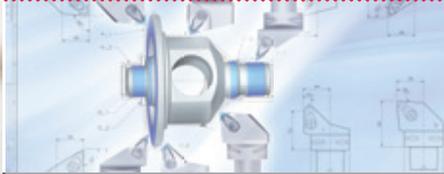




INSERTS



TECHNOLOGY



APPLICATION

# ToolingBox Solid CBN Tools

**ToolingBox**<sup>®</sup>  
THE INDUSTRIAL SOLUTION EXPERTS

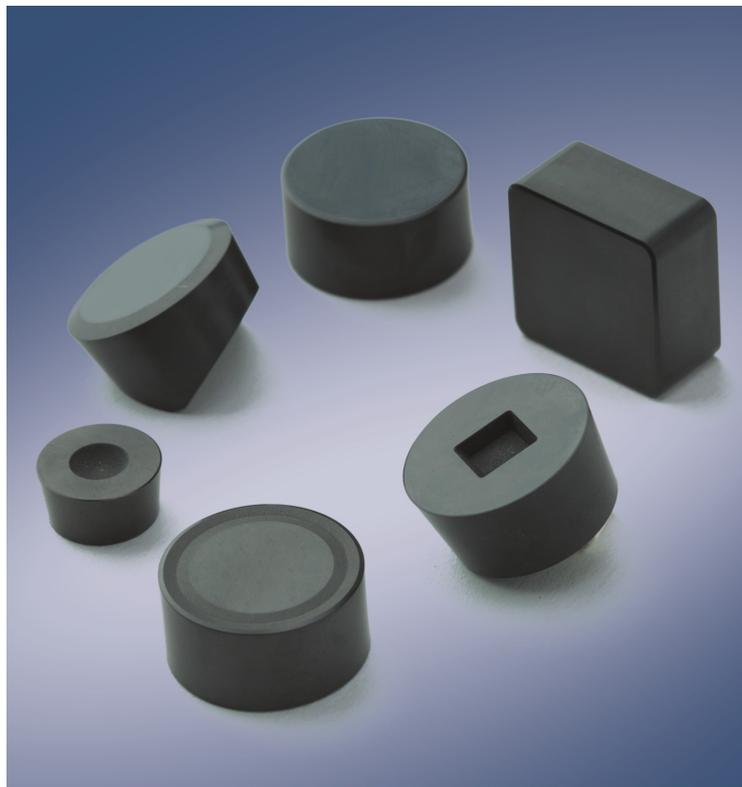
## Company Introduction

Toolingbox (Beijing) Industrial Technology Co.,Ltd is a Chinese professional manufacturer and importer&exporter for customized tools. We specialized in supplying solid carbides, PCD and CBN tools, related machinery and raw materials to metalworking ,metal materials industries worldwide.

Based in Beijing, At ToolingBox, we work and live with the ISO 9001 quality management system ,raw materials of tools were chose from Chinese Local, USA, Euro and Japan, each step of the tools manufacturing process is carefully planned and controlled by our professional engineers, each item is inspected prior to dispatch. The result being that our clients have benefited from our quality products and exceptional services. Due to our strict adherence to the quality management system, and also through the hard work of all our dedicated employees, our company can offered all kind of tools products with high quality and has been growing steadily increasingly distributed all over the world.

At the same time, ToolingBox is committed to bring the world's most advanced industrial technologies to domestic customers, and always focusing on tooling technology, materials and their related equipments.

ToolingBox, Professional makes value!



### CBN Materials Introduction

CBN(Polycrystalline Cubic boron nitride) is a new type of super hard cutting tool material after artificial diamond. Its hardness with HV3000-50000 is the second in the world , and only less than diamond. This material has high resistance with good fracture toughness, wear resistance, heat resistance and good chemical stability .It can be machined for the workpiece with hardness of HRC60 or more, very suitable for high-speed machining of casting iron. It is widely used in cutting and grinding process now.

### ToolingBox Solid CBN grade

Grade	CBN Content(Vol%)	Particle size (um)	Application
TB100	88-94	8-12	high speed machining for normal gray cast iron,such as engine cylinder and cover
TB200	50-70	2-4	Hard steel after heat treatment, such as hardened steel,bearing steel and die steel etc.
TB300	90-95	30-40	Wear resistant alloy cast iron with high speed,such as brake disc and brake drum ans so on
TB400	85-90	20-30	Alloy cast iron and alloy cast steel,such as roller,slurry pump and mine machinery etc.
TB500	85-90	1-3	High-temperature alloy,such as aero engine ect.

# Designation system for indexable inserts ISO 1832

## 可转位刀片代码系统 ISO1832

V	35°	
D	55°	
E	75°	
C	80°	
M	86°	
K	55°	
B	82°	
A	85°	
R		
S	90°	
T	60°	
W	80°	
L		
P	108°	
H	120°	
O	135°	

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

Clearance angle requiring special definition.

Inscribed circle										Inscribed circle	
<b>d</b> mm	<b>RC, RN</b> <b>S</b>	<b>O</b> 135°	<b>T</b> 60°	<b>C</b> 80°	<b>E</b> 75°	<b>D</b> 55°	<b>V</b> 35°	<b>W</b> 80°	<b>d</b> mm	<b>RB</b> (Typ MO)	
3,97			<b>06</b>						6,0	<b>06</b>	
5,56			<b>09</b>						7,0	<b>07</b>	
6,35			<b>11</b>	<b>06</b>		<b>07</b>			8,0	<b>08</b>	
9,52	<b>09</b>		<b>16</b>	<b>09</b>		<b>11</b>	<b>16</b>	<b>06</b>	9,0	<b>09</b>	
10,00						<b>12</b>			10,0	<b>10</b>	
12,70	<b>12</b>	<b>05</b>	<b>22</b>	<b>12</b>	<b>13</b>	<b>15</b>	<b>22</b>	<b>08</b>	12,0	<b>12</b>	
15,88	<b>15</b>	<b>06</b>	<b>27</b>	<b>16</b>					16,0	<b>16</b>	
19,05	<b>19</b>		<b>33</b>						20,0	<b>20</b>	
25,40	<b>25</b>		<b>44</b>						25,0	<b>25</b>	

Insert style  
刀片形状

Insert normal clearance  
刀片名义后角

Insert size  
刀片尺寸

**C**

**N**

**G**

**A**

**12**

Tolerances  
公差

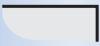
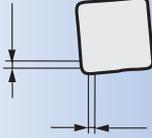
									* Allowable deviation for insert shape, depends on insert size 根据刀片尺寸的允许偏差值			
	<b>s ± mm</b>	<b>d ± mm</b>	<b>m ± mm</b>	Inscribed circle 内切圆	Tolerance class 公差等级							
					<b>m ± mm</b>		<b>d ± mm</b>					
<b>A</b>	0,025	0,025	0,005	<b>d</b> mm	<b>M</b>	<b>U</b>	<b>J, K, L, M</b>	<b>U</b>				
<b>C</b>	0,025	0,025	0,013									
<b>E</b>	0,025	0,025	0,025		0,08	0,13	0,05	0,08				
<b>F</b>	0,025	0,013	0,005									
<b>G</b>	0,130	0,025	0,025									
<b>H</b>	0,025	0,013	0,013									
<b>J</b>	0,025	0,05-0,13*	0,005									
<b>K</b>	0,025	0,05-0,13*	0,013									
<b>L</b>	0,025	0,05-0,13*	0,025									
<b>M</b>	0,130	0,05-0,13*	0,08-0,18*									
<b>U</b>	0,130	0,08-0,25*	0,13-0,38*	0,18	0,38	0,13	0,25					

Insert type  
刀片形式

<b>N</b>		<b>T</b>	
<b>R</b>		<b>Q</b>	
<b>F</b>		<b>U</b>	
<b>A</b>		<b>B</b>	
<b>M</b>		<b>H</b>	
<b>G</b>		<b>C</b>	
<b>W</b>		<b>J</b>	
<b>X</b>	Special type 特殊形式		

# Designation system for indexable inserts ISO 1832

## 可转位刀片代码系统 ISO1832

	<b>00</b> RN, RC <b>M0</b> RB <b>02</b> 0,2 <b>04</b> 0,4 <b>08</b> 0,8 <b>12</b> 1,2 <b>16</b> 1,6 <b>24</b> 2,4 <b>32</b> 3,2 <b>40</b> 4,0 <b>ZZ</b> Special type	<b>F</b>  Sharp	<b>S</b>  Chamfered and rounded	<b>T</b>  Chamfered	 Entering angle  z.B. · eg. · exemple <b>85 = 85°</b> <b>95 = 95°</b>	 Width of zz-chamfer  z.B. · eg. · exemple <b>025 = 0,25 mm</b> <b>050 = 0,50 mm</b>
---	--	--	--	--	---	--

Corner radius  
刀尖圆角

Cutting edge type  
刃口形式

Code of ZZ geometry  
修光刃代码

**04 08 T - 2 L XXX25**

Insert thickness  
刀片厚度

	
<b>01</b>	1,59
<b>02</b>	2,38
<b>03</b>	3,18
<b>T3</b>	3,97
<b>04</b>	4,76
<b>06</b>	6,35
<b>07</b>	7,94
<b>09</b>	9,52
<b>12</b>	12,70

Execution variants  
CBN形式

<b>2</b>		CBN one-side tipped, 2 corners CBN单面焊尖, 2刃
<b>3</b>		CBN one-side tipped, 3 corners CBN单面焊尖, 3刃
<b>4</b>		CBN one-side tipped, 4 corners CBN单面焊尖, 4刃
<b>F</b>		CBN one-sided full face laminated CBN单面整层
<b>S</b>		CBN solid 整体CBN

Length of the CBN element  
CBN长度

	
<b>S</b>	≥ 0,8 mm
<b>L</b>	≥ 2,0 mm

# ToolingBox Solid CBN Inserts List



## SOLID CBN Inserts

# Solid CBN List - ISO grade



INSERT	ISO	GRADE
<b>CNGN12 04 ..</b> 	CNGN 12 04 04 T-S	
	CNGN 12 04 04 S-S	
	CNGN 12 04 04 S-S	
	CNGN 12 04 04 S-S	
	CNGN 12 04 08 T-S	All grades are available
	CNGN 12 04 08 S-S	
	CNGN 12 04 08 S-S	
	CNGN 12 04 08 S-S	
	CNGN 12 04 12 T-S	
	CNGN 12 04 12 S-S	
	CNGN 12 04 12 S-S	
	CNGN 12 04 12 S-S	

INSERT	ISO	GRADE
<b>CNGA12 04 ..</b> 	CNGA 12 04 04 T-S	
	CNGA 12 04 04 S-S	
	CNGA 12 04 04 S-S	
	CNGA 12 04 04 S-S	
	CNGA 12 04 08 T-S	All grades are available
	CNGA 12 04 08 S-S	
	CNGA 12 04 08 S-S	
	CNGA 12 04 08 S-S	
	CNGA 12 04 12 T-S	
	CNGA 12 04 12 S-S	
	CNGA 12 04 12 S-S	
	CNGA 12 04 12 S-S	

## **i** Chamfer geometries

T-chamfer:  
for continuous cuts



❖ 44 for smooth cuts

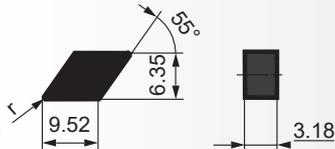
S-chamfer: with rounding

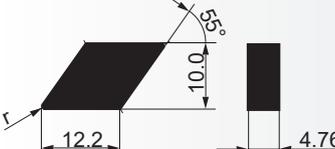


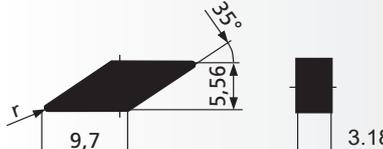
⊙ 46 for lightly interrupted cuts

⊙ 47 for heavily interrupted cuts



INSERT	ISO	GRADE
<b>DNGN(A) 09 03 ..</b> 	DNGN 09 03 04 S-S	
	DNGN 09 03 04 S-S	
	DNGN 09 03 04 S-S	
	DNGN 09 03 08 S-S	
	DNGN 09 03 08 S-S	All grades are available
	DNGN 09 03 08 S-S	
	DNGN 09 03 08 S-S	
	DNGN 09 03 12 S-S	
	DNGN 09 03 12 S-S	
	DNGN 09 03 12 S-S	
	DNGN 09 03 12 S-S	

<b>DNGN(A) 12 04 ..</b> 	DNGN 12 04 04 T-S	
	DNGN 12 04 04 S-S	
	DNGN 12 04 04 S-S	
	DNGN 12 04 04 S-S	
	DNGN 12 04 08 T-S	All grades are available
	DNGN 12 04 08 S-S	
	DNGN 12 04 08 S-S	
	DNGN 12 04 08 S-S	
	DNGN 12 04 12 T-S	
	DNGN 12 04 12 S-S	
	DNGN 12 04 12 S-S	
	DNGN 12 04 12 S-S	

INSERT	ISO	GRADE
<b>VNGN(A) 09 03 .. S-S</b> 	VNGN 09 03 04 S-S	
	VNGA 09 03 04 S-S	
	VNGN 09 03 08 S-S	
	VNGA 09 03 08 S-S	All grades are available
	VNGN 09 04 12 S-S	
	VNGA 09 04 12 S-S	



INSERT	ISO	GRADE
RNGN(A) 06 03 00 .. 	RNGN 06 03 00 T-S	
	RNGN 06 03 00 S-S	
	RNGA 06 03 00 S-S	All grades are available
	RNGA 06 03 00 S-S	
RNGN(A) 09 04 00 .. 	RNGN 09 04 00 T-S	
	RNGN 09 04 00 S-S	
		All grades are available
	RNGA 09 04 00 S-S	
	RNGA 09 04 00 S-S	
RNGN(A) 12 04 00 .. 	RNGN 12 04 00 T-S	
	RNGN 12 04 00 S-S	
	RNGA 12 04 00 S-S	
	RNGA 12 04 00 S-S	

### **i** Chamfer geometries

T-chamfer:

for continuous cuts



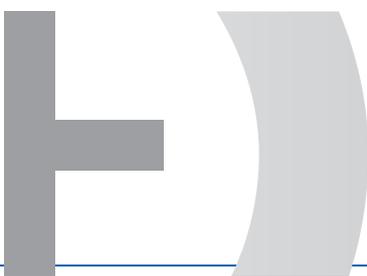
❖ 44 for smooth cuts

S-chamfer: with rounding



⊗ 46 for lightly interrupted cuts

⊕ 47 for heavily interrupted cuts



INSERT	ISO	GRADE
<p>SNGN(A) 09 03 ..</p>	SNGN 09 03 08 T-S	
	SNGN 09 03 08 S-S	
	SNGA 09 03 08 T-S	
	SNGA 09 03 08 S-S	
	SNGN 09 03 12 T-S	All grades are available
	SNGN 09 03 12 S-S	
	SNGA 09 03 12 T-S	
	SNGA 09 03 12 S-S	
	SNGN 09 03 16 T-S	
	SNGN 09 03 16 S-S	
SNGA 09 03 16 T-S		
SNGA 09 03 16 S-S		

<p>SNGN(A) 12 04 ..</p>	SNGN 12 04 08 T-S	
	SNGN 12 04 08 S-S	
	SNGA 12 04 08 S-S	
	SNGA 12 04 08 S-S	All grades are available
	SNGN 12 04 12 T-S	
	SNGN 12 04 12 S-S	
	SNGA 12 04 12 S-S	
	SNGA 12 04 12 S-S	



INSERT	ISO	GRADE
<p>TNGN(A) 11 03 ..</p>	TNGN 11 03 04 T-S	
	TNGN 11 03 04 S-S	
	TNGA 11 03 04 T-S	
	TNGA 11 03 04 S-S	
	TNGN 11 03 08 T-S	
	TNGN 11 03 08 S-S	
	TNGA 11 03 08 T-S	
	TNGA 11 03 08 S-S	All grades are available
	TNGN 11 03 12 T-S	
	TNGN 11 03 12 S-S	
	TNGA 11 03 12 T-S	
	TNGA 11 03 12 S-S	
	TNGN 11 03 16 T-S	
	TNGN 11 03 16 S-S	
	TNGA 11 03 16 S-S	
	TNGA 11 03 16 S-S	

<p>TNGN(A) 16 04 ..</p>	TNGN 16 04 04 T-S	
	TNGN 16 04 04 S-S	
	TNGA 16 04 04 T-S	
	TNGA 16 04 04 S-S	
	TNGN 16 04 08 T-S	
	TNGN 16 04 08 S-S	
	TNGA 16 04 08 S-S	All grades are available
	TNGA 16 04 08 S-S	
	TNGN 16 04 12 T-S	
	TNGN 16 04 12 S-S	
	TNGA 16 04 12 T-S	
	TNGA 16 04 12 S-S	

### **i** Chamfer geometries

T-chamfer:

for continuous cuts

❖ 44 for smooth cuts

S-chamfer: with rounding

⊙ 46 for lightly interrupted cuts

⊙ 47 for heavily interrupted cuts





INSERT	ISO	GRADE
<p><b>WNGN(A) 06 03 ..</b></p>	WNGN 06 03 04 S-S	
	WNGA 06 03 04 S-S	
	WNGN 06 03 08 S-S	
	WNGA 06 03 08 S-S	
		All grades are available
	WNGN 06 03 12 S-S	
	WNGA 06 03 12 S-S	
	WNGN 06 03 16 S-S	
	WNGA 06 03 16 S-S	
<p><b>WNGN(A) 08 04 ..</b></p>	WNGN 08 04 08 S-S	
	WNGA 08 04 08 S-S	
		All grades are available
	WNGN 08 04 12 S-S	
	WNGA 08 04 12 S-S	

# Case story for Milling :

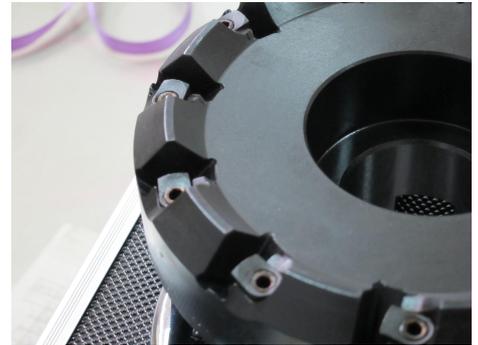
## TOOL LIFE QUANTITY INCREASED UP TO 215%

Roughing Milling OF Engine Block



## Revolution for Milling Cast iron material!!

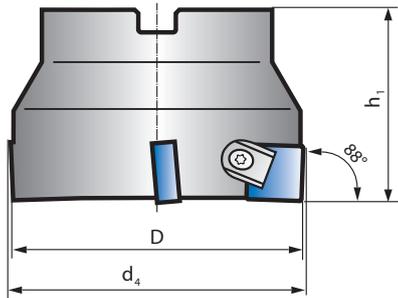
**Vc up to 1000m/min;**  
**Fz up to 0.5**  
**Ap max to 4mm**



Roughing milling of a Engine Block Made of GG300

Cutting Material: Milling	Competitor Tungsten Carbide	Cutting Tools Solid CBN TB300
Cutter: Insert:	D = 80 mm, z = 8	RMC 080-08SN1288 SNGN120412
Cutting Speed vc: Feed per	300 m/min	1000 m/min
Tooth fz: Cutting	0,10 mm/z	0,20 mm/z
Depth ap:	0,50 mm	2 mm
Width of Engagement ae:	65 mm	65 mm
Machining Time:	0,44 min	0,20 min
Tool Life:	100 %	215 %

# Face Milling Cutters RMC ... 88



Axial rake angle $\gamma_a$	-6°
Radial rake angle $\gamma_r$ depending on $\emptyset$	-6° bis -9°
Mounting dimension according to DIN 8030	
For thin-walled and unstable parts	

**i Recommended application**

GJL (GG)    GJS (GGG)

---

WORKPIECE  
 thin-walled    unstable    stable

---

$f_z = 0,40$  mm/tooth

---

12.5/▽ • 6.3/▽ • 0.5/▽

Type	Dimensions				
	D	Teeth t	d4	h1	n <sub>max</sub> (min <sup>-1</sup> )
RMC 040-04SN1288	40	4	41	40	23000
RMC 050-05SN1288	50	5	51	40	18000
RMC 063-06SN1288	63	6	64	40	13000
RMC 080-08SN1288	80	8	81	50	10000
RMC 100-10SN1288	100	10	101	50	8000
RMC 125-12SN1288	125	12	126	63	8000
RMC 160-15SN1288	160	15	161	63	6000

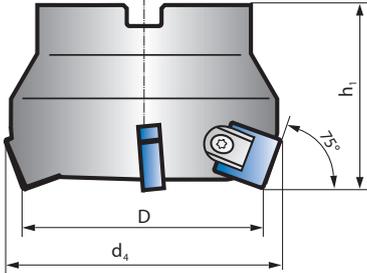
D = 40 - 50 mm



D = 63 - 125 mm



# Face Milling Cutters RMC ... 75



Axial rake angle $\gamma_a$	-6°
Radial rake angle $\gamma_r$ , depending on $\emptyset$	-6° bis -9°
Mounting dimension according to DIN 8030	
For thin-walled and unstable parts	

**i Recommended application**

GJL (GG)     GJS (GGG)

---

WORKPIECE

thin-walled     unstable     stable

---

$f_z = 0,40$  mm/tooth

---

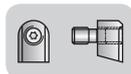
12.5/  • 6.3/

Type	Dimensions				
	D	Teeth t	d4	h1	n <sub>max</sub> (min <sup>-1</sup> )
RMC 040-04SN1275	40	4	41	40	23000
RMC 050-05SN1275	50	5	51	40	18000
RMC 063-06SN1275	63	6	64	40	13000
RMC 080-08SN1275	80	8	81	50	10000
RMC 100-10SN1275	100	10	101	50	8000
RMC 125-12SN1275	125	12	126	63	8000
RMC 160-15SN1275	160	15	161	63	6000

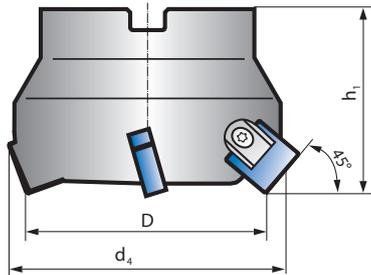
D = 50 mm



D = 63 - 125 mm



# Face Milling Cutters RMC ... 45



Axial rake angle $\gamma_a$	-6°
Radial rake angle $\gamma_r$ depending on $\emptyset$	-6° bis -9°
Mounting dimension according to DIN 8030	
For thin-walled and unstable parts	

**i Recommended application**

GJL (GG)     GJS (GGG)

---

WORKPIECE  
 thin-walled **X**    unstable **X**    stable **✓**

---

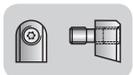
$f_z = 0,30$  mm/tooth

---

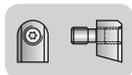
12.5/ • 6.3/ • 3.2/

Type	Dimensions				
	D	Teeth t	d4	h1	n <sub>max</sub> (min <sup>-1</sup> )
RMC 040-04SN1245	40	4	41	40	23000
RMC 050-05SN1245	50	5	51	40	18000
RMC 063-06SN1245	63	6	64	40	13000
RMC 080-08SN1245	80	8	81	50	10000
RMC 100-10SN1245	100	10	101	50	8000
RMC 125-12SN1245	125	12	126	63	8000
RMC 160-15SN1245	160	15	161	63	6000

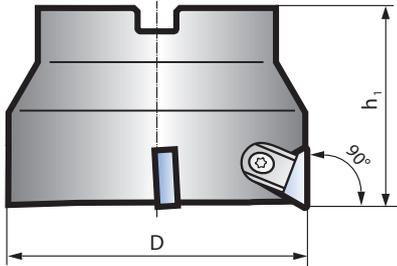
D = 50 mm



D = 63 - 125 mm



# Square Shoulder Milling Cutter RMC ... 90



Axial rake angle $\gamma_a$	-6°
Radial rake angle $\gamma_r$ depending on $\emptyset$	-6° bis -9°
Mounting dimension according to DIN 8030	
For thin-walled and unstable parts	

**i Recommended application**

GJL (GG)     GJS (GGG)

---

WORKPIECE

thin-walled ✓    unstable ✓    stable ✓

---

$f_z = 0,30$  mm/tooth

---

12.5/ • 6.3/

Type	Dimensions				
	D	Teeth t	d4	h1	nmax(min <sup>-1</sup> )
RMC 040-04TN1690	40	4	41	40	23000
RMC 050-05TN1690	50	5	51	40	18000
RMC 063-06TN1690	63	6	64	40	13000
RMC 080-08TN1690	80	8	81	50	10000
RMC 100-10TN1690	100	10	101	50	8000
RMC 125-12TN1690	125	12	126	63	8000
RMC 160-15TN1690	160	15	161	63	6000

D = 50 mm

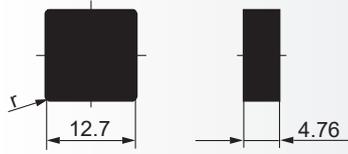


D = 63 - 160mm



# Inserts for RMC ... Milling Cutters

SNGN 12 04 ..

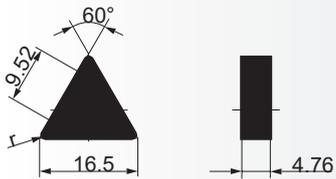


SNGN 12 04 08 T-S  
SNGX 12 04 08 S-S

All grades are available

SNGN 12 04 12 T-S  
SNGN 12 04 12 S-S

TNGN 16 04 ..



TNGN 16 04 04 T-S  
TNGN 16 04 04 S-S

All grades are available

TNGN 16 04 08 T-S  
TNGN 16 04 08 S-S

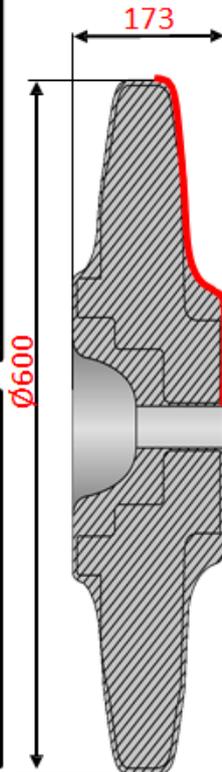
TNGN 16 04 12 T-S  
TNGN 16 04 12 S-S



# Case story for Turning:

**Processing:** Roughing processing

**Material:** Inconel 718



**TOOL LIFE QUANTITY  
INCREASED UP TO 200%!!**

	<b>ToolingBox</b>	Competitor 1	Competitor 2
Insert	<b>RNMN 190700T</b>	RNGN 190700T	RNGN 190700T
Material of the insert	<b>TB500</b>	SX5	KY2000
Vc(m/min)	<b>300</b>	156	156
F(mm/rev)	<b>0.24</b>	0.20	0.20
Ap(mm)	<b>5</b>	5	5
Tool life (pcs)	<b>13</b>	6	7

# CASE STORY FOR TURNING SUPER HARD MATERIALS AND HARD ALLOYS

## Material:

Rellite HRC 60...87

## External roughing

RNMN09400 S-S TB200

Cutting data:

$V = 30 - 40 \text{ m/min}$

$F = 0.3 \text{ mm/rev}$

$A_p = 0.1 - 0.2 \text{ mm}$



- Replacement of the primary grinding with turning
- Reducing of the machining time up to 47% less

*Material - A49 cast iron chromium*

## Pump Impeller



## Turbines, press forms



## External Machining

RNMN120400 T-S TB400

Tool holder CRSNR3232P12

Cutting data:

$V = 100 \text{ m/min}$

$F = 0.2 \text{ mm/rev}$

$A_p = 4.0 \text{ mm}$



## External machining

SNMN120416 S20020 TB400

Tool holder – CSNR3232P12

RNMN120400 S20020 TB400

Tool holder – CSNR3232P12

Cutting data:

$V = 100 - 180 \text{ m/min}$

$F = 0.2 - 0.6 \text{ mm/rev}$

$A_p = 4.0 - 5.0 \text{ mm}$

## Cutting data recommendations grey cast iron 灰铁加工推荐切削参数

Hardness	DIN	EU	F	GB	S	E	I	USA	J
(HB)	DIN	EN	AFNOR	B.S.	SS	UNE	UNI	AISI/SAE	JIS
190	<b>GG-15</b>	GJL-150	Ft 15 D	Grade 150	0115-00	FG 15	G 15	No 25 B	FC 150
210	<b>GG-20</b>	GJL-200	Ft 20 D	Grade 220	0120-00		G 20	No 30 B	FC 200
240	<b>GG-25</b>	GJL-250	Ft 25 D	Grade 260	0125-00	FG 25	G 25	No 35 B	FC 250
260	<b>GG-30</b>	GJL-300	Ft 30 D	Grade 300	0130-00	FG 30	G 30	No 45 B	FC 300
280	<b>GG-35</b>	GJL-350	Ft 35 D	Grade 350	0135-00	FG 35	G 35	No 50 B	FC 350

(HB) Hardness 硬度	$v_c$ (m/min) Cutting speed 切削速度		$a_p$ (mm) Depth of cut 切深	f Feed 进给		Grade 牌号
	Rec. value 推荐值	Total range 全部范围		Rec. value 推荐值	Total range 全部范围	
$\nabla_{25}$ • Roughing • 粗加工						
140 - 280	1000	600 - 1400	2,0 - 5,0	0,40	0,35 - 0,60	TB 100
	1000	600 - 1400	2,0 - 5,0	0,40	0,35 - 0,60	TB 300
$\nabla_{12.5}$ • Semi-roughing • 半精加工						
140 - 280	1000	600 - 1400	1,5 - 2,5	0,25	0,20 - 0,35	TB 100
	1000	600 - 1400	1,5 - 2,5	0,25	0,20 - 0,35	TB 300
	1000	600 - 1400	1,5 - 2,5	0,25	0,20 - 0,35	TB 400
$\nabla_{6.3}$ • Finishing • 精加工						
140 - 280	1200	800 - 1500	0,5 - 1,5	0,25	0,15 - 0,30	TB 100
	1200	800 - 1500	0,5 - 1,5	0,25	0,15 - 0,30	TB 300
	1200	800 - 1500	0,5 - 1,5	0,25	0,15 - 0,30	TB 400
	1200	800 - 1500	0,5 - 1,5	0,25	0,15 - 0,30	TB 500
$\nabla_{0.8}$ • Fine finishing • 超精加工						
140 - 280	1200	800 - 1800	0,2 - 1,0	0,15	0,10 - 0,20	TB 400
	1200	800 - 800	0,2 - 1,0	0,15	0,10 - 0,20	TB 500

Cutting data recommendations chilled cast iron  
冷硬铸铁推荐切削参数

Hardness 肖氏硬度 Shore C	$v_c$ (m/min) Cutting speed 切削速度		$a_p$ (mm) Depth of cut 切深	f Feed 进给	f (mm) (mm)		Grade 牌号
	Rec. value 推荐值	Total range 全部范围			Richtwert Rec. value 推荐值	Gesamtbereich Total range 全部范围	
12.5 ▽ • Semi-roughing • 半精加工							
66 - 86	100	60 - 200	1,0 - 2,5	0,22	0,15 - 0,35		TB 100
	100	60 - 200	1,0 - 2,5	0,22	0,15 - 0,35		TB 300
	100	60 - 200	1,0 - 2,5	0,22	0,15 - 0,35		TB 400
6.3 ▽ • Finishing • 精加工							
66 - 86	120	80 - 220	0,1 - 1,0	0,20	0,10 - 0,30		TB 100
	120	80 - 220	0,1 - 1,0	0,20	0,10 - 0,30		TB 300
	120	80 - 220	0,1 - 1,0	0,20	0,10 - 0,30		TB 400

## Cutting data recommendations hardened steel 硬钢推荐切削参数



(HRC) Hardness 硬度(HRC)	$v_c$ (m/min) Cutting speed 切削速度		$a_p$ (mm) Depth of cut 切深	$f$ (mm) Feed 进给		Grade 牌号
	Rec. value 推荐值	Total range 全部范围		Rec. value 推荐值	Total range 全部范围	
$\nabla_{0.8}$ • Fine finishing in continuous cutting • 精加工连续切削						
50 - 64	180	140 - 250	0,1 - 0,5	0,10	0,05 - 0,2	TB 200
	200	140 - 250	0,1 - 0,5	0,10	0,05 - 0,2	TB 210
	220	140 - 250	0,1 - 0,5	0,10	0,05 - 0,2	TB 220
$\nabla_{6.3}$ • Finishing in lightly intermittent cutting • 精加工轻度断续切削						
50 - 64	160	140 - 200	0,1 - 0,5	0,20	0,05 - 0,2	TB 200
	180	140 - 200	0,1 - 0,5	0,20	0,05 - 0,2	TB 210
	170	140 - 200	0,1 - 0,5	0,20	0,05 - 0,2	TB 220
	180	140 - 200	0,1 - 0,5	0,20	0,05 - 0,2	TB 230
$\nabla_{6.3}$ • Finishing in medium intermittent cutting • 精加工中度断续切削						
50 - 64	160	120 - 170	0,1 - 0,5	0,15	0,05 - 0,2	TB 210
	180	120 - 170	0,1 - 0,5	0,15	0,05 - 0,2	TB 220
	170	120 - 170	0,1 - 0,5	0,15	0,05 - 0,2	TB 230
$\nabla_{6.3}$ • Finishing in heavily intermittent cutting • 精加工严重断续切削						
50 - 64	120	100 - 150	0,1 - 0,5	0,12	0,05 - 0,2	TB 230
	100	100 - 150	0,1 - 0,5	0,12	0,05 - 0,2	TB 240
	100	100 - 150	0,1 - 0,5	0,12	0,05 - 0,2	TB 250

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