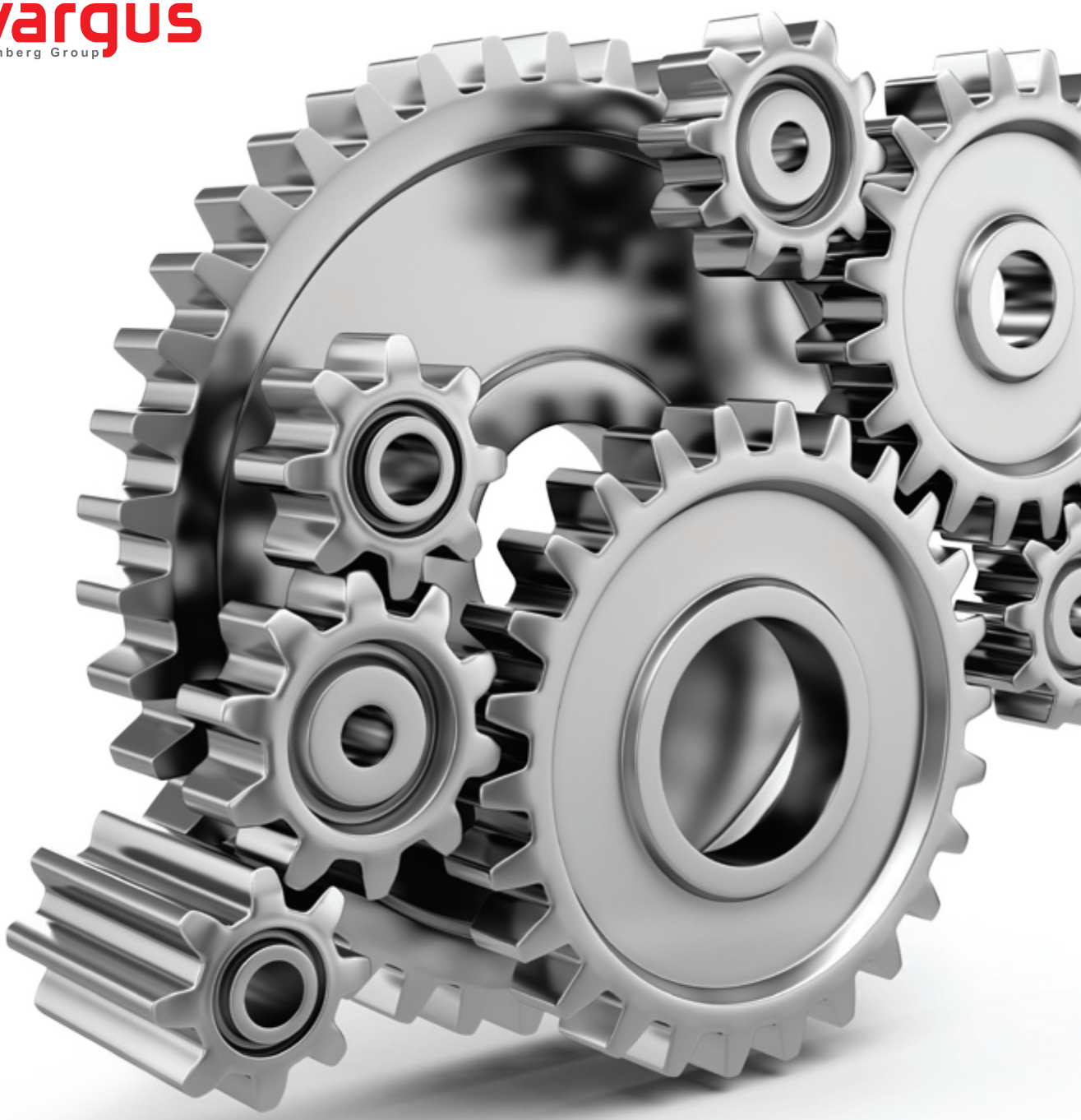
vargus
NEUMO Ehrenberg Group



GEAR MILLING

For Gear, Spline & Rack Manufacturing

METRIC

VARDEX
Advanced Threading Solutions

GEAR MILLING

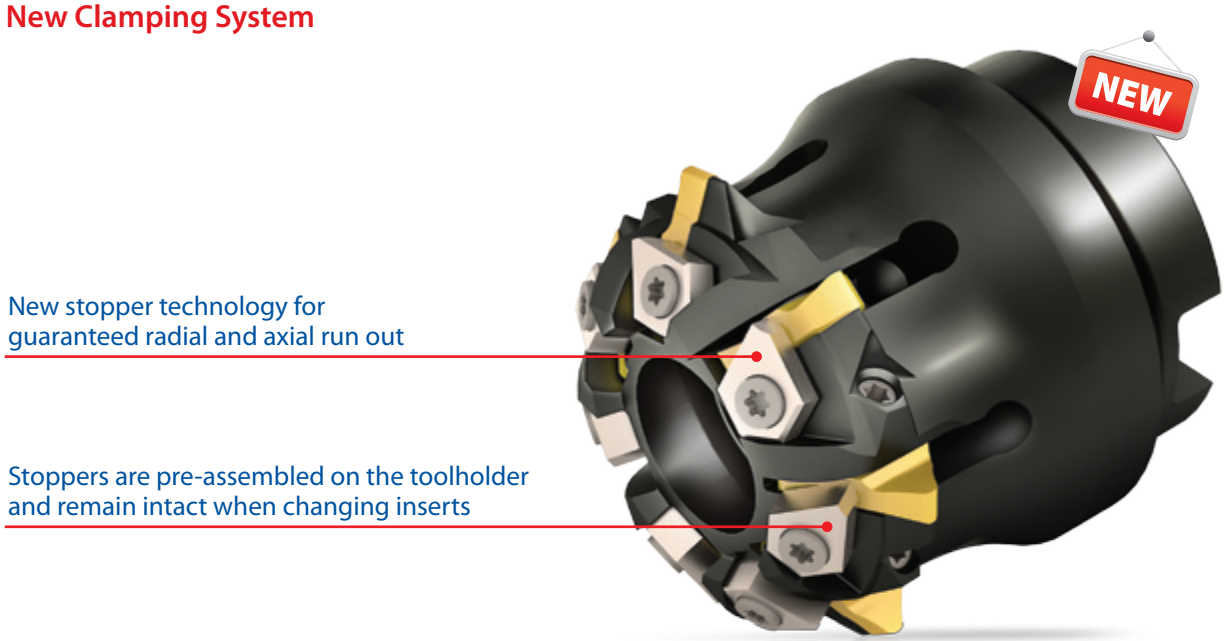
See it in action

Advanced Technologies for Gear, Spline and Rack Manufacturing

The VARDEX Gear Milling Concept

- Advanced milling tools with multi-flute indexable carbide grade inserts for super fast machining.
- Offering a competitive alternative to the traditional Hob system.
- Tailor-made inserts and holders designed per customer application, with the exact required profile shape (evolvent, involute or any other profile) to be transferred to the component.

New Clamping System



Gear Milling System Advantages

Super Fast Machining

- At least 50% less machining cycle time over other methods
- Carbide inserts with full profile designed for single pass machining

Long Tool Life

- Tough sub-micron grade coated inserts with up to 3 cutting edges

High Accuracy & Quality Machining

- No need for additional machining
- High quality surface finish

Economical Solution

- Absolute Price/Performance advantage over existing technology

High Precision Machining

- Gears: Up to Class 7 according to DIN 3962, or Class 11 according to ANSI 390.03
- Involute Splines: According to DIN 5480 or ANSI B92.1
- Straight sided Splines: According to ISO 14-1982

Simplified Machining

- Easy set-up and use on standard 3.5 axis CNC milling machines

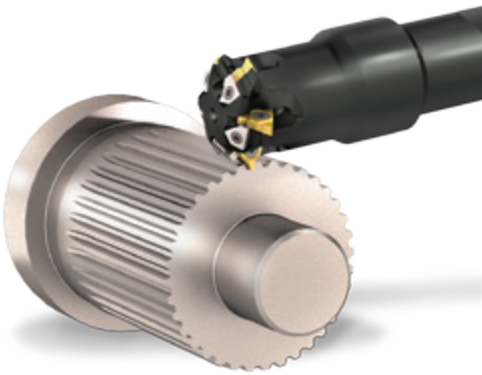
Major Applications

GEAR

The VARDEX Gear milling tools are suitable for machining both straight and helical teeth covering modules from 0.5-6.0mm or DP 128.0-4.0.

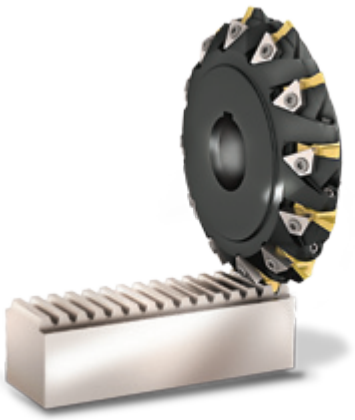
SPLINE

The VARDEX Spline milling tools are suitable for machining both involute or straight-sided profiles, covering modules from 0.5-6.0mm or DP 48/96 - 4/8.



RACK

The VARDEX Rack milling tools are suitable for covering modules from 0.5-6.0mm or DP 128.0-4.0.



Gears, Splines and Racks can be machined with either Shell Mills, End Mills or Disc Mills.

End Mill

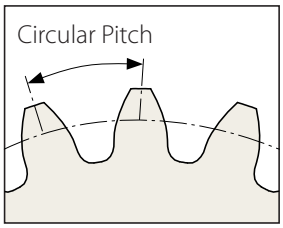
Shell Mill

Disc Mill

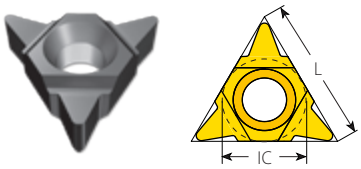
U Style
3 Cutting Edges

UT Style
1 Cutting Edge

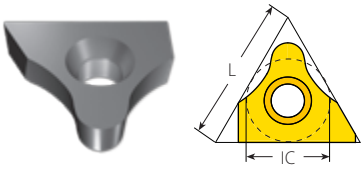
Gear Milling Inserts



Module = Pitch / π
DP = 25.4 / Module



U Style -
3 Cutting Edges



UT Style -
1 Cutting Edge

VARDEX Gear Milling Machining Concept

Based on the required customer application, VARDEX designs and supplies tailor-made inserts to suit a specific and single Module / DP as well as the exact number of teeth used on the component.

Inserts for Gear, Rack and Spline Applications

Application	Module	Diametrical Pitch (DP)	Insert Size	L	Cutting Edges	Toolholder	Page
Gear  Rack 	0.5-1.0	26-52	1/4"U	11	3	GME5N 25W32-50-2U 215/... GMD12N D85-22-2U 215/...	5,9
	1.0-1.5	17-26	3/8"U	16	3	GME5N 32W36-80-3U 215/... GMS6N D42-16-3U 215/... GMS7N D48-22-3U 215/... GMD12N D90-22-3U 215/...	5,6,9
	1.75-2.0	13-16	1/2"U	22	3	GMS7N D70-27-4U 215/...	7
	3.0-3.5	7.5-9	1/2"UT	22	1	GMS6S D85-27-4UT 215/...	7
	2.25-2.75	9.5-12	5/8"U	27	3	GMS6N D80-27-5U 215/...	8
	3.5-6	4.5-7	5/8"UT	27	1	GMS5S D80-27-5UT 215/...	8
Spline 	0.5-1.25	48/96; 40/80; 32/64; 24/48	1/4"U	11	3	GME5N 25W32-50-2U 215/... GMD12N D85-22-2U 215/...	5,9
	1.5-2.0	20/40; 16/32	3/8"U	16	3	GME5N 32W36-80-3U 215/... GMS6N D42-16-3U 215/... GMS7N D48-22-3U 215/... GMD12N D90-22-3U 215/...	5,6,9
	2.0-3.0	12/24; 10/20; 8/16	1/2"U	22	3	GMS7N D70-27-4U 215/...	7
	4.0-5.0	6/12; 5/10	1/2"UT	22	1	GMS6S D85-27-4UT 215/...	7
	3.0-4.0	8/16; 6/12	5/8"U	27	3	GMS6N D80-27-5U 215/...	8
	5.0-8.0	5/10; 4/8	5/8"UT	27	1	GMS5S D80-27-5UT 215/...	8

Toolholder - Weldon Shank for IC 1/4”U

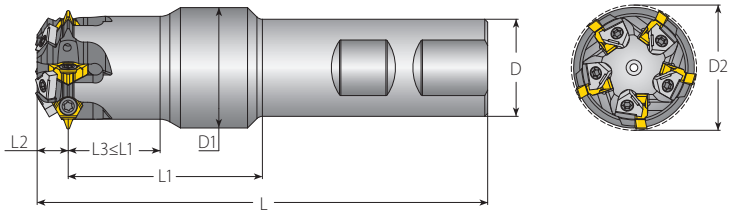


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)						No. of Flutes	Spare Parts				
IC			L	L1	D	D1 (max)	D2 (ref)	*L2 (ref)	Z	Insert Screw	Insert Torx Key	Stopper	Stopper Screw	Stopper Key
1/4”U	3	GME5N 25W32-50-2U 215/...	116	50	25	30	32	8.0	5	SN2T	HK2T	5LST	SN5LTR	K7T

Toolholder - Weldon Shank for IC 3/8”U

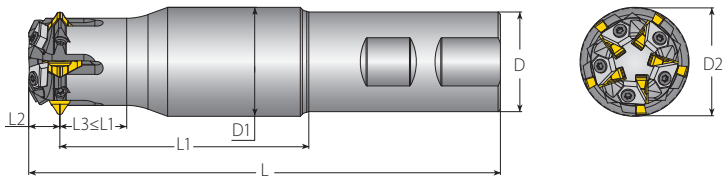


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

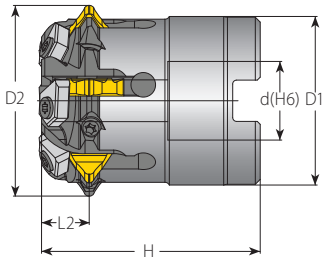
For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)						No. of Flutes	Spare Parts				
IC			L	L1	D	D1 (max)	D2 (ref)	*L2 (ref)	Z	Insert Screw	Insert Torx+ Key	Stopper	Stopper Screw	Stopper Key
3/8”U	3	GME5N 32W36-80-3U 215/...	151	80	32	35	36	10.0	5	SR3FIP8	KIP8	2TM1ST	M3x7.5	KIP8

Note: Customized toolholders are available upon request.

* L2 is measured from the center of the profile to the end of the toolholder. The L2 value is for reference purposes only. For an exact measurement, please use the Controller pre-settings.

Toolholder - Shell Mill for IC 3/8”U



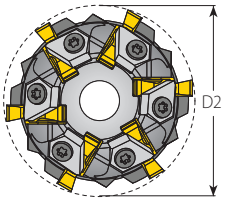
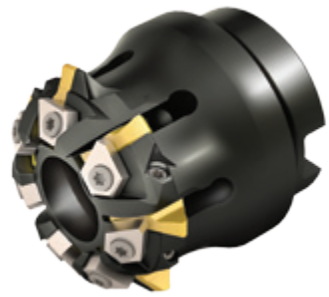


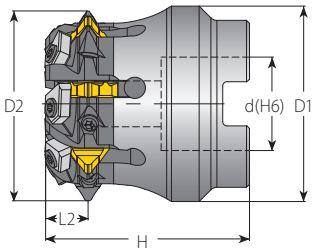
Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)					No. of Flutes	Spare Parts						
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z	Insert Screw	Insert Torx + Key	Stopper	Stopper Screw	Stopper Key	Holder Screw
3/8”U	3	GMS6N D42-16-3U 215/...	41	42	16	44.5	9.7	6	SR3FIP8	KIP8	2TM1ST	M3x7.5	KIP8	M8x1.25x40

Toolholder - Shell Mill for IC 3/8”U





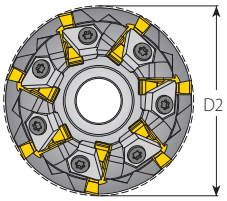


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

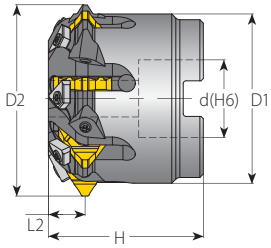
For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)					No. of Flutes	Spare Parts						
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z	Insert Screw	Insert Torx + Key	Stopper	Stopper Screw	Stopper Key	Holder Screw
3/8”U	3	GMS7N D48-22-3U 215/...	47	48	22	48	10.0	7	SR3FIP8	KIP8	2TM1ST	M3x7.5	KIP8	M10x1.5x35

Note: Customized toolholders are available upon request.

* L2 is measured from the center of the profile to the end of the toolholder. The L2 value is for reference purposes only. For an exact measurement, please use the Controller pre-settings.

Toolholder - Shell Mill for IC 1/2"U



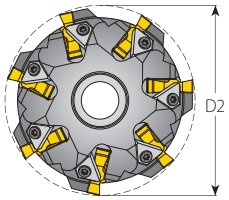
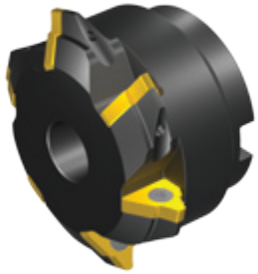


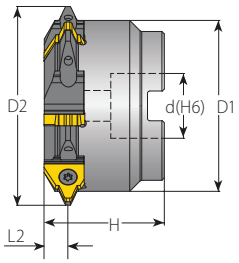
Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)					No. of Flutes	Spare Parts		Spare Parts			
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z	Insert Screw	Insert Torx + Key	Stopper	Stopper Screw	Stopper Key	Holder Screw
1/2"U	3	GMS7N D70-27-4U 215/...	69	70	27	54	12.8	7	SR3FIP8	KIP8	2TM2ST	M3x7.5	KIP8	M12x1.75x40

Toolholder - Shell Mill for IC 1/2" UT





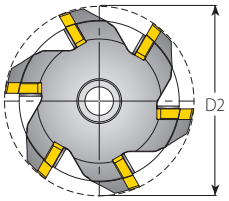


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

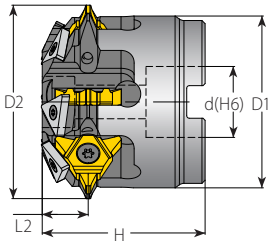
For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)					No. of Flutes	Spare Parts	Spare Parts	
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z	Insert Screw	Insert Torx + Key	Holder Screw
1/2"UT	1	GMS6S D85-27-4UT 215/...	83	85	27	50	9.9	6	SN4T	HK4T	M12x1.75x40

Note: Customized toolholders are available upon request.

* L2 is measured from the center of the profile to the end of the toolholder. The L2 value is for reference purposes only. For an exact measurement, please use the Controller pre-settings.

Toolholder - Shell Mill for IC 5/8”U



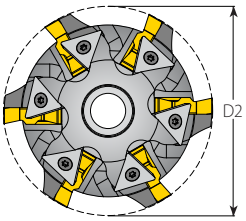
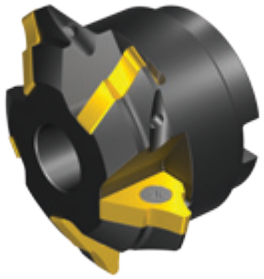


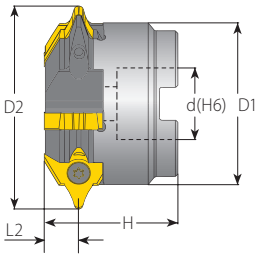
Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)					No. of Flutes	Spare Parts					
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z	Insert Screw	Insert Torx + Key	Stopper	Stopper Screw	Stopper Key	Holder Screw
5/8”U	3	GMS6N D80-27-5U 215/...	79	80	27	62	17.5	6	SN2T	HK5T	3ST	SN3TM	K3T	M12x1.75x40

Toolholder - Shell Mill for IC 5/8”UT





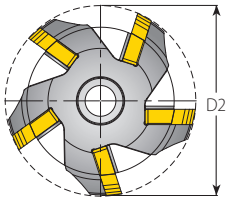


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)					No. of Flutes	Spare Parts		
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z	Insert Screw	Insert Torx + Key	Holder Screw
5/8”UT	1	GMS5S D80-27-5UT 215/...	89	80	27	25	12.5	5	SN5TM	HK5T	M12x1.75x40

Note: Customized toolholders are available upon request.

* L2 is measured from the center of the profile to the end of the toolholder. The L2 value is for reference purposes only. For an exact measurement, please use the Controller pre-settings.

Gear Milling Toolholder - Disc Mill for IC 1/4”U

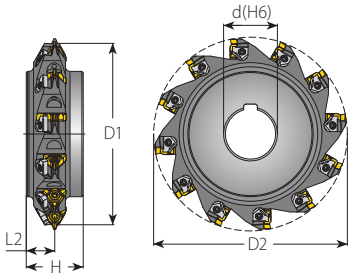


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)						No. of Flutes	Spare Parts				
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z		Insert Screw	Insert Torx + Key	Stopper	Stopper Screw	Stopper Key
1/4”U	3	GMD12N D85-22-2U 215/...	84	85	22	25	12.5	12		SN2T	HK2T	5LST	SN5LTR	K7T

Gear Milling Toolholder - Disc Mill for IC 3/8”U

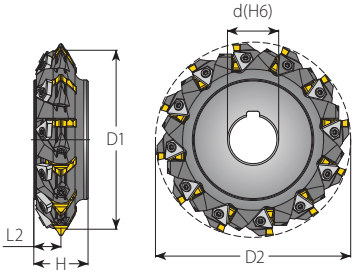


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions (mm)						No. of Flutes	Spare Parts				
IC			D1 (max)	D2 (ref)	d (H6)	H	*L2 (ref)	Z		Insert Screw	Insert Torx + Key	Stopper	Stopper Screw	Stopper Key
3/8”U	3	GMD12N D90-22-3U 215/...	89	90	22	25	12.5	12		SR3FIP8	KIP8	2TM2ST	M3x7.5	KIP8

Note: Customized toolholders are available upon request.

* L2 is measured from the center of the profile to the end of the toolholder. The L2 value is for reference purposes only. For an exact measurement, please use the Controller pre-settings.

Recommended Grades, Cutting Speeds Vc [m/min] and Feed f [mm/tooth]

Material Group	Vardex No.	Material		Hardness Brinell HB	Vc [m/min] VBX	Feed f [mm/tooth]
P Steel	1	Unalloyed steel	Low carbon (C=0.1-0.25%)	125	100-210	0.20-0.32
	2		Medium carbon (C=0.25-0.55%)	150	100-180	0.20-0.32
	3		High Carbon (C=0.55-0.85%)	170	100-170	0.15-0.23
	4	Low alloy steel (alloying elements≤5%)	Non hardened	180	60-90	0.17-0.28
	5		Hardened	275	80-150	0.15-0.28
	6		Hardened	350	70-140	0.15-0.25
	7	High alloy steel (alloying elements>5%)	Annealed	200	60-130	0.15-0.22
	8		Hardened	325	70-110	0.13-0.21
	9	Cast steel	Low alloy (alloying elements <5%)	200	100-170	0.15-0.22
	10		High alloy (alloying elements >5%)	225	70-120	0.12-0.22
M Stainless Steel	11	Stainless steel Ferritic	Non hardened	200	100-170	0.15-0.22
	12		Hardened	330	100-170	0.16-0.23
	13	Stainless steel Austenitic	Austenitic	180	70-140	0.15-0.25
	14		Super Austenitic	200	70-140	0.12-0.20
	15	Stainless steel Cast Ferritic	Non hardened	200	70-140	0.16-0.24
	16		Hardened	330	70-140	0.12-0.20
	17	Stainless steel Cast austenitic	Austenitic	200	70-120	0.15-0.22
	18		Hardened	330	70-120	0.12-0.20
K Cast Iron	28	Malleable Cast iron	Ferritic (short chips)	130	60-130	0.16-0.24
	29		Pearlitic (long chips)	230	60-120	0.15-0.22
	30	Grey cast iron	Low tensile strength	180	60-130	0.15-0.22
	31		High tensile strength	260	60-100	0.15-0.22
	32	Nodular SG iron	Ferritic	160	60-125	0.10-0.20
	33		Pearlitic	260	50-90	0.15-0.22
N(K) Non-Ferrous Metals	34	Aluminium alloys Wrought	Non aging	60	100-250	0.30-0.50
	35		Aged	100	100-180	0.28-0.50
	36	Aluminium alloys	Cast	75	150-400	0.28-0.50
	37		Cast & aged	90	150-280	0.25-0.40
	38	Aluminium alloys	Cast Si 13-22%	130	80-150	0.28-0.50
	39	Copper and Copper alloys	Brass	90	120-210	0.30-0.50
	40		Bronze and non leaded copper	100	120-210	0.28-0.50
S(M) Heat Resistant Material	19	High temperature alloys	Annealed (Iron based)	200	20-45	0.09-0.15
	20		Aged (Iron based)	280	20-30	0.07-0.13
	21		Annealed (Nickel or Cobalt based)	250	15-20	0.08-0.15
	22		Aged (Nickel or Cobalt based)	350	10-15	0.08-0.15
	23	Titanium alloys	Pure 99.5 Ti	400Rm	70-140	0.07-0.13
	24		α+β alloys	1050Rm	20-50	0.07-0.13
H(K) Hardened Material	25	Extra hard steel	Hardened & tempered	45-50HRc	15-45	0.05-0.12
	26			51-60HRc*	15-40	0.05-0.12

* Note: Special tools, which are not listed in this catalog, are required for extra hard steel (51-60HRc).

Grades

Grade	Application
VBX	TiCN coated carbide grade. Excellent grade for **general use**.

Other grades are available upon request.

U Style

UT Style

Distributor Name _____

ENQUIRY No. _____

GEAR MILLING Request Form*

* Please submit a completed version of this form with each request (a drawing is recommended).
For Rack, Straight Spline, Worm or other special forms, a drawing **must** be supplied with all relevant dimensions!

Basic Dimensions

1 | Gear / Spline Standard _____

2 | Class of Accuracy _____

3 | Module (M) / Diametrical Pitch (DP) _____

4 | Number of Teeth _____

5 | Pressure Angle _____

6 | Helix Angle _____

7 | Direction of Helix (RH/LH) _____

8 | Pitch Diameter (REF) _____

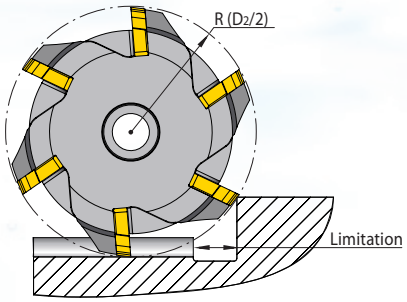
9 | Major Diameter Max: _____ Min: _____

10 | Minor Diameter Max: _____ Min: _____

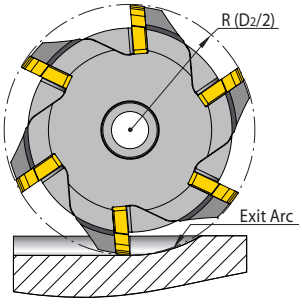
11 | Form Diameter (For Spline only) _____

12 | Fillet Radius _____

13 | Root Type (For Spline only) ☐ Fillet Root ☐ Flat Root



Tool Radius (R) < Tool Exit Limitation



Tool Radius (R) < Exit Arc

One of the following must be supplied:

14a | Measurement Over Pins Ø:_____ Max: _____ Min: _____

14b | Tangent Length Over (N) Teeth N:_____ Max: _____ Min: _____

14c | Actual - Tooth Thickness Max: _____ Min: _____

Additional Information

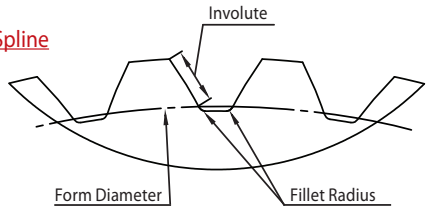
15 | For Tool Exit Limitation, a detailed component drawing must be supplied!

16 | Exit Arc Radius (R) _____

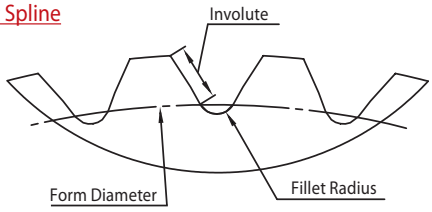
17 | Material Hardness (During machining) _____

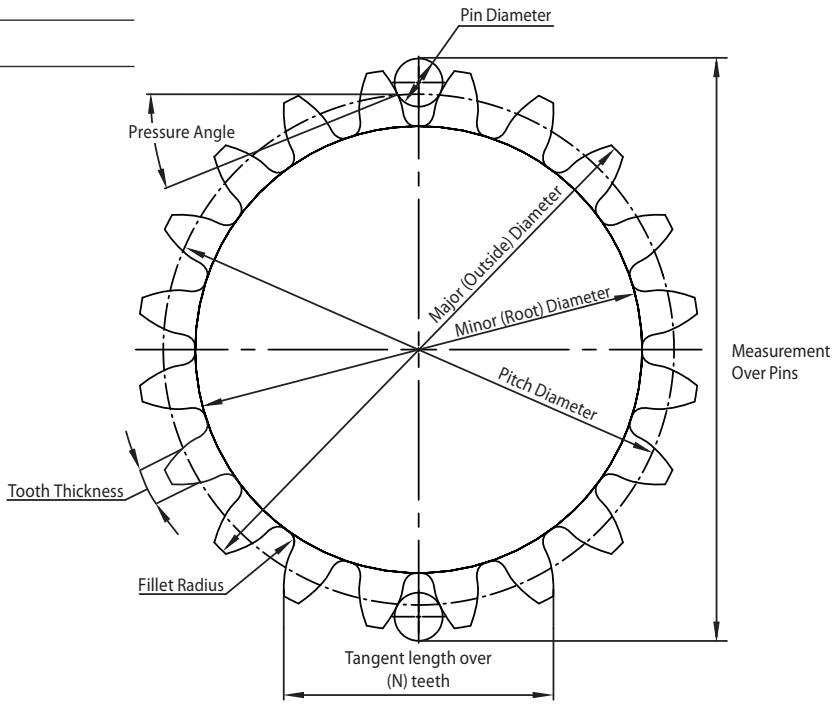
18 | Material Designation _____

Flat Root Spline



Fillet Root Spline





GEAR MILLING

For Gear, Spline & Rack Manufacturing

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