



WORLDIA
MN-D2013 EN

PCD Standard Inserts

1 universal PCD grade for all non-ferrous materials from stock



WORLDIA MANANOVA

Easy Choice Fast Delivery

MANANOVA

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MANANOVA is the name for Worldia's stock-keeping standard product portfolio. It provides best-in-class high-quality products within a wide range of most-common applications at very attractive prices. Each them has an inventory code which simplifies the order process.

Please refer to Worldia's general PCD Turning Inserts catalogue for more grades, geometries, tip sizes, cutting edge designs and coatings.



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A reliable chip - control solution to help reducing stringy chipping - MANANOVA	
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Providing stable , universal , high efficient cutting effects - MANANOVA EASY CHOICE	

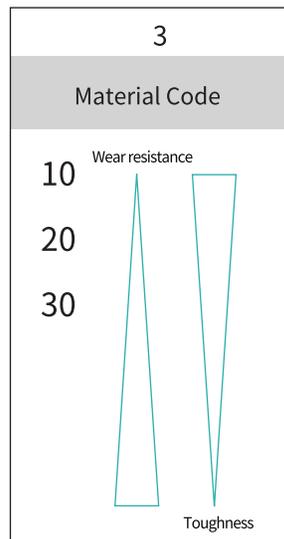
Key Definition - Material designation

Example

M	N	D	10
MANANOVA	1	2	3

1	
Application Materials	
P	Steel
M	Stainless Steel
K	Cast Iron
S	Power Metal
H	Hardened Steel
N	Non-ferrous Metal

2	
Cutting Tool Material	
D	PCD
N	CBN



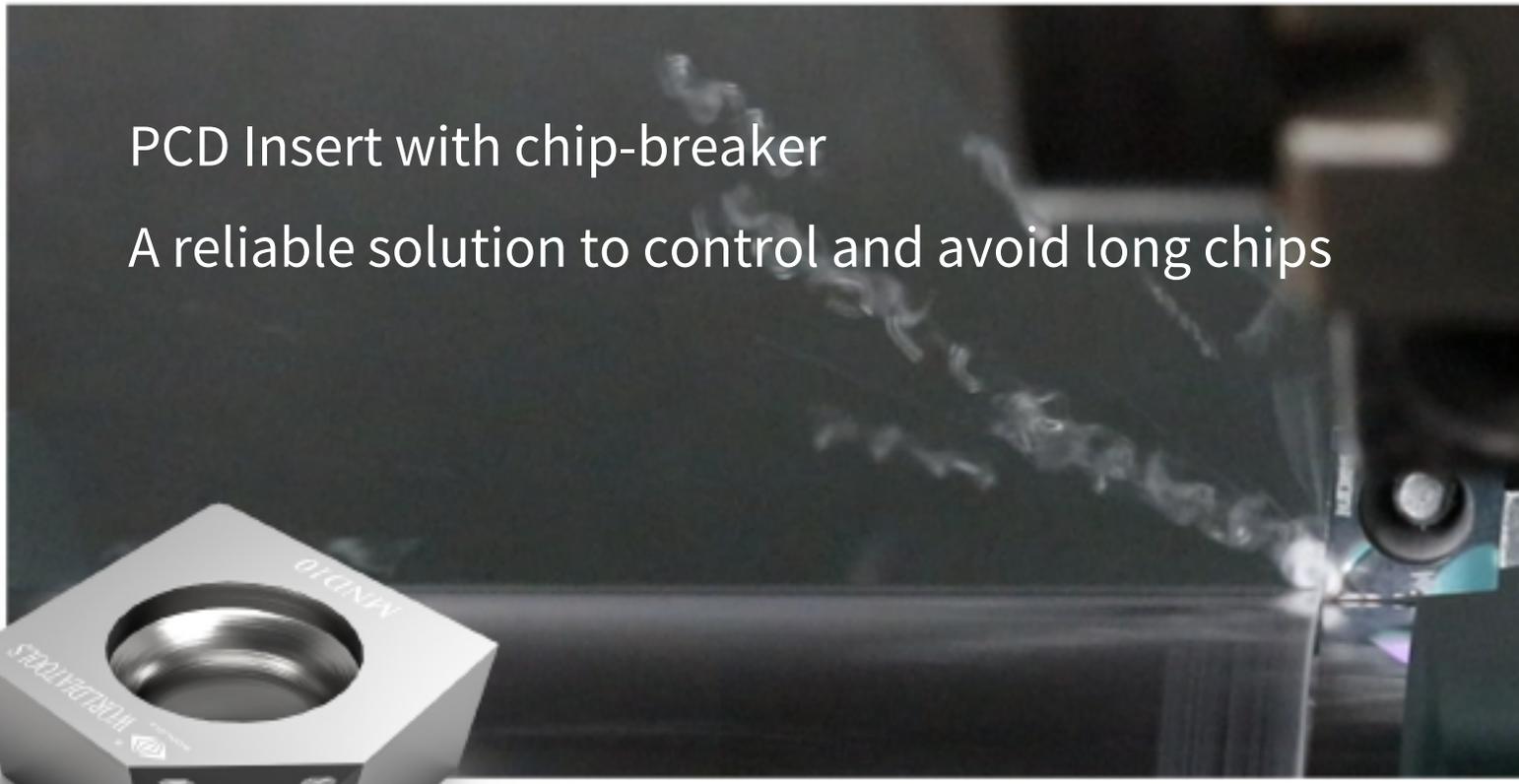
Key Definition - Identification Code

ANSI	C	-	C	C	G	W	2	1.5	0.5	-	1	N
ISO	C	-	C	C	G	W	06	02	02	-	1	N
	1		2	3	4	5	6	7	8		9	10

1	2	3	4	5
Insert Style	Insert Shape	Clearance Angle	Tolerances	Pattern Type
Without Standard C Chip breaker L Full Length F Full Face S Solid W Wiper H Heavy cutting	A 85° M 96° B 80° O 135° C 80° P 108° D 55° R 90° E 75° S 90° H 120° T 60° K 55° V 35° L 90° W 80°	A 3° F 25° B 5° G 30° C 7° N 0° D 15° P 11° E 20°	G ISO mm ANSI inch m ±0.025 ±0.001 IC ±0.025 ±0.001 S ±0.130 ±0.005 R ±0.03 ±0.001	A N T W R
6	7	8	9	10
Inscribed Circle Diameter	Insert Thickness	Nose Radius	Cutting Edges	Cutting Direction
IC (mm) C D T V W IC (inch) Code ISO ANSI 3.970 5/32 1.2 4.760 08 3/16 1.5 5.560 09 7/32 1.8 6.350 06 07 11 11 1/4 2 7.940 5/16 2.5 9.525 09 11 16 16 3/8 3 12.700 12 15 08 1/2 4 15.875 5/8 5	S ISO mm ANSI inch 01 = 1.59 1 1/16 02 = 2.38 1.5 3/32 T2 = 2.78 03 = 3.18 2 1/8 T3 = 3.97 2.5 5/32 04 = 4.76 3 3/16 05 = 5.56 3.5 7/32 06 = 6.35 4 1/4 07 = 7.94 5 5/16 09 = 9.525 6 3/8	R ISO mm ANSI inch 00 = 0.0 0 .000 01 = 2.1 0.2 .004 02 = 0.2 0.5 .008 04 = 0.4 1 1/64 08 = 0.8 2 1/32 12 = 1.2 3 3/64 16 = 1.6 4 1/16 20 = 2.0 5 5/64 24 = 2.4 6 3/32 28 = 2.8 7 7/64	1 single 2 double 3 triple : :	N R L

PCD Insert with chip-breaker

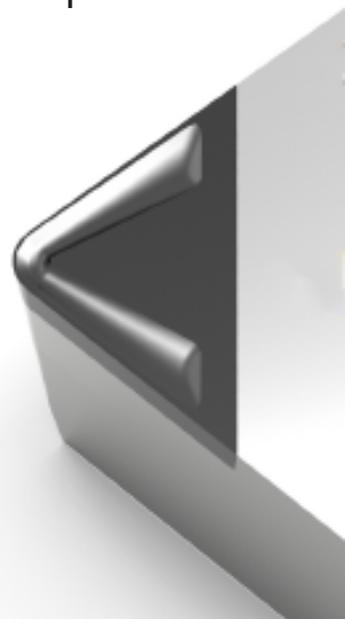
A reliable solution to control and avoid long chips



Material: A6061

Cutting conditions: $V_c=400\text{m/min}$ $f=0.1\text{mm/rev}$ $a_p=0.2\text{mm}$

Insert type: CCGW09T308



PCD Insert

CCGW

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CC

80°Positive

7°Relief

Edge mark:

C - chipbreaker

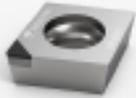
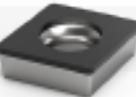
L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

CCGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGW 060202	CCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 0005			
	CCGW 060204	CCGW 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 0007			
	CCGW 060204	CCGW 21.51.5	1N	6.35	2.38	0.5	2.8	2.5	MN 00660			
	CCGW 060208	CCGW21.52	1N	6.35	2.38	0.8	2.8	2.5	MN 00496			
	CCGW 09T302	CCGW 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 0009			
	CCGW 09T304	CCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 0010			
	CCGW 09T304 CBST44	CCGW 32.51 CBST44	1N	9.525	3.97	0.4	4.4	4.4	MN 00839			
	CCGW 09T308	CCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00011			
CCGW 09T308 CBST44	CCGW 32.52 CBST44	1N	9.525	3.97	0.8	4.4	4.4	MN 00840				
	CCGW120404	CCGW431	1N	12.7	4.76	0.4	5.5	2.5	MN 00662			
	CCGW120408	CCGW432	1N	12.7	4.76	0.8	5.5	2.5	MN 00663			
	C - CCGW 060202	C - CCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00006			
	C - CCGW 09T304	C - CCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00075			
	F - CCGW 060204	F - CCGW 21.51	2N	6.35	2.38	0.4	2.8	6.4	MN 00008			

Items with order code MNXXXXX on stock

PCD Insert

CCGT

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CC

80°Positive

7°Relief

Edge mark:

C - chipbreaker

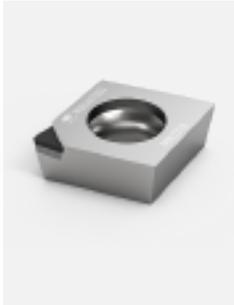
L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

CCGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGT 060202	CCGT 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00012			
	CCGT 060204	CCGT 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 00013			
	CCGT 09T302	CCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00014			
	CCGT 09T304	CCGT 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00015			
	CCGT 09T308	CCGT 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00016			

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PCD Insert

DCGW-DCGT

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DC	55°Positive
	7°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

DCGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	DCGW 070202	DCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00017			
	DCGW 070204	DCGW 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 00018			
	DCGW 11T302	DCGW 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00019			
	DCGW 11T304	DCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00020			
	DCGW 11T308	DCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00021			

Items with order code MNXXXX on stock

DCGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	DCGT 070202	DCGT 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00022			
	DCGT 070204	DCGT 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 00023			
	DCGT 11T302	DCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00024			
	DCGT 11T302	DCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00543			
	DCGT 11T302	DCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00544			
	DCGT 11T304	DCGT 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00025			
	DCGT 11T308	DCGT 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00026			

Items with order code MNXXXX on stock

PCD Insert

VCGW-VC GT

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VC	35°Positive
	7°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

VCGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VCGW 110204	VCGW21.51	1N	6.35	2.38	0.4	2.8	2.5				MN 00512
	VCGW 110302	VCGW 220.5	1N	6.35	3.18	0.2	2.8	2.5				MN 00027
	VCGW 110304	VCGW 221	1N	6.35	3.18	0.4	2.8	2.5				MN 00028
	VCGW 110308	VCGW 221	1N	6.35	3.18	0.8	2.8	2.5				MN 00666
	VCGW 160402	VCGW 330.5	1N	9.525	4.76	0.2	4.4	2.5				MN 00029
	VCGW 160402 CBST44	VCGW 330.5 CBST44	1N	9.525	4.76	0.2	4.4	4.4				MN 00836
	VCGW 160404	VCGW 331	1N	9.525	4.76	0.4	4.4	2.5				MN 00030
	VCGW 160404 CBST44	VCGW 331 CBST44	1N	9.525	4.76	0.4	4.4	4.4				MN 00837
	VCGW 160408	VCGW 332	1N	9.525	4.76	0.8	4.4	2.5				MN 00031
	VCGW 160408	VCGW 332	1N	9.525	4.76	0.8	4.4	4.4				MN 00838

Items with order code MNXXXXX on stock

VC GT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VCGT 110302	VCGT 220.5	1N	6.35	3.18	0.2	2.8	2.5				MN 00032
	VCGT 110304	VCGT 221	1N	6.35	3.18	0.4	3.3	2.5				MN 00033
	VCGT 160402	VCGT 330.5	1N	9.525	4.76	0.2	4.4	2.5				MN 00034
	VCGT 160404	VCGT 331	1N	9.525	4.76	0.4	4.4	2.5				MN 00035
	VCGT 160408	VCGT 332	1N	9.525	4.76	0.8	4.4	2.5				MN 00036

Items with order code MNXXXXX on stock

PCD Insert

VBGW-VBGT

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VB	35°Positive
	5°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

VBGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VBGW 160402	VBGW 330.5	1N	9.525	4.76	0.2	4.4	2.5				MN 00037
	VBGW 160404	VBGW 331	1N	9.525	4.76	0.4	4.4	2.5				MN 00038
	VBGW 160408	VBGW 332	1N	9.525	4.76	0.8	4.4	2.5				MN 00039

Items with order code MNXXXXX on stock

VBGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VBGT 110304	VBGT221	1N	6.35	3.18	0.4	2.8	2.5				MN 00805
	VBGT 160402	VBGT 330.5	1N	9.525	4.76	0.2	4.4	2.5				MN 00040
	VBGT 160404	VBGT 331	1N	9.525	4.76	0.4	4.4	2.5				MN 00041
	VBGT 160408	VBGT 332	1N	9.525	4.76	0.8	4.4	2.5				MN 00042

Items with order code MNXXXXX on stock

PCD Insert

TCGW

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TC	60°Positive
	7°Relief

Edge mark:

C - chipbreaker

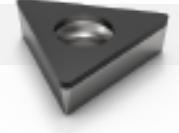
L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

TCGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TCGW 090202	TCGW 1.81.50.5	1N	5.56	2.38	0.2	2.4	2.5	MN 00043			
	TCGW 090204	TCGW 1.81.51	1N	5.56	2.38	0.4	2.4	2.5	MN 00044			
	TCGW 110302	TCGW 220.5	1N	6.35	3.18	0.2	2.8	2.5	MN 00045			
	TCGW 110304	TCGW 221	1N	6.35	3.18	0.4	2.8	2.5	MN 00046			
	TCGW 110308	TCGW 222	1N	6.35	3.18	0.8	2.8	2.5	MN 00047			
	TCGW 16T304	TCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00077			
	TCGW 16T308	TCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00079			
	TCGW 160404	TCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00051			
	TCGW 160408	TCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00053			
	L-TCGW 16T302	L-TCGW 32.50.5	2N	9.525	3.97	0.2	4.4	16.2	MN 00076			
	L-TCGW 16T304	L-TCGW 32.51	2N	9.525	3.97	0.4	4.4	15.9	MN 00078			
	L-TCGW 16T308	L-TCGW 32.52	2N	9.525	3.97	0.8	4.4	15.3	MN 00080			
	F-TCGW 090204	F-TCGW 1.81.51	3N	5.56	2.38	0.4	2.4	9	MN 00057			

Items with order code MNXXXXX on stock

PCD Insert

TCGT

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TC	60°Positive
	7°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

TCGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TCGT 090202	TCGT 1.81.50.5	1N	5.56	2.38	0.2	2.4	2.5	MN 00055			
	TCGT 090204	TCGT 1.81.51	1N	5.56	2.38	0.4	2.4	2.5	MN 00056			
	TCGT 110302	TCGT 220.5	1N	6.35	3.18	0.2	2.8	2.5	MN 00058			
	TCGT 110304	TCGT 221	1N	6.35	3.18	0.4	2.8	2.5	MN 00059			
	TCGT 110308	TCGT 222	1N	6.35	3.18	0.8	2.8	2.5	MN 00060			
	L-TCGT 16T304	L-TCGT 32.51	2N	9.525	3.97	0.4	4.4	15.9	MN 00081			

Items with order code MNXXXXX on stock

PCD Insert

TPGW-TPGT

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TP	60°Positive
	11°Relief

Edge mark:

C - chipbreaker

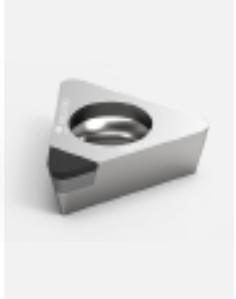
L - full length

F - full face

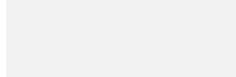
Application:

ISO N - Non-ferrous Metal

ISO O - Others

TPGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TPGW 110302	TPGW 220.5	1N	6.35	3.18	0.2	3.3	2.5				MN 00064
	TPGW 110304	TPGW 221	1N	6.35	3.18	0.4	3.3	2.5				MN 00065
	TPGW 110308	TPGW 222	1N	6.35	3.18	0.8	3.3	2.5				MN 00066
	TPGW 160402	TPGW 330.5	1N	9.525	4.76	0.2	4.4	2.5				MN 00067
	TPGW 160404	TPGW 331	1N	9.525	4.76	0.4	4.4	2.5				MN 00068
	F-TPGW 110308	F-TPGW 222	3N	9.525	3.18	0.8	3.3	15.3				MN 00048

Items with order code MNXXXXX on stock

TPGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TPGT090204	TPGT1.81.51	1N	5.56	2.38	0.4	2.4	2.5				MN 00804
	TPGT 110302	TPGT 22.50.5	1N	6.35	3.18	0.2	3.3	2.5				MN 00069
	TPGT 110304	TPGT 22.51	1N	6.35	3.18	0.4	3.3	2.5				MN 00070
	TPGT 110308	TPGT 22.52	1N	6.35	3.18	0.8	3.3	2.5				MN 00071
	TPGT 160402	TPGT 330.5	1N	9.525	4.76	0.2	4.4	2.5				MN 00072
	TPGT 160404	TPGT 331	1N	9.525	4.76	0.2	4.4	2.5				MN 00073

Items with order code MNXXXXX on stock

The relationship between nose radius, feed rate and Ra.

$$\therefore h = r\epsilon - (r\epsilon^2 - (0.5 \times f)^2)^{0.5} = \text{Scallop Height}$$

$$\therefore Ra = (0.25 \sim 0.33) h$$

$$\therefore f_{MAX} = (Ra \times r\epsilon / 50) \frac{1}{2}$$

Feed rate recommendation:

Nose radius (mm)	Ra μm					
	0.2	0.4	0.8	1.6	3.2	6.4
	Feed Rate f (mm/rev) \leq					
0.2	0.028	0.040	0.057	0.080	0.113	0.160
0.4	0.040	0.057	0.080	0.113	0.160	0.226
0.8	0.057	0.080	0.113	0.160	0.226	0.320
1.2	0.069	0.098	0.139	0.196	0.277	0.392
1.6	0.080	0.113	0.160	0.226	0.320	0.453
2.4	0.098	0.139	0.196	0.277	0.392	0.554



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