ROMEC®

www.romectools.com

BAR PEELING
CATALOGUE

2025

About ROMEC

Romec Tools is the fusion of 20 year experience and knowledge of the cutting tool industry. our aim to deliver high performance cutting tool solution which meet our customer demand and reduce his machining cost.

Romec Tools have wide rage of product in Turning, Milling, Drilling, Grooving, Threading, CBN, PCD, and also provide tailor made Tools and cutter. We are committed to provide high Quality product with regular smooth supply. We Catering our product in different type of manufacturing industries such as Automotive, Agriculture, Bar peeling, Chemical process, Die & Mould, Textiles, Transmission, Surgical and other.

Bar Peeling

Peeling Process Description

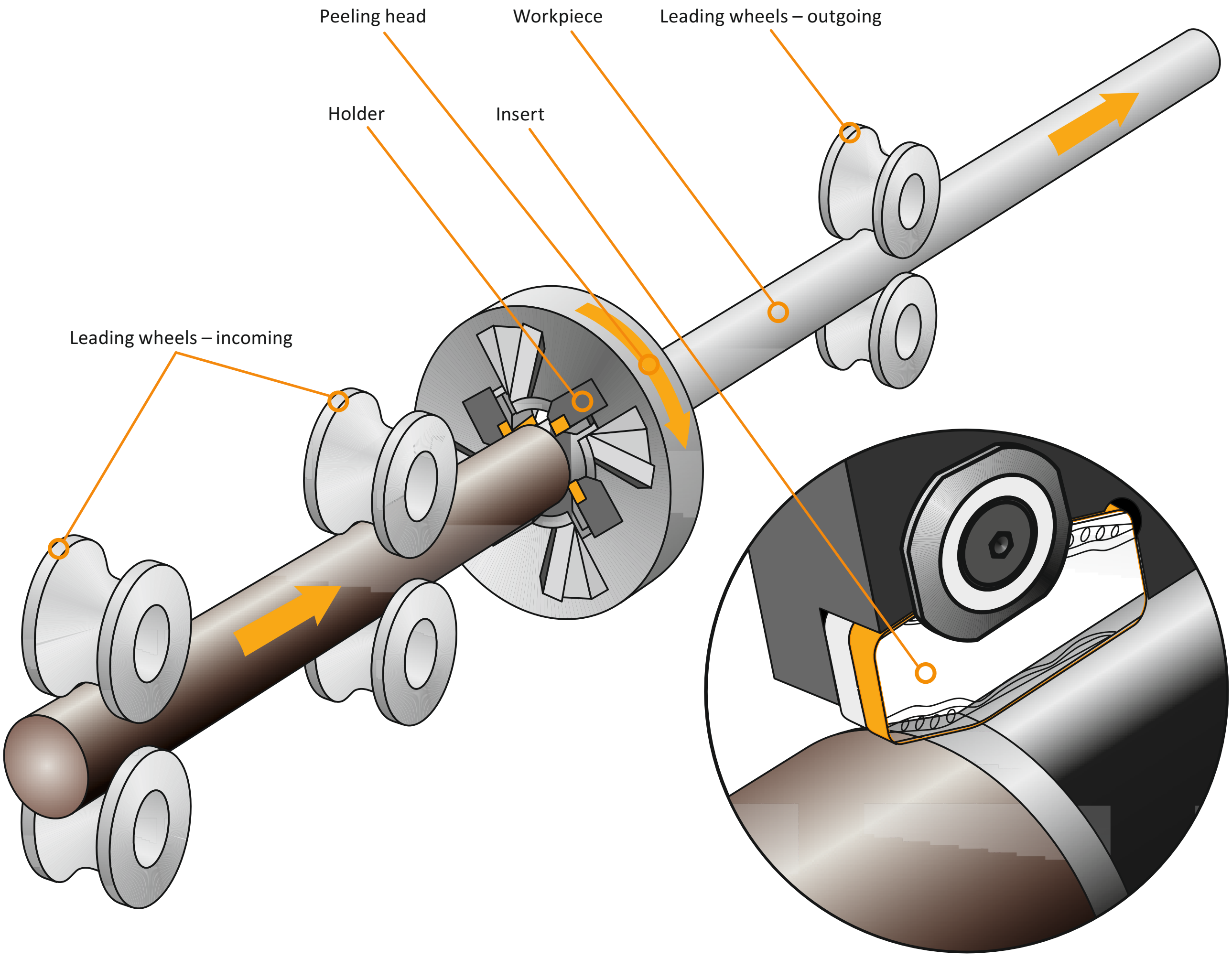
BAR PEELING

The outstanding feature of this specific operation is relatively high feed rates and small depth of cut applied to round bars and thick walled tubes. Peeling operations remove surface layers of oxides, rolled contaminants and cracks caused by hot forging or rolling.

Peeled materials are mostly carbon steel, alloy steel for heat treating, tool steel, stainless steel and also heat–resistant alloys based on Ni, Co, Fe and Ti.

The advantages of peeling technology in comparison with turning are:

- Machining at higher feed rates
- Higher productivity
- Less inserts consumption
- Excellent roughness quality
- High dimensional accuracy

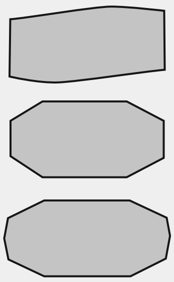
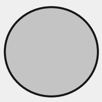
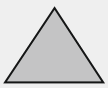
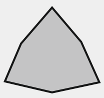


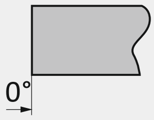
Workpiece material

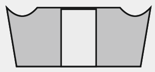
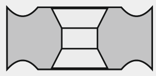
ISO group			Workpiece Material		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)
P	P1	P1.1	Free machining steel (carbon steels with increased machinability)	Sulfurized	< 240 HB	≤ 830
		P1.2		Sulfurized and phosphorized	< 180 HB	≤ 620
		P1.3		Sulfurized/phosphorized and leaded	< 180 HB	≤ 620
	P2	P2.1	Plain carbon steel (steels comprised of mainly iron and carbon)	Containing <0.25 % C	< 180 HB	≤ 620
		P2.2		Containing <0.55 % C	< 240 HB	≤ 830
		P2.3		Containing >0.55 % C	< 300 HB	≤ 1030
	P3	P3.1	Alloy steel (carbon steels with an alloying content ≤ 10%)	Annealed	< 180 HB	≤ 620
		P3.2		Hardened and tempered	180 – 260 HB	> 620 ≤ 900
		P3.3			260 – 360 HB	> 900 ≤ 1240
	P4	P4.1	Tool steel (special alloy steel for tools, dies and molds)	Annealed	< 26 HRC	≤ 900
		P4.2		Hardened and tempered	26 – 39 HRC	> 900 ≤ 1240
		P4.3			39 – 45 HRC	> 1240 ≤ 1450
M	M1	M1.1	Ferritic stainless steel (straight chromium non-hardenable alloys)		< 160 HB	≤ 520
		M1.2			160 – 220 HB	> 520 ≤ 700
	M2	M2.1	Martensitic stainless steel (straight chromium hardenable alloys)	Annealed	< 200 HB	≤ 670
		M2.2		Quenched and tempered	200 – 280 HB	> 670 ≤ 950
		M2.3		Precipitation-hardened	280 – 380 HB	> 950 ≤ 1300
	M3	M3.1	Austenitic stainless steel (chromium-nickel and chromium-nickel-manganese alloys)		< 200 HB	≤ 750
		M3.2			200 – 260 HB	> 750 ≤ 870
		M3.3			260 – 300 HB	> 870 ≤ 1040
	M4	M4.1	Austenitic-ferritic (DUPLEX) or super-austenitic stainless steel		< 300 HB	≤ 990
		M4.2	Precipitation hardening austenitic stainless steel		300 – 380 HB	≤ 1320
K	K1	K1.1	Gray iron or Automotive Gray iron (GG) (iron-carbon castings with a lamellar graphite microstructure)	Ferritic or ferritic-pearlitic	< 180 HB	≤ 190
		K1.2		Ferritic-pearlictic or pearlitic	180 – 240 HB	> 190 ≤ 310
		K1.3		Pearlitic	240 – 280 HB	> 310 ≤ 390
	K2	K2.1	Malleable iron (GTS/GTW) (iron-carbon castings with a graphite-free microstructure)	Ferritic	< 160 HB	≤ 400
		K2.2		Ferritic or pearlitic	160 – 200 HB	> 400 ≤ 550
		K2.3		Pearlitic	200 – 240 HB	> 550 ≤ 660
	K3	K3.1	Ductile iron (GGG) (iron-carbon castings with a nodular graphite microstructure)	Ferritic	< 180 HB	≤ 560
		K3.2		Ferritic or pearlitic	180 – 220 HB	> 560 ≤ 680
		K3.3		Pearlitic	220 – 260 HB	> 680 ≤ 800
	K4	K4.1	Austenitic gray iron (ASTM A436) (iron-carbon alloy castings with an austenitic lamellar graphite microstructure)		< 180 HB	≤ 190
		K4.2	Austenitic ductile iron (ASTM A439 or ASTM A571) (iron-carbon alloy castings with an austenitic nodular graphite microstructure)		< 240 HB	≤ 740
		K4.3	Austempered ductile iron (ASTM A897) (iron-carbon alloy castings with an ausferrite microstructure)		< 280 HB	> 840 ≤ 980
		K4.4			280 – 320 HB	> 980 ≤ 1130
		K4.5			320 – 360 HB	> 1130 ≤ 1280
	K5	K5.1	Compacted graphite iron CGI (ASTM A842) (iron-carbon castings with a vermicular graphite structure)	Ferritic	< 180 HB	≤ 400
		K5.2		Ferritic-pearlitic	180 – 220 HB	> 400 ≤ 450
		K5.3		Pearlitic	220 – 260 HB	> 450 ≤ 500
N	N1	N1.1	Commercially pure wrought aluminium		< 60 HB	≤ 240
		N1.2	Wrought aluminium alloys	Half hard tempered	60 – 100 HB	> 240 ≤ 400
		N1.3		Full hard tempered	100 – 150 HB	> 400 ≤ 590
	N2	N2.1	Cast aluminium alloys		< 75 HB	≤ 240
		N2.2			75 – 90 HB	> 240 ≤ 270
		N2.3			90 – 140 HB	> 270 ≤ 440
	N3	N3.1	Free-cutting copper-alloys materials with excellent machining properties		–	–
		N3.2	Short-chip copper-alloys with good to moderate machining properties		–	–
		N3.3	Electrolytic copper and long-chip copper-alloys with moderate to poor machining properties		–	–
	N4	N4.1	Thermoplastic polymers		–	–
		N4.2	Thermosetting polymers		–	–
		N4.3	Reinforced polymers or composites		–	–
	N5	N5.1	Graphite		–	–
S	S1	S1.1	Titanium or titanium alloys		< 200 HB	≤ 660
		S1.2			200 – 280 HB	> 660 ≤ 950
		S1.3			280 – 360 HB	> 950 ≤ 1200
	S2	S2.1	Fe-based high-temperature alloys		< 200 HB	≤ 690
		S2.2			200 – 280 HB	> 690 ≤ 970
	S3	S3.1	Ni-based high-temperature alloys		< 280 HB	≤ 940
		S3.2			280 – 360 HB	> 940 ≤ 1200
	S4	S4.1	Co-based high-temperature alloys		< 240 HB	≤ 800
		S4.2			240 – 320 HB	> 800 ≤ 1070
H	H1	H1.1	Chilled cast iron		< 440 HB	–
	H2	H2.1	Hardened cast iron		< 55 HRC	–
		H2.2			> 55 HRC	–
	H3	H3.1	Hardened steel <55 HRC		< 51 HRC	–
		H3.2			51 – 55 HRC	–
	H4	H4.1	Hardened steel >55 HRC		55 – 59 HRC	–
		H4.2			> 59 HRC	–

Designation code – bar peeling

ISO	1	2	3	4	5	6	7		8
	L	**N**	**G**	**F**	**40**	**10**	**35**	**-**	**M**

1	
Insert shape	
L	
R	
T	
W	

2	
Insert clearance angle	
N	
O	Special

4	
Insert type	
F	
H	
J	
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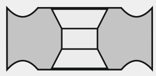
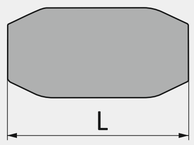
U	
X	Special

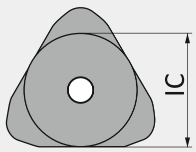
3 Tolerances	[mm]		
	M (±)	S (±)	IC (±)
A	0.005	0.025	0.025
F	0.005	0.025	0.013
C	0.013	0.025	0.025
H	0.013	0.025	0.013
E	0.025	0.025	0.025
G	0.025	0.130	0.025
J	0.005	0.025	0.05 – 0.13
K	0.013	0.025	0.05 – 0.13
L	0.025	0.025	0.05 – 0.13
M	0.08 – 0.18	0.130	0.05 – 0.13
N	0.08 – 0.18	0.025	0.05 – 0.13
U	0.05 – 0.38	0.130	0.05 – 0.13

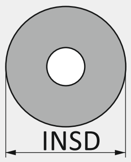
Designation code – bar peeling

	1	2	3	4	5	6	7		8
ISO	**L**	**N**	**G**	**F**	**40**	**10**	**35**	**-**	**M**

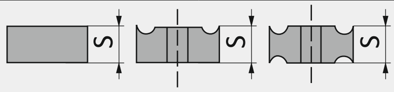
5 Insert size





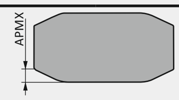


6 Insert thickness



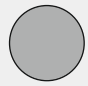
	S [mm]
07	7.54
07	7.94
09	9.52
10	10.15
12	12.00
12	12.70
13	13.00
14	14.00
18	18.00

7 Depth of Cut



	APMX [mm]
10	1.00
15	1.50
20	2.00
25	2.50
35	3.00
40	4.00
80	8.00
12	12.00
16	16.00

Round inserts

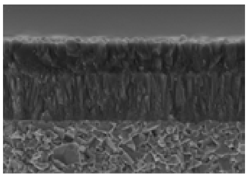
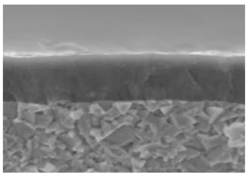
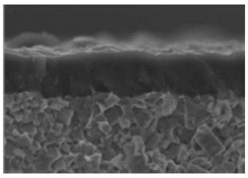
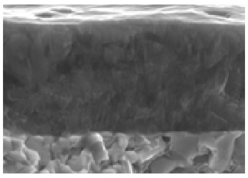
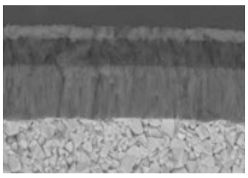


	IC
00	[in]
MO	[mm]

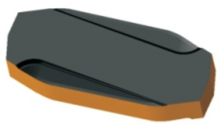
8 Cutting edge variant

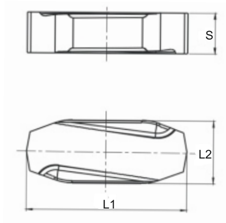
R	For hard material
M	For medium hardness
F	For soft material
-	Special

Peeling Grade

Grade	ISO Group	Application	Coating Structure	Advantages	Coating type
M4000	P25-P35 M15-M20 S15-S20	Semi finishing		• Optimized combination of TiAlN coating and micro-grain carbide substrate with high Co cotent provide superior adhesion resistance and toughness. • Application: Suitable for semi-finishing of Steel, stainless steels and Alloy steel peeling.	CVD
M5000	P20-P40 S15-S30 M20-M40	Roughing		•TiALN coating with micro carbide substarte, has good wear resiatnce and rigidity, suitable on semi finishing to roughing processing of Ti and high temperature alloy	CVD
P5500	P25-P40	Roughing		• CVD-coated grade based on Duratomic™ coating. Grade for high performance and productivity in steel material under stable conditions Ti (C, N) – Al2O3	CVD
P3500	P15-P35	Semi finishing, roughing		• New thinner Al2O3 and Nano MT-TiCN coating, toughness gradient carbide substrate, with good wear resistance, superior adhesion resistance and longer tool life. • Application: Suitable for machining of steel & alloy steel. finishing Conditions.	CVD
M1225	M25-40 S15-S30	Semi finishing, roughing		• New TiAlN coating on submicron substrate with strong adhesion, superior wear resistance and good heat resistance. • Application: Suitable for Wide range of stainless steel and high-temperature alloy on stable conditions.	PVD

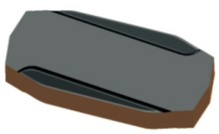
LNGF30_ _

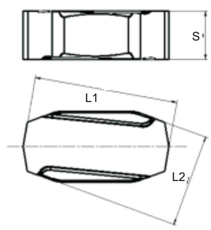




Product code	Dimension(mm)			Grade			
	L1	L2	S	M4000	M1225	P3500	P5500
LNGF300715-M	30.12	12.0	7.54	●	○	○	●

LNGF36_ _





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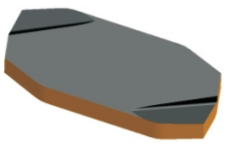
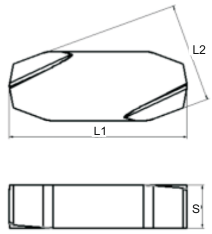
LNGF361220-M	36.5	23.6	12.0	●	○	○	●

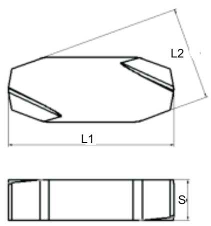
LNGF30_ _





Product code	Dimension(mm)			Grade			
	L1	L2	S	M4000	M1225	P3500	P5500
LNGF300715R-F	30.7	12.2	7.50	●	○	○	○

LNGF30_ _



Product code	Dimension(mm)			Grade			
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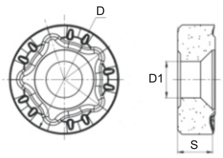
LNGF300715L-F	30.7	17.2	7.54	●	○	○	●

RNMH32_ _



Product code	Dimension(mm)				Grade			
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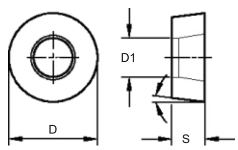
RNMH381200-R	38.0	12.7	12.25		●	○	○	○

RCMX32/25_ _



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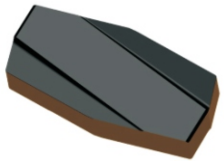
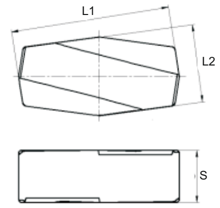
RCMX3209MO	32.0	9.52	9.5	-	●	○	○	○
RCMX2507MO	25.0	7.94	7.2	-	●	○	○	

YNUX36__





Product code	Dimension(mm)			Grade			
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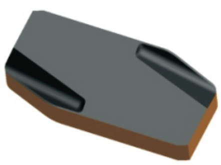
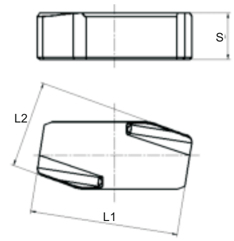
YNUX361240SL-R	36.7	18.0	12.0	●	○	○	●

YNMX38__





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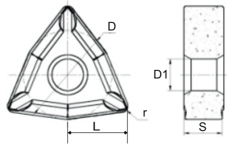
YNMX381227L	38.2	22.3	12.0	○	○	○	○

TNMX15_ _



Product code	Dimension(mm)				Grade			
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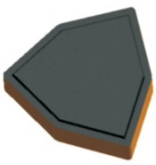
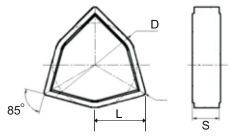
WNMX150930-R2	22.2	9.0	7.94	15.0	●	○	○	○
WNMX150916-R2	22.2	9.0	7.94	15.0	●	●	○	○

WNMX18_ _





Product code	Dimension(mm)				Grade			
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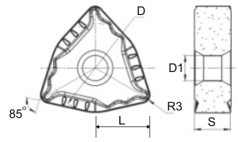
WNMU13__



Product code	Dimension(mm)				Grade			
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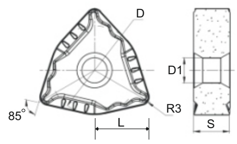
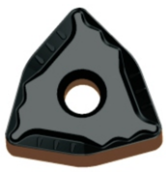
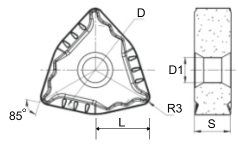
WNMU13__



Product code	Dimension(mm)				Grade			
	D	S	D1	L	M4000	M1225	P3500	P5500
WNMU151340-M30	31.75	13.0	9.0	15.0	○	○	○	○

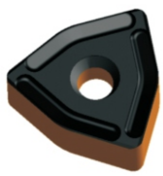
WNMU13_ _

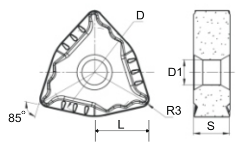




Product code	Dimension(mm)				Grade			
	D	S	D1	L	M4000	M1225	P3500	P5500
WNMU151340-M	31.75	13.0	9.0	15.0	○	○	○	○

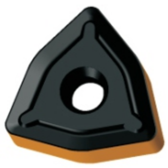
WNMU13_ _

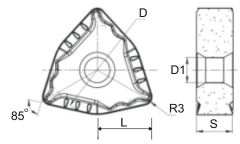




Product code	Dimension(mm)				Grade			
	D	S	D1	L	M4000	M1225	P3500	P5500
WNMU151340-M10	31.75	13.0	9.0	15.0	○	○	○	○

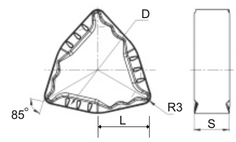
WNMU15_ _





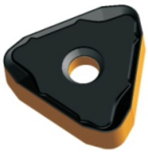
Product code	Dimension(mm)				Grade			
	D	S	D1	L	M4000	M1225	P3500	P5500
WNMU151340-M40	31.75	13.0	9.0	15.0	○	○	○	○

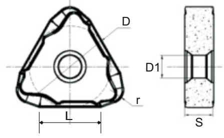
WNMU15_ _



Product code	Dimension(mm)				Grade			
	D	S	D1	L	M4000	M1225	P3500	P5500
WNMU151340-M30	31.75	13.0	9.0	15.0	○	○	○	○

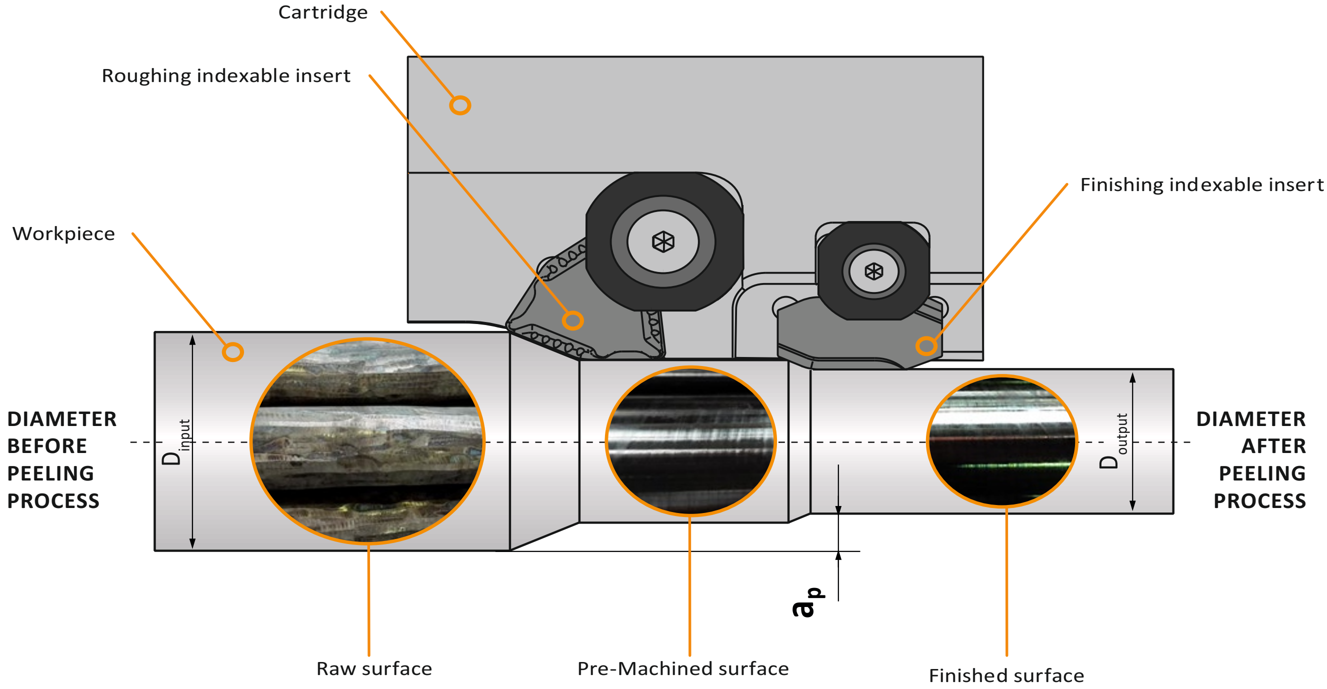
TNMJ20_ _



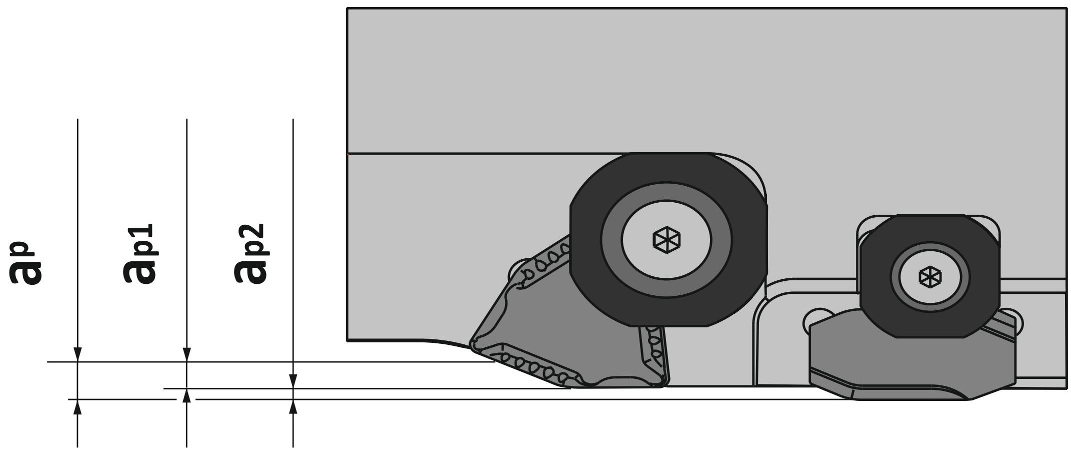


Product code	Dimension(mm)				Grade			
	D	S	D1	L	M4000	M1225	P3500	P5500
TNMJ201025ST-M	28.6	10.0	8.0	20.0	○	○	○	○

Definition Of Basic Terms



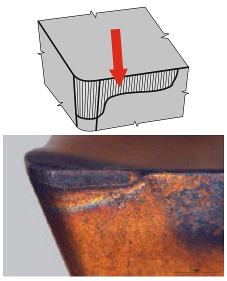
The total depth of cut $\mathbf{a_p}$ is the difference between the input diameter and output diameter of the workpiece divided by two.



Depth of cut ap in cassettes with more than one insert is divided into the partial depths of cut for each insert ($\mathbf{a_{p1}}$; $\mathbf{a_{p2}}$). Those values should be taken into consideration during detailed analyses of the cutting conditions of the roughing and finishing inserts.

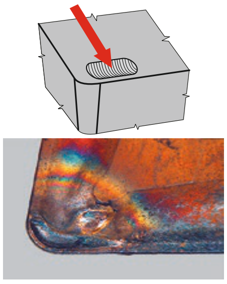
Types Of Wear On Peeling Inserts & Troubleshooting

FLANK WEAR



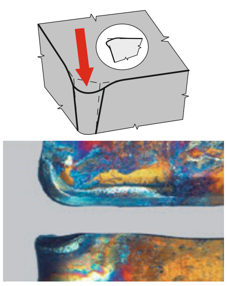
	↑	Use a more wear resistant substrate (s)
(MT)CVD PVD	+ +	Any coating (decisive factor is oxidation resistance – α Al_2O_3)
f	↑	Feed has influence on shape and position of groove
v	↓	Decrease cutting speed
a_p	+	It has no influence
	↑	Increase the clearance angle
		Use coolant or increase its intensity

CRATERING



	↑	Use a more wear resistant substrate (s)
(MT)CVD PVD	+ +	Any coating (decisive factor is thermal resistance – α Al_2O_3)
f	↑	Feed has influence on shape and position of crater
v	↓	Decrease cutting speed
a_p	↓	Minimal effect
	↑	Use more positive cutting geometry
	+ +	Use coolant or increase its intensity

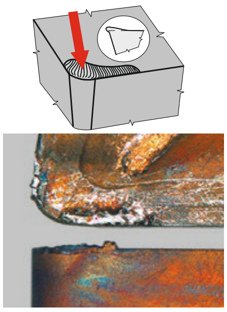
PLASTIC DEFORMATION



	↑	Use a more wear resistant grade (decisive factor is content of Co)
(MT)CVD PVD	+	Any coating (decisive factor is friction)
f	↓	Decrease feed rate
v	↓	Decrease cutting speed
a_p	↓	Minimal effect
	↑	Use another (more positive) cutting geometry
	+ +	Use coolant or increase its intensity

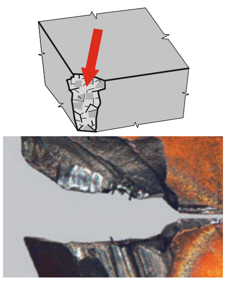
Types Of Wear On Peeling Inserts & Troubleshooting

BUILT–UP EDGE



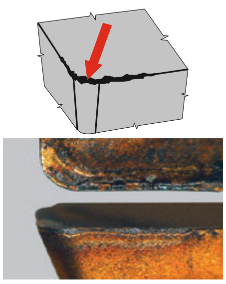
		It has no influence
(MT)CVD PVD	++	Any coating (decisive factor is anti-adhesion effect)
f	↑	The higher the feed rate the less probability of built-up edge creation.
V	↓↑	Change (generally increase) the cutting speed.
a_p		It has no influence
	↓↑	Use more positive geometry
	-	Use a coolant with more effective anti-sticking properties (or no coolant at all)

INSERT FRACTURE



	↓	(H) grain has a great influence
(MT)CVD PVD	+	PVD coating recommended
f	↓	Reduces the force load
V	↑↓	It is about swarf control and vibration
a_p	↓	Reduces the force load
	↓	Use less positive cutting geometry
		It has no influence
		Use better working conditions

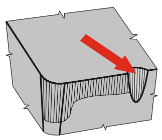
BRITTLE CRACKS AT THE CUTTING EDGE

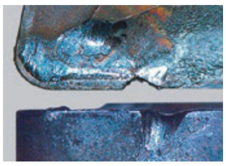


	↓	(H) grain has a great influence
(MT)CVD PVD	+	PVD coating recommended
f	↓	Good swarf control is very important
V	↑↓	It is about swarf control and vibration
a_p	↓	Reduces the force load (important for machining with long overhangs)
	↓	Use less positive cutting geometry; Use insert with wider T-land
		It has no influence

Types Of Wear On Peeling Inserts & Troubleshooting

SIDE FLANK NOTCH – REMEDY





	↑ ↓	It depends on the character of the damage (abrasive – use more wear resistant substrate; breaking – use tougher substrate)
(MT)CVD PVD	+ +	CVD coating (decisive factor is oxidation resistance – α Al_2O_3)
f	↓	Feed has influence on intensity, but less than the cutting speed
V	↓	Decrease cutting speed
	↓	Minimal effect
	+	Use another (more positive) cutting geometry
		Use tool with smaller setting angle

NON – CIRCULAR BAR CROSS SECTION

Description:	**Troubleshooting:**
– uneven bar surface (unstable depth of cut)	– check value of cutting depth–(noncircular raw) product = (noncircular final bar)
– non adjusted tool (incorrectly fixed inserts)	– check inserts clamping and slide of cartridge or toolholder
– bars are not brought into peeling head by coaxial way	– check entry rollers adjustment
	– check outgoing rollers adjustment

VIBRATIONS

– guide rollers are adjusted incorrectly	– check leading rollers adjustment
– smoothing edge is too sharp	– increase cutting edge rounding
– small damping facet on smoothing edge	– increase support facet on flank surface facet
– cutting edge is under axis	– check cutting edge position (to axis or above axis)
– too thin chips (insufficient feed rate)	– increase feed rate „f“ (mm/rev)
– uneven or too high wear of inserts	– check insert adjustment

POOR SURFACE (HELICAL TRACE)

– insert clamping is incorrect, worn insert pocket	– check adjustment and wear of insert (change insert)
– feed „f“ (mm/rev) is bigger than length of smoothing edge	– decrease feed rate „f“ (mm/rev)
– smoothing edge is not parallel to bar axis	– check insert adjustment

BAD CHIP FORMATION

– too low feed per insert	– increase the feed per insert
– not enough coolant	– increase coolant efficiency
– incorrect geometry of insert	– change insert geometry

UNEVEN WEAR BETWEEN INDEXABLE INSERTS

– different depth of cut for each indexable insert	– check the tool-holders pre-adjustment
– tool holder with damaged insert pocket	– use only tool-holder in good condition (change the shims if applied)
– insert clamped incorrectly	– clean the inset pocket properly before clamping of new insert

Formulas

Value	Unit	Formula
Number of revolutions	[rev/min]	$n = \frac{v_c \cdot 1000}{DC \cdot p}$
Cutting speed	[m/min]	$v_c = \frac{\pi \cdot DC \cdot n}{1000}$
Feed per revolution	[mm/rev]	$f_{rev} = \frac{f_{min}}{n} = f_z \cdot z$
Feed per minute (speed of feed)	[mm/min]	$f_{min} = v_f = f_{rev} \cdot n = f_z \cdot z \cdot n$
Feed per one tool-holder in peeling head	[mm/tooth]	$f_z = \frac{f_{rev}}{z} = \frac{f_{min}}{n \cdot z}$
Chip cross section	[mm²]	$A = f_z \cdot a_p$
Chip thickness (for inserts with a straight cutting edge)	[mm]	$h = f_z \cdot \sin k_r$
Chip thickness (for round cutting inserts)	[mm]	$h = f_z \cdot \sqrt{\frac{a_p}{INSD}}$
Metal removal rate	[cm³/min]	$Q = a_p \cdot f_{rev} \cdot v_c$
Power demand	[kW]	$P_c = \frac{a_p \cdot f_z \cdot v_c \cdot \frac{k_{c1}}{h^{mc}}}{60000\ \eta} \cdot Z$

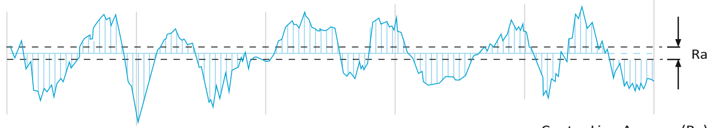
Note:

	Description	Unit
n	Number of revolutions	[rev/min]
DC	Diameter (of work piece)	[mm]
v_c	Cutting speed	[m/min]
f_{rev}	Feed per revolution of peeling head	[mm/rev]
A	Chip cross section (per one tool-holder / cassette)	[mm²]
a_p	Axial depth of cut (depth of cut)	[mm]
KRINS	Setting angle of insert main cutting edge	[°]
f_{min}	Feed per minute (sometimes called speed of feed)	[mm/min]
f_z	Feed per tooth (one tool-holder)	[mm/tooth]
z	Number of teeth (tool-holder)	[-]
INSD	Diameter of insert	[mm]

	Description	Unit
h	Chip thickness	[mm]
Q	Material removal rate per minute	[cm³/min]
Pc	Power demand	[kW]
kc	Specific cutting force according to chip cross-section and thickness	[MPa]
kc1	Specific cutting force per 1 mm2 chip cross-section	[MPa]
η	Machine efficiency usually η = 0,65	[-]
mc	Exponent related to work piece material	[-]

Surface Quality

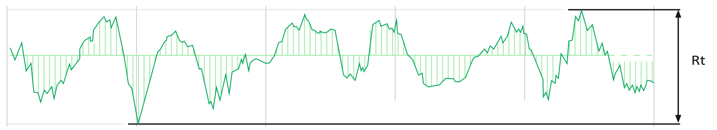
At the beginning of this section, we indicate the main roughness parameters most often specified in engineering practice.



Center Line Average (Ra)

Ra – Average roughness
Ra is also known as Arithmetic Average (AA) or Center Line Average (CLA). It is the average roughness in the area between the roughness profile and its mean line. Graphically, Ra is the area between the roughness profile and its center-line divided by the evaluation length. The evaluation length is normally five sample lengths where each sample length is equal to one cut-off length. As shown in the graph.

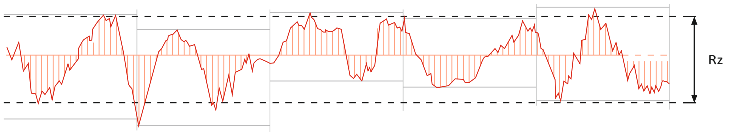
Ra is by far the most commonly used Surface Finish parameter and a good starting point for quantifying parts even when there is no parameter callout (surface finish required). However, while common, Ra is not sufficient to completely characterize the roughness of a surface. Depending on the application, surfaces with the same roughness can perform quite differently. Lets look at the same surface roughness analysed in 3 other ways:



Total height of the roughness prole

Rt – Total height of roughness profile
Difference between height of the highest peak and the depth of the deepest valley within the evaluation length as you can see in the bottom graph.

(Rt)



Mean roughness depth

Rz – Mean roughness depth
Rz is often preferred to Ra in Europe and particularly Germany. Instead of measuring from center-line like Ra, Rz measures the average of the 5 largest peak to valley differences within five sampling lengths. While Ra is relatively insensitive to a few extremes, Rz is quite sensitive since it is the extremes it is designed to measure.

(Rt)

Surface Roughness Grades: “N” Numbers

The N numbers are common used on technical drawings to described the surface finish roughness. In the past triangles where used but the are not so concrete to explain the correct surface finish.

Table 2

Relationship with Triangle Symbol

Arithmetical Mean Roughness Ra (μm)	Max. height Roughness Rz (μm)	Ten Points Mean Roughness Rz (μm)	Roughness Grade	Note: (Relationship) with triangle)
0.025	0.1	0.1	N1	VVVV
0.05	0.2	0.2	N2	
0.1	0.4	0.4	N3	
0.2	0.8	0.8	N4	
0.4	1.6	1.6	N5	VVV
0.8	3.2	3.2	N6	
1.6	6.3	6.3	N7	
3.2	12.5	12.5	N8	VV
6.3	25	25	N9	
12.5	50	50	N10	V
25	100	100	N11	

Note:Finishing symbol (Triangle and wave~) was removed from JIS standard in the 1994 Revision.

Hardness Conversion Table

Strength (MPa)	Hardness			
	Brinell	Vickers	Rockwell	Rockwell
R_m	HB	HV	HRB	HRC
285	86	90	1190	–
320	95	100	56.2	–
350	105	110	62.3	–
385	114	120	66.7	–
415	124	130	71.2	–
450	133	140	75.0	–
480	143	150	78.7	–
510	152	160	81.7	–
545	162	170	85.8	–
575	171	180	87.1	–
610	181	190	89.5	–
640	190	200	91.5	–
675	199	210	93.5	–
705	209	220	95	–
740	219	230	96.7	–
770	228	240	98.1	–
800	238	250	99.5	–
820	242	255	–	23.1
850	252	265	–	24.8
880	261	275	–	26.4
900	266	280	–	27.1
930	276	290	–	28.5
950	280	295	–	29.2
995	295	310	–	31.0
1030	304	320	–	32.2
1060	314	330	–	33.3
1095	323	340	–	34.4
1125	333	350	–	35.5
1155	342	360	–	36.6

Strength (MPa)	Hardness			
	Brinell	Vickers	Rockwell	Rockwell
R_m	HB	HV	HRB	HRC
1190	352	370	–	37.7
1220	361	380	–	38.8
1255	371	390	–	39.8
1290	380	400	–	40.8
1320	390	410	–	41.8
1350	399	420	–	42.7
1385	409	430	–	43.6
1420	418	440	–	44.5
1455	428	450	–	45.3
1485	437	460	–	46.1
1520	447	470	–	46.9
1555	456	480	–	47.7
1595	466	490	–	48.4
1630	475	500	–	49.1
1665	485	510	–	49.8
1700	494	520	–	50.5
1740	504	530	–	51.1
1775	513	540	–	51.7
1810	523	550	–	52.3
1845	532	560	–	53.0
1880	542	570	–	53.6
1920	551	580	–	54.1
1955	561	590	–	54.7
1995	570	600	–	55.2
2030	580	610	–	55.7
2070	589	620	–	56.3
2105	599	630	–	56.8
2145	608	640	–	57.3
2180	618	650	–	57.8

Notes

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