

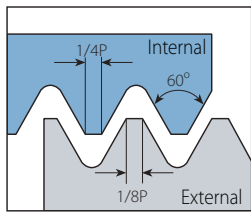


TM Solid

Solid Carbide Thread Milling Tools

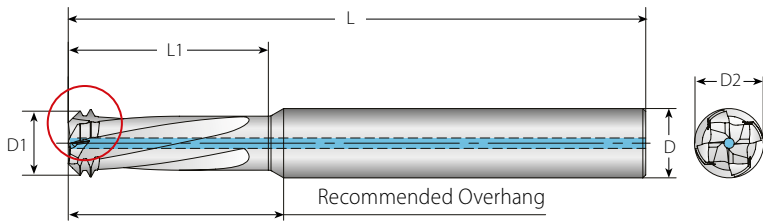
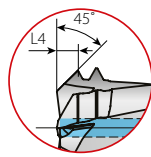
METRIC

Internal



Defined by: R262 (DIN 13)
Tolerance class: 6H

Coolant available only when specified



Left Hand Tool

TMDR - Drilling, Thread Milling & Chamfering

2 x Do (L1 ≤ 2 x Thread Diameter)

Thread		Pitch	Ordering Code	Dimensions mm				No. of Flutes	Teeth		
M Coarse	M Fine	mm	Internal	D	D2	L	L1	Z	Zt	L4*	D1
Without coolant											
M3x0.5	M4x0.5	0.50	TD-2L06024L070-I0.50ISO...	6	2.40	58	7.0	3	2	0.40	2.08
M4x0.7		0.70	TD-2L06032L092-I0.70ISO...	6	3.20	58	9.2	3	2	0.57	2.88
M5x0.8		0.80	TD-2L06039L115-I0.80ISO...	6	3.90	58	11.5	3	2	0.70	3.51
M6-M7x1.0	M8-M9x1.0	1.00	TD-2L06047L140-I1.00ISO...	6	4.70	58	14.0	3	2	0.79	4.16
With coolant											
M6-M7x1.0	M8-M9x1.0	1.00	TDC2L08047L140-I1.00ISO...	8	4.70	64	14.0	3	2	0.79	4.16
M8x1.25	M9-M11x1.25	1.25	TDC2L08061L180-I1.25ISO...	8	6.10	64	18.0	4	2	0.90	5.57
M10x1.5	M11-M14x1.5	1.50	TDC2L08078L230-I1.50ISO...	8	7.80	64	23.0	4	2	1.12	7.24
M12x1.75		1.75	TDC2L10090L260-I1.75ISO...	10	9.00	80	26.0	4	2	1.20	8.35
M16x2.0	M17-M23x2.0	2.00	TDC2L12118L350-I2.00ISO...	12	11.80	100	35.0	4	2	2.00	11.13
M18-M22x2.50		2.50	TDC2L16150L446-I2.5ISO...	16	15.00	135	44.6	4	2	2.25	14.08

TMDR - Drilling, Thread Milling & Chamfering

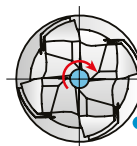
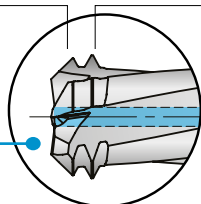
2.5 x Do (L1 ≤ 2.5 x Thread Diameter)

Thread		Pitch	Ordering Code	Dimensions mm				No. of Flutes	Teeth		
M Coarse	M Fine	mm	Internal	D	D2	L	L1	Z	Zt	L4*	D1
Without coolant											
M3x0.5	M4x0.5	0.50	TD-2L06024L085-I0.50ISO...	6	2.40	58	8.5	3	2	0.40	2.08
M4x0.7		0.70	TD-2L06032L112-I0.70ISO...	6	3.20	58	11.2	3	2	0.57	2.88
M5x0.8		0.80	TD-2L06039L144-I0.80ISO...	6	3.90	58	14.4	3	2	0.70	3.51
M6-M7x1.0	M8-M9x1.0	1.00	TD-2L06047L170-I1.00ISO...	6	4.70	58	17.0	3	2	0.79	4.16
With coolant											
M6-M7x1.0	M8-M9x1.0	1.00	TDC2L08047L170-I1.00ISO...	8	4.70	64	17.0	3	2	0.79	4.16
M8x1.25	M9-M11x1.25	1.25	TDC2L08061L220-I1.25ISO...	8	6.10	64	22.0	4	2	0.90	5.57
M10x1.5	M11-M14x1.5	1.50	TDC2L08078L280-I1.50ISO...	8	7.80	64	28.0	4	2	1.12	7.24
M12x1.75		1.75	TDC2L10090L320-I1.75ISO...	10	9.00	80	32.0	4	2	1.20	8.35
M16x2.0	M17-M23x2.0	2.00	TDC2L12118L430-I2.00ISO...	12	11.80	100	43.0	4	2	2.00	11.13
M18-M22x2.50		2.50	TDC2L16150L546-I2.5ISO...	16	15.00	135	54.6	4	2	2.25	14.08
M24x3.0		3.00	TDC2L18178L650-I3.0ISO...	18	17.8	135	65.0	4	2	2.50	16.90

1st Tooth: Partial Profile (Roughing) 2nd Tooth: Full Profile (Finish)

Two cutting teeth: Partial Profile for leading tooth followed by Full Profile for finishing.

The work direction should be from the outside inwards (Climb Milling).



TMDR Tools are left handed. For CNC use M04 code.

* Please use the VARGUS GENius™ for Chamfer recommendations

Internal

Defined by: ANSI B1.1:74
Tolerance class: 2B
Coolant available only when specified

Left Hand Tool

TMDR - Drilling, Thread Milling & Chamfering

2 x Do (L1 ≤ 2 x Thread Diameter)

Thread		Pitch	Ordering Code	Dimensions mm			No. of Flutes	Teeth					
UNC	UNF	UN	TPI	Internal	D	D2	L	L1	Z	Zt	L4*	D1	
Without coolant													
No.4-40, No.5-40	No.6-40		40	TD-2L06021L072-I40UNC...	6	2.10	58	7.2	3	2	0.38	1.76	
No.6-32, No.8-32			32	TD-2L06026L086-I32UNC...	6	2.60	58	8.6	3	2	0.45	2.21	
No.8-32	No.10-32		32	TD-2L06030L100-I32UNC...	6	3.00	58	10.0	3	2	0.60	2.62	
		1/4"x28	5/16"x28	28	TD-2L06050L144-I28UNF...	6	5.00	58	14.4	3	2	0.69	4.58
No.10-24, No.12-24			24	TD-2L06035L114-I24UNC...	6	3.50	58	11.4	3	2	0.80	3.18	
1/4"x20			20	TD-2L06048L145-I20UNC...	6	4.80	58	14.5	3	2	0.80	4.29	
With coolant													
1/4"x28		5/16"x28	28	TDC2L08050L144-I28UNF...	8	5.00	64	14.4	3	2	0.69	4.58	
5/16"x24, 3/8"x24			24	TDC2L08065L176-I24UNF...	8	6.50	64	17.6	3	2	0.85	6.02	
1/4"x20		5/16"x20	20	TDC2L08048L145-I20UNC...	8	4.80	64	14.5	3	2	0.80	4.29	

TMDR - Drilling, Thread Milling & Chamfering

2.5 x Do (L1 ≤ 2.5 x Thread Diameter)

Thread		Pitch	Ordering Code	Dimensions mm			No. of Flutes	Teeth					
UNC	UNF	UN	TPI	Internal	D	D2	L	L1	Z	Zt	L4*	D1	
Without coolant													
No.4-40, No.5-40	No.6-40		40	TD-2L06021L088-I40UNC...	6	2.10	58	8.8	3	2	0.38	1.76	
No.6-32, No.8-32			32	TD-2L06026L105-I32UNC...	6	2.60	58	10.5	3	2	0.45	2.21	
No.8-32	No.10-32		32	TD-2L06030L122-I32UNC...	6	3.00	58	12.2	3	2	0.60	2.62	
		1/4"x28	5/16"x28	28	TD-2L06050L178-I28UNF...	6	5.00	58	17.8	3	2	0.69	4.58
1/4"x20			20	TD-2L06048L180-I20UNC...	6	4.80	58	18.0	3	2	0.80	4.29	
With coolant													
1/4"x28		5/16"x28	28	TDC2L08050L178-I28UNF...	8	5.00	64	17.8	3	2	0.69	4.58	
5/16"x24, 3/8"x24			24	TDC2L08065L218-I24UNF...	8	6.50	64	21.8	3	2	0.85	6.02	
1/4"x20		5/16"x20	20	TDC2L08048L180-I20UNC...	8	4.80	64	18.0	3	2	0.80	4.29	
3/8"x16		7/16"x16	16	TDC2L08067L260-I16UNC...	8	6.70	64	26.0	4	2	1.10	6.18	

1st Tooth: Partial Profile (Roughing) 2nd Tooth: Full Profile (Finish)

Two cutting teeth: Partial Profile for leading tooth followed by Full Profile for finishing.

The work direction should be from the outside inwards (Climb Milling).

TMDR Tools are left handed. For CNC use M04 code.

* Please use the VARGUS GENius™ for Chamfer recommendations

BSP (G)

TMDR

Internal

Defined by: B.S.2779:1956
Tolerance class: Medium class

Left Hand Tool

TMDR - Drilling, Thread Milling & Chamfering

2 x Do (L1 ≤ 2 x Thread Diameter)

Thread	Pitch	Ordering Code	Dimensions mm				No. of Flutes	Teeth		
Standard	TPI	Internal	D	D2	L	L1	Z	Zt	L4*	D1
With Coolant										
1/16"x28	28	TDC2L08059L175-I28BSP...	8	5.9	64	17.5	4	2	0.60	5.50
1/8"x28	28	TDC2L08078L230-I28BSP...	8	7.8	64	23.0	4	2	0.60	7.28
1/4"x19	19	TDC2L12105L320-I19BSP...	12	10.5	80	32.0	4	2	0.80	10.00
3/8"x19	19	TDC2L14126L380-I19BSP...	14	12.6	100	38.0	4	2	0.80	12.04
1/2"x14	14	TDC2L16158L456-I14BSP...	16	15.8	135	45.6	4	2	1.27	15.16

NPT

TMDR

Internal

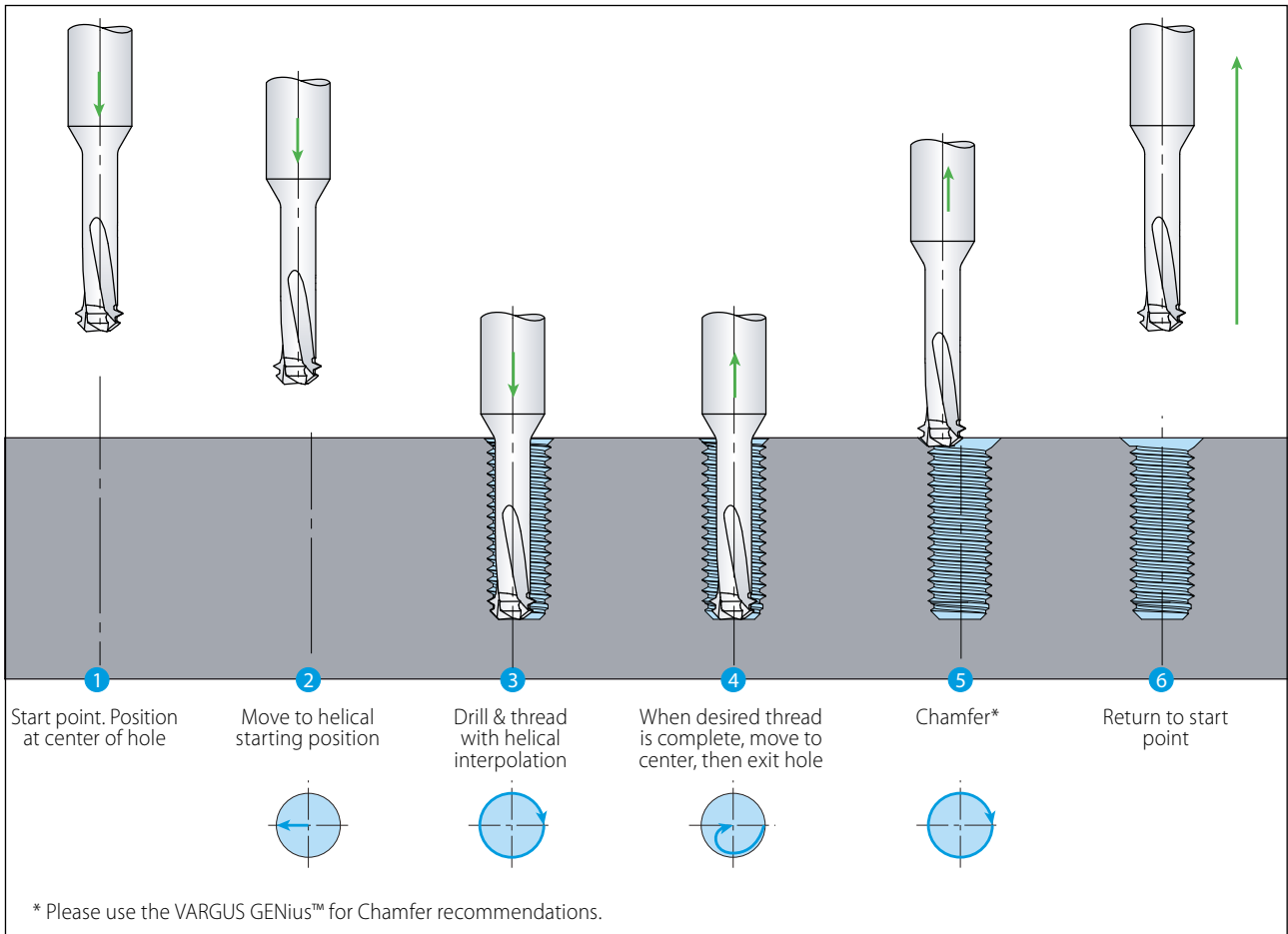
Defined by: USAS B2.1:1968
Tolerance class: Standard
NPT

Left Hand Tool

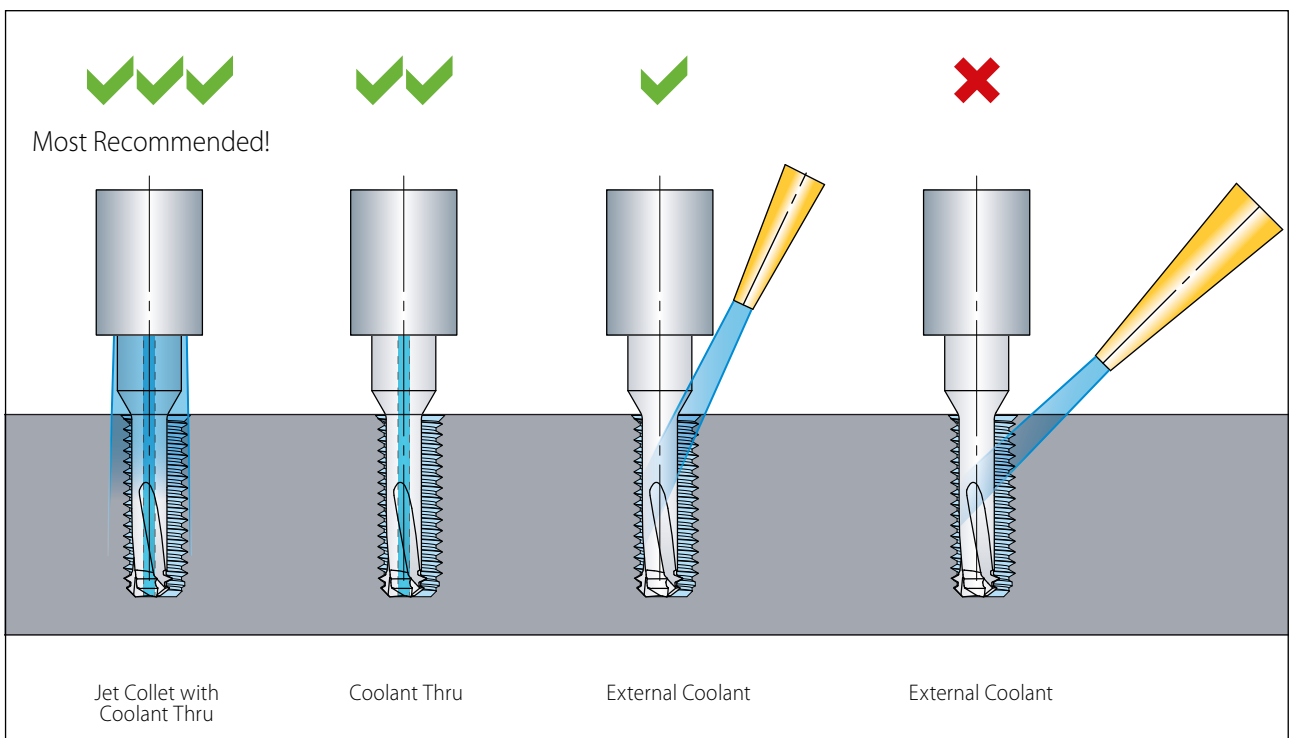
TMDR - Drilling, Thread Milling & Chamfering

Thread	Pitch	Ordering Code	Dimensions mm				No. of Flutes	Teeth		
Standard	TPI	Internal	D	D2	L	L1	Z	Zt	L4*	D1
With Coolant										
1/16"x27	27	TDC2L08056L112-I27NPT...	8	5.6	64	11.2	4	2	0.60	5.07
1/8"x27	27	TDC2L08075L112-I27NPT...	8	7.5	64	11.2	4	2	0.60	6.97
1/4"x18	18	TDC2L10094L164-I18NPT...	10	9.4	80	16.4	4	2	1.00	8.67
3/8"x18	18	TDC2L12119L164-I18NPT...	12	11.9	100	16.4	4	2	1.00	11.19
1/2"x14	14	TDC2L16153L286-I14NPT...	16	15.3	100	28.6	6	2	1.50	14.41

* Please use the VARGUS GENIUS™ for Chamfer recommendations



TMDR - Coolant Use for Best Chip Evacuation



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

Material Group	Vargus No.	Material		Hardness Brinell HB	Vc [m/min]			Feed [mm/tooth]				
					Helicool, HCR, HCC, Helical, Sraight, Deep Threading		MilliPro	Helical	Straight	Deep Threading	Helicool HCC HCR	MilliPro, MilliPro Dental
					VTH	VTS	VTH					
P Steel	1	Unalloyed Steel	Low Carbon (C=0.1-0.25%)	125	80-250	50-180	60-120	0.03-0.08	0.03-0.08	0.10-0.35	0.03-0.08	0.02-0.16
	2		Medium Carbon (C=0.25-0.55%)	150	80-230	50-140	60-120	0.03-0.08	0.03-0.08	0.08-0.30	0.03-0.08	0.02-0.16
	3		High Carbon (C=0.55-0.85%)	170	80-200	50-120	60-90	0.03-0.08	0.03-0.06	0.08-0.30	0.03-0.08	0.02-0.16
	4	Low Alloy Steel (alloying elements ≤5%)	Non Hardened	180	60-180	60-170	60-90	0.03-0.08	0.03-0.07	0.08-0.30	0.03-0.08	0.02-0.16
	5		Hardened	275	60-170	60-160	50-80	0.03-0.07	0.03-0.07	0.08-0.30	0.03-0.07	0.02-0.07
	6		Hardened	350	60-160	60-150	50-80	0.02-0.05	0.02-0.04	0.05-0.15	0.02-0.06	0.02-0.03
	7	High Alloy Steel (alloying elements >5%)	Annealed	200	40-100	40-90	50-80	0.03-0.07	0.03-0.07	0.10-0.24	0.03-0.07	0.02-0.09
	8		Hardened	325	30-80	30-70	50-80	0.02-0.04	0.02-0.05	0.05-0.15	0.03-0.06	0.02-0.03
	9	Cast Steel	Low Alloy (alloying elements <5%)	200	80-250	70-200	70-90	0.03-0.08	0.03-0.06	0.08-0.30	0.03-0.07	0.02-0.16
	10		High Alloy (alloying elements >5%)	225	60-170	60-150	60-80	0.03-0.05	0.03-0.06	0.05-0.15	0.03-0.07	0.02-0.03
M Stainless Steel	11	Stainless Steel Ferritic	Non Hardened	200	60-150	50-140	60-90	0.04-0.07	0.02-0.05	0.11-0.35	0.03-0.08	0.02-0.16
	12		Hardened	330	60-120	50-110	50-80	0.02-0.06	0.01-0.03	0.05-0.24	0.03-0.06	0.02-0.03
	13	Stainless Steel Austenitic	Austenitic	180	60-140	60-130	60-90	0.03-0.08	0.02-0.05	0.11-0.35	0.03-0.08	0.02-0.16
	14		Super Austenitic	200	60-130	50-120	50-80	0.03-0.08	0.02-0.05	0.11-0.35	0.03-0.06	0.02-0.16
	15	Stainless Steel Cast Ferritic	Non Hardened	200	60-160	50-150	60-90	0.03-0.08	0.02-0.05	0.11-0.35	0.03-0.06	0.02-0.16
	16		Hardened	330	60-110	50-100	50-80	0.02-0.05	0.02-0.03	0.10-0.24	0.02-0.05	0.02-0.03
	17	Stainless Steel Cast Austenitic	Austenitic	200	60-150	50-140	60-90	0.03-0.08	0.02-0.06	0.11-0.35	0.02-0.05	0.02-0.16
	18		Hardened	330	60-100	50-90	50-80	0.02-0.05	0.01-0.03	0.10-0.24	0.02-0.04	0.02-0.03
K Cast Iron	28	Malleable Cast Iron	Ferritic (short chips)	130	60-70	60-150	50-80	0.03-0.08	0.03-0.08	0.05-0.15	0.03-0.08	0.02-0.03
	29		Pearlitic (long chips)	230	60-150	80-100	60-90	0.03-0.08	0.03-0.06	0.10-0.24	0.03-0.07	0.02-0.12
	30	Grey Cast Iron	Low Tensile Strength	180	70-160	50-140	70-100	0.03-0.08	0.03-0.06	0.09-0.25	0.03-0.07	0.02-0.16
	31		High Tensile Strength	260	40-120	40-110	60-90	0.02-0.06	0.02-0.05	0.10-0.24	0.03-0.07	0.02-0.12
	32	Nodular Sg Iron	Ferritic	160	40-110	40-100	70-100	0.03-0.08	0.03-0.07	0.09-0.25	0.03-0.08	0.02-0.16
	33		Pearlitic	260	40-100	40-90	60-90	0.02-0.06	0.02-0.05	0.10-0.24	0.03-0.07	0.02-0.12
N Non-Ferrous Metals	34	Aluminium Alloys Wrought	Non Aging	60	200-300	150-250	60-250	0.05-0.12	0.05-0.15	0.12-0.40	0.04-0.1	0.03-0.15
	35		Aged	100	150-250	100-220	60-150	0.05-0.12	0.03-0.1	0.10-0.32	0.03-0.1	0.03-0.16
	36	Aluminium Alloys	Cast	75	100-200	80-150	60-250	0.05-0.12	0.05-0.15	0.10-0.32	0.03-0.1	0.03-0.16
	37		Cast & Aged	90	120-220	90-160	60-150	0.05-0.12	0.03-0.1	0.10-0.30	0.06-0.12	0.02-0.16
	38	Aluminium Alloys	Cast Si 13-22%	130	200-300	150-250	250	0.05-0.12	0.05-0.15	0.10-0.32	0.05-0.12	0.03-0.15
	39	Copper and Copper Alloys	Brass	90	200-300	150-250	60-250	0.06-0.13	0.05-0.15	0.12-0.40	0.05-0.12	0.03-0.16
	40		Bronze And Non Leded Copper	100	150-250	100-220	60-150	0.05-0.12	0.03-0.1	0.10-0.32	0.05-0.12	0.03-0.15
S Heat Resistant Material	19	High Temperature Alloys	Annealed (iron based)	200	30-60	30-50	60	0.03-0.07	0.02-0.04	0.11-0.35	0.03-0.7	0.02-0.16
	20		Aged (iron based)	280	20-50	20-40	50	0.02-0.04	0.01-0.03	0.05-0.15	0.03-0.06	0.02-0.03
	21		Annealed (nickel or cobalt based)	250	15-35	15-30	35	0.02-0.04	0.01-0.03	0.05-0.15	0.03-0.06	0.02-0.03
	22		Aged (nickel or cobalt based)	350	15-30	15-25	30	0.02-0.04	0.01-0.03	0.05-0.15	0.02-0.05	0.02-0.03
	23	Titanium Alloys	Pure 99.5 Ti	400Rm	40-80	30-70	30-50	0.02-0.04	0.01-0.03	0.10-0.24	0.02-0.05	0.02-0.07
24	α+β Alloys		1050Rm	20-50	20-45	25-35	0.02-0.04	0.01-0.02	0.10-0.24	0.02-0.04	0.02-0.07	
H Hardened Material	25	Extra Hard Steel	Hardened & Tempered	45-50HRC	15-45	15-35	45	0.02-0.03	0.02	0.03-0.06	0.02-0.03	-
	26			51-55HRC	15-40	15-30	30	0.02-0.03	0.01	0.03-0.06	0.02-0.03	-

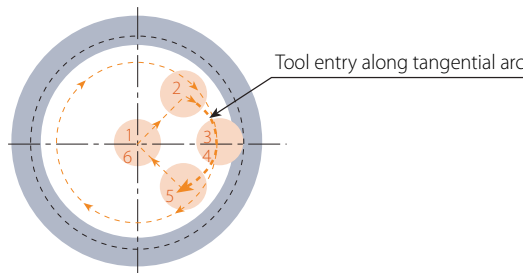
Recommendation:

At tool entry, set the Feed f [mm/tooth] to 70% lower than the threading Feed.

Example:

Threading Feed: 0.3[mm/tooth]

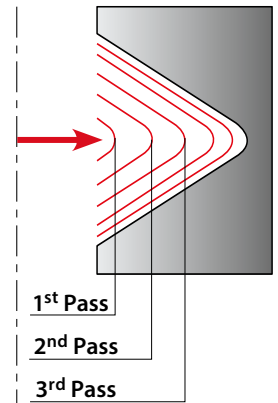
Tool entry Feed: 0.09[mm/tooth]



Efficient Multi-passes Machining Method

Due to the high volume of chips, thinner chips are required. This is achieved by radial multi-pass machining, which reduces the accumulation of chips, and thereby enables high speeds and feed rates.

MultiFlute



Recommended No. of Passes According to Pitch

Pitch TPI	48	32	24	20	16	14	12	10	8
Pitch mm	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.50	3.00
No. of Passes	2-3	2-3	3-4	4-5	5-6	5-6	6-7	7-8	7-9

Conventional milling with multiple passes is required.
For machining recommendations, use the Vargus GENius.

Recommended Cutting Speeds V_c [m/min] and Feed f [mm/tooth]

Material Group	Vargus No.	Material	Hardness Brinell HB	2xDo Tools				3xDo Tools				
				V_c [m/min]	Feed f [mm/tooth] by Cutter Dia. = D2			V_c [m/min]	Feed f [mm/tooth] by Cutter Dia. = D2			
					VTH	2.4-4.0	4.0-9.0		>9.0	VTH	2.4-4.0	4.0-9.0
P Steel	1	Unalloyed Steel	Low Carbon (C=0.1-0.25%)	125	145-185	0.05-0.08	0.09-0.14	0.11-0.17	70-110	0.03-0.05	0.07-0.10	0.08-0.13
	2		Medium Carbon (C=0.25-0.55%)	150	135-175	0.05-0.08	0.09-0.14	0.11-0.17	70-110	0.03-0.05	0.07-0.10	0.08-0.13
	3		High Carbon (C=0.55-0.85%)	170	120-160	0.05-0.08	0.09-0.14	0.11-0.17	65-105	0.03-0.05	0.07-0.10	0.08-0.13
	4	Low Alloy Steel (alloying elements ≤5%)	Non Hardened	180	100-140	0.05-0.08	0.09-0.14	0.11-0.17	65-105	0.03-0.05	0.07-0.10	0.08-0.13
	5		Hardened	275	95-135	0.05-0.08	0.09-0.14	0.11-0.17	65-105	0.03-0.05	0.07-0.10	0.08-0.13
	6		Hardened	350	90-130	0.04-0.06	0.06-0.10	0.08-0.11	60-100	0.03-0.05	0.05-0.08	0.07-0.10
	7	High Alloy Steel (alloying elements >5%)	Annealed	200	50-90	0.05-0.08	0.09-0.14	0.11-0.17	50-90	0.03-0.05	0.07-0.10	0.08-0.13
	8		Hardened	325	40-80	0.04-0.06	0.06-0.10	0.08-0.11	40-80	0.03-0.05	0.05-0.08	0.07-0.10
	9	Cast Steel	Low Alloy (alloying elements <5%)	200	145-185	0.05-0.08	0.09-0.14	0.11-0.17	70-110	0.03-0.05	0.07-0.10	0.08-0.13
	10		High Alloy (alloying elements >5%)	225	95-135	0.04-0.06	0.06-0.10	0.08-0.11	65-105	0.03-0.05	0.05-0.08	0.07-0.10
M Stainless Steel	11	Stainless Steel Ferritic	Non Hardened	200	85-125	0.04-0.06	0.06-0.10	0.08-0.11	60-100	0.03-0.05	0.05-0.08	0.07-0.10
	12		Hardened	330	70-110	0.04-0.06	0.06-0.10	0.08-0.11	60-100	0.03-0.05	0.05-0.08	0.07-0.10
	13	Stainless Steel Austenitic	Austenitic	180	80-120	0.05-0.08	0.09-0.14	0.11-0.17	60-100	0.03-0.05	0.07-0.10	0.08-0.13
	14		Super Austenitic	200	75-115	0.05-0.08	0.09-0.14	0.11-0.17	60-100	0.03-0.05	0.07-0.10	0.08-0.13
	15	Stainless Steel Cast Ferritic	Non Hardened	200	90-130	0.05-0.08	0.09-0.14	0.11-0.17	60-100	0.03-0.05	0.07-0.10	0.08-0.13
	16		Hardened	330	65-105	0.04-0.06	0.06-0.10	0.08-0.11	60-100	0.03-0.05	0.05-0.08	0.07-0.10
	17	Stainless Steel Cast Austenitic	Austenitic	200	85-125	0.05-0.08	0.09-0.14	0.11-0.17	60-100	0.03-0.05	0.07-0.10	0.08-0.13
	18		Hardened	330	60-100	0.04-0.06	0.06-0.10	0.08-0.11	60-100	0.03-0.05	0.05-0.08	0.07-0.10
K Cast Iron	28	Malleable Cast Iron	Ferritic (short chips)	130	60-70	0.05-0.08	0.09-0.14	0.11-0.17	60-100	0.03-0.05	0.07-0.10	0.08-0.13
	29		Pearlitic (long chips)	230	85-125	0.05-0.08	0.09-0.14	0.11-0.17	60-100	0.03-0.05	0.07-0.10	0.08-0.13
	30	Grey Cast Iron	Low Tensile Strength	180	95-135	0.05-0.08	0.09-0.14	0.11-0.17	65-105	0.03-0.05	0.07-0.10	0.08-0.13
	31		High Tensile Strength	260	60-100	0.04-0.06	0.06-0.10	0.08-0.11	70-110	0.03-0.05	0.05-0.08	0.07-0.10
	32	Nodular Sg Iron	Ferritic	160	55-95	0.05-0.08	0.09-0.14	0.11-0.17	40-80	0.03-0.05	0.07-0.10	0.08-0.13
	33		Pearlitic	260	50-90	0.04-0.06	0.06-0.10	0.08-0.11	40-80	0.03-0.05	0.05-0.08	0.07-0.10
N Non-Ferrous Metals	34	Aluminum Alloys Wrought	Non Aging	60	200-300	0.06-0.10	0.11-0.17	0.16-0.19	70-110	0.06-0.09	0.11-0.16	0.13-0.20
	35		Aged	100	150-250	0.06-0.10	0.11-0.17	0.16-0.19	70-110	0.06-0.09	0.11-0.16	0.13-0.20
	36	Aluminum Alloys	Cast	75	100-200	0.06-0.10	0.11-0.17	0.16-0.19	70-110	0.06-0.09	0.11-0.16	0.13-0.20
	37		Cast & Aged	90	120-220	0.06-0.10	0.11-0.17	0.16-0.19	70-110	0.06-0.09	0.11-0.16	0.13-0.20
	38		Cast Si 13-22%	130	200-300	0.06-0.10	0.11-0.17	0.16-0.19	70-110	0.06-0.09	0.11-0.16	0.13-0.20
	39	Copper and Copper Alloys	Brass	90	200-300	0.06-0.10	0.11-0.17	0.16-0.19	70-110	0.06-0.09	0.11-0.16	0.13-0.20
	40		Bronze And Non Leaded Copper	100	150-250	0.06-0.10	0.11-0.17	0.16-0.19	70-110	0.06-0.09	0.11-0.16	0.13-0.20

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

HCN

Material Group	Vargus No.	Material	Hardness Brinell HB	Vc(m/min)		Feed [mm/tooth]
				HCN		
				VTH		
P Steel	1	Unalloyed Steel	Low Carbon (C=0.1-0.25%)	125	50-180	0.03-0.08
	2		Medium Carbon (C=0.25-0.55%)	150	50-140	0.03-0.08
	3		High Carbon (C=0.55-0.85%)	170	50-120	0.03-0.06
	4	Low Alloy Steel (alloying elements ≤5%)	Non Hardened	180	60-170	0.03-0.07
	5		Hardened	275	60-160	0.03-0.07
	6		Hardened	350	60-150	0.02-0.04
	7	High Alloy Steel (alloying elements >5%)	Annealed	200	40-90	0.03-0.07
	8		Hardened	325	30-70	0.02-0.05
	9	Cast Steel	Low Alloy (alloying elements <5%)	200	70-200	0.03-0.06
	10		High Alloy (alloying elements >5%)	225	60-150	0.03-0.06
M Stainless Steel	11	Stainless Steel Ferritic	Non Hardened	200	50-140	0.02-0.05
	12		Hardened	330	50-110	0.01-0.03
	13	Stainless Steel Austenitic	Austenitic	180	60-130	0.02-0.05
	14		Super Austenitic	200	50-120	0.02-0.05
	15	Stainless Steel Cast Ferritic	Non Hardened	200	50-150	0.02-0.05
	16		Hardened	330	50-100	0.02-0.03
	17	Stainless Steel Cast Austenitic	Austenitic	200	50-140	0.02-0.06
	18		Hardened	330	50-90	0.01-0.03
K Cast Iron	28	Malleable Cast Iron	Ferritic (short chips)	130	60-150	0.03-0.08
	29		Pearlitic (long chips)	230	80-100	0.03-0.06
	30	Grey Cast Iron	Low Tensile Strength	180	50-140	0.03-0.06
	31		High Tensile Strength	260	40-110	0.02-0.05
	32	Nodular Sg Iron	Ferritic	160	40-100	0.03-0.07
	33		Pearlitic	260	40-90	0.02-0.05
N Non-Ferrous Metals	34	Aluminum Alloys Wrought	Non Aging	60	150-250	0.05-0.15
	35		Aged	100	100-220	0.03-0.1
	36	Aluminum Alloys	Cast	75	80-150	0.05-0.15
	37		Cast & Aged	90	90-160	0.03-0.1
	38	Aluminum Alloys	Cast Si 13-22%	130	150-250	0.05-0.15
	39	Copper and Copper Alloys	Brass	90	150-250	0.05-0.15
	40		Bronze And Non Leaded Copper	100	100-220	0.03-0.1
S Heat Resistant Material	19	High Temperature Alloys	Annealed (iron based)	200	30-50	0.02-0.04
	20		Aged (iron based)	280	20-40	0.01-0.03
	21		Annealed (nickel or cobalt based)	250	15-30	0.01-0.03
	22		Aged (nickel or cobalt based)	350	15-25	0.01-0.03
	23	Titanium Alloys	Pure 99.5 Ti	400Rm	30-70	0.01-0.03
	24		α+β Alloys	1050Rm	20-45	0.01-0.02
H Hardened Material	25	Extra Hard Steel	Hardened & Tempered	45-50HRC	-	-
	26			51-55HRC	-	-

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

TMDR

Material Group	Vargus No.	Material		Hardness Brinell HB	Vc(m/min)		Feed [mm/tooth]
					TMDR		
					VTS		
P Steel	1	Unalloyed Steel	Low Carbon (C=0.1-0.25%)	125	60-120		0.02-0.12
	2		Medium Carbon (C=0.25-0.55%)	150	60-120		0.02-0.12
	3		High Carbon (C=0.55-0.85%)	170	60-90		0.02-0.12
	4	Low Alloy Steel (alloying elements ≤5%)	Non Hardened	180	60-90		0.02-0.12
	5		Hardened	275	50-80		0.02-0.05
	6		Hardened	350	50-80		0.02-0.03
	7	High Alloy Steel (alloying elements >5%)	Annealed	200	50-80		0.02-0.07
	8		Hardened	325	50-80		0.02-0.03
	9	Cast Steel	Low Alloy (alloying elements <5%)	200	70-90		0.02-0.12
	10		High Alloy (alloying elements >5%)	225	60-80		0.02-0.03
M Stainless Steel	11	Stainless Steel Ferritic	Non Hardened	200	60-90		0.02-0.12
	12		Hardened	330	50-80		0.02-0.03
	13	Stainless Steel Austenitic	Austenitic	180	60-90		0.02-0.12
	14		Super Austenitic	200	50-80		0.02-0.12
	15	Stainless Steel Cast Ferritic	Non Hardened	200	60-90		0.02-0.12
	16		Hardened	330	50-80		0.02-0.03
	17	Stainless Steel Cast Austenitic	Austenitic	200	60-90		0.02-0.12
	18		Hardened	330	50-80		0.02-0.03
K Cast Iron	28	Malleable Cast Iron	Ferritic (short chips)	130	50-80		0.02-0.03
	29		Pearlitic (long chips)	230	60-90		0.02-0.09
	30	Grey Cast Iron	Low Tensile Strength	180	70-100		0.02-0.12
	31		High Tensile Strength	260	60-90		0.02-0.09
	32	Nodular Sg Iron	Ferritic	160	70-100		0.02-0.12
	33		Pearlitic	260	60-90		0.02-0.09
N Non-Ferrous Metals	34	Aluminum Alloys Wrought	Non Aging	60	60-250		0.03-0.11
	35		Aged	100	60-150		0.03-0.12
	36	Aluminum Alloys	Cast	75	60-250		0.03-0.12
	37		Cast & Aged	90	60-150		0.02-0.12
	38	Aluminum Alloys	Cast Si 13-22%	130	250		0.03-0.11
	39	Copper and Copper Alloys	Brass	90	60-250		0.03-0.12
	40		Bronze And Non Leaded Copper	100	60-150		0.03-0.11
	S Heat Resistant Material	19	High Temperature Alloys	Annealed (iron based)	200	60	
20		Aged (iron based)		280	50		0.02-0.03
21		Annealed (nickel or cobalt based)		250	35		0.02-0.03
22		Aged (nickel or cobalt based)		350	30		0.02-0.03
23		Titanium Alloys	Pure 99.5 Ti	400Rm	30-50		0.02-0.05
24			α+β Alloys	1050Rm	25-35		0.02-0.05
H Hardened Material	25	Extra Hard Steel	Hardened & Tempered	45-50HRc	-		-
	26			51-55HRc	-		-

MilliPro HD Cutting Speeds Vc [m/min] and Feed f [mm/tooth]

Material Group	Vargus No.	Material	Hardness Brinell HB	Feed f [mm/tooth] by Cutting Dia.=D2						
				Vc [m/min]	1.5-2.5	2.5-5	5-7	7-9	9-11	
P Steel	6	Low Alloy Steel (alloying elements≤5%) Hardened	350	25-160	0.04	0.05	0.06	0.07	0.08	
	8	High Alloy Steel (alloying elements>5%) Hardened	325	25-180						
M Stainless Steel	12	Stainless Steel Ferritic Hardened	330	25-120	0.04	0.05	0.06	0.07	0.08	
	16	Stainless Steel Cast Ferritic Hardened	330	25-110						
	18	Stainless Steel Cast Austenitic Hardened	330	25-100						
K Cast Iron	28	Malleable Cast Iron	Ferritic (short chips)	130	25-160	0.05	0.06	0.07	0.08	0.1
	29		Pearlitic (long chips)	230	25-150	0.04	0.05	0.06	0.07	0.08
	30	Grey Cast Iron	Low Tensile Strength	180	25-130	0.05	0.06	0.07	0.08	0.1
	31		High Tensile Strength	260	25-100	0.04	0.05	0.06	0.07	0.08
	32	Nodular Sg Iron	Ferritic	160	25-125	0.04	0.05	0.06	0.07	0.09
	33		Pearlitic	260	25-90	0.03	0.04	0.05	0.06	0.07
S Heat Resistant Material	21	High Temperature Alloys	Annealed (nickel or cobalt based)	250	15-35	0.03	0.04	0.05	0.06	0.07
	22		Aged (nickel or cobalt based)	350	15-30					
	23	Titanium Alloys	Pure 99.5 Ti	400Rm	25-70					
	24		α+β alloys	1050Rm	25-50					
H Hardened Material	25	Extra Hard Steel	Hardened & Tempered	45-50HRc	25-70	0.04	0.05	0.06	0.07	0.08
	26			51-55HRc	25-60	0.03	0.04	0.05	0.06	0.07
	27			56-62HRc	25-50	0.02	0.03	0.04	0.05	0.06

HTC Recommended Grades, Cutting Speed and Feed

Material Group	Material	Hardness Brinell HB	Strength (N-mm ²)	Vc[m/min]		fb[mm/rev]		fz[mm/tooth]		
				VTN	VTS	≤6mm	≤12mm	≤6mm	≤12mm	
K Cast Iron	Cast Iron	Grey Cast Iron	≤150	≤500	50-80	80-120	0.10-0.15	0.15-0.22	0.02-0.05	0.05-0.10
		Grey Cast Iron, Heat Treated	150-300	500-1000	50-80	80-120	0.10-0.15	0.15-0.22	0.02-0.05	0.05-0.10
		Spher. Graph. Cast Iron	≤200	≤700	50-80	80-120	0.10-0.15	0.15-0.22	0.02-0.05	0.05-0.10
	Copper	Short Chips, Brass, Bronze, Red Brass	≤200	≤700	100-300	—	0.06-0.10	0.10-0.30	0.03-0.06	0.06-0.10
N Non-Ferrous Metals	Aluminium/Magnesium	Aluminium, Magnesium Non-Alloy	≤100	≤350	100-400	100-400	0.10-0.25	0.25-0.30	0.03-0.06	0.06-0.10
		Aluminium, Wrought Alloy, Breaking Strain (A5) < 14%	≤180	≤600	100-400	100-400	0.10-0.25	0.25-0.30	0.03-0.06	0.06-0.10
		Aluminium, Wrought Alloy, Breaking Strain (A5) ≥ 14%	≤180	≤600	100-400	100-400	0.03-0.06	0.06-0.12	0.03-0.06	0.06-0.10
		Aluminium, Cast Alloy, Si<10%	≤180	≤600	100-300	100-400	0.10-0.25	0.25-0.30	0.03-0.06	0.06-0.10
		Aluminium, Cast Alloy, Si≥10%	≤180	≤600	—	100-300	0.10-0.25	0.25-0.30	0.03-0.06	0.06-0.10
K	Plastic	Thermo Plastics	—	—	60-120	60-120	0.10-0.25	0.25-0.30	0.03-0.06	0.06-0.10
		Thermosetting Plastic	—	—	60-100	60-100	0.10-0.25	0.25-0.30	0.03-0.06	0.06-0.10
		Fibre Reinforced Plastic	—	—	40-60	60-80	0.10-0.15	0.15-0.22	0.02-0.05	0.05-0.10

Vc - Cutting Speed [m/min]

fb (Drilling) - Feed per Revolution [mm/rev]

fz (Threading) - Feed per Tooth [mm/tooth]

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