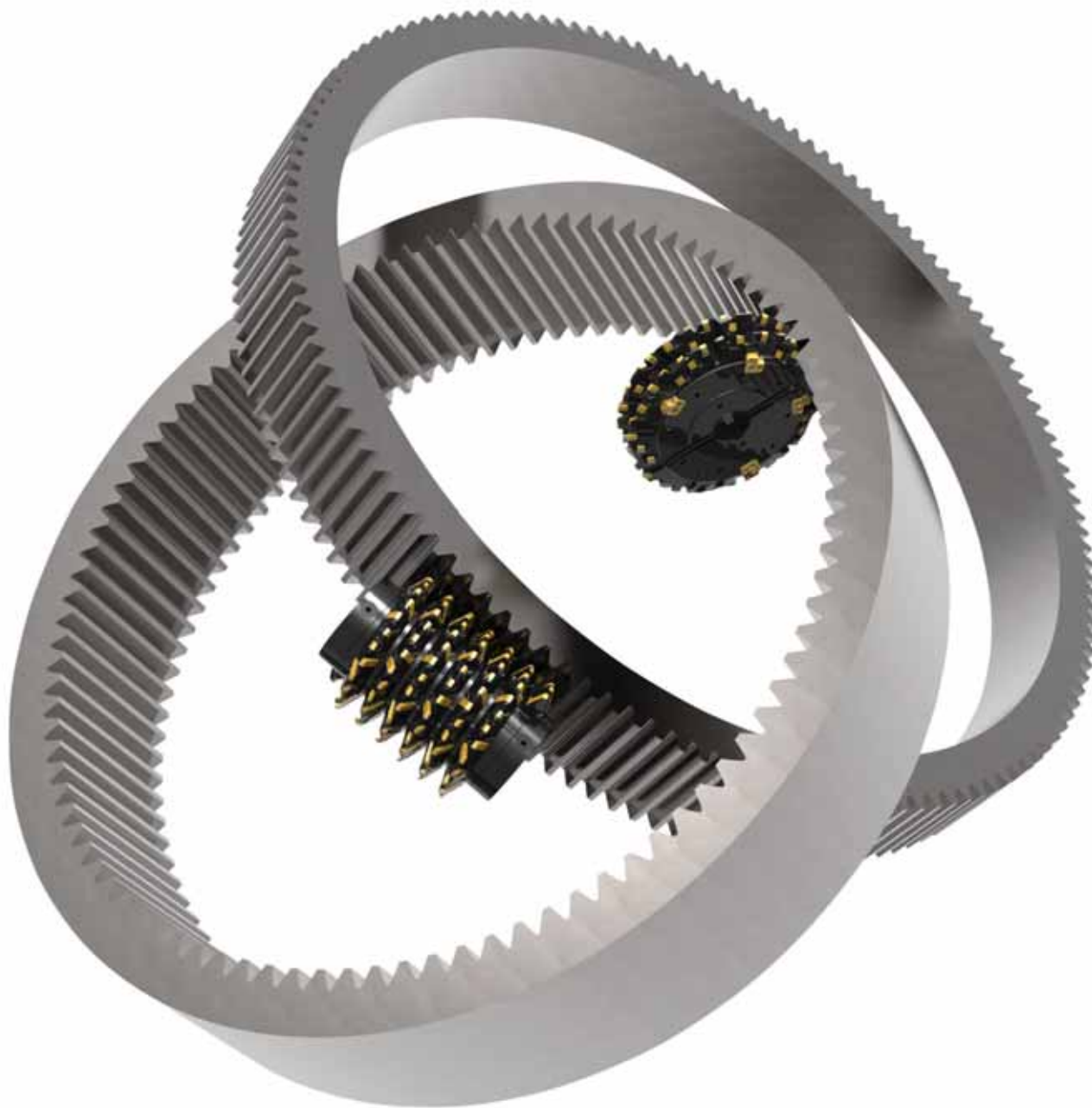


GEAR MILLING

METRIC



INNOVATIONS
CATALOGUE **2017**

➤ Gear Milling

Productivity and innovation — powerful gear cutting tools with modern design

In the production stage of large gears, requirements for cutter machines have changed drastically. The ever-increasing cost pressure on production processes and increasing quality requirements on the components provide customers and tool suppliers with new challenges. This is in accordance with the powerful and innovative tool concepts necessary for a cost-effective production. To meet these demands, we provide powerful solutions with optimized cutting division and positive cutting geometry, as well as custom solutions. Our goal is to increase productivity and optimisation in new and existing product lines.

Features and Benefits

Recommended cutting and power requirements and CPP calculation are also important parts of tool care and productivity. Our technical assistance and tool selection help to round out this complete package.

- Optimised cutting division along with the use of positive cutting geometries ensure low power requirements at higher feed rates.
- Tool wear is minimised by optimising the indexable insert number to achieve smoother cuts and increased productivity.
- High cutting speeds achievable through innovative and material-specific tailored cutting materials and geometries.
- Low tooling costs are achieved by using inserts with up to eight usable cutting edges.
- Optimised accessibility for easy insert changes.

GOAL:

- Optimised number of effective cutting edges per insert
- Insert positioning
- Cutter design
- Positive geometry
- Standardised inserts

CONCEPT:

- Higher speed and feed (cycle time saved)
- Tool cost reduction
- Smoother cutting
- Less power consumption
- Chip forming
- Longer tool life/cutting edge optimisation

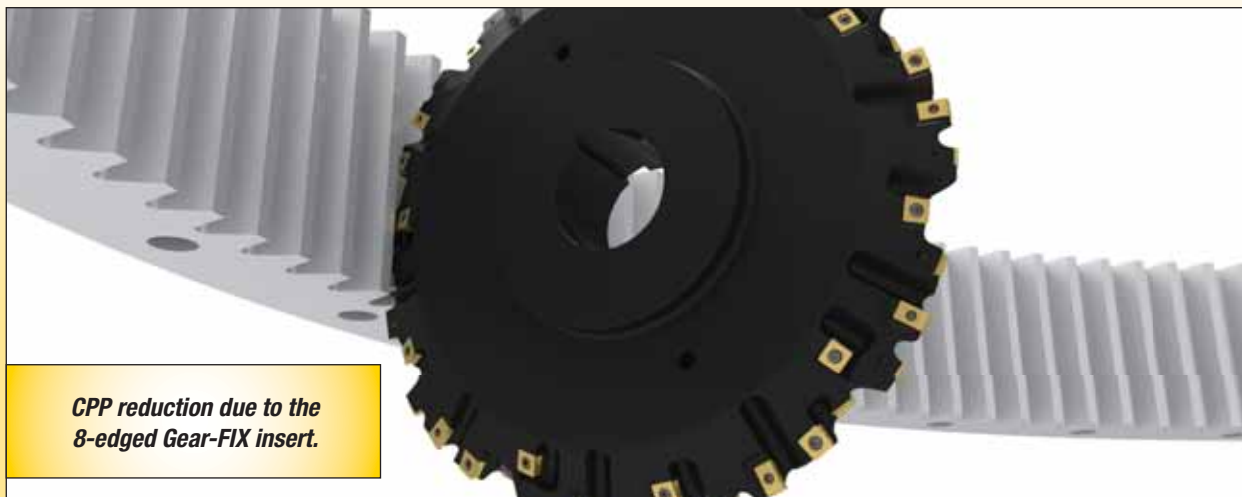


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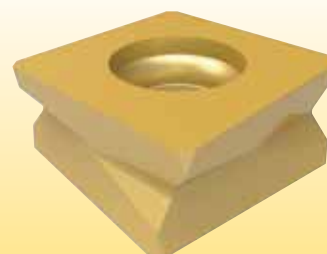
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Module	Roughing Gasher	Pre-finishing		Finishing		Module
		Gasher	Hob	Gasher	Hob	
3						3
4						4
5						5
6						6
7						7
8						8
9						9
10						10
11						11
12						12
14						14
16						16
18						18
20						20
22						22
24						24
25						25
30						30
35						35
40						40
45						45
50						50
55						55
60						60

■ Roughing Module (9) 12–27



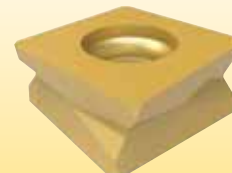
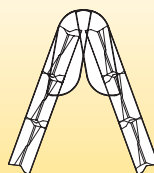
type	roughing (stock 1mm)		
cutting diameter	D1	[mm]	360
number of eff. Inserts	Z _{eff}		8/4
module	m		14
number of teeth	Z		176
pressure angle	PA	[°]	20
speed	vc	[m/min]	170
feed	vf	[mm/min]	570
depth-of-cut	DOC	[mm]	30



■ Roughing Module 17–38 (50)



type	roughing (stock 2mm)		
cutting diameter	D1	[mm]	450
no. of eff. inserts	Z _{eff}		10/5
module	m		32
no. of teeth	Z		87
pressure angle	PA	[°]	25
speed	vc	[m/min]	140
feed	vf	[mm/ min]	350
depth of cut	DOC	[mm]	54/70

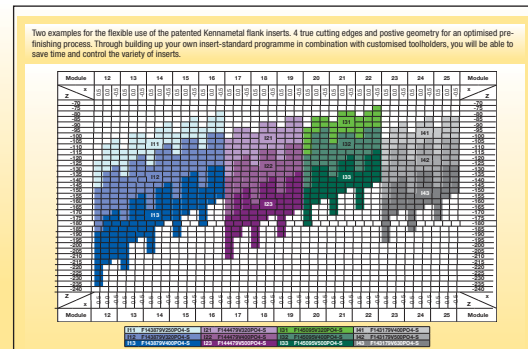


■ Pre-Finishing Internal Module 9–25



*Flexible use of inserts
for different modules.*

type	pre-finishing internal (stock 0,3mm)		
cutting diameter	D1	[mm]	420
number of eff. inserts	Z _{eff}		10/5
module	m		16
number of teeth	Z		153
pressure angle	PA	[°]	20
speed	vc	[m/min]	160
feed	vf	[mm/min]	580
depth of cut	DOC	[mm]	36

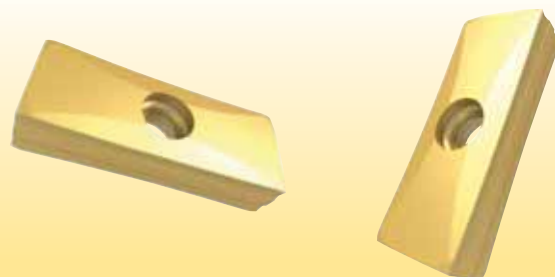


■ Pre-Finishing External Module 9–25

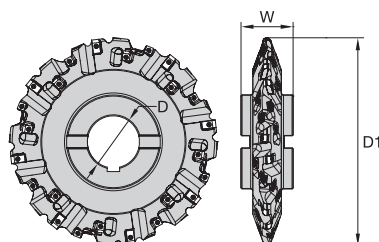
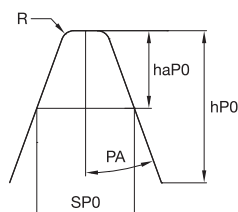


*Patented technology:
Profiled inserts, 4 cutting edges,
and positive geometry.*

type	pre-finishing external (stock 0,3mm)		
cutting diameter	D1	[mm]	520
number of eff. inserts	Z _{eff}		14/7
module	m		18
number of teeth	Z		90
pressure angle	PA	[°]	25
speed	vc	[m/min]	170
feed	vf	[mm/min]	580
depth of cut	DOC	[mm]	38



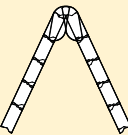
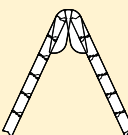
- Up to 8 true cutting edges.
- Less power consumption due to positive geometry.
- Smooth cutting performance due to modern design.
- Machining up to module 30 with one cut.
- Modifications and further dimensions (D1, D, W...) upon request.



■ Roughing Gasher Module 12-27/PA20

cutting view	profile — PA20°				module min*	module max*	D1	catalogue number	Zeff	D	W	inserts			
	hP0	haP0	SP0	R								Ztot	top	flank	
	38,25	15,00	18,85	4,56	12	17	270	GGR121720270	6 3	60	80	30	12	N45 or P45	18
							300	GGR121720300		80	100				
							360	GGR121720360	8 4	80	100	40	16		24
							400	GGR121720400		80	100				
							420	GGR121720420	10 5	100	120	50	20		30
450	GGR121720450	100	120												
	49,50	18,75	23,56	6,08	15	22	270	GGR152220270	6 3	60	80	36	12	N60 or P60	24
							300	GGR152220300		80	100				
							360	GGR152220360	8 4	80	100	48	16		32
							400	GGR152220400		80	100				
							420	GGR152220420	10 5	100	120	60	20		40
450	GGR152220450	100	120												
	60,75	23,75	29,85	6,08	19	27	300	GGR192720300	6 3	60	80	36	12	N76 or P76	24
							360	GGR192720360		80	100				
							400	GGR192720400	8 4	80	100	48	16		32
							420	GGR192720420		80	100				
							450	GGR192720450	10 5	100	120	60	20		40
500	GGR192720500	100	120												

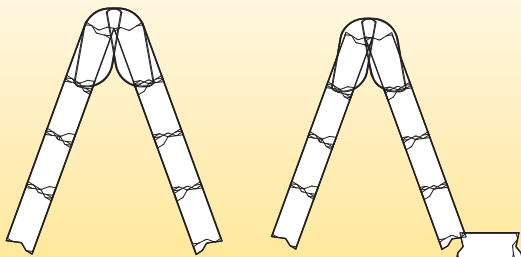
■ Roughing Gasher Module 17-38/PA25

cutting view	profile — PA25°				module min*	module max*	D1	catalogue number	Zeff		D	W	inserts				
	hP0	haP0	SP0	R									Ztot	top		flank	
	58,50	21,25	26,70	4,56	17	26	270	GGR172625270	6	3	60	80	42	12	N45 or P45	30	F15
							300	GGR172625300			80	100					
							360	GGR172625360	8	4	80	100	56	16		40	
							400	GGR172625400			80	100					
							420	GGR172625420	10	5	100	120	70	20		50	
450	GGR172625450	100	120														
	72,00	27,50	34,56	6,08	22	32	300	GGR223225300	6	3	80	100	42	12	N60 or P60	30	F18
							360	GGR223225360			80	100					
							400	GGR223225400	8	4	80	100	56	16		40	
							420	GGR223225420			100	120					
							450	GGR223225450	10	5	100	120	70	20		50	
500	GGR223225500	100	150														
	85,50	35,00	43,98	7,60	28	38	300	GGR283825300	6	3	80	100	48	12	N76 or P76	36	
							360	GGR283825360			80	100					
							400	GGR283825400	8	4	80	100	64	16		48	
							420	GGR283825420			100	120					
							450	GGR283825450	10	5	100	120	80	20		60	
500	GGR283825500	100	150														

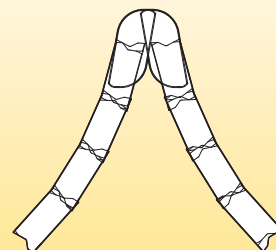
*Basic profile: 1.25/0.38/1.0 ISO 53.2

■ Alternative roughing solutions for your applications.

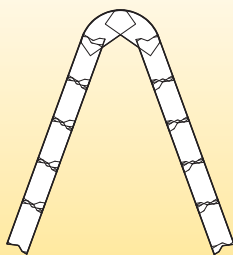
- Customised cutting profiles.
- On request with topping or semi-topping.



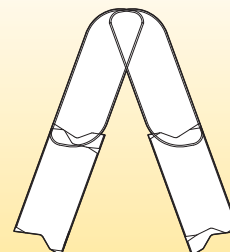
- Profile optimised. For example: pinion.*
- Less stock for finishing operation.



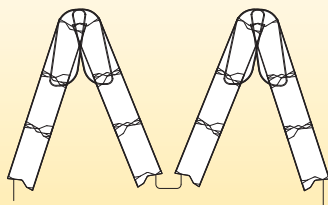
- Big module >35.
- FR18 inserts.



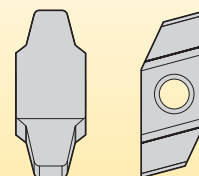
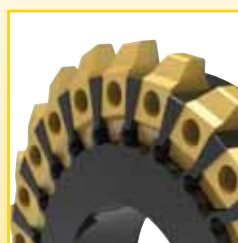
- Small module 5–12.
- FR12 inserts.



- Duplex gasher for double feed.*
- On request: triple gasher.

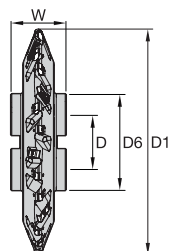
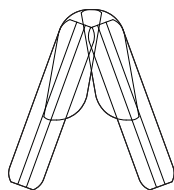


- Small module (up to 4).*
- Full profiled inserts.
- Positive cutting.



* See also: Custom Solutions and Alternatives.

- 4 true cutting edges (patented technology).
- Less power consumption due to positive geometry.
- Pre-Finishing for grinding with equal stock after milling.
- Smooth cutting performance due to modern design.
- Standardised inserts with customised toolholder.
- Modifications and further dimensions (D1, D, W...) upon request.



■ Pre-Finishing Gasher Module 9–25/PA20°

module min*	module max*	D1 min	D1 max	Zeff		Ztot	inserts				
							top		flank		
							no.	ID*	no.	int. ID*	ext. ID*
9	13	260	320	8	4	24	16	N30–N53 P30–P53	8	I01–I03	E01–E03
		330	390	10	5	30	20		10		
		400	460	12	6	36	24		12		
12	16	280	340	8	4	24	16	N45–N68 P45–P68	8	I11–I13	E11–E13
		350	410	10	5	30	20		10		
		420	480	12	6	36	24		12		
15	19	300	360	8	4	24	16	N53–N76 P53–P76	8	I21–I23	E21–E23
		370	430	10	5	30	20		10		
		440	500	12	6	36	24		12		
18	22	320	380	8	4	24	16	N68–N91 P68–P91	8	I31–I33	E31–E33
		390	450	10	5	30	20		10		
		460	520	12	6	36	24		12		
21	25	340	400	8	4	32	16	N76–N98 P76–P98	16	I41–I43	E41–E43
		410	470	10	5	40	20		20		
		480	540	12	6	48	24		24		

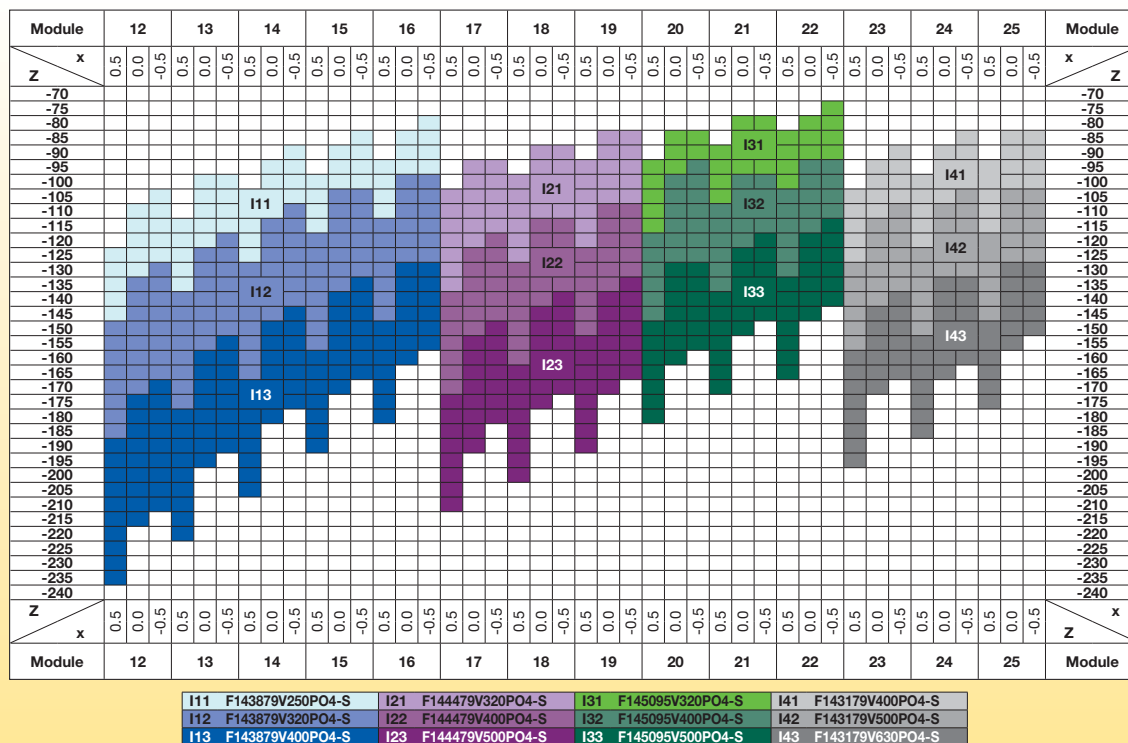
*Recommendation for basic profile: 1.25/ 0.38/1.0 ISO 53.2; PA20.

■ Pre-Finishing Gasher Module 12–26/PA25

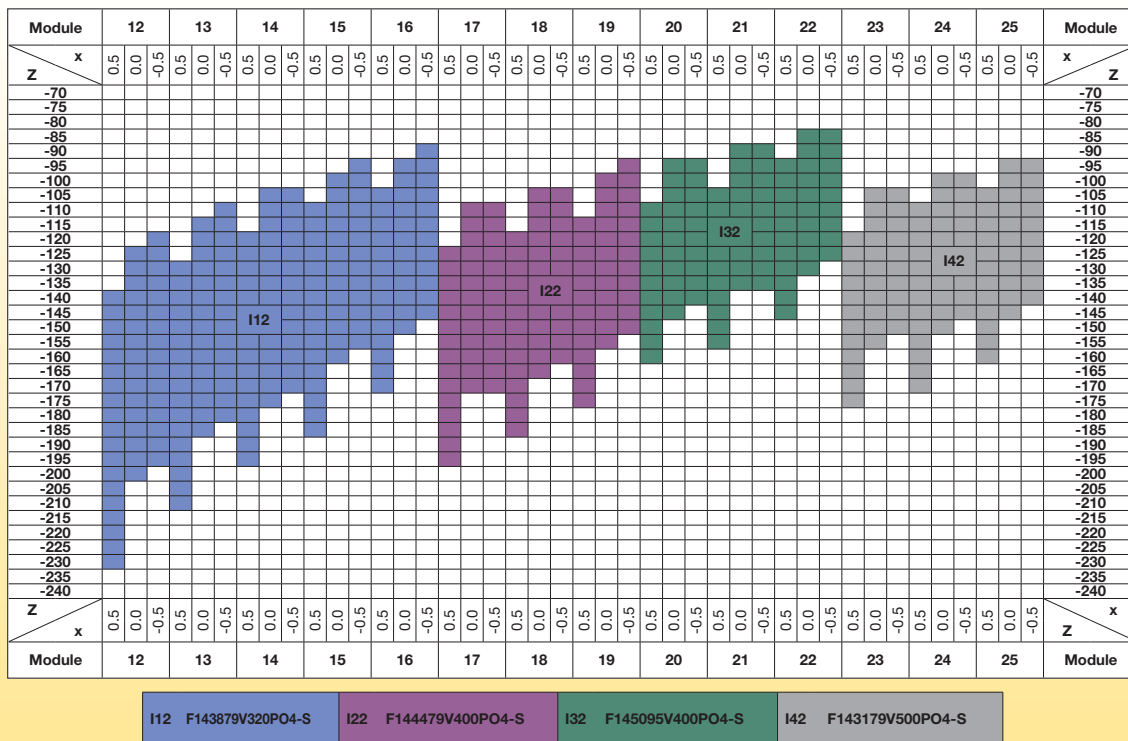
module min*	module max*	D1 min	D1 max	Zeff		Ztot	inserts				
							top		flank		
							no.	ID*	no.	int. ID*	ext. ID*
12	14	280	340	8	4	24	16	N30–N53 P30–P53	8	I11–I13	E11–E13
		350	410	10	5	30	20		10		
		420	480	12	6	36	24		12		
15	17	300	360	8	4	24	16	N45–N68 P45–P68	8	I21–I23	E21–E23
		370	430	10	5	30	20		10		
		440	500	12	6	36	24		12		
18	20	320	380	8	4	24	16	N53–N76 P53–P76	8	I31–I33	E31–E33
		390	450	10	5	30	20		10		
		460	520	12	6	36	24		12		
21	23	340	400	8	4	32	16	N68–N91 P68–P91	16	I41–I43	E41–E43
		410	470	10	5	40	20		20		
		480	540	12	6	48	24		24		
24	26	320	380	8	4	24	16	N76–N98 P76–P98	8	I51–I53	E51–E53
		390	450	10	5	30	20		10		
		460	520	12	6	36	24		12		

*Recommendation for basic profile: 1.25/ 0.38/1.0 ISO 53.2; PA25.

Two examples for the flexible use of the patented Kennametal flank inserts. 4 true cutting edges and positive geometry for an optimised pre-finishing process. Through building up your own insert-standard programme in combination with customised toolholders, you will be able to save time and control the variety of inserts.



Basic profile: ISO 53.2: Profile A; 1,25/0,38/1,0 PA20
Module 12 to 16: stock after milling +/- 0,05mm
Module 17 to 25 stock after milling +/- 0,08mm

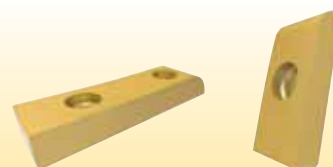
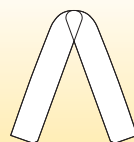


Basic profile: ISO 53.2: Profile A; 1,25/0,38/1,0 PA20
Module 12 to 19: stock after milling +/- 0,12mm
Module 20 to 25 stock after milling +/- 0,15mm

■ Finishing Module 6–22



type	finishing internal		
cutting diameter	D1	[mm]	400
number of eff. inserts	Zeff		10
module	m		12
number of teeth	Z		153
pressure angle	PA	[°]	20
speed	vc	[m/min]	150
feed	vf	[mm/min]	420
depth of cut	DOC	[mm]	27

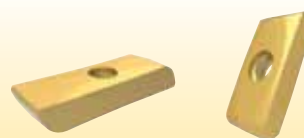


- Flexible design for different profiles and modules.
- 2 true cutting edges.

■ Finishing Module 12–20



type	finishing external		
cutting diameter	D1	[mm]	420
number of eff. inserts	Zeff		16
module	m		16
number of teeth	Z		180
pressure angle	PA	[°]	20
speed	vc	[m/min]	180
feed	vf	[mm/min]	800
depth of cut	DOC	[mm]	1

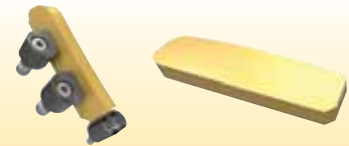
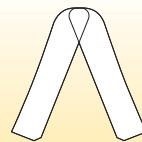


- Cost-saving design for big lot sizes.
- 4 true cutting edges.

■ Finishing Module 23–45



type	finishing external		
cutting diameter	D1	[mm]	400
number of eff. inserts	Zeff		8
module	m		25
number of teeth	Z		25
pressure angle	PA	[°]	20
speed	vc	[m/min]	130
feed	vf	[mm/min]	250
depth of cut	DOC	[mm]	2

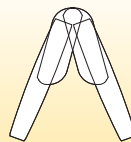


- Flexible design for different profiles and modules.
- 2 true cutting edges.

■ Finishing with Protuberance Module 10–25



type	finishing with protuberance		
cutting diameter	D1	[mm]	450
number of eff. inserts	Zeff		12/6
module	m		20
number of teeth	Z		66
pressure angle	PA	[°]	20
speed	vc	[m/min]	160
feed	vf	[mm/min]	500
depth of cut	DOC	[mm]	41



- Cost-saving design for profiles with protuberance.
- 4 true cutting edges.

➤ Gear Milling Hobs

Hobbing is a useful technology and there are a lot of different kinds available on the market, but ours are simply great.

The goal should not be to provide you with another hob for your production, but a solution to improve and optimise your process. The challenge is to find the best combination of cutting diameter, length, and number of inserts, as well as design and edge preparation. On the following pages, you will find multiple finishing solutions. All hobs and inserts are designed for the basic rack profile II (acc. DIN3972).

Upon request, you could use up to 3 different profiles with the same toolholder.

All hobs are also available with your basic rack profiles, your specifications, and your suggestions.



Features and Benefits

Monoblock design

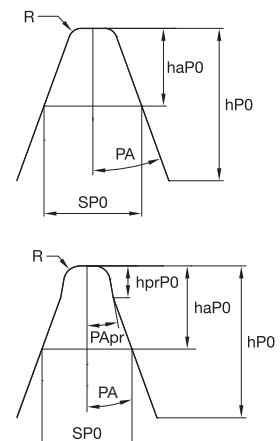
- Designed for the module range 3–10
- Small cutting diameters possible (up to $D1 = 80$)
- Inserts with 4 true cutting edges
- Great quality due to monoblock design

Disc solution

- Stable design for best performance
- Extension and reduction of hob possible
- Available up to quality A/AA upon request

Basic Profile

$hP0$	=	$2,0-2,6 \times \text{module}$
$haP0$	=	$1,0-1,4 \times \text{module}$
$hprP0$	=	$0-0,6 \times \text{module}$
R	=	$0,2-0,4 \times \text{module}$
PA	=	$15-27^\circ$
$PApr$	=	$0-12^\circ$
$SP0$	=	$(\pi \times \text{module})/2$



■ Disc Solution Module 11–20



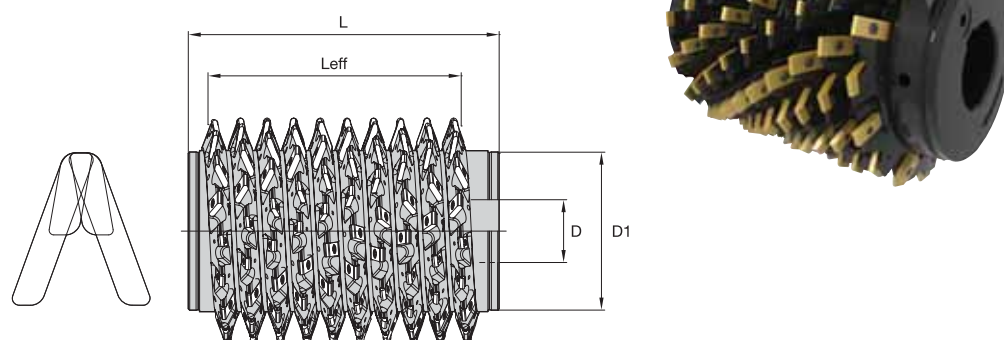
cutting diameter	D1	[mm]	340
number of eff. inserts	Z _{eff}		13
quality class	DIN 3968		B
module	m		18
number of teeth	Z		35
pressure angle	PA	[°]	25
speed	vc	[m/min]	160/200
feed	fa	[mm/WR]	2,2/4,0
depth of cut	DOC	[mm]	41/43

■ Monoblock Design Module 3–10



cutting diameter	D1	[mm]	160
number of eff. inserts	Z _{eff}		7
quality class	DIN 3968		A
module	m		6
number of teeth	Z		85
pressure angle	PA	[°]	20
speed	vc	[m/min]	250
feed	fa	[mm/WR]	3.0
depth of cut	DOC	[mm]	14.4

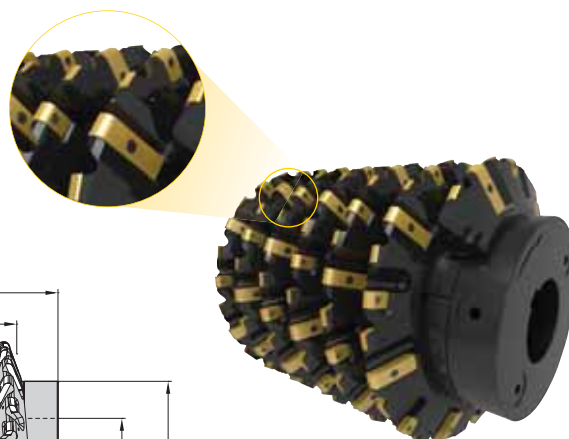
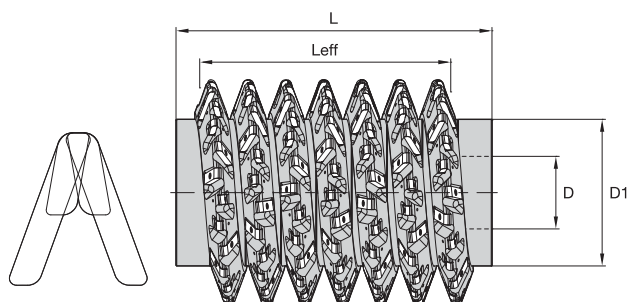
- High precision (no cutting surfaces, monoblock design).
- High productivity and performance (4 true cutting edges).
- Smooth cutting performance due to modern design.
- Zeff +/-1 upon request.
- Modifications and further dimensions (D1, D, W, PA...) upon request.



■ Monoblock Hob Module 3–10/PA 20 • Class B

module	catalogue number	D1	D	Leff	L tot	Zeff	Ztot	inserts		
3	GHM32090B	90	50	47	100	5	46	46	U03	
	GHM32090B	90	50	56	100	6	68	68		
	GHM320150B	150	60	65	150	7	94	94		
	GHM320150B	150	60	75	150	8	124	124		
4	GHM42090B	90	50	62	100	5	48	48	U04	
	GHM42090B	90	50	75	100	6	70	70		
	GHM420150B	150	60	87	150	7	94	94		
	GHM420150B	150	60	100	150	8	124	124		
5	GHM520120B	120	50	78	150	6	58	58	U05	
	GHM520120B	120	50	94	150	7	82	82		
	GHM520180B	180	80	109	200	8	108	108		
	GHM520180B	180	80	125	200	9	140	140		
6	GHM620120B	120	50	94	150	6	58	58	U06	
	GHM620120B	120	50	113	150	7	82	82		
	GHM620180B	180	80	131	200	8	108	108		
	GHM620180B	180	80	150	200	9	140	140		
7	GHM720150B	150	60	109	200	7	68	34	H07	U07
	GHM720150B	150	60	131	200	8	94	48		
	GHM720210B	210	80	153	250	9	122	62		
	GHM720210B	210	80	175	250	10	156	78		
8	GHM820150B	150	60	125	200	7	68	34	H08	U08
	GHM820150B	150	60	150	200	8	94	48		
	GHM820210B	210	80	175	250	9	122	62		
	GHM820210B	210	80	201	250	10	156	78		
9	GHM920180B	180	60	141	250	8	78	40	H09	U09
	GHM920180B	180	60	169	250	9	106	54		
	GHM920240B	240	80	197	300	10	136	68		
	GHM920240B	240	80	226	300	11	172	86		
10	GHM1020180B	180	60	157	250	8	78	40	H10	U10
	GHM1020180B	180	60	188	250	9	106	54		
	GHM1020240B	240	80	219	300	10	136	68		
	GHM1020240B	240	80	251	300	11	172	86		

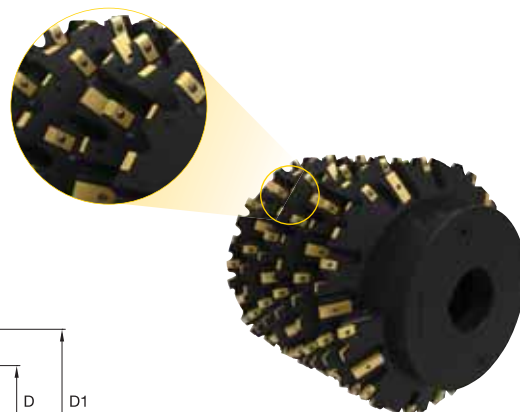
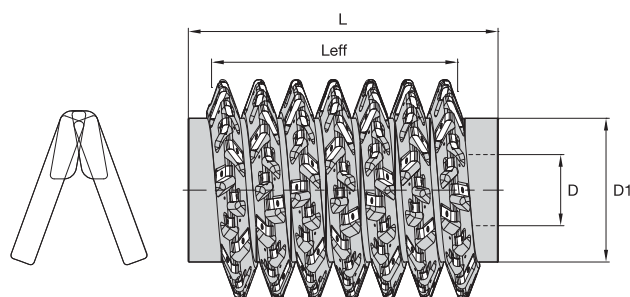
- Stable design for best performance.
- High productivity and performance (4 true cutting edges).
- Smooth cutting performance due to modern design.
- Modifications and further dimensions (D1, D, W, PA...) upon request.



■ Disc Solution Module 11–20/PA20 • Class B

module	catalogue number	D1 min	D	Leff	L tot	Ze _{eff}	Z _{tot}	inserts			
11	GHD1120270B	270	60	161	250	11	100	50	H11	50	U11
	GHD1120270B	270	60	194	300	13	144	72		72	
	GHD1120360B	360	80	226	350	15	196	98		98	
	GHD1120360B	360	80	258	400	18	256	128		128	
12	GHD1220270B	270	60	176	250	11	100	50	H12	50	U12
	GHD1220270B	270	60	211	300	13	144	72		72	
	GHD1220360B	360	80	246	350	15	196	98		98	
	GHD1220360B	360	80	281	400	18	256	128		128	
13	GHD1320270B	270	60	191	250	11	100	50	H13	50	U13
	GHD1320270B	270	60	229	300	13	144	72		72	
	GHD1320360B	360	80	267	350	15	196	98		98	
	GHD1320360B	360	80	305	400	18	256	128		128	
14	GHD1420270B	270	60	205	300	9	80	40	H14	40	U14
	GHD1420270B	270	60	246	350	11	120	60		60	
	GHD1420360B	360	80	287	400	13	168	84		84	
	GHD1420360B	360	80	328	450	15	224	112		112	
15	GHD1520270B	270	60	220	300	9	80	40	H15	40	U15
	GHD1520270B	270	60	264	350	11	120	60		60	
	GHD1520360B	360	80	308	400	13	168	84		84	
	GHD1520360B	360	80	352	450	15	224	112		112	
16	GHD1620270B	270	80	235	350	9	80	40	H16	40	U16
	GHD1620270B	270	80	281	400	11	120	60		60	
	GHD1620360B	360	100	328	450	13	168	84		84	
	GHD1620360B	360	100	375	500	15	224	112		112	
17	GHD1720270B	270	80	249	350	9	120	60	H17	60	U17
	GHD1720270B	270	80	299	400	11	168	84		84	
	GHD1720360B	360	100	349	450	13	224	112		112	
	GHD1720360B	360	100	399	500	15	288	144		144	
18	GHD1820270B	270	80	264	400	9	120	60	H18	60	U18
	GHD1820270B	270	80	317	450	11	168	84		84	
	GHD1820360B	360	100	369	500	13	224	112		112	
	GHD1820360B	360	100	422	550	15	288	144		144	
19	GHD1920360B	360	80	279	400	13	120	60	H19	60	U19
	GHD1920360B	360	80	334	450	15	168	84		84	
	GHD1920450B	450	100	390	500	18	224	112		112	
	GHD1920450B	450	100	446	550	20	288	144		144	
20	GHD2020360B	360	80	293	450	11	100	50	H20	50	U20
	GHD2020360B	360	80	352	500	13	144	72		72	
	GHD2020450B	450	100	411	550	15	196	98		98	
	GHD2020450B	450	100	469	600	18	256	128		128	

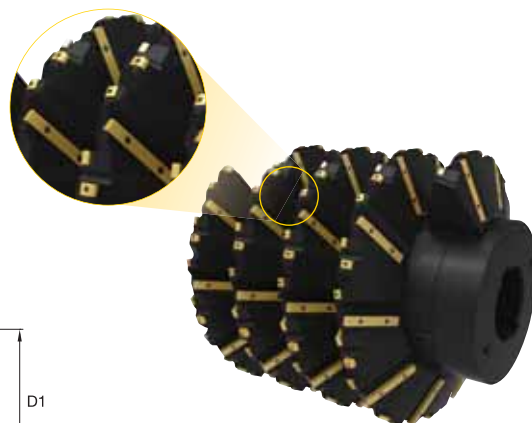
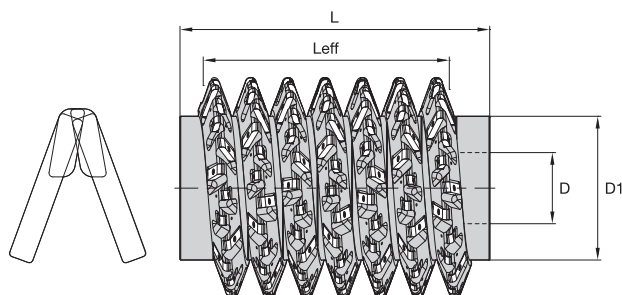
- High precision (up to class A) due to optimised design.
- High productivity and performance (4 true cutting edges).
- Smooth cutting performance due to modern design.
- Zeff (+/-2) upon request.
- Modifications and further dimensions (D1, D, W, PA...) upon request.



■ Disc Solution Module 16–25/PA25 • Class A/AB

module	catalogue number	D1	D	Leff	L tot	Zeff	Ztot	inserts			
16	GHD1625270AB	270	80	281	400	7	108	72	H16*	36	F50
	GHD1625270A	270	80	234	350	6	100	50		50	
	GHD1625360AB	360	100	281	400	9	144	96		48	
	GHD1625360A	360	100	235	350	8	140	70		70	
17	GHD1725270AB	270	80	299	400	7	108	72	H17*	36	
	GHD1725270A	270	80	249	350	6	100	50		50	
	GHD1725360AB	360	100	299	400	9	144	96		48	
	GHD1725360A	360	100	249	350	8	140	70		70	
18	GHD1825270AB	270	80	317	400	7	108	72	H18*	36	
	GHD1825270A	270	80	264	350	6	100	50		50	
	GHD1825360AB	360	100	317	400	9	144	96		48	
	GHD1825360A	360	100	264	350	8	140	70		70	
19	GHD1925360AB	360	80	334	450	9	144	96	H19*	48	
	GHD1925360A	360	80	279	400	8	140	70		70	
	GHD1925450AB	450	100	334	450	11	180	120		60	
	GHD1925450A	450	100	279	400	10	180	90		90	
20	GHD2025360AB	360	80	352	450	9	144	96	H20*	48	
	GHD2025360A	360	80	293	400	8	140	70		70	
	GHD2025450AB	450	100	352	450	11	180	120		60	
	GHD2025450A	450	100	293	400	10	180	90		90	
21	GHD2125360AB	360	80	369	500	9	144	96	H21*	48	F63
	GHD2125360A	360	80	308	450	8	140	70		70	
	GHD2125450AB	450	100	369	500	11	180	120		60	
	GHD2125450A	450	100	308	450	10	180	90		90	
22	GHD2225360AB	360	80	387	500	9	144	96	H22*	48	
	GHD2225360A	360	80	323	450	8	140	70		70	
	GHD2225450AB	450	100	387	500	11	180	120		60	
	GHD2225450A	450	100	323	450	10	180	90		90	
23	GHD2325400AB	400	100	405	550	9	144	96	H23*	48	
	GHD2325400A	400	100	337	450	8	140	70		70	
	GHD2325500AB	500	125	405	550	11	180	120		60	
	GHD2325500A	500	125	337	450	10	180	90		90	
24	GHD2425400AB	400	100	422	550	9	144	96	H24*	48	
	GHD2425400A	400	100	352	500	8	140	70		70	
	GHD2425500AB	500	125	422	550	11	180	120		60	
	GHD2425500A	500	125	352	500	10	180	90		90	
25	GHD2525400AB	400	100	440	550	9	144	96	H25*	48	
	GHD2525400A	400	100	367	500	8	140	70		70	
	GHD2525500AB	500	125	440	550	11	180	120		60	
	GHD2525500A	500	125	367	500	10	180	90		90	

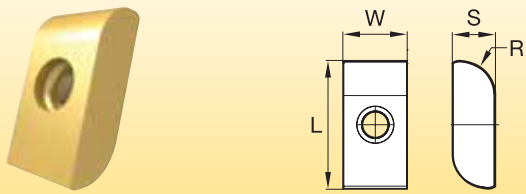
- High precision (up to class A) due to optimised design.
- High productivity and performance (4 true cutting edges).
- Smooth cutting performance due to modern design.
- Zeff (+/-2) upon request.
- Modifications and further dimensions (D1, D, W, PA...) upon request.



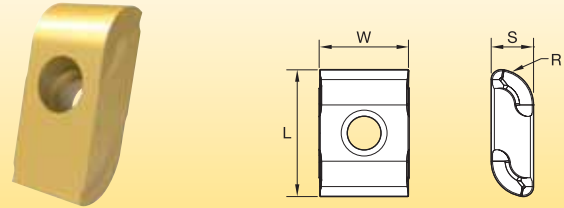
■ Disc Solution Module 26–45/PA25 • Class AA

module	catalogue number	D1	D	Leff	L tot	Zeff	Ztot	inserts			
26	GHD2625450AA	450	100	381	500	8	160	80	H26	80	F80
	GHD2625500AA	500	125			10	200	100		100	
27	GHD2625450AA	450	100	396	500	8	160	80	H27	80	
	GHD2625500AA	500	125			10	200	100		100	
28	GHD2825450AA	450	100	411	550	8	160	80	H28	80	
	GHD2825500AA	500	125			10	200	100		100	
29	GHD2825450AA	450	100	425	550	8	160	80	H29	80	
	GHD2825500AA	500	125			10	200	100		100	
30	GHD3025450AA	450	100	440	550	8	160	80	H30	80	
	GHD3025500AA	500	125			10	200	100		100	
31	GHD3025450AA	450	100	454	550	8	160	80	H31	80	F90
	GHD3025500AA	500	125			10	200	100		100	
32	GHD3225450AA	450	100	469	600	8	160	80	H32	80	
	GHD3225500AA	500	125			10	200	100		100	
33	GHD3225450AA	450	100	484	600	8	160	80	H33	80	
	GHD3225500AA	500	125			10	200	100		100	
34	GHD3425450AA	450	100	498	600	8	160	80	H34	80	
	GHD3425500AA	500	125			10	200	100		100	
35	GHD3425450AA	450	100	513	600	8	160	80	H35	80	
	GHD3425500AA	500	125			10	200	100		100	
36	GHD3625450AA	450	100	422	550	8	128	64	H36	64	F100
	GHD3625500AA	500	125			10	160	80		80	
37	GHD3625450AA	450	100	434	550	8	128	64	H37	64	
	GHD3625500AA	500	125			10	160	80		80	
38	GHD3825450AA	450	100	446	550	8	128	64	H38	64	
	GHD3825500AA	500	125			10	160	80		80	
39	GHD3825450AA	450	100	457	550	8	128	64	H39	64	
	GHD3825500AA	500	125			10	160	80		80	
40	GHD4025450AA	450	100	469	600	8	128	64	H40	64	
	GHD4025500AA	500	125			10	160	80		80	
41	GHD4025450AA	450	100	481	600	8	128	64	H41	64	F110
	GHD4025500AA	500	125			10	160	80		80	
42	GHD4225450AA	450	100	493	600	8	128	64	H42	64	
	GHD4225500AA	500	125			10	160	80		80	
43	GHD4225450AA	450	100	504	600	8	128	64	H43	64	
	GHD4225500AA	500	125			10	160	80		80	
44	GHD4425450AA	450	100	516	650	8	128	64	H44	64	
	GHD4425500AA	500	125			10	160	80		80	
45	GHD4425450AA	450	100	528	650	8	128	64	H45	64	
	GHD4425500AA	500	125			10	160	80		80	

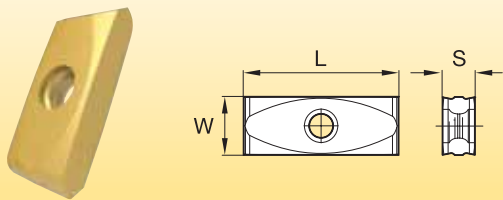
■ Type N



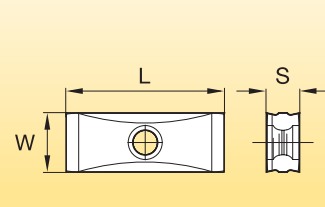
■ Type P



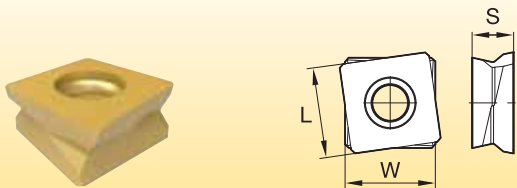
■ Type I



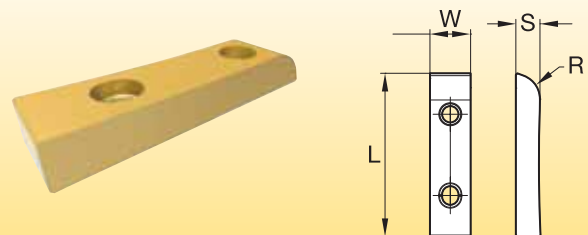
■ Type E



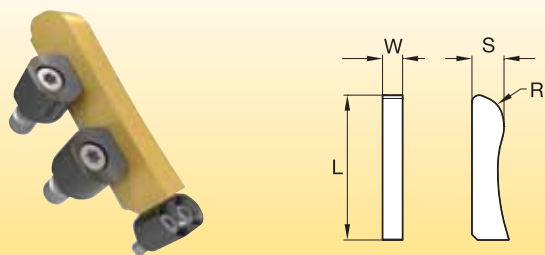
■ Type F15



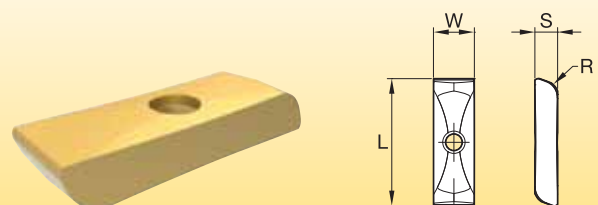
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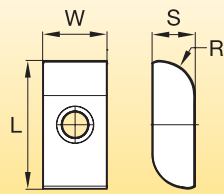
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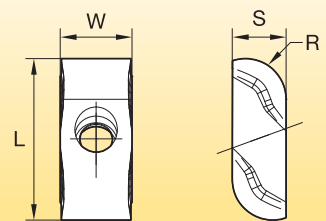
■ Type U4



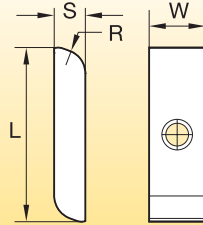
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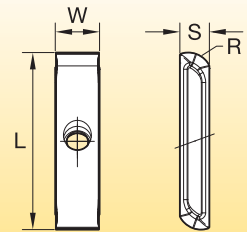
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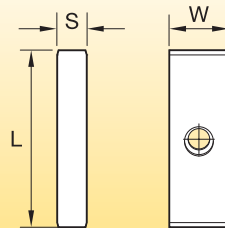
■ Type U



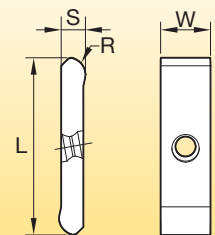
■ Type UP



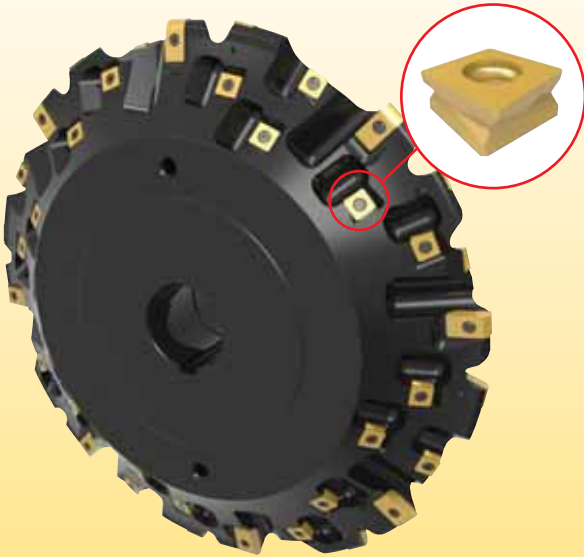
■ Type F



■ Type UH



■ Pinion Roughing Gasher



■ Pinion Pre-Finishing Gasher



■ Duplex Roughing Gasher



■ Duplex Pre-Finishing Gasher



■ End Mill Hob



■ Shaping Cutter



■ Roughing End Mill



■ Solid Profile Gasher (Module <4)





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