ILPT

PCD & CBN PRECISION
CUTTING TOOL EXPERTS

GIVING MANUFACTURERS THE COMPETITIVE EDGE

With PCBN & PCD Inserts

15 YEARS OF PERFORMANCE. DELIVERED.

YOUR PARTNERS FOR SUCCESS

IL Precision Technology manufactures ISO & tailor-made PCBN & PCD inserts with a team of experts with more than 15 years of experience in manufacturing of high-performance PCBN and PCD cutting tools.

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PCBN and PCD are high-performance tool material from a polycrystalline mass, produced in high temperature-pressure process.

WHY PCBN & PCD ?

ALL SET TO MEET CRITICAL NEEDS OF MANUFACTURING INDUSTRY, TODAY !!

PCD which is the hardest known substance has a hardness of about 6000 kg/mm^2, the hardness of CBN (second hardest known substance) is about 4500kg/mm^2. This in addition to many other extreme properties, makes it the ideal cutting tool material for hard, abrasive workpieces. PCBN has greater chemical and thermal stability than diamond, which dissolves in iron and has a maximum temperature limit of approximately 700°C (1300°F).

LOW MACHINING COST

★ For turning it allows,
"Soft turn" and "hard turn" on the same machine.
★ Lower cost of tooling inventory.
★ Metal removal rates are 4-6 times greater.
★ Turning in complex contours is easier.
★ Multiple operations, performed in a single setup.
★ Easier to configure changes.

TOOLS THAT OFFER ENHANCED EFFICIENCY

★ Up to 8 edges per insert.
★ Low per-unit production cost.
★ Better surface finish due to finer microstructure.
★ Excellent toughness permits interrupted cutting.
★ The excellent hardness provides superior edge wear.
★ Chips take heat away from the part and tool.

YOUR ADVANTAGE OF USING PCD & PCBN

PCD (PolyCrystalline Diamond) & PCBN (PolyCrystalline Cubic Boron Nitride)

Better Surface Quality Achievable
+

Dry or Minimal Lubrication Possible
+

High Speed Cutting Achievable
+

Custom Blades that Fulfill Tooling Demands
+

=

YOUR ECONOMIC ADVANTAGE through lower overall cost of production

Parts requiring a greater accuracy, would logically use PCBN if the hardness ranges between 50-68 HRC and the depth of hardness is greater than the depth of material to be removed. PCBN will give good tool life and wear properties. The surface finish of 0.28 - 0.38 µm can be achieved and maintained. ISO and customized inserts are available with multiple grades to suit different machining requirements.

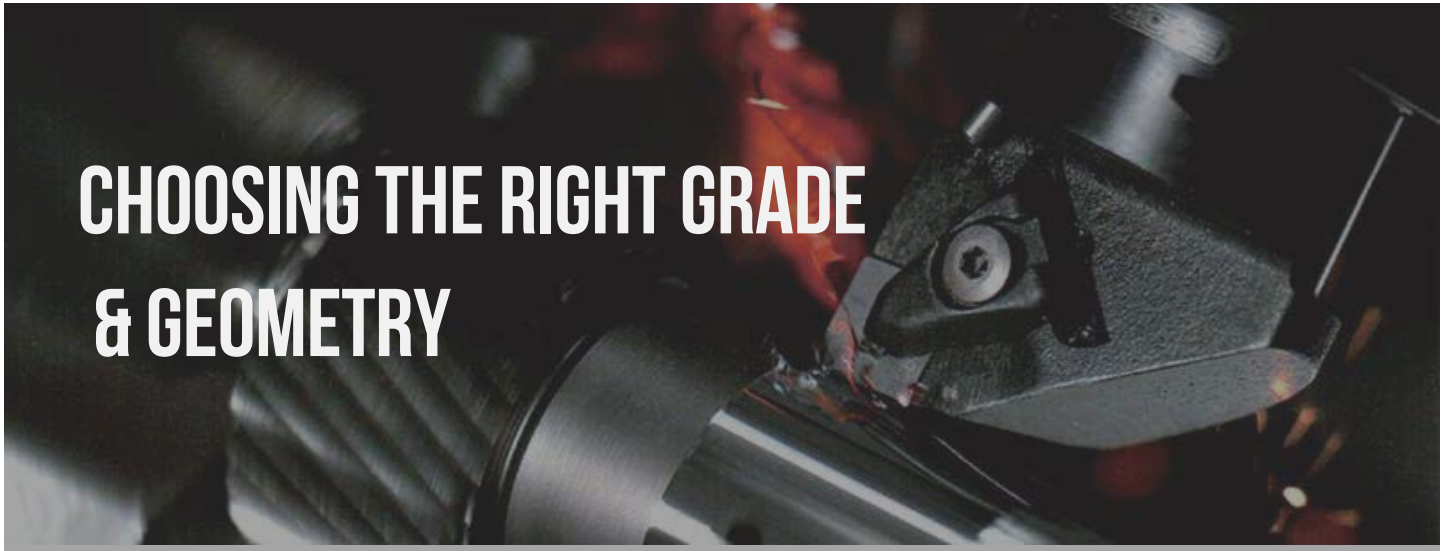
A MATERIAL WITH AN ADVANTAGE

PCD & PCBN tools have advantages over traditional tools, they give less burn, enabling increased cutting speed & feed. PCD is generally suitable for machining non-ferrous workpieces while PCBN is the choice for machining ferrous materials such as hardened steel.

Used particularly for transfer lines since their longer life reduces downtime for tool changing.

WIDE APPLICATION POSSIBILITIES WITH PCBN & PCD

Source	Suited Materials	Machining Type	Typical Application
PCBN	Hardened Steel	Roughing/ Finishing	Gears, Gear Shaft, Bearings...
PCBN	High Strength Cast Iron	Roughing/ Finishing	High hardness component...
PCBN	Gray Cast Iron, Powder Metallurgy	Roughing/ Finishing	Valve Seat Ring, Cylinder Bore, Pulleys, Valve Guides, Drive shafts...
PCD	Aluminum Alloy, Bi-metals Non-Ferrous Metals	Roughing/ Finishing	Crankcase, Cylinder Block Milling, Face Milling...



CHOOSING THE RIGHT GRADE & GEOMETRY

CHOOSE THE RIGHT GEOMETRY

The insert geometry and edge preparation are extremely important as they have a significant influence on tool life and productivity. The ILPT PCBN product range includes inserts with standard nose radius, wipers and the unique design. The standard nose radius generates the lowest cutting forces and has the lowest stability requirements while wipers are an unbeatable combination of high productivity and excellent surface finish.

CHOOSE THE RIGHT STANDARD NOSE RADIUS

Nose radius of the insert is an important performance parameter:

- A small nose radius: 02, 04 (0.008-0.016 inch) provides good chip breaking.
- A large nose radius: 08, 12 (0.03-0.05 inch) generates better surface finish and produces thinner chips, which reduces the degree of crater wear in hard part turning operations.
- The combination of a large nose radius with a small depth of cut results in reduced entry and exit forces.

In general, a large nose radius provides greater edge strength and therefore extended tool life. Use the largest nose radius allowed based on your process requirements.

EDGE CONDITIONS AVAILABLE WITH ILPT PCBN RANGE

Cutting Forces + ⟷ − Edge Strength

S-LAND
(CHAMFER + HONE)

Best choice for hard part turning. Generates consistent surface finish.

Stronger edge than T-land, with more resistance to chipping & fracture, resulting in more predictable tool life.

Critical in interrupted cutting and when using a large depth of cut and the feed rate must be greater than hone size.

T-LAND
(CHAMFER)

T- land is a common edge preparation for PCBN.

A preferred choice for cast iron.

A good alternative to S-land in hard part turning when reduced cutting forces and tighter tolerances are required.

E-LAND
(EDGE HONE)

Honing helps strengthen the edge, giving resistance to chipping and fracturing.

Feed rates must be greater than the hone size to allow actual cutting action to take place and prevent rubbing.

GRADE APPLICATIONS

GRADE	CUTTING SPEED Vc (m/min)	DEPTH OF CUT (mm)	APPLICATION
P155	120-300	0.5 max	H
PS10	100-210	0.5 max	H
P160	100-210	0.5 max	H
P175	100-170	0.5 max	H
P2525	100-175	0.05-0.3	H
PS15	100-210	0.5 max	H
PS50	110-180	0.05-0.5	H
PS80	130-200	0.05-0.2	H
PS30	130-300	0.05-0.3	H
PS85	140-220	0.05-0.2	H
PS95	95-210	0.5max	H
E126S	60-170	0.05-0.64max	H
P3030	140-220	0.05-0.2	H

FEATURES
Moderate interrupted hard turning with superior crater wear resistance. Provides sub micron surface roughness.
Moderate interrupted hard turning and finish hard milling as well as high speed continuous turning.
Continuous and light interrupted cutting of the majority of automotive steels. Excellent abrasion resistance.
Light to moderate interrupted turning of all common hardened steels. Balance of toughness, crater & flank wear resistance.
Continuous to light interrupted turning. Excellent balance of flank and crater wear resistance.
Continuous to light interrupted cutting of the majority of automotive steels.
Machining of high speed steel and cast Iron. Exhibits good wear resistance.
Improved toughness with exceptional crater wear resistance.
Exhibits superior crater wear resistance, offers improved chemical wear, abrasion and impact resistance.
Works well in both hard turning applications as well as valve seat machining.
Light to heavy interrupted turning. Suitable for case and through hardened steels.
Combination of wear resistance and impact strength.
Continuous to heavy interrupted turning. Suitable for case hardened steels.

GRADE APPLICATIONS

GRADE	CUTTING SPEED Vc (m/min)	DEPTH OF CUT (mm)	APPLICATION
P300	600-2200	0.1-5.0	K
PS40	600-2100	0.1 - 4.0	K
P200	600-2500	5.0 max	K
P195	600-2300	0.1 - 4.0	K
E19S	600-1500	3.0 max	K
C10	400-1500	0.1 - 2.5	K
ES01	400-2200	5.5 max	K
P6000	100-170	0.5 max	S
P800	50-180	0.6max	S
P350	50-130	0.5max	S
P17	400-2800	0.1 - 4.0	N
P1402	180-500	0.1 - 4.0	N
P1404	400-2000	0.1 - 4.0	N
P1410	450-2500	0.1 - 4.0	N

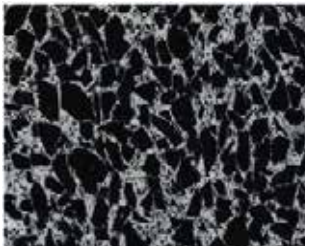
FEATURES
High abrasion resistance, excellent edge quality and retention, superior impact strength. Produces fine surface finish.
Excellent wear resistance, chemical stability, tight dimensional control, consistent surface finish and increased productivity.
Ultimate abrasion and chip resistance. Excellent in interrupted machining of grey & hard cast iron & ferrous powder metals.
Excellent strength & abrasion resistance. Suitable for grey iron fine boring. A choice for the majority of ferrous powder metals.
Machining most kinds of cast iron and powder metal alloy. Extreme wear resistance and high chipping resistance.
A dedicated grade for rough machining of cylinder block liners.
Best choice for the majority of powder metals. Superior for roughing of disc drum and flywheel.
For valve seat and powder metallurgy applications.
Excellent abrasion resistance with good chemical stability. For powder metal application where carbide content is lower.
The general purpose grade for sintered alloy machining.
For non-ferrous milling, reaming and finish cutting of aluminium alloys.
Application areas include MMC, high silicon aluminium alloys, high strength cast irons and bi-metals.
Ideal for profile routers and thread cutting tools can also be used to wear part applications.
Ideal grade where roughing and finishing are done with one tool. Recommended for low to medium content aluminium alloys.

INDUSTRY SUCCESS STORIES...

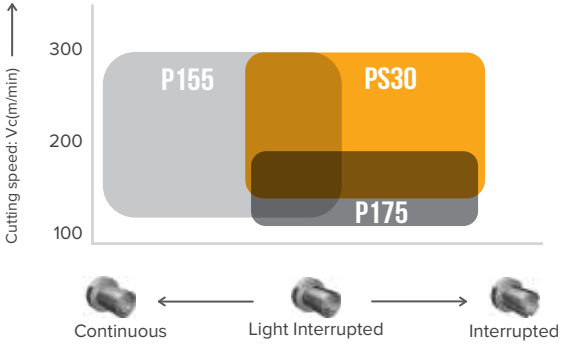
PS30 A solid CBN grade with improved version of P175

For light to moderate interrupted hard turning and finish hard milling in both dry and wet conditions. Suitable for both conventional and elevated machining speeds. PS30 exhibits superior crater wear resistance, thanks to its ultra-pure nano structure binder, combined with optimised CBN grain size structure.

- **Improved Chemical And Wear Properties**
  PS30 offers improved chemical wear, abrasion and impact resistance.
- **Wide Machining Range**
  Suitable for both conventional and elevated machining speeds.
- **Geometrical Advantage**
  Increased tool life and better surface finish with wiper geometry at higher feed rate.



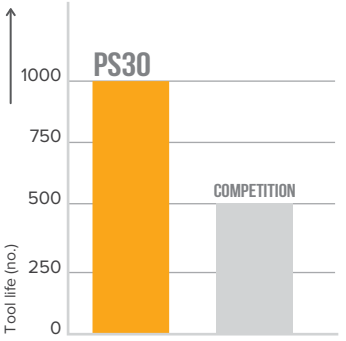
APPLICATION AREA



PS30 Great performance for light to moderate cutting at low and medium speed.

P175 Suitable for light to moderate interruption.

P155 Suitable for continuous to light interruption.



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
PS30 CNGA 120408 4C N	20MnCr5	Vc ≈ 140	f = 0.09	ap - 0.1	Moderate Interrupted

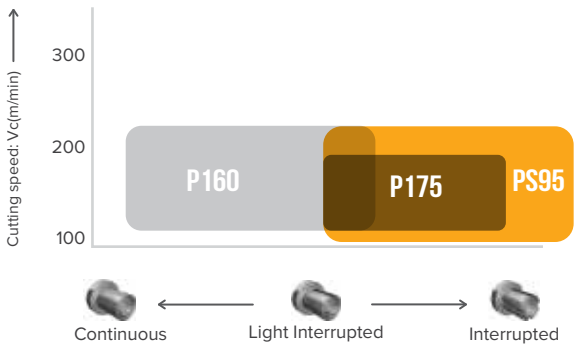
STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning	—	Vc ≈ 130-300	0.05-0.5 max	0.05 - 0.3	Rough/ Finish	✓	✓

PS95 Dedicated grade for Hardened steel machining

Remarkable reliability in hardened steel turning.
Covers a wide range of application areas from light to heavy interrupted cutting.
Provides excellent wear resistance and excellent surface finish.

- **Specially developed CBN substrate**
  Perfect ratio of CBN and binder content for machining of case and through hardened steel.
- **Improved adhesion strength**
  Prevents peeling off, provides excellent surface finish.

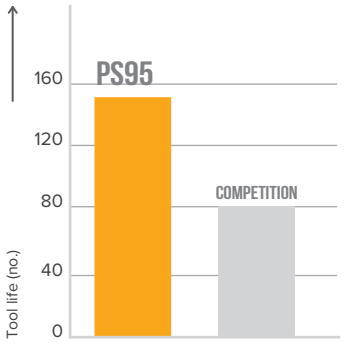
APPLICATION AREA



PS95 Great performance for light to heavy cutting at low and medium speed.

P175 Suitable for medium to moderate interruption.

P160 Suitable for continuous to light interruption.



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
PS95 CNGA 120408 4C N	16MnCr5	Vc ≈ 100	f = 0.01	ap - 0.2	Light/ Heavy Interrupted

STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning/ Milling	—	Vc ≈ 95-210	0.5 max	0.5	Rough	✓	—

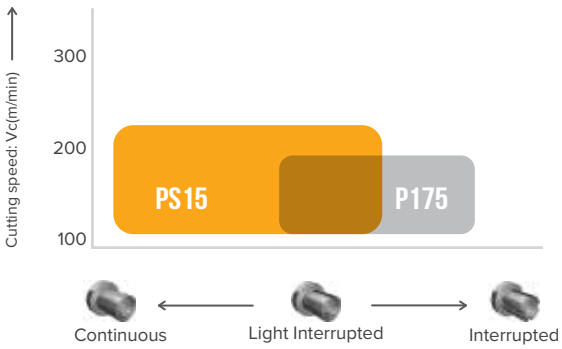
PS15

Ideal choice for cold work tool steel. Excellent abrasion resistance makes it the ideal choice for cold work tool steels and certain valve seat alloys.

Suitable for ductile cast iron
Average grain size and binder properties makes it ideal choice for finishing abrasive high strength ductile cast iron.

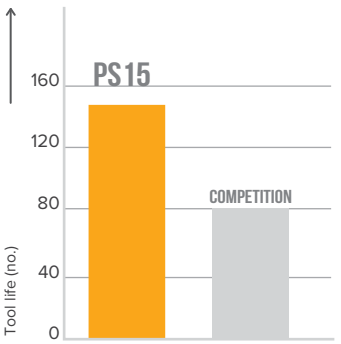
Superior chemical properties
Abrasive resistance and hardness make it ideal choice for both cast iron and hardened steel.

APPLICATION AREA



PS15 For continuous to light interruption.

P175 For light to moderate interruption.



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
PS15 CNGA 120408 4C N	20MnCr5	Vc ≈ 130	f = 0.08	ap - 0.1	Continuous to light

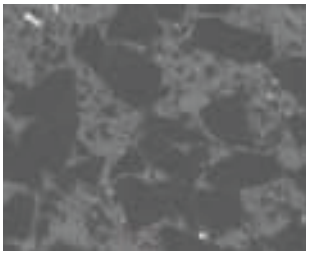
STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning	—	Vc ≈ 100-210	0.5 max	0.5	Rough	✓	✓

P175 High performance grade for light to moderate interruption turning of all common hardened steel

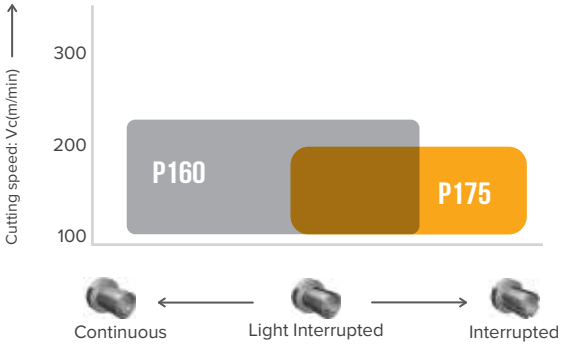
Provides an excellent balance of toughness, crater and flank wear resistance. Better option for valve seat machining.

Multi Modal Grain Size
Its multi modal grain size suits best for case hardened steels.

Increased Strength
Owing to moderate CBN content and grain size, abrasion resistance, impact strength and toughness exists together.

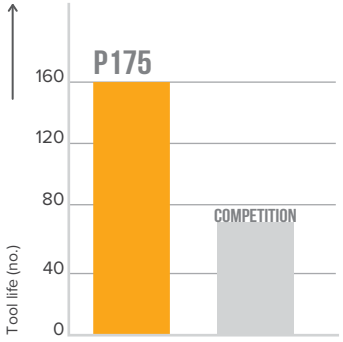


APPLICATION AREA



P175 Suitable for light to moderate interruption.

P160 Suitable for continuous to light interruption.



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
P175 CNGA 120408 W 4C N	16MnCr5	Vc ≈ 120	f = 0.12	ap - 0.25	Interrupted Cutting

STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning	—	Vc ≈ 100-170	0.5 max	0.3 max	Rough/ Finish	✓	✓

P155

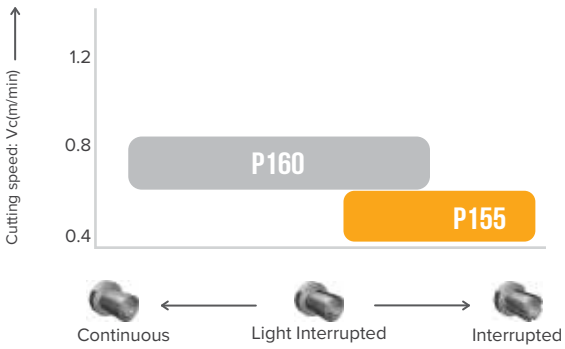
Superior crater wear resistance with finest structure

Gives sub-micron finish.
For moderate interrupted hard turning and finish hard milling as well as high speed continuous turning.

High speed turning
Suitable for finish turning of case hardened steel at elevated speeds.

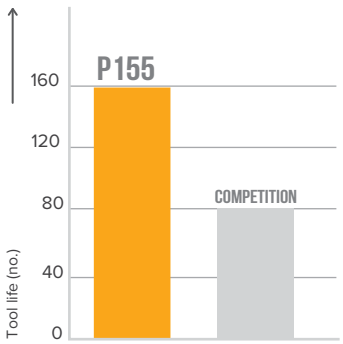
TiCN binder
TiC base binder provides superior chemical wear resistance.

APPLICATION AREA



P155 Better surface finish achievable as compared to P160 in heavy interupted machining.

P160 For continuous cutting of hardened steel.



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
P155 CNGA 120408 4C N	16MnCr5	Vc ≈ 160	f = 0.01	ap - 0.2	Interrupted Cutting

STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning	—	Vc ≈ 120-300	0.5 max	0.3 max	Finish	✓	✗

E19S

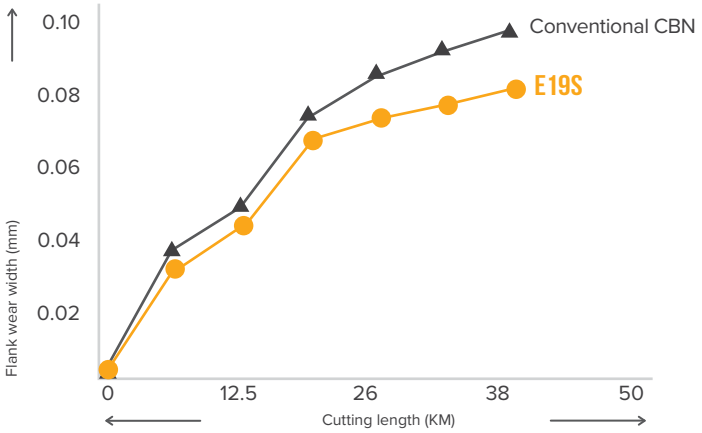
CBN particles are densely sintered for the maximum CBN content possible resulting in high wear and breakage resistance. The strength of CBN particles provides excellent chipping resistance, ensures stable performance and long tool life in high-efficiency machining of cast iron. Excellent wear and thermal crack resistance in high speed machining of grey cast iron.

Edge Preparation Performance Range (for example) :

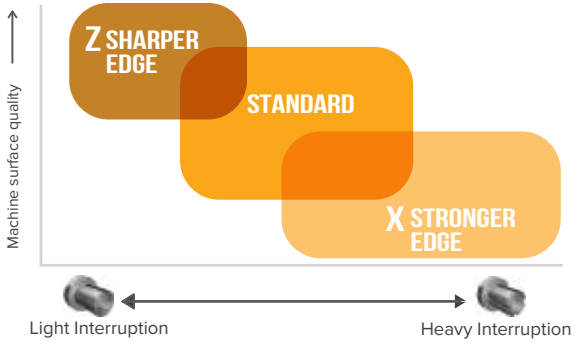
Z Type
Extra sharp edge that is able to provide a high quality machined surface.

X Type
Extra tough edge for heavy interrupted machining applications.

EDGE PREPARATION



Work Material: Gray cast Iron (Pearlite)
Insert: E19S CNGA 120408 4C N
Cutting Conditions: Vc=800 m/min, f=0.25mm/ rev, ap- 0.3mm



Insert	α	W	Honing
Standard	15°	0.127	No
Z	0° no negative land		
X	25°	0.127	Yes

STANDARD CUTTING CONDITIONS

Material Name	Vc (m/min)	f (mm/rev)	ap(mm)
Grey cast iron	492-1650	1.01-5.08	≤ 0.99
Alloy cast iron	198-786	1.01-4.06	≤ 0.48
Ductile cast iron	78-150	1.01-4.06	≤ 0.60
Sintered Alloy	48-123	0.25-2.03	0.005 - 0.5

ES01

New solid CBN for improved cast iron machining. High-speed machining at large depths of cut. Superior for roughing of disc drum and flywheel.

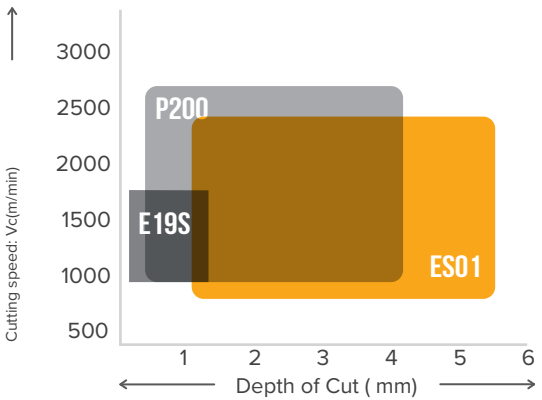
100% Solid CBN structure

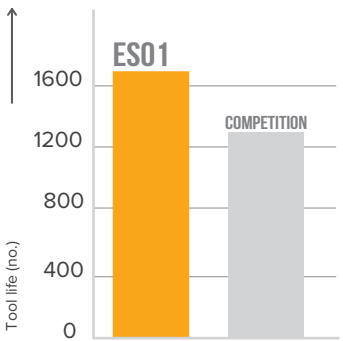
For highly efficient machining at large depths of cut. Inserts made entirely of CBN do not limit the depth of cut. For the high speed and efficiency of CBN finishing but now also used for roughing applications.

Balance of wear and fracture resistance

The use of CBN particles and a newly developed special binder delivers high wear resistance. ES01 offers good impact resistance and wear resistance during machining.

APPLICATION RANGE

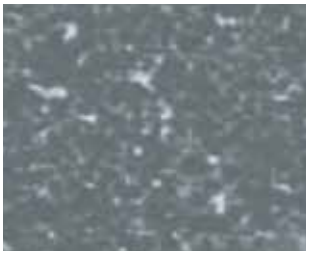




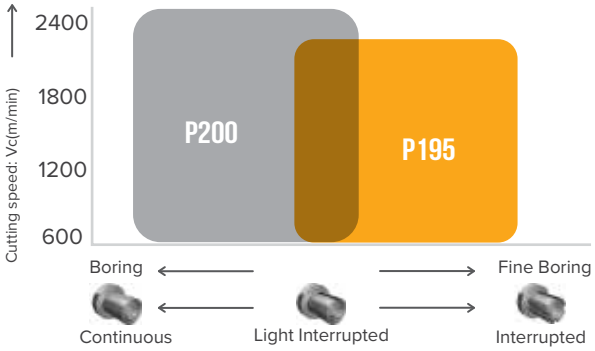
CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
ES01 DNGN 150408 4C N	Grey cast iron	Vc ≈ 700	f = 0.3	ap - 1.5	Turning

P195 Proven performance in fine boring at high cutting speeds

Ideal for heavy interrupted cutting of all hard and abrasive work piece materials including powder metallurgy components. Excellent strength and abrasion resistance. Extreme chip resistance due to special binder content.

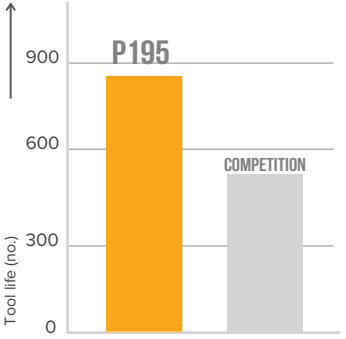


APPLICATION AREA



P195 For fine boring of cast iron as compared to P200.

P200 General purpose grade for cast iron.



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
P195 TPGB 110304 3C N	Cast Iron	Vc ≈ 350	f = 0.07	ap - 0.2	Interrupted Cutting

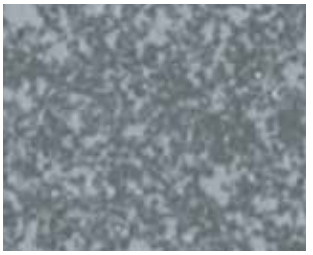
STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Fine Boring + Milling	—	Vc ≈ 600 - 2300	0.1 - 2.0 max	0.1 - 4.0 max	Rough/ Finish	✓	✓

P6000

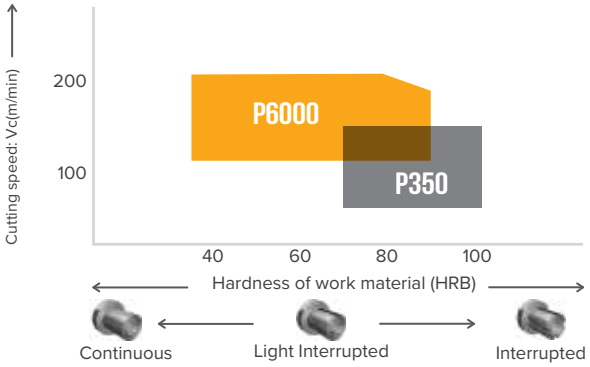
Excellent chemical stability with high impact resistance

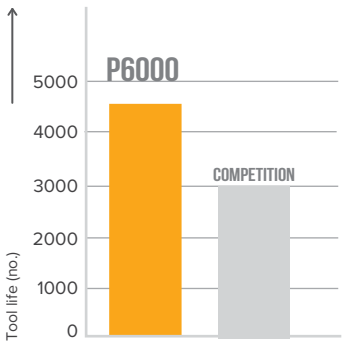
For valve seat and powder metallurgy applications. Provides excellent surface finish. Application areas include sintered metals with high alloy content.

- Maintains optimum cutting edge sharpness.
- Improved wear and fracture resistance in cutting of sintered components.
- Powder metallurgy applications where alloy content is lower.



APPLICATION AREA





CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
P6000 BVS BITE	Powder Metallurgy	Vc ≈ 120	f = 0.06	ap - 0.4	Turning

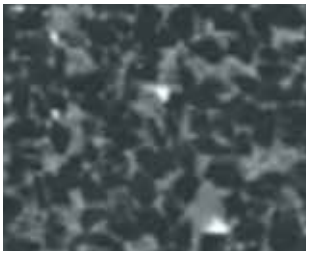
STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning	Sintered Alloy	Vc ≈ 100-170	0.1 - 0.5	0.5 max	Finishing	—	✓

P800 Excellent in machining powder metallurgy applications where carbide content is lower

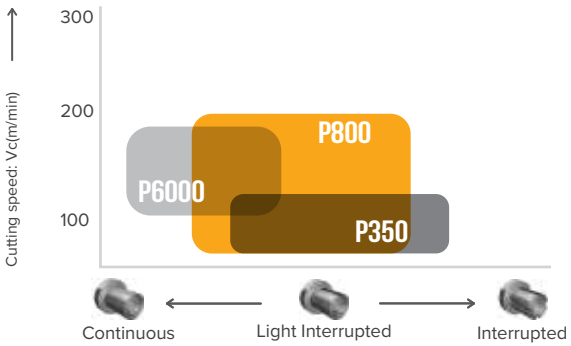
Excellent abrasion resistance. Good chemical stability.

High Fracture Resistance
Fine CBN particles increase cutting edge toughness.
The high fracture resistance allows stable performance even during interrupted cutting.

High adhesion resistance of fine CBN particles.
Optimization of the sintering conditions strengthens adhesion between the CBN particles.
This increases both fracture and wear resistance.



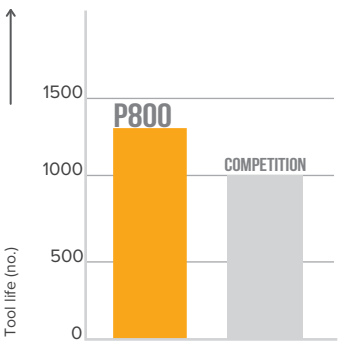
APPLICATION AREA



P800 Cutting range from continuous to light interruption

P6000 Suitable for continuous cutting.

P350 Cutting range from continuous to light interruption.



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
P800 BVS BITE	Powder Metallurgy	Vc ≈ 117	f = 0.06	ap - 0.15	Turning

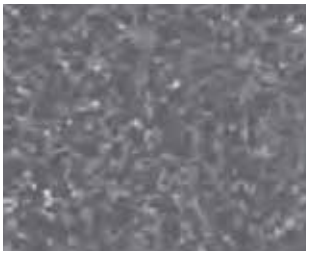
STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning	—	Vc ≈ 50-180	0.1 - 0.5	0.6 max	Rough/Finish	✓	✓

P17

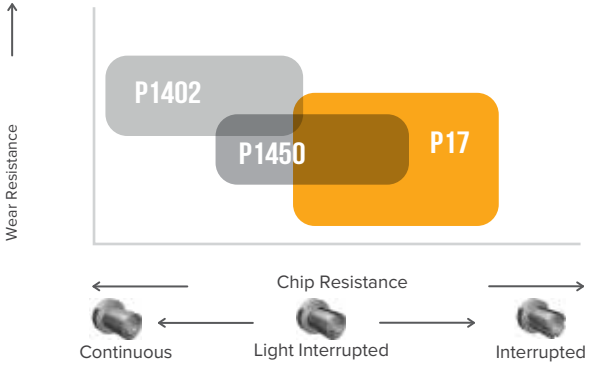
Extreme chip resistance with optimum balance of processability and performance

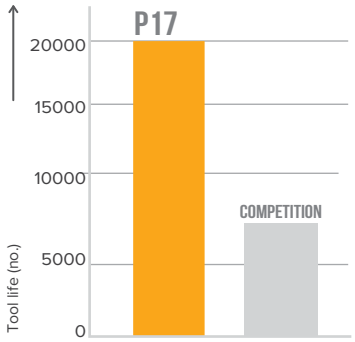
PCD grade for non-ferrous, aluminium applications.
Used for finish & rough cutting applicatons.

Sub Micron Gain Size
Ultra fine structure suitable for applications where mirror finish is required.



APPLICATION AREA





CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Cutting oil
P17 XDCN Z 1C N	Aluminium	Vc ≈ 2700	f = 0.1	ap - 0.25	Yes

STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning/ Milling	—	Vc ≈ 400-2800	0.1 - 0.5	0.1 - 4.0 max	Finishing	✓	✓

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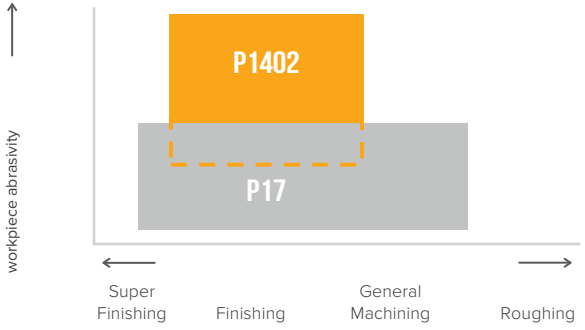
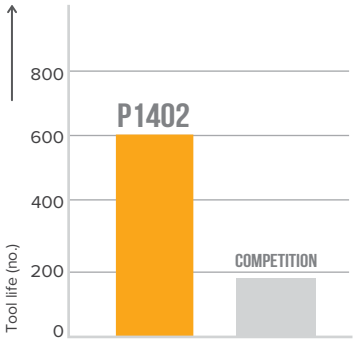
P1402 PCD grade for milling applications, suitable for high finishing

A multi modal PCD with grain sizes of 2 to 30 microns which gives P1402 excellent wear resistance, edge strength, edge quality, abrasion resistance & thermal stability.

Application areas include metal matrix composite (MMC), high silicon aluminium alloys, high strength cast irons and bi-metal applications.

APPLICATION AREA





CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
DMI Milling Cartridge	Aluminium	Vc ≈ 427	f = 0.5	ap-0.3	Milling

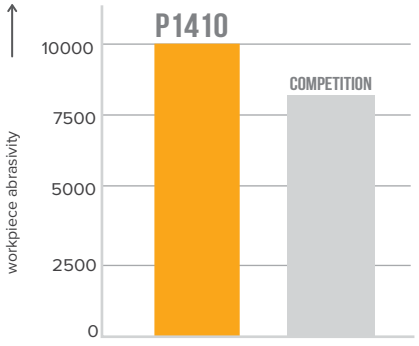
STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning/ Milling	—	Vc ≈ 180-500	0.1 - 5.0 max	0.1 - 4.0 max	Rough	✓	✓

P1410 PCD grade for general machining, sintered medium grain diamond particles.

The ideal grade where roughing and finishing are performed with a single tool. Highly recommended for low to medium content aluminium alloys where the average grain size is 10µm.

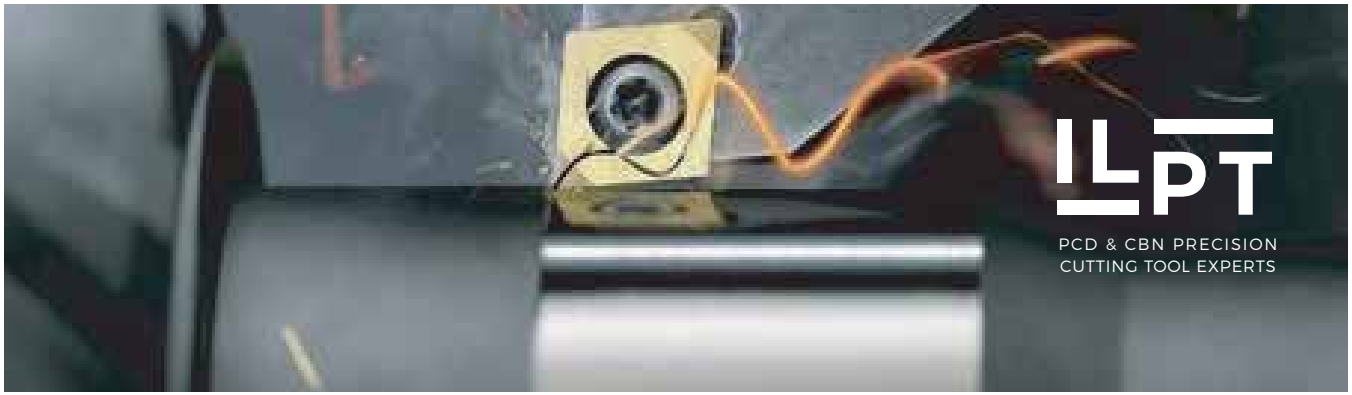
P1410 is the excellent PCD grade ideal for many applications where a good balance of toughness and wear resistance is required.

APPLICATION AREA



CUTTING PERFORMANCE					
Insert	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining
P1410 XDCN Z 1C N	Aluminium	Vc ≈ 2325	f = 0.2	ap - 3.0	Milling

STANDARD CUTTING CONDITIONS							
Application	Workpiece Material	Cutting Speed (m/min)	Feed (mm/rev)	Depth of Cut (mm)	Purpose	Dry	Wet
Turning/ Milling	—	Vc ≈ 450 - 2500	0.1 - 4.0 max	0.1 - 4.0 max	Finish/ Rough	✓	✓



IL PRECISION TECHNOLOGY

Established in the year 2016, IL PRECISION TECHNOLOGY, with a sole motive to provide advanced tooling solutions to the manufacturing sector, the founder over the subsequent years has worked hard to become one of the leading manufacturers of high precision engineered cutting tools in India. Since then, they have satisfactorily met the machining requirements of the various auto component manufacturing & allied industries. ILPT has successfully provided cost-effective solutions to the needs of the discerning customers of today.

ILPT manufactures ISO and tailor-made PCBN and PCD inserts. The team constitutes of experts, with more than 15 years of experience in manufacturing of PCBN and PCD cutting tools. They have consistently continued, to improve every aspect of the business, making sure to offer the best cutting tools, proudly made in India, to deliver to the advanced needs of the growing Indian industrial landscape.

ILPT thrives with one key objective; to manufacture & deliver internationally acceptable high-quality products, stringently following the best laid out industry manufacturing standards, advanced machining and WCM practices, which has been the key reason behind achieving respect and credibility amongst customers & peers. The team continuously strives to keep itself abreast with the latest innovations and efficient manufacturing technologies.

Team ILPT is reasonably flexible with minimum order quantities and does its best to keep customers comfortable which has made them a popular name in the Indian market. With sincere and sustained perseverance to understand customer needs & demands and over years of hard work, they have developed tools that cut much better and longer than the other available tools in the market. The continuous endeavour to provide customised & efficient solutions have made ILPT attain, a trustworthy name in a very short span of time.

IDENTIFICATION NOMENCLATURE

P 160	T	C	G	W	11
GRADE	INSERT SHAPE	RELIEF ANGLE	TOLERANCE	INSERT TYPE	EDGE LENGTH
Table 1	Table 2	Table 3	Table 4	Table 5	Table 6

TABLE 1

COATED GRADE	UNCOATED GRADE
PC200	P200
PC195	P195
PC175	P175
PC160	**P160**
PC155	P155
EC120	E120
EC19S	E19S
EC19	E19
EC19N	E19N
EC16	E16
EC14	E14
ESC14	ES14
EC13	E13
EC126	E126
EC12	E12
EC10	E10
ESC10	ES10
PC17	P17
PC1402	P1402
CC10	C10

TABLE 2

INSERT SHAPE	
85°	A
82°	B
Rhombic 80°	C
55°	D
75°	E
120°	H
55° KNUX	K
90°	L
86°	M
Octa 135°	O
Penta 108°	P
Round	R
Square 90°	S
60°	**T**
35°	V
Trigon 80°	W

TABLE 3

RELIEF ANGLE	
0°	N
3°	A
5°	B
7°	**C**
11°	P
15°	D
20°	E
25°	F
30°	G
Special	O

TABLE 5

INSERT TYPE	
	N
	R
	F
	A
	M
	G
	**W**
	T
	Q
Special	X

TABLE 7

THICKNESS	
1.39 mm	S1
1.59 mm	01
1.79 mm	T0
1.97 mm	T1
2.38 mm	**02**
2.78 mm	T2
3.18 mm	03
3.97 mm	T3
4.76 mm	04
5.56 mm	05
6.35 mm	06
7.94 mm	07
9.52 mm	09

TABLE 8

NOSE RADIUS	
0.0 mm	00
0.1 mm	01
0.2 mm	02
0.4 mm	04
0.8 mm	**08**
1.2 mm	12
1.6 mm	16
2.0 mm	20
2.4 mm	24
3.0 mm	30
4.0 mm	40
5.0 mm	50

TABLE 12

BRAZED CORNERS	
1	1C
2	2C
3	**3C**
4	4C
6	6C
8	8C

TABLE 13

CUTTING DIRECTION	
Neutral	**N**
Left Hand	L
Right Hand	R

KNOW HOW TO PLACE YOUR ORDER

02	08				3C	N
THICKNESS	NOSE RADIUS	ILPT USP			BRAZED CORNER	CUTTING DIRECTION
Table 7	Table 8	Table 9	Table 10	Table 11	Table 12	Table 13

TABLE 4

TOLERANCE						
Symbol	Nose Height Tolerance **M** (mm)		Inscribed Circle Tolerance **IC** (mm)		Insert Thickness Tolerance **S** (mm)	
G	± 0.025		± 0.025		± 0.13	
M	± 0.08 ≈ ± 0.2		± 0.08 ≈ ± 0.15		± 0.13	
Detail of **M class** Tolerance Inserts						
IC	▲ 60°	■ 90°	◢ 80°	◢ 55°	◢ 35°	●
6.35	± 0.08	± 0.08	± 0.08	± 0.11	± 0.16	-
9.525	± 0.08	± 0.08	± 0.08	± 0.11	± 0.16	-
12.7	± 0.13	± 0.13	± 0.13	± 0.15	± 0.16	-
Detail of **IC class** Tolerance Inserts (B Size)						
IC	▲ 60°	■ 90°	◢ 80°	◢ 55°	◢ 35°	●
6.35	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05	± 0.08
9.525	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05
12.7	± 0.08	± 0.08	± 0.08	± 0.08	± 0.08	± 0.08

TABLE 6

EDGE LENGTH IC (mm)							
IC	▲ 60°	■ 90°	◢ 80°	◢ 55°	◢ 35°	●	▲ 80°
3.97	06	03	03	04			02
4.76	08	04	04	05	08		L3
5.00						05	
5.56	09	05	05	06	09		03
6.00						06	
6.35	**11**	06	06	07	11		04
7.94	13	07	08	09	13		05
8.00						08	
9.525	16	09	09	11	16	09	06
10.00						10	
12.00						12	
12.70	22	12	12	15	22	12	08
15.875	27	15	16	19		15	10
16.00						16	
19.05	33	19	19	23		19	13
20.00						20	
25.00			25			25	
25.4	44	25				25	

TABLE 9 | TABLE 10 | TABLE 11

UNIQUE ILPT DESIGNS

ILPT OFFERINGS

SHAPE	DESCRIPTION	NOSE RADIUS	GRADE									
			P155	P160	P175	P2525	P3030	E126S	P300	E195	P200	P350
C TYPE	CNGA 120402	0.2	•	•	•	•	•	o	o	o	o	o
	CNGA 120404	0.4	•	•	•	•	•	o	o	o	o	o
	CNGA 120408	0.8	•	•	•	•	•	o	o	o	o	o
	CNGA 120412	1.2	•	•	•	•	•	o	o	o	o	o
	CNMA 120402	0.2	•	•	•	•	•	o	o	o	o	o
	CNMA 120408	0.8	•	•	•	•	•	o	o	o	o	o
	CNMA 120404	0.4	•	•	•	•	•	o	o	o	o	o
	CNMA 120412	1.2	•	•	•	•	•	o	o	o	o	o
	CNGX 120408 solid type	0.8	o	o	o	o	o	o	o	o	o	o
	CNGX 120412 solid type	1.2	o	o	o	o	o	o	o	o	o	o
	CNGX 120416 solid type	1.6	o	o	o	o	o	o	o	o	o	o
	CNGN 090308 4CN solid type	0.8	o	o	o	o	o	o	o	o	o	o
	CNGN 090312 4CN solid type	1.2	o	o	o	o	o	o	o	o	o	o
	CCGW 060202	0.2	•	•	•	•	o	o	o	•	o	o
	CCGW 060204	0.4	•	•	•	•	o	o	o	•	o	o
	CCGW 060208	0.8	•	•	•	•	o	o	o	•	o	o
	CCGW 09T302 2C	0.2	•	•	•	•	o	o	o	•	o	o
	CCGW 09T304 2C	0.4	•	•	•	•	o	o	o	•	o	o
	CCGW 09T308 2C	0.8	•	•	•	•	o	o	o	•	o	o
	CPGW 09T302	0.2	•	•	•	•	o	o	o	•	o	o
	CCMT 09T302	0.2	o	o	o	•	o	o	o	o	o	o
	CCMT 09T304	0.4	o	o	o	•	o	o	o	o	o	o
	CCGN 040104	0.4	o	o	o	o	o	o	o	o	o	o
	CCGN 040108	0.8	o	o	o	o	o	o	o	o	o	o
	CPGW 080202	0.2	o	o	o	o	o	o	o	o	o	o
	CPGW 080204	0.4	o	o	o	o	o	o	o	o	o	o

» • Stock Items » o On Order

GRADE																
P800	P6000	ES01	C10	E19S	PS30	PS40	PS50	PS10	PS15	PS80	PS85	PS95	P17	P1402	P1404	P1410
o	o	o	o	o	o	o	o	o	•	o	o	o	o	o	o	o
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» • Stock Items » o On Order

ILPT OFFERINGS

SHAPE	DESCRIPTION	NOSE RADIUS	GRADE									
			P155	P160	P175	P2525	P3030	E126S	P300	E195	P200	P350
C TYPE	CPGW 080208	0.8	o	o	o	o	o	o	o	o	o	o
	CPGW 090302	0.2	o	o	o	o	o	o	o	o	o	o
	CPGW 090304	0.4	o	o	o	o	o	o	o	o	o	o
	CPGW 090308	0.8	o	o	o	o	o	o	o	o	o	o
D TYPE	DNGA 150402	0.2	•	•	•	•	o	o	o	•	o	o
	DNGA 150404	0.4	•	•	•	•	o	o	o	•	o	o
	DNGA 150408	0.8	•	•	•	•	o	o	o	•	o	o
	DNGA 150412	1.2	•	•	•	•	o	o	o	•	o	o
	DNGA 150602	0.2	•	•	•	•	o	o	o	•	o	o
	DNGA 150604	0.4	•	•	•	•	o	o	o	•	o	o
	DNGA 150608	0.8	•	•	•	•	o	o	o	•	o	o
	DNGA 150612	1.2	•	•	•	•	o	o	o	•	o	o
	DNGN 110308	0.8	•	•	•	•	o	o	o	•	o	o
	DNGN 110312	1.2	•	•	•	•	o	o	o	•	o	o
	DCGW 70202	0.2	•	•	•	•	o	o	o	•	o	o
	DCGW 070204	0.4	•	•	•	•	o	o	o	•	o	o
	DCGW 070208	0.8	•	•	•	•	o	o	o	•	o	o
	DCGW 11T302	0.2	•	•	•	•	o	o	o	•	o	o
	DCGW 11T304	0.4	•	•	•	•	o	o	o	•	o	o
	DCGW 11T308	0.8	•	•	•	•	o	o	o	•	o	o
	DCGW 11T312	1.2	•	•	•	•	o	o	o	•	o	o
	DCMW 11T302	0.2	o	o	o	o	o	o	o	o	o	o
	DCMW 11T304	0.4	o	o	o	o	o	o	o	o	o	o
	DCMW 11T308	0.8	o	o	o	o	o	o	o	o	o	o
	DCMT 11T302	0.2	o	o	o	o	o	o	o	o	o	o

» • Stock Items » o On Order

GRADE																
P800	P6000	ES01	C10	E19S	PS30	PS40	PS50	PS10	PS15	PS80	PS85	PS95	P17	P1402	P1404	P1410
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
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o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

• Stock Items   o On Order

ILPT OFFERINGS

SHAPE	DESCRIPTION	NOSE RADIUS	GRADE									
			P155	P160	P175	P2525	P3030	E126S	P300	E195	P200	P350
	DCMT 1T304	0.4	o	o	o	o	o	o	o	o	o	o
V TYPE	VNGA 160404	0.4	•	•	•	•	o	o	o	o	o	o
	VNGA 160408	0.8	•	•	•	•	o	o	o	o	o	o
	VNGA 160412	1.2	•	•	•	•	o	o	o	o	o	o
	VBGW 110302	0.2	•	•	•	•	o	o	o	•	o	o
	VBGW 110304	0.4	•	•	•	•	o	o	o	•	o	o
	VBGW 110308	0.8	•	•	•	•	o	o	o	•	o	o
	VBGW 160402	0.2	•	•	•	•	o	o	o	•	o	o
	VBGW 160404	0.4	•	•	•	•	o	o	o	•	o	o
	VBGW 160408	0.8	•	•	•	•	o	o	o	•	o	o
	VCGW 080202	0.2	•	•	•	•	o	o	o	•	o	o
	VCGW 080204	0.4	•	•	•	•	o	o	o	•	o	o
	VCGW 080208	0.8	•	•	•	•	o	o	o	•	o	o
	VCGW 110302	0.2	•	•	•	•	o	o	o	•	o	o
	VCGW 110304	0.4	•	•	•	•	o	o	o	•	o	o
	VCGW 160404	0.4	•	•	•	•	o	o	o	•	o	o
	VCGW 160408	0.8	•	•	•	•	o	o	o	•	o	o
S TYPE	SNMA 120404	0.4	o	o	o	o	o	o	o	o	o	o
	SNMA 120408	0.8	o	o	o	o	o	o	o	o	o	o
	SNMA 120412	1.2	o	o	o	o	o	o	o	o	o	o
	SNGA 120404	0.4	o	o	o	o	o	o	o	o	o	o
	SNGA 120408	0.8	o	o	o	o	o	o	o	o	o	o
	SNGA 120412	1.2	o	o	o	o	o	o	o	o	o	o
	SNGN 090308	0.8	o	o	o	o	o	o	o	o	o	o

» • Stock Items » o On Order

GRADE																
P800	P6000	ES01	C10	E19S	PS30	PS40	PS50	PS10	PS15	PS80	PS85	PS95	P17	P1402	P1404	P1410
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
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o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o

• Stock Items   o On Order

ILPT OFFERINGS

SHAPE	DESCRIPTION	NOSE RADIUS	GRADE									
			P155	P160	P175	P2525	P3030	E126S	P300	E195	P200	P350
S TYPE	SNGN 090308	0.8	o	o	o	o	o	o	o	o	o	o
	SPGN 090304	0.8	o	o	o	o	o	o	o	o	o	o
	SPGN 090308	0.8	o	o	o	o	o	o	o	o	o	o
	SPGN 120308	0.8	o	o	o	o	o	o	o	o	o	o
	SPGN 120312	1.2	o	o	o	o	o	o	o	o	o	o
	SNGN 120308	0.8	o	o	o	o	o	o	o	o	o	o
	SNGN 120312	1.2	o	o	o	o	o	o	o	o	o	o
	SNGN 120408	0.8	o	o	o	o	o	o	o	o	o	o
	SNGN 120412	1.2	o	o	o	o	o	o	o	o	o	o
W TYPE	WNGA 080404	0.4	o	o	o	o	o	o	o	•	o	o
	WNGA 080408	0.8	o	o	o	o	o	o	o	•	o	o
	WNGA 080412	1.2	o	o	o	o	o	o	o	•	o	o
T TYPE	TNGA 160402	0.2	•	•	•	•	o	o	o	•	•	o
	TNGA 160404	0.4	•	•	•	•	o	o	o	•	•	o
	TNGA 160408	0.8	•	•	•	•	o	o	o	•	•	o
	TNGA 160412	1.2	•	•	•	•	o	o	o	•	•	o
	TNMA 160402	0.2	•	•	•	•	o	o	o	•	•	o
	TNMA 160404	0.4	•	•	•	•	o	o	o	•	•	o
	TNMA 160408	0.8	•	•	•	•	o	o	o	•	•	o
	TNMA 160412	1.2	•	•	•	•	o	o	o	•	•	o
	TNGN 160404	0.4	•	•	•	•	o	o	o	•	•	o
	TNGN 160408	0.8	•	•	•	•	o	o	o	•	•	o
	TNGN 160412	1.2	•	•	•	•	o	o	o	•	•	o
	TPGW 080202	0.2	•	•	•	•	o	o	o	•	•	o

» • Stock Items » o On Order

GRADE																
P800	P6000	ES01	C10	E19S	PS30	PS40	PS50	PS10	PS15	PS80	PS85	PS95	P17	P1402	P1404	P1410
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
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o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o

» • Stock Items » o On Order

ILPT OFFERINGS

SHAPE	DESCRIPTION	NOSE RADIUS	GRADE									
			P155	P160	P175	P2525	P3030	E126S	P300	E195	P200	P350
T TYPE	TPGW 080204	0.4	•	•	•	•	o	o	o	•	•	o
	TPGW 080208	0.8	•	•	•	•	o	o	o	•	•	o
	TPGW 090202	0.2	•	•	•	•	o	o	o	•	•	o
	TPGW 090204	0.4	•	•	•	•	o	o	o	•	•	o
	TPGW 090208	0.8	•	•	•	•	o	o	o	•	•	o
	TPGW 110202	0.2	•	•	•	•	o	o	o	•	•	o
	TPGW 110204	0.4	•	•	•	•	o	o	o	•	•	o
	TPGW 110208	0.8	•	•	•	•	o	o	o	•	•	o
	TPGW 110302	0.2	•	•	•	•	o	o	o	•	•	o
	TPGW 110304	0.4	•	•	•	•	o	o	o	•	•	o
	TPGW 110308	0.8	•	•	•	•	o	o	o	•	•	o
	TPGW 160302	0.2	•	•	•	•	o	o	o	•	•	o
	TPGW 160304	0.4	•	•	•	•	o	o	o	•	•	o
	TPGW 160308	0.8	•	•	•	•	o	o	o	•	•	o
	TPGW 160404	0.4	•	•	•	•	o	o	o	•	•	o
	TPGN 090204	0.4	•	•	•	•	o	o	o	•	•	o
	TPGN 090208	0.8	•	•	•	•	o	o	o	•	•	o
	TPGN 110304	0.4	•	•	•	•	o	o	o	•	•	o
	TPGN 110308	0.8	•	•	•	•	o	o	o	•	•	o
	TPGN 110312	1.2	•	•	•	•	o	o	o	•	•	o
	TPGN 160302	0.2	•	•	•	•	o	o	o	•	•	o
	TPGN 160304	0.4	•	•	•	•	o	o	o	•	•	o
	TPGN 160308	0.8	•	•	•	•	o	o	o	•	•	o
	TPGN 220408	0.8	o	o	o	o	o	o	o	o	o	o

» • Stock Items » o On Order

GRADE																
P800	P6000	ES01	C10	E19S	PS30	PS40	PS50	PS10	PS15	PS80	PS85	PS95	P17	P1402	P1404	P1410
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
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o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
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o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	•	o	o	o	o	o	o	o	o	o	o	o	o
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o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	•	•	o	o	o	o	o	o	o	o	o	o	o	o
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

• Stock Items   o On Order

ILPT

PCD & CBN PRECISION
CUTTING TOOL EXPERTS

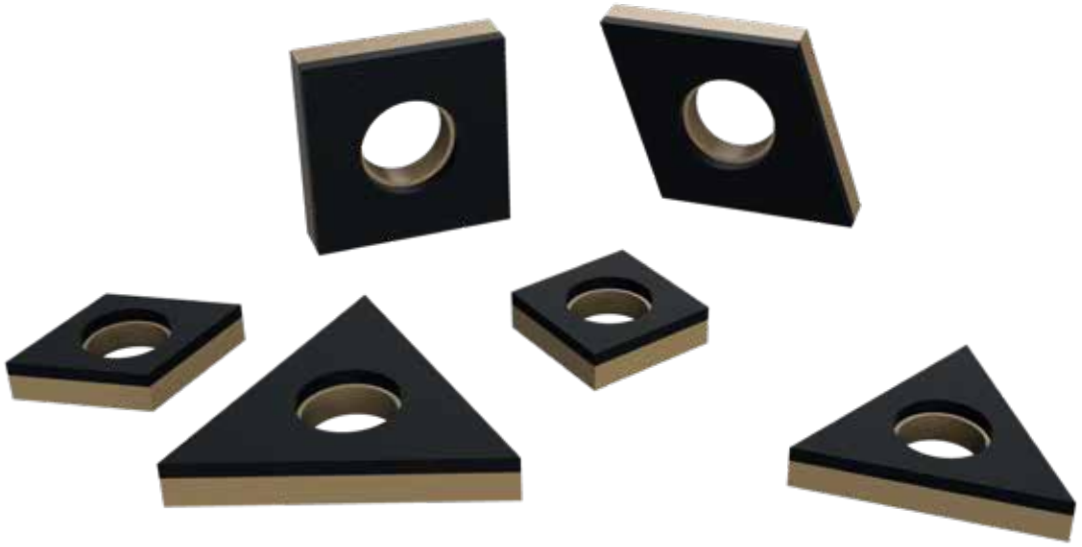
UNIQUE PRODUCTS OFFERINGS

TAILORMADE & EFFICIENT

REDUCE DOWNTIME & IMPROVE PRODUCTIVITY BY CONVERTING TO INTEGRAL INSERTS

HIGH PERFORMANCE COMPONENTS

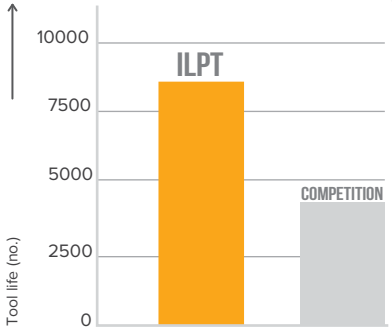
- Centre-lock full face PCBN inserts, provide multi-cornered tools with a number of benefits.
- A more robust cutting component than a conventional brazed tool.
- Greater reliability in interrupted cutting applications.
- Elimination of the braze joint allowing higher temperature coatings to be applied.
- Reduced insert failure risks and improved production continuity.
- Longer cutting edges which enable productivity improvements in application; either through the use of larger depths of cut or plunge-type machining operations.
- High and low CBN content configurations.



P17 SP 590 CH30° MILLING INSERT

Features

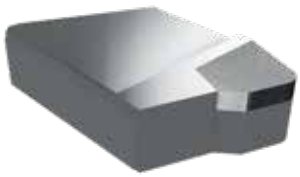
Face milling insert.
Surface roughness of sub micron can be achieved.
Insert can be used at high feed and high RPM.



SP 590= 1.5X COMPETITOR

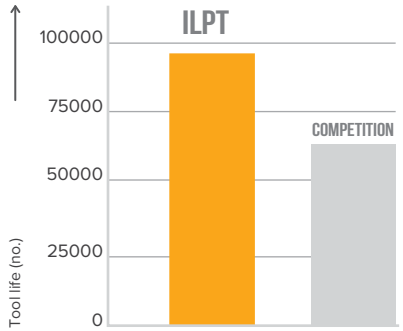
ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Aluminium	Face Milling	Vc ≈ 1507	f = 0.09	ap - 2.0	—	—	✓

P17 FDCN 2005 R1.2 MILLING WIPER INSERT



Features

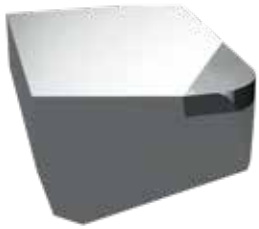
Face milling insert.
Finish value of sub micron can be achieved as compared to competitor insert. These inserts can be used at high feed and high RPM.



ILPT= 1.2X COMPETITOR

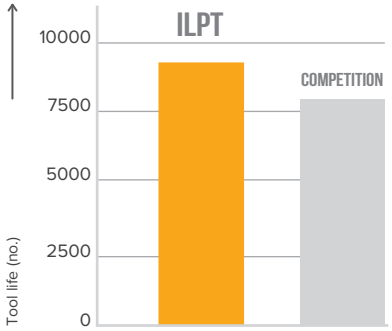
ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Aluminium	Turning	Vc ≈ 1884	f = 0.16	ap-3	—	—	✓

P17 DMI 0494 MILLING INSERT



Features

Face milling insert.
Inserts can be used for high machining parameters.
Burr generaton is minimum.



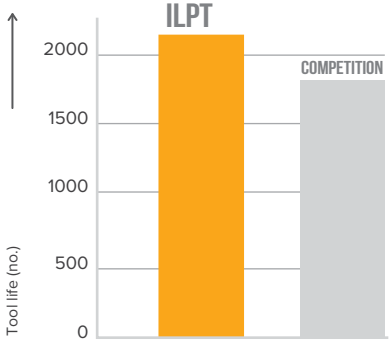
SP 590= 1.5X COMPETITOR

ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Aluminium	Milling	Vc ≈ 2750	f = 0.125	ap - 4.0	—	—	✓

P800 BVS CHF BITE

Features

Used for machining sintered alloys.
Used in valve seat machining, 100% blue match is achieved.

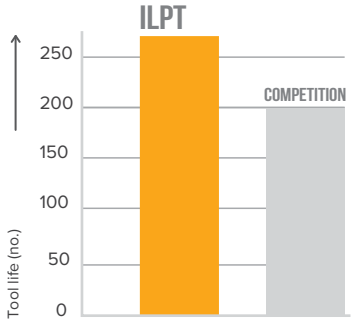


ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Sintered material	Chamfering	Vc ≈ 133	f = 0.05	ap-0.15	—	—	✓

P160 BNGNT 0200R R0.1

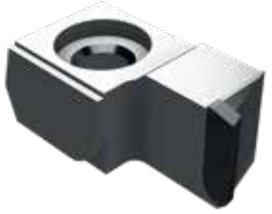
Features

CBN insert specially designed for grooving of gears.
Better wear resistance while machining hardened steel parts.
Special design enables better performance.



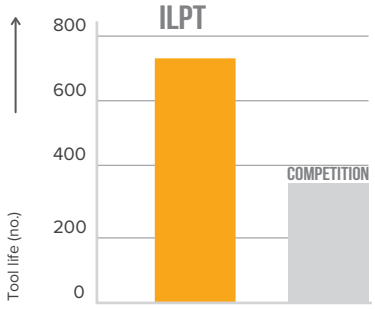
ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Aluminium	Grooving	Vc ≈ 70	f = 0.05	ap - 7.0	—	✓	—

P1402 DMI MILLING CARTRIDGE



Features

Used for face milling of cylinder block.
Cartridge brazed with ILPT unique PCD for excellent performance on bimetal applications (aluminium & cast iron).
Normal wear and better tool life.
Material removal rate is much higher than Inserts used for similar applications.

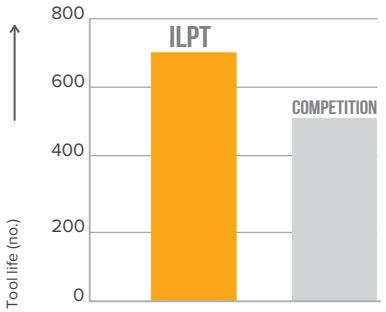


ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Aluminium+CI	Face milling	Vc ≈ 527	f = 0.5	ap - 0.3	—	—	✓

E19S CBN FULL TOP BITE

Features

Used in valve seat machining
Specially developed to suit the machining of all Automobiles (including 2 wheeler, 3 wheeler, 4 wheeler etc.)

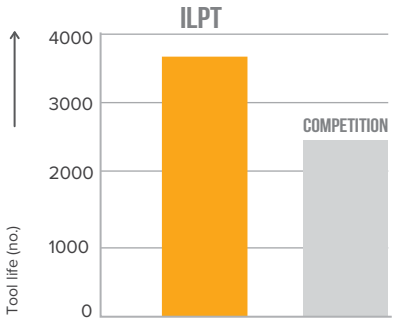


ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Sintered material	Chamfering	Vc ≈ 130	f = 0.04	ap - 0.01	—	—	✓

E19S VSR 45^0 BITE

Features

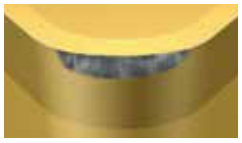
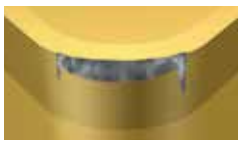
Used for chamfering operation of valve seats in cylinder head. VSR BITES (CBN) are especially developed to suit the machining of all Automobiles (including 2 wheeler, 3 wheeler, 4 wheeler etc.).
100% blue match is achieved.



ILPT= 1.3X COMPETITOR

ACTUAL CUTTING CONDITIONS							
Work Material	Application	Cutting Speed(m/min)	Feed (mm/rev)	Depth of Cut (mm)	Machining	Dry	Wet
Sintered material	Turning	Vc ≈ 148	f = 0.05	ap - 2.0	—	—	✓

TROUBLE SHOOTING RECOMMENDATIONS

TOOL WEAR		SOLUTION
Flank wear		Increase cutting speed. Increase feed.
Crater wear		Reduce cutting speed. Increase feed.
Chipping		Check stability, eliminate vibration. Do not use coolant. Use a stronger cutting edge; - S-edge geometry - Increase chamfer size (angle and /or width) - Use larger nose radius.
Cracking /fracture		Use uncoated inserts. Check stability, eliminate vibration. Check/ replace shim. Make sure tool is aligned to centre. Do not use coolant. Decrease feed. Decrease depth of cut. Use a stronger cutting edge; - S-edge geometry - Increase chamfer size (angle and /or width) - Use larger nose radius. - Use wiper.
Notch wear		Increase speed. Reduce feed. Reduce/ vary depth of cut.

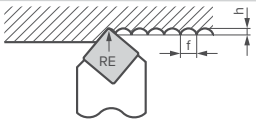
TECHNICAL GUIDANCE

MACHINED SURFACE ROUGHNESS

Theoretical Surface Finish

$$h = \frac{f^2}{8 \times RE} \times 10^3$$

h : Theoretical surface roughness (mm)
f : Feed rate (mm/rev)
RE: Nose radius (mm)

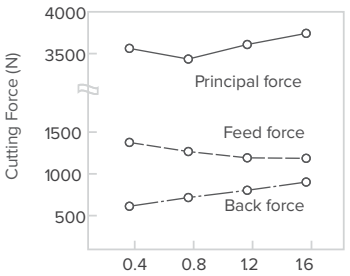


Actual Surface Roughness
Steel: Theoretical surface finish x 15 to 3
Cast iron: Theoretical surface finish x 3 to 5

Ways to Improve Machined Surface Roughness

(1) Use an insert with a larger nose radius.
(2) Optimise the cutting speed and feed rate so that built-up edge does not occur.
(3) Select an appropriate insert grade.
(4) Use wiper insert

RELATION BETWEEN NOSE RADIUS & CUTTING FORCE

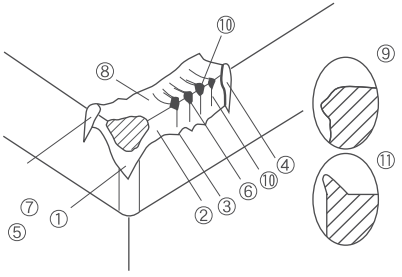


Large nose radius increases back force.

Work : SCM 440(38HS)
Insert : TNGA 2204 SS
Holder : PTGNR 2525-43

Cutting Conditions
v_c = 100m/min
a_p = 4mm
f = 0.45mm/rev

FORMS OF TOOL FAILURES



Cat.	No.	Name of Failure	Cause of Failure
Resulting from Mechanical Causes	(1) to (5)	Flank Wear	• Due to the scratching effect of hard grains contained in the work material.
	(6)	Chipping	• Fine breakages caused by high cutting loads or chattering.
	(7)	Fracture	• Large breakage caused by the impact of excessive mechanical forces acting on the cutting edge.
Resulting from Chemical Reactions	(8)	Crater Wear	• Swaft chips removing tool material as it flow over the top face at high temperatures.
	(9)	Plastic Deformation	• Adhesion or accumulation of extremely-hard work material on the cutting edge.
	(10)	Thermal Crack	• Cutting edge is depressed due to softening at high temperatures.
	(11)	Built-up Edge	• Fatigue from rapid, repeated heating & cooling cycles during machining.

TECHNICAL GUIDANCE . . .

CALCULATING CUTTING SPEED

(1) Calculating rotation speed from cutting speed

$$n = \frac{1{,}000 \times v_c}{\pi \times D_m}$$

- n : Spindle speed (min $^{-1}$)
- v_c : Cutting speed (m/min)
- D_m : Diameter of work piece (mm)
- π : ≈ 3.14

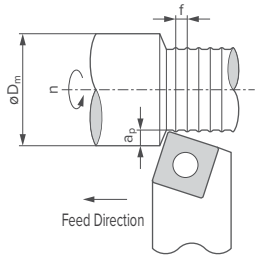
(Ex.) v_c=150m/min, D_m=100mm

$$n = \frac{1{,}000 \times 150}{3.14 \times 100} = 478 \text{ (min}^{-1}\text{)}$$

(2) Calculating cutting speed from rotational speed

$$v_c = \frac{\pi \times D_m \times n}{1{,}000}$$

Refer to the above table



- n : Spindle speed (min $^{-1}$)
- v_c : Cutting speed (m/min)
- f : Feed rate (mm/rev)
- a_p : Depth of cut (mm)
- D_m : Diameter of work piece (mm)

CALCULATING POWER REQUIREMENT

$$P_c = \frac{v_c \times f \times a_p \times k_c}{60 \times 10^3 \times \eta}$$

$$H = \frac{P_c}{0.75}$$

- P_c : Net power requirement (KW)
- v_c : Cutting speed (m/min)
- f : Feed rate (mm/rev)
- a_p : Depth of cut (mm)
- k_c : Specific cutting force (MPa)
- H : Required horsepower (HP)
- η : Machine efficiency (0.70 to 0.85)

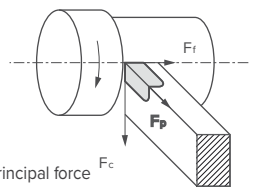
Rough Value of kc

Aluminium: 800MPa

General Steel: 2,500 to 3,000MPa

Cast Iron: 1,500MPa

CUTTING FORCE : PRINCIPAL, FEED & BACK FORCE



F_c: Principal force

F_f: Feed force

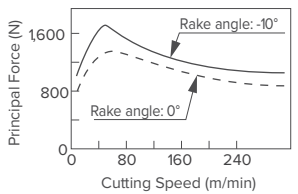
F_p: Back force

CALCULATING CUTTING FORCE

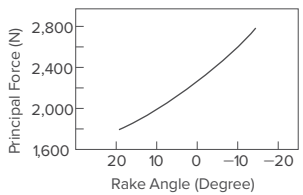
$$P = \frac{k_c \times q}{1{,}000} = \frac{k_c \times a_p \times f}{1{,}000}$$

- P : Cutting force (kN)
- k_c : Specific cutting force (MPa)
- q : Chip area (mm ^{2})
- a_p : Depth of Cut (mm)
- f : Feed Rate (mm/rev)

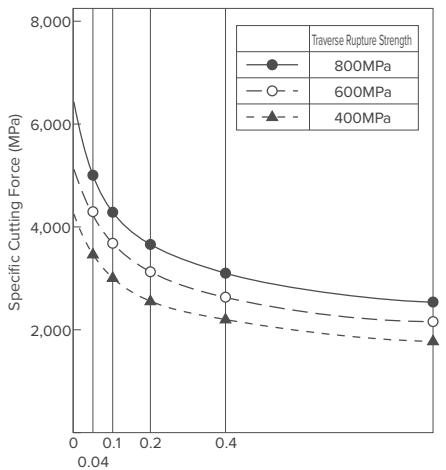
RELATION BETWEEN CUTTING SPEED & CUTTING FORCE



RELATION BETWEEN RAKE ANGLE AND CUTTING FORCE



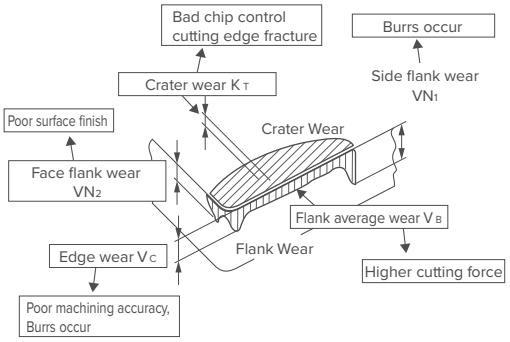
RELATION BETWEEN FEED RATE AND SPECIFIC CUTTING FORCE (FOR CARBON STEEL)

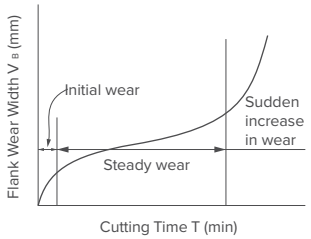
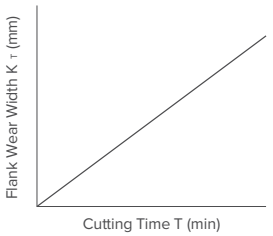


When feed rate decreases, specific cutting force increases.

TOOL WEAR

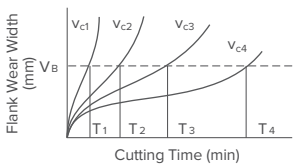
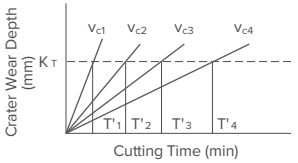
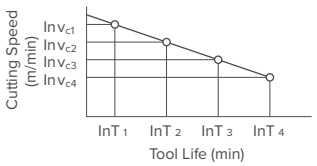
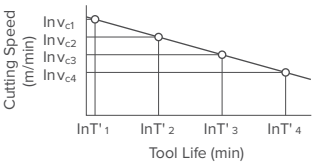
Forms of Tool Wear



Flank Wear	Crater Wear
	
• Wear increases rapidly right after cutting starts, it then progresses at a moderate and proportionate pace up to a certain point where it suddenly increases rapidly again.	• Wear increases in proportion to the cutting time.

TOOL LIFE (V-T)

This double logarithm graph shows the relative tool life of the specified wear over a range of cutting speeds on the X-axis, and the cutting speed along the Y-axis.

	Flank Wear	Crater Wear
Tool Wear		
Tool Life		

SAFETY INFORMATION

Material composition

Tool holders : Tool holders mainly contain iron (Fe), and low alloy elements such as chromium, nickel, manganese, molybdenum and silicon.

Indexable inserts/cutting tools/round tools: Substances in cemented carbide products contain mostly wolfram carbide and cobalt. They may also contain carbides and carbonitrides of the following elements: titanium, tantalum, niobium, chromium, molybdenum and vanadium.

Routes of exposure

Grinding or heating of hard metal blanks or hard metal products will produce products that give off dangerous dust and fumes. Avoiding ingestion and contact with skin or eyes is very important.

Acute toxicity

Intake of the aforementioned substances is toxic. Inhalation may cause irritation and inflammation of the airways. Significantly higher acute inhalation toxicity has been reported during simultaneous inhalation of cobalt and tungsten carbide compared to inhalation of cobalt alone.

Skin contact can cause irritation and rash. Sensitive individuals may even experience an allergic reaction.

Chronic toxicity

Repeated inhalation of aerosols containing cobalt may cause obstruction of the airways. Prolonged exposure to increased concentrations may cause lung fibrosis or lung cancer. Epidemiological studies indicate that workers previously exposed to high concentrations of tungsten carbide/cobalt carried an increased risk of developing lung cancer.

Cobalt and nickel are potent skin sensitizers. Repeated or prolonged contact can cause irritation and sensitization.

Risk phrases

Toxic: danger of serious damage to health by prolonged exposure through inhalation (Toxic when inhaled)

Limited evidence of a carcinogenic effect.

May cause sensitization by inhalation and skin contact

Preventive measures

Avoid formation & inhalation of dust.

Use adequate local exhaust ventilation to keep personal exposure well below nationally authorised limits.

If ventilation is not available or adequate, use respirators appropriately approved for the purpose.

Use safety goggles or glasses with side shields when necessary.

Avoid repeated skin contact. Wear suitable gloves. Wash skin thoroughly after handling.

Use suitable protective clothing. Launder clothing if needed.

Do not eat, drink or smoke in the working area. Wash skin thoroughly before eating, drinking or smoking.

NOTES

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