

TUNGGEAR

TUNGALOY GEAR PRODUCTION TOOLS







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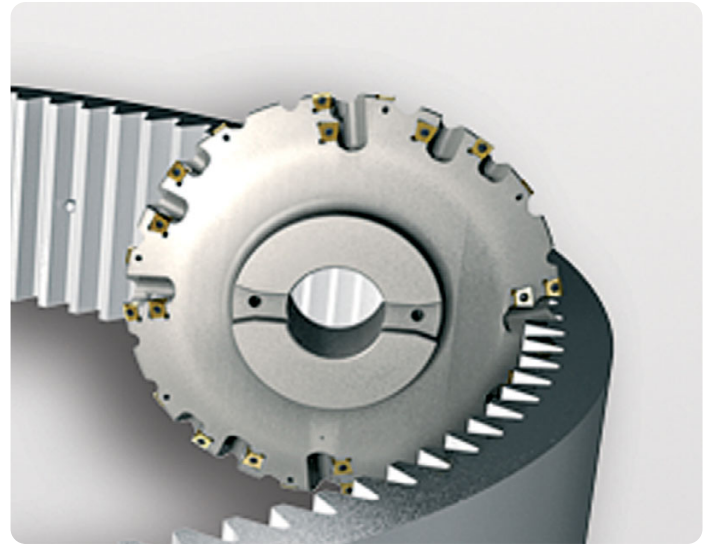


General Description

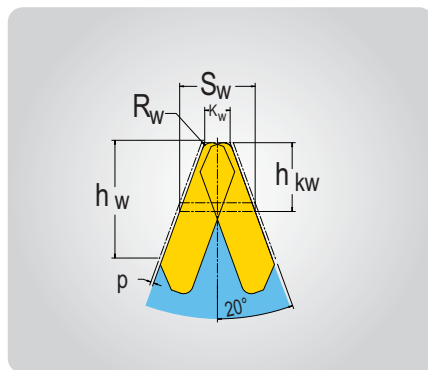
The newly developed tool series for the pre-machining of outer and inner gear production, is the result of the optimization of negative and double-positive tangential cutting edge geometry. At the root of the tooth, the negative insert provides the stability necessary to implement high feed rates thus realizing a high chip removal rate. The negative insert has an inclined bore. With the inclined position of the insert screw a higher depth of thread is achieved, which stabilizes the insert pocket and thus the whole tool. The double-positive tangential insert allows for a smooth cutting process at the flank of the tooth, which reduces the axial force enormously.

The exact positioning of inserts for each individual cutting process provides a vibration-free performance of the cutter. It is certainly possible to produce alternative profiles according to customers' specifications. When premachining pinions with a low amount of teeth, it may be more economical to use a tool which complies to the involute shape with protuberance inserts. Tools such as these can be supplied in special design.

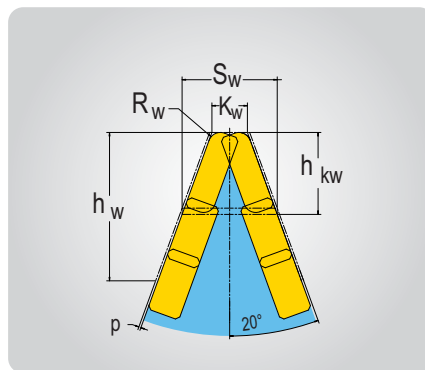
Module	S_w	h_{kw}	p	K_w	K_{w1}	R_w	h_w
6	9,43	8,59	0,37	3,17	-	1,2	14,7
8	12,57	11,20	0,41	4,41	-	1,8	19,6
10	15,71	13,79	0,44	5,67	-	1,8	24,5
12	18,82	16,37	0,47	6,93	-	2,8	29,4
14	21,99	18,95	0,50	8,20	-	2,8	34,3
16	25,13	21,51	0,52	9,47	-	2,8	39,2
18	28,27	24,07	0,54	10,75	-	4,0	44,1
20	31,42	26,63	0,56	12,03	-	4,0	49,0
22	34,56	29,18	0,58	13,32	12,3	4,0	53,9
24	37,70	31,73	0,59	14,60	-	4,0	58,8
26	40,84	34,28	0,61	15,89	-	4,0	63,7
28	43,98	36,82	0,62	17,18	-	4,0	68,6
30	47,12	39,36	0,64	18,47	15,9	4,0	73,5
32	50,27	41,91	0,65	19,76	17,2	4,0	78,4
34	53,41	44,44	0,67	21,05	-	5,0	83,3
36	56,55	46,98	0,68	22,35	19,3	5,0	88,2



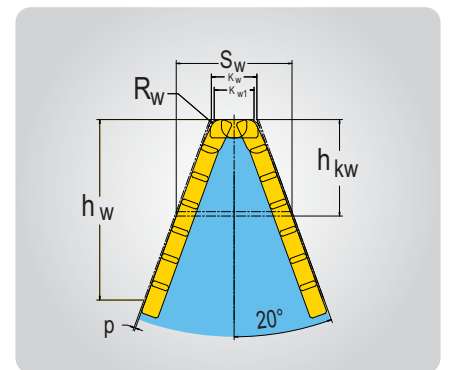
Roughing of annulus module 16



Module 6

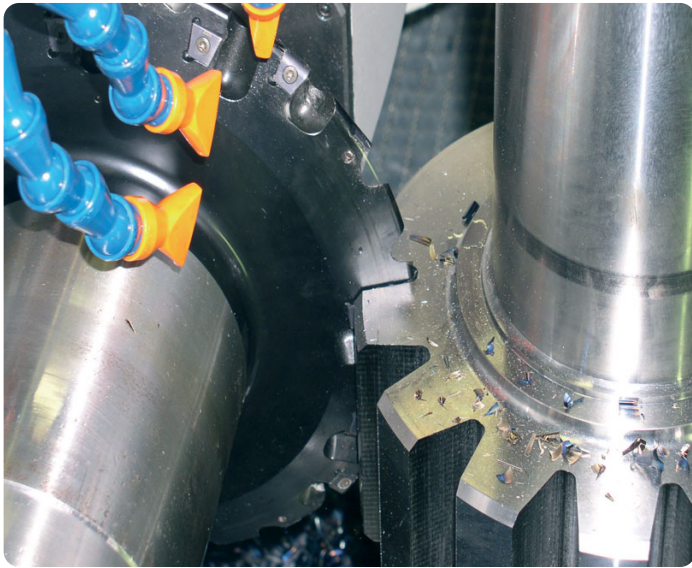


Module 8 - Module 26



Module 28 - Module 36

Application Examples

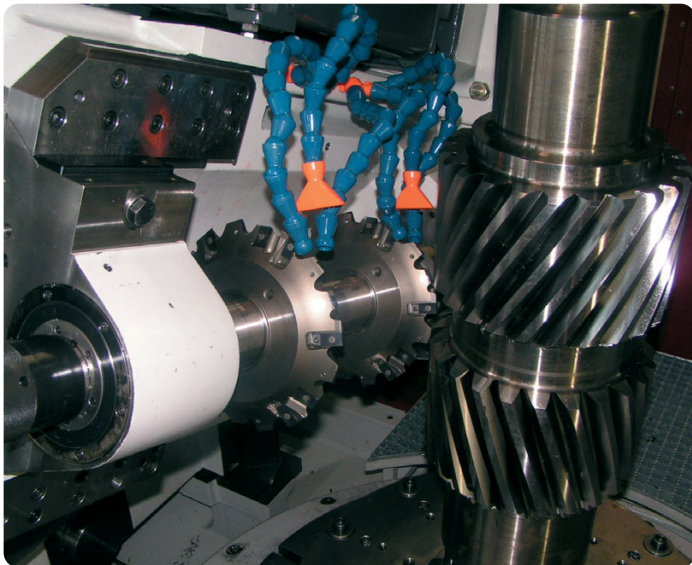


Roughing Gasher

Pinion gear module 16; material: 18CrNiMo6

$D = 360 \text{ mm}$
 $f_z = 0,4 \text{ mm}$
 $ae = 36,5 \text{ mm}$

$n = 95 \text{ rpm}$
 $vf = 304 \text{ mm/min}$



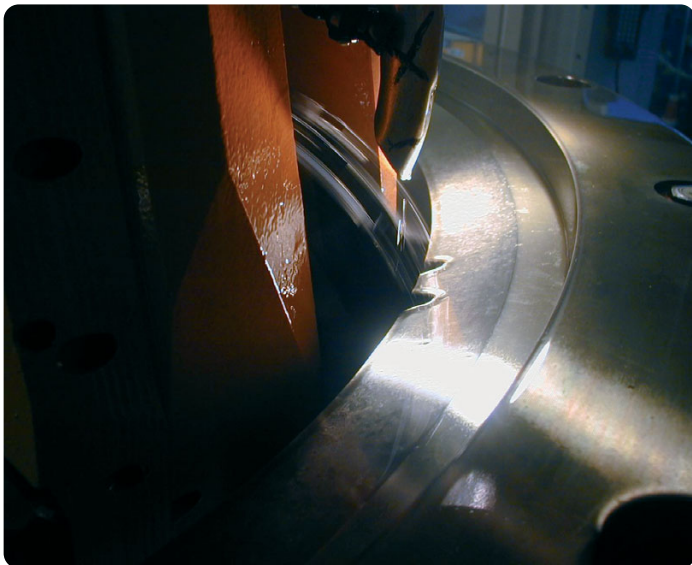
Roughing Gasher

*with profile ground inserts to obtain an equal stock.
 Design including protuberance.*

Pinion gear module 10; material: 18CrNiMo6

$D = 250 \text{ mm}$
 $f_z = 0,4 \text{ mm}$
 $ae = 22,5 \text{ mm}$

$n = 180 \text{ rpm}$
 $vf = 430 \text{ mm/min}$



Duplex-Roughing Gasher

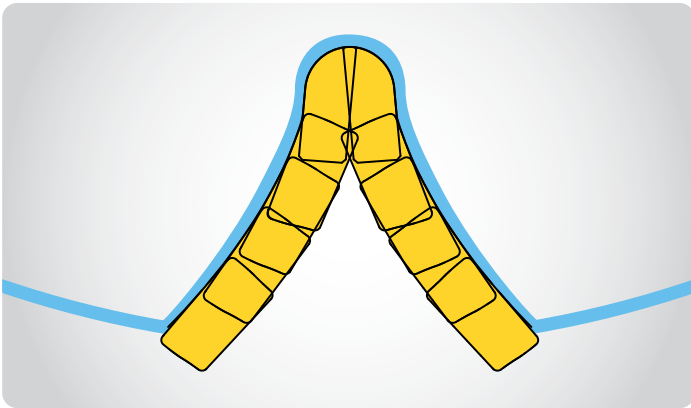
*with profile ground inserts to obtain an equal stock.
 Design including protuberance.*

Annulus module 16; material: 42CrMo4

$D = 420 \text{ mm}$
 $f_z = 0,38 \text{ mm}$
 $ae = 36,7 \text{ mm}$

$n = 100 \text{ rpm}$
 $vf = 380 \text{ mm/min}$

Custom-made



Roughing gasher for pinion gear

with unequal stock at the flank and finish milled protuberance.

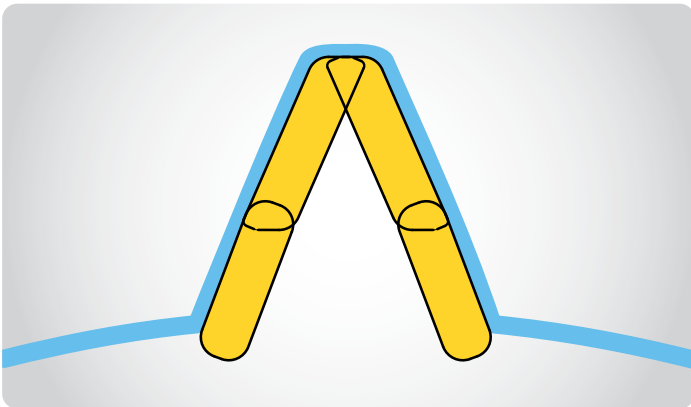
- Protuberance insert with four respectively two cutting edges.
- Flank insert with four cutting edges.



Roughing gasher for pinion gear

with equal stock at the flank and finish milled protuberance.

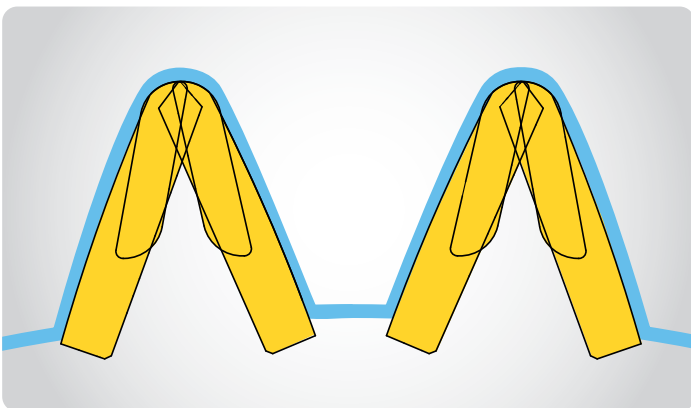
- Protuberance insert with four cutting edges.
- Involute insert with two cutting edges.



Roughing gasher for annuluses

with an unequal stock.

- Insert with four cutting edges.



Roughing gasher for annuluses

with an equal stock at the flank and finish milled protuberance.

- Protuberance insert with four cutting edges.
- Involute insert with two cutting edges.

For a long period of time Tungaloy Corporation has produced milling and boring tools with internal coolant supply. These positive experiences were reason enough to develop a coolant supply (air or emulsion) for the various gear gasher types as well. The coolant channels are positioned in the tool in such a way that the respective medium cools the insert directly.

In addition to the positive cooling effect the chips are either blown or flushed away from the operation area which has an enormous influence on the tool life of the inserts. Another advantage is the lower degree of warming of the workpiece during the machining operation which has a positive effect on the quality of your product.

Innovative technology thanks to Tungaloy!

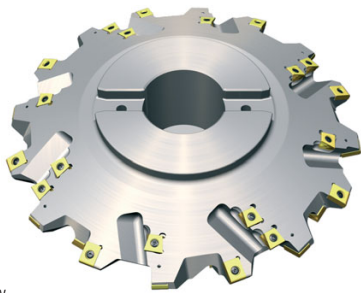


Roughing gasher with coolant channel



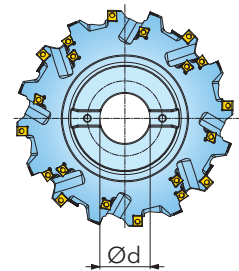
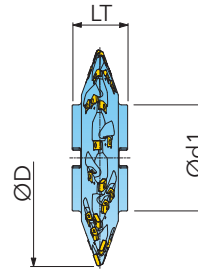
Finishing gasher with coolant channels





Cutter with radial keyway

(DIN 3972)

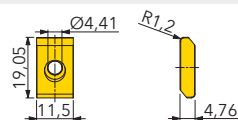


Module	Designation	D	d	LT	Z	Ze _{ff}	d1	Fitting insert
6	37W8F210006GE-00	210	50	50	16	8	120	16x A
	37W8F270006GF-00	270	60	50	20	10	140	20x A
	37W8F350006GA-00	350	80	70	24	12	170	24x A
8	3SW8F210008GE-00	210	50	50	24	8/4	120	16x B 8x C, H
	3SW8F270008GF-00	270	60	50	30	10/5	140	20x B 10x C, H
	3SW8F350008GA-00	350	80	70	36	12/6	170	24x B 12x C, H
10	3SW8F210010GE-00	210	50	60	24	8/4	120	16x B 8x C, H
	3SW8F270010GF-00	270	60	60	30	10/5	140	20x B 10x C, H
	3SW8F350010GA-00	350	80	70	36	12/6	170	24x B 12x C, H
12	3SW8K210012GE-00	210	50	70	24	6/3	120	12x D 12x C, H
	3SW8K270012GF-00	270	60	70	24	6/3	140	12x D 12x C, H
	3SW8K350012GA-00	350	80	90	32	8/4	170	16x D 16x C, H
14	3SW8K210014GE-00	210	50	70	24	6/3	120	12x D 12x C, H
	3SW8K270014GF-00	270	60	70	24	6/3	140	12x D 12x C, H
	3SW8K350014GA-00	350	80	90	32	8/4	170	16x D 16x C, H
16	3SW8K270016GF-00	270	60	90	30	6/3	140	12x D 18x C, H
	3SW8K350016GA-00	350	80	90	40	8/4	170	16x D 24x C, H
	3SW8K450016GC-00	450	100	90	50	10/5	190	20x D 30x C, H
18	3SW8M270018GF-00	270	60	90	30	6/3	140	12x E 18x C, H
	3SW8M350018GA-00	350	80	90	40	8/4	170	16x E 24x C, H
	3SW8M450018GC-00	450	100	90	50	10/5	190	20x E 30x C, H
20	3SW8M270020GF-00	270	60	90	36	6/3	130	12x E 24x C, H
	3SW8M350020GA-00	350	80	90	48	8/4	170	16x E 32x C, H
	3SW8M450020GC-00	450	100	90	60	10/5	190	20x E 40x C, H
22	3SW8M270022GF-00	270	60	90	36	6/3	130	12x E 24x C, H
	3SW8M350022GA-00	350	80	90	48	8/4	170	16x E 32x C, H
	3SW8M450022GC-00	450	100	90	60	10/5	190	20x E 40x C, H
24	3SW8N270024GF-00	270	60	100	36	6/3	130	12x F 24x C, H
	3SW8N350024GA-00	350	80	100	48	8/4	170	16x F 32x C, H
	3SW8N450024GC-00	450	100	100	60	10/5	190	20x F 40x C, H
26	3SW8N350026GA-00	350	80	120	56	8/4	170	16x F 40x C, H
	3SW8N450026GC-00	450	100	120	70	10/5	190	20x F 50x C, H
28	3SW8M350028GA-00	350	80	120	56	8/4	170	16x E 40x C, H
	3SW8M450028GC-00	450	100	120	70	10/5	190	20x E 50x C, H
30	3SW8M350030GA-00	350	80	120	64	8/4	160	16x E 48x C, H
	3SW8M450030GC-00	450	100	120	80	10/5	190	20x E 60x C, H
32	3SW8M400032GA-00	400	80	120	64	8/4	170	16x E 48x C, H
	3SW8M500032GC-00	500	100	120	80	10/5	190	20x E 60x C, H
34	3SW8N400034GA-00	400	80	120	64	8/4	170	16x G 48x C, H
	3SW8N500034GC-00	500	100	120	80	10/5	190	20x G 60x C, H
36	3SW8N400036GA-00	400	80	140	72	8/4	170	16x G 56x C, H
	3SW8N500036GC-00	500	100	140	90	10/5	190	20x G 70x C, H

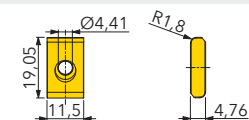
INSERTS

A LNV333-500T05-A

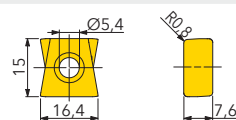

Root


B LNV333-501T05-A

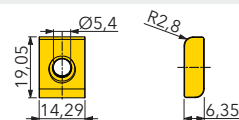

Root


C DPM424-001

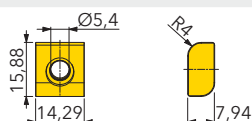

Flank


D LNV434-500T05-A

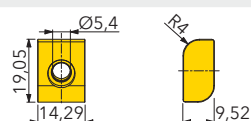

Root


E LNV425-500T05-A

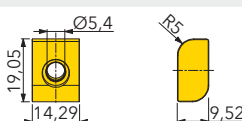

Root


F LNV436-500T05-A

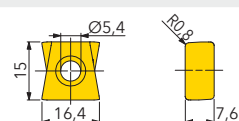

Root


G LNV436-501T05-A


Root


H DPX424-001


Flank



Designation	Description	No. of corners	Grade	AH330	APH730	APH130
LVN_	negative geometry	4				
DPM_	positive geometry R 0,8	4				
DPX_	positive geometry R 0,8	4				

● = P ● = M ● = K ● = N ● = S ○ = H

SPARE PARTS

Insert screw

SM40-110-00

for inserts:

A


Insert screw

SM40-090-00

for inserts:

B


Insert screw

SM50-120-10

for inserts:

C D H


Insert screw

SM50-140-10

for inserts:

C D H


Insert screw

SM50-160-10

for inserts:

C D E F G H


Module	Designation	D [mm]	Zeff.	a _{e1} [mm] cut1	f _{z1} [mm] cut1	V _{c1} [m/min] Rm<1000 N/mm ²	V _{c1} [m/min] Rm>1000 N/mm ²
6	37W8F210006GE-00	210	8	13,5	0,40-0,50	160-180	140-160
	37W8F270006GF-00	270	10	13,5	0,50-0,60	160-180	140-160
	37W8F350006GA-00	350	12	13,5	0,55-0,65	160-180	140-160
8	3SW8F210008GE-00	210	8/4	18,0	0,35-0,45	160-180	140-160
	3SW8F270008GF-00	270	10/5	18,0	0,40-0,50	160-180	140-160
	3SW8F350008GA-00	350	12/6	18,0	0,45-0,55	160-180	140-160
10	3SW8F210010GE-00	210	8/4	22,5	0,35-0,45	150-170	130-150
	3SW8F270010GF-00	270	10/5	22,5	0,40-0,50	150-170	130-150
	3SW8F350010GA-00	350	12/6	22,5	0,45-0,55	150-170	130-150
12	3SW8K210012GE-00	210	6/3	27,0	0,30-0,40	150-170	130-150
	3SW8K270012GF-00	270	6/3	27,0	0,35-0,45	150-170	130-150
	3SW8K350012GA-00	350	8/4	27,0	0,40-0,50	150-170	130-150
14	3SW8K210014GE-00	210	6/3	31,5	0,30-0,40	140-160	120-140
	3SW8K270014GF-00	270	6/3	31,5	0,35-0,45	140-160	120-140
	3SW8K350014GA-00	350	8/4	31,5	0,40-0,50	140-160	120-140
16	3SW8K270016GF-00	270	6/3	36,0	0,30-0,40	140-160	120-140
	3SW8K350016GA-00	350	8/4	36,0	0,35-0,45	140-160	120-140
	3SW8K450016GC-00	450	10/5	36,0	0,40-0,50	140-160	120-140
18	3SW8M270018GF-00	270	6/3	40,5	0,28-0,38	140-160	120-140
	3SW8M350018GA-00	350	8/4	40,5	0,32-0,40	140-160	120-140
	3SW8M450018GC-00	450	10/5	40,5	0,35-0,45	140-160	120-140
20	3SW8M270020GF-00	270	6/3	45,0	0,28-0,34	140-160	120-140
	3SW8M350020GA-00	350	8/4	45,0	0,31-0,38	140-160	120-140
	3SW8M450020GC-00	450	10/5	45,0	0,34-0,43	140-160	120-140
22	3SW8M270022GF-00	270	6/3	39,5	0,29-0,36	120-140	100-120
	3SW8M350022GA-00	350	8/4	39,5	0,32-0,40	120-140	100-120
	3SW8M450022GC-00	450	10/5	39,5	0,35-0,45	120-140	100-120
24	3SW8N270024GF-00	270	6/3	43,0	0,28-0,35	120-140	100-120
	3SW8N350024GA-00	350	8/4	43,0	0,30-0,38	120-140	100-120
	3SW8N450024GC-00	450	10/5	43,0	0,34-0,44	120-140	100-120
26	3SW8N350026GA-00	350	8/4	46,5	0,30-0,38	120-140	100-120
	3SW8N450026GC-00	450	10/5	46,5	0,33-0,43	120-140	100-120
28	3SW8M350028GA-00	350	8/4	50,5	0,29-0,37	120-140	100-120
	3SW8M450028GC-00	450	10/5	50,5	0,32-0,42	120-140	100-120
30	3SW8M350030GA-00	350	8/4	54,0	0,28-0,35	120-140	100-120
	3SW8M450030GC-00	450	10/5	54,0	0,30-0,40	120-140	100-120
32	3SW8M400032GA-00	400	8/4	57,5	0,30-0,40	120-140	100-120
	3SW8M500032GC-00	500	10/5	57,5	0,32-0,42	120-140	100-120
34	3SW8N400034GA-00	400	8/4	61,0	0,28-0,38	120-140	100-120
	3SW8N500034GC-00	500	10/5	61,0	0,30-0,40	120-140	100-120
36	3SW8N400036GA-00	400	8/4	64,5	0,28-0,38	120-140	100-120
	3SW8N500036GC-00	500	10/5	64,5	0,30-0,40	120-140	100-120

The indicated cutting data can only be a recommendation and must be adapted on location and, if necessary, optimized.

Module	Designation	D [mm]	Ze _{eff}	ae2 [mm] cut2	f _z 2 [mm] cut2	V _c 2 [m/min] R _m <1000 N/mm ²	V _{ec} 2 [m/min] R _m >1000 N/mm ²	
6	37W8F210006GE-00	210	8	-	-	-	-	Machining in one cut
	37W8F270006GF-00	270	10	-	-	-	-	
	37W8F350006GA-00	350	12	-	-	-	-	
8	3SW8F210008GE-00	210	8/4	-	-	-	-	
	3SW8F270008GF-00	270	10/5	-	-	-	-	
	3SW8F350008GA-00	350	12/6	-	-	-	-	
10	3SW8F210010GE-00	210	8/4	-	-	-	-	
	3SW8F270010GF-00	270	10/5	-	-	-	-	
	3SW8F350010GA-00	350	12/6	-	-	-	-	
12	3SW8K210012GE-00	210	6/3	-	-	-	-	
	3SW8K270012GF-00	270	6/3	-	-	-	-	
	3SW8K350012GA-00	350	8/4	-	-	-	-	
14	3SW8K210014GE-00	210	6/3	-	-	-	-	
	3SW8K270014GF-00	270	6/3	-	-	-	-	
	3SW8K350014GA-00	350	8/4	-	-	-	-	
16	3SW8K270016GF-00	270	6/3	-	-	-	-	
	3SW8K350016GA-00	350	8/4	-	-	-	-	
	3SW8K450016GC-00	450	10/5	-	-	-	-	
18	3SW8M270018GF-00	270	6/3	-	-	-	-	
	3SW8M350018GA-00	350	8/4	-	-	-	-	
	3SW8M450018GC-00	450	10/5	-	-	-	-	
20	3SW8M270020GF-00	270	6/3	-	-	-	-	
	3SW8M350020GA-00	350	8/4	-	-	-	-	
	3SW8M450020GC-00	450	10/5	-	-	-	-	
22	3SW8M270022GF-00	270	6/3	10	0,55-0,67	140-160	120-140	Machining in two cuts
	3SW8M350022GA-00	350	8/4	10	0,62-0,75	140-160	120-140	
	3SW8M450022GC-00	450	10/5	10	0,70-0,85	140-160	120-140	
24	3SW8N270024GF-00	270	6/3	11	0,50-0,65	140-160	120-140	
	3SW8N350024GA-00	350	8/4	11	0,60-0,73	140-160	120-140	
	3SW8N450024GC-00	450	10/5	11	0,65-0,80	140-160	120-140	
26	3SW8N350026GA-00	350	8/4	12	0,55-0,67	140-160	120-140	
	3SW8N450026GC-00	450	10/5	12	0,65-0,77	140-160	120-140	
	3SW8M350028GA-00	350	8/4	12,5	0,55-0,67	140-160	120-140	
28	3SW8M450028GC-00	450	10/5	12,5	0,65-0,77	140-160	120-140	
	3SW8M350030GA-00	350	8/4	13,5	0,53-0,65	140-160	120-140	
30	3SW8M450030GC-00	450	10/5	13,5	0,63-0,75	140-160	120-140	
	3SW8M400032GA-00	400	8/4	14,5	0,58-0,68	140-160	120-140	
32	3SW8M500032GC-00	500	10/5	14,5	0,65-0,75	140-160	120-140	
	3SW8N400034GA-00	400	8/4	15,5	0,55-0,65	140-160	120-140	
34	3SW8N500034GC-00	500	10/5	15,5	0,60-0,70	140-160	120-140	
	3SW8N400036GA-00	400	8/4	16,5	0,55-0,65	140-160	120-140	
36	3SW8N500036GC-00	500	10/5	16,5	0,60-0,70	140-160	120-140	

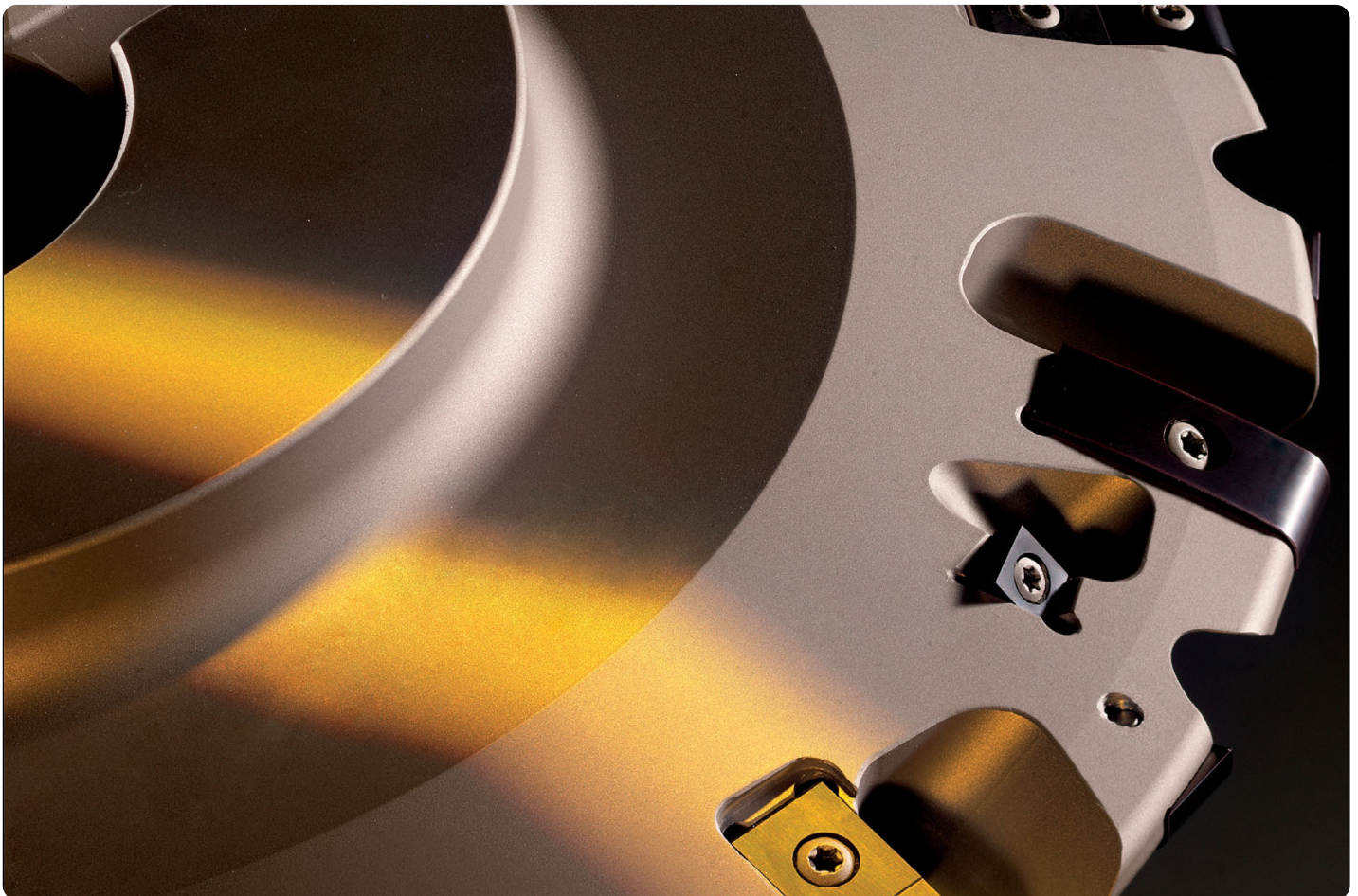
The indicated cutting data can only be a recommendation and must be adapted on location and, if necessary, optimized.

General Description

The finishing of gears has been practiced successfully with Tungaloy tools for many years now. For the finishing operation all over the world tools with a convex (internal gear production) or concave (external gear production) form are applied. The tools, as well as the inserts are within very narrow tolerances to achieve the required accuracy of the tooth gap. During the machining of the tooth gap, a lot of material is removed from the tooth base, whereas in the involute area rather a finishing operation and polishing of the surface are carried out.

This complex machining operation was reason enough to develop a tool concept suitable for the various cutting requirements. The result is a tool with different radial angles as well as overlapping insert geometries.

These new tools obtain fully effective teeth at the root of the tooth and half effective teeth at the tooth flank thus optimizing the chip thickness. The advantages of this Tungaloy design are reflected in a longer tool life, improved surface finish, lower heat development on the component, as well as in a reduction of the cutting material costs.





Finishing gasher with profile ground inserts

Outer ring module 20; material: 42CrMo4 finishing (2nd cut)

$D = 290 \text{ mm}$

$f_z = 0,4 \text{ mm}$

$ae = 2 \text{ mm}$

$n = 132 \text{ rpm}$

$vf = 520 \text{ mm/min}$



Finishing gasher with profile ground inserts

Inner ring module 10; material: 42CrMo4 finishing

$D = 380 \text{ mm}$

$f_z = 0,45 \text{ mm}$

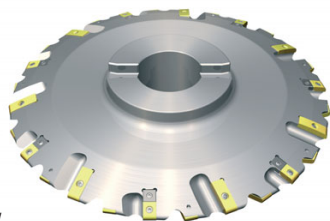
$ae = 22,5 \text{ mm}$

$n = 140 \text{ rpm}$

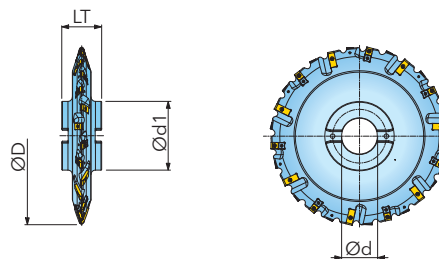
$vf = 785 \text{ mm/min}$



GEAR FINISHING GASHER WITH 2-EDGED PROFILE GROUND INSERT (INTERNAL)



Cutter with radial keyway



Module	Designation	D	d	LT	Z	Ze _{eff}	d1	Fitting insert
6	37W8Z300006GA-I	300	80	90	24	12/6	160	A B
	37W8Z360006GA-I	360	80	90	28	14/7	170	A B
	37W8Z420006GA-I	420	80	90	32	16/8	180	A B
8	37W8Z300008GA-I	300	80	90	24	12/6	160	C D
	37W8Z360008GA-I	360	80	90	28	14/7	170	C D
	37W8Z420008GA-I	420	80	90	32	16/8	180	C D
10	37W8Z300010GA-I	300	80	90	24	12/6	160	E F
	37W8Z360010GA-I	360	80	90	28	14/7	170	E F
	37W8Z420010GA-I	420	80	90	32	16/8	180	E F
12	37W8Z300012GA-I	300	80	90	24	12/6	160	G H
	37W8Z360012GA-I	360	80	90	28	14/7	170	G H
	37W8Z420012GA-I	420	80	90	32	16/8	180	G H
14	37W8Z300014GA-I	300	80	90	24	12/6	160	I J
	37W8Z360014GA-I	360	80	90	28	14/7	170	I J
	37W8Z420014GA-I	420	80	90	32	16/8	180	I J
16	37W8Z300016GA-I	300	80	90	24	12/6	160	K L
	37W8Z360016GA-I	360	80	90	28	14/7	170	K L
	37W8Z420016GA-I	420	80	90	32	16/8	180	K L
18	37W8Z300018GA-I	300	80	90	24	12/6	160	M N
	37W8Z360018GA-I	360	80	90	28	14/7	170	M N
	37W8Z420018GA-I	420	80	90	32	16/8	180	M N
20	37W8Z300020GA-I	300	80	90	24	12/6	150	O P
	37W8Z360020GA-I	360	80	90	28	14/7	170	O P
	37W8Z420020GA-I	420	80	90	32	16/8	180	O P
22	37W8Z300022GA-I	300	80	90	24	12/6	150	Q R
	37W8Z360022GA-I	360	80	90	28	14/7	170	Q R
	37W8Z420022GA-I	420	80	90	32	16/8	180	Q R

SPARE PARTS

Insert screw

SM40-090-00

for inserts:

A B D F



Insert screw

SM50-100-00

for inserts:

C H



Insert screw

SM50-140-10

for inserts:

E G I J



Insert screw

SM50-160-10

for inserts:

K L M N O P Q R

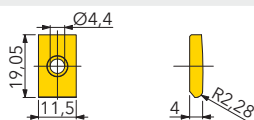


INSERTS

A FNC332-I-MOD6



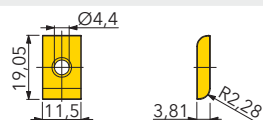
Flank



B LNA332-MOD6



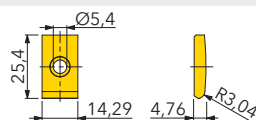
Root



C FNC443-I-MOD8



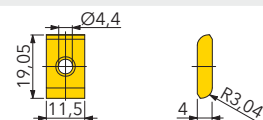
Flank



D LNA332-MOD8



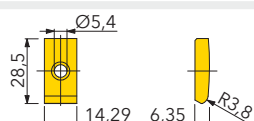
Root



E FNC444-I-MOD10



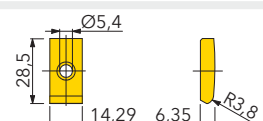
Flank



F LNA333-MOD10



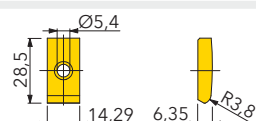
Root



G FNC464-I-MOD12



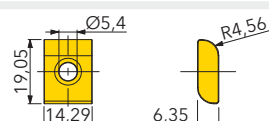
Flank



H LNA434-MOD12



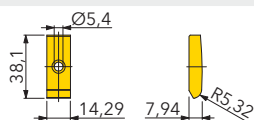
Root



I FNC465-I-MOD14



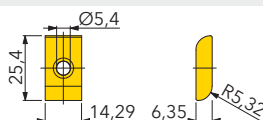
Flank



J LNA444-MOD14



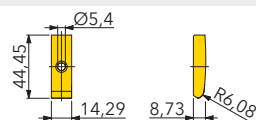
Root



K FNC475-I-MOD16



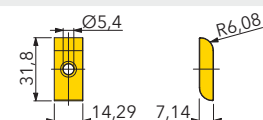
Flank



L LNA454-MOD16



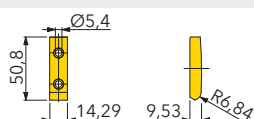
Root



M FNC485-I-MOD18



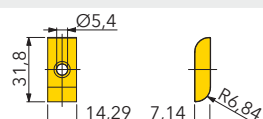
Flank



N LNA454-MOD18



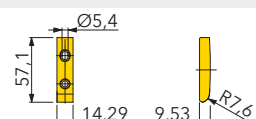
Root



O FNC496-I-MOD20



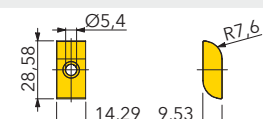
Flank



P LNA446-MOD20



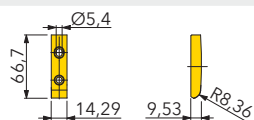
Root



Q FNC4106-I-MOD22



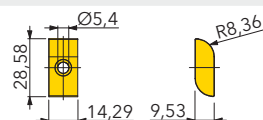
Flank



R LNA446-MOD22



Root



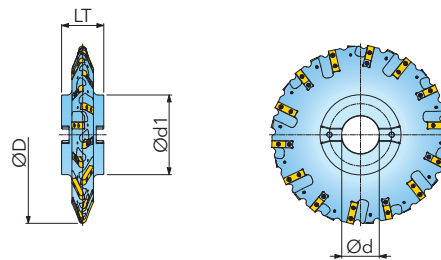
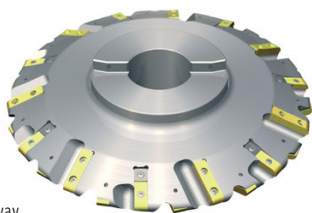
Designation	Description	No. of corners	Grade	AH330	APH730	APH130
FNC_	negative geometry	2				
LNA_	negative geometry	4				

● = P ● = M ● = K ● = N ● = S ○ = H

GEAR FINISHING GASHER WITH 2-EDGED PROFILE GROUND INSERT (EXTERNAL)

TUNG^{EAR}**GASH**

Cutter with radial keyway



Module	Designation	D	d	LT	Z	Zeff.	d1	Fitting insert
6	37W8Z300006GA-A	300	80	90	24	12/6	160	A B
	37W8Z360006GA-A	360	80	90	28	14/7	170	A B
	37W8Z420006GA-A	420	80	90	32	16/8	180	A B
8	37W8Z300008GA-A	300	80	90	24	12/6	160	C D
	37W8Z360008GA-A	360	80	90	28	14/7	170	C D
	37W8Z420008GA-A	420	80	90	32	16/8	180	C D
10	37W8Z300010GA-A	300	80	90	24	12/6	160	E F
	37W8Z360010GA-A	360	80	90	28	14/7	170	E F
	37W8Z420010GA-A	420	80	90	32	16/8	180	E F
12	37W8Z300012GA-A	300	80	90	24	12/6	160	G H
	37W8Z360012GA-A	360	80	90	28	14/7	170	G H
	37W8Z420012GA-A	420	80	90	32	16/8	180	G H
14	37W8Z300014GA-A	300	80	90	24	12/6	160	I J
	37W8Z360014GA-A	360	80	90	28	14/7	170	I J
	37W8Z420014GA-A	420	80	90	32	16/8	180	I J
16	37W8Z300016GA-A	300	80	90	24	12/6	160	K L
	37W8Z360016GA-A	360	80	90	28	14/7	170	K L
	37W8Z420016GA-A	420	80	90	32	16/8	180	K L
18	37W8Z300018GA-A	300	80	90	24	12/6	160	M N
	37W8Z360018GA-A	360	80	90	28	14/7	170	M N
	37W8Z420018GA-A	420	80	90	32	16/8	180	M N
20	37W8Z300020GA-A	300	80	90	24	12/6	160	O P
	37W8Z360020GA-A	360	80	90	28	14/7	170	O P
	37W8Z420020GA-A	420	80	90	32	16/8	180	O P
22	37W8Z300022GA-A	300	80	90	24	12/6	160	Q R
	37W8Z360022GA-A	360	80	90	28	14/7	170	Q R
	37W8Z420022GA-A	420	80	90	32	16/8	180	Q R

SPARE PARTS

Insert screw

SM40-090-00

for inserts:

A B D F



Insert screw

SM50-100-00

for inserts:

C H



Insert screw

SM50-140-10

for inserts:

E G I J



Insert screw

SM50-160-10

for inserts:

K L M N O P Q R

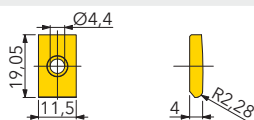


INSERTS

A FNC332-A-MOD6



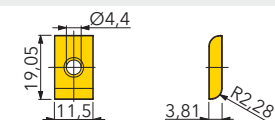
Root



B LNA332-MOD6



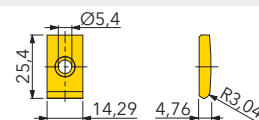
Root



C FNC443-A-MOD8



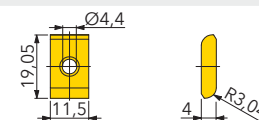
Flank



D LNA332-MOD8



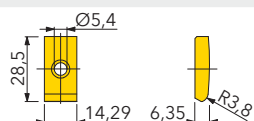
Root



E FNC444-A-MOD10



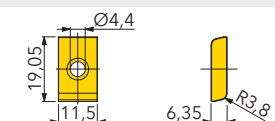
Flank



F LNA333-MOD10



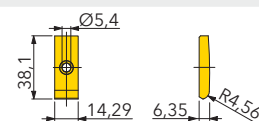
Root



G FNC464-A-MOD12



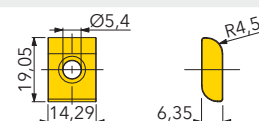
Flank



H LNA434-MOD12



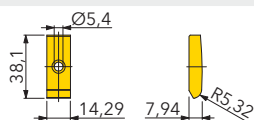
Root



I FNC465-A-MOD14



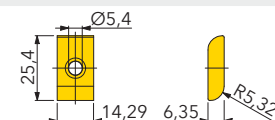
Flank



J LNA444-MOD14



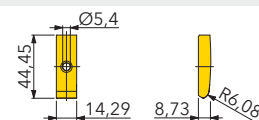
Root



K FNC475-A-MOD16



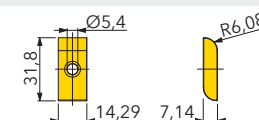
Flank



L LNA454-MOD16



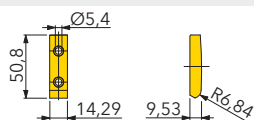
Root



M FNC485-A-MOD18



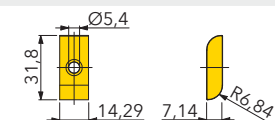
Flank



N LNA454-MOD18



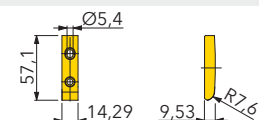
Root



O FNC496-A-MOD20



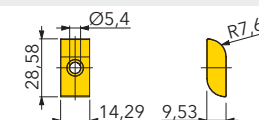
Flank



P LNA446-MOD20



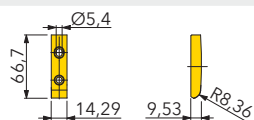
Root



Q FNC4106-A-MOD22



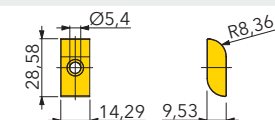
Flank



R LNA446-MOD22



Root



Designation	Description	No. of corners	Grade	AH330	APH730	APH130
-------------	-------------	----------------	-------	-------	--------	--------

FNC_	negative geometry	2				
LNA_	negative geometry	4				

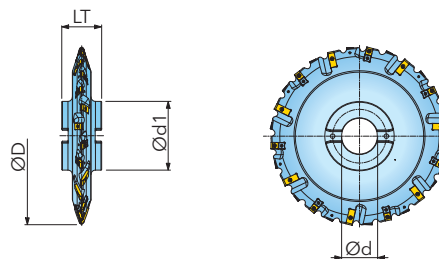
● = P ● = M ● = K ● = N ● = S ○ = H

GEAR FINISHING GASHER WITH 4-EDGED PROFILE GROUND INSERT (INTERNAL)

TUNG^{EAR}**GASH**



Cutter with radial keyway



Module	Designation	D	d	LT	z	Ze _{ff}	d ₁	Fitting insert
6	37W8Z300406GA-I	300	80	90	24	12/6	160	A B
	37W8Z360406GA-I	360	80	90	28	14/7	170	A B
	37W8Z420406GA-I	420	80	90	32	16/8	180	A B
8	37W8Z300408GA-I	300	80	90	24	12/6	160	C D
	37W8Z360408GA-I	360	80	90	28	14/7	170	C D
	37W8Z420408GA-I	420	80	90	32	16/8	180	C D
10	37W8Z300410GA-I	300	80	90	24	12/6	160	E F
	37W8Z360410GA-I	360	80	90	28	14/7	170	E F
	37W8Z420410GA-I	420	80	90	32	16/8	180	E F
12	37W8Z300412GA-I	300	80	90	24	12/6	160	G H
	37W8Z360412GA-I	360	80	90	28	14/7	170	G H
	37W8Z420412GA-I	420	80	90	32	16/8	180	G H
14	37W8Z300414GA-I	300	80	90	24	12/6	160	I J
	37W8Z360414GA-I	360	80	90	28	14/7	170	I J
	37W8Z420414GA-I	420	80	90	32	16/8	180	I J
16	37W8Z300416GA-I	300	80	90	24	12/6	160	K L
	37W8Z360416GA-I	360	80	90	28	14/7	170	K L
	37W8Z420416GA-I	420	80	90	32	16/8	180	K L
18	37W8Z300418GA-I	300	80	90	24	12/6	160	M N
	37W8Z360418GA-I	360	80	90	28	14/7	170	M N
	37W8Z420418GA-I	420	80	90	32	16/8	180	M N

SPARE PARTS

Insert screw

SM40-090-00

for inserts:

B D



Insert screw

SM40-110-00

for inserts:

A C F



Insert screw

SM50-140-10

for inserts:

E G H I J



Insert screw

SM50-160-10

for inserts:

K L M N

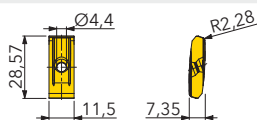


INSERTS

A QNC344-I-MOD6



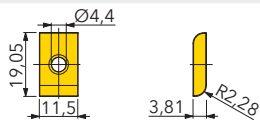
Flank



B LNA332-MOD6



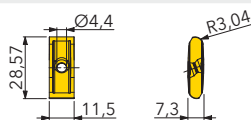
Root



C QNC344-I-MOD8



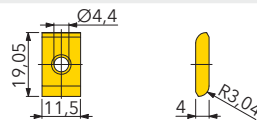
Flank



D LNA332-MOD8



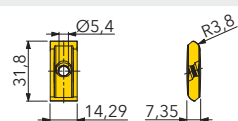
Root



E QNC454-I-MOD10



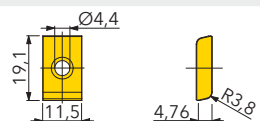
Flank



F LNA333-MOD10



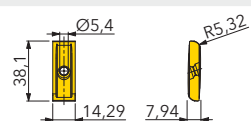
Root



G QNC464-I-MOD12



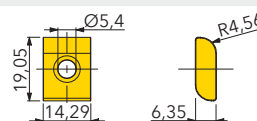
Flank



H LNA434-MOD12



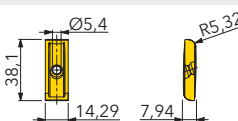
Root



I QNC464-I-MOD14



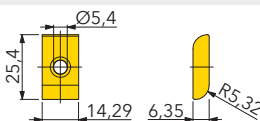
Flank



J LNA444-MOD14



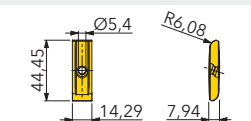
Root



K QNC475-I-MOD16



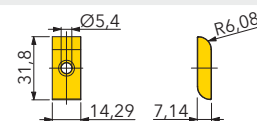
Flank



L LNA454-MOD16



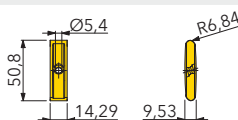
Root



M QNC486-I-MOD18



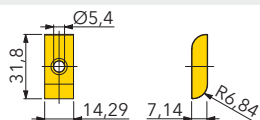
Flank



N LNA454-MOD18



Root

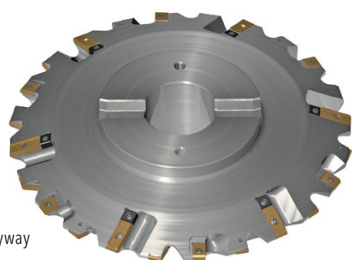


Designation	Description	No. of corners	Grade	AH330	APH130
LNA_	negative geometry	4			
QNC_	negative geometry	4			

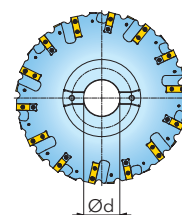
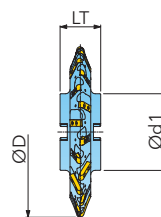
● = P ● = M ● = K ● = N ● = S ○ = H

GEAR FINISHING GASHER WITH 4-EDGED PROFILE GROUND INSERT (EXTERNAL)

TUNG^{EAR}**GASH**



Cutter with radial keyway



Module	Designation	D	d	LT	z	Ze _{ff}	d1	Fitting insert
6	37W8Z300406GA-A	300	80	90	24	12/6	160	A B
	37W8Z360406GA-A	360	80	90	28	14/7	170	A B
	37W8Z420406GA-A	420	80	90	32	16/8	180	A B
8	37W8Z300408GA-A	300	80	90	24	12/6	160	C D
	37W8Z360408GA-A	360	80	90	28	14/7	170	C D
	37W8Z420408GA-A	420	80	90	32	16/8	180	C D
10	37W8Z300410GA-A	300	80	90	24	12/6	160	E F
	37W8Z360410GA-A	360	80	90	28	14/7	170	E F
	37W8Z420410GA-A	420	80	90	32	16/8	180	E F
12	37W8Z300412GA-A	300	80	90	24	12/6	160	G H
	37W8Z360412GA-A	360	80	90	28	14/7	170	G H
	37W8Z420412GA-A	420	80	90	32	16/8	180	G H
14	37W8Z300414GA-A	300	80	90	24	12/6	160	I J
	37W8Z360414GA-A	360	80	90	28	14/7	170	I J
	37W8Z420414GA-A	420	80	90	32	16/8	180	I J
16	37W8Z300416GA-A	300	80	90	24	12/6	160	K L
	37W8Z360416GA-A	360	80	90	28	14/7	170	K L
	37W8Z420416GA-A	420	80	90	32	16/8	180	K L
18	37W8Z300418GA-A	300	80	90	24	12/6	160	M N
	37W8Z360418GA-A	360	80	90	28	14/7	170	M N
	37W8Z420418GA-A	420	80	90	32	16/8	180	M N

SPARE PARTS

Insert screw

SM40-090-00

for inserts:

B D



Insert screw

SM40-110-00

for inserts:

A C F



Insert screw

SM50-140-10

for inserts:

E G H I J



Insert screw

SM50-160-10

for inserts:

K L M N

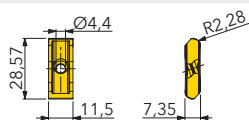


INSERTS

A QNC344-A-MOD6



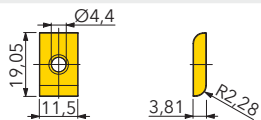
Flank



B LNA332-MOD6



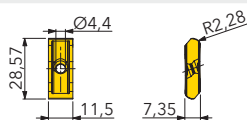
Root



C QNC344-A-MOD8



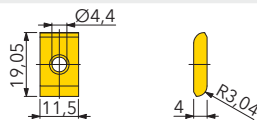
Flank



D LNA332-MOD8



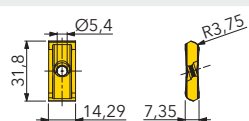
Root



E QNC454-A-MOD10



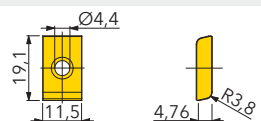
Flank



F LNA333-MOD10



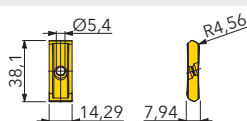
Root



G QNC464-A-MOD12



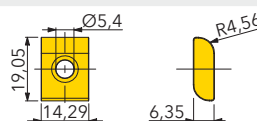
Flank



H LNA434-MOD12



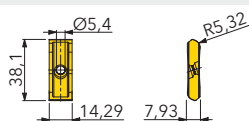
Root



I QNC464-A-MOD14



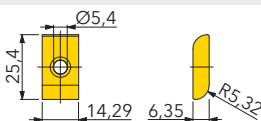
Flank



J LNA444-MOD14



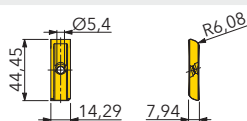
Root



K QNC475-A-MOD16



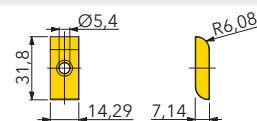
Flank



L LNA454-MOD16



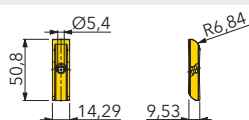
Root



M QNC486-A-MOD18



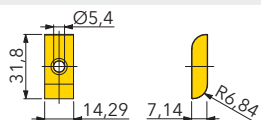
Flank



N LNA454-MOD18



Root



QNC insert usable for external gears with no. of teeth > 50.

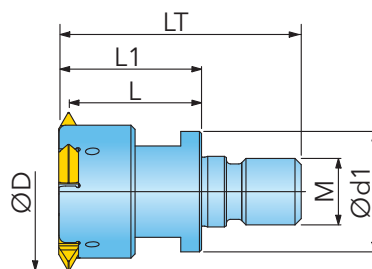
Designation	Description	No. of corners	Grade	AH330	APH130
LNA_	negative geometry	4			
QNC_	negative geometry	4			

● = P ● = M ● = K ● = N ● = S ○ = H

Module	Designation	D [mm]	Zeff.	ae1 [mm] cut1	fz1 [mm] cut1	Vc1 [m/min] Rm<1000 N/mm2	Vc1 [m/min] Rm>1000 N/mm2
6	37W8Z300006GA-I/A	300	12/6	13,5	0,50-0,60	160-180	140-160
	37W8Z360006GA-I/A	360	14/7	13,5	0,55-0,65	160-180	140-160
	37W8Z420006GA-I/A	420	16/8	13,5	0,58-0,72	160-180	140-160
8	37W8Z300008GA-I/A	300	12/6	18,0	0,42-0,52	160-180	140-160
	37W8Z360008GA-I/A	360	14/7	18,0	0,48-0,58	160-180	140-160
	37W8Z420008GA-I/A	420	16/8	18,0	0,52-0,62	160-180	140-160
10	37W8Z300010GA-I/A	300	12/6	22,5	0,38-0,48	150-170	130-150
	37W8Z360010GA-I/A	360	14/7	22,5	0,42-0,52	150-170	130-150
	37W8Z420010GA-I/A	420	16/8	22,5	0,45-0,55	150-170	130-150
12	37W8Z300012GA-I/A	300	12/6	27,0	0,35-0,45	150-170	130-150
	37W8Z360012GA-I/A	360	14/7	27,0	0,38-0,48	150-170	130-150
	37W8Z420012GA-I/A	420	16/8	27,0	0,42-0,52	150-170	130-150
14	37W8Z300014GA-I/A	300	12/6	31,5	0,32-0,42	150-170	130-150
	37W8Z360014GA-I/A	360	14/7	31,5	0,35-0,45	150-170	130-150
	37W8Z420014GA-I/A	420	16/8	31,5	0,38-0,48	150-170	130-150
16	37W8Z300016GA-I/A	300	12/6	36,0	0,30-0,40	140-160	120-140
	37W8Z360016GA-I/A	360	14/7	36,0	0,32-0,42	140-160	120-140
	37W8Z420016GA-I/A	420	16/8	36,0	0,36-0,46	140-160	120-140
18	37W8Z300018GA-I/A	300	12/6	37,5	0,30-0,38	140-160	120-140
	37W8Z360018GA-I/A	360	14/7	37,5	0,32-0,42	140-160	120-140
	37W8Z420018GA-I/A	420	16/8	37,5	0,35-0,45	140-160	120-140
20	37W8Z300020GA-I/A	300	12/6	41,0	0,29-0,37	140-160	120-140
	37W8Z360020GA-I/A	360	14/7	41,0	0,32-0,40	140-160	120-140
	37W8Z420020GA-I/A	420	16/8	41,0	0,34-0,42	140-160	120-140
22	37W8Z300022GA-I/A	300	12/6	44,5	0,29-0,35	120-140	100-120
	37W8Z360022GA-I/A	360	14/7	44,5	0,30-0,38	120-140	100-120
	37W8Z420022GA-I/A	420	16/8	44,5	0,32-0,42	120-140	100-120

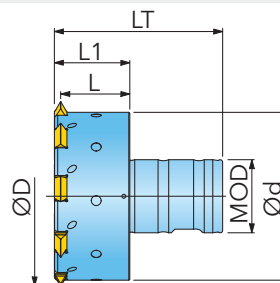
Module	Designation	D [mm]	Zeff.	ae2 [mm] cut2	fz2 [mm] cut2	Vc2 [m/min] Rm<1000 N/mm2	Vc2 [m/min] Rm>1000 N/mm2	
6	37W8Z300006GA-I/A	300	12/6	-	-	-	-	Machining in one cut
	37W8Z360006GA-I/A	360	14/7	-	-	-	-	
	37W8Z420006GA-I/A	420	16/8	-	-	-	-	
8	37W8Z300008GA-I/A	300	12/6	-	-	-	-	
	37W8Z360008GA-I/A	360	14/7	-	-	-	-	
	37W8Z420008GA-I/A	420	16/8	-	-	-	-	
10	37W8Z300010GA-I/A	300	12/6	-	-	-	-	
	37W8Z360010GA-I/A	360	14/7	-	-	-	-	
	37W8Z420010GA-I/A	420	16/8	-	-	-	-	
12	37W8Z300012GA-I/A	300	12/6	-	-	-	-	
	37W8Z360012GA-I/A	360	14/7	-	-	-	-	
	37W8Z420012GA-I/A	420	16/8	-	-	-	-	
14	37W8Z300014GA-I/A	300	12/6	-	-	-	-	
	37W8Z360014GA-I/A	360	14/7	-	-	-	-	
	37W8Z420014GA-I/A	420	16/8	-	-	-	-	
16	37W8Z300016GA-I/A	300	12/6	-	-	-	-	
	37W8Z360016GA-I/A	360	14/7	-	-	-	-	
	37W8Z420016GA-I/A	420	16/8	-	-	-	-	
18	37W8Z300018GA-I/A	300	12/6	3,0	0,8-1,0	160-180	140-160	Machining in two cuts
	37W8Z360018GA-I/A	360	14/7	3,0	0,9-1,1	160-180	140-160	
	37W8Z420018GA-I/A	420	16/8	3,0	1,0-1,2	160-180	140-160	
20	37W8Z300020GA-I/A	300	12/6	4,0	0,8-1,0	160-180	140-160	
	37W8Z360020GA-I/A	360	14/7	4,0	0,9-1,1	160-180	140-160	
	37W8Z420020GA-I/A	420	16/8	4,0	1,0-1,2	160-180	140-160	
22	37W8Z300022GA-I/A	300	12/6	5,0	0,8-1,0	140-160	120-140	
	37W8Z360022GA-I/A	360	14/7	5,0	0,9-1,1	140-160	120-140	
	37W8Z420022GA-I/A	420	16/8	5,0	1,0-1,2	140-160	120-140	

The indicated cutting data can only be a recommendation and must be adapted on location and, if necessary, optimized.



Designation	D	d1	LT	L	L1	M	Z	WSP			Related Insert
17Y1B041055X8R00	40,7	29	58,381	32	34,3	M16	4	LZA323-MOD1	3	0,20	A
17Y1E051064X8R00	50,7	29	69,175	42	45,1	M16	4	LZA434-MOD2	3	0,31	B

GEAR MILL17Y1...Z



Designation	D	d	LT	L	L1	MOD	Z	WSP			Related Insert
17Y1E060064Z4R00	59,7	50	73,175	35	38,1	40	5	LZA434-MOD2	3	1,10	B
17Y1E080064Z4R00	79,7	69	73,175	35	38,1	40	8	LZA434-MOD2	3	0,62	B
17Y1E096064Z5R00	95,7	85	85,175	35	38,1	50	9	LZA434-MOD2	3	1,80	B
17Y1E112064Z5R00	111,7	101	95,175	45	48,1	50	11	LZA434-MOD2	3	3,10	B
17Y1L112010Z5R00	111,1	95,5	96,763	45	49,7	50	11	LZA446-MOD3	3	2,70	C

A LZA323-MOD1**B** LZA434-MOD2**C** LZA446-MOD3

Designation	Description	No. of corners	Grade	AH330
LZA323-MOD1	Modulbereich ≤ 1 mm / module range ≤ 1 mm	4		
LZA434-MOD2	Modulbereich 1 - 2 mm / module range 1 to 2 mm	4		
LZA446-MOD3	Modulbereich 2 - 3 mm / module range 2 to 3 mm	4		

Design of profile inserts depends on gear data.

= P = M = K = N = S = H

SPARE PARTS

Insert

LZA323-MOD1	SM40-090-00	DS-T15S
LZA434-MOD2	SM50-160-00	DS-T15S
LZA446-MOD3	SM50-160-00	DS-T15S

① = insert screw ② = screw driver

Grades information for Gasher

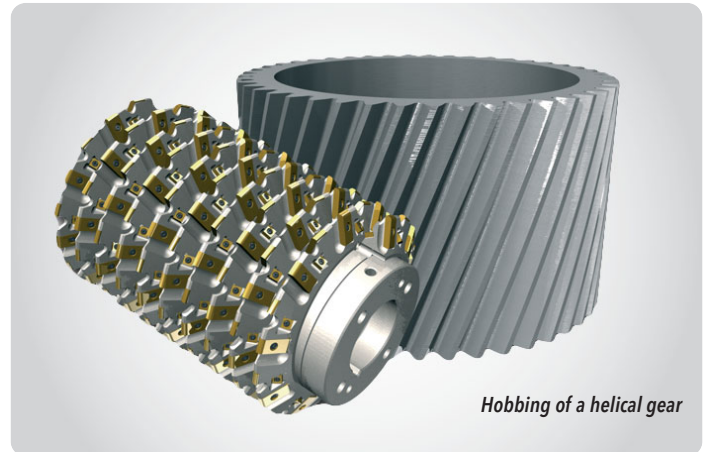
AH330	Excellent wear resistance	
APH730	Good balance between wear and fracture resistance	
APH130	High chipping and fracture resistance Designed for machining austenitic stainless steel under general cutting conditions	

 = P
  = M
  = K
  = N
  = S
  = H

NOTES

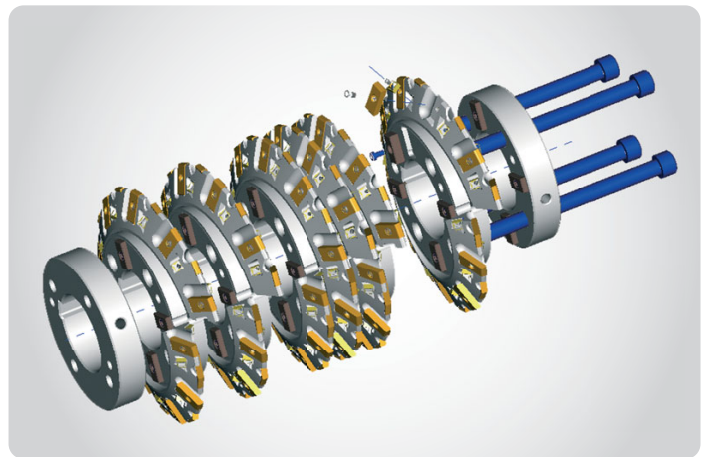


The Tungaloy hobs are the result of continuous further development by our engineers. The experience and individual requirements of our customers were carefully included in the development and conception. These tools allow an economical machining of gears from module 6 and upwards. With the application of carbide inserts a high chip removal can be achieved at high cutting speeds.



Hobbing of a helical gear

Tungaloy hobs consist of individual segments which are positioned by means of high-precision cross slots. Large fitting surfaces allow us form-fit support of each segment in the spiral. These segments are connected with clamping screws via two end caps. Because a 360° spiral forms a segment, the production tolerances within one rotation are minimized, which has a positive effect on the quality class of the hobs. The Tungaloy segment design makes an extension of the tool - an enlargement of the cutting length - comparatively simple. Only longer pull bars are required. Moreover, easy assembly and disassembly is guaranteed.

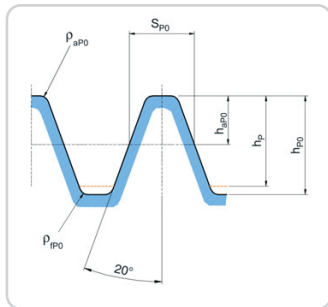


With the further development of the insert with an inclined bore the problem of exchanging an insert has also been solved. It is now possible to exchange the insert with a standard screwdriver while the hob is assembled. A further advantage is that the position of the insert can be exactly defined because of the inclined bore. The insert can no longer be inadvertently assembled incorrectly. Furthermore, a larger thread percentage contact area can be achieved thanks to this inclined position of the insert screw which stabilizes the insert pocket as well as the tool itself.



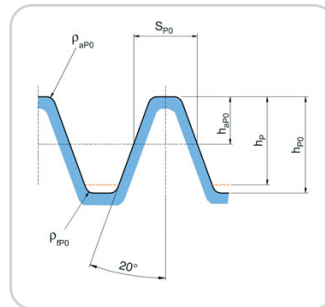
Definition of basic rack profiles acc. to DIN 3972

Basic Rack Profile I / For finishing



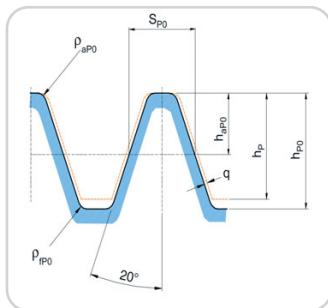
$$\begin{aligned} h_{aP0} &= 1,167 \times m \\ h_p &= 2,167 \times m \\ h_{P0} &= 2,367 \times m \\ \rho_{aP0} &\sim 0,2 \times m \\ \rho_{fP0} &\sim 0,2 \times m \\ S_{P0} &= \frac{\pi}{2} \times m \end{aligned}$$

Basic Rack Profile II / For finishing



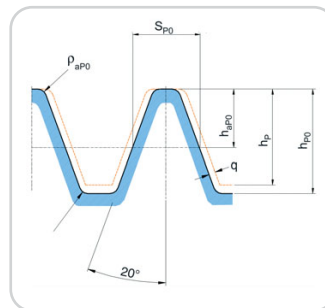
$$\begin{aligned} h_{aP0} &= 1,250 \times m \\ h_p &= 2,250 \times m \\ h_{P0} &= 2,450 \times m \\ \rho_{aP0} &\sim 0,2 \times m \\ \rho_{fP0} &\sim 0,2 \times m \\ S_{P0} &= \frac{\pi}{2} \times m \end{aligned}$$

Basic Rack Profile III / Preshaping for grinding or shaving



$$\begin{aligned} h_{aP0} &= 1,25 \times m + 0,25 \sqrt[3]{m} \\ h_p &= 2,250 \times m \\ h_{P0} &= 2,450 \times m \\ \rho_{aP0} &\sim 0,2 \times m \\ \rho_{fP0} &\sim 0,2 \times m \\ S_{P0} &= \frac{\pi}{2} \times m \\ q &= 0,25 \sqrt[3]{m} \times \sin 20^\circ \end{aligned}$$

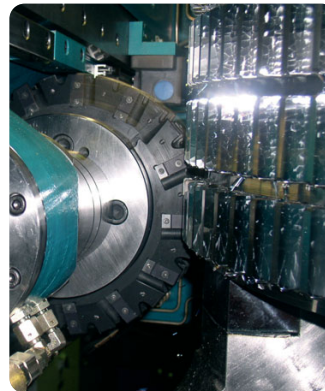
Basic Rack Profile IV / Preshaping for finishing



$$\begin{aligned} h_{aP0} &= 1,25 \times m + 0,60 \sqrt[3]{m} \\ h_p &= 2,250 \times m \\ h_{P0} &= 2,450 \times m \\ \rho_{aP0} &\sim 0,2 \times m \\ \rho_{fP0} &\sim 0,2 \times m \\ S_{P0} &= \frac{\pi}{2} \times m \\ q &= 0,6 \sqrt[3]{m} \times \sin 20^\circ \end{aligned}$$

Description of symbols

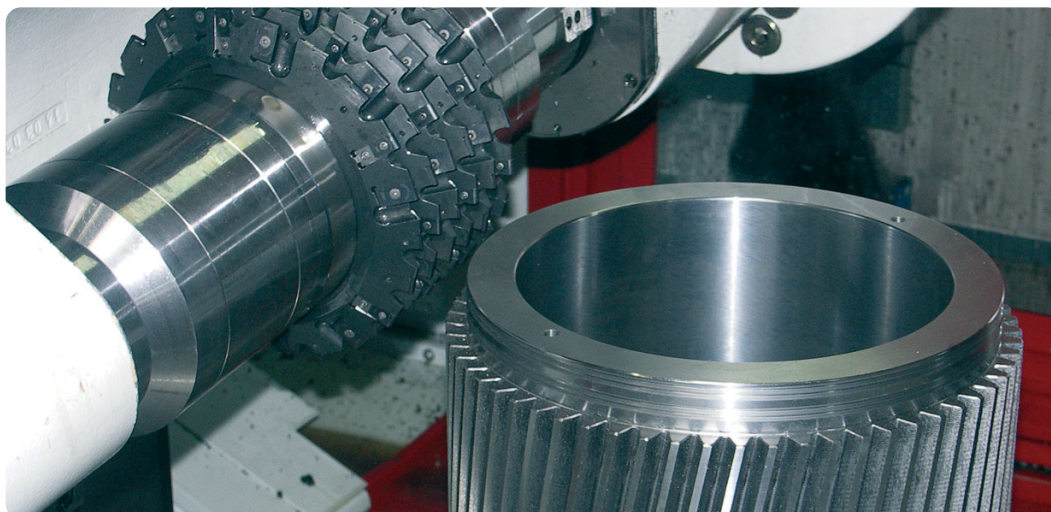
- h_{aP0} = addendum
- h_p = tooth depth = cutting depth
- h_{P0} = tooth depth of the basic rack profile
- S_{P0} = tooth thickness
- ρ_{aP0} = tip radius
- ρ_{fP0} = root radius



Finishing with hob

Outer ring module 10, $z = 94$
material: 42CrMo4

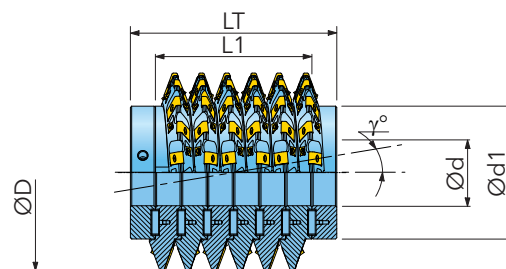
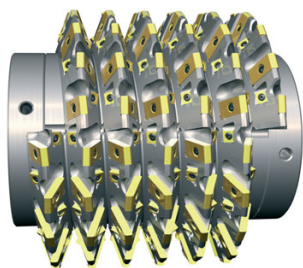
$D = 300 \text{ mm}$
 $n = 148 \text{ min}^{-1} [\text{rpm}]$
 $f_a = 4 \text{ mm/WU} [\text{mm/rev.}]$
 $a_e = 22,5 \text{ mm}$



Roughing with hob

Spur gear module 12, $z = 45$
material: 18CrMo6

$D = 270 \text{ mm}$
 $n = 140 \text{ min}^{-1} [\text{rpm}]$
 $f_a = 3 \text{ mm/WU} [\text{mm/rev.}]$
 $a_e = 28 \text{ mm}$



Module	Designation	D	d	Anz./no. Segm.	L1	LT	Zsegm.	Zges./total	d1	γ	Fitting insert
6	77X8Z180006BDA02	180	40	6	113	173	15	90	125	2,084	90x A
	77X8Z210006BEA02	210	50	6	113	173	17	102	125	1,763	102x A
	77X8Z240006BFA02	240	60	6	113	173	19	114	160	1,528	114x A
7	77X8Z180007BDA02	180	40	6	132	192	15	90	125	2,469	90x B
	77X8Z210007BEA02	210	50	6	132	192	17	102	125	2,084	102x B
	77X8Z240007BFA02	240	60	6	132	192	19	114	160	1,803	114x B
8	77X8Z210008BEA02	210	50	6	151	211	17	102	125	2,413	102x C
	77X8Z240008BFA02	240	60	6	151	211	19	114	160	2,084	114x C
	77X8Z270008BHA02	270	80	6	151	211	21	126	180	1,834	126x C
9	77X8Z210009BEA02	210	50	6	169	229	17	102	125	2,751	102x D
	77X8Z240009BFA02	240	60	6	169	229	19	114	160	2,372	114x D
	77X8Z270009BHA02	270	80	6	169	229	21	126	180	2,084	126x D
10	77X8Z210010BEA02	210	50	6	189	249	17	102	125	3,099	102x E
	77X8Z240010BFA02	240	60	6	189	249	19	114	160	2,666	114x E
	77X8Z270010BHA02	270	80	6	189	249	21	126	180	2,339	126x E
12	77X8Z240012BFA02	240	60	6	226	298	18	108	140	3,276	54x F 54x G
	77X8Z270012BHA02	270	80	6	226	298	22	132	180	2,866	66x F 66x G
	77X8Z350012BHA02	350	80	6	226	298	26	156	240	2,194	78x F 78x G
14	77X8Z270014BHA02	270	80	6	264	336	22	132	180	3,415	66x H 66x I
	77X8Z350014BHA02	350	80	6	264	336	26	156	240	2,547	78x H 78x I
16	77X8Z270016BHA02	270	80	6	302	375	22	132	160	3,989	66x J 66x K
	77X8Z350016BHA02	350	80	6	302	375	26	156	220	2,959	78x J 78x K
18	77X8Z270018BHA02	270	80	5	283	355	22	110	145	4,589	55x L 55x M
	77X8Z350018BHA02	350	80	5	283	355	26	130	220	3,383	65x L 65x M
20	77X8Z350020BHA02	350	80	5	314	386	26	130	220	3,823	65x N 65x O
	77X8Z450020BJA02	450	100	5	314	386	34	170	270	2,866	85x N 85x O

Hobs are generally produced in a single thread right-hand design in class B according to DIN 3968. Hobs in left-hand design, multiple thread and in class A on request.

SPARE PARTS

Insert screw

SM40-090-00

for inserts:

A B C D



Insert screw

SM50-120-10

for inserts:

E F G I K



Insert screw

SM50-140-10

for inserts:

H



Insert screw

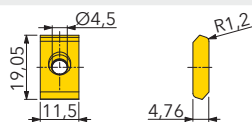
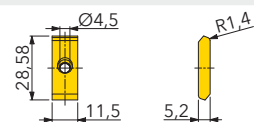
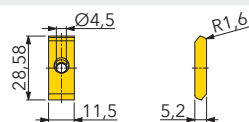
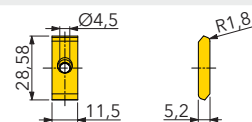
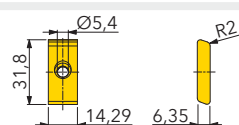
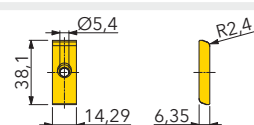
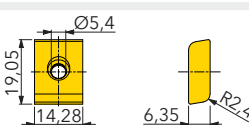
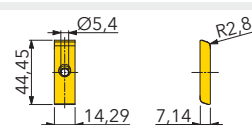
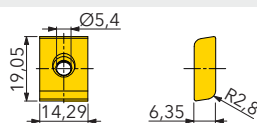
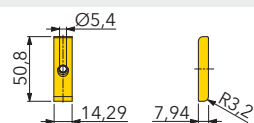
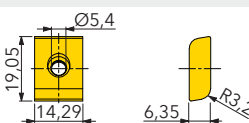
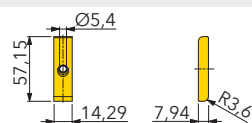
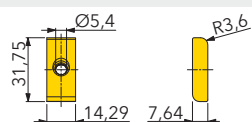
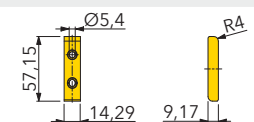
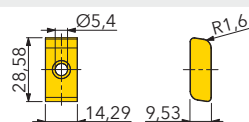
SM50-160-10

for inserts:

J L M N O



INSERTS

A FNC333-131-A

B FNC343-117-A

C FNC343-108-A

D FNC343-118-A

E FNC454-135-A

F FNC464-137-A

G FNC434-116T05-A

H FNC474-133-A

I FNC434-117T05-A

J FNC485-124-A

K FNC434-118T05-A

L FNC496-137-A

M FNC454-143T05-A

N FNC496-138

O FNC446-102T05


Designation	Description	No. of corners	Grade	AH330	APH730	APH130
FNC_	negative geometry	4				
● = P ● = M ● = K ● = N ● = S ○ = H ● ● ● ● ● ○						

Module	Designation	D [mm]	ae1 [mm] Schnitt1/cut1	ae2 [mm] Schnitt2/cut2	Vc1 [m/min] Rm>1000 N/mm ²	Vc2 [m/min] Rm<1000 N/mm ²	fa [mm/WU] Z ≤ 50	fa [mm/WU] Z = 50-100	fa [mm/WU] Z ≥ 100
6	77X8Z180006BDA02	180	13,5	-	160-180	180-200	1,5-2,5	2,5-4,5	4,5-6,0
	77X8Z240006BFA02	210	13,5	-	160-180	180-200	2,0-3,0	3,0-5,0	5,0-6,0
	77X8Z240006BFA02	240	13,5	-	160-180	180-200	2,5-3,5	3,5-5,0	5,0-6,0
7	77X8Z180007BDA02	180	15,75	-	160-180	180-200	1,2-2,0	2,0-3,5	3,5-5,0
	77X8Z210007BEA02	210	15,75	-	160-180	180-200	1,5-2,5	2,5-4,5	4,5-6,0
	77X8Z240007BFA02	240	15,75	-	160-180	180-200	2,0-3,0	3,0-5,0	5,0-6,0
8	77X8Z210008BEA02	210	18,00	-	140-160	160-180	1,3-2,2	2,2-4,0	4,0-6,0
	77X8Z240008BFA02	240	18,00	-	140-160	160-180	1,8-2,5	2,5-4,5	4,5-6,0
	77X8Z270008BHA02	270	18,00	-	140-160	160-180	2,0-3,5	3,5-5,0	5,0-6,0
9	77X8Z210009BEA02	210	20,25	-	140-160	160-180	1,2-1,8	1,8-3,5	3,5-5,0
	77X8Z240009BFA02	240	20,25	-	140-160	160-180	1,5-2,3	2,3-4,5	4,5-6,0
	77X8Z270009BHA02	270	20,25	-	140-160	160-180	1,8-2,8	2,8-5,0	5,0-6,0
10	77X8Z210010BEA02	210	22,50	-	140-160	160-180	1,0-1,6	1,6-3,2	3,2-5,0
	77X8Z240010BFA02	240	22,50	-	140-160	160-180	1,3-2,0	2,0-4,0	4,0-5,5
	77X8Z270010BHA02	270	22,50	-	140-160	160-180	1,6-2,5	2,5-4,5	4,5-6,0
12	77X8Z240012BFA02	240	27,00	-	120-140	140-160	0,8-1,3	1,3-2,5	2,5-4,0
	77X8Z270012BHA02	270	27,00	-	120-140	140-160	1,2-2,0	2,0-4,0	4,0-5,5
	77X8Z350012BHA02	350	27,00	-	120-140	140-160	1,8-2,8	2,8-4,5	4,5-6,0
14	77X8Z270014BHA02	270	31,50	-	120-140	140-160	1,0-1,5	1,5-3,2	3,2-4,5
	77X8Z350014BHA02	350	31,50	-	120-140	140-160	1,5-2,3	2,3-4,0	4,0-5,5
	77X8Z270016BHA02	270	34,00	2*	120-140	140-160	0,9-1,4	1,5-2,8	2,8-4,2
16	77X8Z350016BHA02	350	34,00	2*	120-140	140-160	1,4-2,2	2,2-3,8	3,8-5,2
	77X8Z270018BHA02	270	38,00	2,5*	100-120	120-140	1,2-1,8	1,2-2,5	2,5-4,0
	77X8Z350018BHA02	350	38,00	2,5*	100-120	120-140	1,2-1,8	1,2-2,5	2,5-4,0
20	77X8Z350020BHA02	350	42,00	3*	100-120	120-140	0,7-1,1	1,1-2,2	2,2-3,6
	77X8Z450020BJA02	450	42,00	3*	100-120	120-140	1,0-1,6	1,6-3,4	3,4-4,5

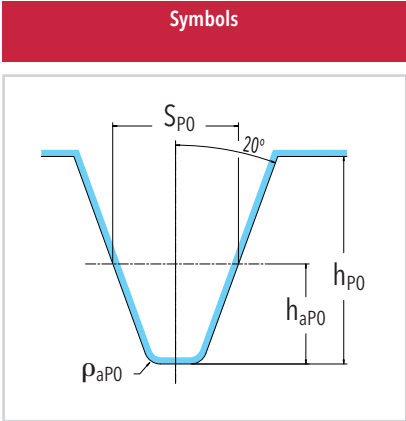
*For the 2nd cut the axial feed rates fa can be used as for Z≥100.

The indicated cutting data can only be a recommendation and must be adapted on location and, if necessary, optimized.

Remark: fa [mm/WU] = fa [mm/rev]

Profile Design of Hobs BP II

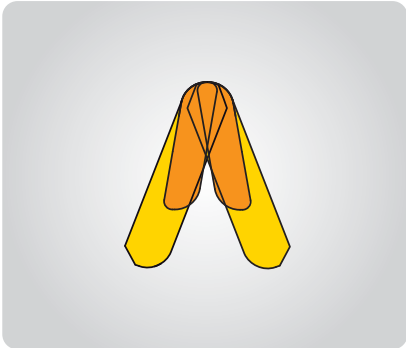
Module	S_{p0}	ρ_{ap0}	h_{ap0}	h_{p0}
6	9,43	1,2	7,50	14,7
7	11,00	1,4	8,75	17,15
8	12,57	1,6	10,00	19,6
9	14,14	1,8	11,25	22,05
10	15,70	2,0	12,50	24,5
12	18,85	2,4	15,00	29,4
14	22,00	2,8	17,50	34,3
16	25,13	3,2	20,00	39,2
18	28,27	3,6	22,50	44,1
20	31,42	4,0	25,00	49



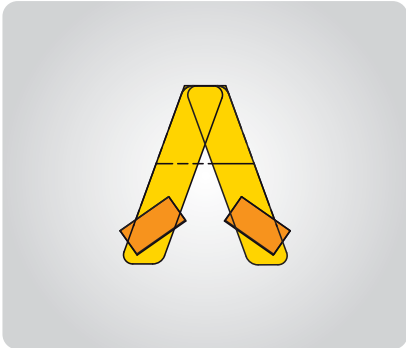
Formulas

$$h_{ap0} = 1,250 \times m$$
$$\rho_{ap0} = 0,2 \times m$$
$$S_{p0} = \frac{\pi \times m}{2}$$


Design of module 6 to 10

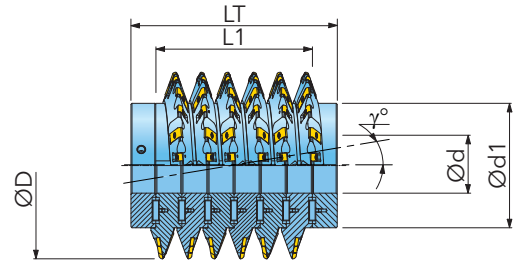
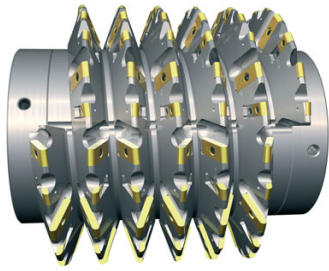


Design of module 12 to 20



Optional with inserts for semi-topping.





Module	Designation	D	d	Anz./no. Segm.	L1	LT	Zsegm.	Zges./total	d1	γ	Fitting insert
6	77X8Z180006BDA00	180	40	6	113	173	15	90	125	2,107	90x A
	77X8Z210006BEA00	210	50	6	113	173	17	102	125	1,780	102x A
	77X8Z240006BFA00	240	60	6	113	173	19	114	160	1,540	114x A
7	77X8Z180007BDA00	180	40	6	132	192	15	90	125	2,501	90x B
	77X8Z210007BEA00	210	50	6	132	192	17	102	125	2,107	102x B
	77X8Z240007BFA00	240	60	6	132	192	19	114	160	1,820	114x B
8	77X8Z210008BEA00	210	50	6	151	211	18	108	125	2,444	54x C 54x D
	77X8Z240008BFA00	240	60	6	151	211	18	108	160	2,107	54x C 54x D
	77X8Z270008BHA00	270	80	6	151	211	22	132	180	1,852	66x C 66x D
9	77X8Z210009BEA00	210	50	6	169	229	18	108	125	2,791	54x E 54x F
	77X8Z240009BFA00	240	60	6	169	229	18	108	160	2,401	54x E 54x F
	77X8Z270009BHA00	270	80	6	169	229	22	132	180	2,107	66x E 66x F
10	77X8Z210010BEA00	210	50	6	189	249	18	108	125	3,150	54x G 54x H
	77X8Z240010BFA00	240	60	6	189	249	18	108	160	2,704	54x G 54x H
	77X8Z270010BHA00	270	80	6	189	249	22	132	180	2,368	66x G 66x H
12	77X8Z240012BFA00	240	60	6	226	298	18	108	140	3,339	54x I 54x J
	77X8Z270012BHA00	270	80	6	226	298	22	132	180	2,910	66x I 66x J
	77X8Z350012BHA00	350	80	6	226	298	26	156	240	2,174	78x I 78x J
14	77X8Z270014BHA00	270	80	6	264	336	22	132	180	3,478	66x K 66x L
	77X8Z350014BHA00	350	80	6	264	336	26	156	240	2,582	78x K 78x L
16	77X8Z270016BHA00	270	80	6	302	375	22	132	160	4,074	66x M 66x N
	77X8Z350016BHA00	350	80	6	302	375	26	156	220	3,005	78x M 78x N
18	77X8Z270018BHA00	270	80	5	283	355	22	110	145	4,702	55x O 55x P
	77X8Z350018BHA00	350	80	5	283	355	26	130	220	3,444	65x O 65x P
20	77X8Z350020BHA00	350	80	5	314	386	26	130	220	3,901	65x Q 65x R
	77X8Z450020BJA00	450	100	5	314	386	34	170	270	2,910	85x Q 85x R

Hobs are generally produced in a single thread right-hand design in class B according to DIN 3968. Hobs in left-hand design on request.

SPARE PARTS

Insert screw

SM40-090-00

for inserts:

A B C D E F
H J



Insert screw

SM50-120-10

for inserts:

G I L N



Insert screw

SM50-160-10

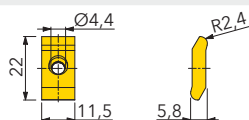
for inserts:

K M O P Q R

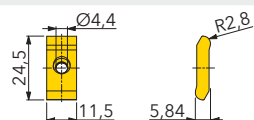


INSERTS

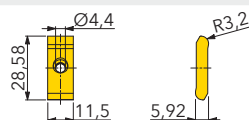
A FNC343-115-A



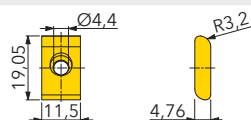
B FNC343-116-A



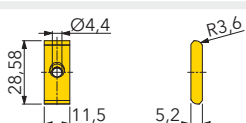
C FNC343-102-A



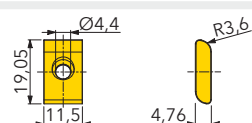
D FNC333-124T05-A



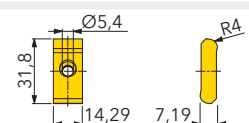
E FNC343-104-A



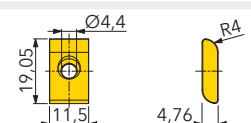
F FNC333-125T05-A



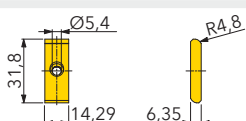
G FNC454-136-A



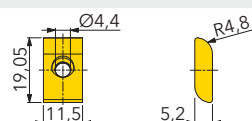
H FNC333-130T05-A



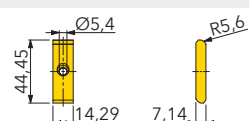
I FNC464-119-A



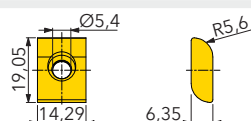
J FNC333-142T05-A



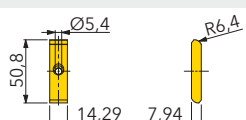
K FNC474-118-A



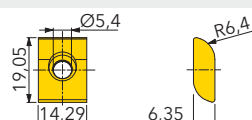
L FNC434-114T05-A



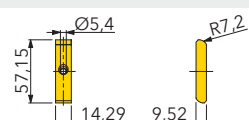
M FNC485-108-A



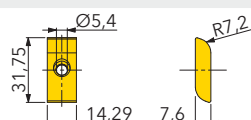
N FNC434-115T05-A



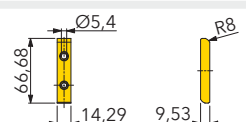
O FNC496-131-A



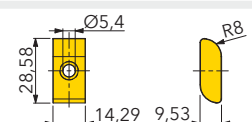
P FNC454-142T05-A



Q FNC4106-110



R LNA446-145T05



Designation

Description

No. of corners

Grade

AH330

APH730

APH130

FNC_

negative geometry

4

● = P ● = M ● = K ● = N ● = S ○ = H

Module	Designation	D [mm]	a _{e1} [mm] Schnitt1/cut1	a _{e2} [mm] Schnitt2/cut2	V _{c1} [m/min] Rm>1000 N/mm ²	V _{c2} [m/min] Rm<1000 N/mm ²	f _a [mm/WU] Z ≤ 50	f _a [mm/WU] Z = 50-100	f _a [mm/WU] Z ≥ 100
6	77X8Z180006BDA00	180	14,7	-	140-160	160-180	1,2-2,3	2,3-4,0	4,0-5,5
	77X8Z210006BEA00	210	14,7	-	140-160	160-180	1,8-2,7	2,7-4,6	4,6-6,0
	77X8Z240006BFA00	240	14,7	-	140-160	160-180	2,2-3,2	3,2-4,8	4,8-6,0
7	77X8Z180007BDA00	180	17,2	-	140-160	160-180	1,0-1,8	1,8-3,2	3,2-5,0
	77X8Z210007BEA00	210	17,2	-	140-160	160-180	1,3-2,2	2,2-4,2	4,2-6,0
	77X8Z240007BFA00	240	17,2	-	140-160	160-180	1,8-2,8	2,8-4,4	4,4-6,0
8	77X8Z210008BEA00	210	19,6	-	120-140	140-160	1,2-2,0	2,0-3,8	3,8-5,0
	77X8Z240008BFA00	240	19,6	-	120-140	140-160	1,5-2,3	2,3-4,2	4,2-5,5
	77X8Z270008BHA00	270	19,6	-	120-140	140-160	1,8-3,2	3,2-4,6	4,6-6,0
9	77X8Z210009DEA00	210	22,0	-	120-140	140-160	1,0-1,6	1,6-3,2	3,2-5,0
	77X8Z240009BFA00	240	22,0	-	120-140	140-160	1,3-2,0	2,0-4,0	4,0-5,5
	77X8Z270009BHA00	270	22,0	-	120-140	140-160	1,6-2,5	2,5-4,5	4,5-6,0
10	77X8Z210010BEA00	210	24,5	-	120-140	140-160	0,9-1,5	1,5-3,0	3,0-5,0
	77X8Z240010BFA00	240	24,5	-	120-140	140-160	1,2-1,8	1,8-3,8	3,8-5,5
	77X8Z270010BHA00	270	24,5	-	120-140	140-160	1,5-2,4	2,4-4,3	4,3-6,0
12	77X8Z240012BFA00	240	29,4	-	100-120	120-140	0,6-1,1	1,1-2,0	2,0-3,5
	77X8Z270012BHA00	270	29,4	-	100-120	120-140	1,0-1,6	1,6-3,5	3,5-4,5
	77X8Z350012BHA00	350	29,4	-	100-120	120-140	1,4-2,4	2,4-4,0	4,0-5,5
14	77X8Z270014BHA00	270	34,3	-	100-120	120-140	0,8-1,3	1,3-3,0	3,0-4,5
	77X8Z350014BHA00	350	34,3	-	100-120	120-140	1,2-2,0	2,0-3,8	3,8-5,5
16	77X8Z270016BHA00	270	37,2	2*	100-120	120-140	0,8-1,2	1,2-2,5	2,5-4,0
	77X8Z350016BHA00	350	37,2	2*	100-120	120-140	1,2-1,8	1,8-3,5	3,5-5,0
18	77X8Z270018BHA00	270	41,6	2,5*	80-100	100-120	0,7-1,1	1,1-2,2	2,2-3,5
	77X8Z350018BHA00	350	41,6	2,5*	80-100	100-120	1,0-1,6	1,6-3,4	3,4-5,0
20	77X8Z350020BHA00	350	46,0	3*	80-100	100-120	0,6-1,0	1,0-2,0	2,0-3,5
	77X8Z450020BJA00	450	46,0	3*	80-100	100-120	0,9-1,5	1,5-3,2	3,2-5,0

*For the 2nd cut the axial feed rates f_a can be used as for $Z \geq 100$.

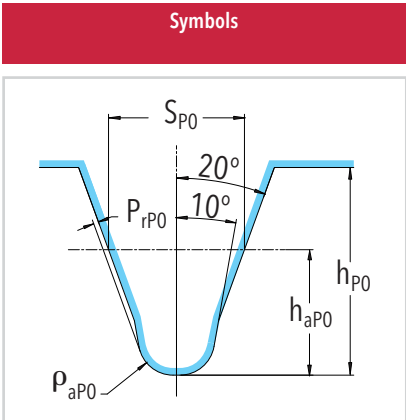
The indicated cutting data can only be a recommendation and must be adapted on location and, if necessary, optimized.

Remark: f_a [mm/WU] = f_a [mm/rev]

Profile Design of Hob with Protuberance

Module	S _{P0}	P _{rP0} *	ρ _{aP0}	h _{aP0}	h _{P0}
6	9,43	-	2,4	8,85	16
7	11,00	-	2,8	10,30	19
8	12,57	-	3,2	11,73	21
9	14,14	-	3,6	13,17	24
10	15,70	-	4,0	14,61	26
12	18,85	-	4,8	17,52	32
14	22,00	-	5,6	20,45	37
16	25,13	-	6,4	23,37	42
18	28,27	-	7,2	26,30	47
20	31,42	-	8,0	29,23	52

*On request



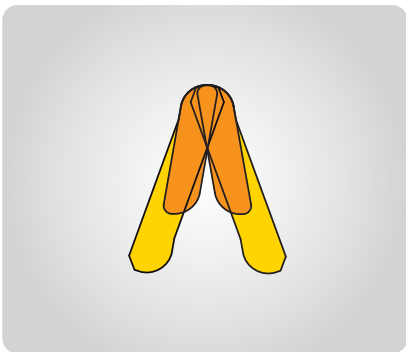
Formulas

$$S_{P0} = \frac{\pi \cdot m}{2}$$
$$h_{aP0} = 1,4 \cdot m + \frac{q}{\sin 20^\circ}$$
$$\rho_{aP0} = 0,4 \cdot m$$

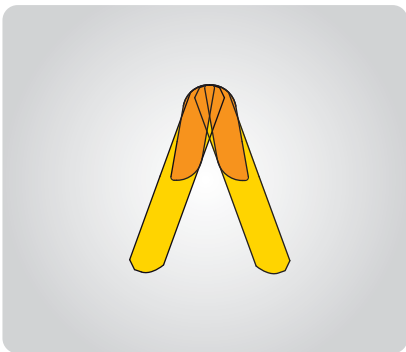
q = 研削代



Design of module 6 to 7

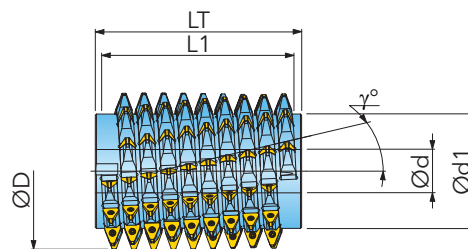
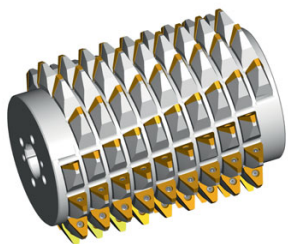


Design of module 8 to 10



Design of module 12 and over





Module	Designation	D	d	No. of windings	L1	LT	Z _{eff.}	Z _{ges./Z_{total}}	d1	γ	Fitting insert
4	75X8Z090004BCA02	90	32	9	113	136	10	92	60	2,866	A
	75X8Z120004BDA02	120	40	9	113	136	13	119	90	2,084	A
	75X8Z150004BEA02	150	50	9	113	136	16	146	120	1,637	A
5	75X8Z090005BCA02	90	32	9	141	167	10	92	55	3,699	B
	75X8Z120005BDA02	120	40	9	141	167	13	119	85	2,666	B
	75X8Z150005BEA02	150	50	9	141	167	16	146	115	2,084	B
6	75X8Z120006BDA02	120	40	6	113	140	10	61	72	3,276	C
	75X8Z150006BEA02	150	50	6	113	140	13	79	102	2,547	C
	75X8Z180006BFA02	180	60	6	113	140	16	97	132	2,084	C
7	75X8Z150007BEA02	150	50	6	132	155	8	50	98	3,028	D
	75X8Z180007BFA02	180	60	6	132	155	10	62	128	2,469	D
	75X8Z210007BFA02	210	60	6	132	155	12	74	158	2,084	D
8	75X8Z180008BFA02	180	60	6	151	175	10	62	124	2,866	E
	75X8Z210008BFA02	210	60	6	151	175	12	74	154	2,413	E
	75X8Z240008BHA02	240	80	6	151	175	14	86	184	2,084	E

Hobs are generally produced in a single thread right-hand design in class B according to DIN 3968. Hobs in left-hand design, multiple thread and in class A on request.

SPARE PARTS

Insert screw

SM30-082-20

for inserts:

A B C

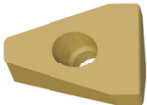
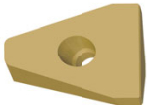
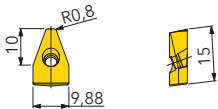
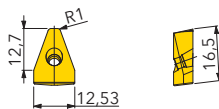
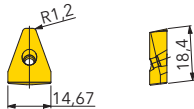
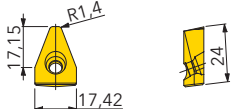
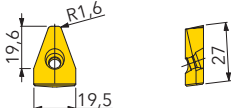
Insert screw

SM50-140-10

for inserts:

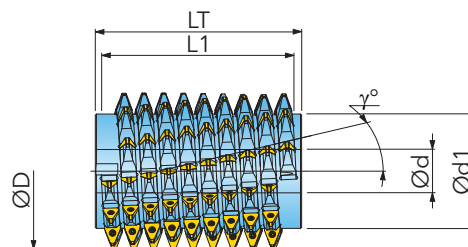
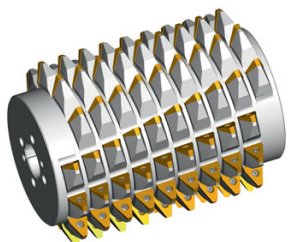
D E

FULL PROFILE INSERTS

A ZPDW040508	B ZPDW050610	C ZPDW060612	D ZPDW070814
			
			
E ZPDW080816			
			
			

Designation	Description	No. of corner	Grade	APH730	AH7025
ZPDW_	positive geometry	1			

● = P ● = M ● = K ● = N ● = S ○ = H



Module	Designation	D	d	No. of windings	L1	LT	Z _{eff.}	Z _{ges./Z_{total}}	d1	γ	Fitting insert
4	75X8Z090004BCA00	90	32	9	113	136	10	92	60	2,866	A
	75X8Z120004BDA00	120	40	9	113	136	13	119	90	2,084	A
	75X8Z150004BEA00	150	50	9	113	136	16	146	120	1,637	A
5	75X8Z090005BCA00	90	32	9	141	167	10	92	55	3,699	B
	75X8Z120005BDA00	120	40	9	141	167	13	119	85	2,666	B
	75X8Z150005BEA00	150	50	9	141	167	16	146	115	2,084	B
6	75X8Z120006BDA00	120	40	6	113	140	10	61	72	3,276	C
	75X8Z150006BEA00	150	50	6	113	140	13	79	102	2,547	C
	75X8Z180006BFA00	180	60	6	113	140	16	97	132	2,084	C
7	75X8Z150007BEA00	150	50	6	132	155	8	50	98	3,028	D
	75X8Z180007BFA00	180	60	6	132	155	10	62	128	2,469	D
	75X8Z210007BFA00	210	60	6	132	155	12	74	158	2,084	D
8	75X8Z180008BFA00	180	60	6	151	175	10	62	124	2,866	E
	75X8Z210008BFA00	210	60	6	151	175	12	74	154	2,413	E
	75X8Z240008BHA00	240	80	6	151	175	14	86	184	2,084	E

Hobs are generally produced in a single thread right-hand design in class B according to DIN 3968. Hobs in left-hand design, multiple thread and in class A on request.

SPARE PARTS

Insert screw

SM30-082-20

for inserts:

A B C



Insert screw

SM50-140-10

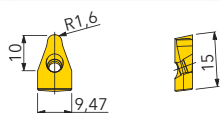
for inserts:

D E

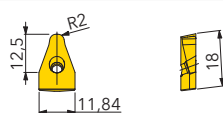


FULL PROFILE INSERTS

A ZPDW040516



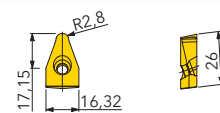
B ZPDW050620



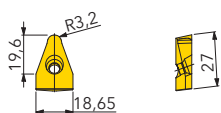
C ZPDW060624



D ZPDW070828



E ZPDW080832



Designation	Description	No. of corner	Grade	APH730	AH7025
ZPDW_	positive geometry	1			

● = P ● = M ● = K ● = N ● = S ○ = H



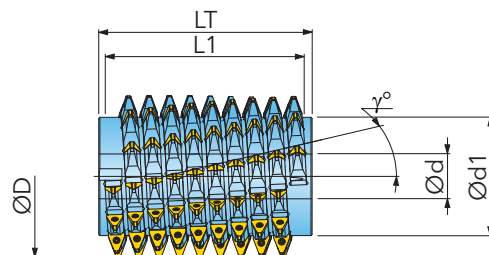
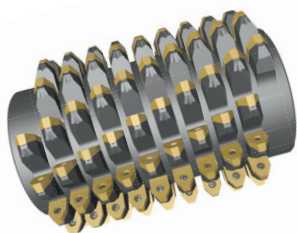
Finishing with hob

Gear wheel M7, z = 41, material: 16MnCr5

D = 210 mm

n1 = 334 min⁻¹ [rpm] fa1 = 2,5 mm/WU [mm/WR] ae1 = 45,5 mm
n2 = 425 min⁻¹ [rpm] fa2 = 6 mm/WU [mm/WR] ae2 = 0,75 mm





Module	Designation	D	d	No. of windings	L1	LT	Z _{eff.}	Z _{total}	d1	γ	Fitting insert
4	75X8Z090004BCA54	90	32	9	113	136	11	100	63	2,690	A
	75X8Z120004BDA54	120	40	9	113	136	14	127	93	1,990	A
	75X8Z150004BEA54	150	50	9	113	136	17	154	123	1,578	A
5	75X8Z090005BCA54	90	32	9	141	168	10	92	57	3,412	B
	75X8Z120005BDA54	120	40	9	141	168	13	119	87	2,514	B
	75X8Z150005BEA54	150	50	9	141	168	16	146	117	1,990	B
6	75X8Z120006BDA54	120	40	6	113	140	12	74	89	3,049	C
	75X8Z150006BEA54	150	50	6	113	140	15	92	119	2,408	C
	75X8Z180006BFA54	180	60	6	113	140	18	110	149	1,990	C
7	75X8Z150007BEA54	150	50	6	132	155	11	68	112	2,834	D
	75X8Z180007BFA54	180	60	6	132	155	13	80	142	2,338	D
	75X8Z210007BFA54	210	60	6	132	155	15	92	172	1,990	D
8	75X8Z180008BFA54	180	60	6	151	175	13	80	138	2,691	E
	75X8Z210008BFA54	210	60	6	151	175	15	92	168	2,288	E
	75X8Z240008BHA54	240	80	6	151	175	17	104	198	1,990	E

Hobs are generally produced in a single thread right-hand design in class B according to DIN 3968. Hobs in left-hand design, multiple thread and in class A on request.

SPARE PARTS

Insert screw

SM30-082-20

for inserts:

A B C



Insert screw

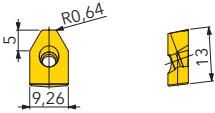
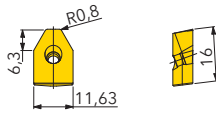
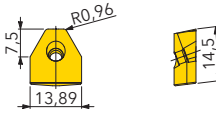
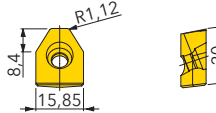
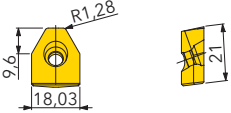
SM50-140-10

for inserts:

D E



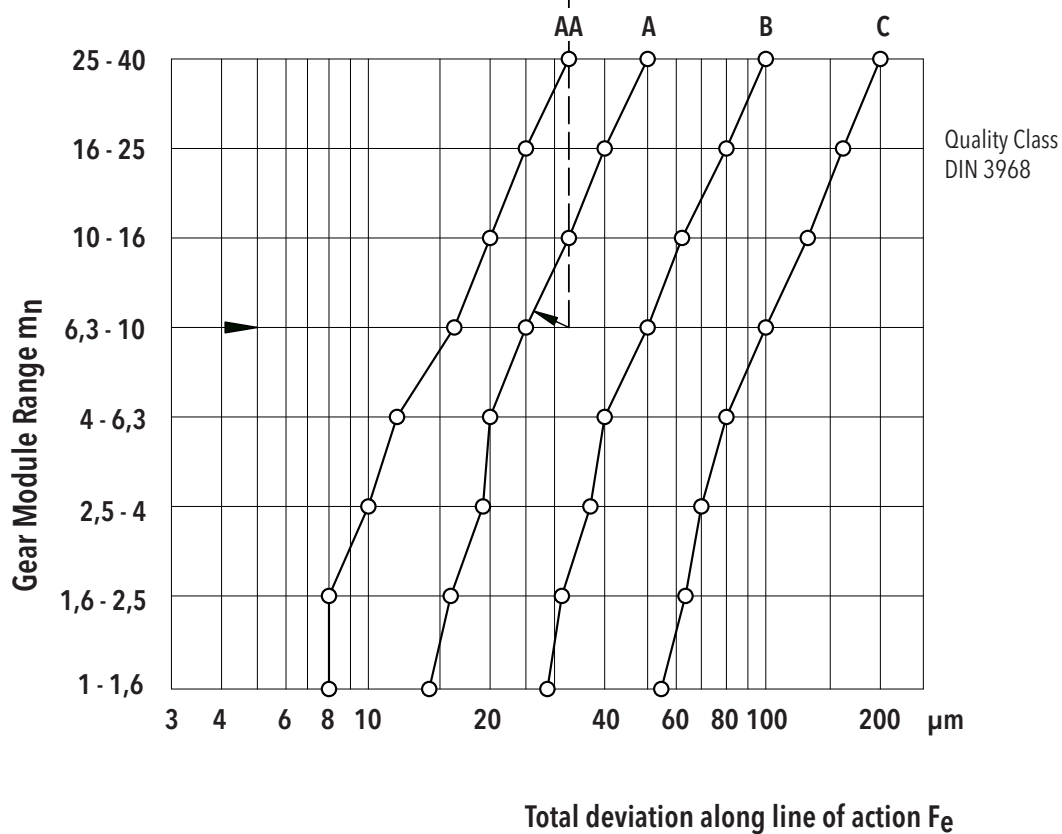
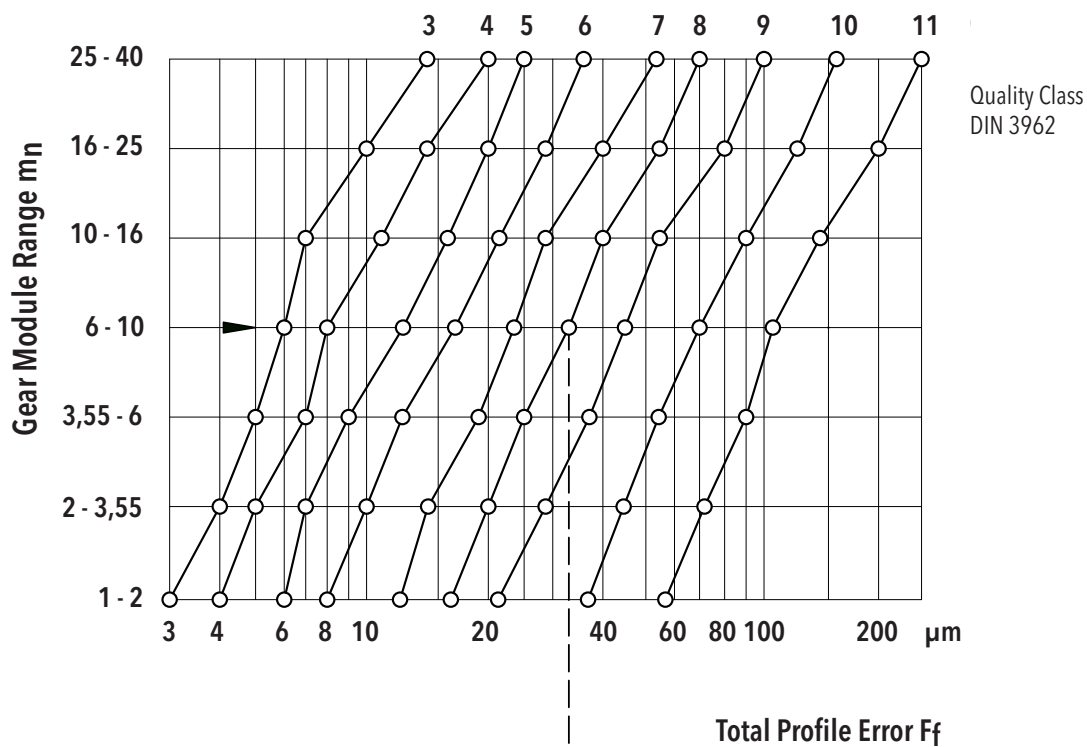
FULL PROFILE INSERTS

A ZPDW040506	B ZPDW050608	C ZPDW060609	D ZPDW070811
			
			
E ZPDW080813			
			
			

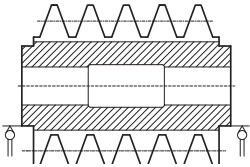
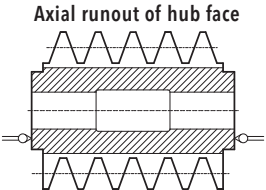
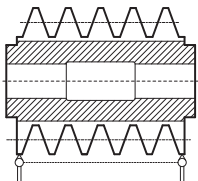
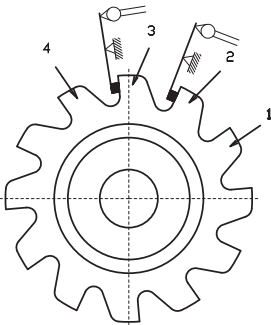
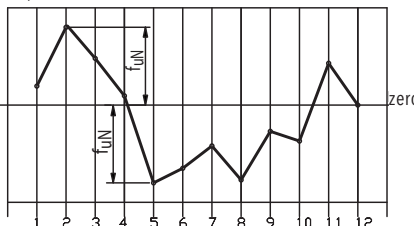
Designation	Description	No. of corner	Grade	APH730	AH7025
ZPDW_	positive geometry	1			

● = P ● = M ● = K ● = N ● = S ○ = H

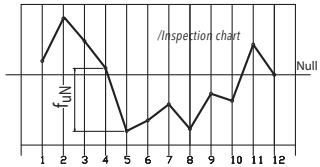
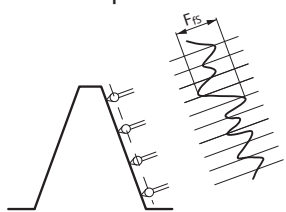
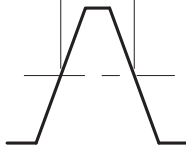
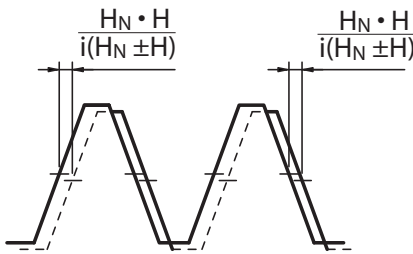
Comparison Tool Class / Total Profile Deviation of Gear



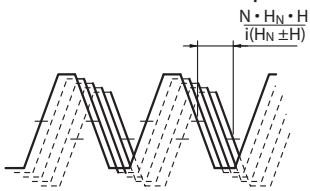
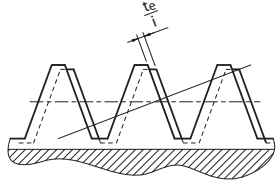
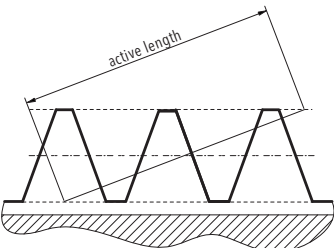
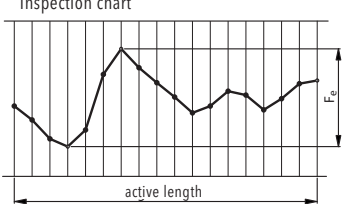
Accuracy Requirements for Single Thread Hobs

No.	Measured dimension	short descript.	quality class	Tolerance in μm ($1 \mu\text{m} = 0,001 \text{ mm}$) at module								
				$>0,63-1$	$>1-1,6$	$>1,6-2,5$	$>2,5-4$	$>4-6,3$	$>6,3-10$	$>10-16$	$>16-25$	$>25-40$
4	Radial runout of hub diameter 	f_{rp}	AA	5	5	5	5	5	5	6	6	8
			A	5	5	5	6	8	10	12	16	20
			B	6	6	6	8	10	12	16	20	25
			C	10	10	10	12	16	20	25	32	40
5	Axial runout of hub face 	f_{pa}	AA	3	3	3	3	3	4	5	5	6
			A	3	3	3	5	5	8	8	10	10
			B	4	4	4	6	6	10	10	12	12
			C	6	6	6	10	10	16	16	20	20
			D	10	10	10	16	16	25	25	32	32
6	Radial runout of tips of teeth 	f_{rk}	AA	10	10	12	16	20	25	32	40	50
			A	12	16	20	25	32	40	50	63	80
			B	25	32	40	50	63	80	100	125	160
			C	50	63	80	100	125	160	200	250	315
			D	100	125	160	200	250	315	400	500	630
8	Adjacent spacing of the cutting face of gashes  Inspection chart 	f_{tN}	AA	± 10	± 10	± 12	± 16	± 20	± 25	± 32	± 40	± 50
			A	± 12	± 16	± 20	± 25	± 32	± 40	± 50	± 63	± 80
			B	± 25	± 32	± 40	± 50	± 63	± 80	± 100	± 125	± 160
			C	± 50	± 63	± 80	± 100	± 125	± 160	± 200	± 250	± 315
			D	± 100	± 125	± 160	± 200	± 250	± 315	± 400	± 500	± 630

Accuracy Requirements for Single Thread Hobs

No.	Measured dimension	short descript.	quality class	Tolerance in μm ($1\text{ }\mu\text{m} = 0,001\text{ mm}$) at module								
				$>0,63-1$	$>1-1,6$	$>1,6-2,5$	$>2,5-4$	$>4-6,3$	$>6,3-10$	$>10-16$	$>16-25$	$>25-40$
9	Pitch error of the cutting face of gashes Prüfdiagramm  //Inspection chart zero	f_{uN}	AA	10	10	12	16	20	25	32	40	50
			A	12	16	20	25	32	40	50	63	80
			B	25	32	40	50	63	80	100	125	160
			C	50	63	80	100	125	160	200	250	345
			D	100	125	160	200	250	315	400	500	630
12	Tooth profile deviation 	F_{fs}	AA	6	6	6	8	10	12	14	18	22
			A	10	11	12	14	16	20	25	32	40
			B	20	22	25	28	32	40	50	63	80
			C	40	45	50	56	63	80	100	125	160
13	Tooth thickness S 	f_s	AA	- 16	- 16	- 16	- 20	- 25	- 32	- 40	- 50	- 63
			A	- 25	- 28	- 32	- 36	- 40	- 50	- 63	- 80	- 100
			B	- 50	- 56	- 63	- 71	- 80	- 100	- 125	- 160	- 200
			C	- 100	- 112	- 125	- 140	- 160	- 200	- 250	- 320	- 400
			D	- 100	- 112	- 125	- 140	- 160	- 200	- 250	- 320	- 400
14	Lead deviation on adjacent teeth 	f_{HF}	AA	± 4	± 4	± 4	± 5	± 6	± 8	± 10	± 12	± 16
			A	± 6	± 7	± 8	± 9	± 10	± 12	± 16	± 20	± 25
			B	± 12	± 14	± 16	± 18	± 20	± 25	± 32	± 40	± 50
			C	± 25	± 28	± 32	± 36	± 40	± 50	± 63	± 80	± 100
			D	± 50	± 56	± 63	± 71	± 80	± 100	± 125	± 160	± 200

Accuracy Requirements for Single Thread Hobs

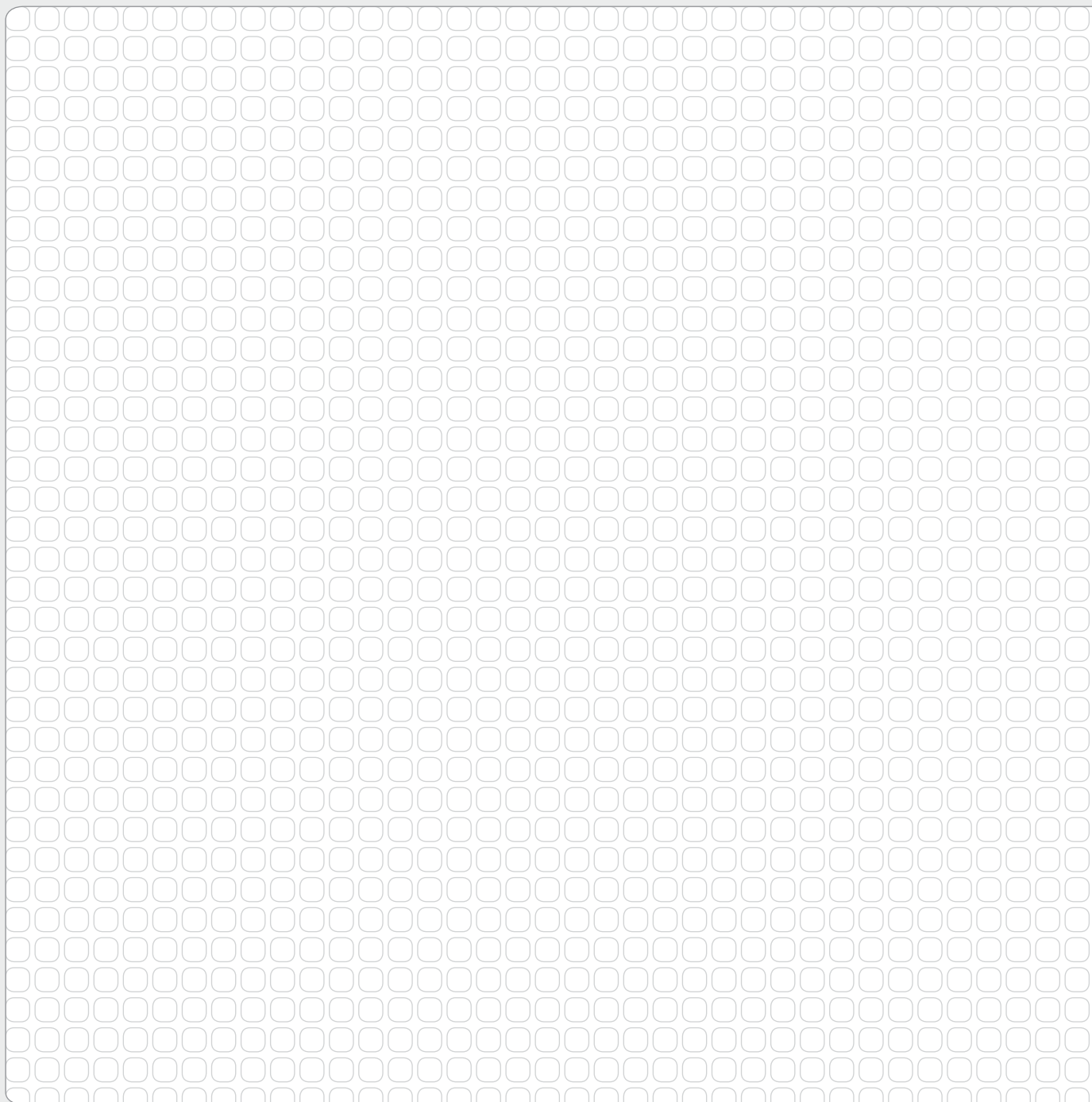
No.	Measured dimension	short descript.	quality class	Tolerance in μm ($1 \mu\text{m} = 0,001 \text{ mm}$) at module								
				>0,63-1	>1-1,6	>1,6-2,5	>2,5-4	>4-6,3	>6,3-10	>10-16	>16-25	>25-40
15	Lead deviation in one axial pitch 	F_{HF}	AA	6	6	6	8	10	12	14	18	22
			A	10	11	12	14	16	20	25	32	40
			B	20	22	25	28	32	40	50	63	80
			C	40	45	50	56	63	80	100	125	160
			D	80	90	100	112	125	160	200	250	320
16	Adjacent deviation along line of action 	f_e	AA	± 4	± 4	± 4	± 5	± 6	± 8	± 10	± 12	± 16
			A	± 6	± 7	± 8	± 9	± 10	± 12	± 16	± 20	± 25
			B	± 12	± 14	± 16	± 18	± 20	± 25	± 32	± 40	± 50
			C	± 25	± 28	± 32	± 36	± 40	± 50	± 63	± 80	± 100
17	Total deviation along line of action 	F_e	AA	8	8	8	10	12	16	20	25	32
			A	12	14	16	18	20	25	32	40	50
			B	25	28	32	36	40	50	63	80	100
			C	50	56	63	71	80	100	125	160	200
	Inspection chart 											

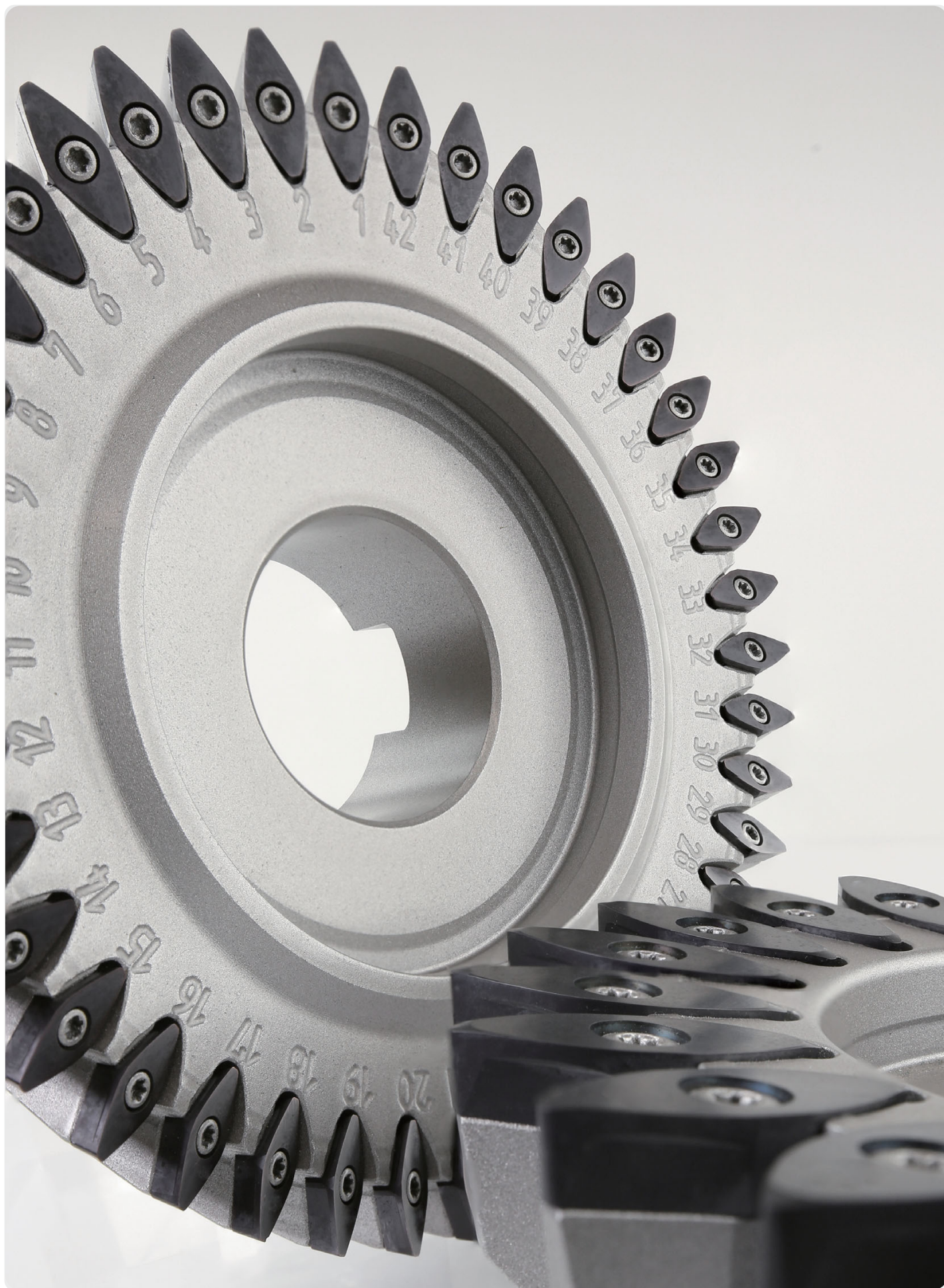
Grades information for Hob

AH330	Excellent wear resistance	
APH730	Good balance between wear and fracture resistance	
APH130	High chipping and fracture resistance Designed for machining austenitic stainless steel under general cutting conditions	
AH7025	Good resistance to wear and fracture in machining stainless steel at low to medium cutting speed	
A35HP	High fracture resistance Suitable for machining steel and stainless steel under general cutting conditions	

● = P ● = M ● = K ● = N ● = S ○ = H

NOTES





General Description

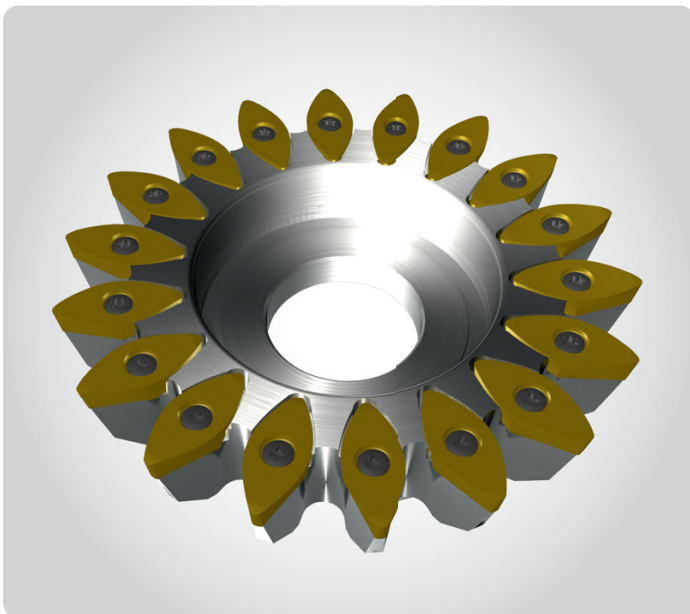
Gear shaping has been an established machining process for generating gears since the mid-twenties of the last century. Gear shaping is one of the most widely used machining methods for producing gearwheels. It is indispensable for the production of gearing on certain workpiece geometries and on shoulders, but also for special applications, such as non-round contours.

Despite the limited productivity compared to other gearing methods such as hobbing, new developments have been made in the process engineering, machinery, tools and technology areas, which considerably improve the economic efficiency and quality of the process.

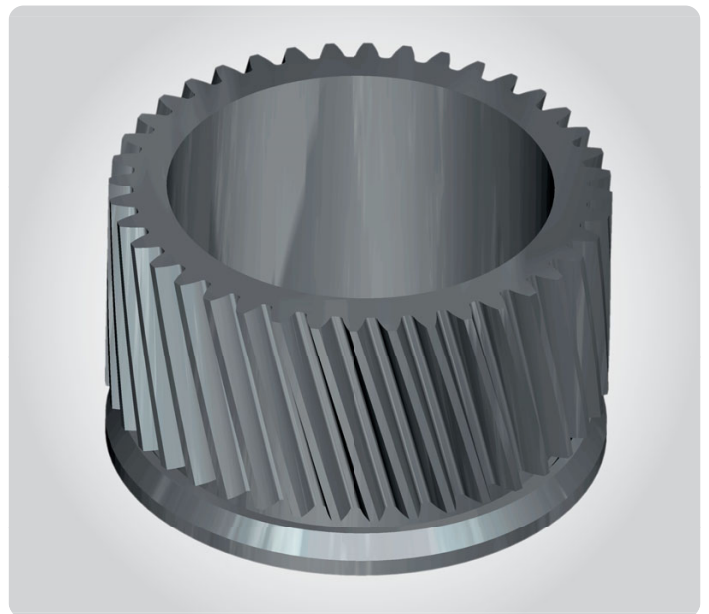
To date, however, very little, if anything, has changed on the used gear-shaping tools, except for the accuracy and the materials. Gear shapers made of HSS, and to a lesser degree, solid carbide gear shapers are still used. Disk-type shapers (DIN 1825), bell-type shapers (DIN 1826) and shank-type shapers (DIN 1828) are used, whereby the disk-type shapers are used most often. New to the tool concept is the use and presently unique application of indexable inserts for this machining process.

These tools were primarily designed for roughing, i.e. gashing ready for finish-shaping or finish-grinding. Gearwheels with low quality requirements can be finish-shaped, within limits.

The gear shaping method is generally used whenever index milling or hobbing is not possible. Straight- and helical-toothed, internal and external spur gears can be produced using the gear-shaping method. From an economic point of view, gear-shaping comes in third, after hobbing and index milling.



Indexable Insert Gear Shaper 74X8D



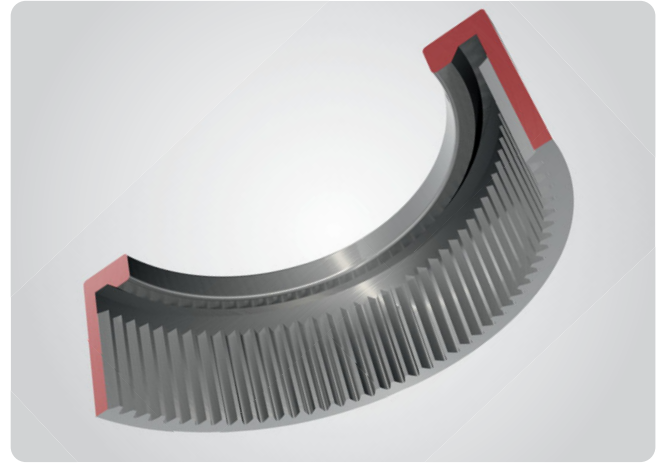
From an economical point of view, however, it is the most universal of all methods, as in addition to 'normal' external and internal gearing, it can also be used to generate other gears, which, due to their geometry, cannot be produced with the aforementioned methods, such as:

- External and internal gearing with shoulders
- External and internal herringbone gearing
- Gearing with thrust surfaces
- Component-related interference contours
- General gearing that does not permit an overrun of a side and face mill or a hob, so called collision gearing.

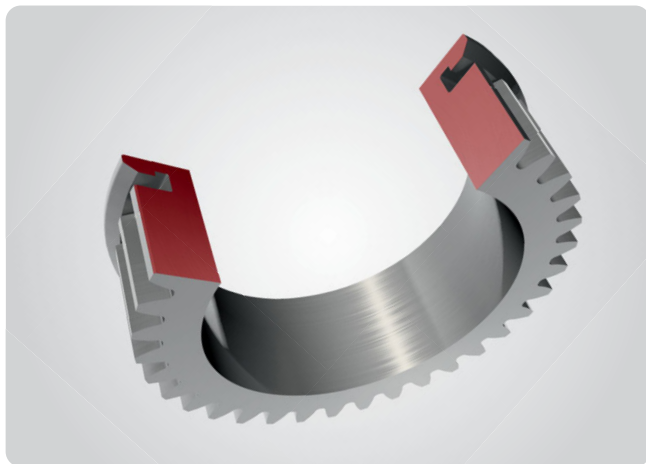
When all is said and done, the gear shaping method can be used to generate every type of gear that can be generated using the hobbing or index milling method, but conversely, this is only possible to a limited degree.

The new gear shapers are generally designed for roughing, i.e. gashing in preparation for finish-shaping or finish-grinding. Lower gear qualities of up to max Q8 have been achieved, but cannot be generally guaranteed, as workpiece qualities do not allow any conclusions to be drawn about tool qualities. At present, the tools approximately correspond to class B according to DIN 1829.

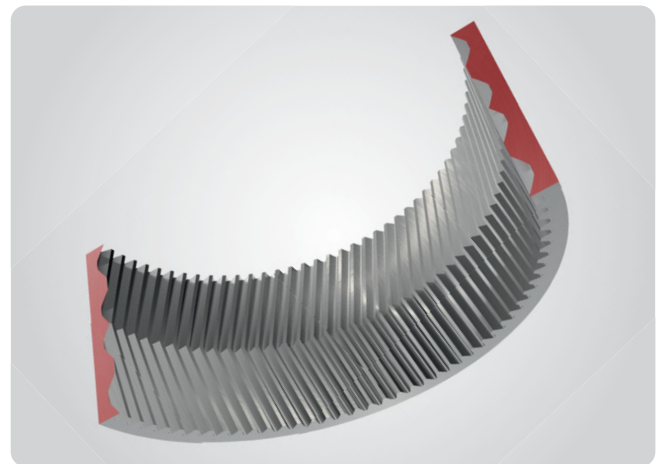
Profiles are standardly produced to reference profile II and reference profile III standards, as defined in DIN 3972.



Internal gearing with shoulder

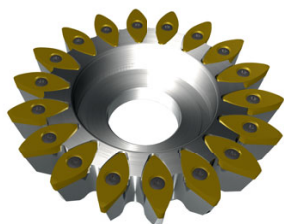


External gearing with shoulder

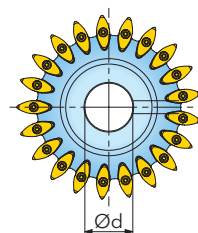
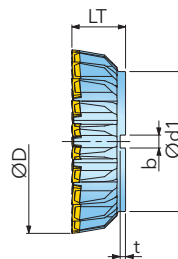


Herringbone gearing

Shaper



(DIN 3972)



Module	Designation	D	D ₀	d	LT	Z	d1	b	t	Fitting insert
3	74X8D116003AG-02	115,5	108	31,75	40	36	88	12	4	A
	74X8D134003AJ-02	133,5	125	44,45	40	42	106	12	4	A
	74X8D152003AJ-02	151,5	144	44,45	40	48	124	12	4	A
4	74X8D090004AG-02	90	80	31,75	40	20	68	12	4	B
	74X8D114004AG-02	114	104	31,75	40	26	92	12	4	B
	74X8D130004AJ-02	130	120	44,45	40	30	108	12	4	B
5	74X8D113005AG-02	112,5	100	31,75	40	20	82	12	4	C
	74X8D143005AJ-02	142,5	130	44,45	40	26	112	12	4	C
	74X8D163005AJ-02	162,5	150	44,45	40	30	132	12	4	C
6	74X8D135006AG-02	135	120	31,75	40	20	91	12	4	D
	74X8D171006AJ-02	171	156	44,45	40	26	127	12	4	D
	74X8D195006AJ-02	195	180	44,45	40	30	151	12	4	D
7	74X8D158007AJ-02	157,5	140	44,45	40	20	108	12	4	E
	74X8D200007AJ-02	199,5	182	44,45	40	26	150	12	4	E
	74X8D228007BG-02	227,5	210	70	50	30	178	12	4	E
8	74X8D180008AJ-02	180	160	44,45	40	20	122	12	4	F
	74X8D228008BG-02	228	208	70	40	26	170	12	4	F
	74X8D260008BG-02	260	240	70	50	30	202	12	4	F
9	74X8D203009AJ-02	202,5	180	44,45	40	20	139	12	4	G
	74X8D257009BG-02	256,5	234	70	50	26	193	12	4	G
	74X8D293009BG-02	292,5	270	70	50	30	229	12	4	G
10	74X8D225010AJ-02	205	180	44,45	40	18	150	12	4	H
	74X8D225010BG-02	225	200	70	50	20	170	12	4	H
	74X8D455010BG-02	245	220	70	50	22	190	12	4	H
11	74X8D223011AJ-02	225,5	198	44,45	40	18	166	12	4	I
	74X8D248011BG-02	247,5	220	70	50	20	188	12	4	I
	74X8D270011BG-02	269,5	242	70	50	22	210	12	4	I
12	74X8D222012AJ-02	222	192	44,45	40	16	145	12	4	J
	74X8D246012BG-02	246	216	70	50	18	170	12	4	J
	74X8D270012BG-02	270	240	70	50	20	195	12	4	J
13	74X8D241013BG-02	240,5	208	70	50	16	150	12	4	K
	74X8D267013BG-02	266,5	234	70	50	18	175	12	4	K
	74X8D293013BJ-02	292,5	260	100	50	20	205	12	4	K
14	74X8D259014BG-02	259	224	70	50	16	170	12	4	L
	74X8D287014BJ-02	287	252	100	50	18	200	12	4	L
	74X8D263015BJ-02	262,5	225	100	50	15	180	12	4	M
15	74X8D293015BJ-02	292,5	255	100	50	17	200	12	4	M
	74X8D280016BJ-02	280	240	100	50	15	190	12	4	N
	74X8D296016BJ-02	296	256	100	50	16	200	12	4	N
17	74X8D300017BJ-02	297,5	255	100	50	15	200	12	4	O
18	74X8D315018BJ-02	315	226	100	50	15	200	12	4	P

SPARE PARTS

Insert screw

SM30-082-20

for inserts:

A

Insert screw

SM40-110-00

for inserts:

B

Insert screw

SM40-130-00

for inserts:

C

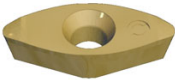
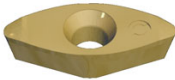
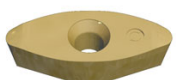
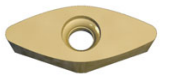
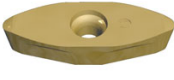
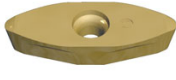
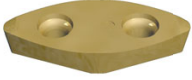
Insert screw

SM50-140-10

for inserts:

D E F G H I J K L M N O P

INSERTS

A VCDV0303	B VCDV0404	C VCDV0506	D VCDV0607
			
			
E VCDV0707	F VCDV0807	G VCDV0907	H VCDV1007
			
			
I VCDV1107	J VCDV1207	K VCDV1307	L VCDV1407
			
			
M VCDV1507	N VCDV1607	O VCDV1707	P VCDV1807
			
			

Shapers are generally produced for spur gears in class B according DIN 1829. Shapers für helical gears on request.

Designation	Description	No. of corners	Grade	A35HP	APH130
VCDV_	positive geometry	2			

● = P ● = M ● = K ● = N ● = S ○ = H

Shaping of an internal wheel

module 6, $z = -77$, $b = 170$ mm, material: 42CrMo4

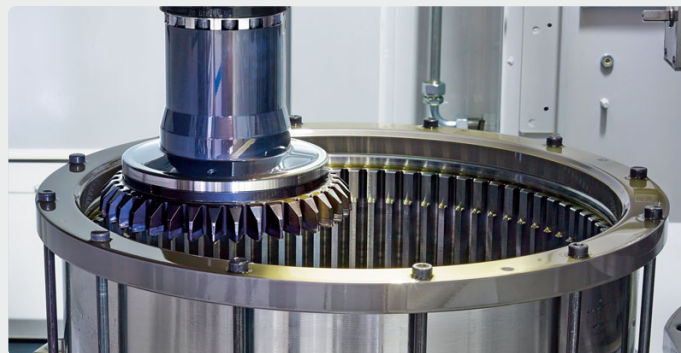
Shaper with $z = 36$:

$n = 141$ DS/min

$Sr = 0,0024 - 0,0013$ mm/DS

$Sw = 1,885$ mm/DS

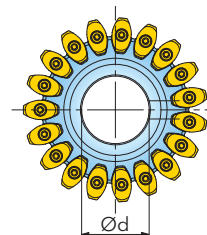
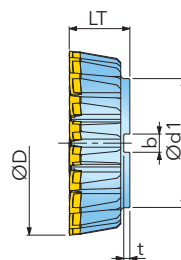
$ae = 12,2$ mm



Shaper



(DIN 5480)



Module	Designation	D	D ₀	d	LT	Z	d1	b	t	Fitting insert
3	74X8D112003AG-54	111,9	108	31,75	40	36	85	12	4	A
	74X8D130003AJ-54	129,9	125	44,45	40	42	100	12	4	A
	74X8D148003AJ-54	147,9	144	44,45	40	48	120	12	4	A
4	74X8D085004AG-54	85,2	80	31,75	40	20	73	12	4	B
	74X8D109004AG-54	109,2	104	31,50	40	26	97	12	4	B
	74X8D125004AJ-54	125,2	120	44,45	40	30	113	12	4	B
5	74X8D107005AG-54	106,5	100	31,50	40	20	88	12	4	C
	74X8D137005AJ-54	136,5	130	44,45	40	26	118	12	4	C
	74X8D157005AJ-54	156,5	150	44,45	40	30	138	12	4	C
6	74X8D128006AG-54	127,8	120	31,75	40	20	102	12	4	D
	74X8D164006AJ-54	163,8	156	44,45	40	26	138	12	4	D
	74X8D188006AJ-54	187,8	180	44,45	40	30	162	12	4	D
7	74X8D149007AJ-54	149,1	140	44,45	40	20	115	12	4	E
	74X8D191007AJ-54	191,1	182	44,45	40	26	157	12	4	E
	74X8D219007BG-54	219,1	210	70	50	30	185	12	4	E
8	74X8D170008AJ-54	170,4	160	44,45	40	20	130	12	4	F
	74X8D218008BG-54	218,4	208	70	50	26	178	12	4	F
	74X8D250008BG-54	250,4	240	70	50	30	210	12	4	F
9	74X8D192009AJ-54	191,7	180	44,45	40	20	143	12	4	G
	74X8D246009BG-54	245,7	234	70	50	26	197	12	4	G
	74X8D282009BG-54	281,7	270	70	50	30	233	12	4	G
10	74X8D293010AJ-54	193	180	44,45	40	18	150	12	4	H
	74X8D213010BG-54	213	200	70	50	20	155	12	4	H
	74X8D233010BG-54	233	220	70	50	22	160	12	4	H
11	74X8D223011AJ-54	225,5	198	44,45	40	18	166	12	4	I
	74X8D248011BG-54	247,5	220	70	50	20	188	12	4	I
	74X8D270011BG-54	269,5	242	70	50	22	210	12	4	I
12	74X8D222012AJ-54	222	192	44,45	40	16	145	12	4	J
	74X8D246012BG-54	246	216	70	50	18	170	12	4	J
	74X8D270012BG-54	270	240	70	50	20	195	12	4	J
13	74X8D241013BG-54	240,5	208	70	50	16	150	12	4	K
	74X8D267013BG-54	266,5	234	70	50	18	175	12	4	K
	74X8D293013BJ-54	292,5	260	100	50	20	205	12	4	K
14	74X8D259014BG-54	259	224	70	50	16	170	12	4	L
	74X8D287014BJ-54	287	252	100	50	18	200	12	4	L
	74X8D263015BJ-54	262,5	225	100	50	15	180	12	4	M
15	74X8D293015BJ-54	292,5	255	100	50	17	200	12	4	M
	74X8D280016BJ-54	280	240	100	50	15	190	12	4	N
	74X8D296016BJ-54	296	256	100	50	16	200	12	4	N
17	74X8D300017BJ-54	297,5	255	100	50	15	200	12	4	O
18	74X8D315018BJ-54	315	226	100	50	15	200	12	4	P

SPARE PARTS

Insert screw

SM30-082-20

for inserts:

A

Insert screw

SM40-110-00

for inserts:

B

Insert screw

SM40-130-00

for inserts:

C

Insert screw

SM50-140-10

for inserts:

D E F G H I J K L M N O P

SOLID CARBIDE INSERTS

A VCDV0303-DIN5480**B** VCDV0404-DIN5480**C** VCDV0506-DIN5480**D** VCDV0607-DIN5480**E** VCDV0707-DIN5480**F** VCDV0807-DIN5480**G** VCDV0907-DIN5480**H** VCDV1007-DIN5480**I** VCDV1107-DIN5480**J** VCDV1207-DIN5480**K** VCDV1307-DIN5480**L** VCDV1408-DIN5480**M** VCDV1508-DIN5480**N** VCDV1608-DIN5480**O** VCDV1708-DIN5480**P** VCDV1808-DIN5480

Shapers are generally produced for spur gears in class B according DIN 1829. Shapers für helical gears on request.

Designation	Description	No. of corners	Grade	A35HP	APH130
VCDV_	positive geometry	2			

● = P ● = M ● = K ● = N ● = S ○ = H

Grades information for Shaper

APH130	High chipping and fracture resistance Designed for machining austenitic stainless steel under general cutting conditions	
A35HP	High fracture resistance Suitable for machining steel and stainless steel under general cutting conditions	

 = P
 = M
 = K
 = N
 = S
 = H

NOTES



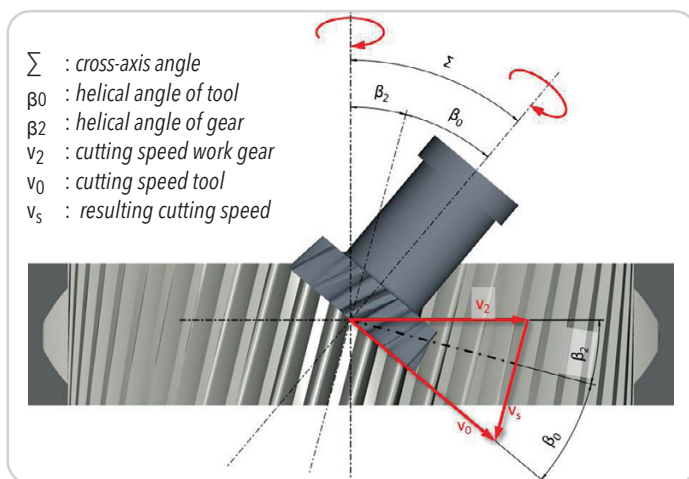
General Description

Development of gear skiving has been started at the beginning of the twentieth century. The new machining process for production of gears was then applied for a patent by Wilhelm von Pittler in 1910. Although gear skiving promised great potential in terms of productivity and flexibility, it was not successful in practice and was forgotten. The technical possibilities of that time were not yet available in the areas of machine control and tool performance for this high-performance machining process. Thanks to enormous progress in both machine tools and tools, thanks to modern cutting materials and coatings, gear skiving is now suitable for serial production and promises to be an interesting alternative to the established machining processes such as hobbing and gear shaping.

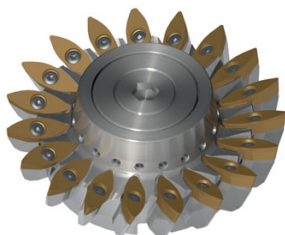
Gear skiving is a continuous cutting process for the production of so-called rotationally symmetrical periodic structures, primarily gears. The skiving tool and the work gear rotate with crossed axes according to a helical gear pair. With the helical gear pairing, the movement is divided into a rolling and a screwing part, which becomes a sliding cutting movement when skiving. The larger you choose the cross-axis angle, the more the rolling component decreases and the screwing component increases, which leads to an increase of cutting speed. Cutting speed can only be varied by changing axis arrangement and speed of tool and work gear. Skiving tool and work gear receive rotary movements that are related to each other in the ratio of the number of teeth z_2/z_0 . The cross-axis angle Σ is equal to the difference in the case of opposing flank directions; in the case of flank directions in the same direction, it is equal to the sum of the helical angles of skiving tool β_0 and work gear β_2 .



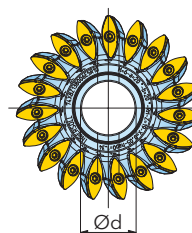
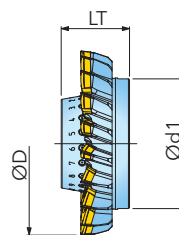
In simple terms, gear skiving can be viewed as a combination of hobbing and gear shaping, combining some of the advantages of both machining processes. Primarily, these are the productivity of hobbing and the flexibility of gear shaping. Especially when machining internal gears compared to gear shaping, the gear skiving process scores with significantly higher productivity. Machining times for gear skiving are around 30% to 50% compared to the gear shaping process. In contrast to gear shaping, however, due to the inclined position of the tool in relation to the workpiece (cross-axis angle), gear skiving requires a machining path that is slightly larger than the width of the gearing to be produced. These additional paths are called approach and overrun distance. They increase as the cross-axis angle increases. Due to these necessary approach and overrun distances, gear skiving has few restrictions compared to gear shaping with very narrow internal gears and interfering contours. For the majority of applications that were previously reserved for gear shaping, gear skiving is a much more productive and economical machining method.



Skiving cutter



(DIN 3972)



Module	Designation	D	D ₀ ⁽¹⁾	d	LT	z	d1	α ⁽²⁾	β ⁽³⁾	Fitting insert
3	74X8Z094003AG-02	94	86,5	31,75	40	27	76	20	20	A
	74X8Z106003AG-02	106	98,5	31,75	40	31	88	20	20	A
	74X8Z152003AJ-02	132	124,5	44,45	40	39	114	20	20	A
4	74X8Z091004AG-02	91	81	31,75	40	19	67	20	20	B
	74X8Z108004AG-02	108	98	31,75	40	23	84	20	20	B
	74X8Z133004AJ-02	133	123	44,45	40	29	109	20	20	B
5	74X8Z114005AG-02	114	101,5	31,75	40	19	84	20	20	C
	74X8Z135005AJ-02	135	122,5	44,45	40	23	105	20	20	C
	74X8Z167005AJ-02	167	154,5	44,45	40	29	137	20	20	C
6	74X8Z136006AG-02	136	121	31,75	40	19	100	20	20	D
	74X8Z171006AJ-02	162	147	44,45	40	23	126	20	20	D
	74X8Z200006AJ-02	200	185	44,45	40	29	164	20	20	D
7	74X8Z159007AJ-02	159	141,5	44,45	40	19	117	20	20	E
	74X8Z216007AJ-02	189	171,5	44,45	40	23	147	20	20	E
	74X8Z267007BG-02	234	216,5	70	50	29	192	20	20	E
8	74X8Z164008AJ-02	164	144	44,45	40	17	116	20	20	F
	74X8Z182008BG-02	182	162	70	50	19	134	20	20	F
	74X8Z216008BG-02	216	196	70	50	23	168	20	20	F
9	74X8Z204009AJ-02	185	162,5	44,45	40	17	131	20	20	G
	74X8Z205009BG-02	205	182,5	70	50	19	151	20	20	G
	74X8Z243009BG-02	243	220,5	70	50	23	189	20	20	G
10	74X8Z185010AJ-02	185	160	44,45	40	15	125	20	20	H
	74X8Z206010BG-02	206	181	70	50	17	146	20	20	H
	74X8Z249010BG-02	249	224	70	50	21	189	20	20	H
11	74X8Z203011AJ-02	203	175,5	44,45	40	15	137	20	20	I
	74X8Z227011BG-02	227	199,5	70	50	17	161	20	20	I
	74X8Z250011BG-02	250	222,5	70	50	19	184	20	20	I
12	74X8Z222012AJ-02	222	192	44,45	40	15	150	20	20	J
	74X8Z247012BG-02	247	217	70	50	17	175	20	20	J
	74X8Z272012BG-02	272	242	70	50	19	200	20	20	J

(1) : D₀ = PCD, (2) : α = Pressure angle, (3) : β = helical angle

SPARE PARTS

Insert screw

SM30-082-20

for inserts:

A



Insert screw

SM40-110-00

for inserts:

B



Insert screw

SM40-130-00

for inserts:

C



Insert screw

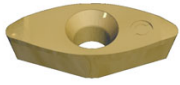
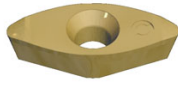
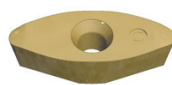
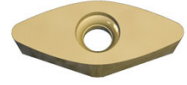
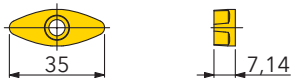
SM50-140-10

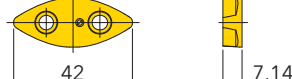
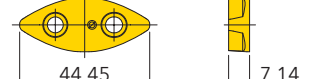
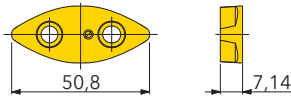
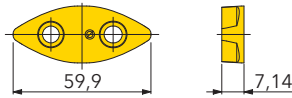
for inserts:

D E F G H I J



SOLID CARBIDE INSERTS

A VCDW0303

B VCDW0404

C VCDW0506

D VCDW0607

E VCDW0707

F VCDW0807

G VCDW0907

H VCDW1007

I VCDW1107

J VCDW1207


Skiving Cutter are generally produced for spur gears in class B according DIN 1829. Skiving Cutter for helical gears on request..

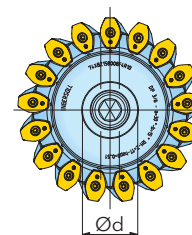
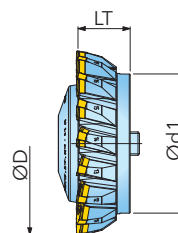
Designation	Description	No. of corners	Grade	A35HP	APH130
VCDW_	positive geometry	2			

● = P ● = M ● = K ● = N ● = S ○ = H



Skiving cutter

(DIN 5480)



Module	Designation	D	D ₀ ⁽¹⁾	d	LT	z	d1	α ⁽²⁾	β ⁽³⁾	Fitting insert
3	74X8Z086003AG-54	86	78,7	31,75	40	27	74	30	20	A
	74X8Z099003AG-54	99	91,5	31,75	40	31	87	30	20	A
	74X8Z125003AJ-54	125	117	44,45	40	39	113	30	20	A
4	74X8Z081004AG-54	81	70,9	31,75	40	19	65	30	20	B
	74X8Z098004AG-54	98	87,9	31,75	40	23	82	30	20	B
	74X8Z123004AJ-54	123	113	44,45	40	29	107	30	20	B
5	74X8Z101005AG-54	101	88,6	31,75	40	19	81	30	20	C
	74X8Z122005AJ-54	122	110	44,45	40	23	102	30	20	C
	74X8Z154005AJ-54	154	142	44,45	40	29	134	30	20	C
6	74X8Z121006AG-54	121	106	31,75	40	19	97	30	20	D
	74X8Z147006AJ-54	147	132	44,45	40	23	123	30	20	D
	74X8Z185006AJ-54	185	170	44,45	40	29	161	30	20	D
7	74X8Z142007AJ-54	142	124	44,45	40	19	114	30	20	E
	74X8Z171007AJ-54	171	154	44,45	40	23	143	30	20	E
	74X8Z216007BG-54	216	199	70	50	29	188	30	20	E
8	74X8Z145008AJ-54	145	125	44,45	40	17	113	30	20	F
	74X8Z162008BG-54	162	142	70	50	19	130	30	20	F
	74X8Z196008BG-54	196	176	70	50	23	164	30	20	F
9	74X8Z163009AJ-54	163	140	44,45	40	17	127	30	20	G
	74X8Z182009BG-54	182	159	70	50	19	146	30	20	G
	74X8Z220009BG-54	220	198	70	50	23	184	30	20	G
10	74X8Z160010AJ-54	160	135	44,45	40	15	120	30	20	H
	74X8Z181010BG-54	181	156	70	50	17	141	30	20	H
	74X8Z223010BG-54	223	198	70	50	21	183	30	20	H
11	74X8Z176011AJ-54	176	148	44,45	40	15	132	30	20	I
	74X8Z199011BG-54	199	171	70	50	17	155	30	20	I
	74X8Z222011BG-54	222	195	70	50	19	178	30	20	I
12	74X8Z192012AJ-54	192	162	44,45	40	15	144	30	20	J
	74X8Z217012BG-54	217	187	70	50	17	169	30	20	J
	74X8Z243012BG-54	243	213	70	50	19	195	30	20	J

(1) : D₀ = PCD, (2) : α = Pressure angle, (3) : β = Helical angle

SPARE PARTS

Insert screw

SM30-082-20

for inserts:

A


Insert screw

SM40-110-00

for inserts:

B


Insert screw

SM40-130-00

for inserts:

C


Insert screw

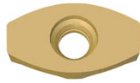
SM50-140-10

for inserts:

D E F G H I J


SOLID CARBIDE INSERTS

A VCDW0303-DIN5480

B VCDW0404-DIN5480

C VCDW0506-DIN5480

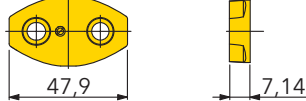
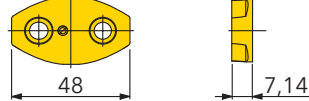
D VCDW0607-DIN5480

E VCDW0707-DIN5480

F VCDW0807-DIN5480

G VCDW0907-DIN5480

H VCDW1007-DIN5480

I VCDW1107-DIN5480

J VCDW1207-DIN5480


Skiving Cutter are generally produced for spur gears in class B according DIN 1829. Skiving Cutter for helical gears on request.

Designation	Description	No. of corners	Grade	A35HP	APH130
VCDW_	positive geometry	2			
● = P ● = M ● = K ● = N ● = S ○ = H					

TUNG^{EAR}GASH
TUNG^{EAR}GSHAPE
TUNG^{EAR}GSKIVE



Application range

Involute gear (external)



DIN 3960 / 3972
20° pressure angle
Tooth height 2,25 x m
Spur & helical teeth

Spline gear (external)



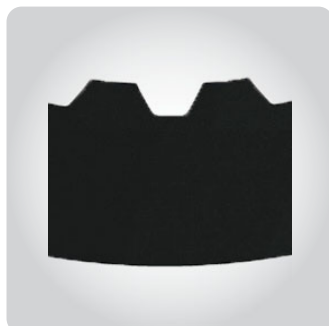
DIN 5480
30° pressure angle
Tooth height 1,10 x m
Normally only spur teeth

Involute gear (internal)



DIN 3960 / 3972
20° pressure angle
Tooth height 2,25 x m
Spur & helical teeth

Spline gear (internal)



DIN 5480
30° pressure angle
Tooth height 1,10 x m
Normally only spur teeth

Grades information for TungMeister gear heads

A35HP

High fracture resistance
Suitable for machining steel and stainless steel under general cutting conditions



● = P ● = M ● = K ● = N ● = S ○ = H

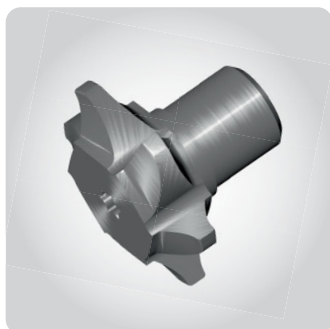
Special Solutions with TungMeister

Blank:

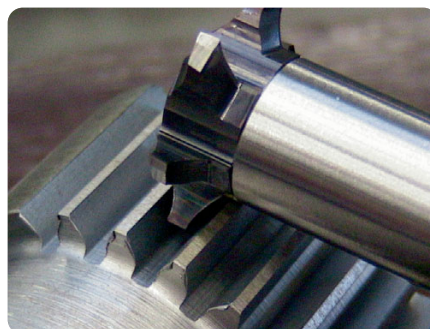


Diameter: 17,0 mm to 35,0 mm
Cutting width: 1,9 mm to 16 mm
Cutting depth: to 6 mm
Module sizes: module 0,8 - 3,5

Example:



TungMeister 18Z25002TRRA061 A35HP



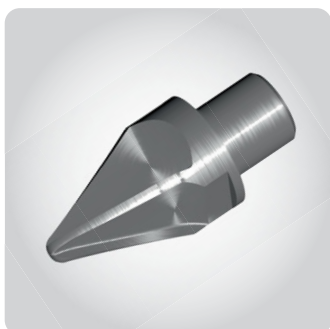
Gear finish mill module 2; No. of gear teeth = 23

Blank



Cutting depth: to 6 mm
Cutting width: 10 mm to 25 mm
Diameter: 8 mm to 25 mm
Module sizes: module 2.5 to 12

Example:

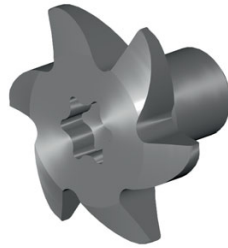


TungMeister 47Z04037TURA10 AH730

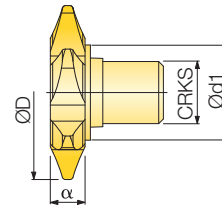


Gear finish end mill module 12;
No. of gear teeth = 128

Gear Finishing Gasher



(DIN 3972)



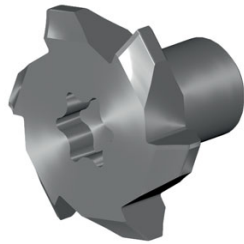
Module	Designation	D	d1	a max.	CRKS	z	zmin ⁽¹⁾	zmax ⁽²⁾	α ⁽³⁾
0,8	18Z17008T6RA120	17	9,5	4,5	S06	6	11	13	20
	18Z17008T6RA150	17	9,5	4,5	S06	6	14	16	20
	18Z17008T6RA180	17	9,5	4,5	S06	6	17	19	20
	18Z17008T6RA210	17	9,5	4,5	S06	6	20	22	20
	18Z17008T6RA240	17	9,5	4,5	S06	6	23	25	20
	18Z17008T6RA270	17	9,5	4,5	S06	6	26	28	20
	18Z17008T6RA300	17	9,5	4,5	S06	6	29	31	20
	18Z17008T6RA330	17	9,5	4,5	S06	6	32	34	20
	18Z17008T6RA360	17	9,5	4,5	S06	6	35	37	20
	18Z17008T6RA390	17	9,5	4,5	S06	6	38	40	20
	18Z17010T6RA120	17	9,5	4,5	S06	6	11	13	20
	18Z17010T6RA150	17	9,5	4,5	S06	6	14	16	20
1	18Z17010T6RA180	17	9,5	4,5	S06	6	17	19	20
	18Z17010T6RA210	17	9,5	4,5	S06	6	20	22	20
	18Z17010T6RA240	17	9,5	4,5	S06	6	23	25	20
	18Z17010T6RA270	17	9,5	4,5	S06	6	26	28	20
	18Z17010T6RA300	17	9,5	4,5	S06	6	29	31	20
	18Z17010T6RA330	17	9,5	4,5	S06	6	32	34	20
	18Z17010T6RA360	17	9,5	4,5	S06	6	35	37	20
	18Z17010T6RA390	17	9,5	4,5	S06	6	38	40	20
	18Z23013T8RA120	23	11,5	9,9	S08	6	11	13	20
	18Z23013T8RA150	23	11,5	9,9	S08	6	14	16	20
	18Z23013T8RA180	23	11,5	9,9	S08	6	17	19	20
	18Z23013T8RA210	23	11,5	9,9	S08	6	20	22	20
1,25	18Z23013T8RA240	23	11,5	9,9	S08	6	23	25	20
	18Z23013T8RA270	23	11,5	9,9	S08	6	26	28	20
	18Z23013T8RA300	23	11,5	9,9	S08	6	29	31	20
	18Z23013T8RA330	23	11,5	9,9	S08	6	32	34	20
	18Z23013T8RA360	23	11,5	9,9	S08	6	35	37	20
	18Z23013T8RA390	23	11,5	9,9	S08	6	38	40	20
	18Z28015T8RA120	28	15,2	10,3	S10	6	11	13	20
	18Z28015T8RA150	28	15,2	10,3	S10	6	14	16	20
	18Z28015T8RA180	28	15,2	10,3	S10	6	17	19	20
	18Z28015T8RA210	28	15,2	10,3	S10	6	20	22	20
	18Z28015T8RA240	28	15,2	10,3	S10	6	23	25	20
	18Z28015T8RA270	28	15,2	10,3	S10	6	26	28	20
1,5	18Z28015T8RA300	28	15,2	10,3	S10	6	29	31	20
	18Z28015T8RA330	28	15,2	10,3	S10	6	32	34	20
	18Z28015T8RA360	28	15,2	10,3	S10	6	35	37	20
	18Z28015T8RA390	28	15,2	10,3	S10	6	38	40	20
	18Z28020T8RA120	28	15,2	10,3	S10	6	11	13	20
	18Z28020T8RA150	28	15,2	10,3	S10	6	14	16	20
	18Z28020T8RA180	28	15,2	10,3	S10	6	17	19	20
	18Z28020T8RA210	28	15,2	10,3	S10	6	20	22	20
	18Z28020T8RA240	28	15,2	10,3	S10	6	23	25	20
	18Z28020T8RA270	28	15,2	10,3	S10	6	26	28	20
	18Z28020T8RA300	28	15,2	10,3	S10	6	29	31	20
	18Z28020T8RA330	28	15,2	10,3	S10	6	32	34	20
2	18Z28020T8RA360	28	15,2	10,3	S10	6	35	37	20
	18Z28020T8RA390	28	15,2	10,3	S10	6	38	40	20
	18Z35025T8RA120	35	18,3	16	S12	8	12	-	20
	18Z35025T8RA160	35	18,3	16	S12	8	16	-	20
	18Z35025T8RA200	35	18,3	16	S12	8	20	-	20
	18Z35025T8RA240	35	18,3	16	S12	8	24	-	20
	18Z35025T8RA280	35	18,3	16	S12	8	28	-	20
	18Z35025T8RA320	35	18,3	16	S12	8	32	-	20
	18Z35025T8RA360	35	18,3	16	S12	8	36	-	20
	18Z35025T8RA400	35	18,3	16	S12	8	40	-	20
	18Z35025T8RA440	35	18,3	16	S12	8	44	-	20
	18Z35025T8RA480	35	18,3	16	S12	8	48	-	20
2,5	18Z35030T8RA120	35	18,3	16	S12	8	12	-	20
	18Z35030T8RA160	35	18,3	16	S12	8	16	-	20
	18Z35030T8RA200	35	18,3	16	S12	8	20	-	20
	18Z35030T8RA240	35	18,3	16	S12	8	24	-	20
	18Z35030T8RA280	35	18,3	16	S12	8	28	-	20
	18Z35030T8RA320	35	18,3	16	S12	8	32	-	20
	18Z35030T8RA360	35	18,3	16	S12	8	36	-	20
	18Z35030T8RA400	35	18,3	16	S12	8	40	-	20
	18Z35030T8RA440	35	18,3	16	S12	8	44	-	20
	18Z35030T8RA480	35	18,3	16	S12	8	48	-	20
	18Z35030T8RA120	35	18,3	16	S12	8	12	-	20
	18Z35030T8RA160	35	18,3	16	S12	8	16	-	20
3	18Z35030T8RA200	35	18,3	16	S12	8	20	-	20
	18Z35030T8RA240	35	18,3	16	S12	8	24	-	20
	18Z35030T8RA280	35	18,3	16	S12	8	28	-	20
	18Z35030T8RA320	35	18,3	16	S12	8	32	-	20
	18Z35030T8RA360	35	18,3	16	S12	8	36	-	20
	18Z35030T8RA400	35	18,3	16	S12	8	40	-	20
	18Z35030T8RA440	35	18,3	16	S12	8	44	-	20
	18Z35030T8RA480	35	18,3	16	S12	8	48	-	20
	18Z35030T8RA120	35	18,3	16	S12	8	12	-	20
	18Z35030T8RA160	35	18,3	16	S12	8	16	-	20
	18Z35030T8RA200	35	18,3	16	S12	8	20	-	20
	18Z35030T8RA240	35	18,3	16	S12	8	24	-	20

(1) : Zmin = Minimum number of teeth, (2) : Zmax = Maximum number of teeth (3) : α = Pressure angle

Gear milling cutter for finishing of spur gears with basic rack profile II according to DIN3972 and addendum modification factor x=0. The gear quality IT8 can be achieved in the specified number of teeth range.

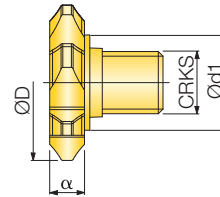
Designation	Description	Grade	A35HP
18Z_	positive geometry		

● = P
 ● = M
 ● = K
 ● = N
 ● = S
 ○ = H



Gear Finishing Gasher

(DIN 5480)



Module	Designation	D	d1	a max.	CRKS	z	zmin ⁽¹⁾	zmax ⁽²⁾	α ⁽³⁾
0,8	18Z17008T6RB120	17	9,5	4,5	S06	6	11	13	30
	18Z17008T6RB150	17	9,5	4,5	S06	6	14	16	30
	18Z17008T6RB180	17	9,5	4,5	S06	6	17	19	30
	18Z17008T6RB210	17	9,5	4,5	S06	6	20	22	30
	18Z17008T6RB240	17	9,5	4,5	S06	6	23	25	30
	18Z17008T6RB270	17	9,5	4,5	S06	6	26	28	30
	18Z17008T6RB300	17	9,5	4,5	S06	6	29	31	30
	18Z17008T6RB330	17	9,5	4,5	S06	6	32	34	30
	18Z17008T6RB360	17	9,5	4,5	S06	6	35	37	30
	18Z17008T6RB390	17	9,5	4,5	S06	6	38	40	30
	18Z17010T6RB120	17	9,5	4,5	S06	6	11	13	30
	18Z17010T6RB150	17	9,5	4,5	S06	6	14	16	30
1	18Z17010T6RB180	17	9,5	4,5	S06	6	17	19	30
	18Z17010T6RB210	17	9,5	4,5	S06	6	20	22	30
	18Z17010T6RB240	17	9,5	4,5	S06	6	23	25	30
	18Z17010T6RB270	17	9,5	4,5	S06	6	26	28	30
	18Z17010T6RB300	17	9,5	4,5	S06	6	29	31	30
	18Z17010T6RB330	17	9,5	4,5	S06	6	32	34	30
	18Z17010T6RB360	17	9,5	4,5	S06	6	35	37	30
	18Z17010T6RB390	17	9,5	4,5	S06	6	38	40	30
	18Z23013T8RB120	23	11,5	9,9	S08	6	11	13	30
	18Z23013T8RB150	23	11,5	9,9	S08	6	14	16	30
	18Z23013T8RB180	23	11,5	9,9	S08	6	17	19	30
	18Z23013T8RB210	23	11,5	9,9	S08	6	20	22	30
1,25	18Z23013T8RB240	23	11,5	9,9	S08	6	23	25	30
	18Z23013T8RB270	23	11,5	9,9	S08	6	26	28	30
	18Z23013T8RB300	23	11,5	9,9	S08	6	29	31	30
	18Z23013T8RB330	23	11,5	9,9	S08	6	32	34	30
	18Z23013T8RB360	23	11,5	9,9	S08	6	35	37	30
	18Z23013T8RB390	23	11,5	9,9	S08	6	38	40	30
	18Z28015T8RB120	28	15,2	10,3	S10	6	11	13	30
	18Z28015T8RB150	28	15,2	10,3	S10	6	14	16	30
	18Z28015T8RB180	28	15,2	10,3	S10	6	17	19	30
	18Z28015T8RB210	28	15,2	10,3	S10	6	20	22	30
	18Z28015T8RB240	28	15,2	10,3	S10	6	23	25	30
	18Z28015T8RB270	28	15,2	10,3	S10	6	26	28	30
1,5	18Z28015T8RB300	28	15,2	10,3	S10	6	29	31	30
	18Z28015T8RB330	28	15,2	10,3	S10	6	32	34	30
	18Z28015T8RB360	28	15,2	10,3	S10	6	35	37	30
	18Z28015T8RB390	28	15,2	10,3	S10	6	38	40	30
	18Z28020T8RB120	28	15,2	10,3	S10	6	11	13	30
	18Z28020T8RB150	28	15,2	10,3	S10	6	14	16	30
	18Z28020T8RB180	28	15,2	10,3	S10	6	17	19	30
	18Z28020T8RB210	28	15,2	10,3	S10	6	20	22	30
	18Z28020T8RB240	28	15,2	10,3	S10	6	23	25	30
	18Z28020T8RB270	28	15,2	10,3	S10	6	26	28	30
	18Z28020T8RB300	28	15,2	10,3	S10	6	29	31	30
	18Z28020T8RB330	28	15,2	10,3	S10	6	32	34	30
2	18Z28020T8RB360	28	15,2	10,3	S10	6	35	37	30
	18Z28020T8RB390	28	15,2	10,3	S10	6	38	40	30
	18Z35025SRB120	35	18,3	16	S12	8	12	-	30
	18Z35025SRB160	35	18,3	16	S12	8	16	-	30
	18Z35025SRB200	35	18,3	16	S12	8	20	-	30
	18Z35025SRB240	35	18,3	16	S12	8	24	-	30
	18Z35025SRB280	35	18,3	16	S12	8	28	-	30
	18Z35025SRB320	35	18,3	16	S12	8	32	-	30
	18Z35025SRB360	35	18,3	16	S12	8	36	-	30
	18Z35025SRB400	35	18,3	16	S12	8	40	-	30
	18Z35025SRB440	35	18,3	16	S12	8	44	-	30
	18Z35025SRB480	35	18,3	16	S12	8	48	-	30
2,5	18Z35030TSRB120	35	18,3	16	S12	8	12	-	30
	18Z35030TSRB160	35	18,3	16	S12	8	16	-	30
	18Z35030TSRB200	35	18,3	16	S12	8	20	-	30
	18Z35030TSRB240	35	18,3	16	S12	8	24	-	30
	18Z35030TSRB280	35	18,3	16	S12	8	28	-	30
	18Z35030TSRB320	35	18,3	16	S12	8	32	-	30
	18Z35030TSRB360	35	18,3	16	S12	8	36	-	30
	18Z35030TSRB400	35	18,3	16	S12	8	40	-	30
	18Z35030TSRB440	35	18,3	16	S12	8	44	-	30
	18Z35030TSRB480	35	18,3	16	S12	8	48	-	30
	18Z35030TSRB120	35	18,3	16	S12	8	12	-	30
	18Z35030TSRB160	35	18,3	16	S12	8	16	-	30
3	18Z35030TSRB200	35	18,3	16	S12	8	20	-	30
	18Z35030TSRB240	35	18,3	16	S12	8	24	-	30
	18Z35030TSRB280	35	18,3	16	S12	8	28	-	30
	18Z35030TSRB320	35	18,3	16	S12	8	32	-	30
	18Z35030TSRB360	35	18,3	16	S12	8	36	-	30
	18Z35030TSRB400	35	18,3	16	S12	8	40	-	30
	18Z35030TSRB440	35	18,3	16	S12	8	44	-	30
	18Z35030TSRB480	35	18,3	16	S12	8	48	-	30
	18Z35030TSRB120	35	18,3	16	S12	8	12	-	30
	18Z35030TSRB160	35	18,3	16	S12	8	16	-	30
	18Z35030TSRB200	35	18,3	16	S12	8	20	-	30
	18Z35030TSRB240	35	18,3	16	S12	8	24	-	30

(1) : Zmin = Minimum number of teeth, (2) : Zmax = Maximum number of teeth, (3) : α = Pressure angle

Gear milling cutter for finishing of spline gears with basic rack profile according to DIN5480. The gear quality IT8 can be achieved in the specified number of teeth range.

Designation	Description	Grade	A35HP
18Z_	positive geometry		

● = P ● = M ● = K ● = N ● = S ○ = H

Special Solutions with TungMeister

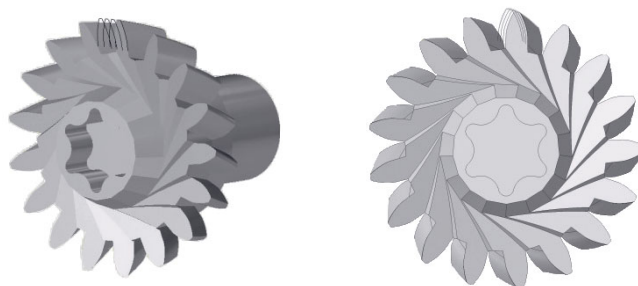
Module (spur gear)	0,4 – 1,0	0,4 – 1,3	0,4 – 1,6	0,4 – 2,0	0,4 – 6,0
Module (splines)	0,4 – 2,0	0,4 – 2,5	0,4 – 3,0	0,4 – 3,0	0,4 – 6,0
Diameter range	Ø 15 – 17	Ø 17 – 23	Ø 23 – 28	Ø 28 – 35	Ø 60 – 125
Blanks					
example of tools					
	74D16511T6R01	74Z23012T8RA101	74Z28020TRRA101	74Z35007TSRA101	74Z56025BAAA191

TungMeister-Adaption you will find in the catalog and webshop

Regrinding of tools



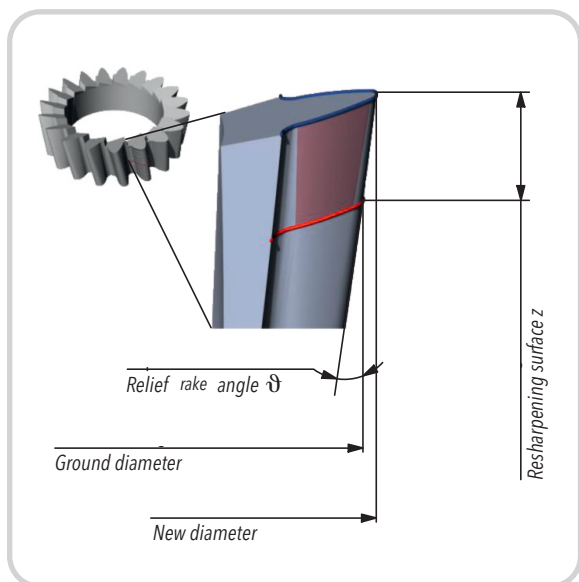
New tool



Completely reground tool

- Regrinding takes place exclusively on the rake face
- Tool diameter changes with each regrinding

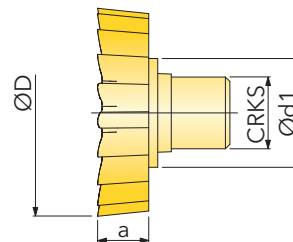
- When using reground tools, center distance and tool length must be necessarily adapted



Shaper



(DIN 3960 / 3972)



Module	Designation	D	d1	a	CRKS	z	$\alpha^{(1)}$
0,4	74D16504T6RA390	16,5	9,5	4,5	S06	39	20
	74D23004T8RA550	23	11,5	7	S08	55	20
	74D28004TRRA680	28	15,2	7,5	S10	68	20
	74D35004TSRA850	35	18,3	8,5	S12	85	20
0,5	74D16505T6RA310	16,5	9,5	4,5	S06	31	20
	74D23005T8RA440	23	11,5	7	S08	44	20
	74D28005TRRA540	28	15,2	7,5	S10	54	20
	74D35005TSRA680	35	18,3	8,5	S12	68	20
0,6	74D16506T6RA250	16,5	9,5	4,5	S06	25	20
	74D23006T8RA360	23	11,5	7	S08	36	20
	74D28006TRRA440	28	15,2	7,5	S10	44	20
	74D35006TSRA560	35	18,3	8,5	S12	56	20
0,7	74D16507T6RA200	16,5	9,5	4,5	S06	21	20
	74D23007T8RA290	23	11,5	7	S08	30	20
	74D28007TRRA380	28	15,2	7,5	S10	38	20
	74D35007TSRA480	35	18,3	8,5	S12	48	20
0,8	74D16508T6RA180	16,5	9,5	4,5	S06	18	20
	74D23008T8RA260	23	11,5	7	S08	26	20
	74D28008TRRA330	28	15,2	7,5	S10	33	20
	74D35008TSRA410	35	18,3	8,5	S12	41	20
0,9	74D23009T8RA230	23	11,5	7	S08	23	20
	74D28009TRRA290	28	15,2	7,5	S10	29	20
	74D35009TSRA360	35	18,3	8,5	S12	36	20
	74D23010T8RA210	23	11,5	7	S08	21	20
1	74D28010TRRA260	28	15,2	7,5	S10	26	20
	74D35010TSRA330	35	18,3	8,5	S12	33	20
	74D23011T8RA190	23	11,5	7	S08	19	20
	74D28011TRRA230	28	15,2	7,5	S10	23	20
1,1	74D35011TSRA290	35	18,3	8,5	S12	29	20
	74D28012TRRA210	28	15,2	7,5	S10	21	20
	74D35012TSRA270	35	18,3	8,5	S12	27	20
	74D28013TRRA190	28	15,2	7,5	S10	19	20
1,3	74D35013TSRA250	35	18,3	8,5	S12	25	20
	74D35014TSRA230	35	18,3	8,5	S12	23	20
	74D35015TSRA210	35	18,3	8,5	S12	21	20
	74D35016TSRA200	35	18,3	8,5	S12	20	20
1,6	74D35017TSRA180	35	18,3	8,5	S12	18	20
1,8	74D35018TSRA170	35	18,3	8,5	S12	17	20
1,9	74D35019TSRA160	35	18,3	8,5	S12	16	20
2	74D35020TSRA150	35	18,3	8,5	S12	15	20
2,1	74D35021TSRA140	35	18,3	8,5	S12	14	20

(1) : α = Pressure angle

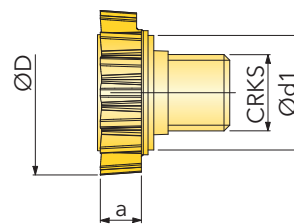
Designation	Description	Grade	A35HP
74D_	positive geometry		

● = P ● = M ● = K ● = N ● = S ○ = H

Shaper



(DIN 5480)



Module	Designation	D	d1	a	CRKS	z	$\alpha^{(1)}$
0,4	74D16504T6RB400	16,5	9,5	4,5	S06	40	30
	74D23004T8RB570	23	11,5	7	S08	57	30
	74D28004TRRB650	28	15,2	7,5	S10	69	30
	74D35004TSRB870	35	18,3	8,5	S12	87	30
0,5	74D16505T6RB320	16,5	9,5	4,5	S06	32	30
	74D23005T8RB450	23	11,5	7	S08	45	30
	74D28005TRRB550	28	15,2	7,5	S10	55	30
	74D35005TSRB690	35	18,3	8,5	S12	69	30
0,6	74D16506T6RB260	16,5	9,5	4,5	S06	26	30
	74D23006T8RB370	23	11,5	7	S08	37	30
	74D28006TRRB460	28	15,2	7,5	S10	46	30
	74D35006TSRB570	35	18,3	8,5	S12	57	30
0,7	74D16507T6RR220	16,5	9,5	4,5	S06	22	30
	74D23007T8RB320	23	11,5	7	S08	32	30
	74D28007TRRB390	28	15,2	7,5	S10	39	30
	74D35007TSRB490	35	18,3	8,5	S12	49	30
0,8	74D16508T6RB190	16,5	9,5	4,5	S06	19	30
	74D23008T8RB280	23	11,5	7	S08	28	30
	74D28008TRRB340	28	15,2	7,5	S10	34	30
	74D35008TSRB430	35	18,3	8,5	S12	43	30
0,9	74D16509T6RB170	16,5	9,5	4,5	S06	17	30
	74D23009T8RB240	23	11,5	7	S08	24	30
	74D28009TRRB300	28	15,2	7,5	S10	30	30
	74D35009TSRB380	35	18,3	8,5	S12	38	30
1	74D16510T6RB150	16,5	9,5	4,5	S06	15	30
	74D23010T8RB220	23	11,5	7	S08	22	30
	74D28010TRRB270	28	15,2	7,5	S10	27	30
	74D35010TSRB340	35	18,3	8,5	S12	34	30
1,1	74D23011T8RB200	23	11,5	7	S08	20	30
	74D28011TRRB240	28	15,2	7,5	S10	24	30
	74D35011TSRB310	35	18,3	8,5	S12	31	30
	74D23012T8RB180	23	11,5	7	S08	18	30
1,2	74D28012TRRB220	28	15,2	7,5	S10	22	30
	74D35012TSRB280	35	18,3	8,5	S12	28	30
	74D23013T8RB170	23	11,5	7	S08	17	30
	74D28013TRRB200	28	15,2	7,5	S10	20	30
1,3	74D35013TSRB260	35	18,3	8,5	S12	26	30
	74D23014T8RB150	23	11,5	7	S08	15	30
1,4	74D28014TRRB190	28	15,2	7,5	S10	19	30
	74D35014TSRB240	35	18,3	8,5	S12	24	30
1,5	74D28015TRRB170	28	15,2	7,5	S10	17	30
	74D35015TRRB220	35	18,3	8,5	S12	22	30
1,6	74D28016TRRB160	28	15,2	7,5	S10	16	30
	74D35016TSRB210	35	18,3	8,5	S12	21	30
1,7	74D28017TRRB150	28	15,2	7,5	S10	15	30
	74D35017TSRB190	35	18,3	8,5	S12	19	30
1,8	74D35018TSRB180	35	18,3	8,5	S12	18	30
	74D35019TSRB170	35	18,3	8,5	S12	17	30
2	74D35020TSRB160	35	18,3	8,5	S12	16	30
	74D35020TSRA150	35	18,3	8,5	S12	15	30

(1) : α = Pressure angle

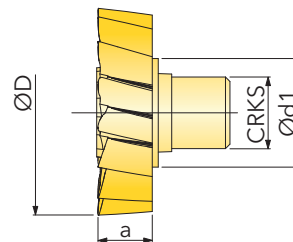
Designation	Description	Grade	A35HP
74D_	positive geometry		

● = P
 ● = M
 ● = K
 ● = N
 ● = S
 ○ = H

Skiving cutter



(DIN 3972)



Module	Designation	D	d1	a	CRKS	z	$\alpha^{(1)}$	$\beta^{(2)}$
0,4	74Z16504T6RA360	16,5	9,5	4,5	S06	36	20	20
	74Z23004T8RA510	23	11,5	7	S08	51	20	20
	74Z28004TRRA630	28	15,2	7,5	S10	63	20	20
	74Z35004TSRA800	35	18,3	8,5	S12	80	20	20
0,5	74Z16505T6RA290	16,5	9,5	4,5	S06	29	20	20
	74Z23005T8RA410	23	11,5	7	S08	41	20	20
	74Z28005TRRA500	28	15,2	7,5	S10	50	20	20
	74Z35005TSRA640	35	18,3	8,5	S12	64	20	20
0,6	74Z16506T6RA240	16,5	9,5	4,5	S06	24	20	20
	74Z23006T8RA340	23	11,5	7	S08	34	20	20
	74Z28006TRRA420	28	15,2	7,5	S10	42	20	20
	74Z35006TSRA530	35	18,3	8,5	S12	53	20	20
0,7	74Z16507T6RA200	16,5	9,5	4,5	S06	20	20	20
	74Z23007T8RA290	23	11,5	7	S08	29	20	20
	74Z28007TRRA360	28	15,2	7,5	S10	36	20	20
	74Z35007TSRA450	35	18,3	8,5	S12	45	20	20
0,8	74Z16508T6RA170	16,5	9,5	4,5	S06	17	20	20
	74Z23008T8RA250	23	11,5	7	S08	25	20	20
	74Z28008TRRA310	28	15,2	7,5	S10	31	20	20
	74Z35008TSRA390	35	18,3	8,5	S12	39	20	20
0,9	74Z23009T8RA220	23	11,5	7	S08	22	20	20
	74Z28009TRRA270	28	15,2	7,5	S10	27	20	20
	74Z35009TSRA340	35	18,3	8,5	S12	34	20	20
	74Z23010T8RA190	23	11,5	7	S08	19	20	20
1,0	74Z28010TRRA240	28	15,2	7,5	S10	24	20	20
	74Z35010TSRA310	35	18,3	8,5	S12	31	20	20
	74Z23011T8RA170	23	11,5	7	S08	17	20	20
	74Z28011TRRA220	28	15,2	7,5	S10	22	20	20
1,1	74Z35011TSRA280	35	18,3	8,5	S12	28	20	20
	74Z28012TRRA200	28	15,2	7,5	S10	20	20	20
	74Z35012TSRA250	35	18,3	8,5	S12	25	20	20
	74Z28013TRRA180	28	15,2	7,5	S10	18	20	20
1,2	74Z35013TSRA230	35	18,3	8,5	S12	23	20	20
	74Z35014TSRA210	35	18,3	8,5	S12	21	20	20
	74Z35015TSRA200	35	18,3	8,5	S12	20	20	20
	74Z35016TSRA180	35	18,3	8,5	S12	18	20	20
1,3	74Z35017TSRA170	35	18,3	8,5	S12	17	20	20
	74Z35018TSRA160	35	18,3	8,5	S12	16	20	20
	74Z35019TSRA150	35	18,3	8,5	S12	15	20	20
	74Z35020TSRA140	35	18,3	8,5	S12	14	20	20
2,1	74Z35021TSRA130	35	18,3	8,5	S12	13	20	20

(1) : α = Pressure angle, (2) : β = Helical angle

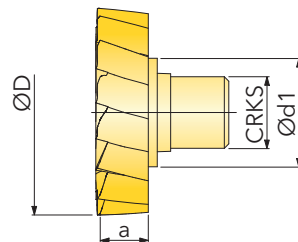
Designation	Description	Grade	A35HP
74Z_	positive geometry		

● = P ● = M ● = K ● = N ● = S ○ = H

Skiving cutter



(DIN 5480)



Module	Designation	D	d1	a	CRKS	z	$\alpha^{(1)}$	$\beta^{(2)}$
0,4	74Z16504T6RB380	16,5	9,5	4,5	S06	38	30	20
	74Z23004T8RB530	23	11,5	7	S08	53	30	20
	74Z28004TRRB660	28	15,2	7,5	S10	66	30	20
	74Z35004TSRB810	35	18,3	8,5	S12	81	30	20
0,5	74Z16505T6RB300	16,5	9,5	4,5	S06	30	30	20
	74Z23005T8RB420	23	11,5	7	S08	42	30	20
	74Z28005TRRB520	28	15,2	7,5	S10	52	30	20
	74Z35005TSRB650	35	18,3	8,5	S12	65	30	20
0,6	74Z16506T6RB250	16,5	9,5	4,5	S06	25	30	20
	74Z23006T8RB350	23	11,5	7	S08	35	30	20
	74Z28006TRRB430	28	15,2	7,5	S10	43	30	20
	74Z35006TSRB540	35	18,3	8,5	S12	54	30	20
0,7	74Z16507T6RB210	16,5	9,5	4,5	S06	21	30	20
	74Z23007T8RB300	23	11,5	7	S08	30	30	20
	74Z28007TRRB370	28	15,2	7,5	S10	37	30	20
	74Z35007TSRB460	35	18,3	8,5	S12	46	30	20
0,8	74Z16508T6RB180	16,5	9,5	4,5	S06	18	30	20
	74Z23008T8RB260	23	11,5	7	S08	26	30	20
	74Z28008TRRB320	28	15,2	7,5	S10	32	30	20
	74Z35008TSRB400	35	18,3	8,5	S12	40	30	20
0,9	74Z16509T6RB160	16,5	9,5	4,5	S06	16	30	20
	74Z23009T8RB230	23	11,5	7	S08	23	30	20
	74Z28009TRRB280	28	15,2	7,5	S10	28	30	20
	74Z35009TSRB360	35	18,3	8,5	S12	36	30	20
1,0	74Z16510T6RB140	16,5	9,5	4,5	S06	14	30	20
	74Z23010T8RB200	23	11,5	7	S08	20	30	20
	74Z28010TRRB250	28	15,2	7,5	S10	25	30	20
	74Z35010TSRB320	35	18,3	8,5	S12	32	30	20
1,1	74Z23011T8RB190	23	11,5	7	S08	19	30	20
	74Z28011TRRB230	28	15,2	7,5	S10	23	30	20
	74Z35011TSRB290	35	18,3	8,5	S12	29	30	20
	74Z23012T8RB170	23	11,5	7	S08	17	30	20
1,2	74Z28012TRRB210	28	15,2	7,5	S10	21	30	20
	74Z35012TSRB260	35	18,3	8,5	S12	26	30	20
	74Z23013T8RB150	23	11,5	7	S08	15	30	20
	74Z28013TRRB190	28	15,2	7,5	S10	19	30	20
1,3	74Z35013TSRB240	35	18,3	8,5	S12	24	30	20
	74Z23014T8RB140	23	11,5	7	S08	14	30	20
	74Z28014TRRB180	28	15,2	7,5	S10	18	30	20
	74Z35014TSRB220	35	18,3	8,5	S12	22	30	20
1,4	74Z28015TRRB160	28	15,2	7,5	S10	16	30	20
	74Z35015TSRB210	35	18,3	8,5	S12	21	30	20
	74Z28016TRRB150	28	15,2	7,5	S10	15	30	20
	74Z35016TSRB190	35	18,3	8,5	S12	19	30	20
1,5	74Z28017TRRB140	28	15,2	7,5	S10	14	30	20
	74Z35017TSRB180	35	18,3	8,5	S12	18	30	20
	74Z35018TSRB170	35	18,3	8,5	S12	17	30	20
	74Z35019TSRB160	35	18,3	8,5	S12	16	30	20
2,0	74Z35020TSRB150	35	18,3	8,5	S12	15	30	20
2,1	74Z35021TSRB140	35	18,3	8,5	S12	14	30	20

(1) : α = Pressure angle, (2) : β = Helical angle

Designation	Description	Grade	A35HP
74Z_	positive geometry		

● = P ● = M ● = K ● = N ● = S ○ = H

Contact

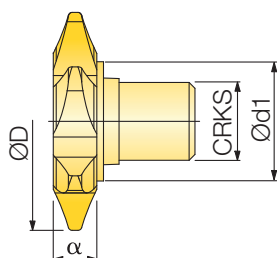
Tungaloy Contact	
Customer	
Contact Customer	
Customer No.	

Order/Quotation already in TungSales

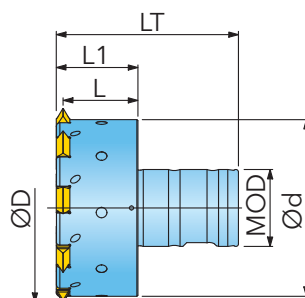
Yes ☐	No ☐
Order-/Quotation-No.:	

Date: _____

Module 0,8 - 3,5

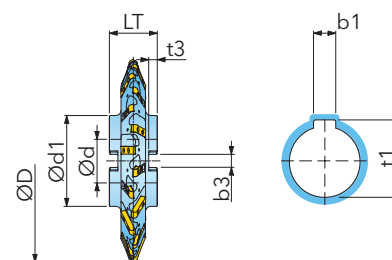


Module <1 - 3



Module 6 - 36 t / Module 6 - 22 tt

☐ 荒用 ☐ 仕上げ用



Tool

Outside diameter	D [mm]:	
Mounting diameter	Ts / d / MOD [mm]:	
Hub diameter	d ₁ [mm]:	
Cutter width	a / LT [mm]:	
Radial keyway (DIN 138)	b ₃ [mm]:	
Radial keyway (DIN 138)	t ₃ [mm]:	
Axial keyway (DIN 138)	b ₁ [mm]:	
Axial keyway (DIN 138)	t ₁ [mm]:	
Coolant channel	:	

Workpiece Data

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

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Contact

Tungaloy Contact	
Customer	
Contact Customer	
Customer No.	

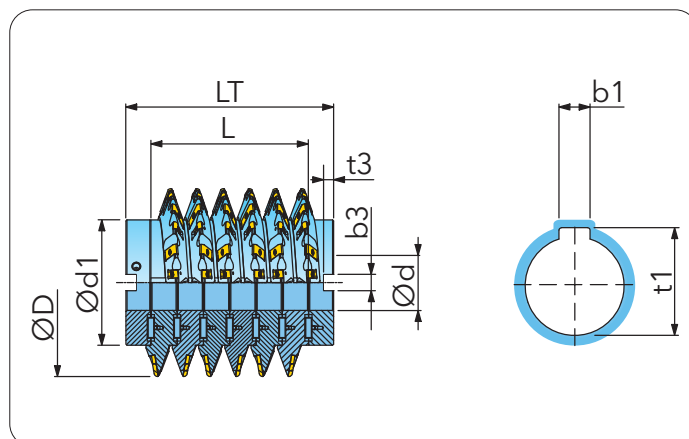
Order/Quotation already in TungSales

Yes ☐	No ☐
Order-/Quotation-No.:	

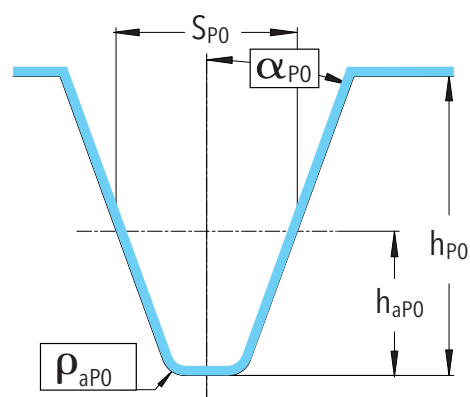
Date: _____

Tool

Tool length	LT [mm]:	
Usable length	L [mm]:	
Keyway (axial/radial)	a / r:	
Keyway width	b1 / b3 [mm]:	
Keyway depth	t1 / t3 [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	:	



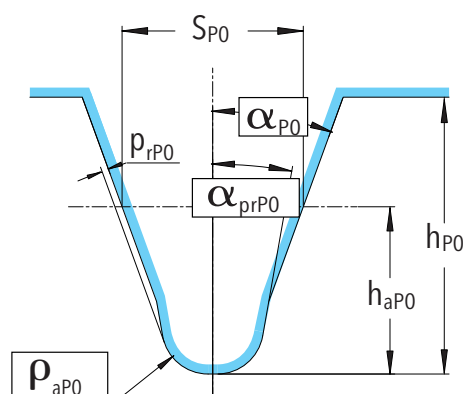
Profile of Finishing Hob



Tool Profile Data

Addendum	h _{aP0} [mm]:	
Tooth thickness	S _{P0} [mm]:	
Tooth depth	h _{P0} [mm]:	
Pressure angle	α _{P0} [°]:	
Tip radius	ρ _{aP0} [mm]:	
Protuberance amount	p _{rP0} [mm]:	
Protuberance angle	α _{prP0} [°]:	

Profile of Roughing Hob with Protuberance



Remark	
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Contact

Tungaloy Contact	
Customer	
Contact Customer	
Customer No.	

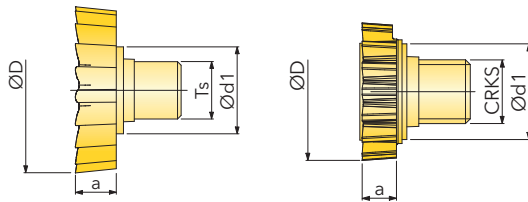
Order/Quotation already in TungSales

Yes ☐	No ☐
Order-/Quotation-No.:	

Date: _____

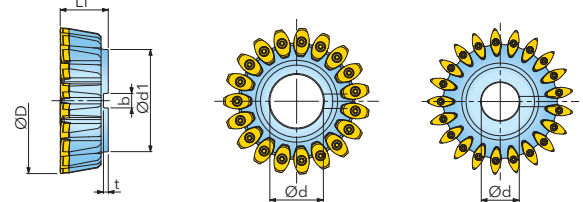
Module 0,4-2,1

☐ Solid Carbide



Module 3-18

☐ Indexable inserts type



Tool

Outside diameter	D [mm]:	
Adaption diameter	CRKS / 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 :	

Workpiece Data

Module	m [mm]:	
No. of teeth (+EXT / -INT)	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	:	

Remark

Contact

Tungaloy Contact	
Customer	
Contact Customer	
Customer No.	

Order/Quotation already in TungSales

Yes ☐	No ☐
Order-/Quotation-No.:	

Datum / Date: _____

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

Module 0,4-2,5



Module 2,5-12



Workpiece Data

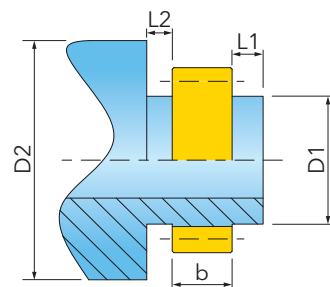
Module	m [mm]:	
Gear quality	:	
No. of teeth (+EXG / -ING)	z:	
Pressure angle	α [°]:	
Helix angle	β [°]:	
Flank direction	L / R:	
Addendum modification coefficient	x:	
Tip diameter	d_a [mm]:	
Root diameter	d_f [mm]:	
Root radius	ρ_{fp} [mm]:	
Root form diameter	d_{ff} [mm]:	
Dimension over balls	M_d [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	:	

Gear tooth modification

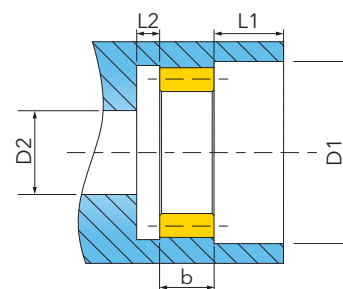
Protuberance	No ☐	Yes ☐
Tip relief	No ☐	Yes ☐

Workpiece collision dimensions

External gear



Internal gear



D1		mm
D2		mm

L1		mm
L2		mm
b		mm

Remark

COMPARISON: PITCH - MODULE - DIAMETRAL PITCH - CIRCULAR PITCH

Pitch	Module	DP	CP
0,31416	0,10	-	-
0,34558	0,11	-	-
0,37699	0,12	-	-
0,39898	-	200	-
0,43982	0,14	-	-
0,44331	-	180	-
0,45598	-	175	-
0,49873	-	160	-
0,50265	0,16	-	-
0,53198	-	150	-
0,56549	0,18	-	-
0,62831	0,20	-	-
0,62832	-	127	-
0,66497	-	120	-
0,69115	0,22	-	-
0,75997	-	105	-
0,78540	0,25	-	-
0,79796	-	100	-
0,83121	-	96	-
0,87965	0,28	-	-
0,90678	-	88	-
0,94248	0,30	-	-
0,99746	-	80	-
1,09557	0,35	-	-
1,10828	-	72	-
1,24682	-	64	-
1,25664	0,40	-	-
1,32994	-	60	-
1,41372	0,45	-	-
1,57080	0,50	-	-
1,58750	-	-	1/16
1,59593	-	50	-
1,66243	-	48	-
1,72788	0,55	-	-
1,73471	-	46	-
1,81356	-	44	-
1,88496	0,60	-	-
1,89992	-	42	-
1,99491	-	40	-
2,04204	0,65	-	-
2,09991	-	38	-
2,19911	0,70	-	-
2,21657	-	36	-
2,34695	-	34	-
2,35619	0,75	-	-
2,49364	-	32	-
2,51327	0,80	-	-
2,65988	-	30	-
2,67035	0,85	-	-
2,82743	0,90	-	-

Pitch	Module	DP	CP
2,84987	-	28	-
2,98451	0,95	-	-
3,06909	-	26	-
3,14159	1	-	-
3,17500	-	-	1/8
3,32485	-	24	-
3,62711	-	22	-
3,92699	1,25	-	-
3,98982	-	20	-
4,43314	-	18	-
4,71239	1,5	-	-
4,76250	-	-	3/16
4,98728	-	16	-
5,49779	1,75	-	-
5,69975	-	14	-
6,28319	2	-	-
6,35000	-	-	1/4
6,64970	-	12	-
7,06858	2,25	-	-
7,85398	2,5	-	-
7,93750	-	-	5/16
7,97965	-	10	-
8,63938	2,75	-	-
8,86627	-	9	-
9,42478	3	-	-
9,52500	-	-	3/8
9,97456	-	8	-
10,21018	3,25	-	-
10,99557	3,5	-	-
11,11250	-	-	7/16
11,39949	-	7	-
11,78097	3,75	-	-
12,56637	4	-	-
12,70000	-	-	1/2
13,29941	-	6	-
14,13717	4,5	-	-
14,28750	-	-	9/16
14,50845	-	-	5/2
15,70796	5	-	-
15,87500	-	-	5/8
15,95930	-	5	-
17,27876	5,5	-	-
17,46250	-	-	11/16
17,73255	-	4 1/2	-
18,84956	6	-	-
19,05000	-	-	3/4
19,94911	-	4	-
20,42035	6,5	-	-
20,63750	-	-	13/16
21,99115	7	-	-

Pitch	Module	DP	CP
22,22500	-	-	7/8
22,79899	-	3 1/2	-
23,81250	-	-	15/16
25,13274	8	-	-
25,40000	-	-	1
26,59892	-	3	-
26,98750	-	-	11/16
28,27433	9	-	-
28,57500	-	-	11/8
29,01689	-	2 3/4	-
30,16250	-	-	13/16
31,41593	10	-	-
31,75000	-	-	11/4
31,91858	-	2 1/2	-
33,33750	-	-	15/16
34,55752	11	-	-
34,92500	-	-	13/8
35,46509	-	2 1/4	-
36,51250	-	-	17/16
37,69911	12	-	-
38,10000	-	-	11/2
39,89823	-	2	-
41,27500	-	-	15/8
43,98230	14	-	-
44,45000	-	-	13/4
45,59797	-	13/4	-
47,62500	-	-	17/8
50,26548	16	-	-
50,80000	-	-	2
53,19764	-	11/2	-
56,54867	18	-	-
62,83185	20	-	-
63,83716	-	11/4	-
69,11504	22	-	-
75,39822	24	-	-
78,53982	25	-	-
79,79645	-	1	-
81,68141	26	-	-
87,96459	28	-	-
91,19595	-	7/8	-
94,24778	30	-	-
100,53096	32	-	-
106,39527	-	3/4	-
109,95574	35	-	-
113,09734	36	-	-
125,66371	40	-	-
127,67432	-	5/8	-
141,37167	45	-	-
157,07963	50	-	-
159,59290	-	1/2	-

Module

$$m = \frac{25,4}{DP}$$

$$m = 8,08507111 \times CP$$

Diametral Pitch

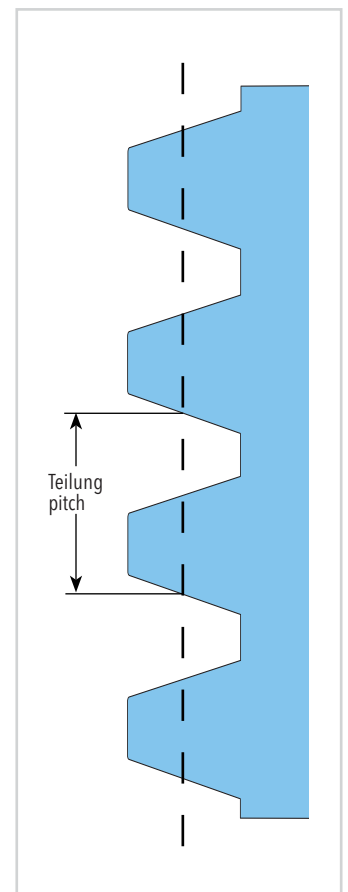
$$DP = \frac{3,14159265}{CP}$$

$$DP = \frac{25,4}{m}$$

Circular Pitch

$$CP = \frac{3,14159265}{DP}$$

$$CP = \frac{m}{8,08507111}$$



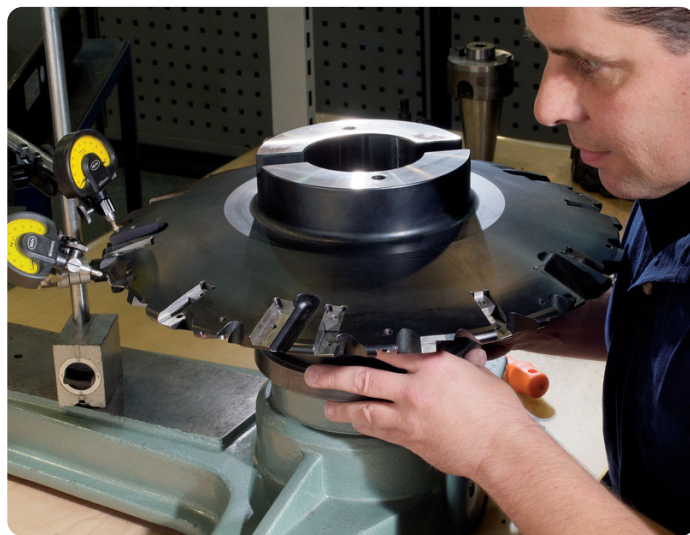
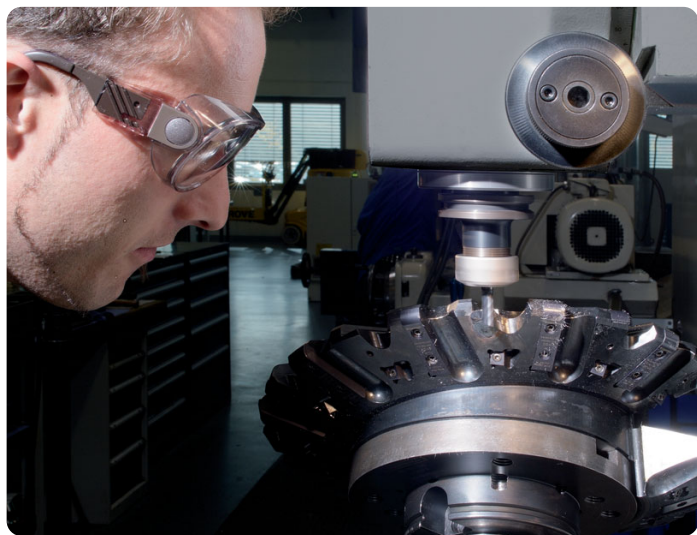
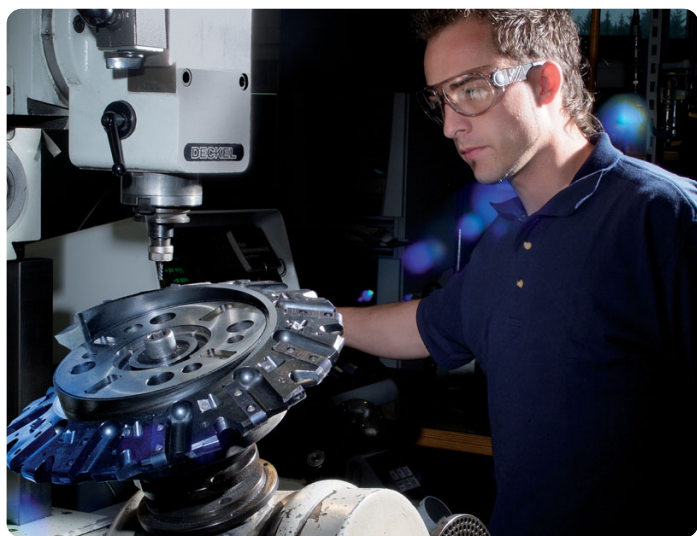
INSPECTION & TOOL MAINTENANCE SERVICE

With the purchase of the gear milling tool, you have already made your decision for the quality and service of our products. This decision should also be extended to the maintenance of your gear milling tool.

Despite careful application of the tool, every now and then the tool can be damaged for various reasons. Tungaloy offers the service of cost-efficient and careful repair and maintenance. The tool will be carefully inspected within a short period of time to determine the extent of damage. Subsequently, you will be informed as to whether the repair of the tool would be profitable. The professional repair of the tools will be carried out within five days, depending on the amount of labour involved.

We guarantee that the repair will be carried out on time, with the usual Tungaloy quality. The quality of a tool has greatly influence on the efficiency of its production. Make no compromises where quality of maintenance is concerned; only then can you be sure of the superior efficiency of your production.

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