



2021

GERMAN 
Technology

EN

CUTTING TOOLS

- TURNING ▪ MILLING ▪ GROOVING
- THREADING ▪ DRILLING ▪ CERAMIC
- CBN ▪ PCD

VOLLCUT®
Technologies

Vollcut technology corporations is an outsource manufacturing of carbide indexable inserts, cutting tools, CBN, PCBN, Ceramic and PCD. Thanks to advance German technology and machinery from Switzerland and Germany including Ball Grinding Mill, Spray granulation tower, CNC automotive pressing machine, low pressure vacuum sintering furnace, CNC Grinding Machines, CNC forming Tool Grinding Machine, Automatic Chamfering machine, CVD and PVD coating furnace, high-speed milling machine, EDM machine, WEDM-LS, Linear detector, Sigma meter ,Coercive force machine, Metalloscope ,etc., with annual output twenty million pieces, and has passed the ISO 9001 international quality system certification.

- 1, Milling and Turning inserts for processing aluminum , cast iron , stainless steel , a variety of steel and other metals , grooving inserts, drilling and milling inserts , cermet indexable inserts with thick - film multi-layer coating ,tool holders , brazing inserts.
- 2, The indexable woodworking inserts, woodworking dowel drill bits, hinge boring bits, high precision planer, etc.
- 3, Inserts shim, diamond and CBN substrate, mining ball gear, blanks, rod, wire drawing dies, punching dies and other carbide products.



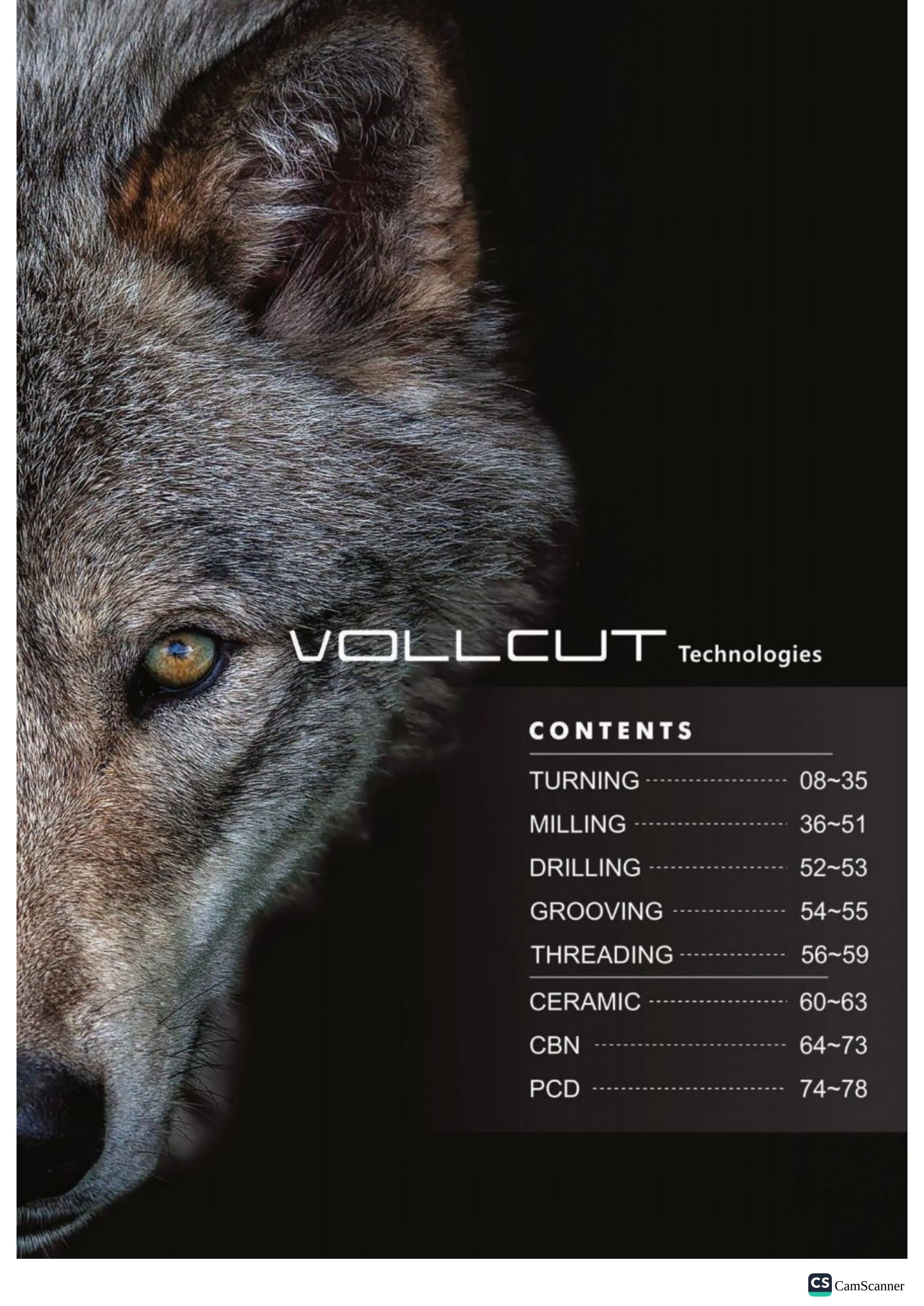
- **The Synergy Of Traditional and Technology**



- **Art, Technology, Education**
- **Peer-to-Peer training**
- **Great way to transfer skills**



- **Total Procurement Solution**
- **Solution offering**



VOLLCUT Technologies

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Recommended grade overview for carbide insert

Code letters	Machining group	Groups of materials to be machined	
P	P	Steel	All types of steel and cast steel, with the exception of steel with an austenitic structure
M	M	Stainless steel	Stainless austenitic steel and austenitic-ferritic steel and cast steel
K	K	Cast iron	Grey cast iron, cast iron with spheroidal graphite, malleable cast iron, cast iron with vermicular graphite
H	H	Hard materials	Hardened steel, hardened cast iron materials, chilled cast iron
N	N	NF metals	Aluminium and other non-ferrous metals non-ferrous materials

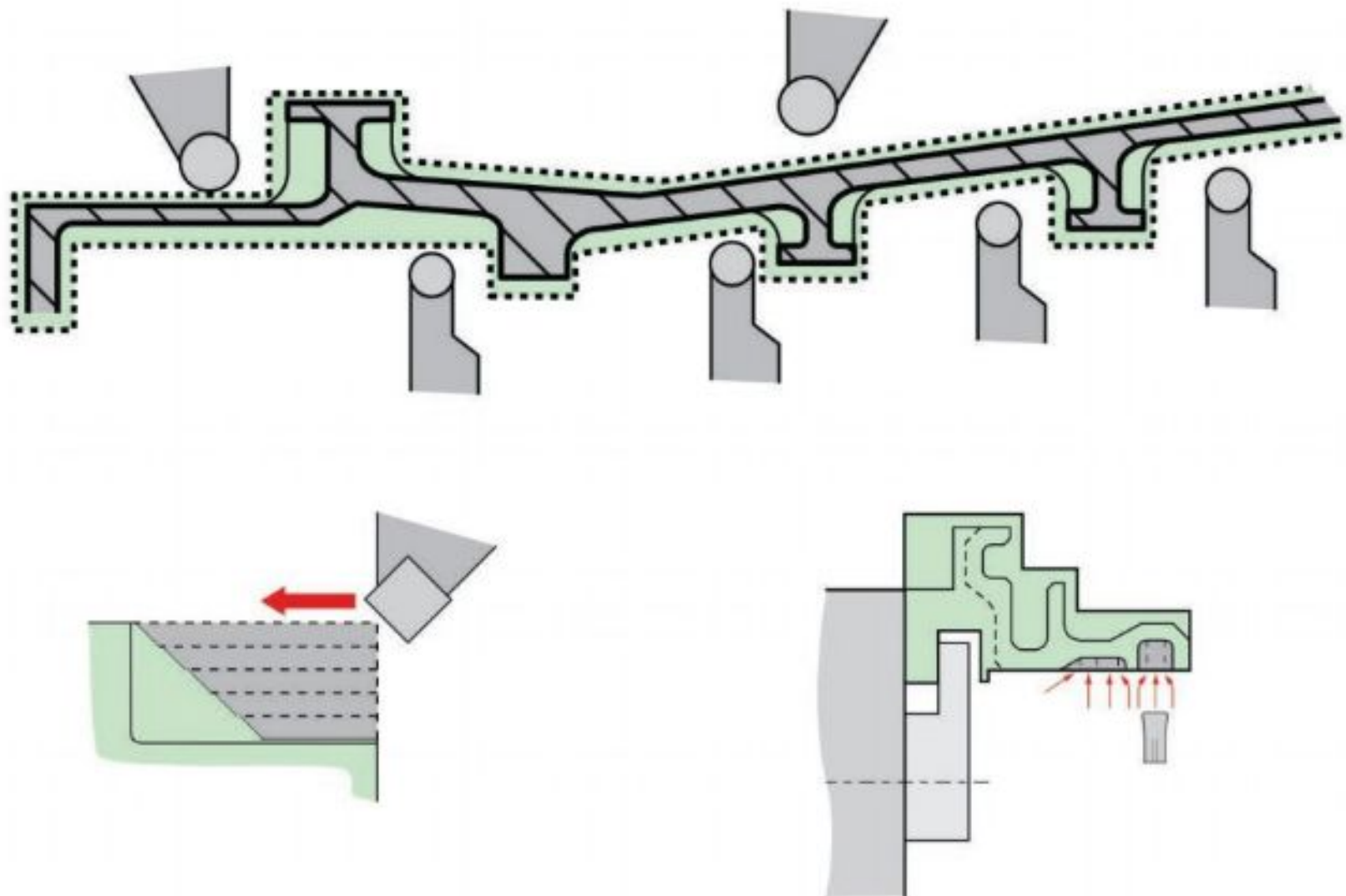
Standard	Steel					Stainless steel					Cast iron				Heat treating			Aluminium		
	01	10	20	30	40	01	10	20	30	40	01	10	20	30	01	10	20	01	10	20
CVD coating			VCTP30	VCTP40				VCTM40			VCTK15	VCTK25	VCTK30							
PVD coating	VCTP10	VCTP20	VCTP30			VCTM10	VCTM20	VCTM25	VCTM40		VCTK05									
Cemented carbide	VCTP20	VCTP30				VCTM20					VCTK05		VCTH10	VCTH20						
CBN			VCB300								VCTB200					VCTB200				
Ceramic		VCT650									VCT670	VCT6060			VCT650	VCT670				
PCD																		VCTH10	VCTH05	

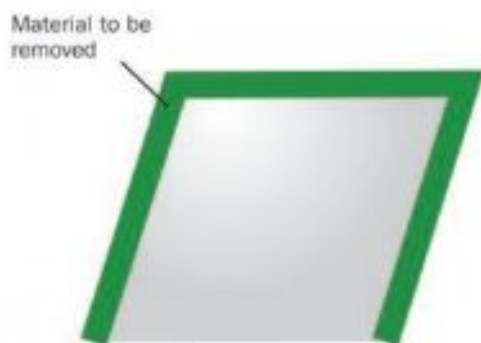
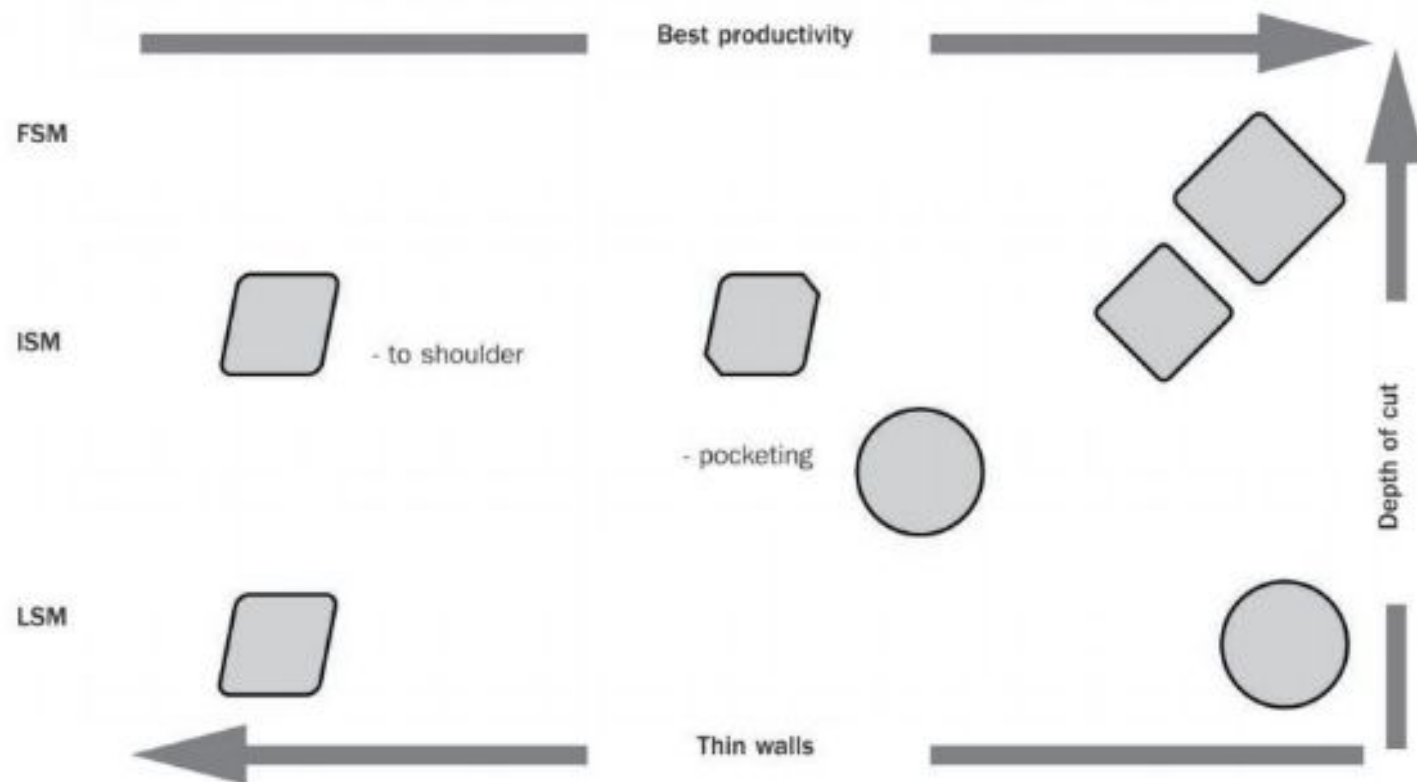
Selecting the right insert for the job

Polycrystalline cubic boron nitride composites (PCBN) are produced by sintering CBN particles and various ceramics. This results in a very hard, temperature-resistant and chemically extremely stable cutting material.

CBN is the second hardest known material after synthetic diamond. CBN tools are used for machining hardened steels because they offer a cost-effective alternative to grinding processes.

Further applications are machining of cast iron and gray cast iron as well as cold and hot work steels. CBN is also increasingly used for machining of super alloys (nickel and cobalt alloys).



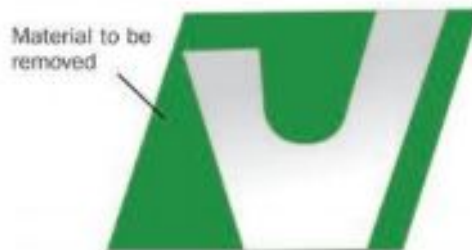


FSM First stage machining up to 10 mm depth of cut

The forged components often have rough, uneven skin or scale. They are generally machined in the soft condition (the hardness is typically 26 HRC) at the foundry to the basic component shape. Coated carbide grades are used at high feed rates, large depths of cut and low speeds.

Ceramics may also be used with good machine and forging conditions. Here the main priorities are productivity and large stock removal in the total machining process, up to 80% of the original weight will be machined away, and the bulk of it will be removed during FSM.

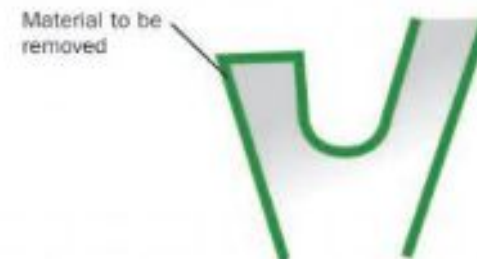
The component shapes are simple and standard general turning tool holders can be used. Many critical parts have a ring removed at this stage for material analysis.



ISM Intermediate stage machining 0.5 to 5 mm depth of cut

At this stage the material is mainly in the final hard/aged condition, (the hardness is typically 36 to 46 HRC) having undergone some form of heat treatment after FSM.

The ISM process involves profiling of the component with varying depths of cut at moderate tolerances, where productivity is important but insert security is equally vital. In this area, ceramics offer the best productivity where stability allows. Due to the complex shape of the components, ISM may involve a high degree of grooving/ recessing and profiling, which can require a large amount of special tool holders.

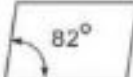
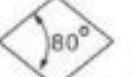
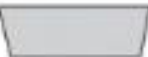
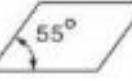
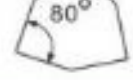
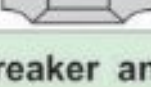
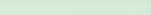


LSM Last stage machining 0.2 to 1 mm depth of cut

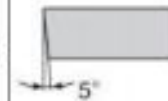
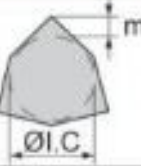
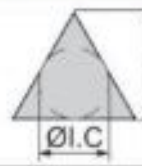
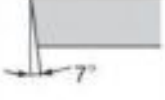
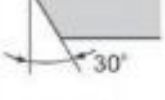
LSM represents the least amount of material removal, but imposes the highest demands on surface quality. For this critical stage of production, the tools, tool paths and cutting data are sometimes certified by end producers of the aerospace engine.

These parts should be machined with cemented carbide grades, to ensure a minimal deformation zone and correct residual stresses in the finished component surface.

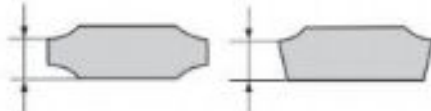
General turning inserts code key

Insert Shape/Code			Metric							
			Code	With/Without hole	With/Without chipbreaker	Section plane of insert	Code	With/Without hole	With/Without chipbreaker	Section plane of insert
 A	 B	 C	B	With	Without		N	Without	Without	
 D	 E	 H	H	With	Single-side		R	Without	Single-side	
 K	 L	 M	C	With	Without		F	Without	Double-side	
 O	 P	 R	J	With	Double-side		A	With	Without	
 S	 T	 T	W	With	Without		M	With	Single-side	
 V	 W	Others Z	T	With	Single-side		G	With	Double-side	
			Q	With	Without		X	---	---	Special
			U	With	Double-side					
Insert shape			Chipbreaker and clamping system							

T N M G

Clearance angle of main cutting edge				Allowed tolerance										
Code	Clearance angle	Code	Clearance angle											
A	 3°	B	 5°											
C	 7°	D	 15°	Code	tolerance range	Inscribed circle Tolerance (mm)	Thickness S Tolerance (mm)	(Reference) Details of M-class tolerance (Identified by shape and size) Nose height tolerance (mm)						
E	 20°	F	 25°	A	±0.005	±0.025	±0.025	Inscribed circle						
G	 30°	N	 0°	F	±0.005	±0.013	±0.025	6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
P	 11°	O	Other clearance angle	C	±0.013	±0.025	±0.025	9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
				H	±0.013	±0.013	±0.025	12.7	±0.13	±0.13	±0.13	±0.15	---	---
				E	±0.025	±0.025	±0.025	15.875	±0.15	±0.15	±0.15	±0.18	---	---
				G	±0.025	±0.025	±0.13	19.05	±0.15	±0.15	±0.15	±0.18	---	---
				J	±0.005	±0.05-±0.13	±0.025	25.4	---	±0.18	---	---	---	---
				Tolerance of inscribed circle										
				K	±0.013	±0.05-±0.13	±0.025	Inscribed circle						
				L	±0.025	±0.05-±0.13	±0.025	6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
				M	±0.08-±0.18	±0.05-±0.13	±0.13	9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
				N	±0.08-±0.18	±0.05-±0.13	±0.025	12.7	±0.08	±0.08	±0.08	±0.08	---	±0.08
				U	±0.13-±0.38	±0.08-±0.25	±0.13	15.875	±0.10	±0.10	±0.10	±0.10	---	±0.10

Diameter of IC	Insert shape							
	C	D	R	S	T	V	W	K
								
3.97					06			
5.0			05					
5.56					09			
6.0			06					
6.35	06	07			11	11		
8.0			08					
9.525	09	11	09	09	16	16	06	16
10.0			10					
12.0			12					
12.7	12	15	12	12	22	22	08	
15.875	16	19	15	15	27		10	
16.0			16					
19.05	19		19	19	33			
20.0			20					
25.0			25					
25.4	25		25	25				
31.75			31					
32			32					
Length of cutting edge								

	
Code	Insert thickness (mm)
00	0.79
T0	0.99
01	1.59
T1	1.98
02	2.38
T2	2.78
03	3.18
T3	3.97
04	4.76
T4	4.96
05	5.56
T5	5.95
06	6.35
T6	6.75
07	7.94
09	9.52
T9	9.72
11	11.11
12	12.70
Insert thickness	

22 04 08 - PHR (ISO)

4 3 2 (inch)

Inscribed circle	
Code	Diameter of IC (mm)
2	6.35
3	9.525
4	12.7
5	15.875
6	19.05
8	25.4

Thickness	
Code	Thickness
2	3.18
3	4.76
4	6.35
5	7.94
6	9.52

Nose radius	
Code	Nose radius
0	0.2
1	0.4
2	0.8
3	1.2
4	1.6
5	2.0
6	2.4

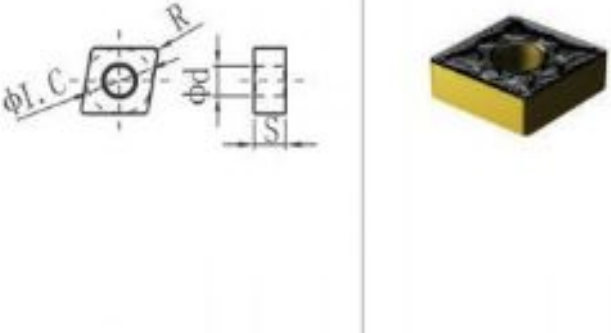
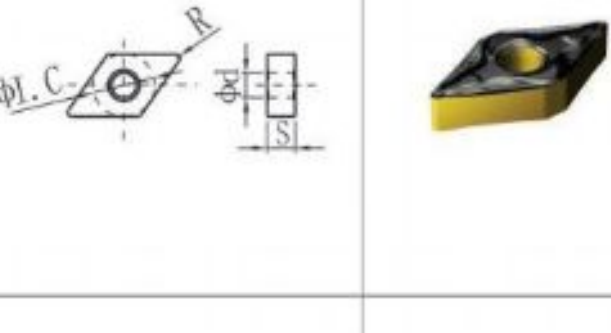
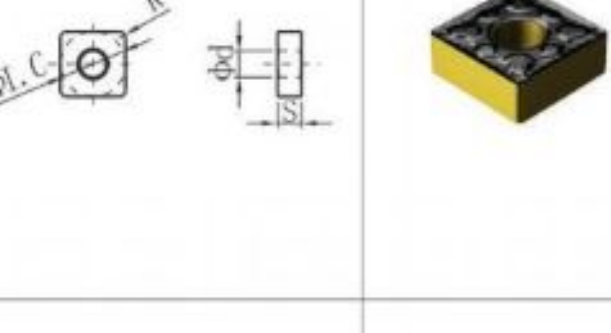
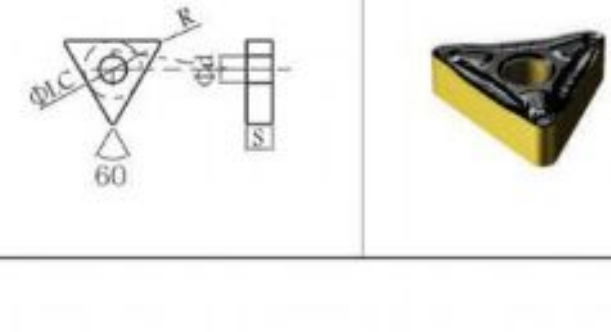
Nose radius Code	
Code	Nose radius
00	No radius
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	
(Metric)	Round insert

Chipbreaker code			
PHF	KHR	MHF	AL
			
DHM	KHR	MHM	MHM
			
XHM	K3	PHM	AL
			
PHR	KHM	QHM	
			

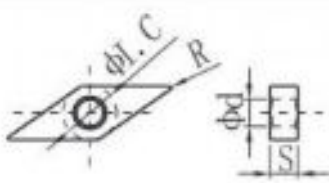
Inserts for processing steel				Finishing									
The basic shape of blade	Type	Dimension mm				Grade recommended							
		ΦI.C	S	Φd	R	CVD coating grade				PVD coating grade		CBN	
						VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
	CNMG	090304-PHF	9.525	3.18	3.81	0.4		●	●				
		090308-PHF	9.525	3.18	3.81	0.8		●	●				
		120404-PHF	12.7	4.76	5.16	0.4		●	●				
		120408-PHF	12.7	4.76	5.16	0.8		●	●				
		120412-PHF	12.7	4.76	5.16	1.2		●	●				
	DNMG	110404-PHF	9.525	4.76	3.81	0.4		●	●				
		110408-PHF	9.525	4.76	3.81	0.8		●	●				
		150404-PHF	12.7	4.76	5.16	0.4		●	●				
		150408-PHF	12.7	4.76	5.16	0.8		●	●				
		150604-PHF	12.7	6.35	5.16	0.4		●	●				
		150608-PHF	12.7	6.35	5.16	0.8		●	●				
		150612-PHF	12.7	6.35	5.16	1.2		●	●				
	SNMG	120404-PHF	12.7	4.76	5.16	0.4		●	●				
		120408-PHF	12.7	4.76	5.16	0.8		●	●				
		120412-PHF	12.7	4.76	5.16	1.2		●	●				
	TNMG	160404-PHF	9.525	4.76	3.81	0.4		●	●				
		160408-PHF	9.525	4.76	3.81	0.8		●	●				
		160412-PHF	9.525	4.76	3.81	1.2		●	●				
		220404-PHF	12.7	4.76	5.16	0.4		●	●				
		220408-PHF	12.7	4.76	5.16	0.8		●	●				
	VNMG	160404-PHF	9.525	4.76	3.81	0.4		●	●				
		160408-PHF	9.525	4.76	3.81	0.8		●	●				
	WNMG	060404-PHF	9.525	4.76	3.81	0.4		●	●				
		060408-PHF	9.525	4.76	3.81	0.8		●	●				
		060412-PHF	9.525	4.76	3.81	1.2		●	●				
		080404-PHF	12.7	4.76	5.16	0.4		●	●				
		080408-PHF	12.7	4.76	5.16	0.8		●	●				
		080412-PHF	12.7	4.76	5.16	1.2		●	●				

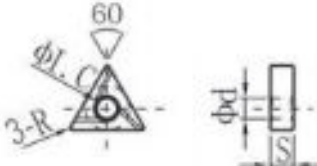


Inserts for processing steel								Finishing								
The basic shape of blade		Type	Dimension mm					Grade recommended								
								CVD coating grade				PVD coating grade		CBN		
			ΦL.C	S	Φd	R	α	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300	
		CCMT	060202-PHF	6.35	2.38	2.8	0.2	7								
			060204-PHF	6.35	2.38	2.8	0.4	7								
			060208-PHF	6.35	2.38	2.8	0.8	7								
			09T302-PHF	9.525	3.97	4.4	0.2	7								
			09T304-PHF	9.525	3.97	4.4	0.4	7								
			09T308-PHF	9.525	3.97	4.4	0.8	7								
			120404-PHF	12.7	4.76	5.5	0.4	7								
			120408-PHF	12.7	4.76	5.5	0.8	7								
		DCMT	070202-PHF	6.35	2.38	2.8	0.2	7								
			070204-PHF	6.35	2.38	2.8	0.4	7								
			11T302-PHF	9.525	3.97	4.4	0.2	7								
			11T304-PHF	9.525	3.97	4.4	0.4	7								
			11T308-PHF	9.525	3.97	4.4	0.8	7								
		SCMT	09T304-PHF	9.525	3.97	4.4	0.4	7								
			09T308-PHF	9.525	3.97	4.4	0.8	7								
		TCMT	090204-PHF	5.56	2.38	2.5	0.4	7								
			090208-PHF	5.56	2.38	2.5	0.8	7								
			110304-PHF	6.35	3.18	2.8	0.4	7								
			110308-PHF	6.35	3.18	2.8	0.8	7								
			110312-PHF	6.35	3.18	2.8	1.2	7								
			16T304-PHF	9.525	3.97	4.4	0.4	7								
			16T308-PHF	9.525	3.97	4.4	0.8	7								
			16T312-PHF	9.525	3.97	4.4	1.2	7								
		VBMT	110304-PHF	6.35	3.18	2.8	0.4	5								
			110308-PHF	6.35	3.18	2.8	0.8	5								
			160404-PHF	9.525	4.76	4.4	0.4	5								
			160408-PHF	9.525	4.76	4.4	0.8	5								
		VCMT	110304-PHF	6.35	3.18	2.8	0.4	7								
			110308-PHF	6.35	3.18	2.8	0.8	7								
			160404-PHF	9.525	4.76	4.4	0.4	7								
			160408-PHF	9.525	4.76	4.4	0.8	7								

Inserts for processing steel				Semi finishing									
The basic shape of blade	Type	Dimension mm				Grade recommended							
		ΦI.C	S	Φd	R	CVD coating grade				PVD coating grade		CBN	
						VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
	CNMG	090304-PHM	9.525	3.18	3.81	0.4	●	●	●				
		090308-PHM	9.525	3.18	3.81	0.8	●	●	●				
		120404-PHM	12.7	4.76	5.16	0.4	●	●	●				
		120408-PHM	12.7	4.76	5.16	0.8	●	●	●				
		120412-PHM	12.7	4.76	5.16	1.2	●	●	●				
		160608-PHM	15.875	6.35	6.35	0.8	●	●	●				
		160612-PHM	15.875	6.35	6.35	1.2	●	●	●				
		190608-PHM	19.05	6.35	7.93	0.8	●	●	●				
		190612-PHM	19.05	6.35	7.93	1.2	●	●	●				
		190616-PHM	19.05	6.35	7.93	1.6	●	●	●				
	DNMG	110404-PHM	9.525	4.76	3.81	0.4	●	●	●				
		110408-PHM	9.525	4.76	3.81	0.8	●	●	●				
		150404-PHM	12.7	4.76	5.16	0.4	●	●	●				
		150408-PHM	12.7	4.76	5.16	0.8	●	●	●				
		150412-PHM	12.7	4.76	5.16	1.2	●	●	●				
		150604-PHM	12.7	6.35	5.16	0.4	●	●	●				
		150608-PHM	12.7	6.35	5.16	0.8	●	●	●				
		150612-PHM	12.7	6.35	5.16	1.2	●	●	●				
	SNMG	090304-PHM	9.525	3.18	3.81	0.4	●	●	●				
		120404-PHM	12.7	4.76	5.16	0.4	●	●	●				
		120408-PHM	12.7	4.76	5.16	0.8	●	●	●				
		120412-PHM	12.7	4.76	5.16	1.2	●	●	●				
		150608-PHM	15.875	6.35	6.35	0.8	●	●	●				
		150612-PHM	15.875	6.35	6.35	1.2	●	●	●				
		190608-PHM	19.05	6.35	7.93	0.8	●	●	●				
		190612-PHM	19.05	6.35	7.93	1.2	●	●	●				
		190616-PHM	19.05	6.35	7.93	1.6	●	●	●				
	TNMG	160404-PHM	9.525	4.76	3.81	0.4	●	●	●				
		160408-PHM	9.525	4.76	3.81	0.8	●	●	●				
		160412-PHM	9.525	4.76	3.81	1.2	●	●	●				
		220404-PHM	12.7	4.76	5.16	0.4	●	●	●				
		220408-PHM	12.7	4.76	5.16	0.8	●	●	●				
		220412-PHM	12.7	4.76	5.16	1.2	●	●	●				



Inserts for processing steel								Semi finishing							
The basic shape of blade		Type		Dimension mm				Grade recommended							
								CVD coating grade				PVD coating grade		CBN	
				ΦI.C	S	Φd	R	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
		VNMG	160404-PHM	9.525	4.76	3.81	0.4		●	●	●				
			160408-PHM	9.525	4.76	3.81	0.8		●	●	●				
			160412-PHM	9.525	4.76	3.81	1.2		●	●	●				
		VNMG	060404-PHM	9.525	4.76	3.81	0.4		●	●	●				
			060408-PHM	9.525	4.76	3.81	0.8		●	●	●				
			060412-PHM	9.525	4.76	3.81	1.2		●	●	●				
			080404-PHM	12.7	4.76	5.16	0.4		●	●	●				
			080408-PHM	12.7	4.76	5.16	0.8		●	●	●				
			080412-PHM	12.7	4.76	5.16	1.2		●	●	●				

The basic shape of blade		Type		Dimension mm				Grade recommended							
				$\Phi I.C$	S	Φd	R	CVD coating grade				PVD coating grade		ceramic	
								VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
		TNMG	160404R/L-RHK	9.525	4.76	3.81	0.4		●	●	●				
			160408R/L-RHK	9.525	4.76	3.81	0.8		●	●	●				

Inserts for processing steel

Semi finishing

The basic shape of blade	Type	Dimension mm				Grade recommended							
		ΦI.C	S	Φd	R	CVD coating grade				PVD coating grade		CBN	
						VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
	CNMG	120404-QHM	12.7	4.76	5.16	0.4	●	●	●				
		120408-QHM	12.7	4.76	5.16	0.8	●	●	●				
		120412-QHM	12.7	4.76	5.16	1.2	●	●	●				
		160604-QHM	15.875	6.35	6.35	0.4	●	●	●				
		160608-QHM	15.875	6.35	6.35	0.8	●	●	●				
	DNMG	150404-QHM	12.7	4.76	5.16	0.4	●	●	●				
		150408-QHM	12.7	4.76	5.16	0.8	●	●	●				
		150604-QHM	12.7	6.35	5.16	0.4	●	●	●				
		150608-QHM	12.7	6.35	5.16	0.8	●	●	●				
	SNMG	120404-QHM	12.7	4.76	5.16	0.4	●	●	●				
		120408-QHM	12.7	4.76	5.16	0.8	●	●	●				
	TNMG	160404-QHM	9.525	4.76	5.16	0.4	●	●	●				
		160408-QHM	9.525	4.76	5.16	0.8	●	●	●				
		160412-QHM	9.525	4.76	5.16	1.2	●	●	●				
	VNMG	160404-QHM	9.525	4.76	5.16	0.4	●	●	●				
		160408-QHM	9.525	4.76	5.16	0.8	●	●	●				
	WNMG	080404-QHM	12.7	4.76	5.16	0.4	●	●	●				
		080408-QHM	12.7	4.76	5.16	0.8	●	●	●				

General Turning



Inserts for processing steel								Semi finishing							
The basic shape of blade		Type		Dimension mm				Grade recommended							
								CVD coating grade				PVD coating grade		CBN	
				ΦI.C	S	Φd	R	VCTP01	VCTP10	VCTP20	VCTP30	VCTN10	VCTN20	VCB200	VCB300
		CNMG	120404-XHM	12.7	4.76	5.16	0.4		●	●	●				
			120408-XHM	12.7	4.76	5.16	0.8		●	●	●				
			120412-XHM	12.7	4.76	5.16	1.2		●	●	●				
		DNMG	150404-XHM	12.7	4.76	5.16	0.4		●	●	●				
			150408-XHM	12.7	4.76	5.16	0.8		●	●	●				
			150412-XHM	12.7	4.76	5.16	1.2		●	●	●				
			150604-XHM	12.7	6.35	5.16	0.4		●	●	●				
			150608-XHM	12.7	6.35	5.16	0.8		●	●	●				
			150612-XHM	12.7	6.35	5.16	1.2		●	●	●				
		TNMG	160404-XHM	9.525	4.76	3.81	0.4		●	●	●				
			160408-XHM	9.525	4.76	3.81	0.8		●	●	●				
			160412-XHM	9.525	4.76	3.81	1.2		●	●	●				
			220404-XHM	12.7	4.76	5.16	0.4		●	●	●				
			220408-XHM	12.7	4.76	5.16	0.8		●	●	●				
			220412-XHM	12.7	4.76	5.16	1.2		●	●	●				
		VNMG	160404-XHM	9.525	4.76	3.81	0.4		●	●	●				
			160408-XHM	9.525	4.76	3.81	0.8		●	●	●				
			160412-XHM	9.525	4.76	3.81	1.2		●	●	●				
		WNMG	080404-XHM	12.7	4.76	5.16	0.4		●	●	●				
			080408-XHM	12.7	4.76	5.16	0.8		●	●	●				
			080412-XHM	12.7	4.76	5.16	1.2		●	●	●				
		VNMG	160408-XHM	9.525	4.76	3.81	0.8		●	●	●				
			160412-XHM	9.525	4.76	3.81	1.2		●	●	●				
		WNMG	080408-XHM	12.7	4.76	5.16	0.8		●	●	●				
			080412-XHM	12.7	4.76	5.16	1.2		●	●	●				

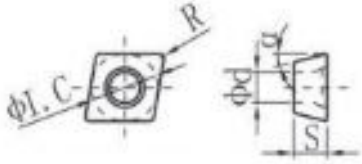
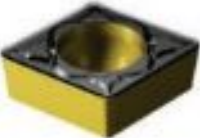
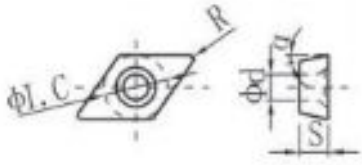
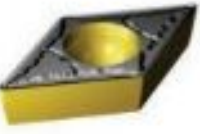
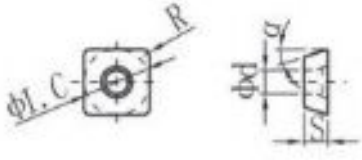
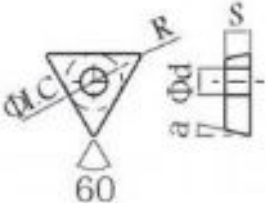
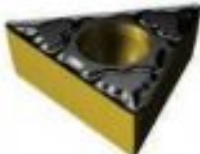
Inserts for processing steel

Semi finishing

The basic shape of blade	Type	Dimension mm				Grade recommended			
		ΦI.C	S	Φd	R	CVD coating grade			
						VCTP01	VCTP10	VCTP20	VCTP30
	CNMG	120404-XHRM	12.7	4.76	5.16	0.4		●	●
		120408-XHRM	12.7	4.76	5.16	0.8		●	●
		120412-XHRM	12.7	4.76	5.16	1.2		●	●
		160604-XHRM	15.875	6.35	6.35	0.4		●	●
		160608-XHRM	15.875	6.35	6.35	0.8		●	●
		160612-XHRM	15.875	6.35	6.35	1.2		●	●
	DNMG	150404-XHRM	12.7	4.76	5.16	0.4		●	●
		150408-XHRM	12.7	4.76	5.16	0.8		●	●
		150604-XHRM	12.7	6.35	5.16	0.4		●	●
		150608-XHRM	12.7	6.35	5.16	0.8		●	●
	SNMG	120404-XHRM	12.7	4.76	5.16	0.4		●	●
		120408-XHRM	12.7	4.76	5.16	0.8		●	●
		150608-XHRM	15.875	6.35	5.16	0.8		●	●
		150612-XHRM	15.87	6.35	5.16	1.2		●	●
	TNMG	160404-XHRM	9.525	4.76	5.16	0.4		●	●
		160408-XHRM	9.525	4.76	5.16	0.8		●	●
		160412-XHRM	9.525	4.76	5.16	1.2		●	●
	VNMG	160404-XHRM	9.525	4.76	5.16	0.4		●	●
		160408-XHRM	9.525	4.76	5.16	0.8		●	●
		160412-XHRM	9.525	4.76	5.16	1.2		●	●
	WNMG	080404-XHRM	12.7	4.76	5.16	0.4		●	●
		080408-XHRM	12.7	4.76	5.16	0.8		●	●
		080412-XHRM	12.7	4.76	5.16	1.2		●	●

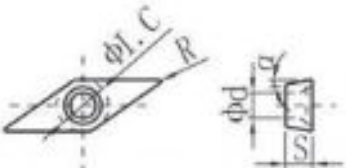
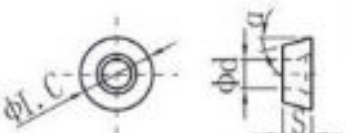
General Turning



Inserts for processing steel									Semi finishing							
The basic shape of blade		Type		Dimension mm					Grade recommended							
									CVD coating grade				PVD coating grade		CBN	
				ΦL/C	S	Φd	R	α	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
		CCMT	060204-PHM	6.35	2.38	2.8	0.4	7		●	●			●		
			060208-PHM	6.35	2.38	2.8	0.8	7		●	●			●		
			09T302-PHM	9.525	3.97	4.4	0.2	7		●	●			●		
			09T304-PHM	9.525	3.97	4.4	0.4	7		●	●			●		
			09T308-PHM	9.525	3.97	4.4	0.8	7		●	●			●		
			120404-PHM	12.7	4.76	5.5	0.4	7		●	●			●		
			120408-PHM	12.7	4.76	5.5	0.8	7		●	●			●		
			120412-PHM	12.7	4.76	5.5	1.2	7		●	●			●		
		DCMT	070204-PHM	6.35	2.38	2.8	0.4	7		●	●			●		
			070208-PHM	6.35	2.38	2.8	0.8	7		●	●			●		
			11T302-PHM	9.525	3.97	4.4	0.2	7		●	●			●		
			11T304-PHM	9.525	3.97	4.4	0.4	7		●	●			●		
			11T308-PHM	9.525	3.97	4.4	0.8	7		●	●			●		
			11T312-PHM	9.525	3.97	4.4	1.2	7		●	●			●		
		SCMT	09T302-PHM	9.525	3.97	4.4	0.2	7		●	●			●		
			09T304-PHM	9.525	3.97	4.4	0.4	7		●	●			●		
			09T308-PHM	9.525	3.97	4.4	0.8	7		●	●			●		
			09T312-PHM	9.525	3.97	4.4	1.2	7		●	●			●		
			120404-PHM	12.7	4.76	5.5	0.4	7		●	●			●		
			120408-PHM	12.7	4.76	5.5	0.8	7		●	●			●		
			120412-PHM	12.7	4.76	5.5	1.2	7		●	●			●		
		TCMT	090204-PHM	5.56	2.38	2.5	0.4	7		●	●			●		
			090208-PHM	5.56	2.38	2.5	0.8	7		●	●			●		
			110304-PHM	6.35	3.18	2.8	0.4	7		●	●			●		
			110308-PHM	6.35	3.18	2.8	0.8	7		●	●			●		
			110312-PHM	6.35	3.18	2.8	1.2	7		●	●			●		
			16T304-PHM	9.525	3.97	4.4	0.4	7		●	●			●		
			16T308-PHM	9.525	3.97	4.4	0.8	7		●	●			●		
			16T312-PHM	9.525	3.97	4.4	1.2	7		●	●			●		

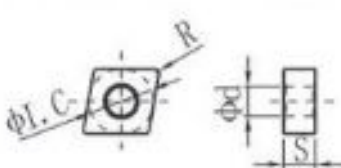
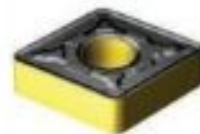
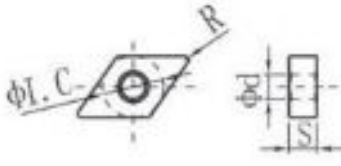
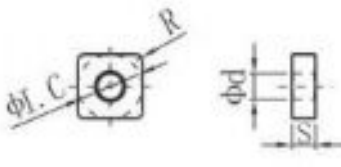
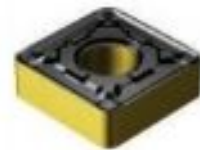
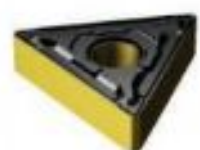
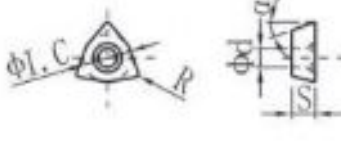
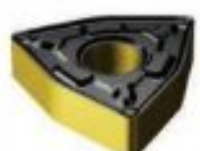
Inserts for processing steel

Semi finishing

The basic shape of blade	Type	Dimension mm					Grade recommended							
		$\Phi L.C$	S	Φd	R	α	CVD coating grade				PVD coating grade		CBN	
							VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
 	VCMT	110304-PHM	6.35	3.18	2.8	0.4	7		●	●		●		
		110308-PHM	6.35	3.18	2.8	0.8	7		●	●		●		
		160404-PHM	9.525	4.76	4.4	0.4	7		●	●		●		
		160408-PHM	9.525	4.76	4.4	0.8	7		●	●		●		
	VBMT	110304-PHM	6.35	3.18	2.8	0.4	5		●	●		●		
		110308-PHM	6.35	3.18	2.8	0.8	5		●	●		●		
		160404-PHM	9.525	4.76	4.4	0.4	5		●	●		●		
		160408-PHM	9.525	4.76	4.4	0.8	5		●	●		●		
 	RCMT	0803MOE-MHO	8	2.38	3.3	-	7		●	●		●		
		10T3MOE-MHO	10	3.97	4.5	-	7		●	●		●		
		1204MOE-MHO	12	4.76	4.4	-	7		●	●		●		
		1606MOE-MHO	16	6.35	5.5	-	7		●	●		●		
		2006MOE-MHO	20	6.35	6.5	-	7		●	●		●		

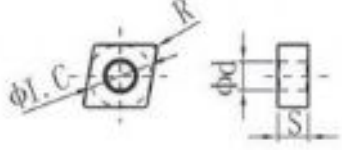
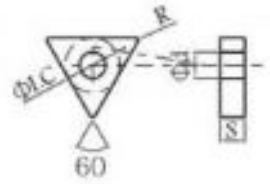
General Turning



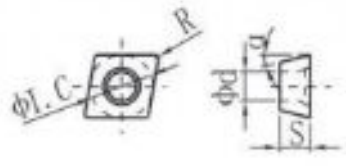
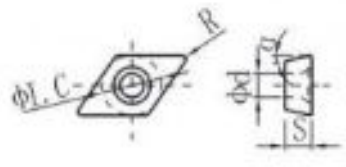
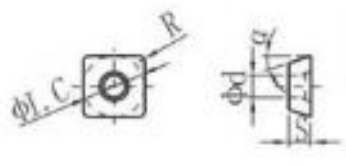
Inserts for processing steel					Rough machining										
The basic shape of blade		Type	Dimension mm				Grade recommended								
							CVD coating grade				PVD coating grade		CBN		
			ΦI.C	S	Φd	R	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300	
		CNMG	120408-PHR	12.7	4.76	5.16	0.8		●	●	●				
			120412-PHR	12.7	4.76	5.16	1.2		●	●	●				
			120416-PHR	12.7	4.76	5.16	1.6		●	●	●				
			160608-PHR	15.875	6.35	6.35	0.8		●	●	●				
			160612-PHR	15.875	6.35	6.35	1.2		●	●	●				
			160616-PHR	15.875	6.35	6.35	1.6		●	●	●				
			190612-PHR	19.05	6.35	7.93	1.2		●	●	●				
		DNMG	150408-PHR	12.7	4.76	5.16	0.8		●	●	●				
			150412-PHR	12.7	4.76	5.16	1.2		●	●	●				
			150416-PHR	12.7	4.76	5.16	1.6		●	●	●				
			150608-PHR	12.7	6.35	5.16	0.8		●	●	●				
			150612-PHR	12.7	6.35	5.16	1.2		●	●	●				
			150616-PHR	12.7	6.35	5.16	1.6		●	●	●				
		SNMG	120408-PHR	12.7	4.76	5.16	0.8		●	●	●				
			120412-PHR	12.7	4.76	5.16	1.2		●	●	●				
			120416-PHR	12.7	4.76	5.16	1.6		●	●	●				
			150608-PHR	15.875	6.35	6.35	0.8		●	●	●				
			150612-PHR	15.875	6.35	6.35	1.2		●	●	●				
			150616-PHR	15.875	6.35	6.35	1.6		●	●	●				
			190608-PHR	19.05	6.35	7.93	0.8		●	●	●				
			190612-PHR	19.05	6.35	7.93	1.2		●	●	●				
			190616-PHR	19.05	6.35	7.93	1.6		●	●	●				
			190624-PHR	19.05	6.35	7.93	2.4		●	●	●				
		TNMG	160408-PHR	9.525	4.76	3.81	0.8		●	●	●				
			160412-PHR	9.525	4.76	3.81	1.2		●	●	●				
			220408-PHR	12.7	4.76	5.16	0.8		●	●	●				
			220412-PHR	12.7	4.76	5.16	1.2		●	●	●				
			220416-PHR	12.7	4.76	5.16	1.6		●	●	●				
		WNMG	060408-PHR	9.525	4.76	3.81	0.8		●	●	●				
			060412-PHR	9.525	4.76	3.81	1.2		●	●	●				
			080408-PHR	12.7	4.76	5.16	0.8		●	●	●				
			080412-PHR	12.7	4.76	5.16	1.2		●	●	●				
			080416-PHR	12.7	4.76	5.16	1.6		●	●	●				

Inserts for processing steel

Semi finishing

The basic shape of blade	Type	Dimension mm				Grade recommended							
		ΦLC	S	Φd	R	CVD coating grade				PVD coating grade		CBN	
						VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
	CNMM	120408-PHR	12.7	4.76	5.16	0.8			●	●			
		120412-PHR	12.7	4.76	5.16	1.2			●	●			
		120416-PHR	12.7	4.76	5.16	1.6			●	●			
		160608-PHR	15.875	6.35	6.35	0.8			●	●			
		160612-PHR	15.875	6.35	6.35	1.2			●	●			
		160616-PHR	15.875	6.35	6.35	1.6			●	●			
		190612-PHR	19.05	6.35	7.93	1.2			●	●			
		190616-PHR	19.05	6.35	7.93	1.6			●	●			
		190624-PHR	19.05	6.35	7.93	2.4			●	●			
		250724-PHR	25.4	7.94	9.12	2.4			●	●			
		250924-PHR	25.4	9.52	9.12	2.4			●	●			
	SNMM	120408-PHR	12.7	4.76	5.16	0.8			●	●			
		120412-PHR	12.7	4.76	5.16	1.2			●	●			
		120416-PHR	12.7	4.76	5.16	1.6			●	●			
		150608-PHR	15.875	6.35	6.35	0.8			●	●			
		150612-PHR	15.875	6.35	6.35	1.2			●	●			
		150616-PHR	15.875	6.35	6.35	1.6			●	●			
		190608-PHR	19.05	6.35	7.93	0.8			●	●			
		190612-PHR	19.05	6.35	7.93	1.2			●	●			
		190616-PHR	19.05	6.35	7.93	1.6			●	●			
		190624-PHR	19.05	6.35	7.93	2.4			●	●			
		250724-PHR	25.4	7.94	9.12	2.4			●	●			
		250924-PHR	25.4	9.52	9.12	2.4			●	●			
		250932-PHR	25.4	9.52	9.12	3.2			●	●			
	TNMM	160408-PHR	9.525	4.76	3.81	0.8			●	●			
		160412-PHR	9.525	4.76	3.81	1.2			●	●			
		220408-PHR	12.7	4.76	5.16	0.8			●	●			
		220412-PHR	12.7	4.76	5.16	1.2			●	●			
		220416-PHR	12.7	4.76	5.16	1.6			●	●			



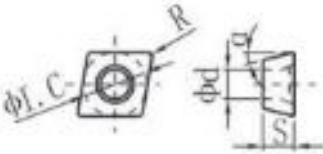
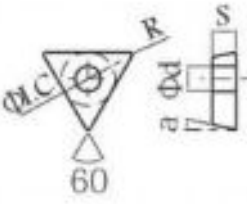
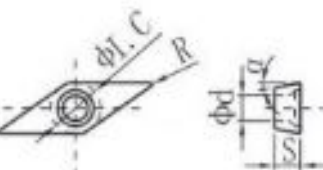
Inserts for processing steel									Rough machining							
The basic shape of blade		Type		Dimension mm					Grade recommended							
									CVD coating grade				PVD coating grade		CBN	
				ΦL/C	S	Φd	R	α	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
		CCMT	09T308-PHR	9.525	3.97	4.4	0.8	7		●	●	●				
			120408-PHR	12.7	4.76	5.5	0.8	7		●	●	●				
			120412-PHR	12.7	4.76	5.5	1.2	7		●	●	●				
		DCMT	11T308-PHR	9.525	3.97	4.4	0.8	7		●	●	●				
		SCMT	120412-PHR	12.7	4.76	5.5	1.2	7		●	●	●				
		TCMT	16T308-PHR	9.525	3.97	4.4	0.8	7		●	●	●				

Inserts for processing stainless steel

Finishing

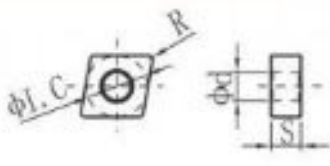
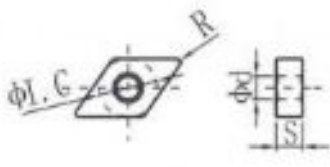
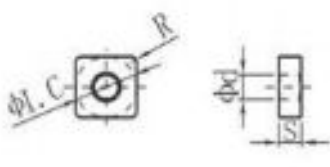
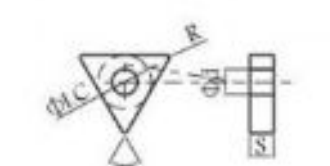
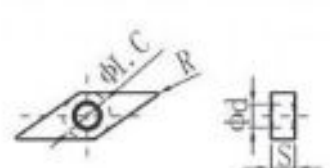
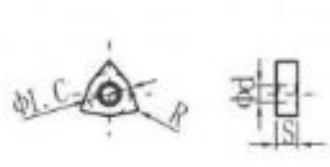
The basic shape of blade	Type	Dimension mm					Grade recommended									
		ΦI.C	S	Φd	R	α	CVD coating grade				PVD coating grade				Cermec	
							VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCTM30	VCTM40	VCTHIP	VCTP15
	CCMT	060202-MHF	6.35	2.38	2.8	0.2	7					●	●	●		
		060204-MHF	6.35	2.38	2.8	0.4	7					●	●	●		
		09T302-MHF	9.525	3.97	4.4	0.2	7					●	●	●		
		09T304-MHF	9.525	3.97	4.4	0.4	7					●	●	●		
		09T308-MHF	9.525	3.97	4.4	0.8	7					●	●	●		
		120404-MHF	12.7	4.76	5.5	0.4	7					●	●	●		
	DCMT	070202-MHF	6.35	2.38	2.8	0.2	7					●	●	●		
		070204-MHF	6.35	2.38	2.8	0.4	7					●	●	●		
		11T302-MHF	9.525	3.97	4.4	0.2	7					●	●	●		
		11T304-MHF	9.525	3.97	4.4	0.4	7					●	●	●		
		11T308-MHF	9.525	3.97	4.4	0.8	7					●	●	●		
	SCMT	09T304-MHF	9.525	3.18	4.4	0.4	7					●	●	●		
		09T308-MHF	9.525	3.18	4.4	0.8	7					●	●	●		
		120404-MHF	12.7	4.76	5.5	0.4	7					●	●	●		
		120408-MHF	12.7	4.76	5.5	0.8	7					●	●	●		
		120412-MHF	12.7	4.76	5.5	1.2	7					●	●	●		
	TCMT	090202-MHF	5.56	2.38	2.5	0.2	7					●	●	●		
		090204-MHF	5.56	2.38	2.5	0.4	7					●	●	●		
		110302-MHF	6.35	3.18	2.8	0.2	7					●	●	●		
		110304-MHF	6.35	3.18	2.8	0.4	7					●	●	●		
		110308-MHF	6.35	3.18	2.8	0.8	7					●	●	●		
		16T304-MHF	9.525	3.97	4.4	0.4	7					●	●	●		
	VBMT	110302-MHF	6.35	3.18	2.8	0.2	5					●	●	●		
		110304-MHF	6.35	3.18	2.8	0.4	5					●	●	●		
		110308-MHF	6.35	3.18	2.8	0.8	5					●	●	●		
		160402-MHF	9.525	4.76	4.4	0.2	5					●	●	●		
		160404-MHF	9.525	4.76	4.4	0.4	5					●	●	●		
		160408-MHF	9.525	4.76	4.4	0.8	5					●	●	●		
	VCMT	110302-MHF	6.35	3.18	2.8	0.2	7					●	●	●		
		110304-MHF	6.35	3.18	2.8	0.4	7					●	●	●		
		110308-MHF	6.35	3.18	2.8	0.8	7					●	●	●		
		160402-MHF	9.525	4.76	4.4	0.2	7					●	●	●		
		160404-MHF	9.525	4.76	4.4	0.4	7					●	●	●		
		160408-MHF	9.525	4.76	4.4	0.8	7					●	●	●		



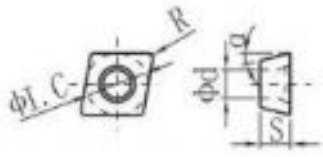
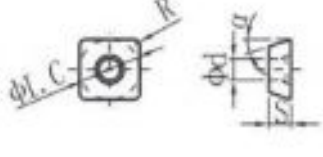
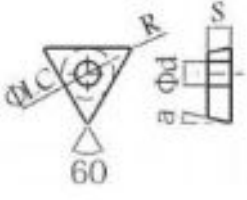
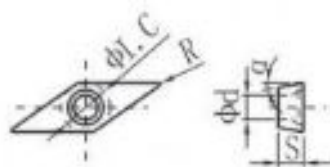
Inserts for processing stainless steel							Finishing											
The basic shape of blade	Type	Dimension mm					Grade recommended											
							CVD coating grade				PVD coating grade				Cermet			
		ΦI.C	S	Φd	R	α	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCTM30	VCTM40	VCTHP	VCTP15		
	CCMT	060202-MHM	6.35	2.38	2.8	0.2	7						●	●	●			
		060204-MHM	6.35	2.38	2.8	0.4	7						●	●	●			
		060208-MHM	6.35	2.38	2.8	0.8	7						●	●	●			
		09T302-MHM	9.525	3.97	4.4	0.2	7						●	●	●			
		09T304-MHM	9.525	3.97	4.4	0.4	7						●	●	●			
		09T308-MHM	9.525	3.97	4.4	0.8	7						●	●	●			
		120404-MHM	12.7	4.76	5.5	0.4	7						●	●	●			
	DCMT	070202-MHM	6.35	2.38	2.8	0.2	7						●	●	●			
		070204-MHM	6.35	2.38	2.8	0.4	7						●	●	●			
		11T302-MHM	9.525	3.97	4.4	0.2	7						●	●	●			
		11T304-MHM	9.525	3.97	4.4	0.4	7						●	●	●			
		11T308-MHM	9.525	3.97	4.4	0.8	7						●	●	●			
	TCMT	090202-MHM	5.56	2.38	2.5	0.2	7						●	●	●			
		090204-MHM	5.56	2.38	2.5	0.4	7						●	●	●			
		110302-MHM	6.35	3.18	2.8	0.2	7						●	●	●			
		110304-MHM	6.35	3.18	2.8	0.4	7						●	●	●			
		110308-MHM	6.35	3.18	2.8	0.8	7						●	●	●			
		16T304-MHM	9.525	3.97	4.4	0.4	7						●	●	●			
		16T308-MHM	9.525	3.97	4.4	0.8	7						●	●	●			
	VBMT	110302-MHM	6.35	3.18	2.8	0.2	5						●	●	●			
		110304-MHM	6.35	3.18	2.8	0.4	5						●	●	●			
		110308-MHM	6.35	3.18	2.8	0.8	5						●	●	●			
		160402-MHM	9.525	4.76	4.4	0.2	5						●	●	●			
		160404-MHM	9.525	4.76	4.4	0.4	5						●	●	●			
		160408-MHM	9.525	4.76	4.4	0.8	5						●	●	●			

Inserts for processing stainless steel

Finishing

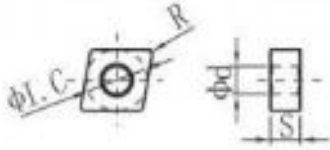
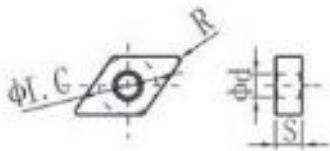
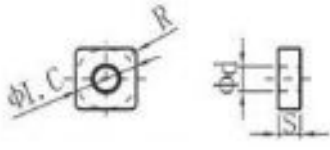
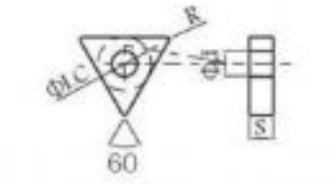
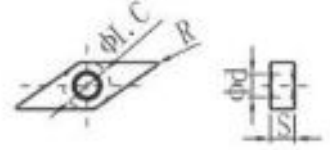
The basic shape of blade	Type	Dimension mm						Grade recommended									
		Φl.C	S	Φd	R			CVD coating grade				PVD coating grade				Uncoated grade	
								VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCTM30	VCTM40	VCTHIP	VCTP15
		CNMG	120402E-QHM	12.7	4.76	5.16	0.2					●	●	●			
			120404E-QHM	12.7	4.76	5.16	0.4					●	●	●			
			120408E-QHM	12.7	4.76	5.16	0.8					●	●	●			
		DNMG	150404E-QHM	12.7	4.76	5.16	0.4					●	●	●			
			150408E-QHM	12.7	4.76	5.16	0.8					●	●	●			
			150604E-QHM	12.7	6.35	5.16	0.4					●	●	●			
			150608E-QHM	12.7	6.35	5.16	0.8					●	●	●			
		SNMG	120404E-QHM	12.7	4.76	5.16	0.4					●	●	●			
			120408E-QHM	12.7	4.76	5.16	0.8					●	●	●			
			120412E-QHM	12.7	4.76	5.16	1.2					●	●	●			
		TNMG	160404E-QHM	9.525	4.76	3.81	0.4					●	●	●			
			160408E-QHM	9.525	4.76	3.81	0.8					●	●	●			
			160412E-QHM	9.525	4.76	3.81	1.2					●	●	●			
			220408E-QHM	12.7	4.76	5.16	0.8					●	●	●			
		VNMG	160402E-QHM	9.525	4.76	3.81	0.2					●	●	●			
			160404E-QHM	9.525	4.76	3.81	0.4					●	●	●			
			160408E-QHM	9.525	4.76	3.81	0.8					●	●	●			
		WNMG	060404E-QHM	9.525	4.76	3.81	0.4					●	●	●			
			060408E-QHM	9.525	4.76	3.81	0.8					●	●	●			
			080404E-QHM	12.7	4.76	5.16	0.4					●	●	●			
			080408E-QHM	12.7	4.76	5.16	0.8					●	●	●			
			080412E-QHM	12.7	4.76	5.16	1.2					●	●	●			



Inserts for processing stainless steel								Semi finishing											
The basic shape of blade		Type	Dimension mm					Grade recommended											
								CVD coating grade				PVD coating grade				Cermet			
			Φl.C	S	Φd	R	α	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCTM30	VCTM40	VCTHP	VCTP15		
		CCMT	060204-MHM	6.35	2.38	2.8	0.4	7						●	●	●	●		
			060208-MHM	6.35	2.38	2.8	0.8	7						●	●	●	●		
			09T302-MHM	9.525	3.97	4.4	0.2	7						●	●	●	●		
			09T304-MHM	9.525	3.97	4.4	0.4	7						●	●	●	●		
			09T308-MHM	9.525	3.97	4.4	0.8	7						●	●	●	●		
			120404-MHM	12.7	4.76	5.5	0.4	7						●	●	●	●		
			120408-MHM	12.7	4.76	5.5	0.8	7						●	●	●	●		
			120412-MHM	12.7	4.76	5.5	1.2	7						●	●	●	●		
		DCMT	070204-MHM	6.35	2.38	2.8	0.4	7						●	●	●	●		
			070208-MHM	6.35	2.38	2.8	0.8	7						●	●	●	●		
			11T302-MHM	9.525	3.97	4.4	0.2	7						●	●	●	●		
			11T304-MHM	9.525	3.97	4.4	0.4	7						●	●	●	●		
			11T308-MHM	9.525	3.97	4.4	0.8	7						●	●	●	●		
			11T312-MHM	9.525	3.97	4.4	1.2	7						●	●	●	●		
		SCMT	09T302-MHM	9.525	3.97	4.4	0.2	7						●	●	●	●		
			09T304-MHM	9.525	3.97	4.4	0.4	7						●	●	●	●		
			09T308-MHM	9.525	3.97	4.4	0.8	7						●	●	●	●		
			09T312-MHM	9.525	3.97	4.4	1.2	7						●	●	●	●		
			120404-MHM	12.7	4.76	5.5	0.4	7						●	●	●	●		
			120408-MHM	12.7	4.76	5.5	0.8	7						●	●	●	●		
			120412-MHM	12.7	4.76	5.5	1.2	7						●	●	●	●		
		TCMT	090204-MHM	5.56	2.38	2.5	0.4	7						●	●	●	●		
			090208-MHM	5.56	2.38	2.5	0.8	7						●	●	●	●		
			110304-MHM	6.35	3.18	2.8	0.4	7						●	●	●	●		
			110308-MHM	6.35	3.18	2.8	0.8	7						●	●	●	●		
			110312-MHM	6.35	3.18	2.8	1.2	7						●	●	●	●		
			16T304-MHM	9.525	3.97	4.4	0.4	7						●	●	●	●		
			16T308-MHM	9.525	3.97	4.4	0.8	7						●	●	●	●		
			16T312-MHM	9.525	3.97	4.4	1.2	7						●	●	●	●		
		VCMT	110304-MHM	6.35	3.18	2.8	0.4	7						●	●	●	●		
			110308-MHM	6.35	3.18	2.8	0.8	7						●	●	●	●		
			160404-MHM	9.525	4.76	4.4	0.4	7						●	●	●	●		
			160408-MHM	9.525	4.76	4.4	0.8	7						●	●	●	●		
		VBMT	110304-MHM	6.35	3.18	2.8	0.4	5						●	●	●	●		
			110308-MHM	6.35	3.18	2.8	0.8	5						●	●	●	●		
			160404-MHM	9.525	4.76	4.4	0.4	5						●	●	●	●		
			160408-MHM	9.525	4.76	4.4	0.8	5						●	●	●	●		

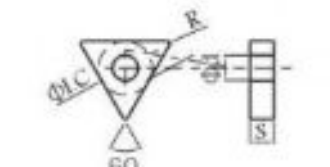
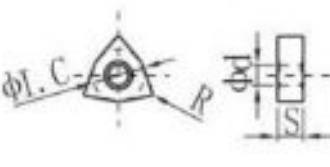
Inserts for processing stainless steel

Semi finishing

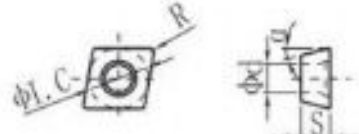
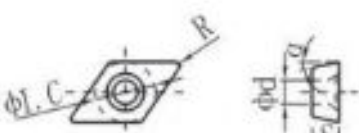
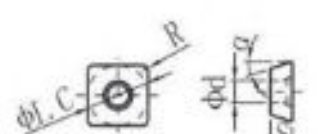
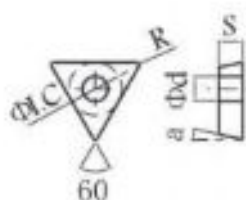
The basic shape of blade	Type	Dimension mm					Grade recommended									
		ΦI.C	S	Φd	R		CVD coating grade				PVD coating grade				Uncoated grade	
							VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCTM30	VCTM40	VCTHIP	VCTP15
		CNMG	120404-MHM	12.7	4.76	5.16	0.4					●	●	●	●	
			120408-MHM	12.7	4.76	5.16	0.8					●	●	●	●	
			120412-MHM	12.7	4.76	5.16	1.2					●	●	●	●	
			160604-MHM	15.875	6.35	6.35	0.4					●	●	●	●	
			160608-MHM	15.875	6.35	6.35	0.8					●	●	●	●	
		DNMG	150404-MHM	12.7	4.76	5.16	0.4					●	●	●	●	
			150408-MHM	12.7	4.76	5.16	0.8					●	●	●	●	
			150604-MHM	12.7	6.35	5.16	0.4					●	●	●	●	
			150608-MHM	12.7	6.35	5.16	0.8					●	●	●	●	
		SNMG	120404-MHM	12.7	4.76	5.16	0.4					●	●	●	●	
			120408-MHM	12.7	4.76	5.16	0.8					●	●	●	●	
		TNMG	160404-MHM	9.525	4.76	5.16	0.4					●	●	●	●	
			160408-MHM	9.525	4.76	5.16	0.8					●	●	●	●	
			160412-MHM	9.525	4.76	5.16	1.2					●	●	●	●	
		VNMG	160404-MHM	9.525	4.76	5.16	0.4					●	●	●	●	
			160408-MHM	9.525	4.76	5.16	0.8					●	●	●	●	
		WNMG	080404-MHM	12.7	4.76	5.16	0.4					●	●	●	●	
			080408-MHM	12.7	4.76	5.16	0.8					●	●	●	●	
			080412-MHM	12.7	4.76	5.16	1.2					●	●	●	●	

General Turning



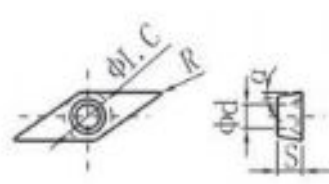
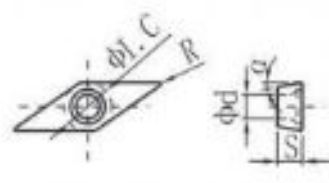
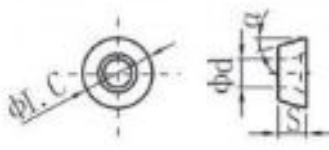
Inserts for processing stainless steel				Finishing													
The basic shape of blade	Type	Dimension mm						Grade recommended									
		ΦI.C	S	Φd	R			CVD coating grade				PVD coating grade				Uncoated grade	
								VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCTM30	VCTM40	VCTH1P	VCTP15
		CNMG	120404-XHM	12.7	4.76	5.16	0.4					●	●	●			
			120408-XHM	12.7	4.76	5.16	0.8					●	●	●			
			120412-XHM	12.7	4.76	5.16	1.2					●	●	●			
		TNMG	160404-XHM	12.7	4.76	5.16	0.4					●	●	●			
			160408-XHM	12.7	4.76	5.16	0.8					●	●	●			
		WNMG	080404-XHM	12.7	4.76	5.16	0.4					●	●	●			
			080408-XHM	12.7	4.76	5.16	0.8					●	●	●			

Aluminum processing

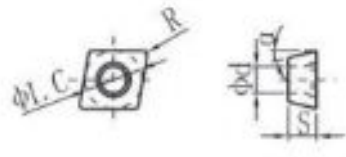
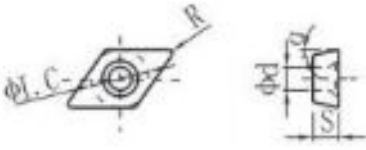
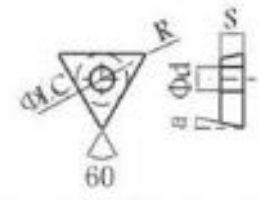
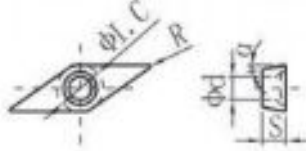
The basic shape of blade		Type	Dimension mm					Grade recommended					
			Φ I.C	S	Φ d	R	α	CVD coating grade			Uncoated grade		
								VCTM10	VCTM20	VCTM30	VCTH10	VCTH20	VCTK10
 		CCGT	060202-LHC	6.35	2.38	2.8	0.2	7			●	●	●
			060204-LHC	6.35	2.38	2.8	0.4	7			●	●	●
			060208-LHC	6.35	2.38	2.8	0.8	7			●	●	●
			09T302-LHC	9.525	3.97	4.4	0.2	7			●	●	●
			09T304-LHC	9.525	3.97	4.4	0.4	7			●	●	●
			09T308-LHC	9.525	3.97	4.4	0.8	7			●	●	●
			120402-LHC	12.7	4.76	5.5	0.2	7			●	●	●
			120404-LHC	12.7	4.76	5.5	0.4	7			●	●	●
			120408-LHC	12.7	4.76	5.5	0.8	7			●	●	●
 		DCGT	070202-LHC	6.35	2.38	2.8	0.2	7			●	●	●
			070204-LHC	6.35	2.38	2.8	0.4	7			●	●	●
			070208-LHC	6.35	2.38	2.8	0.8	7			●	●	●
			11T302-LHC	9.525	3.97	4.4	0.2	7			●	●	●
			11T304-LHC	9.525	3.97	4.4	0.4	7			●	●	●
			11T308-LHC	9.525	3.97	4.4	0.8	7			●	●	●
			11T312-LHC	9.525	3.97	4.4	1.2	7			●	●	●
 		SCGT	09T302-LHC	9.525	3.97	4.4	0.2	7			●	●	●
			09T304-LHC	9.525	3.97	4.4	0.4	7			●	●	●
			09T308-LHC	9.525	3.97	4.4	0.8	7			●	●	●
			120402-LHC	12.7	4.76	5.5	0.2	7			●	●	●
			120404-LHC	12.7	4.76	5.5	0.4	7			●	●	●
			120408-LHC	12.7	4.76	5.5	0.8	7			●	●	●
			120412-LHC	12.7	4.76	5.5	1.2	7			●	●	●
			120416-LHC	12.7	4.76	5.5	1.6	7			●	●	●
 		TCGT	090202-LHC	5.56	2.38	2.5	0.2	7			●	●	●
			090204-LHC	5.56	2.38	2.5	0.4	7			●	●	●
			090208-LHC	5.56	2.38	2.5	0.8	7			●	●	●
			110202-LHC	6.35	2.38	2.8	0.2	7			●	●	●
			110204-LHC	6.35	2.38	2.8	0.4	7			●	●	●
			110208-LHC	6.35	2.38	2.8	0.8	7			●	●	●
			16T302-LHC	9.525	3.97	4.4	0.2	7			●	●	●
			16T304-LHC	9.525	3.97	4.4	0.4	7			●	●	●
			16T308-LHC	9.525	3.97	4.4	0.8	7			●	●	●
			16T312-LHC	9.525	3.97	4.4	1.2	7			●	●	●

General Turning



Aluminum processing													
The basic shape of blade		Type	Dimension mm					Grade recommended					
								CVD coating grade			Uncoated grade		
			Φ I.C	S	Φ d	R	α	VCTM10	VCTM20	VCTM30	VCTH10	VCTH20	VCTK10
 	VBGT	110302-LHC	6.35	3.18	2.8	0.2	5			●	●	●	
		110304-LHC	6.35	3.18	2.8	0.4	5			●	●	●	
		110308-LHC	6.35	3.18	2.8	0.8	5			●	●	●	
		160402-LHC	9.525	4.76	4.4	0.2	5			●	●	●	
		160404-LHC	9.525	4.76	4.4	0.4	5			●	●	●	
		160408-LHC	9.525	4.76	4.4	0.8	5			●	●	●	
		160412-LHC	9.525	4.76	4.4	1.2	5			●	●	●	
		220516-LHC	12.7	5.96	5.5	1.6	5			●	●	●	
		220525-LHC	12.7	5.96	5.5	2.5	5			●	●	●	
		220530-LHC	12.7	5.96	5.5	3	5			●	●	●	
 	VCGT	110302-LHC	6.35	3.18	2.8	0.2	7			●	●	●	
		110304-LHC	6.35	3.18	2.8	0.4	7			●	●	●	
		110308-LHC	6.35	3.18	2.8	0.8	7			●	●	●	
		130302-LHC	7.86	3.18	3.4	0.2	7			●	●	●	
		130304-LHC	7.86	3.18	3.4	0.4	7			●	●	●	
		160402-LHC	9.525	4.76	4.4	0.2	7			●	●	●	
		160404-LHC	9.525	4.76	4.4	0.4	7			●	●	●	
		160408-LHC	9.525	4.76	4.4	0.8	7			●	●	●	
		160412-LHC	9.525	4.76	4.4	1.2	7			●	●	●	
		220520-LHC	12.7	5.96	5.5	2	7			●	●	●	
		220530-LHC	12.7	5.96	5.5	3	7			●	●	●	
 	RCGT	0602MO-LHC	6	2.38	2.5	-	7			●	●	●	
		0803MO-LHC	8	3.18	3.4	-	7			●	●	●	
		1003MO-LHC	10	3.18	4.4	-	7			●	●	●	
		10T3MO-LHC	10	3.97	4.4	-	7			●	●	●	
		1204MO-LHC	12	4.76	5.5	-	7			●	●	●	

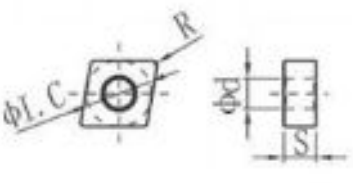
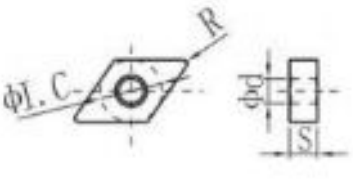
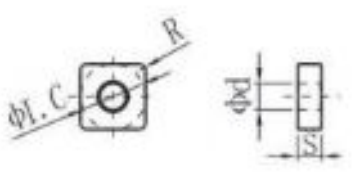
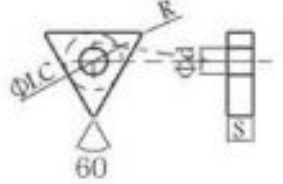
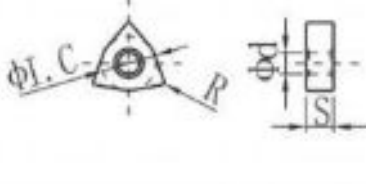
Aluminum processing

The basic shape of blade		Type	Dimension mm					Grade recommended					
			ΦLC	S	Φd	R	α	CVD coating grade			Uncoated grade		
								VCTM10	VCTM20	VCTM30	VCTH10	VCTH20	VCTK10
			060202-AL	6.35	2.38	2.8	0.2	7			●	●	●
			060204-AL	6.35	2.38	2.8	0.4	7			●	●	●
		CCGT	09T302-AL	9.53	3.97	4.4	0.2	7			●	●	●
			09T304-AL	9.53	3.97	4.4	0.4	7			●	●	●
			09T308-AL	9.53	3.97	4.4	0.8	7			●	●	●
			120404-AL	12.7	4.76	5.5	0.4	7			●	●	●
			120408-AL	12.7	4.76	5.5	0.8	7			●	●	●
			070202-AL	6.35	2.38	2.8	0.2	7			●	●	●
			070204-AL	6.35	2.38	2.8	0.4	7			●	●	●
		DCGT	11T302-AL	9.53	3.97	4.4	0.2	7			●	●	●
			11T304-AL	9.53	3.97	4.4	0.4	7			●	●	●
			11T308-AL	9.53	3.97	4.4	0.8	7			●	●	●
		TCGT	110204-AL	6.35	2.38	2.8	0.4	7			●	●	●
			16T304-AL	9.53	3.97	4.4	0.4	7			●	●	●
			16T308-AL	9.53	3.97	4.4	0.8	8			●	●	●
		VCGT	110302-AL	6.35	3.18	2.8	0.2	7			●	●	●
			110304-AL	6.35	3.18	2.8	0.4	7			●	●	●
			160402-AL	9.53	4.76	4.4	0.2	7			●	●	●
			160404-AL	9.53	4.76	4.4	0.4	7			●	●	●
			160408-AL	9.53	4.76	4.4	0.8	7			●	●	●

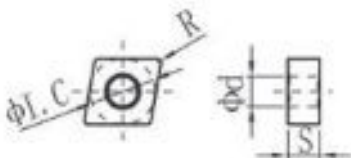
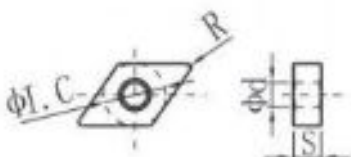
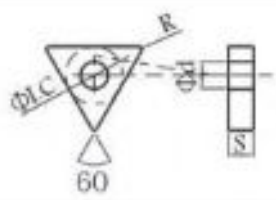
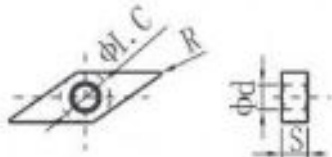
General Turning



Aluminum processing													
The basic shape of blade		Type		Dimension mm				Grade recommended					
				Φ LC	S	Φ d	R	CVD coating grade			Uncoated grade		
								VCTM10	VCTM20	VCTM30	VCTH10	VCTH20	VCTK10
		CNGG	120402-AL	12.7	4.76	5.16	0.2			●	●	●	
			120404-AL	12.7	4.76	5.16	0.4			●	●	●	
			120408-AL	12.7	4.76	5.16	0.8			●	●	●	
			120412-AL	12.7	4.76	5.16	1.2			●	●	●	
		DNNG	150404-AL	12.7	4.76	5.16	0.4			●	●	●	
			150408-AL	12.7	4.76	5.16	0.8			●	●	●	
			150604-AL	12.7	6.35	5.16	0.4			●	●	●	
			150608-AL	12.7	6.35	5.16	0.8			●	●	●	
		SNGG	120404-AL	12.7	4.76	5.16	0.4			●	●	●	
			120408-AL	12.7	4.76	5.16	0.8			●	●	●	
			120412-AL	12.7	4.76	5.16	1.2			●	●	●	
		TNGG	160404-AL	9.525	4.76	3.81	0.4			●	●	●	
			160408-AL	9.525	4.76	3.81	0.8			●	●	●	
			160412-AL	9.525	4.76	3.81	1.2			●	●	●	
			220408-AL	12.7	4.76	5.16	0.8			●	●	●	
			220412-AL	12.7	4.76	5.16	1.2			●	●	●	
		VNGG	160401-AL	9.525	4.76	3.81	0.1			●	●	●	
			160402-AL	9.525	4.76	3.81	0.2			●	●	●	
			160404-AL	9.525	4.76	3.81	0.4			●	●	●	
			160408-AL	9.525	4.76	3.81	0.8			●	●	●	
		WNGG	060404-AL	9.525	4.76	3.81	0.4			●	●	●	
			060408-AL	9.525	4.76	3.81	0.8			●	●	●	
			080404-AL	12.7	4.76	5.16	0.4			●	●	●	
			080408-AL	12.7	4.76	5.16	0.8			●	●	●	
			080412-AL	12.7	4.76	5.16	1.2			●	●	●	

Inserts for processing cast iron								Finishing						
The basic shape of inserts		Type		Dimension mm				Grade recommended						
								CVD coating grade				Uncoated grade		
				ΦL.C	S	Φd	R	VCTK15	VCTK05	VCTK10	VCTK10	VCTP10	VCTP15	VCTK15
		CNMG	120404-KHR	12.7	4.76	5.16	0.4							
			120408-KHR	12.7	4.76	5.16	0.8							
			120412-KHR	12.7	4.76	5.16	1.2							
			160604-KHR	15.875	6.35	6.35	0.4							
			160608-KHR	15.875	6.35	6.35	0.8							
			160612-KHR	15.875	6.35	6.35	1.2							
		DNMG	110404-KHR	9.525	4.76	3.81	0.4							
			110408-KHR	9.525	4.76	3.81	0.8							
			150404-KHR	12.7	4.76	5.16	0.4							
			150408-KHR	12.7	4.76	5.16	0.8							
			150412-KHR	12.7	4.76	5.16	1.2							
			150604-KHR	12.7	6.35	5.16	0.4							
			150608-KHR	12.7	6.35	5.16	0.8							
			150612-KHR	12.7	6.35	5.16	1.2							
		SNMG	090304-KHR	9.525	3.18	3.81	0.4							
			090308-KHR	9.525	3.18	3.81	0.8							
			120404-KHR	12.7	4.76	5.16	0.4							
			120408-KHR	12.7	4.76	5.16	0.8							
			120412-KHR	12.7	4.76	5.16	1.2							
			150608-KHR	15.875	6.35	6.35	0.8							
			150612-KHR	15.875	6.35	6.35	1.2							
		TNMG	160404-KHR	9.525	4.76	3.81	0.4							
			160408-KHR	9.525	4.76	3.81	0.8							
			160412-KHR	9.525	4.76	3.81	1.2							
		WNMG	060404-KHR	9.525	4.76	5.16	0.4							
			060408-KHR	9.525	4.76	5.16	0.8							
			080404-KHR	12.7	4.76	5.16	0.4							
			080408-KHR	12.7	4.76	5.16	0.8							
			080412-KHR	12.7	4.76	5.16	1.2							



Inserts for processing cast iron								Semi finishing						
The basic shape of inserts		Type		Dimension mm				Grade recommended						
								CVD coating grade				Uncoated grade		
				ΦL.C	S	Φd	R	VCTK15	VCTK05	VCTK10	VCTK10	VCTP10	VCTP15	VCTK15
		CNMG	120404-KHR	12.7	4.76	5.16	0.4		●	●				●
			120408-KHR	12.7	4.76	5.16	0.8		●	●				●
			120412-KHR	12.7	4.76	5.16	1.2		●	●				●
			120416-KHR	12.7	4.76	5.16	1.6		●	●				●
			160608-KHR	15.875	6.35	6.35	0.8		●	●				●
			160612-KHR	15.875	6.35	6.35	1.2		●	●				●
			160616-KHR	15.875	6.35	6.35	1.6		●	●				●
		DNMG	110408-KHR	9.525	4.76	3.81	0.8		●	●				●
			110412-KHR	9.525	4.76	3.81	1.2		●	●				●
			150404-KHR	12.7	4.76	5.16	0.4		●	●				●
			150408-KHR	12.7	4.76	5.16	0.8		●	●				●
			150412-KHR	12.7	4.76	5.16	1.2		●	●				●
			150604-KHR	12.7	6.35	5.16	0.4		●	●				●
			150608-KHR	12.7	6.35	5.16	0.8		●	●				●
			150612-KHR	12.7	6.35	5.16	1.2		●	●				●
		SNMG	120408-KHR	12.7	4.76	5.16	0.8		●	●				●
			120412-KHR	12.7	4.76	5.16	1.2		●	●				●
			120416-KHR	12.7	4.76	5.16	1.6		●	●				●
			150612-KHR	15.875	6.35	6.35	1.2		●	●				●
			150616-KHR	15.875	6.35	6.35	1.6		●	●				●
		TNMG	160408-KHR	9.525	4.76	3.81	0.8		●	●				●
			160412-KHR	9.525	4.76	3.81	1.2		●	●				●
			220408-KHR	12.7	4.76	5.16	0.8		●	●				●
			220412-KHR	12.7	4.76	5.16	1.2		●	●				●
		VNMG	060404-KHR	9.525	4.76	3.81	0.4		●	●				●
			060408-KHR	9.525	4.76	3.81	0.8		●	●				●
			060412-KHR	9.525	4.76	3.81	1.2		●	●				●
			080404-KHR	12.7	4.76	5.16	0.4		●	●				●
			080408-KHR	12.7	4.76	5.16	0.8		●	●				●
			080412-KHR	12.7	4.76	5.16	1.2		●	●				●
			080416-KHR	12.7	4.76	5.16	1.6		●	●				●
		VNMG	160404-KHR	9.525	4.76	3.81	0.4		●	●				●
			160408-KHR	9.525	4.76	3.81	0.8		●	●				●
			160412-KHR	9.525	4.76	3.81	1.2		●	●				●

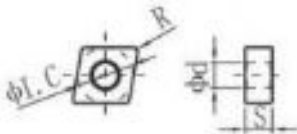
Inserts for processing cast iron

Semi finishing

The basic shape of inserts		Type	Dimension mm				Grade recommended					
			ΦL.C	S	Φd	R	CVD coating grade				Uncoated grade	
							VCTK15	VCTK05	VCTK10	VCTK10	VCTK20	VCTP10
		CNMG	120404-K3	12.7	4.76	5.16	0.4			●	●	●
			120408-K3	12.7	4.76	5.16	0.8			●	●	●
			120412-K3	12.7	4.76	5.16	1.2			●	●	●
			160604-K3	15.875	6.35	6.35	0.4			●	●	●
			160608-K3	15.875	6.35	6.35	0.8			●	●	●
			160612-K3	15.875	6.35	6.35	1.2			●	●	●
		DNMG	150404-K3	12.7	4.76	5.16	0.4			●	●	●
			150408-K3	12.7	4.76	5.16	0.8			●	●	●
			150604-K3	12.7	6.35	5.16	0.4			●	●	●
			150608-K3	12.7	6.35	5.16	0.8			●	●	●
		SNMG	120404-K3	12.7	4.76	5.16	0.4			●	●	●
			120408-K3	12.7	4.76	5.16	0.8			●	●	●
			150608-K3	15.875	6.35	5.16	0.8			●	●	●
			150612-K3	15.875	6.35	5.16	1.2			●	●	●
		TNMG	160404-K3	9.525	4.76	5.16	0.4			●	●	●
			160408-K3	9.525	4.76	5.16	0.8			●	●	●
			160412-K3	9.525	4.76	5.16	1.2			●	●	●
		VNMG	160404-K3	9.525	4.76	5.16	0.4			●	●	●
			160408-K3	9.525	4.76	5.16	0.8			●	●	●
			160412-K3	9.525	4.76	5.16	1.2			●	●	●
		WNMG	080404-K3	12.7	4.76	5.16	0.4			●	●	●
			080408-K3	12.7	4.76	5.16	0.8			●	●	●
			080412-K3	12.7	4.76	5.16	1.2			●	●	●

General Turning



Inserts for processing cast iron						Semi finishing							
The basic shape of inserts	Type	Dimension mm				Grade recommended							
						CVD coating grade				Uncoated grade			
		ΦL.C	S	Φd	R	VCTK15	VCTK05	VCTK10	VCTK10	VCTP10	VCTP15	VCTK15	
 	CNMA	120404	12.7	4.76	5.16	0.4		●	●				●
		120408	12.7	4.76	5.16	0.8		●	●				●
		120412	12.7	4.76	5.16	1.2		●	●				●
		120416	12.7	4.76	5.16	1.6		●	●				●
		160604	15.875	6.35	6.35	0.4		●	●				●
		160608	15.875	6.35	6.35	0.8		●	●				●
		160612	15.875	6.35	6.35	1.2		●	●				●
		160616	15.875	6.35	6.35	1.6		●	●				●
		190612	19.05	6.35	7.94	1.2		●	●				●
		190616	19.05	6.35	7.94	1.6		●	●				●
		190624	19.05	6.35	7.94	2.4		●	●				●
 	DNMA	110404	9.525	4.76	3.81	0.4		●	●				●
		110408	9.525	4.76	3.81	0.8		●	●				●
		110412	9.525	4.76	3.81	1.2		●	●				●
		150404	12.7	4.76	5.16	0.4		●	●				●
		150408	12.7	4.76	5.16	0.8		●	●				●
		150412	12.7	4.76	5.16	1.2		●	●				●
		150604	12.7	6.35	5.16	0.4		●	●				●
		150608	12.7	6.35	5.16	0.8		●	●				●
		150612	12.7	6.35	5.16	1.2		●	●				●
 	SNMA	090304	9.525	3.18	3.81	0.4		●	●				●
		090308	9.525	3.18	3.81	0.8		●	●				●
		120404	12.7	4.76	5.16	0.4		●	●				●
		120408	12.7	4.76	5.16	0.8		●	●				●
		120412	12.7	4.76	5.16	1.2		●	●				●
		120416	12.7	4.76	5.16	1.6		●	●				●
		150608	15.875	6.35	6.35	0.8		●	●				●
		150612	15.875	6.35	6.35	1.2		●	●				●
		150616	15.875	6.35	6.35	1.6		●	●				●
		190608	19.05	6.35	7.93	0.8		●	●				●
		190612	19.05	6.35	7.93	1.2		●	●				●
		190616	19.05	6.35	7.94	1.6		●	●				●
		190624	19.05	6.35	7.94	2.4		●	●				●
		250724	25.4	7.94	9.12	2.4		●	●				●
		250924	25.4	9.52	9.12	2.4		●	●				●

Inserts for processing cast iron

Semi finishing

The basic shape of inserts		Type	Dimension mm				Grade recommended							
							CVD coating grade				Uncoated grade			
			ΦL.C	S	Φd	R	VCTK15	VCTK05	VCTK10	VCTK10	VCTP10	VCTP15	VCTK15	
		TNMA	160404	9.525	4.76	3.81	0.4		●	●				●
			160408	9.525	4.76	3.81	0.8		●	●				●
			160412	9.525	4.76	3.81	1.2		●	●				●
			160416	9.525	4.76	3.81	1.6		●	●				●
			220404	12.7	4.76	5.16	0.4		●	●				●
			220408	12.7	4.76	5.16	0.8		●	●				●
			220412	12.7	4.76	5.16	1.2		●	●				●
			220416	12.7	4.76	5.16	1.6		●	●				●
			270616	15.875	6.35	6.35	1.6		●	●				●
		WNMA	060404	9.525	4.76	3.81	0.4		●	●				●
			060408	9.525	4.76	3.81	0.8		●	●				●
			060412	9.525	4.76	3.81	1.2		●	●				●
			080404	12.7	4.76	5.16	0.4		●	●				●
			080408	12.7	4.76	5.16	0.8		●	●				●
			080412	12.7	4.76	5.16	1.2		●	●				●
			080416	12.7	4.76	5.16	1.6		●	●				●

General Turning



Turning inserts for profile								Semi finishing								
The basic shape of inserts		Type		Dimension mm					Grade recommended							
									CVD coating grade				PVD coating grade		Uncoated grade	
				B	L	LW	S	R	VCTP01	VCTP10	VCTP20	VCTP30	VCTM10	VCTM20	VCB200	VCB300
		KNUX	160405L11	16	16.15	9.525	4.76	0.5	●	●	●					
			160410L11	16	16.15	9.525	4.76	1	●	●	●					
			160405R11	16	16.15	9.525	4.76	0.5	●	●	●					
			160410R11	16	16.15	9.525	4.76	1	●	●	●					
		KNUX	160405L11-1	16.15	9.525	3.38	4.76	0.5	●	●	●					
			160410L11-1	16.15	9.525	3.38	4.76	1	●	●	●					
			160405R11-1	16.15	9.525	3.38	4.76	0.5	●	●	●					
			160410R11-1	16.15	9.525	3.38	4.76	1	●	●	●					

General Turning



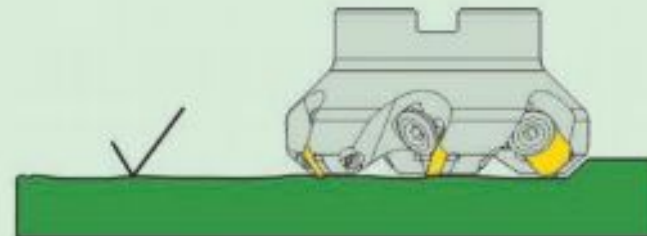
Trouble shooting carbide milling

Vibrations



- Improve the stability of cutter and workpiece.
- Change cutter positioning.
- Minimize tool overhang.
- Reduce the cutting speed.
- Increase the feed rate.
- Reduce the depth of cut.
- Select a different insert geometry, see page Insert geometry
- Use Steadyline antivibration bar

Poor surface finish



- Improve the stability of cutter and workpiece.
- Minimize tool overhang.
- Reduce the feed rate.
- Increase the cutting speed
- Use coolant.
- Use wiper inserts.
- Keep feed/rev value within wiper width
- Use Steadyline antivibration bar

Tool life problems

Rapid flank wear



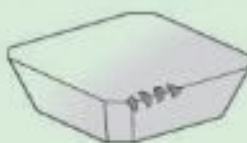
- Reduce the cutting speed.
- Increase the feed rate.
- Climb milling.

Rapid notch wear



- Reduce the cutting speed.
- Increase the feed rate.
- Increase the depth of cut.
- Climb milling.
- Change cutter positioning

Chipping



- Increase the cutting speed.
- reduce the feed rate.
- Conventional milling.
- Improve chip evacuation.
- Change cutter positioning.
- Minimize tool overhang.
- Improve stability.

Comb cracks



- Reduce the cutting speed.
- Reduce the feed rate.
- No coolant
- Change cutter positioning.

Built-up edge (BUE)



- Increase the cutting speed.
- Increase the feed rate
- No coolant.
- Climb milling.
- Change cutter positioning

Inserts for face milling

The basic shape of blade	Type	Dimension mm						Grade recommended									
		d	S	d1	r	bs		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTP30
	SNMX1205ANEN-FM	12.7	5.56	6	0.8	1.5							●	●	●		●
	SNMX1205ANEN-MM	12.7	5.56	6	0.8	1.5							●	●	●		●
	SNMX1205ANSN-HM	12.7	5.56	6	0.8	1.5							●	●	●		●
	SNMX1205 12-MM	12.7	5.56	6	1.2								●	●	●		●

The basic shape of blade	Type	Dimension mm						Grade recommended									
		d	S	d1				VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTP30
	HNGX0906ANSN-F	16.5	6.35	4.9									●	●	●		●
	HNGX0906ANSN-M	16.5	6.35	4.9									●	●	●		●
	HNGX0906ANSN-R	16.5	6.35	4.9									●	●	●		●



Inserts for face milling

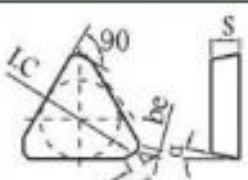
The basic shape of blade	Type	Dimension mm						Grade recommended									
		r	L	s				VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTP30
	XOHT1202R06-MM	6	10.8	2.38								●	●	●	●		●
	XOHT1603R08-MM	8	14.4	3.18								●	●	●	●		●
	XOHT20T3R10-MM	10	17.9	3.97								●	●	●	●		●
	XOHT12504R12.5-MM	12.5	22.3	4.76								●	●	●	●		●
	XOHT3006R15-MM	15	26.9	6.35								●	●	●	●		●
	XOHT3206R16-MM	16	28.6	6.35								●	●	●	●		●
	XOHT4007R20-MM	20	36.5	7.94								●	●	●	●		●
	XOHT5007R25-MM	25	44.6	7.94								●	●	●	●		●

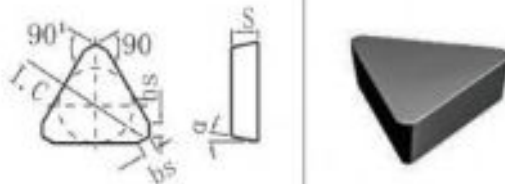
MILLING

The basic shape of blade	Type	Dimension mm						Grade recommended									
		r	L	s				VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTP30
	ROHT0824-EL	8	4	2.40								●	●	●	●		●
	ROHT1226-EL	10	5	2.60								●	●	●	●		●
	ROHT1230-EL	12	6	3.00								●	●	●	●		●
	ROHT1640-EL	16	8	4.00								●	●	●	●		●
	ROHT2050-EL	20	10	5.00								●	●	●	●		●
	ROHT2560-EL	25	12.5	6.00								●	●	●	●		●
	ROHT3070-EL	30	15	7.00								●	●	●	●		●
	ROHT3270-EL	32	16	7.00								●	●	●	●		●

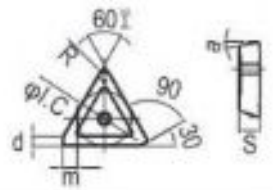
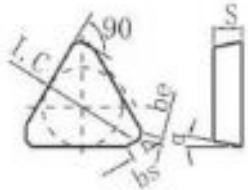
Inserts for face milling

Inserts for face milling																					
Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade				Uncoating grade						
		I.C	S	r	α			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	TPMR090204	5.56	2.38	0.4	11											●		●			
	TPMR110304	6.35	3.18	0.4	11											●		●			
	TPMR160304	9.525	3.18	0.4	11											●		●			
	TPMR160308	9.525	3.18	0.8	11											●		●			
	TPMR220404	12.7	4.76	0.4	11											●		●			
	TPMR220408	12.7	4.76	0.8	11											●		●			

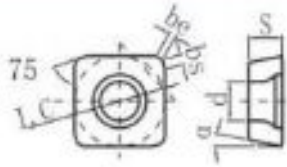
Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade					Uncoating grade					
		I.C	S	bs	be	α		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		TPKR1603PDR	9.525	3.18	1.2	0.7	11						●	●		●		●			
		TPKR2204PDR	12.7	4.76	1.4	0.7	11							●	●		●		●		

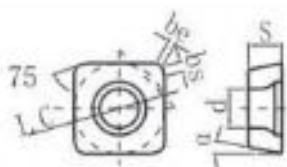
Inserts shape	Type	Dimension mm						Material recommended														
								CVD coating grade			PVD coating grade					Uncoating grade						
		I.C	S	bs	α			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20	
	TPKN1603PPR/L	9.525	3.18	1.2	11								●	●		●		●				
	TPAN1603PDR/L	9.525	3.18	1.3	11								●	●		●		●				
	TPCN1603PDR/L	9.525	3.18	1.3	11								●	●		●		●				
	TPKN1603PDR/L	9.525	3.18	1.2	11								●	●		●		●				
	TECN1603PER/L	9.525	3.18	2	20								●	●		●		●				
	TPAN2204PDR/L	12.7	4.76	1.4	11									●	●		●		●			
	TPCN2204PDR/L	12.7	4.76	1.4	11									●	●		●		●			
	TPKN2204PDR/L	12.7	4.76	1.4	11									●	●		●		●			

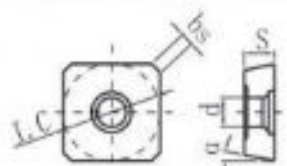


Inserts for face milling																					
Inserts shape		Type	Dimension mm						Material recommended												
									CVD coating grade			PVD coating grade					Uncoating grade				
			I.C	S	d	α			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15
		TPKN2204PDR-SU	12.7	4.76	1.4	11															
		TPKN2204PDR-3	12.7	4.76	1.4	11															
Inserts shape		Type	Dimension mm						Material recommended												
									CVD coating grade			PVD coating grade					Uncoating grade				
			I.C	S	bs	α			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15
		TPAN1103PPN	6.35	3.18	0.7	11															
		TPCN1103PPN	6.35	3.18	0.7	11															
		TPKN1103PPN	6.35	3.18	0.7	11															
		TPAN1603PPN	9.525	3.18	1.2	11															
		TPCN1603PPN	9.525	3.18	1.2	11															
		TPKN1603PPN	9.525	3.18	1.2	11															
		TPAN2204PPN	12.7	4.76	1.3	11															
		TPCN2204PPN	12.7	4.76	1.3	11															
		TPKN2204PPN	12.7	4.76	1.3	11															
		TPAN1603PPN-D2	9.525	3.18	1.2	11															
		TPCN1603PPN-D2	9.525	3.18	1.2	11															
		TPKN1603PPN-D2	9.525	3.18	1.2	11															
		TPAN2204PPN-D2	12.7	4.76	1.3	11															
		TPCN2204PPN-D2	12.7	4.76	1.3	11															
		TPKN2204PPN-D2	12.7	4.76	1.3	11															

Inserts for face milling

Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade					Uncoating grade					
		I.C	S	d	a	bs	be	VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		SPCW1504EDR/L	15.875	4.76	5.5	11	1.5	1							●	●		●			
		SPCW1504EPR/L	15.875	4.76	5.5	11	1.5	1							●	●		●			

Inserts shape	Type	Dimension mm							Material recommended												
									CVD coating grade			PVD coating grade				Uncoating grade					
		I.C	S	d	a	bs	be	VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		SPKW1204EDFR/L	12.7	4.76	5.5	11	1.4	1						●	●		●	●			
		SPKW1204EDSR/L	12.7	4.76	5.5	11	1.4	1						●	●		●	●			
		SPKW1204EDTR/L	12.7	4.76	5.5	11	1.4	1						●	●		●	●	●		

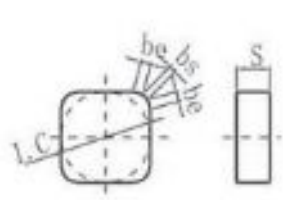
Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade				Uncoating grade						
		I.C	S	d	a	bs		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		SEEW1504AFN	15.875	4.76	5.5	20	2.85							●	●		●	●			

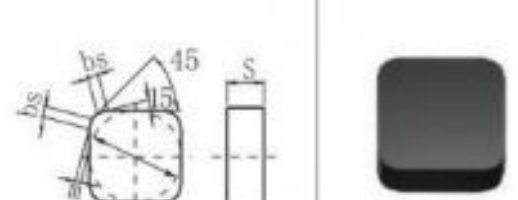


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Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade					Uncoating grade					
		I.C	S	d	a	R		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	SDET120408-RF	12.7	4.76	4.4	15	0.8									●	●		●			
	SDET120412-RF	12.7	4.76	4.4	15	1.2									●	●		●			
	SDET120416-RF	12.7	4.76	4.4	15	1.6									●	●		●			
	SDET120420-RF	12.7	4.76	4.4	15	2.0									●	●		●			
	SDET120424-RF	12.7	4.76	4.4	15	2.4									●	●		●			
	SDET120432-RF	12.7	4.76	4.4	15	3.2									●	●		●			

Inserts for face milling

Inserts shape		Type	Dimension mm							Material recommended												
										CVD coating grade			PVD coating grade				Uncoating grade					
			I.C	S	a	bs	be			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15
 	SNAN1204ANN	12.7	4.76	0	2									●	●		●		●			
	SNCN1204ANN	12.7	4.76	0	2									●	●		●		●			
	SNKN1204ANN	12.7	4.76	0	2									●	●		●		●			
	SNAN1504ANN	15.875	4.76	0	2.5									●	●		●		●			
	SNCN1504ANN	15.875	4.76	0	2.5									●	●		●		●			
	SNKN1504ANN	15.875	4.76	0	2.5									●	●		●		●			
	SNAN1904ANN	19.05	4.76	0	3									●	●		●		●			
	SNCN1904ANN	19.05	4.76	0	3									●	●		●		●			
	SNKN1904ANN	19.05	4.76	0	3									●	●		●		●			
	SNCN1904ADSN	19.05	4.76	1	4	0.5								●	●		●		●			

Inserts shape	Type	Dimension mm						Material recommended															
								CVD coating grade			PVD coating grade				Uncoating grade								
		I.C	S	bs	m				VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	SNAN1204ENN	12.7	4.76	1.4	0.8									●	●		●		●				
	SNCN1204ENN	12.7	4.76	1.4	0.8									●	●		●		●				
	SNKN1204ENN	12.7	4.76	1.4	0.8									●	●		●		●				
	SNAN1504ENN	15.875	4.76	1.4	1.5									●	●		●		●				
	SNCN1504ENN	15.875	4.76	1.4	1.5									●	●		●		●				
	SNKN1504ENN	15.875	4.76	1.4	1.5									●	●		●		●				
	SNAN1904ENN	19.05	4.76	2	1.3									●	●		●		●				
	SNCN1904ENN	19.05	4.76	2	1.3									●	●		●		●				
	SNKN1905ENN	19.05	4.76	2	1.3									●	●		●		●				



A diagram showing a square loop with a dashed circle inside. The dashed circle is labeled 'I.C.' and the square loop is labeled 'S'.

Inserts for face milling

Inserts shape	Type	Dimension mm						Material recommended											
								CVD coating grade			PVD coating grade				Uncoating grade				
		I.C	S	a	bs	be		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10
		SPKN1204ZETR/L	12.7	4.76	11	1.93	0.6		●				●	●		●		●	
		SPCN1504ZETR/L	15.875	4.76	11	2	1		●				●	●		●		●	
		SPKN1504ZEFRL	15.875	4.76	11	2	0.8		●				●	●		●		●	

Inserts shape	Type	Dimension mm						Material recommended											
								CVD coating grade			PVD coating grade				Uncoating grade				
		I.C	S	bs	m			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10
		SPKN1504EDL-D2	15.875	4.76	11	1.4			●				●	●		●		●	

Inserts shape	Type	Dimension mm						Material recommended											
								CVD coating grade			PVD coating grade				Uncoating grade				
		I.C	S	a	bs	be		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10
		SPKN1203EDFR/L	12.7	3.18	11	1.4			●				●	●		●		●	
		SPKN1203EDER/L	12.7	3.18	11	1.4			●				●	●		●		●	
		SPKN1504EDFR/L	15.875	4.76	11	1.4			●				●	●		●		●	
		SPKN1504EDER/L	15.875	4.76	11	1.4			●				●	●		●		●	
		SPKN1203EDFR/L-D2	12.7	3.18	11	1.4			●				●	●		●		●	
		SPKN1203EDER/L-D2	12.7	3.18	11	1.4			●				●	●		●		●	
		SPKN1504EDFR/L-D2	15.875	4.76	11	1.4			●				●	●		●		●	
		SPKN1504EDER/L-D2	15.875	4.76	11	1.4			●				●	●		●		●	
		SPAN1203EDR/L	12.7	3.18	11	1.4			●				●	●		●		●	
		SPCN1203EDR/L	12.7	3.18	11	1.4			●				●	●		●		●	
		SPKN1203EDR/L	12.7	3.18	11	1.4			●				●	●		●		●	

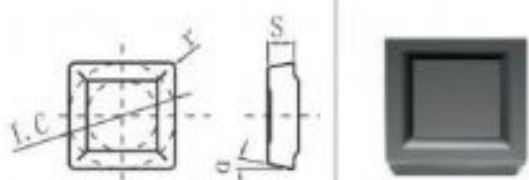
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SELECT

GOOD

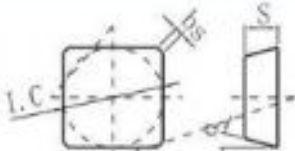
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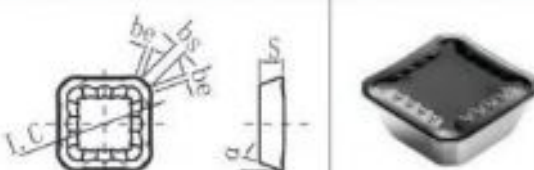
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Inserts shape	Type	Dimension mm							Material recommended													
									CVD coating grade			PVD coating grade				Uncoating grade						
		LC	S	a	bs				VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		SPAN1203EDR/L	12.7	3.18	11	1.4				●				●	●		●		●			
		SPCN1203EDR/L	12.7	3.18	11	1.4				●				●	●		●		●			
		SPKN1203EDR/L	12.7	3.18	11	1.4				●				●	●		●		●			

Inserts shape	Type	Dimension mm							Material recommended													
									CVD coating grade			PVD coating grade					Uncoating grade					
		L.C	S	a	r				VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	SPMR090304	9.525	3.18	11	0.4					●				●	●		●		●			
	SPMR09T304	9.525	3.97	11	0.4					●				●	●		●		●			
	SPMR090308	9.525	3.18	11	0.8					●				●	●		●		●			
	SPMR120304	12.7	3.18	11	0.4					●				●	●		●		●			
	SPMR120308	12.7	3.18	11	0.8					●				●	●		●		●			
	SPMR120312	12.7	3.18	11	1.2					●				●	●		●		●			

Inserts for face milling

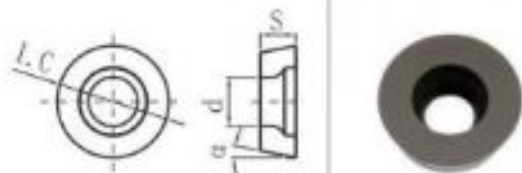
Inserts for face milling																					
Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade				Uncoating grade						
		I.C	S	α	L			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		SEMN1203AFTN	12.7	3.18	20	15.7			●				●	●		●		●			

Inserts shape	Type	Dimension mm							Material recommended												
									CVD coating grade			PVD coating grade				Uncoating grade					
		I.C	S	a	bs	be		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	SEKR1203AZ-YM	12.7	3.18	20	1.6	0.8			●				●	●		●		●			
	SEKR12T3AZ-YM	12.7	3.98	20	1.6	0.8			●				●	●		●		●			
	SEKR1204AZ-YM	12.7	4.76	20	1.6	0.8			●				●	●		●		●			
	SEKR1504AZ-YM	15.875	4.76	20	1.6	0.8			●				●	●		●		●			

Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade				Uncoating grade						
		I.C	S	a	R	L1		VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	SPEX1203EDR/L	12.7	3.18	11	500	15							●	●		●		●			
	SPKX1504EDFR/L	15.88	4.76	11	500	19.37							●	●		●		●			



[illegible][illegible]

Inserts shape	Type	Dimension mm							Material recommended													
									CVD coating grade			PVD coating grade					Uncoating grade					
		Φ I.C	S	Φ d	α				VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	RPMW0803MOE	8	3.18	3.4	11									●	●		●	●				
	RPMW1003MOE	10	3.18	4.4	11									●	●		●	●				
	RPMW10T3MOE	10	3.97	4.4	11									●	●		●	●				
	RPMW10T3MOT	10	3.97	4.4	11									●	●		●	●				
	RPMW1204MOE	12	4.76	4.4	11									●	●		●	●				
	RPMW1204MOT	12	4.76	4.4	11									●	●		●	●				

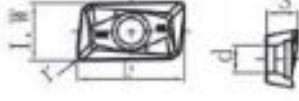
Inserts for face milling

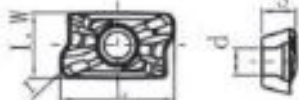
Inserts shape	Type	Dimension mm						Material recommended													
								CVD coating grade			PVD coating grade				Uncoating grade						
		Φ I.C	S	Φ d	α			VCTP20	VCTP30	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
	RDMT0802MO-V1	8	2.38	3.4	15								●	●		●		●		●	
	RDMT0803MO-V1	8	3.18	3.4	15								●	●		●		●		●	
	RDMT1003MO-V1	10	3.18	4.4	15								●	●		●		●		●	
	RDMT10T3MO-V1	10	3.97	4.4	15								●	●		●		●		●	
	RDMT1204MO-V1	12	4.76	4.4	15								●	●		●		●		●	

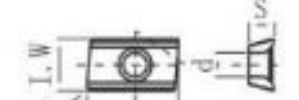
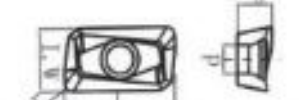
Inserts shape	Type	Dimension mm						Material recommended											
								CVD coating grade		PVD coating grade				Uncoating grade					
		φ I.C	S	φ d	α			VCTP20	VCTP30	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15
	RPMT0803MOE-BJS	8	3.18	3.4	11								●	●		●		●	
	RPMT10T3MOE-BJS	10	3.97	4.4	11								●	●		●		●	
	RPMT1204MOE-BJS	12	4.76	4.4	11								●	●		●		●	

Inserts shape	Type	Dimension mm							Material recommended												
									CVD coating grade		PVD coating grade					Uncoating grade					
		φ I.C	S	φ d	α				VCTP20	VCTP30	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTH10	VCTH20	VCTP30	VCTK10	VCTK15	VCTK20
	RCGT0602MO-LHC	6	2.38	2.5	7							●				●	●			●	
	RCGT0803MO-LHC	8	3.18	3.4	7							●				●	●			●	
	RCGT1003MO-LHC	10	3.18	4	7							●				●	●			●	
	RCGT10T3MO-LHC	10	3.97	4.4	7							●				●	●			●	
	RCGT12T3MO-LHC	12	3.97	4.4	7							●				●	●			●	



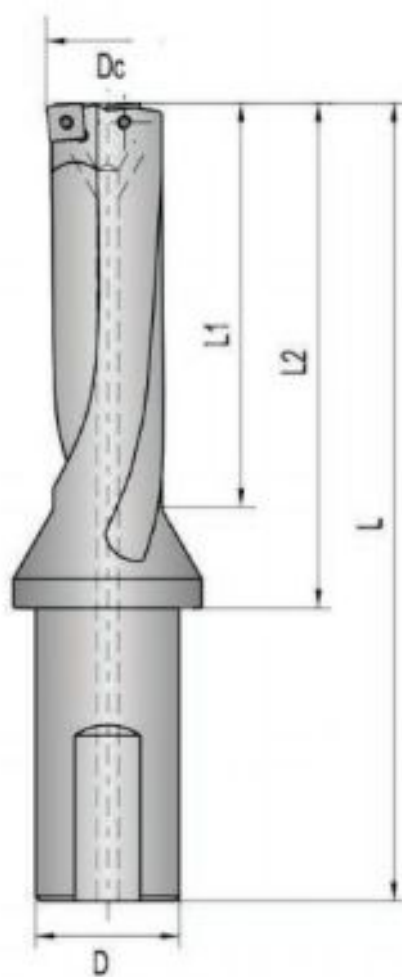
Inserts for square shoulder milling																					
Inserts shape		Type	Dimension mm					Material recommended													
								CVD coating grade		PVD coating grade						Uncoating grade					
			I.W	L	S	Φd	r		VCTP20	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		APMT1135PDER-H2	6.2	11.21	3.5	2.8	0.8			●				●	●	●					
		APMT1604PDER-H2	9.28	17.15	4.76	4.4	0.8			●				●	●	●					
		APMT160432PDER-H8	9.33	16.31	4.76	4.4	3.2			●				●	●	●					
		APMT1135PDER-M2	6.2	11.21	3.5	2.8	0.8			●				●	●	●					
		APMT1604PDER-M2	9.28	17.15	4.76	4.4	0.8			●				●	●	●					

Inserts shape		Type	Dimension mm					Material recommended													
								CVD coating grade		PVD coating grade						Uncoating grade					
			I.W	L	S	Φd	r		VCTP20	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30	VCTK10	VCTK15	VCTK20
		APMT1135PDER-EM	6.24	11.2	3.5	2.8	0.8			●				●	●	●					
		APMT1604PDER-EM	9.41	17.24	5.28	4.4	0.8			●				●	●	●					
		APMT170608R-EM	10.63	18.54	5.56	4.4	0.8			●				●	●	●					
		APMT170616R-EM	10.63	18.54	5.56	4.4	1.6			●				●	●	●					

Inserts shape		Type	Dimension mm					Material recommended													
								CVD coating grade		PVD coating grade						Uncoating grade					
			I.W	L	S	Φd	r		VCTP20	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTH10	VCTH20	VCTP30	VCTK10	VCTK15	VCTK20
		APKT160402FR-LHC	9.8	16.88	4.76	4.4	0.2					●				●	●				
		APKT160404PDR-LHC	9.8	16.88	4.76	4.4	0.4					●				●	●				
		APKT160408PDR-LHC	9.8	16.88	4.76	4.4	0.8					●				●	●				
		APKT160416PDR-LHC	9.8	16.88	4.76	4.4	1.6					●				●	●				
		APKT16T4PDR-LH1C	9.5	17	4.96	4.4	0.8					●				●	●				
		APKT16S2PDR-LH2C	9.8	16.88	4.76	4.4	3.2					●				●	●				

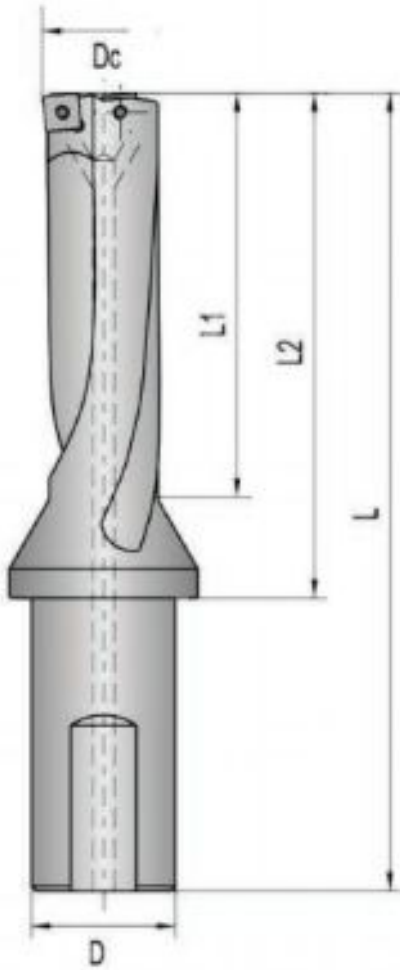
Vollcut drilling

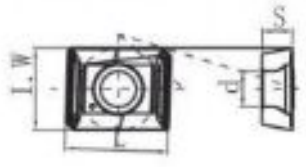
The basic shape of blade

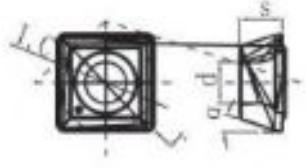


DRILLING



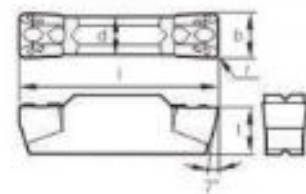
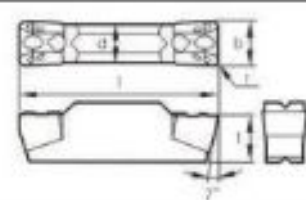
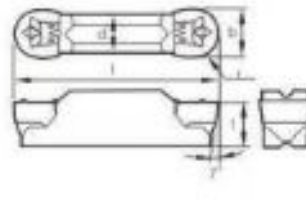
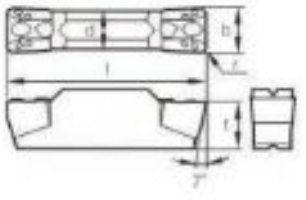
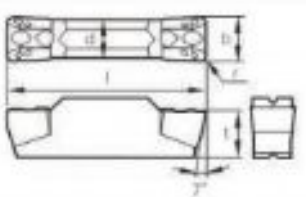
Vollcut drilling										
The basic shape of blade	Type	Φ Dc	Φ D	stock item	Dimension mm			Available inserts	Screw	Wrench
					L	L1	L2			
	TSX130D20-4	13	20		114	55	70	SP...050204	M2*5	T6
	TSX135D20-4	13.5			116	57	72			
	TSX140D20-4	14			118	59	74			
	TSX145D20-4	14.5			120	61	76			
	TSX150D20-4	15			122	63	78			
	TSX155D25-4	15.5	25		136	65	80	SP...060204	M2.2*6	T6
	TSX160D25-4	16			138	67	82			
	TSX165D25-4	16.5			140	69	84			
	TSX170D25-4	17			142	71	86			
	TSX175D25-4	17.5			144	73	88			
	TSX180D25-4	18			146	75	90			
	TSX185D25-4	18.5			148	77	92			
	TSX190D25-4	19			150	79	94			
	TSX195D25-4	19.5			152	81	96			
	TSX200D25-4	20			154	83	98			
	TSX205D25-4	20.5			156	85	100			
	TSX210D25-4	21			158	87	102			
	TSX215D25-4	21.5			160	89	104			
	TSX220D25-4	22			162	91	106			
	TSX225D25-4	22.5			164	93	108			
	TSX230D25-4	23			169	95	113			
	TSX235D25-4	23.5			171	97	115			
	TSX240D25-4	24			173	99	117			
	TSX245D25-4	24.5			175	101	119			
	TSX250D25-4	25			177	103	121			
	TSX255D32-4	25.5	32		185	105	125	SP...07T308	M2.5*6	T8
	TSX260D32-4	26			187	107	127			
	TSX265D32-4	26.5			189	109	129			
	TSX270D32-4	27			191	111	131			
	TSX275D32-4	27.5			193	113	133			
	TSX280D32-4	28			195	115	135			
	TSX285D32-4	28.5			197	117	137			
	TSX290D32-4	29			201	120	141			
	TSX295D32-4	29.5			203	122	143			
	TSX300D32-4	30			208	124	148			
TSX305D32-4	30.5			210	126	150				
TSX310D32-4	31			212	128	152				
TSX315D32-4	31.5			214	130	154				
TSX320D32-4	32			216	132	156				
TSX325D32-4	32.5			218	134	158				
TSX330D32-4	33		220	136	160					
TSX335D32-4	33.5		222	138	162					

Inserts for shallow hole drilling																		
Inserts shape		Type	Dimension mm						Material recommended									
									CVD coating grade			PVD coating grade			Uncoating grade			
			L.W	L	S	d			VCTP20	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30
		APMT1504T-WT	15.88	12.7	4.76	5.5			●	●			●	●				●

Inserts shape		Type	Dimension mm						Material recommended									
									CVD coating grade			PVD coating grade			Uncoating grade			
			Φ I.C	S	d	r	a		VCTP20	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30
		SPMG050204-ZV	5.56	2.38	2.5	0.4	11		●	●			●	●				●
		SPMG060204-ZV	6.35	2.38	2.8	0.4	11		●	●			●	●				●
		SPMG07T308-ZV	7.94	3.97	2.8	0.8	11		●	●			●	●				●
		SPMG090408-ZV	9.8	4.3	4.1	0.8	11		●	●			●	●				●
		SPMG110408-ZV	11.5	4.76	4.4	0.8	11		●	●			●	●				●
		SPMG140512-ZV	14.3	5.56	5.5	1.2	11		●	●			●	●				●

Inserts shape		Type	Dimension mm						Material recommended									
									CVD coating grade			PVD coating grade			Uncoating grade			
			Φ I.C	S	Φ d	R	α		VCTP20	VCTP40	VCTP10	VCTK10	VCTM20	VCTM30	VCTM10	VCTM20	VCTM20	VCTP30
		WCGX030204-ZV	5.56	2.38	2.5	0.4	7		●	●			●	●				●
		WCGX030208-ZV	5.56	2.38	2.5	0.8	7		●	●			●	●				●
		WCGX040204-ZV	6.35	2.38	2.8	0.4	7		●	●			●	●				●
		WCGX040208-ZV	6.35	2.38	2.8	0.8	7		●	●			●	●				●
		WCGX050304-ZV	7.94	3.18	3.4	0.4	7		●	●			●	●				●
		WCGX050308-ZV	7.94	3.18	3.4	0.8	7		●	●			●	●				●
		WCGX06T304-ZV	9.525	3.97	4.4	0.4	7		●	●			●	●				●
		WCGX06T308-ZV	9.525	3.97	4.4	0.8	7		●	●			●	●				●
		WCGX080404-ZV	12.7	4.76	5.5	0.4	7		●	●			●	●				●
		WCGX080408-ZV	12.7	4.76	5.5	0.8	7		●	●			●	●				●
		WCGX080412-ZV	12.7	4.76	5.5	1.2	7		●	●			●	●				●

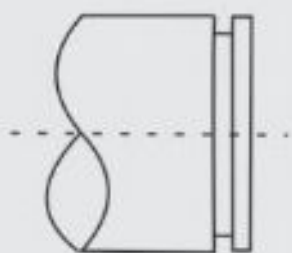
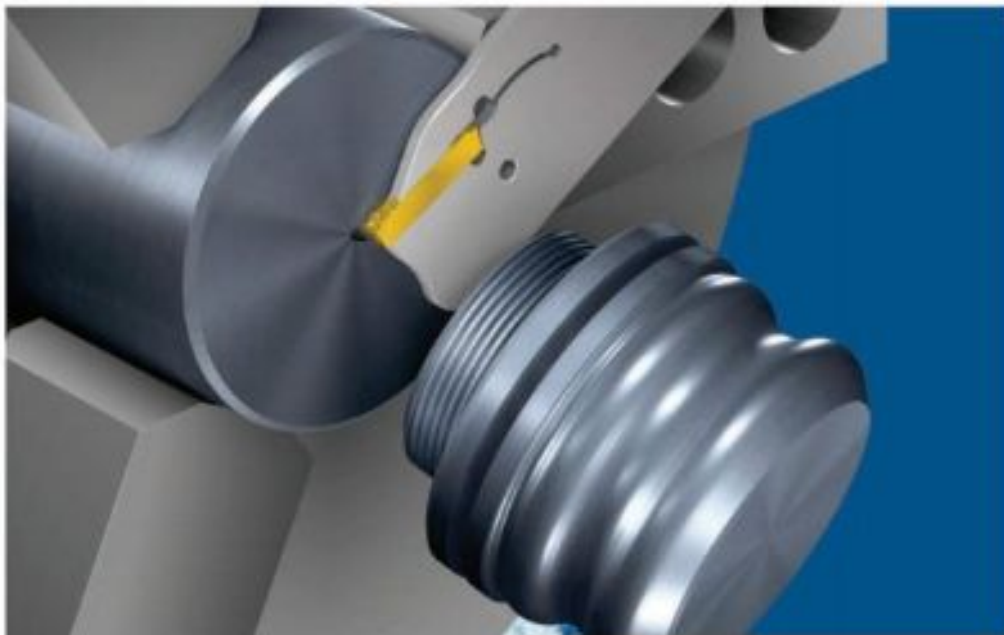
Parting and grooving tools

Parting and grooving tools																	
The basic shape of inserts		Type		Dimension mm					Grade recommended								
									CVD coating grade		PVD coating grade			Uncoated grade			
				B	R	L	D	S	VCTP20	VCTP30	VCTM20	VCTP20	VCTM30	VCTK15	VCTP20	VCTP30	
		BP	200	2.2	9.3	0.2			●		●						
			300	3.1	11.3	0.2			●		●						
			400	4.1	11.3	0.25			●		●						
			500	5.1	11.4	0.3			●		●						
		MGMN	200-M	2	0.2	16	1.2	3.5	●		●						
			250-M	2.5	0.2	18.5	2	3.85	●		●						
			300-M	3	0.4	21	2.35	4.8	●		●						
			400-M	4	0.4	21	3.3	4.8	●		●						
			500-M	5	0.8	26	4.1	5.8	●		●						
			600-M	6	0.8	26	5	5.8	●		●						
		MGMN	150-G	1.5	0.15	16	1.2	3.5	●		●						
			200-G	2	0.2	16	1.6	3.5	●		●						
			300-G	3	0.4	21	2.35	4.8	●		●						
			400-G	4	0.4	21	3.3	4.8	●		●						
		MRMN	200-M	2	1	16	1.5	3.5	●		●						
			300-M	3	1.5	21	2.35	4.8	●		●						
			400-M	4	2	21	3.3	4.8	●		●						
			500-M	5	2.5	25.86	4.12	5.8	●		●						
			600-M	6	3	26	5	5.8	●		●						
		MGGN	200-M	2	0.2	16	1.5	3.5	●		●						
			300-M	3	0.4	21	2.35	4.8	●		●						
			400-M	4	0.4	21	3.3	4.8	●		●						
			500-M	5	0.8	25.86	4.12	5.8	●		●						
			600-M	6	0.8	26	5	5.8	●		●						
		MGGN	150-G	1.5	0.15	16	1.2	3.5	●		●						
			200-G	2	0.2	16	1.6	3.5	●		●						
			300-G	3	0.4	21	2.35	4.8	●		●						
			400-G	4	0.4	21	3.3	4.8	●		●						

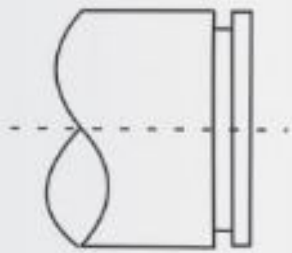




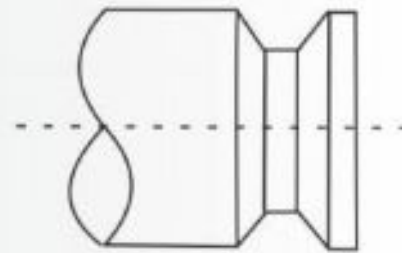
GROOVING



Square Groove



Round Groove



Angular Groove

Threading data

16	I	R	1.75	ISO	VCTM20
1	2	3	4	5	6

THREADING

Insert dimension	
L(mm)	I.C.
06	3.97mm=5/32"
08	4.76mm=3/16"
11	6.35mm=1/4"
16	9.525mm=3/8"
22	12.7mm=1/2"
27	15.875mm=5/8"



(profile / hour)

Cutting Type	
	
E	External
I	Internal

RH/LH Insert	
R	Right Hand Insert
L	Left Hand Insert

Pitch Code
Full thread profile (Number for pitch) 0.35~9.0mm 72-2 TPI 72-2TP (profile/finch) V type Letters for scope mm TPI mm TPI (profile/inch) A 0.5~1.5 48~16 AG 0.5~3.0 48~8 G 1.75~3.0 14~8 N 3.5~5.0 7~5 U 5.5~9.0 4.5~2.75 Q 5.5~6.0 4.5~4

Thread Profiles type	
60	Partial Profile 60
55	Partial Profile 55
ISO	ISO metric
UN	American UN
W	British Standard Whitworth Thread(B.S.W)
NPT	NPT
NPTF	NPTF
BSPT	British Standard pipe thread
ACME	American ACME
STACME	American Stup ACME
UNJ	American Aerospace
MJ	Metric Aerospace
TR	(DIN103) Trapezoidal(DIN 103)
ABUT	American buttress
SAGE	Metric Buttress
RD	Round (DIN405)
API	American petroleum pipe thread

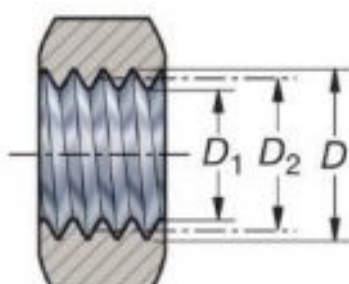
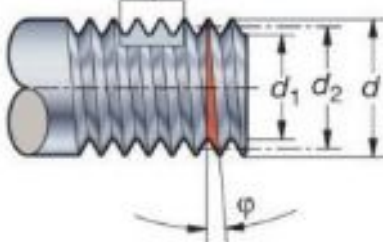
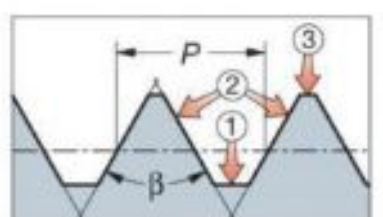
Insert material	
VCTM20	Steel Stainless steel Cast steel Cast iron
VCTH10	Aluminum alloy or copper Alloy
VCTM10	High temperature Alloy



Threading data

Threading Tools standards

THREADING



Application	Thread form	Thread type
Connecting		
General usage		ISO metric, American UN
Pipe threads		Whitworth, British Standard (BSPT), American National, Pipe Threads, NPT, NPTF
Food and fire		Round DIN 405
Aerospace		MJ, UNJ
Oil and gas		API Rounded, API Buttress, VAM
Motion		
General usage		Trapezoidal, ACME, Stub ACME

Threading insert

Shape of insert	IC	Pitch mm	Type		Dimensions					Material recommended				
			Right hand	Left hand	hmin	X	Y	R	T	VCTP20	VCTM10	VCTK15	VCTS10	VCTM20
	1/4"	0.5	11ER 0.50ISO	11EL 0.50ISO	0.29	0.6	0.4	0.07			●			●
		0.75	11ER 0.75ISO	11EL 0.75ISO	0.45	0.6	0.6	0.11			●			●
		0.8	11ER 0.80ISO	11EL 0.80ISO	0.49	0.6	0.6	0.12			●			●
		1.0	11ER 1.00ISO	11EL 1.00ISO	0.6	0.6	0.7	0.14			●			●
		1.25	11ER 1.25ISO	11EL 1.25ISO	0.74	0.6	0.9	0.18			●			●
		1.5	11ER 1.50ISO	11EL 1.50ISO	0.9	0.6	1.0	0.22			●			●
	3/8"	0.5	16ER 0.50ISO	16EL 0.50ISO	0.29	0.6	0.6	0.07			●			●
		0.75	16ER 0.75ISO	16EL 0.75ISO	0.45	0.6	0.6	0.11			●			●
		1.0	16ER 1.00ISO	16EL 1.00ISO	0.6	0.7	0.7	0.14			●			●
		1.25	16ER 1.25ISO	16EL 1.25ISO	0.74	0.8	0.9	0.18			●			●
		1.50	16ER 1.50ISO	16EL 1.50ISO	0.9	0.8	1.0	0.22			●			●
		1.75	16ER 1.75ISO	16EL 1.75ISO	1.06	0.9	1.2	0.25			●			●
		2.0	16ER 2.00ISO	16EL 2.00ISO	1.21	1.0	1.3	0.29			●			●
		2.5	16ER 2.50ISO	16EL 2.50ISO	1.51	1.1	1.5	0.36			●			●
		3.0	16ER 3.00ISO	16EL 3.00ISO	1.83	1.2	1.6	0.43			●			●
		0.5	16ER 0.50ISO-Z		0.29	1.1	0.6	0.07			●			●
		0.75	16ER 0.75ISO-Z		0.45	1.1	0.6	0.11			●			●
		1.0	16ER 1.00ISO-Z		0.6	1.1	0.7	0.14			●			●
		1.25	16ER 1.25ISO-Z		0.74	1.1	0.9	0.18			●			●
		1.50	16ER 1.50ISO-Z		0.9	1.1	1.0	0.22			●			●
		1.75	16ER 1.75ISO-Z		1.06	1.1	1.2	0.25			●			●
		2.0	16ER 2.00ISO-Z		1.21	1.1	1.3	0.29			●			●
		2.5	16ER 2.50ISO-Z		1.51	1.1	1.5	0.36			●			●
		3.0	16ER 3.00ISO-Z		1.83	1.1	1.6	0.43			●			●
	1/2"	3.5	22ER 3.50ISO	22EL 3.50ISO	2.13	1.6	2.3	0.51			●			●
		4.0	22ER 4.00ISO	22EL 4.00ISO	2.44	1.6	2.3	0.58			●			●
		4.5	22ER 4.50ISO	22EL 4.50ISO	2.74	1.7	2.4	0.65			●			●
		5.0	22ER 5.00ISO	22EL 5.00ISO	3.05	1.7	2.5	0.75			●			●
	5/8"	5.5	27ER 5.50ISO	27EL 5.50ISO	3.34	1.9	2.7	0.79			●			●
		6.0	27ER 6.00ISO	27EL 6.00ISO	3.65	2.0	2.9	0.87			●			●

THREADING



Threading insert														
Shape of insert	IC	Pitch mm	Type		Dimensions				Material recommended					
			Right hand	Left hand	hmin	X	Y	T	VCTP20	VCTM10	VCTK15	VCTS10	VCTM20	
	1.4°	27	11ER 27NPT	11EL 27NPT	0.66	0.7					●			●
		18	11ER 18NPT	11EL 18NPT	1.01	0.8					●			●
		14	11ER 14NPT	11EL 14NPT	1.33	0.8					●			●
	3/8°	27	16ER 27NPT	16EL 27NPT	0.66	0.7					●			●
		18	16ER 18NPT	16EL 18NPT	1.01	0.8					●			●
		14	16ER 14NPT	16EL 14NPT	1.33	0.9					●			●
		11.5	16ER 11.5NPT	16EL 11.5NPT	1.64	1.1					●			●
		8	16ER 8NPT	16EL 8NPT	2.42	1.3					●			●
	3/8°	27	16ER 27NPT-Z		0.66	1.1					●			●
		18	16ER 18NPT-Z		1.01	1.1					●			●
		14	16ER 14NPT-Z		1.33	1.1					●			●
		11.5	16ER 11.5NPT-Z		1.64	1.1					●			●
	3/8°	14	16ER 14NPT-2M	16EL 14NPT-2M	1.33	1.2					●			●
	1/2°	11.5	22ER 11.5NPT-2M	22EL 11.5NPT-2M	1.64	2.3					●			●
	5/8°	8	27ER 8NPT-2M	27EL 8NPT-2M	2.42	3.1					●			●
	1/4°	27	11VER 27NPT	11VER 27NPT	0.66	0.7	3.2				●			●
		18	11VER 18NPT	11VER 18NPT	1.01	0.7	3.2				●			●
		14	11VER 14NPT	11VER 14NPT	1.33	0.7	3.2				●			●
		11.5	11VER 11.5NPT	11VER 11.5NPT	1.64	0.7	3.2				●			●
	3/8°	27	16VER 27NPT	16VER 27NPT	0.66	1.1	3.65				●			●
		18	16VER 18NPT	16VER 18NPT	1.01	1.1	3.65				●			●
		14	16VER 14NPT	16VER 14NPT	1.33	1.1	3.65				●			●
		11.5	16VER 11.5NPT	16VER 11.5NP	1.64	1.1	3.65				●			●

THREADING

Ceramic milling

Ceramic inserts cutter for roughing super alloys

- Ceramic milling typically runs at 20 to 30 times the speed of carbide, although at lower feed rates (~0.1 mm/tooth), which results in high productivity gains. Due to intermittent cutting, it is a much cooler operation than turning. For this reason, speeds of 700-1000 m/min when milling are adapted, compared with 200-300 m/min for turning.
- Ceramics have a high tendency for notching, which is why round inserts are primarily used to ensure a low entering angle.
- Never use coolant.
- Ceramics have a negative effect on the surface integrity and topography, and are therefore not used when machining close to the finished component shape.
- The primary application for grade VCT6060 is milling Inconel 718 engine castings and oil drilling equipment, in both cases due to the high metal removal rates.
- Maximum flank wear when using ceramic inserts in HRSA is 1 mm.

CERAMIC

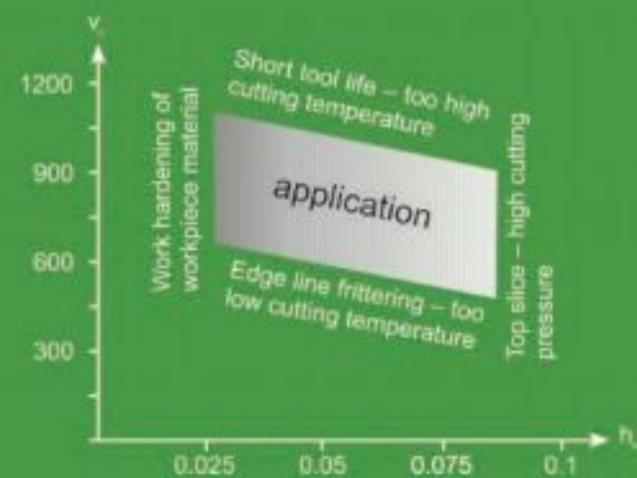
Negative inserts require up-milling

Please observe that negative inserts require up-milling while positive inserts prefer down-milling

Programming considerations when using turn milling technique – the center line of the insert must be on the centre line of the component.

Cutting data for milling

- Grade VCT6060
- no coolant
- Conventional milling
- zero chip thickness on entry into component
- Radial immersion, a_e
- >70% to give smoothest exit from component



Grade	Cutting speed, v_c	Cutting depth, a_p	Feed, f_n
VCT6060	700 to 1000 m/min	2 mm	0.07 to 0.11 mm/r



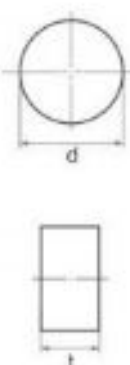
Product offer for - super alloys

Turning Applications

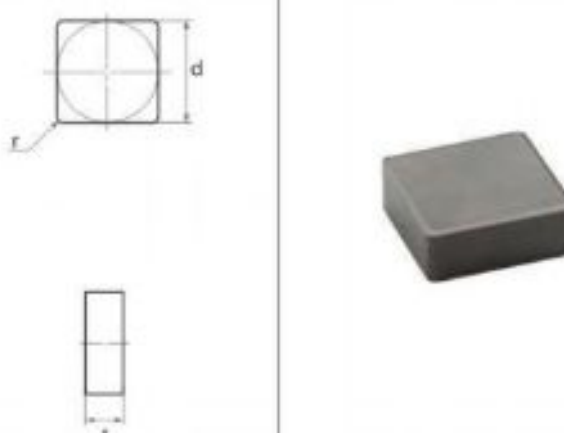
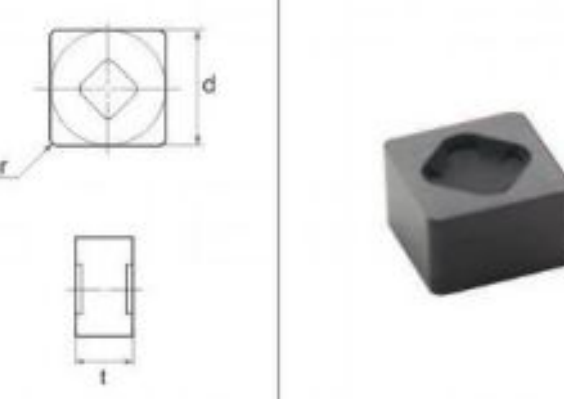
External turning	Shank tools		Damped blade for turning/ grooving		Internal turning
Ceramic and CBN inserts with negative basic-shape, without hole.	 Holders for inserts with hole				ceramic inserts with positive or negative basic-shape and without hole. 
Gauge inserts	CNGN DNGN SNGN TNGN RNGN	CNGN DNGN SNGN TNGN RCGN RNGN	CSGX RCGX	Special Inserts	RPGN RNGN

CERAMIC

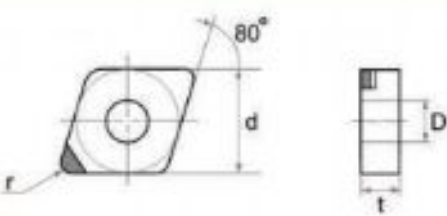
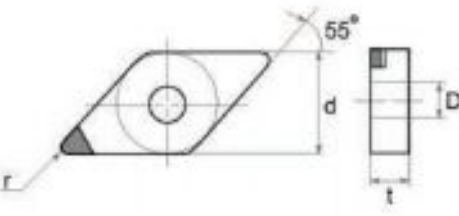
	General inserts turning/ milling	ISO	ANSI	VCT6060	VCT650	VCT670
 CNGN	CNGN	12	4	●	●	●
 DNGN	DNGN	15	4			●
 RNGN	RNGN	9 ,12, 15, 19, 25	3 ,4 ,5 ,6 ,8	●	●	●
 SNGN	SNGN	9 ,12, 15, 19	3 ,4 ,5 ,6	●	●	●
 TNGN	TNGN	16 ,22	3 ,4			●
 RPGN	RPGN	6 ,9, 12	2 ,3 ,4	●		●
 RCGX RPGX	RCGX	6 ,9, 12	2 ,3 ,4	●	●	●
 RPGX	RPGX	6 ,9, 12	2 ,3 ,4	●	●	●
 TPGN	TPGN	11 ,16	2 ,3			●
	Grooving	ISO	ANSI			
	CSGX	6 ,9, 12	2 ,3 ,4			●
		●	●			●

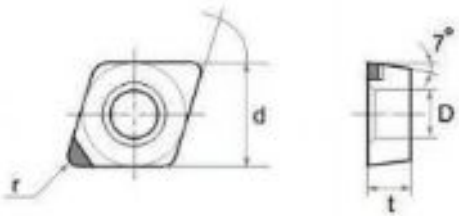
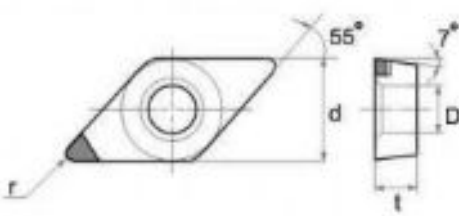
Roll Turning Insert		ISO	Dimension mm				Grade recommended		
			d	t	T	a	VCT6060	VCT650	VCT670
		RCGX060400	6.35	4.76	4.57	120	●	●	●
		RCGX060600	6.35	6.35	6.20	120	●	●	●
		RCGX060700	6.35	7.94	7.70	120	●	●	●
		RCGX090700	9.52	7.94	7.70	120	●	●	●
		RCGX120700	12.70	7.94	7.70	120	●	●	●
		RCGX151000	15.87	10.00	9.77	120	●	●	●
		RCGX191000	19.05	10.00	9.77	120	●	●	●
		RCGX251200	25.40	12.00	11.85	140	●	●	●
		RNGN060300	6.35	3.18			●	●	●
		RNGN060400	6.35	4.76			●	●	●
		RNGN090300	9.52	3.18			●	●	●
		RNGN090400	9.52	4.76			●	●	●
		RNGN120300	12.70	3.18			●	●	●
		RNGN120400	12.70	4.76			●	●	●
		RNGN120700	12.70	7.94			●	●	●
		RNGN150700	15.87	7.94			●	●	●
		RNGN190700	19.05	7.94			●	●	●
		RNGN250700	25.40	7.94			●	●	●



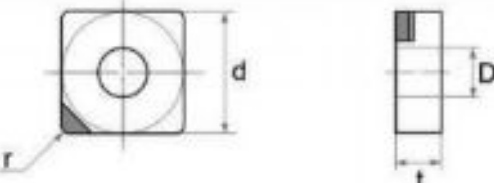
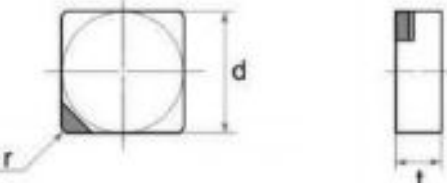
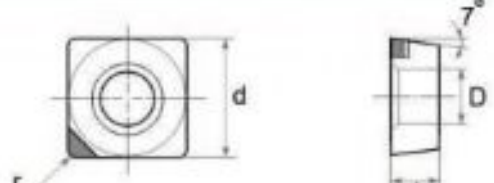
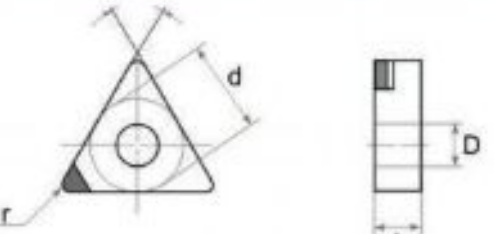
Roll Turning Insert		ISO	Dimension mm				Grade recommended		
			d	t	r		VCT6060	VCT650	VCT670
		SNGN090304	9.52	3.18	0.4		●	●	●
		SNGN090308	9.52	3.18	0.8		●	●	●
		SNGN090312	9.52	3.18	1.2		●	●	●
		SNGN120404	12.70	4.76	0.4		●	●	●
		SNGN120408	12.70	4.76	0.8		●	●	●
		SNGN120412	12.70	4.76	1.2		●	●	●
		SNGN120416	12.70	4.76	1.6		●	●	●
		SNGN120420	12.70	4.76	2.0		●	●	●
		SNGN120704	12.70	7.94	0.4		●	●	●
		SNGN120708	12.70	7.94	0.8		●	●	●
		SNGN120712	12.70	7.94	1.2		●	●	●
		SNGN120716	12.70	7.94	1.6		●	●	●
		SNGN120720	12.70	7.94	2.0		●	●	●
		SNGN150708	15.87	7.94	0.8		●	●	●
		SNGN150712	15.87	7.94	1.2		●	●	●
		SNGN150716	15.87	7.94	1.6		●	●	●
		SNGN190712	19.05	7.94	1.2		●	●	●
		SNGN190716	19.05	7.94	1.6		●	●	●
		SNGN190720	19.05	7.94	2.0		●	●	●
		SNGN250724	25.40	7.94	2.4		●	●	●
		SNGN250924	25.40	9.52	2.4		●	●	●
		SNGX120408	12.70	4.76	0.8		●	●	
		SNGX120412	12.70	4.76	1.2		●	●	
		SNGX120416	12.70	4.76	1.6		●	●	
		SNGX120708	12.70	7.94	0.8		●	●	
		SNGX120712	12.70	7.94	1.2		●	●	
		SNGX120716	12.70	7.94	1.6		●	●	
		SNGX150708	15.87	7.94	0.8		●	●	
		SNGX150712	15.87	7.94	1.2		●	●	
		SNGX150716	15.87	7.94	1.6		●	●	

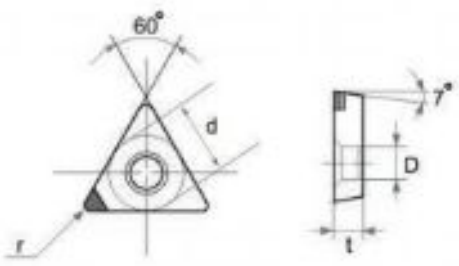
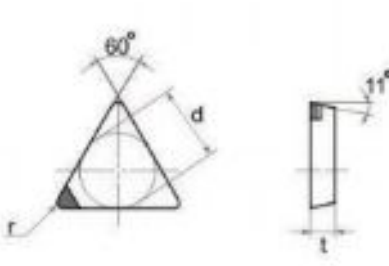
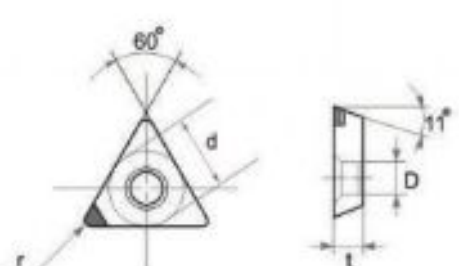
CERAMIC

CBN						STANDARD			
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	CNGA 120402 R1	12.70	4.76	0.2	5.16	●			
	CNGA 120404 R1	12.70	4.76	0.4	5.16	●			
	CNGA 120408 R1	12.70	4.76	0.8	5.16	●			
	CNGA 120412 R1	12.70	4.76	1.2	5.16	●			
	DNGA 150404 R1	12.70	4.76	0.4	5.16	●			
	DNGA 150408 R1	12.70	4.76	0.8	5.16	●			
	DNGA 150412 R1	12.70	4.76	1.2	5.16	●			
	DNGA 150604 R1	12.70	6.35	0.4	5.16	●			
	DNGA 150608 R1	12.70	6.35	0.8	5.16	●			
	DNGA 150612 R1	12.70	6.35	1.2	5.16	●			

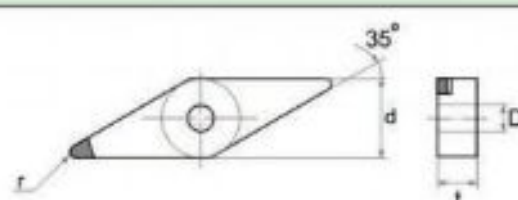
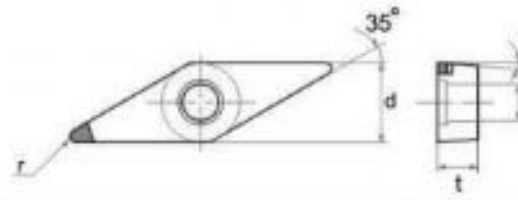
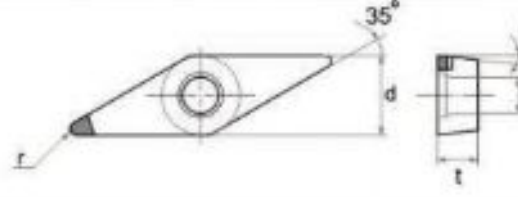
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	CCGW 060202 R1	6.35	2.38	0.2	2.80	●			
	CCGW 060204 R1	6.35	2.38	0.4	2.80	●			
	CCGW 060208 R1	6.35	2.38	0.8	2.80	●			
	CCGW 09T304 R1	9.52	3.97	0.4	4.40	●			
	CCGW 09T308 R1	9.52	3.97	0.8	4.40	●			
	DCGW 070202 R1	6.35	2.38	0.2	2.80	●			
	DCGW 070204 R1	6.35	2.38	0.4	2.80	●			
	DCGW 070208 R1	6.35	2.38	0.8	2.80	●			
	DCGW 11T302 R1	9.52	3.97	0.2	4.40	●			
	DCGW 11T304 R1	9.52	3.97	0.4	4.40	●			
	DCGW 11T308 R1	9.52	3.97	0.8	4.40	●			

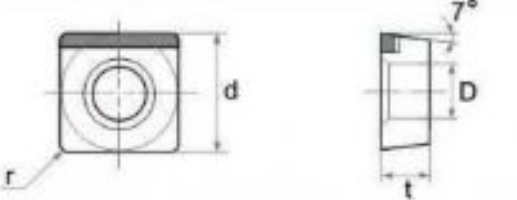


CBN						STANDARD			
The basic shape of blade	Type	Dimension mm				Grade recommended			
		d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	SNGA 090304 R1	9.52	3.18	0.4	3.81	●			
	SNGA 120404 R1	12.70	4.76	0.4	5.16	●			
	SNGA 120408 R1	12.70	4.76	0.8	5.16	●			
	SNGA 120412 R1	12.70	4.76	1.2	5.16	●			
The basic shape of blade	Type	Dimension mm				Grade recommended			
		d	t	r		VCB200	VCB300	VCTH10	VCTH05
	SNGN 090304 R1	9.52	3.18	0.4		●			
	SNGN 090308 R1	9.52	3.18	0.8		●			
	SNGN 090312 R1	9.52	3.18	1.2		●			
	SNGN 120404 R1	12.70	4.76	0.4		●			
	SNGN 120408 R1	12.70	4.76	0.8		●			
	SNGN 120412 R1	12.70	4.76	1.2		●			
The basic shape of blade	Type	Dimension mm				Grade recommended			
		d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	SCGW 09T304 R1	9.52	3.97	0.4	4.40	●			
	SCGW 09T308 R1	9.52	3.97	0.8	4.40	●			
The basic shape of blade	Type	Dimension mm				Grade recommended			
		d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	TNGA 160402 R1	9.52	4.76	0.2	3.81	●			
	TNGA 160404 R1	9.52	4.76	0.4	3.81	●			
	TNGA 160408 R1	9.52	4.76	0.8	3.81	●			
	TNGA 160412 R1	9.52	4.76	1.2	3.81	●			

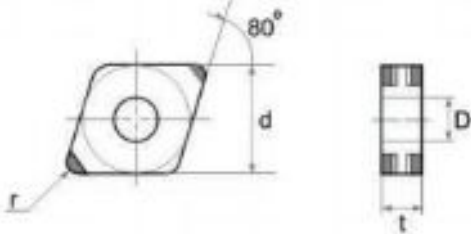
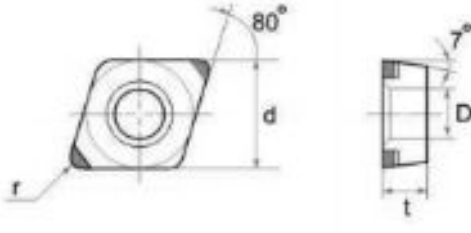
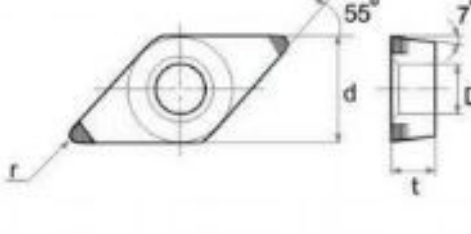
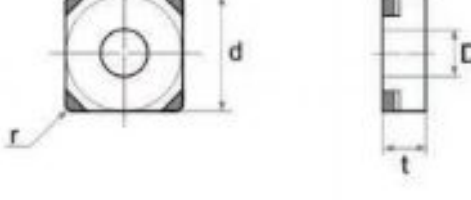
CBN						STANDARD			
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	TCGW 090204 R1	5.56	2.38	0.4	2.50	●			
	TCGW 090208 R1	5.56	2.38	0.8	2.50	●			
	TCGW 110202 R1	6.35	2.38	0.2	2.80	●			
	TCGW 110204 R1	6.35	2.38	0.4	2.80	●			
	TCGW 110208 R1	6.35	2.38	0.8	2.80	●			
	TCGW 16T304 R1	9.52	3.97	0.4	4.40	●			
	TCGW 16T308 R1	9.52	3.97	0.8	4.40	●			
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r		VCB200	VCB300	VCTH10	VCTH05
	TPGN 110304 R1	6.35	3.18	0.4		●			
	TPGN 110308 R1	6.35	3.18	0.8		●			
	TPGN 110312 R1	6.35	3.18	1.2		●			
	TPGN 160304 R1	9.52	3.18	0.4		●			
	TPGN 160308 R1	9.52	3.18	0.8		●			
	TPGN 160312 R1	9.52	3.18	1.2		●			
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	TPGB 080202 R1	4.76	2.38	0.2	2.40	●			
	TPGB 090204 R1	5.56	2.38	0.4	2.50	●			
	TPGB 110302 R1	6.35	3.18	0.2	3.30	●			
	TPGB 110304 R1	6.35	3.18	0.4	3.30	●			
	TPGB 110308 R1	6.35	3.18	0.8	3.30	●			
	TPGW 160304 R1	9.52	3.18	0.4	4.40	●			
	TPGW 160308 R1	9.52	3.18	0.8	4.40	●			



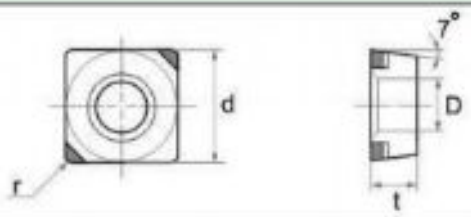
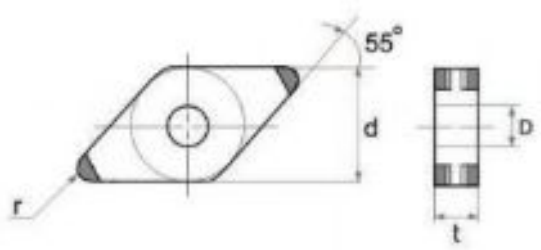
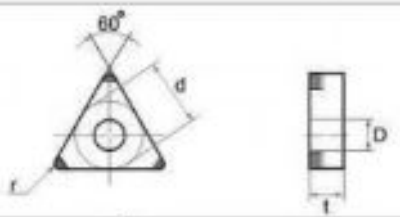
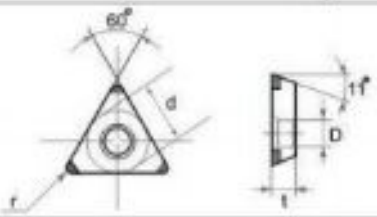
CBN				STANDARD					
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	VNGA 160404 R1	9.52	4.76	0.4	3.18	●			
	VNGA 160408 R1	9.52	4.76	0.8	3.18	●			
	VBGW 110302 R1	6.35	3.18	0.2	2.80	●			
	VBGW 110304 R1	6.35	3.18	0.4	2.80	●			
	VBGW 160404 R1	9.52	4.76	0.4	4.40	●			
	VBGW 160408 R1	9.52	4.76	0.8	4.40	●			
	VCGW 110302 R1	6.35	3.18	0.2	2.80	●			
	VCGW 110304 R1	6.35	3.18	0.4	2.80	●			
	VCGW 160404 R1	9.52	4.76	0.4	4.40	●			
	VCGW 160408 R1	9.52	4.76	0.8	4.40	●			

The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	SCGW 09T304 FS	9.52	3.97	0.4	4.40	●			
	SCGW 09T308 FS	9.52	3.97	0.8	4.40	●			
	SCGW 120404 FS	12.70	4.76	0.4	5.60	●			
	SCGW 120408 FS	12.70	4.76	0.8	5.60	●			

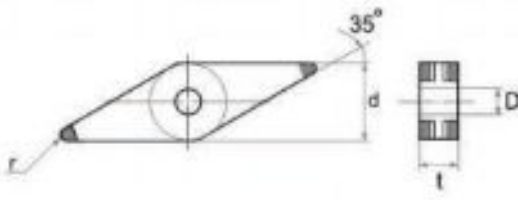
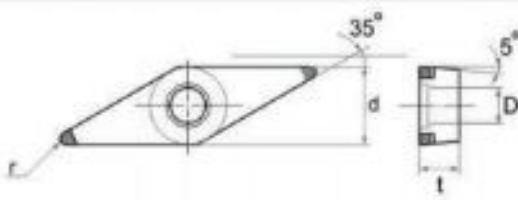
CBN

CBN						MINI TIP			
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	CNGA 120404 M1	12.70	4.76	0.4	5.16	●			
	CNGA 120404 M2	12.70	4.76	0.4	5.16	●			
	CNGA 120404 M4	12.70	4.76	0.4	5.16	●			
	CNGA 120408 M1	12.70	4.76	0.8	5.16	●			
	CNGA 120408 M2	12.70	4.76	0.8	5.16	●			
	CNGA 120408 M4	12.70	4.76	0.8	5.16	●			
	CCGW 09T304 M1	9.52	3.97	0.4	4.40	●			
	CCGW 09T304 M2	9.52	3.97	0.4	4.40	●			
	CCGW 09T308 M1	9.52	3.97	0.8	4.40	●			
	CCGW 09T308 M2	9.52	3.97	0.8	4.40	●			
	DCGW 11T302 M1	9.52	3.97	0.2	4.40	●			
	DCGW 11T302 M2	9.52	3.97	0.2	4.40	●			
	DCGW 11T304 M1	9.52	3.97	0.4	4.40	●			
	DCGW 11T304 M2	9.52	3.97	0.4	4.40	●			
	DCGW 11T308 M1	9.52	3.97	0.8	4.40	●			
	DCGW 11T308 M2	9.52	3.97	0.8	4.40	●			
	SNGA 120404 M1	12.70	4.76	0.4	5.16	●			
	SNGA 120404 M2	12.70	4.76	0.4	5.16	●			
	SNGA 120404 M4	12.70	4.76	0.4	5.16	●			
	SNGA 120408 M1	12.70	4.76	0.8	5.16	●			
	SNGA 120408 M2	12.70	4.76	0.8	5.16	●			
	SNGA 120408 M4	12.70	4.76	0.8	5.16	●			

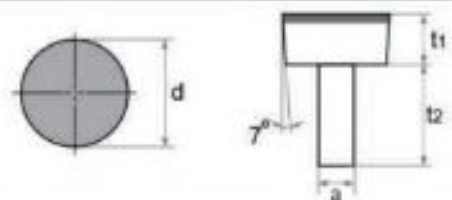
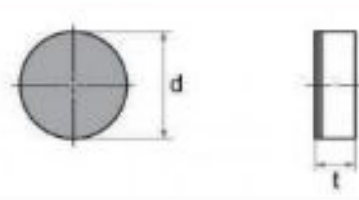
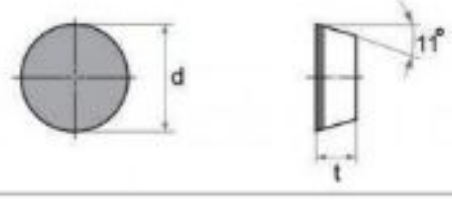


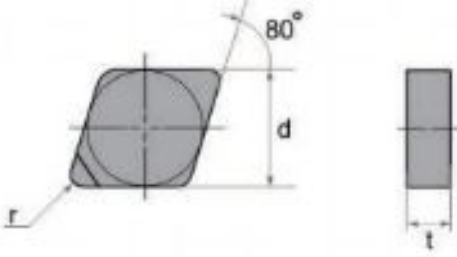
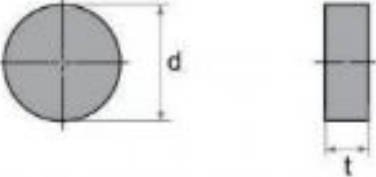
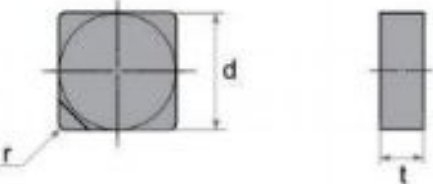
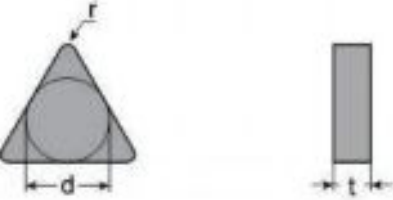
CBN						MINI TIP
The basic shape of blade	Type	Dimension mm				Grade recommended
	ISO	d	t	r	D	VCB200 VCB300 VCTH10 VCTH05
	SCGW 09T304 M1	9.52	3.97	0.4	4.40	●
	SCGW 09T304 M2	9.52	3.97	0.4	4.40	●
	SCGW 09T308 M1	9.52	3.97	0.8	4.40	●
	SCGW 09T308 M2	9.52	3.97	0.8	4.40	●
	DNGA 150404 M1	12.70	4.76	0.4	5.16	●
	DNGA 150404 M2	12.70	4.76	0.4	5.16	●
	DNGA 150404 M4	12.70	4.76	0.4	5.16	●
	DNGA 150408 M1	12.70	4.76	0.8	5.16	●
	DNGA 150408 M2	12.70	4.76	0.8	5.16	●
	DNGA 150408 M4	12.70	4.76	0.8	5.16	●
	DNGA 150604 M1	12.70	6.35	0.4	5.16	●
	DNGA 150604 M2	12.70	6.35	0.4	5.16	●
	DNGA 150604 M4	12.70	6.35	0.4	5.16	●
	DNGA 150608 M1	12.70	6.35	0.8	5.16	●
	DNGA 150608 M2	12.70	6.35	0.8	5.16	●
	DNGA 150608 M4	12.70	6.35	0.8	5.16	●
	TNGA 160404 M1	9.52	4.76	0.4	3.81	●
	TNGA 160404 M3	9.52	4.76	0.4	3.81	●
	TNGA 160408 M1	9.52	4.76	0.8	3.81	●
	TNGA 160408 M3	9.52	4.76	0.8	3.81	●
	TPGW 160304 M1	9.52	3.18	0.4	4.40	●
	TPGW 160304 M3	9.52	3.18	0.4	4.40	●
	TPGW 160308 M1	9.52	3.18	0.8	4.40	●
	TPGW 160308 M3	9.52	3.18	0.8	4.40	●

CBN

CBN						MINI TIP			
The basic shape of blade	Type	Dimension mm				Grade recommended			
	ISO	d	t	r	D	VCB200	VCB300	VCTH10	VCTH05
	VNGA 160404 M1	9.52	4.76	0.4	3.18	●			
	VNGA 160404 M2	9.52	4.76	0.4	3.18	●			
	VNGA 160404 M4	9.52	4.76	0.4	3.18	●			
	VNGA 160408 M1	9.52	4.76	0.8	3.18	●			
	VNGA 160408 M2	9.52	4.76	0.8	3.18	●			
	VNGA 160408 M4	9.52	4.76	0.8	3.18	●			
	VBGW 160404 M1	9.52	4.76	0.4	4.40	●			
	VBGW 160404 M2	9.52	4.76	0.4	4.40	●			
	VBGW 160408 M1	9.52	4.76	0.8	4.40	●			
	VBGW 160408 M2	9.52	4.76	0.8	4.40	●			



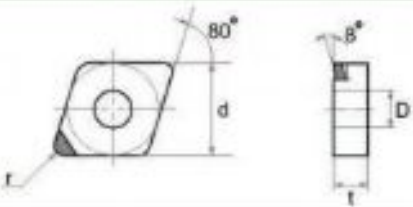
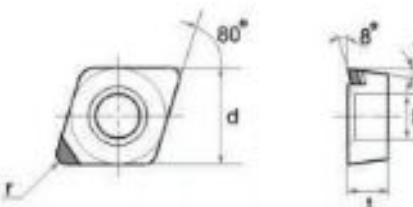
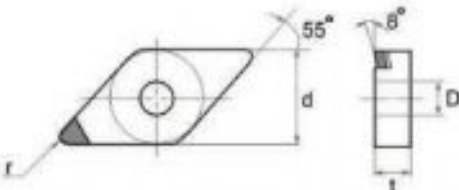
PCBN						FULL FACE			
The basic shape of blade	Type	Dimension mm				Grade recommended			
		d	t	T	α	VCB200	VCB300	VCTH10	VCTH05
	RCGX 060600 F	6.35	6.35	6.20	120°		●		
	RCGX 090700 F	9.52	7.94	7.70	120°		●		
	RCGX 120700 F	12.70	7.94	7.70	120°		●		
The basic shape of blade	Type	Dimension mm				Grade recommended			
		d	t ₁	t ₂	a	VCB200	VCB300	VCTH10	VCTH05
	RCGX 060D F	6.35	5.00	8.35	3.00		●		
	RCGX 090D F	9.52	6.00	20.00	4.00		●		
	RCGX 120D F	12.70	6.00	20.00	5.88		●		
The basic shape of blade	Type	Dimension mm				Grade recommended			
		d	t			VCB200	VCB300	VCTH10	VCTH05
	RNGN 090300 F	9.52	3.18				●		
	RNGN 120400 F	12.70	4.76				●		
	RPGN 090300 F	9.52	3.18				●		
	RPGN 120300 F	12.70	3.18				●		
	RPGN 120400 F	12.70	4.76				●		

PCBN					SOLID
The basic shape of blade	Type	Dimension mm			Grade recommended
	ISO	d	t	r	VCB300
	CNGN 090308S	9.52	3.18	0.8	●
	CNGN 090312S	9.52	3.18	1.2	●
	CNGN 090316S	9.52	3.18	1.6	●
	CNGN 120408S	12.70	4.76	0.8	●
	CNGN 120412S	12.70	4.76	1.2	●
	CNGN 120416S	12.70	4.76	1.6	●
The basic shape of blade	Type	Dimension mm			Grade recommended
	ISO	d	t		VCB300
	RNGN 090300S	9.52	3.18		●
	RNGN 120300S	12.70	3.18		●
	RNGN 120400S	12.70	4.76		●
The basic shape of blade	Type	Dimension mm			Grade recommended
	ISO	d	t	r	VCB300
	SNGN 090308S	9.52	3.18	0.8	●
	SNGN 090312S	9.52	3.18	1.2	●
	SNGN 090316S	9.52	3.18	1.6	●
	SNGN 120308S	12.70	3.18	0.8	●
	SNGN 120312S	12.70	3.18	1.2	●
	SNGN 120316S	12.70	3.18	1.6	●
	SNGN 120408S	12.70	4.76	0.8	●
	SNGN 120412S	12.70	4.76	1.2	●
	SNGN 120416ST	12.70	4.76	1.6	●
	TNGN 110308S	6.35	3.18	0.8	●
	TNGN 110312S	6.35	3.18	1.2	●
	TNGN 160408S	9.52	4.76	0.8	●
	TNGN 160412S	9.52	4.76	1.2	●
	TNGN 160416S	9.52	4.76	1.6	●

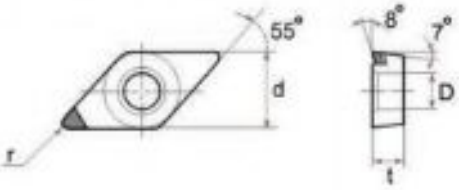
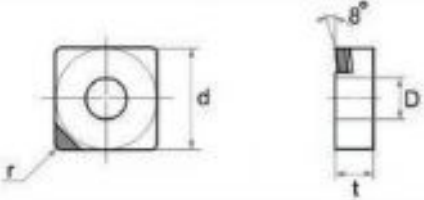
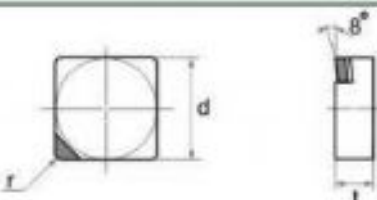
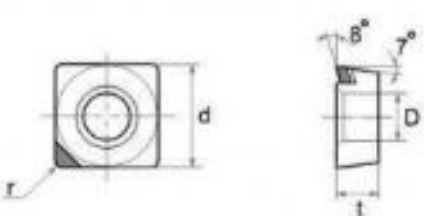


PCBN					SOLID	
The basic shape of blade	Type	Dimension mm				Grade recommended
	ISO	d	t	r	D	VCB300
	CNGA 090308	9.52	3.18	0.8	3.81	●
	CNGA 090312	9.52	3.18	1.2	3.81	●
	CNGA 090316	9.52	3.18	1.6	3.81	●
	CNGA 120408	12.7	4.76	0.8	5.16	●
	CNGA 120412	12.7	4.76	1.2	5.16	●
	CNGA 120416	12.7	4.76	1.6	5.16	●
	RNGA 060300	6.35	3.18	-	2.26	●
	RNGA 060400	6.35	4.76	-	2.26	●
	RNGA 090300	9.52	3.18	-	3.81	●
	RNGA 120300	12.7	3.18	-	5.16	●
	RNGA 120400	12.7	4.76	-	5.16	●
	SNGA 090308	9.52	3.18	0.8	3.81	●
	SNGA 090312	9.52	3.18	1.2	3.81	●
	SNGA 090316	9.52	3.18	1.6	3.81	●
	SNGA 120308	9.52	3.18	0.8	5.16	●
	SNGA 120312	9.52	3.18	1.2	5.16	●
	SNGA 120316	9.52	3.18	1.6	5.16	●
	SNGA 120408	12.7	4.76	0.8	5.16	●
	SNGA 120412	12.7	4.76	1.2	5.16	●
	SNGA 120416	12.7	4.76	1.6	5.16	●
	TNGA 110308	6.35	3.18	0.8	2.26	●
	TNGA 110312	6.35	3.18	1.2	2.26	●
	TNGA 110316	6.35	3.18	1.6	2.26	●
	TNGA 160408	9.52	4.76	0.8	3.81	●
	TNGA 160412	9.52	4.76	1.2	3.81	●
	TNGA 160416	9.52	4.76	1.6	3.81	●

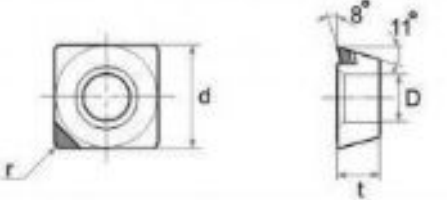
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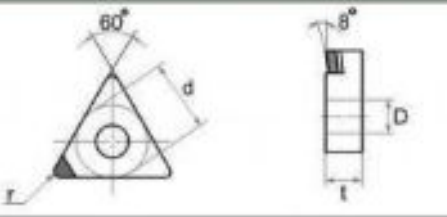
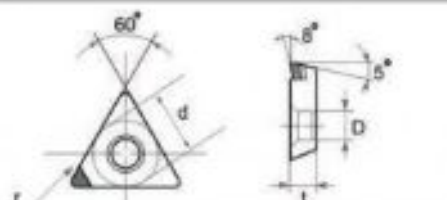
PCD						STANDARD		
The basic shape of blade	Type	Dimension mm				Grade recommended		
	ISO	d	t	r	D	VCB200	VCB300	VCTH10
	CNGA 120404 R1	12.70	4.76	0.4	5.16			●
	CNGA 120408 R1	12.70	4.76	0.8	5.16			●
	CNGA 120412 R1	12.70	4.76	1.2	5.16			●
	CCGW 060202 R1	6.35	2.38	0.2	2.80			●
	CCGW 060204 R1	6.35	2.38	0.4	2.80			●
	CCGW 060208 R1	6.35	2.38	0.8	2.80			●
	CCGW 09T302 R1	9.52	3.97	0.2	4.40			●
	CCGW 09T304 R1	9.52	3.97	0.4	4.40			●
	CCGW 09T308 R1	9.52	3.97	0.8	4.40			●
	CCGW 120404 R1	12.70	4.76	0.4	5.50			●
	CCGW 120408 R1	12.70	4.76	0.8	5.50			●
	CCGW 120412 R1	12.70	4.76	1.2	5.50			●
	DNGA 150404 R1	12.70	4.76	0.4	5.16			●
	DNGA 150408 R1	12.70	4.76	0.8	5.16			●
	DNGA 150412 R1	12.70	4.76	1.2	5.16			●
	DNGA 150604 R1	12.70	6.35	0.4	5.16			●
	DNGA 150608 R1	12.70	6.35	0.8	5.16			●
	DNGA 150612 R1	12.70	6.35	1.2	5.16			●



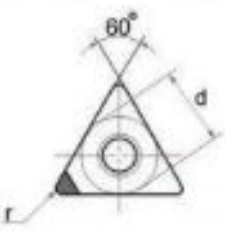
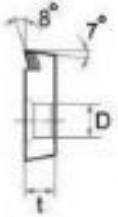
PCD						STANDARD
The basic shape of blade	Type	Dimension mm				Grade recommended
	ISO	d	t	r	D	VCB200 VCB300 VCTH10
	DCGW 070202 R1	6.35	2.38	0.2	2.80	●
	DCGW 070202 R1	6.35	2.38	0.4	2.80	●
	DCGW 070202 R1	6.35	2.38	0.8	2.80	●
	DCGW 070202 R1	9.52	3.97	0.2	4.40	●
	DCGW 070202 R1	9.52	3.97	0.4	4.40	●
	DCGW 070202 R1	9.52	3.97	0.8	4.40	●
	SNGA 120404 R1	12.70	4.76	0.4	5.16	●
	SNGA 120408 R1	12.70	4.76	0.8	5.16	●
	SNGA 120412 R1	12.70	4.76	1.2	5.16	●
The basic shape of blade	Type	Dimension mm				Grade recommended
	ISO	d	t	r		VCB200 VCB300 VCTH10
	SNGN 120404 R1	12.70	4.76	0.4		●
	SNGN 120408 R1	12.70	4.76	0.8		●
	SNGN 120412 R1	12.70	4.76	1.2		●
The basic shape of blade	Type	Dimension mm				Grade recommended
	ISO	d	t	r	D	VCB200 VCB300 VCTH10
	SCGW 09T304 R1	9.52	3.97	0.4	4.40	●
	SCGW 09T308 R1	9.52	3.97	0.8	4.40	●
	SCGW 09T312 R1	9.52	3.97	1.2	4.40	●
	SCGW 120402 R1	12.70	4.76	0.2	5.50	●
	SCGW 120404 R1	12.70	4.76	0.4	5.50	●
	SCGW 120408 R1	12.70	4.76	0.8	5.50	●

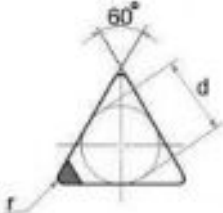
PCD

PCD					STANDARD		
The basic shape of blade	Type	Dimension mm			Grade recommended		
		d	t	r	VCB200	VCB300	VCTH10
	SPGN 090304 R1	9.52	3.18	0.4			●
	SPGN 090308 R1	9.52	3.18	0.8			●
	SPGN 120304 R1	12.70	3.18	0.4			●
	SPGN 120308 R1	12.70	3.18	0.8			●
	SPGW 090302 R1	9.52	3.18	0.2			●
	SPGW 090304 R1	9.52	3.18	0.4			●
	SPGW 090308 R1	9.52	3.18	0.8			●

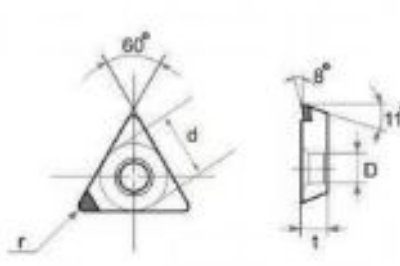
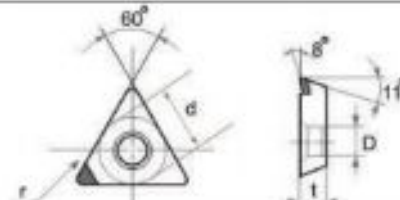
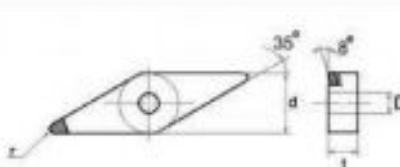
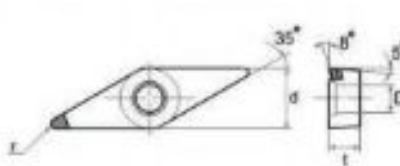
The basic shape of blade	Type	Dimension mm				Grade recommended		
		d	t	r	D	VCB200	VCB300	VCTH10
	TNGA 160402 R1	9.52	4.76	0.2	3.81			●
	TNGA 160404 R1	9.52	4.76	0.4	3.81			●
	TNGA 160408 R1	9.52	4.76	0.8	3.81			●
	TNGA 160412 R1	9.52	4.76	1.2	3.81			●
	TBGW 060102 R1	3.97	1.59	0.2	2.80			●
	TBGW 060104 R1	3.97	1.59	0.4	2.80			●



PCD						STANDARD
The basic shape of blade	Type	Dimension mm				Grade recommended
	ISO	d	t	r	D	VCB200 VCB300 VCTH10
 	TCGW 090202 R1	5.56	2.38	0.2	2.5	●
	TCGW 090204 R1	5.56	2.38	0.4	2.5	●
	TCGW 090208 R1	5.56	2.38	0.8	2.5	●
	TCGW 110202 R1	6.35	2.38	0.2	2.8	●
	TCGW 110204 R1	6.35	2.38	0.4	2.8	●
	TCGW 110208 R1	6.35	2.38	0.8	2.8	●
	TCGW 16T302 R1	9.52	3.97	0.2	4.4	●
	TCGW 16T304 R1	9.52	3.97	0.4	4.4	●
	TCGW 16T308 R1	9.52	3.97	0.8	4.4	●

The basic shape of blade	Type	Dimension mm			Grade recommended		
	ISO	d	t	r	VCB200	VCB300	VCTH10
 	TPGN 090204 R1	5.56	2.38	0.4			●
	TPGN 090208 R1	5.56	2.38	0.8			●
	TPGN 110302 R1	6.35	3.18	0.2			●
	TPGN 110304 R1	6.35	3.18	0.4			●
	TPGN 110308 R1	6.35	3.18	0.8			●
	TPGN 160302 R1	9.52	3.18	0.2			●
	TPGN 160304 R1	9.52	3.18	0.4			●
	TPGN 160308 R1	9.52	3.18	0.8			●

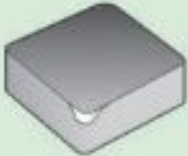
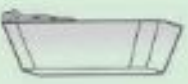
PCD

PCD						STANDARD		
The basic shape of blade	Type	Dimension mm				Grade recommended		
	ISO	d	t	r	D	VCB200	VCB300	VC TH10
	TPGW 080202 R1	4.76	2.38	0.2	2.40			●
	TPGW 080204 R1	4.76	2.38	0.4	2.40			●
	TPGW 110302 R1	6.35	3.18	0.2	3.30			●
	TPGW 110304 R1	6.35	3.18	0.4	3.30			●
	TPGW 110308 R1	6.35	3.18	0.8	3.30			●
	TPGW 160404 R1	9.52	4.76	0.4	3.81			●
	TPGW 160408 R1	9.52	4.76	0.8	3.81			●
	TPGT 110302 R1	6.35	3.18	0.2	3.40			●
	TPGT 110304 R1	6.35	3.18	0.4	3.40			●
The basic shape of blade	Type	Dimension mm				Grade recommended		
	ISO	d	t	r	D	VCB200	VCB300	VC TH10
	VNGA 160404 R1	9.52	4.76	0.4	3.18			●
	VNGA 160408 R1	9.52	4.76	0.8	3.18			●
	VBGW 110302 R1	6.35	3.18	0.2	3.40			●
	VBGW 110304 R1	6.35	3.18	0.4	3.40			●
	VBGW 110308 R1	6.35	3.18	0.8	3.40			●
	VBGW 160402 R1	9.52	4.76	0.2	4.40			●
	VBGW 160404 R1	9.52	4.76	0.4	4.40			●
	VBGW 160408 R1	9.52	4.76	0.8	4.40			●
	VBGW 160412 R1	9.52	4.76	1.2	4.40			●



Trouble shooting PCD milling

Troubleshooting

Problem	Cause	Suggested action(s)
Flank wear 	Wrong grade Presence of Fe/Ni/Co	•Change to coarser PCD grade •Check material composition •Reduce cutting speed •Use coolant
Built-up edge 	Not correct edge temperature Wrong grade	•Decrease or increase cutting speed •Choose a sharper insert •Change to a finer grade
Edge chipping 	Poor rigidity Wrong grade Incorrect cutting data High run-out	•Minimize vibrations •Change to a tougher grade •Change cutting data •Check set-up
Poor surface finish	Wrong grade Too high cutting data Incorrect wiper position	•Change to a finer PCD grade •Reduce cutting speed and feed rate •Check wiper position
Flaking of work-piece	Too high depth of cut	•Decrease depth of cut •Add entry chamfer on component

PCD

TECHNICAL DATA

HARDNESS CONVERSION TABLE

VICKERS HARDNESS NUMBER [HV]	KNOOP HARDNESS NUMBER [HK]	BRINELL HARDNESS NUMBER [HB]		ROCKWELL HARDNESS NUMBER [HR]				ROCKWELL SUPERFICIAL HARDNESS NUMBER [HR]			SHORE HARDNESS NUMBER [HS]	TENSILE STRENGTH [APPROX.]
	500gf LOAD and OVER	HBS- 3000kgf LOAD 10mm STEEL BALL	HBW 3000kgf LOAD 10mm CARBIDE BALL	SCALE A 60kgf LOAD DIAMOND INDENTER	SCALE B 100kgf LOAD 1/16" STEEL BALL	SCALE C 150kgf LOAD DIAMOND INDENTER	SCALE D 100kgf LOAD DIAMOND INDENTER	SCALE 15N 15kgf LOAD DIAMOND INDENTER	SCALE 30N 30kgf LOAD DIAMOND INDENTER	SCALE 45N 45kgf LOAD DIAMOND INDENTER		
1865				92.1		80	86.5	96.5	92.0	87.0		
1787				91.6		79	85.7	96.3	91.5	86.2		
1710				91.1		78	84.9	96.1	90.9	85.4		
1633				90.6		77	84.2	95.8	90.3	84.5		
1556				90.1		76	83.4	95.5	89.7	83.6		
1478				89.6		75	82.6	95.2	89.1	82.5		
1400				89.0		74	81.8	94.9	88.5	81.6		
1323				88.5		73	81.0	94.6	87.9	80.7		
1245				88.0		72	80.1	94.3	87.2	79.7		
1160				87.1		71	79.4	94.0	86.5	78.7		
1076	972			86.8		70	78.6	93.7	85.8	77.6		
1004	946			86.2		69	77.8	93.4	85.1	76.4		
940	920			85.6		68	76.9	93.2	84.3	75.4		
900	895			85.0		67	76.1	92.9	83.6	74.2	95.2	
865	870			84.5		66	75.4	92.5	82.8	73.3	93.1	
832	846		739	83.9		65	74.5	92.2	81.9	72.0	91.0	
800	822		722	83.4		64	73.8	91.8	81.1	71.0	88.9	
772	799		705	82.8		63	73.0	91.4	80.1	69.9	87.0	
746	776		688	82.3		62	72.2	91.1	79.3	66.6	85.2	
720	754		670	81.8		61	71.5	90.7	78.4	67.7	83.3	
697	732		654	81.2		60	70.7	90.2	77.5	66.6	81.6	
674	710		634	80.7		59	69.9	89.8	76.6	65.5	79.9	
653	690		615	80.1		58	69.2	89.3	75.7	64.3	78.2	
633	670		595	79.6		57	68.5	88.9	74.8	63.2	75.6	
613	650		577	79.0		56	67.7	88.3	73.9	62.0	75.0	
595	630		560	78.5		55	66.9	87.9	73.0	60.9	73.5	212
577	612		543	78.0		54	66.1	87.4	72.0	59.8	71.9	205
560	594		525	77.4		53	65.4	86.9	71.2	58.6	70.4	199
544	576	500	512	76.8		52	64.6	86.4	70.2	57.4	69.0	192
528	558	487	496	76.3		51	63.8	85.9	69.4	56.1	67.6	186
513	542	475	481	75.9		50	63.1	85.5	68.5	55.0	66.2	179
498	526	464	469	75.2		49	62.1	85.0	67.6	53.8	64.7	172
484	510	451	455	74.7		48	61.4	84.5	66.7	52.5	63.4	167
471	495	442	443	74.1		47	60.8	83.9	65.8	51.4	62.1	161
458	480	432	432	73.6		46	60.0	83.5	64.8	50.3	60.8	156
446	466	421	421	73.1		45	59.2	83.0	64.0	49.0	59.6	151
434	452	409	409	72.5		44	58.5	82.5	63.1	47.8	58.4	146
423	438	400	400	70.0		43	57.7	82.0	62.2	46.7	57.2	141
412	426	390	390	71.5		42	56.9	81.5	61.3	45.5	56.1	136
402	414	381	381	70.9		41	56.2	80.9	60.4	44.3	55.0	132
392	402	371	371	70.4		40	55.4	80.4	59.5	43.1	53.9	127
382	391	362	362	69.9		39	54.6	79.9	58.6	41.9	52.9	124
372	380	353	353	69.4		38	53.8	79.4	57.7	40.8	51.8	120
363	370	344	344	68.9		37	53.1	78.8	56.8	39.6	50.7	118
354	360	336	336	68.4	109.0	36	52.3	78.3	55.9	38.4	49.7	114
345	351	327	327	67.9	108.5	35	51.5	77.7	55.0	37.2	48.7	110

VICKERS HARDNESS NUMBER [HV]	KNOOP HARDNESS NUMBER [HK]	BRINELL HARDNESS NUMBER [HB]		ROCKWELL HARDNESS NUMBER [HR]				ROCKWELL SUPERFICIAL HARDNESS NUMBER [HR]			SHORE HARDNESS NUMBER [HS]	TENSILE STRENGTH [APPROX.]
	500gf LOAD and OVER	HBS 3000kgf LOAD 10mm STEEL BALL	HBW 3000kgf LOAD 10mm CARBIDE BALL	SCALE A 60kgf LOAD DIAMOND INDENTER	SCALE B 100kgf LOAD 1/16" STEEL BALL	SCALE C 150kgf LOAD DIAMOND INDENTER	SCALE D 100kgf LOAD DIAMOND INDENTER	SCALE 15N 15kgf LOAD DIAMOND INDENTER	SCALE 30N 30kgf LOAD DIAMOND INDENTER	SCALE 45N 45kgf LOAD DIAMOND INDENTER		
336	342	319	319	67.4	108.0	34	50.8	77.2	54.2	36.1	47.7	108
327	334	311	311	66.8	107.5	33	50.0	76.6	53.3	34.9	46.6	105
318	326	301	301	66.3	107.0	32	49.2	76.1	52.1	33.7	45.6	102
310	318	294	294	65.8	106.0	31	48.4	75.6	51.3	32.5	44.6	100
302	311	286	286	65.3	105.5	30	47.7	75.0	50.4	31.3	43.6	97
294	304	279	279	64.7	104.5	29	47.0	74.5	49.5	30.1	42.7	95
286	297	271	271	64.3	104.0	28	46.1	73.9	48.6	28.9	41.7	93
279	290	264	264	63.8	103.0	27	45.2	73.3	47.7	27.8	40.8	90
272	284	258	258	63.3	102.5	26	44.6	72.8	46.8	26.7	39.9	88
266	278	253	253	62.8	101.5	25	43.8	72.2	45.9	25.5	39.2	86
260	272	247	247	62.4	101.0	24	43.1	71.6	45.0	24.3	38.4	84
254	266	243	243	62.0	100.0	23	42.1	71.0	44.0	23.1	37.7	82
248	261	237	237	61.5	99.0	22	41.6	70.5	43.2	22.0	36.9	80
243	256	231	231	61.0	98.5	21	40.9	69.9	42.3	20.7	36.3	79
238	251	226	226	60.5	97.8	20	40.1	69.4	41.5	19.6	35.6	77
230	243	219	219		96.7	18					34.6	75
222	236	212	212		95.5	16					33.5	72
213	229	203	203		93.9	14					32.3	69
204	220	194	194		92.3	12					31.1	66
196	212	187	187		90.7	10					30.0	63
188	204	179	179		89.5	8						61
180	196	171	171		87.1	6						59
173	189	165	165		85.5	4						56
166	181	158	158		83.5	2						54

PROPERTIES OF ELEMENTS

Element	Density [g/cm ³]	Hardness [kg/mm ²]	Youngs Modulus [X10 ³ kg/mm ²]	Thermal Expansion Coefficient [10 ⁻⁵ /°C]	Melting Point [°C]
WC	15.60	2,150	70	5.1	2,900
TiC	4.94	3,200	46	7.6	3,200
TaC	14.50	1,800	29	6.6	3,800
NbC	8.20	2,050	35	6.8	3,500
TiN	5.43	2,000	26	9.2	2,950
Al ₂ O ₃	3.98	3,000	42	8.5	2,050
CBN	3.48	4,500	71	4.7	
Diamond	3.52 >	9,000	99	3.1	
Co	8.90		10~18	12.3	1,495
Ni	8.90		20	13.3	1,455

TECHNICAL DATA

TROUBLE SHOOTING

Types		Status	Cause	Countermeasures
Flank Wear		- Variation of dimension - Deteriorated finishing surface - Increasing machining load	- Wear by grinded surface - Excessive feed rate and cutting speed	- Reduce cutting Speed - Use larger corner radius - Use high wear-resistant grade
Crater Wear		- Deterioration of chip disposal - Deteriorated finishing surface	- Wear by chips (remarkable with ductile cast iron) - Excessive cutting speed	- Reduce cutting Speed - Use smaller lead angle - Check edge geometry - Use high wear-resistant grade
Thermal Cracking		- Deteriorated finishing surface - Occurrence of chipping	- Severe cycle of heating & cooling during cutting - Excessive feed rate and cutting speed	- Reduce cutting speed - Reduce feed rate - Change to dry machining - Use tougher grade
Notch Wear		- Deteriorated finishing surface - Increasing machining load	Excessive feed rate and cutting depth	- Reduce cutting depth - Reduce feed rate - Use tougher grade - Increase coolant supply
Edge Splintering		- Occurrence of fire flower - Occurrence of noise - Increasing Machining load	- Excessive feed rate - Falling-off of BUE - Weak cutting edge	- Use tougher grade - Check edge geometry - Increase stability of the system - Use larger lead angle
Plastic Deformation		- Variation of dimension - Chipping of cutting edge	- High machining load - Use of improper grade	- Reduce cutting speed - Reduce feed rate - Reduce cutting depth - Use harder grade
Built-up-Edge		- Deteriorated finishing surface - Variation of dimension - Occurrence of chipping	- High affinity with work piece - Low cutting speed	- Increase cutting speed - Increase feed rate - Use tougher grade - Use larger rake angle
Breakage		- Occurrence of fire flower - Cutting impossible	- Using low toughness Insert - Using improper clamping holder	- Use tougher grade - Reduce feed rate - Reduce cutting depth - Increase stability of the system

VOLLCUT INSERTS WEAR PROBLEMS AND SOLUTIONS

COMPARISON OF WORK-PIECE

ISO	Korea KS	United Kingdom BS	America AIS/SAE	German DIN	Spain UNF	Italy UNI	Sweden SS	France AFNOR	Japan JIS
P Steel	Carbon steels								
	SM15C	080M15	1015	Ck15	C15K	C16	1370	XC12	S15C
	SM25C	-	1025	Ck25	-	-	-	-	S25C
	SM35C	060A35	1035(1037)	Ck35	-	C36	1572	XC38TS	S35C
	SM45C	080M46	1045(1046)	Ck45	C45K	C45	1672	XC42	S45C
	SM50C	060A52	1049	Ck50	-	C53	1674	XC48TS	S50C
	SM55C	070M55	1055	Ck55	C55K	C5	-	XC55	S55C
	SM58C	080A62	1060	Ck58	-	C60	1678	XC60	S58C
	-	212M36	1140	35S20	F210G	-	1957	35MF4	-
	SCMn1	150M28	1330	28Mn6	-	-	-	20M5	SCMn1
	-	230M07	1215	95Mn36	125Mn35	CF9SMn36	-	S300	-
	SMn438(H)	-	1355	36Mn5	36Mn5	-	2120	40M5	SMn738(H)
	sum22	230M07	1213	95Mn28	115Mn28	CF9SMn28	1912	S250	sum22
	Low alloy steels								
	SNC815	655M13	3310:3415	14NiCr14	-	-	-	12NC15	SNC815(H)
	SNC415	-	3415	14NiCr10	15NiCr11	16NiCr11	-	14NC11	SNC415(H)
	SNC236	640A35	3435	36NiCr6	-	-	-	35NC6	SNC236
	SCM420,SCM430	1717DS110	41300	25CrMo4	55Cr3	25CrMo(KB)	2225	25CD4	SM420;SCM430
	SCM432,SCCRM3	708A37	4137:4135	34CrMo4	34CrMo4	35CrMo4	2234	35CD4	SM432;SCCRM3
	SCM415	-	-	15CrMo5	12CrMo4	-	2216	12CD4	SCM415(H)
	SCM440	708M40	4140	42CrMo4	42CrMo4	42CrMo4	2244	42CD4	SCM440(H)
	SCM440	708M40	4140:4142	41CrMo4	42CrMo4	41CrMo4	2244	42CD4TS	SCM440
	-	820A16	-	17CrNiMo6	14NiCrMo13	-	-	18NCD6	-
	-	1503-245-420	4520	16Mo5	16Mo5	16Mo5	-	-	-
	SCMnH1	Z120M12	-	G-X120Mn12	X120Mn12	XG120Mn12	-	Z120M12	SCMnH/1
	SCr415	523M15	5015	15Cr3	-	-	-	12C3	SCr415(H)
	-	[527M20]	5115	16MnCr5	16MnCr5	16MnCr5	2511	16MC5	-
	SCr430	530A32	5130	34Cr4	35Cr4	34Cr4(KB)	-	32C4	SCr430(H)
	SCr440	530M40	5140	42Cr4	42Cr4	41Cr4	-	42C4	SCr440(H)
	SPS	735A50	6050	50CrV4	51CrV4	50CrV4	2230	50CA4	SUP10
	SPS9	527M60	5155	55Cr3	-	-	-	55Cr3	SUP9(A)
	-	905M39	-	41CrAlMo7	41CrAlMo7	41CrAlMo7	2940	40CAD6,12	-
	SNCM220	805M20	8620	21NiCrMo22	20NiCrMo2	20NiCrMo2	2506	30NCD2	SNCM22(H)
	SNCM240	311-Type7	8637,8640	40NiCrMo22	40NiCrMo2	40NiCrMo2(KB)	-	-	SNCM240
	-	250A53	9255	55Si7	56Si7	55Si8	2085	55S7	-
	-	816M40	9840	36CrNiMo4	35NiCrMo4	38NiCrMo4(KB)	-	40NCD3	-
	SU2	534A99	52100	100Cr6	F131	100Cr6	2258	100C6	SU2
	SUM22L	-	12L13	95MnPb28	115MnPb28	CF9SMnPb28	1914	S250Pb	SUM22L
	-	-	12L14	5MnPb36	125MnPb25	CF9SMnPb36	1926	S300Pb	-
	-	150-620Gr27	ASTM A182	13CrMo44	14CrMo45	14CrMo45	-	15CD3.5	-
	-	1501-622	ASTM A182	10CrMo910	TU.H	12CrMo9,10	2218	12CD9,10	-
	-	-	ASTM A350LF5	14Ni6	15Ni6	14Ni6	-	16N6	-
	-	1501-240	ASTM A204GrA	15Mo3	16Mo3	16Mo3KW	2912	15D3	-
	-	722M24	32CrMo12	32CrMo12	F124.A	32CrMo12	2240	30CD12	-
	High alloy steels								
	STD1	B03	D3	X210Cr12	X210Cr12	X210CrMoV13KU	-	Z200C12	SKD1
	STS12	-	A2	Z100CrMoV51Z100CDV5	BA2	2260	Z100CrMoV51	Z100CrMoV51KU	SKD12
	-	-	-	X210CrW12	X210CrE12	X215CRW121KU	2312	-	SKD2
	STD61	BH21	H21	X30WCrV9	X30WCrV9	X28W09KU	-	Z30WCV9	SKD5
	-	BH13	H13	X40CrMoV51	X40CrMoV5	X35CrMoVKU	2242	Z40CDV5	SKS31
	STS31	-	-	105WCr6	05WCr5	3KU	2140	105WC13	SKS43
	STS43	BW2	W210	100V1	-	-	-	Y105V	SKT4
	STF4	-	L6	55NiCrMoV6	F520.S	-	-	55NCDV7	SUH1
	-	401S45	HW3	X45GrSi93	F322	10WCr6	-	Z45CS9	SKH55
	-	-	-	-	-	-	-	-	-
	SKH55	-	-	S6-5-2-5	HS6-5-2-5	-	2723	Z85WDCV2723	SKH3
	SKH3	BT4	T4	S18-1-2-5	HS18-1-1-5	X78WCo1805KU	-	Z80WKCV	SKH9
	SKH51	BM2	M2	S6-5-2	HS6-5-2	X82WMo0650KU	2722	Z85WDCV	-
	-	-	-	M7	HS2-9-2	Z100WCWVHS2-9-2	2782	S2-9-2	-
	SKH2	BT1	T1	S18-0-1	HS18-0-1	X75W18KU	-	Z08WCV	SKH2
	-	BS1	S1	45WCrV7	45WCrSi8	45WCrV8KU	2710	-	-

TECHNICAL DATA

COMPARISON OF WORK-PIECE

ISO	Korea KS	United Kingdom BS	America AIS/SAE	German DIN	Spain UNF	Italy UNI	Sweden SS	France AFNOR	Japan JIS
M Stainless Steel	Carbon steels								
	STS301	-	301	X12CrNi177	-	2331	F3517	Z12CN1707X12CrNi1707	SUS301
	STS303	-	303	X12CrNi180710CNF18.09	-	2346	F3517	X10CrNiS18.09	SUS303
	-	-	304	X5CrNi189	304S31	X5CrNi18	2332/2333F.3551	Z6CN18.09	SUS304
	STS304	304S15	304	X5CrNi189	F3551	X5CrNi1810	2332	Z6CN18.09	SUS304
	STS304L	-	304L	X2CrNi1911	304C12	2333	-	-	SUS304L
	SSC16	-	304LX2CrNi1819	Z2CrNi1810	304S12	2352	F3503	X2CrNi1011	SCS16
	STS304L	304S62	304LN	Z2CrNiN,1810	-	-	2371	Z2CN1810	NSUS304LN
	STR31	-	HW3X45CrSi93	Z45CrSi93	401S45	-	SF322	X45CrSi8	SUH1
	STR309	-	309	X15CrNiSi201	-	-	-	Z15CNS2012	SUH309
	STR310	310S24	310S	X12CrNi2521	F332	X60CrNi2520	2361	Z12CN2520	SUH310
	STS316	-	316	X5CrNiMo1810	346S16	X5CrNiMo17122347	F3543	Z6CND1711	SUS316
	STS316LN	-	316LN	X2CrNiMoN	-	-	2375	X2CND1713	SUS316LN
	STS316L	-	316L	X2CrNiMo1812	-	-	-	-	SUS316L
	SSC16	-	316LXCrNiMo	Z2cndCND1712	316S13	2353	-	X2CrNiMo1712	SCS16
	-	320S17	316Ti	Z2CND1915	F3535	X6CrNiMoTi1712	2350	Z6VDT1712	-
	STS317L	-	317L	X24CrNiMo1816	317S12	2367	-	X2CrNiMo1816	317L
	-	-	X10CrNi	Z6CNDNb	-	-	-	X6CrNiMoMoNb	318
	-	-	S32304	X2CrNiN,234	-	-	2327	Z2CN23-04AZ	-
	-	-	S32900	X8CrNiMo.275	-	-	2324	-	-
	-	-	S31803	X2CrNiMoN	-	-	2377	Z2CND22-0503	-
	STS321	351S12	321	X10CrNiTi	F3553	X6CrNiTi1811	2337	Z6CNT18.10	SUS321
	STS347	-	347	X6CrNiNb189	347S17	X6CrNiNb18.112338	F3552	Z6CNNb18.10	SUS347
	STS12	BA2	A2	Z100CrMoV51	Z100CrMoV51	Z100CrMoV51KU	2260	Z100C0V5	SKD12
	High alloy steels								
	STS403	403S17	403	X7Cr13	F3110	X6Cr13	2301	Z6C13	SUS403
	STS405	403S17	405	X10CrAl13	F311	X10CrAl13	-	Z10C13	SUS405
	STS410	410S21	410	X10Cr13	F3401	L13	2302	Z10C14	SUS410
	STS420J2	420S45	-	X46Cr13	F3405	X40Cr145	2304	Z4CM	SUS420J2
	STS430	430S15	430	X8Cr17	F3113	X8Cr17	2320	ZBC17	SUS430
	STS430F	-	430F	X12CrMoS17	F3117	X10CrS17	2383	Z10CF17	SUS430F
	STS431	431S29	431	X22CrNi6	F33427	X16CrNi16	2321	Z15CNI6.02	SUS431
	STS434	434S17	434	X6CrMo17	-	ZX8CrMo17	2325	ZBCD17.01	SUS434
	STR446	-	446	X10CrAl24	-	X16Cr26	2322	Z10CAC24	SUH446
	SSC5	425C11	-	X5CrNi134	-	-	-	Z4CND13.4M	SCS5
	STR35,STR36	348S54	EV8	X53CrMnNiN219	-	X53CrMnNiN	-	Z52CMN21.09	SUH35,SUH36
	STR4	443S65	HNW6	X80CrNiSi20	F320B	X80CrSiNi20	-	Z80CSN20.02	SUH4
	High alloy steels								
	HRHC15	330C11	-	GX40NiCrSi	-	XG50NiCr	-	-	SCH15
	STR330	-	X12NiCrSi	-	-	-	-	Z12NCS35.16	SUH330330
	-	3072-76	4676	NiCu30Al	-	-	-	-	-
	-	-	5390A	-	-	-	-	NC22FeD	-
	-	3146-3	5391	S-NiCr13A16MoNb	-	-	-	NC12D	-
	-	HR8	5383	NiCr19Fe19NbMo	-	-	-	NC19rNB	-
	-	-	5537C	CoCr20W15Ni	-	-	-	KC20WN	-
	-	-	5660	NiFe35Cr14MoTi	-	-	-	ZSNCDT42	-
	-	-	5666	NiCr22Mo9Nb	-	-	-	NC22FeDNB	-
	-	-	AMS5397	NiCr15Cr10MoAlTi	-	-	-	-	-
	-	-	AMS5399	NiCr19Co11MoTi	-	-	-	NC19KDT	-
	-	-	AMS5544	NiCr19Fe19NbMo	-	-	-	NC20K14	-
	-	-	AMS5772	CoCr22W14Ni	-	-	-	KC22WN	-
	-	TA10-13/TA28	AMSR56400	TiAl6V4	-	-	-	T-A6V	-
	-	TA14/17	AMSR54520	TiAl5Sn2.5	-	-	-	T-A5E	-

ISO	Korea KS	United Kingdom BS	America AIS/SAE	German DIN	Spain UNF	Italy UNI	Sweden SS	France AFNOR	Japan JIS
K Cast iron	Gray cast iron								
	GC100	-	No20B	GG10	-	G10	110	Ft100	FC100
	GC150	Grade150	No25B	GG15	-	G14	115	Ft150	FC150
	GC200	Grade220	No30B	GG20	-	G20	120	Ft200	FC200
	GC250	Grade260	No35B	GG25	-	G25	125	Ft250	FC250
	GC300	Grade300	GNo45B	GG30	-	G30	130	Ft300	FC300
	GC350	Grade350	No50B	GG35	-	G35	135	Ft350	FC350
	GCD400	SNG420/2	60-40-18	GGG40	-	GS400-12	0717-02	FCS400-12	FCD400
	GCD500	SNG500/7	65-45-12	GGG50	-	GS500/7	0727-02	HGS500-7	FCD500
	GCD600	SNG600/3	80-55-06	GGG60	-	GS600/3	0732-03	FGS600-3	FCD600
	GCD700	SNG700/2	100-70-03	GGG70	-	GS700/2	0737-01	FGS700-2	FCD700
	Ductile cast iron								
	-	B340/12	32510	GTS-35	-	-	0815	MN35-10	-
	-	P440/7	40010	GTS-45	-	-	0852	-	-
	-	P510/4	50005	GTS-55	-	-	0854	MP50-5	-
	-	P570/3	70003	GTS-65	-	-	0858	MP60-3	-
Aluminium	Aluminium alloy								
	HRHC15	330C11	-	GX40NiCrSi	-	XG50NiCr	-	-	SCH15
	STR330	-	X12NiCrSi	-	-	-	-	Z12NCS35.16	SUH330330
	-	3072-76	4676	NiCu30Al	-	-	-	-	-
	-	-	5390A	-	-	-	-	NC22FeD	-
	-	3146-3	5391	S-NiCr13A16MoNb	-	-	-	NC120	-

Turning

Terminology and units

D_m = Machined diameter	mm	f_n = Feed per revolution	mm/r
v_c = Cutting speed	m/min	κ_r = Entering angle	degree
n = Spindle speed	r/min	R_{max} = Profile depth	μm
T_c = Machining time	min	r_{ϵ} = Insert nose radius	mm
Q = Metal removal rate	cm^3/min	a_p = Depth of cut	mm
l_m = Machined length	mm	h_{ex} = Max chip thickness	mm
P_c = Net power	kW	SCL = Spiral Cutting Length	m
$k_{c0.4}$ = Specific cutting force for chip thickness 0.4 mm	N/mm^2		

Formulas

Cutting speed (m/min)

$$v_c = \frac{D_m \times \pi \times n}{1000}$$

Spindle speed (r/min)

$$n = \frac{v_c \times 1000}{\pi \times D_m}$$

Metal removal rate
(cm^3/min)

$$Q = v_c \times a_p \times f_n$$

Power requirement (kW)

$$P_c = \frac{v_c \times a_p \times f_n \times k_{c0.4}}{60 \times 10^3} \left[\frac{0.4}{f_n \times \sin \kappa_r} \right]^{0.29}$$

Machining time (min)

Constant n

$$T_c = \frac{l_m}{f_n \times n}$$

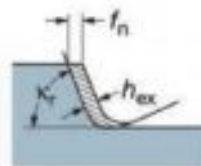
Profile depth (μm)

$$R_{max} = \frac{f_n^2 \times 125}{r_{\epsilon}}$$

Max chip thickness

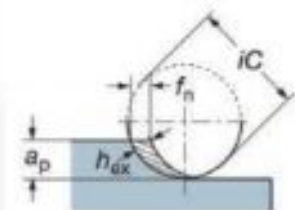
Insert shapes:
C, D, S, T, V, W

$$h_{ex} = f_n \times \sin \kappa_r$$



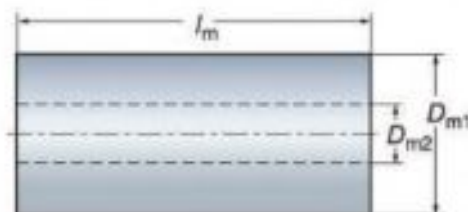
Round inserts

$$h_{ex} = f_n \times \sqrt{\frac{4a_p}{iC} - \left(\frac{2a_p}{iC}\right)^2}$$



SCL (Spiral Cutting Length) – input info in mm – result in m

External or internal turning



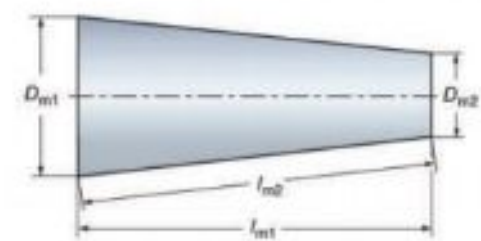
$$SCL = \frac{D_m \times \pi}{1000} \times \frac{l_m}{f_n}$$

Facing



$$SCL = \left(\frac{D_{m1} + D_{m2}}{2} \times \frac{\pi}{1000} \right) \times \frac{l_{m1}}{f_n}$$

Taper cutting



$$SCL = \left(\frac{D_{m1} + D_{m2}}{2} \times \frac{\pi}{1000} \right) \times \frac{l_{m2}}{f_n}$$

Machining time (min)

$$T_c = \frac{SCL}{v_c}$$

How to calculate: l_{m2}

$$l_{m2} = \sqrt{(l_{m1})^2 + \left(\frac{D_{m1} - D_{m2}}{2} \right)^2}$$

Milling

Terminology and units

D_{cap} = Cutting diameter at actual depth of cut, a_p	mm	h_m = Average chip thickness	mm
l_m = Machined length	mm	z_c = Effective number of teeth	piece
a_p = Cutting depth	mm	k_{c1} = Specific cutting force (for $h_{ex} = 1$ mm)	N/mm ²
a_e = Working engagement	mm	n = Spindle speed	r/min
v_c = Cutting speed	m/min	P_c = Cutting power net	kW
Q = Metal removal rate	cm ³ /min	κ_r = Entering angle	degrees
T_c = Machining time	min	m_c = Rise in specific cutting force (k_c) as a function of chip thickness	
z_n = Total number of teeth in cutter	piece	iC = Inscribed circle	
f_z = Feed per tooth	mm/r	γ_0 = Chip rake angle	
f_n = Feed per revolution	mm		
v_f = Table feed (feed speed)	mm/min		
h_{ex} = Max chip thickness	mm		

Formulas

Cutting speed
(m/min)

$$v_c = \frac{D_{cap} \times \pi \times n}{1000}$$

Spindle speed
(r/min)

$$n = \frac{v_c \times 1000}{\pi \times D_{cap}}$$

Table feed (feed speed)
(mm/min)

$$v_f = f_z \times n \times z_n$$

Feed per tooth
(mm)

$$f_z = \frac{v_f}{n \times z_c}$$

Feed per revolution
(mm/r)

$$f_n = \frac{v_f}{n}$$

Metal removal rate
(cm³)

$$Q = \frac{a_p \times a_e \times v_f}{1000}$$

Specific cutting force
(N/mm²)

$$k_c = k_{c1} \times h_m^{-m_c} \times \left(1 - \frac{\gamma_0}{100}\right)$$

Average chip thickness (mm)
(Side and facemilling) when $a_e/D_c \leq 0.1$

$$h_m \approx f_z \sqrt{\frac{a_e}{D_{cap}}}$$

Average chip thickness (mm)
when $a_e/D_c \geq 0.1$

$$h_m = \frac{\sin \kappa_r \times 180 \times a_e \times f_z}{\pi \times D_{cap} \times \arcsin \left(\frac{a_e}{D_{cap}} \right)}$$

Machining time
(min)

$$T_c = \frac{l_m}{v_f}$$

Net power
(kW)

$$P_c = \frac{a_p \times a_e \times v_f \times k_c}{60 \times 10^6}$$

Comparison table of Grade

Turning materials comparison table

		VOLLCUT	SANDVIK	SECO	KENNAMETAL	TaeguTec	WALTER	MITSUBISHI	SUMITOMO	TUNGALOY	KYOCERA	KORLOY
K	K01	VCTK01	GC3205	TK1000	KCK05 KC9315	TT1300	WAK10	UC5105	AC405K AC410K	T5105 T5010	CA4505 CA4010	NC6105 NC305K
	K10	VCTK10	GC3210	TK2000	KCK15	TT7310	WAK20	UC5115	AC420K	T5115 T5125	CA4515 CA4115 CA4120	NC6110 NC6010
	K15	VCTK15	GC3215		KC9325							
	K20	VCTK20										
P	P01	VCTP01	GC4205	TP0500	KCP05	TT8115	WPP05	UE6105	AC700G	T9005	CA5505	NC3010
	P10	VCTP10	GC4215	TP1500	KCP10		WPP10	UE6110	AC810P	T9115	CA5515	
	P20	VCTP20	GC4225	TP2000	KCP25	TT8125	WPP20	UE6020	AC820P	T9125	CA5525	NC3015
			GC4025	TP2500	KC9125	TT5100	WAP20		PAC2000		CR7025	NC3120 NC3020
M	P30	VCTP30	GC4235 GC4035	TP3000 TP3500	KCP30 KCP40 KC9140	TT8135 TT7100	WPP30 WAP30	UE6035 UH6400	AC830P AC3000	T9135	CA5535 CR9025	NC3030 NC500H
	M10	VCTM10	GC2015	TM2000 TP200	KCM15	TT9215	WAM10	US7020 VP05RT	AC610M AC510U	T6020	CA6515	PC8110 NC9020
	M20	VCTM20	C2025	CP500	KCM25	TT9225	WAM20	US735	AC630M AC520U	T6030	CA6525	NC9025
	M30	VCTM30	GC2035	TM4000 TP400	KCM35	TT9235 TT8020	WAM30	UH6400	AC630M AC530U		PR630	NCS330 PC9030
S				KCK20		GC3215		AC2000				
	S05		GCS05F	TH1000	KC5510	TT5080	WSM10	VP05RT VP10RT	AC510U	AH110	PR1005 PR930	PC8110
	S15		GC1105 GC1115	TH1500 TS2000 TS2500								
	S25		GC1125	CP500	KC5525	TT9080	WSM20 WSM30	VP15TF VP20RT	AC520U	AH120	PR1025 PR1125 PR1225	PC5300 PC9530

Comparison table of Grade

Milling materials comparison table

		VOLLCUT	SANDVIK	SECO	KENNAMETAL	TaeguTec	WALTER	mitsubishi	SUMITOMO	TUNGALOY	KYOCERA	KORLOY
K	K01	VCTK01	GC3220	T150M	KC915M	TT6800		MP8010				
	K10	VCTK10	GC3020	MK2000		TT6080	WKK25	VP10TF	ACZ310		PR510	PC6510
	K20	VCTK20	GC1020						ACK200		PR610	PC215K
P	P10	VCTP10	GC4220	MP2500		TT6800	WAM10	F7030	ACP100		PR830	PC3500
	P20	VCTP20	GC4020	T250M		TT7080	WAM20				PR1025	PC3535
						TT7030	WKP25			AH725	PR1225	PC3525
P	P30	VCTP30	GC4230	F30M	KC522M	TT9080	WAM30	VP15TF	ACP200	GH330	PR1225	PC9530
			GC4030		KC635M	TT9030						
	P40	VCTP40	GC4240	F40M	KC725M	TT8020	WKP35	VP30RT	ACP300		PR1225	NCM325
M			GC4040	T350M	KC735M	TT8080	WSP45	F7030	ACZ350	AH730	PR1230	NCM335
					KC935M	TT7800				AH140		PC3545
	M10	VCTM10	GC1010	F30M	KC522M	TT9080	WAM30	VP15TF	ACP200	AH120	PR1025	
	M20	VCTM20	GC1030		KC525M	TT9030	WQM35				PR1225	
	M25	VCTM25	GC2030								PR905	
	M30	VCTM30				TT8020						
	M40	VCTM40	GC2040	F40M	KC725M	TT8020	WXM35	VP30RF	ACP300	AH130	PR1535	
						TT8080	WSM35					
							WSP45					

Comparison table of Grade

Carbide materials

ISO Classification	VOLLCUT	SANDVIK	SECO	KENNAMETAL	TaeguTec	WALTER	mitsubishi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY
P	P10	VCTP10	S1P								SRT		
	P20	VCTP20		K125	P10		UTi20T	A30N	TX25		SRT DX30	EX35	ST20
	P30	VCTP30		GX K600	P20		UTi20T	A30N	UX30	PW30	SR30 DX30	EX35 EX40	ST30A
	P40	VCTP40			P30					PW30	SR30	EX45	ST40
M	M10	VCTM10		K110M	M10						UMN		U10
	M20	VCTM20		K313	M20		UTi20T	A30N			DX25 UMS	EX35	U20
	M30	VCTM30		KFM K600			UTi20T	A30N	UX30		DX25 UMS	EX40 EX45	
	M40	VCTM40			M40				TU40			EX45	U40
K	K01	VCTK01					UTi05T				KG03		H01
	K10	VCTK10	H1P	K110M K313	K10	WK10	HTi10	G10E	TH10	KW10	KG10	WH10	H05 H10
	K20	VCTK20		KFM	K20		UTi20T	G10E			KT9 CR1 KG20	WH20	G10
	K30	VCTK30					UTi20T				KG30		
Milling													

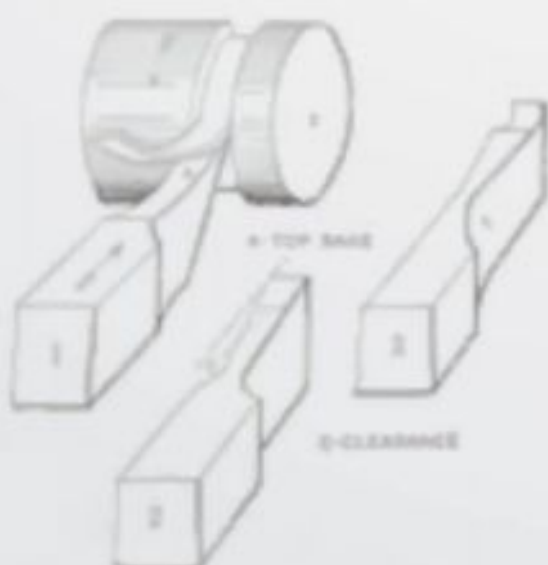
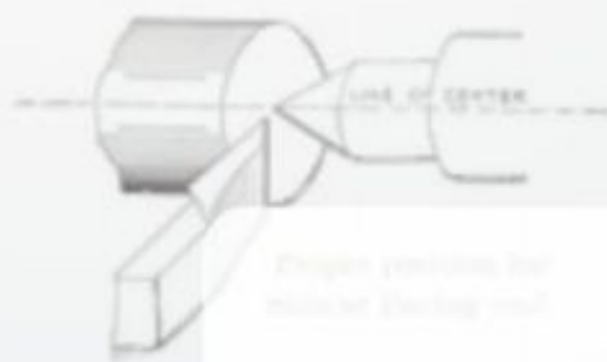
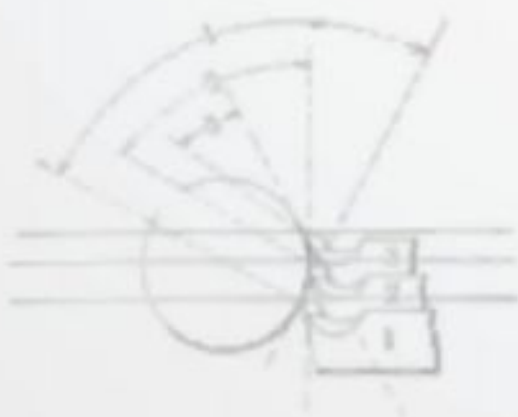
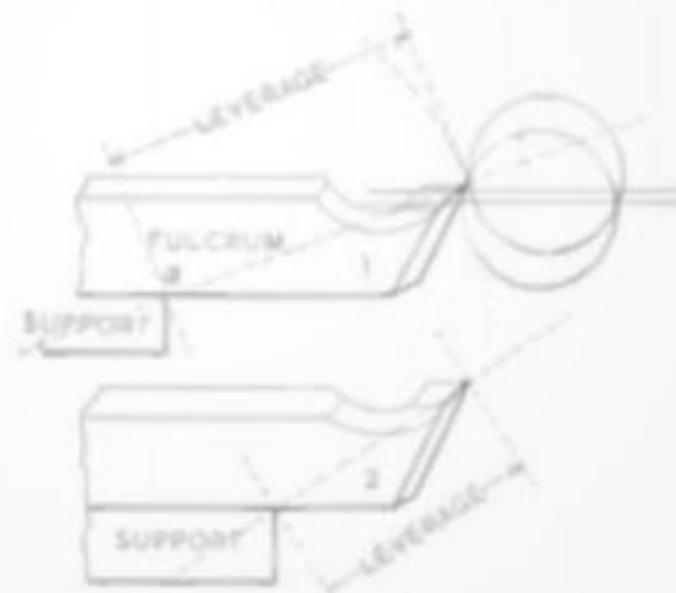
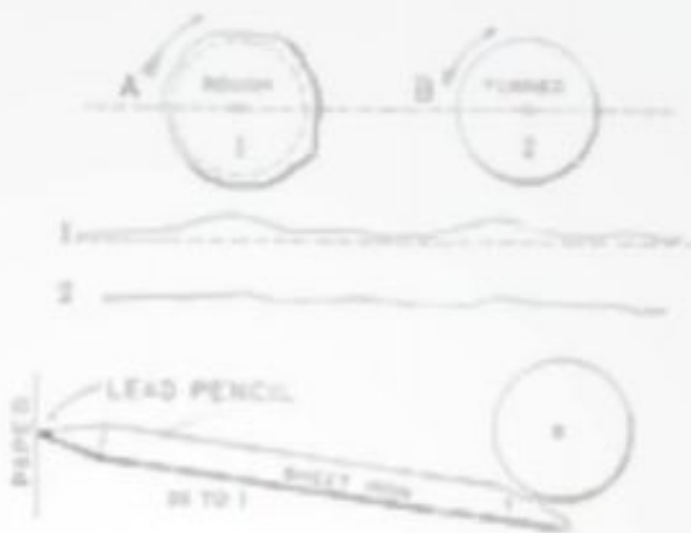
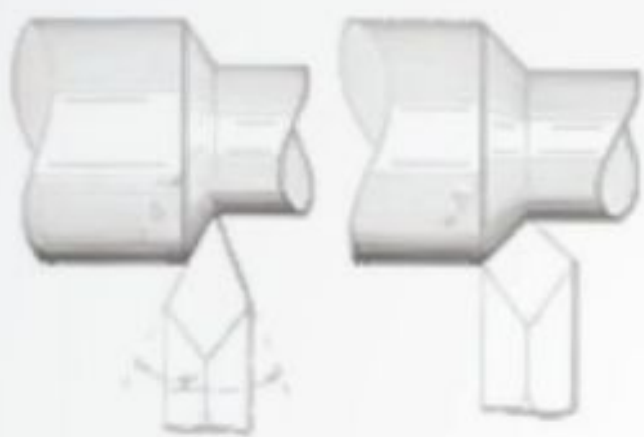
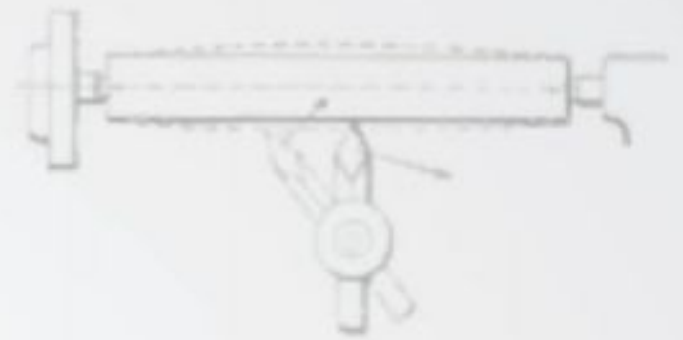
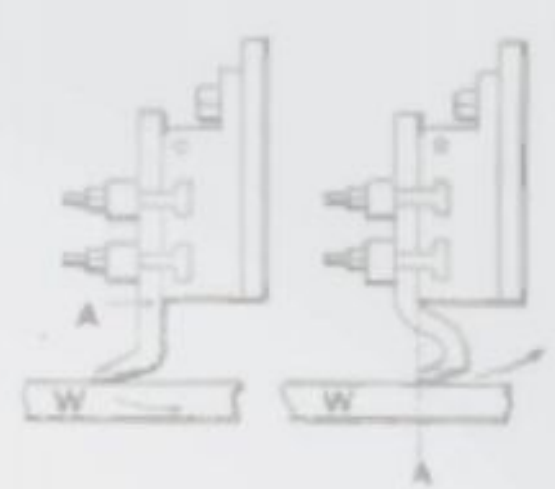
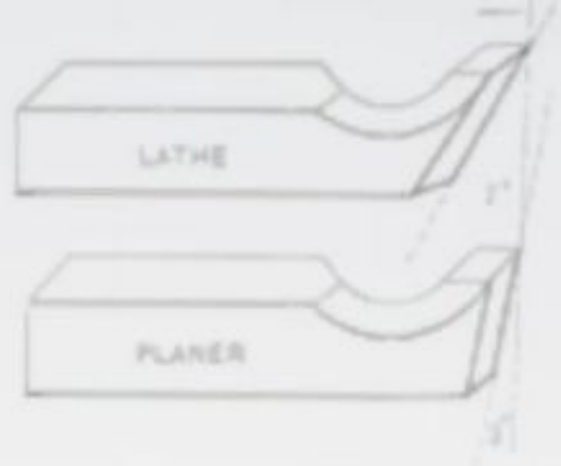
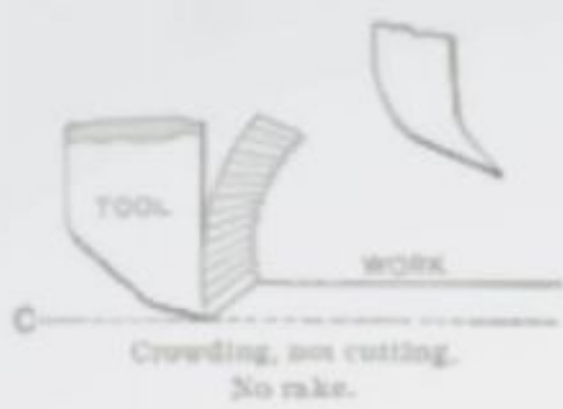
Comparison table of chipbreaker for turning insert

Comparison table for chipbreaker of positive inserts

ISO	Processing range	VOLLCUT	VALANTTE	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MISTUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA
P	Finishing	UHF PHF	PF4 JQ JZ	UF PF	HFP	FA FG	PF4	FF1 F1	FV SV	FP LU SU SK	11 UF LF		JQ	01 PF FS	GP XP VF
	Finishing(Fix light blade)	WHK WHP		WK W WP			PF	W-F1	SW	LUW	FW				
	Semi finishing	UHM PHM	PM2 PM4	UM PM	HMP C25	MT CMX	PS5 PM5	F2	MV	MU	MF	FT	JE	PM 23 24	HQ XQ GK
M	Semi finishing (Fix light blade)	WHM		WM			PM		MW		MW				
	Finishing	MHF	1A 2A	MF	HFP	FA FG	PF4		SV					SS	
K	Semi finishing	MHM	PM2 PM4	MM	HMP C25	MT CMX	PS5 PM5		MV						
	Semi finishing	KHF KHM KHR	PM2 PM4	KF KM KR	HMP C25	MT CMX	MW PS5 PM5		No slot GH	No slot GH		FT		No slot GH	No slot GH
S	Finishing, semi finishing		PM2 1A 2A				PF4 PS5 PM5		FJ	SC	LF HP				
N	General cutting		1L 1A 2A	AL	TA AK MA	FL	PM2			AG	HP	ALU ACB		PP	A3

Comparison table of chipbreaker for turning insert
Comparison table for chipbreaker of negative inserts

ISO Classification	Processing range	VOLLCUT	VALANTTE	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MISTUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA
P	Super finishing	QHF	F1	QF	HU		NF3	FF1	PK FH FY	FA FL	UF FF		FE	01 TF ZF	DP GP VF XP XP-T
	Finishing	PHF MHF	F2(2B) F5(5C)	PF MF	HF	FG	NS6	MF2	C SA SH	SU LU SX	LF FN	PF UR UA UT	BE CE	NS 27 TS AS	HQ CQ
					HF				SY					17	XQ XS
	Finishing(Fix light blade)	WHP WHF		WIP WF	HW		NF	W-MF2	SW	LUW	FW			AFW ASW	IWP WQ
	Semi finishing	PHM QHM SHM	F3 F4(9A) W(2C) M3 M4 M5(5B) M6 M7 55 M8	PM QM SM	HA HC HM	MC ML MP	NM4 NM6	MF3 M3 M5	MV MA MH	GU UG UX	MG MN	PG UB	AB AY AE	NM ZM TM DM 37	CJ GS PS HS PT CS
	Semi finishing/Fix light blade	WHM		WM			NM	W-M3	MW	GUW	MW				
M	Rough machining/Fix light blade	PHR		PR		MT MG	NM9	MR7	GH	MU MX	RN	UD GG	AR RE	TH	GT HT
	Light load balancing	QHR PHR HHR	R3 R4 R6(9A) R7(9B) R9(9C)	QR PR HR	HR HH	RT RH	NR6	R4 R6 R7 PR9	HZ HX HV	MP HG HP	MR RM RH	UC	HX HE	57 65 TU	HX
	Finishing	MHF	F1 F2(2B) F5(5C)	MF	HA	FG SF	NF4		FS	SU	K FP		SE	SS	GU
	Semi finishing	MHM	F3 F4(9A) W(2C) M3 M4 M5(5B) M6 M7 55 M8	MM	HS	ML MP	NM4		MS ES	EX UP	P MP	SF SG	DE	SA SM S	SU HU ST
	Rough machining	MHR	R3 R4 R6(9A) R7(9B) R9(9C)	MR	GS HM	MT RH	NR4	M5 MR7	GH HZ	MP	RP				
	Finishing	KHF	F2(2B)	KF	No broken flooks slot	FG	MA		All Week	UZ	FN			CM	All Week C
K	Semi finishing	KHM	M5(5B) M6 M8	KM	Whole Weeks slot	MC MT MG	MA NM5		All Week	UX	All Week UN			All Week	ZS GC
	Rough machining	KHR	R3 R4 R7(9B)	KR	GR HR GH	RT RH	MA		No broken flooks slot	No broken flooks slot					No broken flooks slot
S	Finishing		F5(5C) M2(2C)			SF	NF4	56 R6	FJ		FS K				
	Semi finishing		M4 M5(5B) M7 55	NGP 23			NM4	MF1	MJ	SU	NGP			SA	
	Rough machining	SHR		SR			NR4	M1	GJ		MS				
N															



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