vargus
NEUMO Ehrenberg Group

GEAR MILLING

For Gear, Spline & Rack Manufacturing

INCH

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

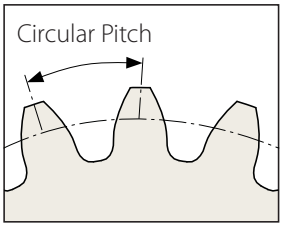
Shell Mill

Disc Mill

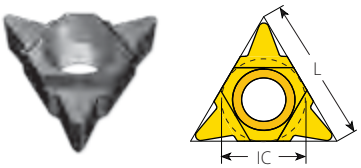
U Style
3 Cutting Edges

UT Style
1 Cutting Edge

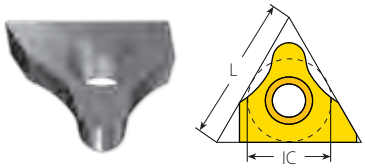
Gear Milling Inserts



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 	0.5-1.0	26-52	1/4"U	11	3	GME5N 100W125-197-2U 215/... GMD12N D335-100-2U 215/...	5,9
	1.0-1.5	17-26	3/8"U	16	3	GME5N 125W142-315-3U 215/... GMS7N D189-075-3U 215/... GMD12N D354-100-3U 215/...	5,6,9
Rack 	1.75-2.0	13-16	1/2"U	22	3	GMS7N D275-100-4U 215/...	7
	3.0-3.5	7.5-9	1/2"UT	22	1	GMS6S D335-100-4UT 215/...	7
	2.25-2.75	9.5-12	5/8"U	27	3	GMS6N D315-100-5U 215/...	8
	3.5-6	4.5-7	5/8"UT	27	1	GMS5S D315-100-5UT 215/...	8
Spline 	0.5-1.25	48/96; 40/80; 32/64; 24/48	1/4"U	11	3	GME5N 100W125-197-2U 215/... GMD12N D335-100-2U 215/...	5,9
	1.5-2.0	20/40; 16/32	3/8"U	16	3	GME5N 125W142-315-3U 215/... GMS7N D189-075-3U 215/... GMD12N D354-100-3U 215/...	5,6,9
	2.0-3.0	12/24; 10/20; 8/16	1/2"U	22	3	GMS7N D275-100-4U 215/...	7
	4.0-5.0	6/12; 5/10	1/2"UT	22	1	GMS6S D335-100-4UT 215/...	7
	3.0-4.0	8/16; 6/12	5/8"U	27	3	GMS6N D315-100-5U 215/...	8
	5.0-8.0	5/10; 4/8	5/8"UT	27	1	GMS5S D315-100-5UT 215/...	8

Toolholder - Weldon Shank for IC 1/4"U

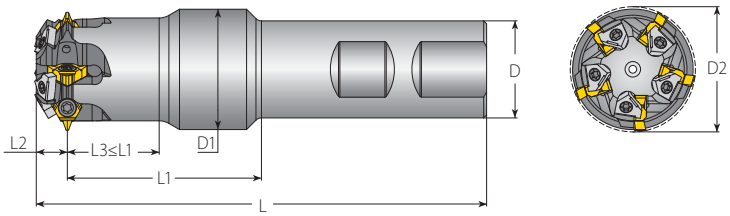


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch						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 100W125-197-2U 215/...	4.65	1.97	1.00	1.18	1.25	.31	5	SN2T (70036)	HK2T (70227)	5LST (70013)	SN5LTR (72007)	K7T (70026)

Toolholder - Weldon Shank for IC 3/8"U

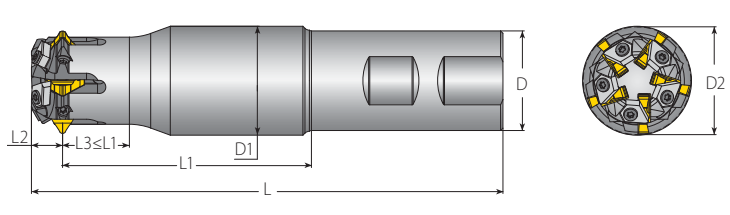


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

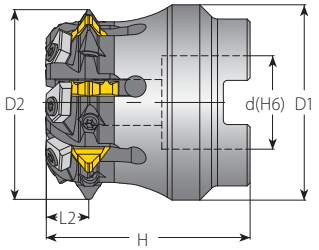
For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch						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 125W142-315-3U 215/...	5.9	3.15	1.25	1.37	1.42	.39	5	SR3FIP8 (80973)	KIP8 (70231)	2TM1ST (70016)	M3x7.5 (70029)	KIP8 (70231)

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



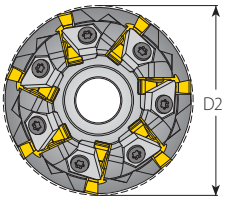


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch					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 D189-075-3U 215/...	1.8	1.89	.75	1.89	.39	7	SR3FIP8 (80973)	KIP8 (70231)	2TM1ST (70016)	M3x7.5 (70029)	KIP8 (70231)	3/8-24x1.5 (70264)

Note: Customized toolholders are available upon request.

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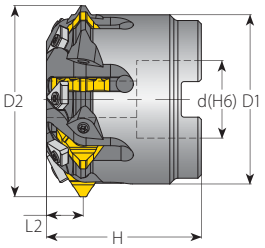
Toolholder - Shell Mill for IC 1/2"U



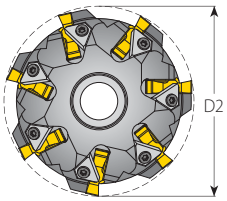
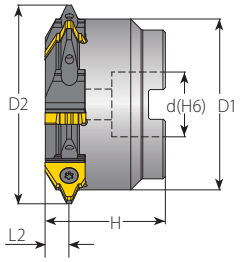


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch					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
1/2"U	3	GMS7N D275-100-4U 215/...	2.7	2.75	1.00	2.05	.5	7	SR3FIP8 (80973)	KIP8 (70231)	2TM2ST (70023)	M3x7.5 (70029)	KIP8 (70231)	1/2-20x1.5 (70224)

Toolholder - Shell Mill for IC 1/2" UT



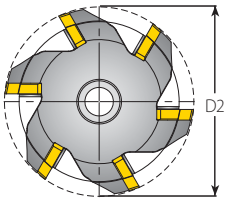


Image for illustration only, final D2 and D1 values will be supplied with the toolholder

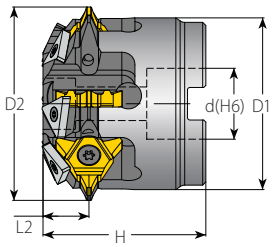
For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch					No. of Flutes	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 D335-100-4UT 215/...	3.27	3.35	1.00	1.97	.40	6	SN4T (70039)	HK4T (70241)	1/2x20x1.5 (70224)

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



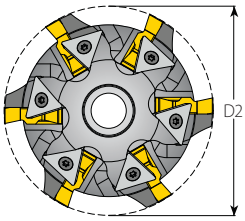
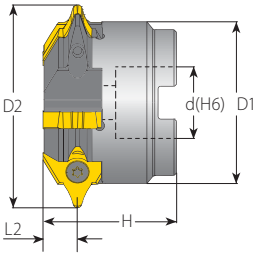


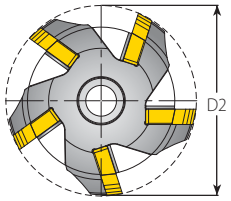
Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch					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 D315-100-5U 215/...	3.1	3.15	1.00	2.36	.69	6	SN2T (70036)	HK5T (70229)	3ST (70027)	SN3TM (70236)	K3T (70021)	1/2-20x1.5 (70224)

Toolholder - Shell Mill for IC 5/8"UT





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For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch					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 D315-100-5UT 215/...	3.07	3.15	1.00	1.97	.39	5	SN5TM (70041)	HK5T (70229)	1/2-20x1.5 (70224)

Note: Customized toolholders are available upon request.

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

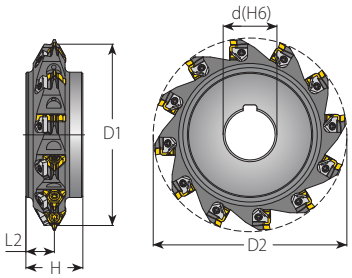

Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch					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 D335-100-2U 215/...	3.3	3.35	1.00	.98	.49	12	SN2T (70036)	HK2T (70227)	5LST (70013)	SN5LTR (72007)	K7T (70026)

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

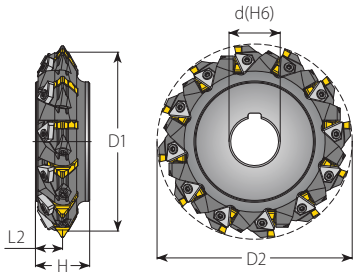

Image for illustration only, final D2 and D1 values will be supplied with the toolholder

For Gear, Rack and Spline

Insert Size	Insert Cutting Edges	Ordering Code	Dimensions inch					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 D354-100-3U 215/...	3.5	3.54	1.00	.98	.49	12	SR3FIP8 (80973)	KIP8 (70231)	2TM2ST (70023)	M3x7.5 (70029)	KIP8 (70231)

Note: Customized toolholders are available upon request.

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Recommended Grades, Cutting Speeds Vc [ft/min] and Feed f [inch/tooth]

Material Group	Vardex No.	Material		Hardness Brinell HB	Vc [ft/min] VBX	Feed f [inch/tooth]
P Steel	1	Unalloyed steel	Low carbon (C=0.1-0.25%)	125	328 - 689	.0079 - .0126
	2		Medium carbon (C=0.25-0.55%)	150	328 - 590	.0079 - .0126
	3		High Carbon (C=0.55-0.85%)	170	328 - 558	.0060 - .0090
	4	Low alloy steel (alloying elements≤5%)	Non hardened	180	197 - 295	.0067 - .011
	5		Hardened	275	262 - 492	.0060 - .011
	6		Hardened	350	230 - 459	.0060 -.0098
	7	High alloy steel (alloying elements>5%)	Annealed	200	197 - 426	.0060 - .0087
	8		Hardened	325	227 - 361	.0051 - .0083
	9	Cast steel	Low alloy (alloying elements <5%)	200	328 - 558	.0060 - .0087
	10		High alloy (alloying elements >5%)	225	230 - 394	.0047 - .0087
M Stainless Steel	11	Stainless steel Ferritic	Non hardened	200	328 - 558	.0060 - .0087
	12		Hardened	330	328 - 558	.0063 - .0091
	13	Stainless steel Austenitic	Austenitic	180	230 - 460	.0060 - .0098
	14		Super Austenitic	200	230 - 460	.0047 - .0079
	15	Stainless steel Cast Ferritic	Non hardened	200	230 - 460	.0063 - .0094
	16		Hardened	330	230 - 460	.0047 - .0079
	17	Stainless steel Cast austenitic	Austenitic	200	230 - 394	.0060 - .0087
	18		Hardened	330	230 - 394	.0047 - .0079
K Cast Iron	28	Malleable Cast iron	Ferritic (short chips)	130	197 - 426	.0063 - .0095
	29		Pearlitic (long chips)	230	197 - 394	.0060 - .0087
	30	Grey cast iron	Low tensile strength	180	197 - 426	.0060 - .0087
	31		High tensile strength	260	197 - 328	.0060 - .0087
	32	Nodular SG iron	Ferritic	160	197 - 410	.0039 - .0079
	33		Pearlitic	260	164 - 295	.0060 - .0087
N(K) Non-Ferrous Metals	34	Aluminium alloys Wrought	Non aging	60	328 - 820	.0118 - .0197
	35		Aged	100	328 - 590	.011 - .0197
	36	Aluminium alloys	Cast	75	492 - 1312	.011 - .0197
	37		Cast & aged	90	492 - 918	.0098 - .0157
	38	Aluminium alloys	Cast Si 13-22%	130	262 - 492	.011 - .0197
	39	Copper and Copper alloys	Brass	90	394 - 689	.0118 - .0197
	40		Bronze and non leaded copper	100	394 - 689	.011 - .0197
S(M) Heat Resistant Material	19	High temperature alloys	Annealed (Iron based)	200	66 - 148	.0035 - .0059
	20		Aged (Iron based)	280	66 - 98	.0028 - .0051
	21		Annealed (Nickel or Cobalt based)	250	49 - 66	.0031 - .0059
	22		Aged (Nickel or Cobalt based)	350	33 - 49	.0031 - .0059
	23	Titanium alloys	Pure 99.5 Ti	400Rm	230 - 459	.0028 - .0051
	24		α+β alloys	1050Rm	66 - 164	.0028 - .0051
H(K) Hardened Material	25	Extra hard steel	Hardened & tempered	45-50HRc	49 - 148	.002 - .0047
	26			51-55HRc*	49 - 131	.002 - .0047

* Note: Special tools, which are not listed in this catalog, are required for extra hard steel (51-55HRc).

Grades

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

Other grades are available upon request.

U Style

UT Style

vargus
NEUMO Ehrenberg Group

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) _____

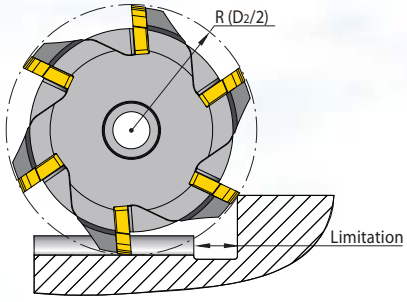
9 | Major Diameter Max: _____ Min: _____

10 | Minor Diameter Max: _____ Min: _____

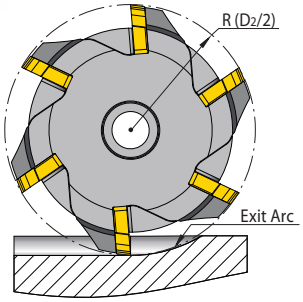
11 | Form Diameter (For Spline only) _____

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

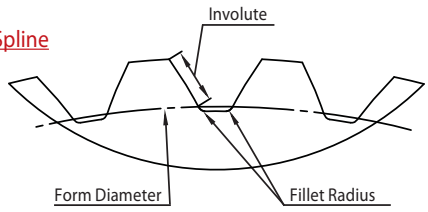
15 | For Tool Exit Limitation, a detailed component drawing must be supplied!

16 | Exit Arc Radius (R) _____

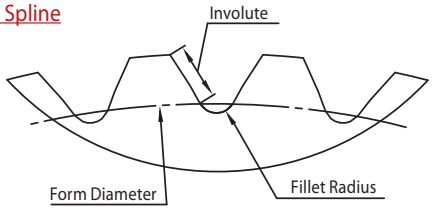
17 | Material Hardness (During machining) _____

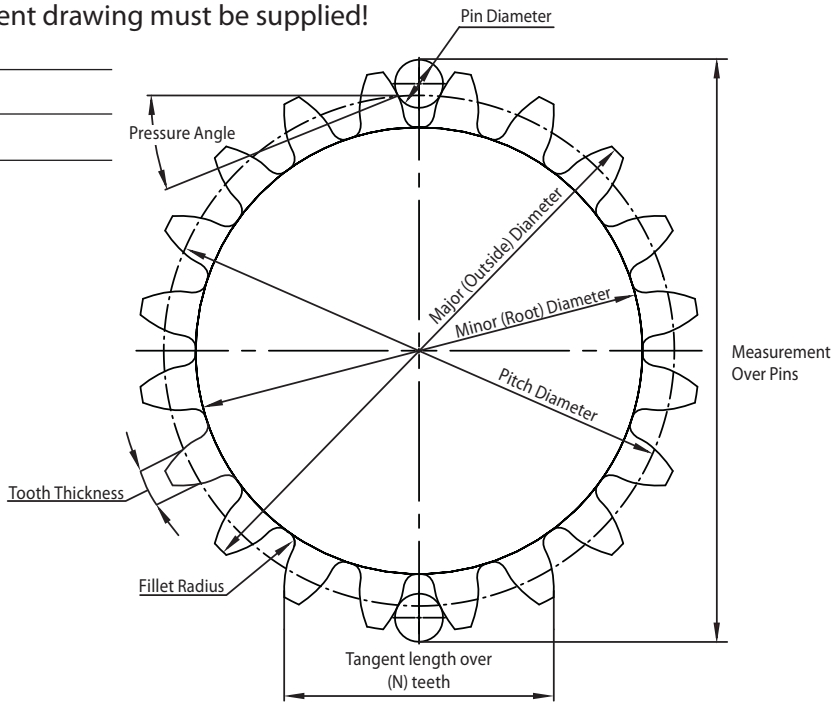
18 | Material Designation _____

Flat Root Spline



Fillet Root Spline





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EDITION 02