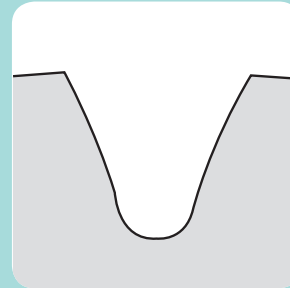
Request Form

Profile Type

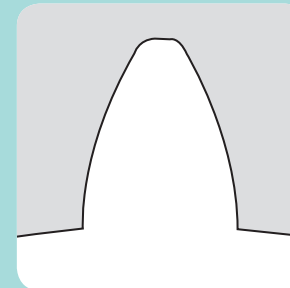
➤ External with Protuberance



➤ External without Protuberance



➤ Internal without Protuberance



Tool Specifications for Technical Quotation


Date: _____

Contact	
TaeguTec Contact	
Customer	
Customer Contact	


Order/Quotation Already in	
Yes	<input type="checkbox"/>
No	<input type="checkbox"/>
Order- / Quotation-No.	

Machine tool builder / Type		Power (kW)	
Revolution speed (rpm)	Spindle	Table	
Internal coolant			
HSK-T	ISO 12164-3	100 <input type="checkbox"/>	80 <input type="checkbox"/> 63 <input type="checkbox"/> 50 <input type="checkbox"/>
Polygon	ISO 26623-1	C8X <input type="checkbox"/>	C8 <input type="checkbox"/> C6 <input type="checkbox"/> C5 <input type="checkbox"/>
Special adaption			
Workpiece material			

Module 0.4-2.5



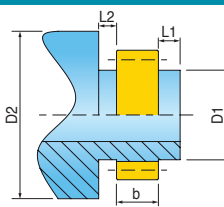
Module 2.5-10



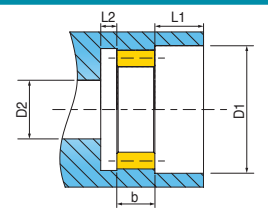
Workpiece Data	
Module	m [mm]
Gear quality	
No. of teeth	z
Pressure angle	α [°]
Helix angle	β [°]
Flank direction	L / R
Addendum modification coefficient	x
Tip diameter	d_a [mm]
Root diameter	d_f [mm]
Root radius	r_{fP} [mm]
Root form diameter	d_{fR} [mm]
Dimension over balls	M_d [mm]
Max. dimension over balls	M_{dmax} [mm]
Min. dimension over balls	M_{dmin} [mm]
Ball diameter	D_M [mm]
Base tangent length over k meas. teeth	W_k [mm]
Max. base tangent length	W_{kmax} [mm]
Min. base tangent length	W_{kmin} [mm]
No. of measuring teeth	k
Stock for finishing	[mm]
Basic rack profile	

Workpiece Collision Dimensions

External Gear



Internal Gear



D1	mm	L1	mm
D2	mm	L2	mm
		b	mm

Gear Tooth Modification		
Protuberance	No <input type="checkbox"/>	Yes <input type="checkbox"/>
Tip relief	No <input type="checkbox"/>	Yes <input type="checkbox"/>

Remark

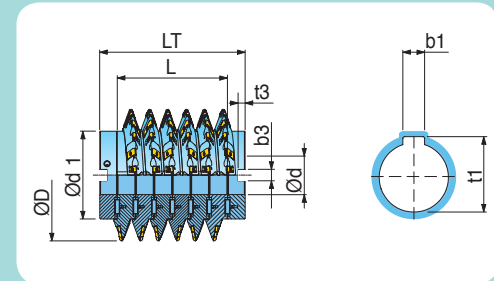
Tool Specifications for Technical Quotation

Date: _____

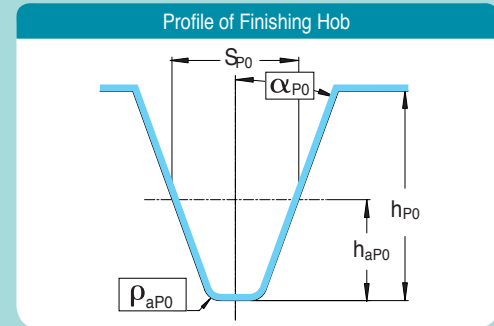
Contact	
TaeguTec Contact	
Customer	
Customer Contact	

Order/Quotation Already in	
Yes	<input type="checkbox"/>
No	<input type="checkbox"/>
Order- / Quotation-No.	

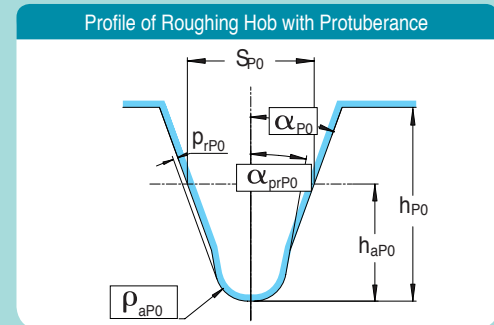
Tool	
Tool length	LT [mm]
Usable length	L [mm]
Keyway (axial/radial)	a / r
Keyway width	b_1 / b_3 [mm]
Keyway depth	t_1 / t_3 [mm]
Module	m [mm]
Outside diameter	D [mm]
Bore diameter	d [mm]
Hub diameter	d_1 [mm]
Quality class acc. to	[DIN 3968]
Spiral direction	LH/RH
No. of starts	



Tool Profile Data	
Addendum	h_{aPO} [mm]
Tooth thickness	S_{PO} [mm]
Tooth depth	h_{PO} [mm]
Pressure angle	α_{PO} [°]
Tip radius	ρ_{aPO} [mm]
Protuberance amount	p_{PO} [mm]
Protuberance angle	α_{prPO} [°]



Remark



Tool Specification for Technical Quotation

Date: _____

Contact	
TaeguTec Contact	
Customer	
Customer Contact	

Order/Quotation Already in	
Yes <input type="checkbox"/>	No <input type="checkbox"/>
Order- / Quotation-No.	

Module 0.8-3.5

Module 1-4

Module 4-80 (Rough) / 4-22 (Finish)

Tool	
Outside diameter	D [mm]
Mounting diameter	d [mm]
Hub diameter	d ₁ [mm]
Cutter width	a / LT [mm]
Radial keyway (DIN 138)	b _s [mm]
Radial keyway (DIN 138)	t _s [mm]
Axial keyway (DIN 138)	b ₁ [mm]
Axial keyway (DIN 138)	t ₁ [mm]

Workpiece Data	
Internal gear <input type="checkbox"/>	External gear <input type="checkbox"/>
Module	m [mm]
No. of teeth	z
Pressure angle	α [°]
Helix angle	β [°]
Addendum modification coefficient	x
Tip diameter	d _a [mm]
Root diameter	d _f [mm]
Root radius	ρ _{FP} [mm]
Dimension over balls	M _d [mm]
Max. dimension over balls	M _{dmax} [mm]
Min. dimension over balls	M _{dmin} [mm]
Ball diameter	D _M [mm]
Base tangent length over k meas. teeth	W _k [mm]
Max. base tangent length	W _{kmax} [mm]
Min. base tangent length	W _{kmin} [mm]
No. of measuring teeth	k
Roughing/Finishing	
Stock for finishing	[mm]
Gear quality	[DIN 3962]
Basic rack profile	

Remark	

Tool Specification for Technical Quotation

Date: _____

Contact	
TaeguTec Contact	
Customer	
Customer Contact	

Order/Quotation Already in	
Yes <input type="checkbox"/>	No <input type="checkbox"/>
Order- / Quotation-No.	

Module 0.4-2.1

Head-changeable

Module 2.5-10

Indexable insert type

Tool	
Outside diameter	D [mm]
Adaption diameter	d [mm]
Hub diameter	d ₁ [mm]
Cutter width	a / LT [mm]
Keyway width	b [mm]
Keyway depth	t [mm]
Module	m [mm]
No. of teeth	z ₀
Pitch diameter	d ₀ [mm]
Addendum	h _{aPO} [mm]
Dedendum	h _{fPO} [mm]
Addendum modification	x ₀ • m [mm]
Pressure angle	α ₀ [°]
Helix angle	β ₀ [°]
Flank direction	L / R
Tip radius	ρ _{aPO} [mm]
Base tangent length	W _{k0} [mm]
No. of measuring teeth	k ₀

Remark	

Workpiece Data	
Internal gear <input type="checkbox"/>	External gear <input type="checkbox"/>
Module	m [mm]
No. of teeth	z
Pressure angle	α _{po} [°]
Helix angle	β [°]
Flank direction	L / R
Addendum modification coefficient	x
Tip diameter	d _a [mm]
Root diameter	d _f [mm]
Dimension over balls	M _d [mm]
Max. dimension over balls	M _{dmax} [mm]
Min. dimension over balls	M _{dmin} [mm]
Ball diameter	D _M [mm]
Base tangent length over k meas. teeth	W _k [mm]
Max. base tangent length	W _{kmax} [mm]
Min. base tangent length	W _{kmin} [mm]
No. of measuring teeth	k
Stock for finishing	[mm]
Gear quality	
Basic rack profile	





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