



新概念刀具高效加工实践分析

伊斯卡（ISCAR）刀具国际贸易（上海）有限公司

吴 江

什么是高效加工

(High Performance Cutting)

HPC切削被描述为能满足提高金属去除率要求的切削加工，与传统的加工技术相比，要提高效率200%到500%。更广义的解释就是，HPC这一名词意味着对整个加工工艺链进行优化，目标是将生产成本降低10%到30%。

高效加工背景

Price, Tool Life or Productivity?

价格, 刀具寿命, 生产率?



3%



97%

Price

价格

Decreased Price

降低价格

Tool Life

刀具寿命

Increased Tool Life

提高刀具寿命

Productivity

生产率

**Increased Cutting Speed
and Improved Process**

提高切削速度 缩短加工过程

Actual Production Cost

高效加工背景

The Impact of Cutting Tools

由切削刀具带来的冲击

-1.0%

Price
价格



-1.5%

Tool life
刀具寿命

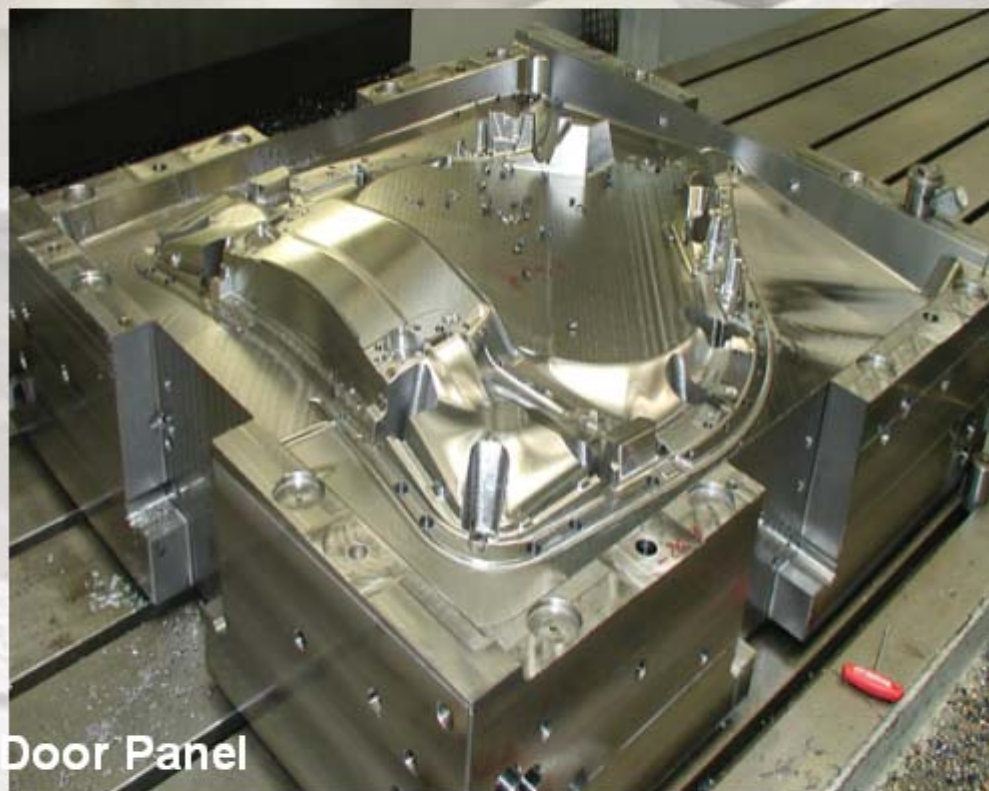
-15%

Speed and Process
Improvement
提高了切削速度 &
缩短了加工时间

3P Productivity
Performance ■ Profitability

HPC切削实践

这个任务涉及到宽1500mm、长1500mm、厚430mm及硬度HRC36-40的P-20模具钢的粗加工。模具的设计上需要在粗加工时切除超过2000kg的材料。为了完成这个重载粗加工任务，需要大量时间和资源。



Door Panel

Dimension
Mat.

1500x1500x430
1.2738

HPC切削实践一

使用直径100的圆刀片铣刀用于粗加工。刀片的每个切削刃通常仅能连续加工约15分钟，对于淬硬的P-20工具钢的加工参数为切深1mm、进给速度约为1000mm/min

解决方案一是用D100的仿形铣刀。使用IC908牌号的刀片，在转速450 rpm、切深1.5mm时获得了1650 mm/m的进给速度。使用这把铣刀时，每个切削刃的刀片寿命一个小时，为原来的四倍。



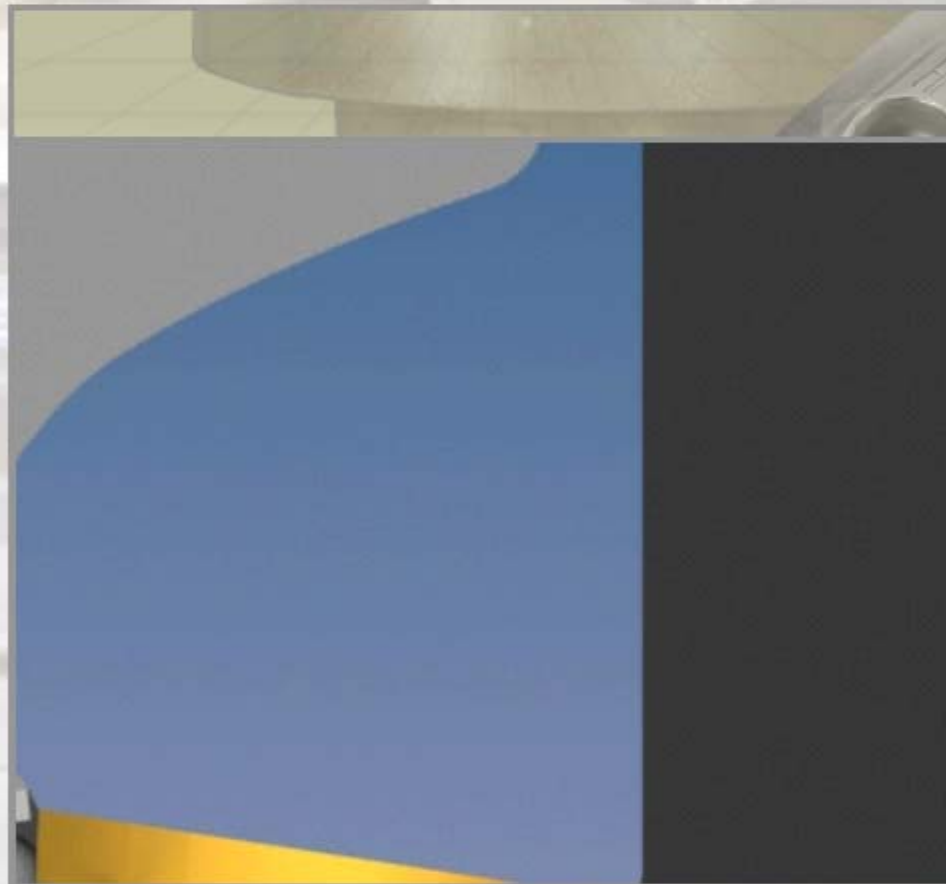
HPC切削技术实践

- 方案二
使用装一种特殊形状的三角形刀片的铣刀，它能承受高达每齿3.5mm的进给量。切削力沿轴向作用到主轴上，即使加工时有长的悬伸也有助于提供稳定性



FEEDMILL

飞碟铣刀FF WOMT 刀片

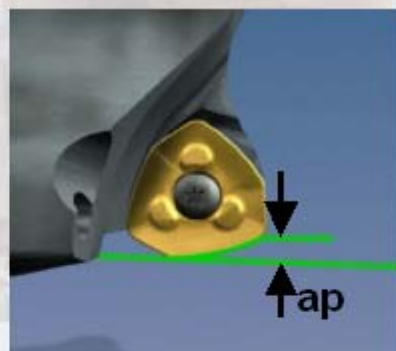


FEEDMILL

飞碟铣刀

高达 1.5mm/齿

ap: 1.5mm



高达 3.5mm/齿

ap: 2mm

- 直径: 25-100mm

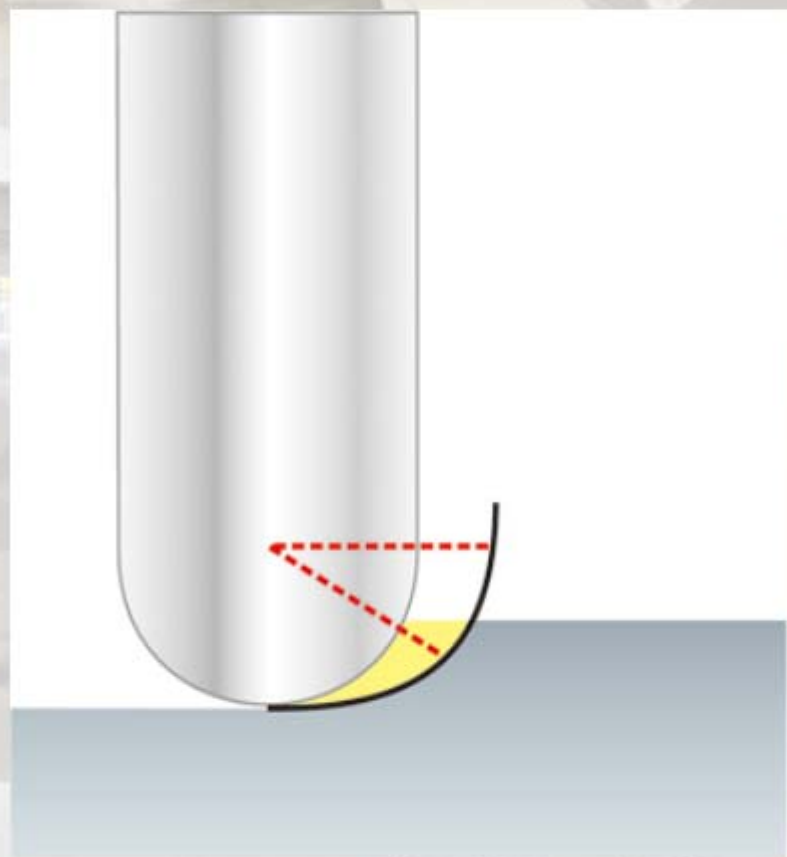
- 所有刀具都有内冷却液



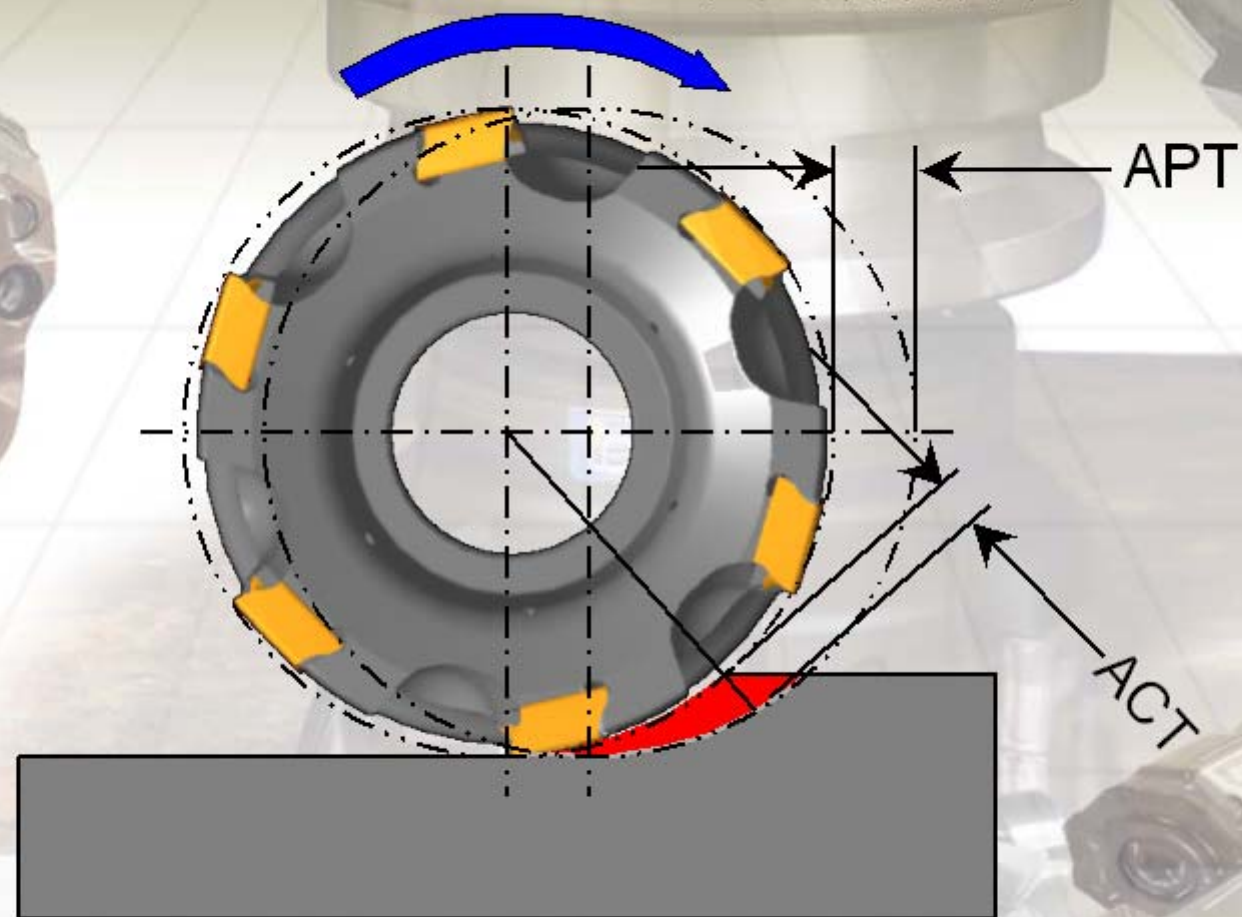
轴向减薄切削技术

什么叫轴向减薄切削技术？

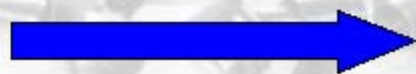
采用球头铣刀加工，其切削状态不同于标准的铣刀，它与刀具的切削接触面小于其曲面的全部半径。切屑厚度和每齿的进给量也将有所不同——切削厚度减小



Radial Chip Thickness
铣刀径向切屑厚度示意
Cutter Rotation, 铣刀旋转方向



Cutter feed direction
铣刀进给方向

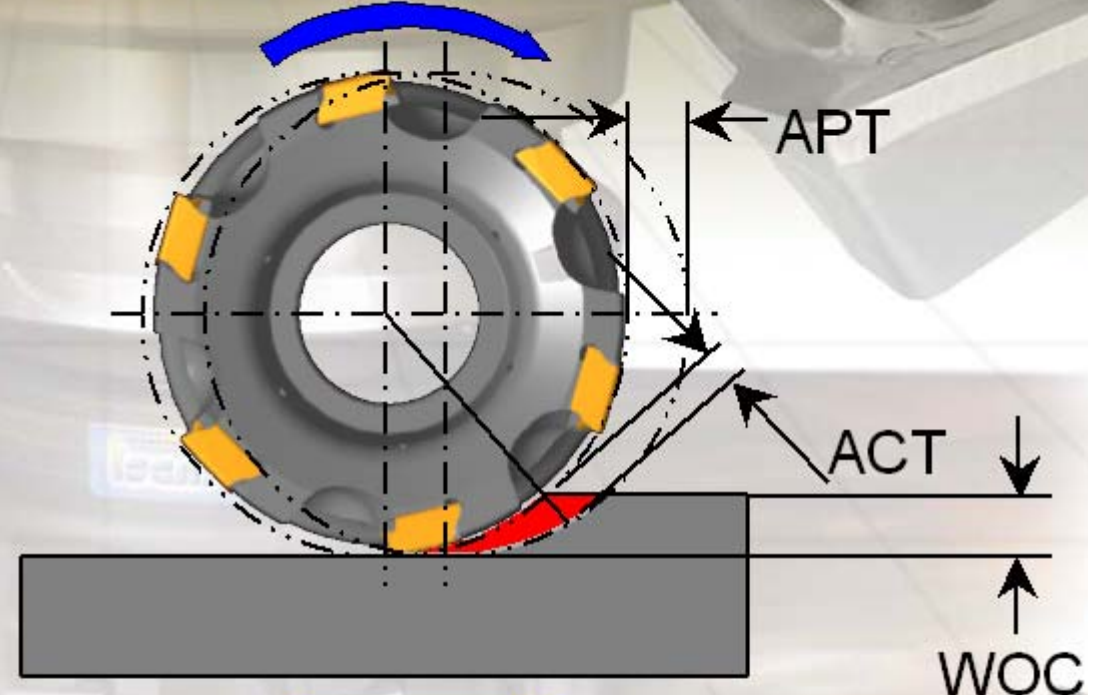


铣刀切屑径向厚度示意

Cutter Rotation, 铣刀旋转方向

When the radial width of cut is a percentage of the cutter radius, use the Multiplier shown to increase the APT.

当径向切削宽度为铣刀半径的百分比时，可采用下表数据，以提高APT值。



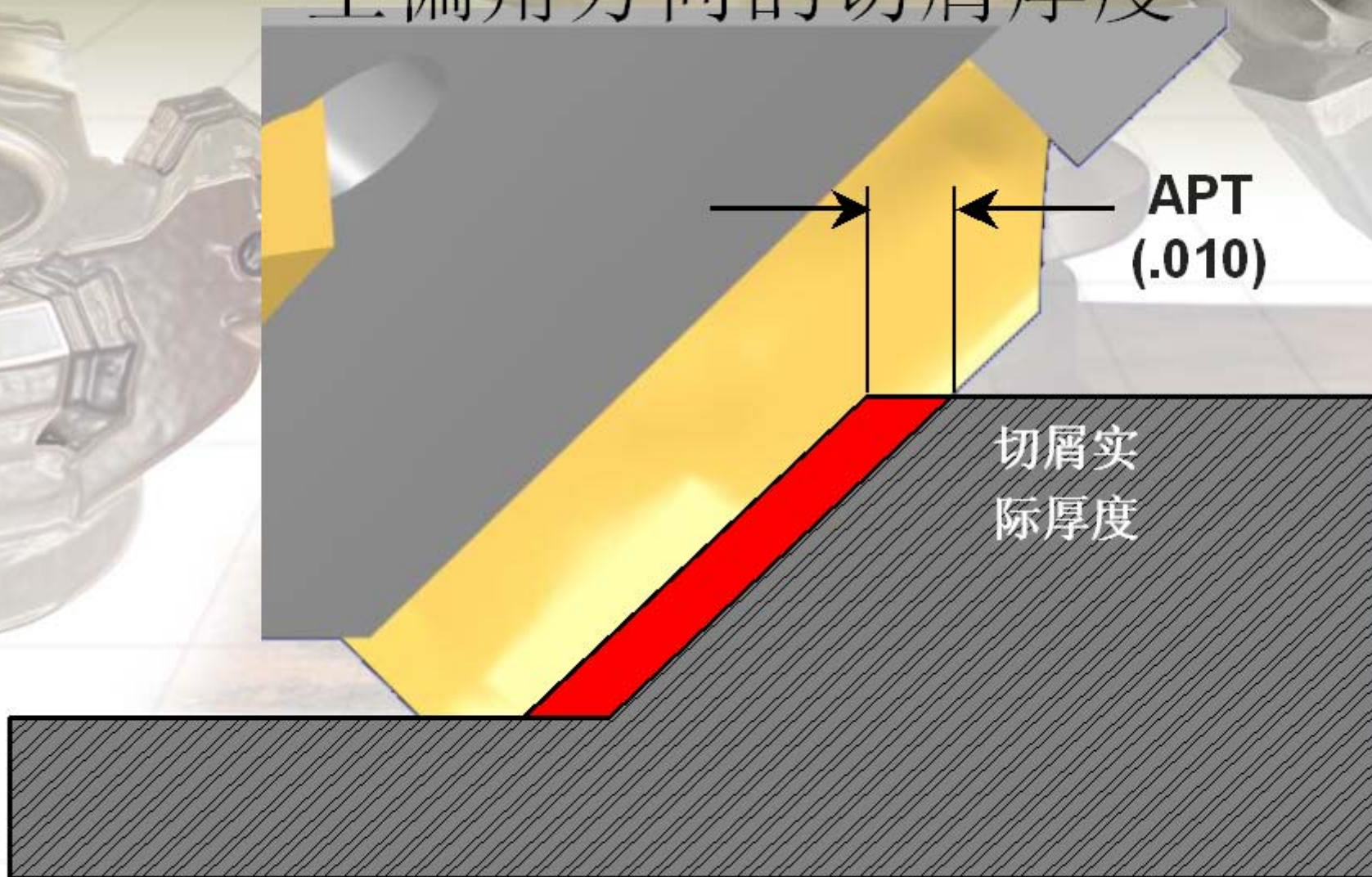
Cutter feed direction

铣刀进给方向

% of Radius	Chip Thinning Factor	Multiplier
10%	.43	2.3
15%	.53	1.9
25%	.66	1.5
30%	.71	1.4
50%	.86	1.2
75%	.97	1
100%	1.00	1

Lead Angle Chip Thinning

主偏角方向的切屑厚度



轴向切屑减薄

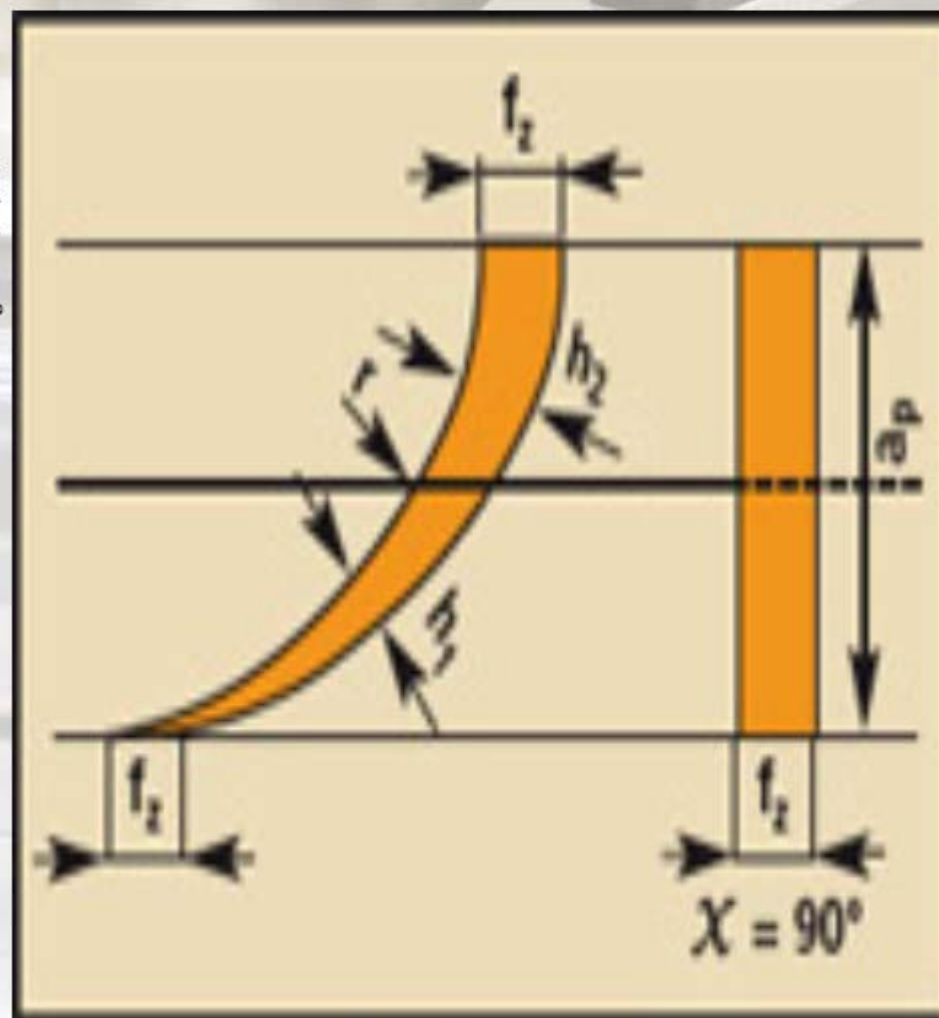
与直刃刀片不同的是，圆刀片切出的切屑厚度将随着切削深度的增加而增大。平均切屑厚度 h_m 来表示圆刀片的切削厚度。 h_m 值是根据通过刀具直径的圆刀片与工件径向接合处的切屑厚度来确定的。如果两种刀片采用相同的切削深度和每齿进给量进行切削，则它们切除的切屑量也完全相同。

$A_p=1/2R$ 时， h_m 减薄30%

而切削深度减小至等于圆刀片的25%，则在切屑量相等的情况下，圆刀片切出的切屑厚度将减薄50%。

为了达到通过减薄切屑厚度来提高生产率的目的，选取的最大切削深度应为圆刀片内切圆的20%-25%。

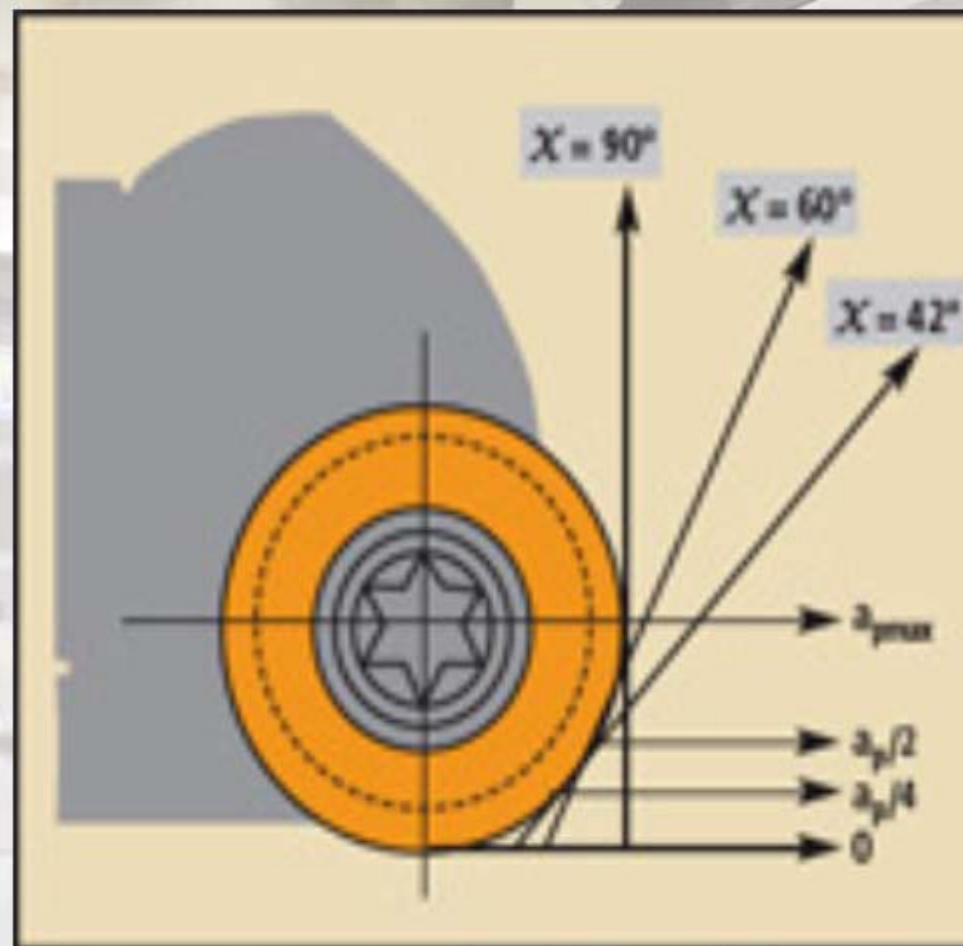
对于不同类型的工件材料， h_m 值不同。



进给率的提高

由于切屑厚度随着切削深度的变浅而减薄，因此，为了获得高水平的加工生产率，需要通过提高进给率来补偿较小的切削深度。无论是使用圆刀片或是小主偏角的铣刀，均可利用切屑减薄效应来实现高进给率铣削。

因此，在确定输入CNC加工程序的每齿进给量时，将变量平均切屑厚度 h_m 和主偏角 k_r 代入计算公式 $f_z = h_m / \sin k_r$ 中，进给率可获得大幅度提高。



New *ChaseFeed*

TFMRB-□□□□□-R-50

特点

提高生产效率
(在最大切深3.0mm时, 最大进给4.0mm/齿)
进给率达mm/tooth,
能提高效率, 减低成本



RBEX 50-M/MR

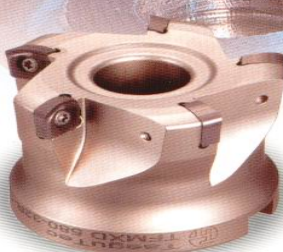
Tmill **New Bull Cutter** 大进给铣刀盘

刀片



- XDMX 130515R-M
- XDMX 08T310R-M

Bull Cutter



- TFMXD-□□□ -13 (D50, D63, D80, D100)
- TFMXD-□□□ -08 (D50)

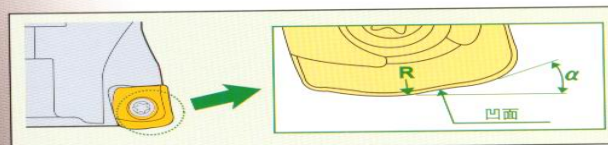
PATENT PENDING



- TEXTD-□□□ -W□□ F-08/13-L/XL
- TEXTD-□□□ -□□ -08/13-L
(D20, D25, D32 & D40)

特点与优点

进给率最大达4.5mm/tooth，大大提高生产效率
 XDMX13刀片切深达2mm
 (XDMX 08进给率最大达2.5mm/tooth，切深1.0mm)



独特楔形设计，大排屑槽，
 用一个简易安全螺钉锁紧就可达到较好的性能
 锐角平行四边行

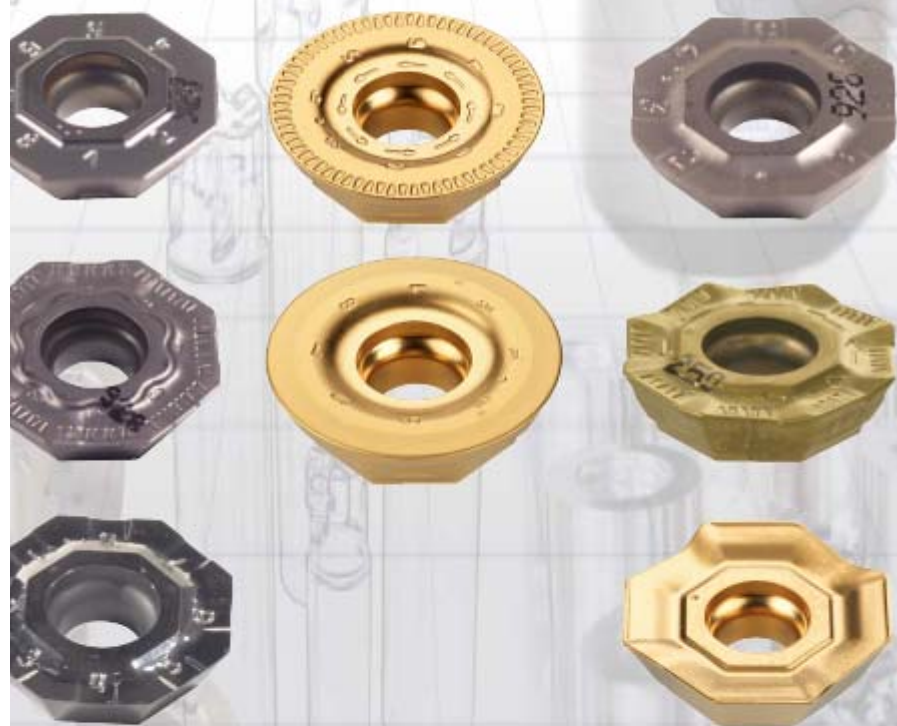


ISCAR **M**ILL LINE

Fast Metal Removal

快速金属切除

HELIOCTO Insert Variety



HELIOCTO *Fast Feed* Line

螺旋八角铣刀, 大进给系列

OFMW 0706R10 **FF**

OF.. 0706



HELIOCTO

Fast Feed Insert 3.0 mm/tooth ,

MULTI-MASTER

Fast Metal Removal

快速金属切削

One Shank Carries Heads with Different Profiles
同一刀体可装夹不同几何形体的刀头



One Shank Carries Heads with Different Profiles
同一刀体可装夹不同几何形体的刀头



Fast Feed Insert 1.0-1.5 mm/tooth ,

FEEDTURN

Inserts

LNMX 1608 R/L-HF

2 Cutting edges

Grades: IC9015 & IC3028

Feed Up To 2.5 mm per Rev (.095 ipr)



FEEDTURN

Inserts

LNMX 1608 R/L-HF

2 Cutting edges

Grades: IC9015 & IC3028

Feed Up To 2.5 mm per Rev (.095 ipr)



FEEDTURN Features

LNMX 1608L-HF Vs. CNMM 160616 (544)

ap= 4.8mm
(.190")
f= 0.8mm/rev
(.031ipr)

ap= 2.4mm
(.095")
f= 2.4mm/rev
(.095ipr)

HPC切削实践二

• 由于这一零件太大，加工中心的行程不够，因此车间只好采用部分加工的方法来加工这一零件。当该零件的前半部分采用19.05mm(0.75 in)半径的可转位刀片刀具加工以后，车间同意采用可使切屑减薄的19.05mm半径可转位刀片刀具加工零件的另一半。带有后者可转位刀片的刀具利用一个齿，而不是两个齿进行切削加工，但还是采用较浅的切削深度。然而，由于切屑减薄，获得了较高的进给速度，因此生产率提高。刀具的使用寿命也有所提高。



图2 传动箱盖是采用高速进给刀具加工的另一零件。

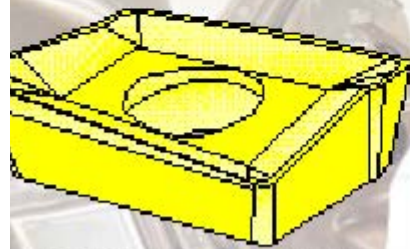
HPC切削实践

- 可转位刀片的刀尖圆角半径从2.7mm过渡到12.7mm。这样，切削时产生的切屑就会变薄，因为较浅的切削深度符合这一曲面的可转位刀片要求，允许提高进给速度
- 在高速加工中，为提高进给速度而使切屑减薄的做法仍然是一种真正有价值的想法。这种可转位刀片被称为“进给式铣刀”，其外形具有曲面的特点，它使切屑变薄成为可能。换句话说，切屑减薄不一定非要采用球端立铣刀或小直径刀具。至少这一方面的高速加工可以在中等速度的机床上应

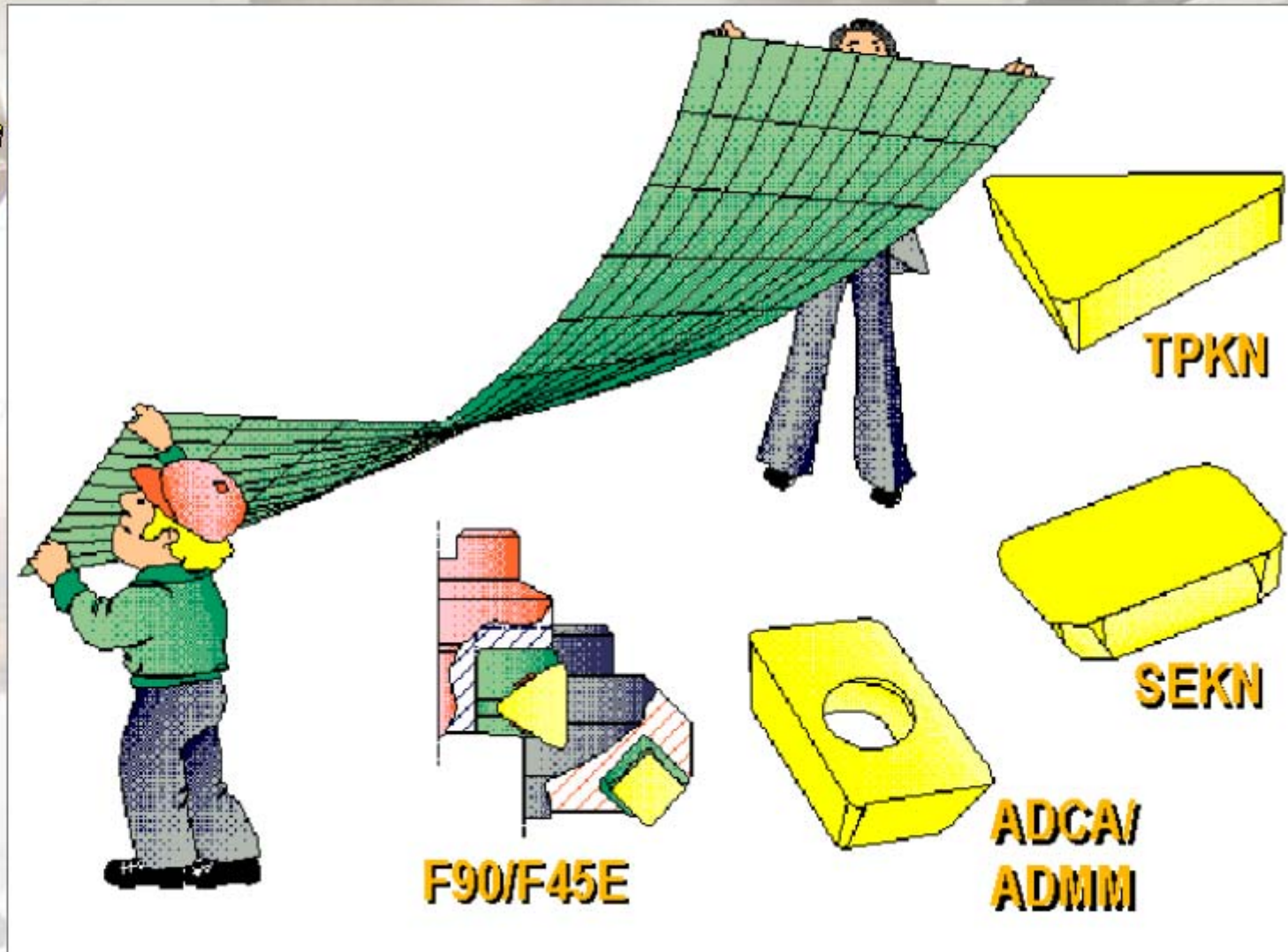


HEMMH. HEHEAL MINING LINE

- We torqued the planes into curved surfaces.

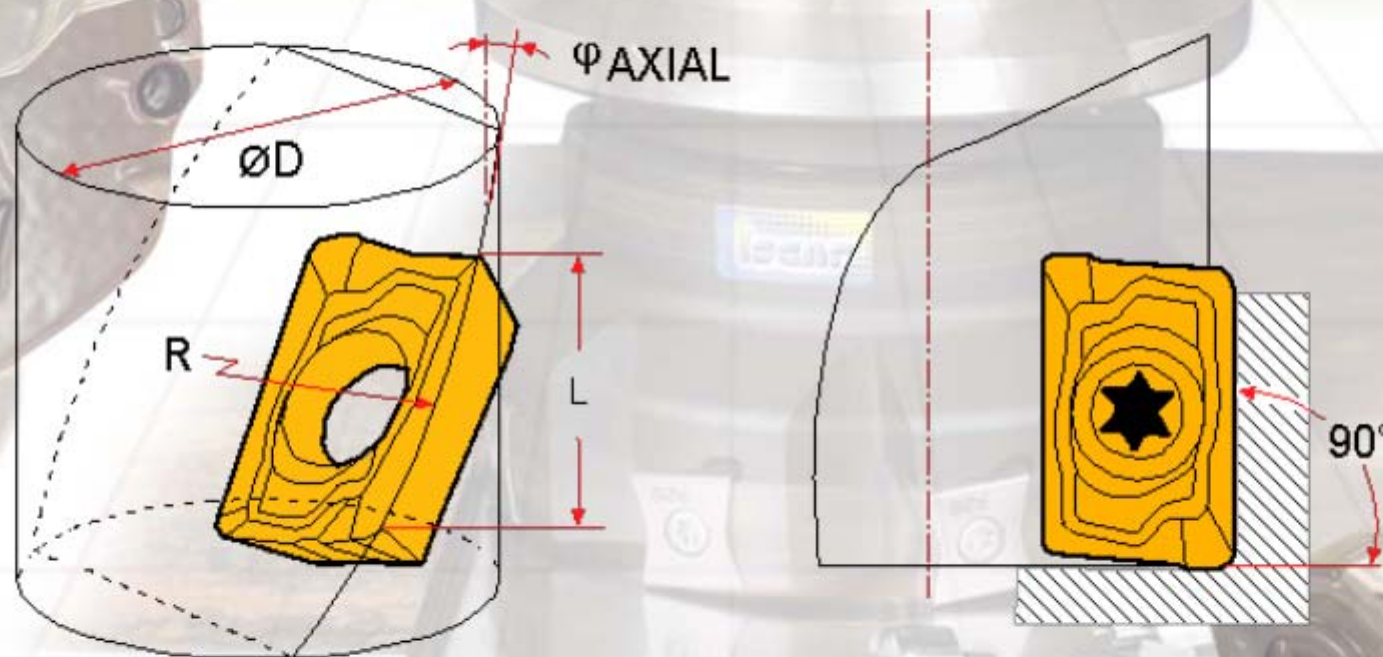


APKT/ADKT



with Helical Cutting Edge

- ❑ For better perpendicularity (90°) and flatness



- Due to the cutting edge as a part of a helix, every point of the
- cutting edge is equally spaced from a tool axis. This principle
- ensures 90° profile of a shoulder without distorting a wall.

HELI2000

**NO
MISMATCH**
SMOOTH SURFACE



HELIDO-H490

Advanced cutting geometry combined with newest technology of SUMO TEC carbide grades



2

1

DOUBLE SIDED
4 Corners

4

3



☐ 4 helical cutting edges

☐ Inclined dovetail pocket
and reliable support

☐ M5 clamping screw

☐ Insert thickness

☐ Economical

☐ Strength structure
High insert repeatability
Rigid clamping
Cutter security

☐ Stable clamping
Increased security

☐ Strong construction

☐ Cost per edge

☐ Milling with higher feed

☐ High feed potential

☐ High feed potential

☐ Increased productivity

ISCAR **M**ILL LINE

HELIDO

490 LINE

Expanding the Successful **HELIDO** High Productivity Line
New Insert Sizes



HELIDO

490 LINE

Cutters: **H 490 F90/E90AN... 12**

Dia.: 40-100 mm (1.5-4")



Dia.: 25-200mm

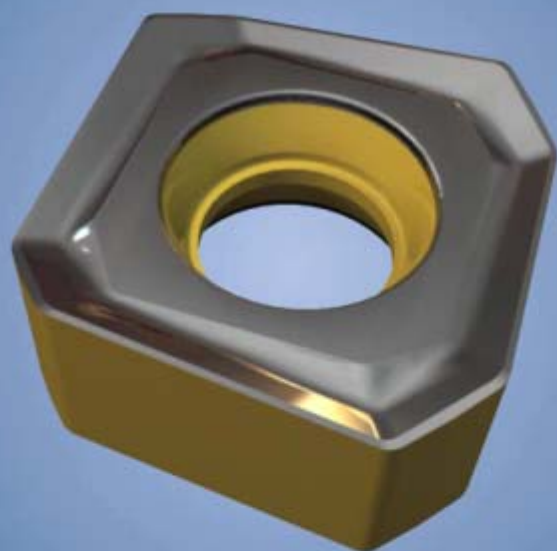


HELIDO 12 for General Milling Applications

ISCAR **M**ILL LINE

HELIDO 845 LINE

Double Sided Positive Square Insert with **8** Cutting Edges
New Addition to the **Economic HELIDO 845 Line**



HELIDO 13 Insert is Economical for Smaller Depth of Cut Application

ISCAR **D**RILL LINE **DR-TWIST**

Size Range 直径范围: 14– 60mm (.551" – 2.3")

3, 4 & 5 X DEEP!



ISCAR **DRILL LINE** **DR-TWIST**

Using **POSITIVE** with Indexable **DR-Twist** Drills 趋势 -- 大正前角刀片 -- 用于 **DR-Twist**

New **Helical** Inserts for **High Productivity** on **Exotic** Material

新的螺旋刃刀片 -- 用于难加工材料的高效加工

Applications 应用



Cutting Angles 切削角度



Axial Positive
轴向正前角



Radial Positive
径向正前角



Reduces up to 15% Cutting Forces vs. Square Inserts!

与方刀片相比 切削力降低 **15%**

高金属切除率系列

HELITURN

螺旋刃给ISO车刀带来更多优势

HELITURN



LNMX 1506..R/L-HT 立式刀片
具有 4个 螺旋状 切削刃



ISO TURN Features

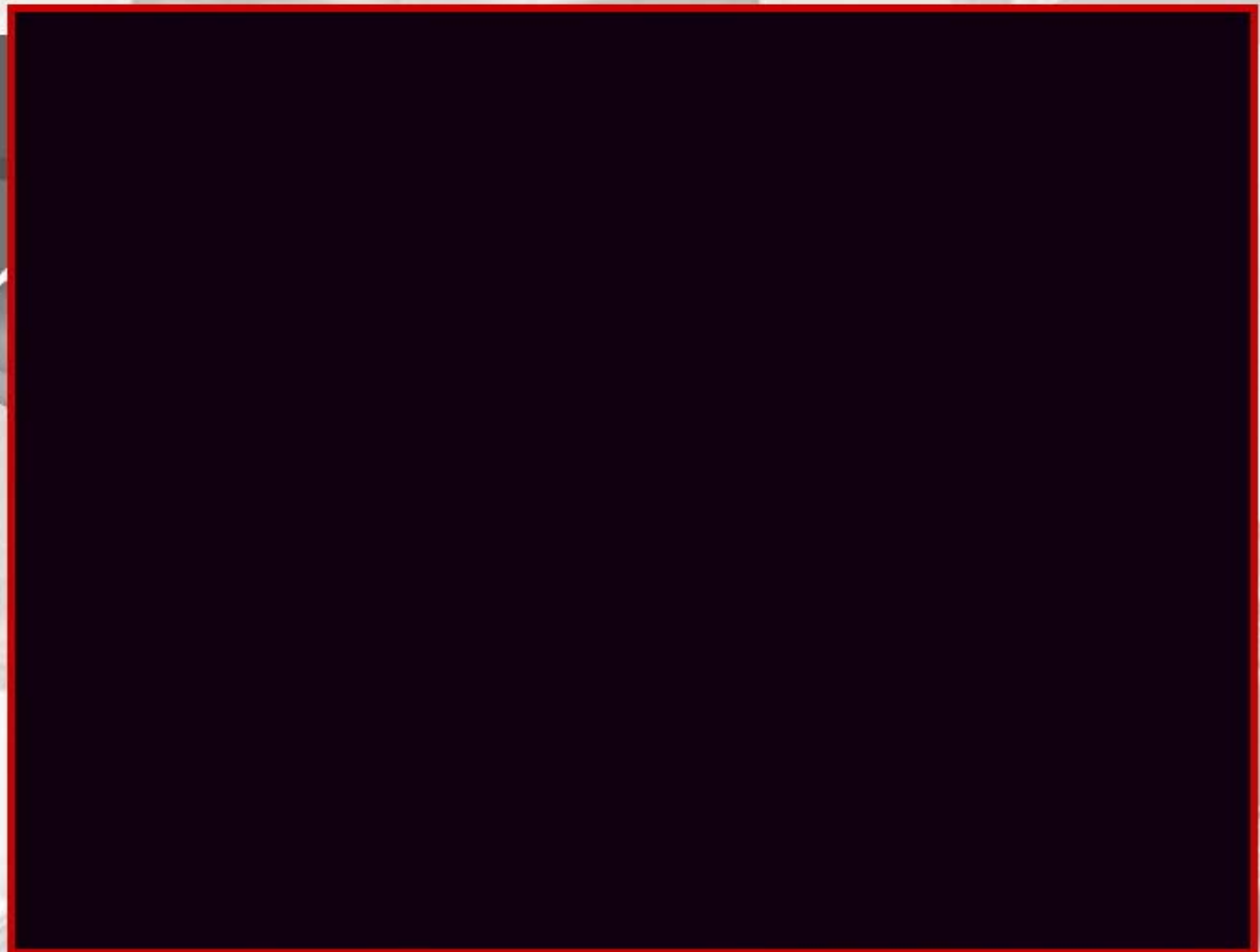
Application Range

Vs. CNMG 190616
(644)

- $a_p=8\text{mm}$
- $f=0.6\text{mm/rev}$
-

Near Tail Stock

Low cutting forces
Free chipflow



Test Report Canada

Part: Shaft

Material: Alloy steel SAE 4140

Hardness: 32 HRc

Heavy Roughing

Dia: 400 mm (16")

ap: 6 mm (.245")

LOC: 1830mm (72")

**“At the same speed and feed rate as competitor,
the Heli-Turn drew approx. 30% less power.”**



	Competitor	ISCAR
Insert	CNMG 190616 (644) GC4025	LNMX 150616R-HT IC9025
Vc m/min (sfm)	60 (200)	70 (230) +15%
Feed mm/min (ipr)	0.76 (.030)	1.15 (.045) +50%
Tool life min.	120	120
Passes	2.4	4
Cycle time	50min	29min -42%

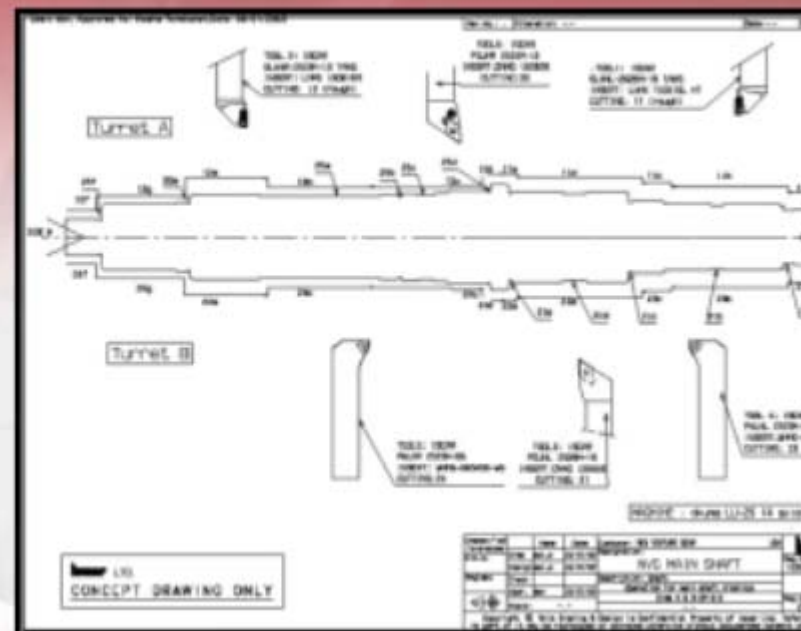
Part: Main Shaft (GM)

Material: Steel SAE 1055

Hardness: 28 HRc

Vc: 175 m/min (576 sfm)

ap: 3.5mm (.138")



Competitor

ISCAR

Insert	WNMG 080412 (433) AG300G	LNMX 150616R-HT IC9025
Feed mm/min (ipr)	0.5 (.020)	0.8 (.032)
Tool life min.	125	125
Cycle time net	0.602'	0.376'

- 40%

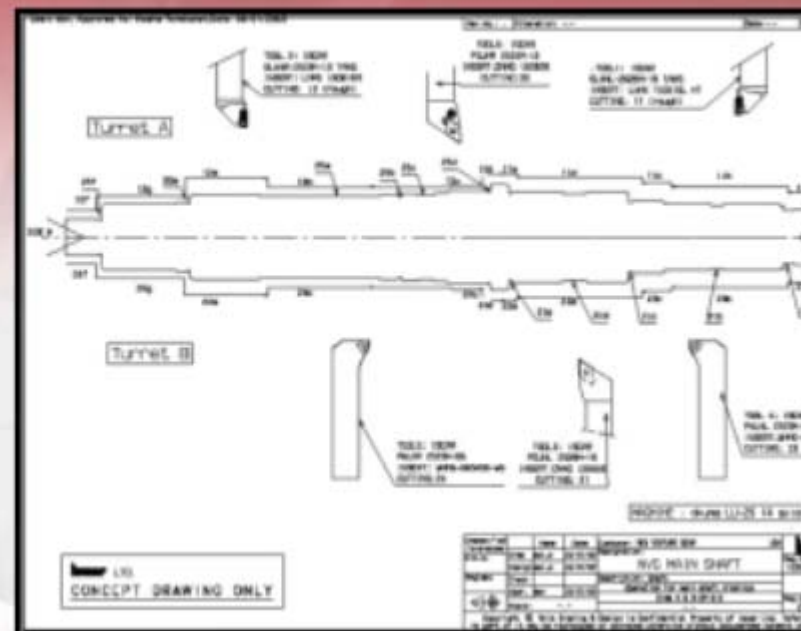
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- 40%

ISCAR **TURN LINE**

HELITURN New Turning Generation Line

ISO TURN

CNMG

CNMG

12 (4)

CNMG

15 (5)

CNMG

19 (6)



HELITURN

HELI

LNMX 11

ISCAR **UPDATE!**

LNMX 15

LNMX 22

ISCAR **UPDATE!**



The Most Popular Inserts for Turning

New Generation Inserts for Turning

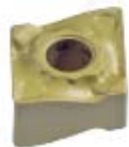
Inserts with **4 Helical**

ISCAR **TURN** LINE

HELITURN



HELITURN



HELITURN LayDown Inserts

ISCAR **TURN** LINE

HELITURN LayDown Inserts 平装螺旋刃车刀片

HELITURN 螺旋刃车刀



HELITURN 螺旋刃车刀



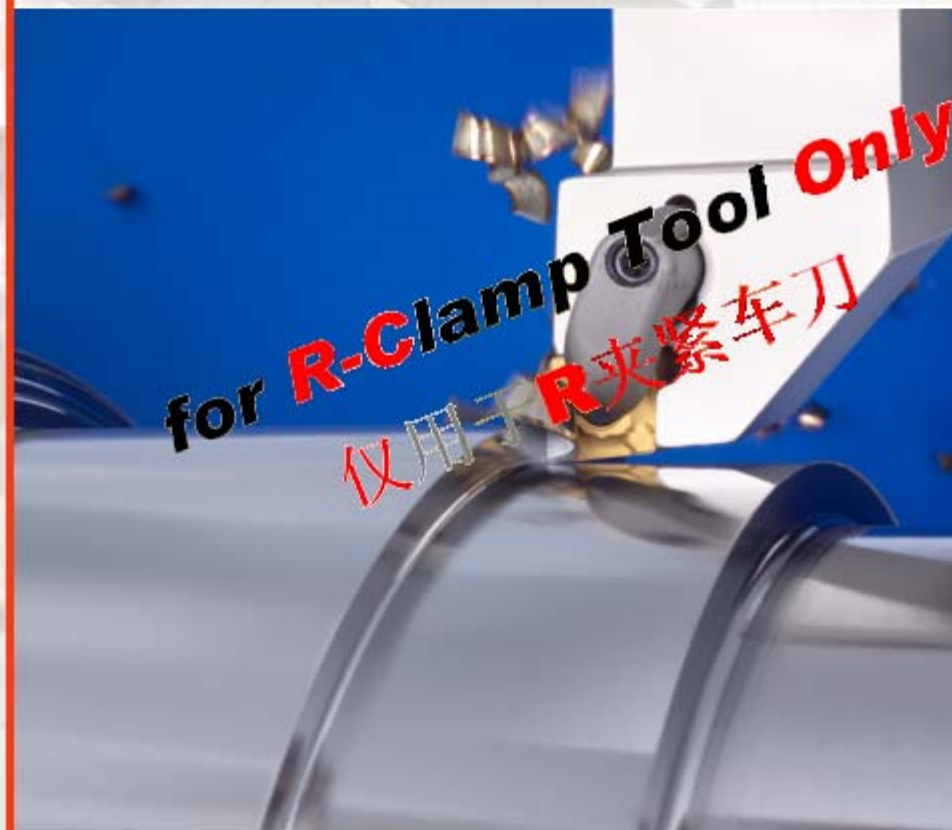
ISCAR **TURN** LINE

HELiTURN LayDown Inserts 平装螺旋刃车刀片

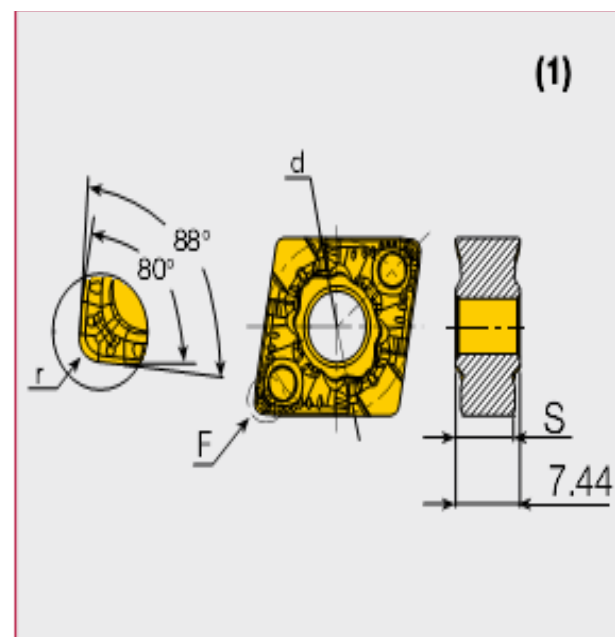
HELiTURN 螺旋刃车刀



HELiTURN 螺旋刃车刀



 **HELiLD** 10% Less Cutting Forces 50% Better Tool Life
切削力降低10%, 刀片寿命提高50%



规格	推荐切削参数					f (mm/rev)	ap (mm)
	IC9350	IC9250	IC9025	IC9150	IC907		
CNMX 120708-HTW	100-200 80-100	150-250 100-150	150-250	200-300 150-250	150-250	0.25-0.60	1.5-6.0
CNMX 120712-HTW	100-200 80-100	150-250 100-150	150-250	200-300 150-250	150-250	0.30-0.80	2.0-6.0
CNMX 120716-HTW	100-200 80-100	150-250 100-150	150-250	200-300 150-250	150-250	0.30-1.00	2.0-6.0

侧面提示: TCU 4 刀地盤与 CNMX 1207 HT 刀片一起使用

ISCAR **TURN** LINE

HELITURN

LAYDOWN LINE

拓展大正前角Heli Turn系列

HELITURN

LAYDOWN LINE

CNMX...-12 (4)



CNMX...-16 (5)



**NEW
PRODUCT**

HELITURN

LAYDOWN LINE

压杆式夹持方式



**NEW
PRODUCT**

具有更长刃口寿命，切削更加流畅
更小的振动，更好的表面质量

SUMO TEC
UNBEATABLE CARBIDE GRADES FROM ISCAR





SUMO TEC
8150
Finishing
P M K N S H



SUMO TEC
8250
Medium
P M K N S H



SUMO TEC
8350
Roughing
P M K N S H

SUMOTURN
HEAVY DUTY LINE

**A New Generation of
Grades for Advanced
Turning Technology**






ISCAR **TURN** LINE

HELITURN

LAYDOWN LINE

拓展大正前角Heli Turn系列

HELITURN

LAYDOWN LINE

**NEW
PRODUCT**

3P
ISCAR PREMIUM PRODUCTIVITY PRODUCTS
SUMO TEC

压杆式夹持方式

ISCAR PREMIUM PRODUCTIVITY PRODUCTS
SUMO TEC

HELITURN

LAYDOWN LINE

压杆式夹持方式

**NEW
PRODUCT**

具有更长刃口寿命，切削更加流畅
更小的振动，更好的表面质量

ISCAR **T**URN LINE

HELITURN

LAYDOWN LINE

拓展大正前角Heli Turn系列

DNMX

HELITURN

LAYDOWN LINE

**NEW
PRODUCT**



DNMX 15 (4)



压杆式夹持方式

具有更长刃口寿命，切削更加流畅
更小的振动，更好的表面质量

ISCAR **T**URN LINE

HELITURN

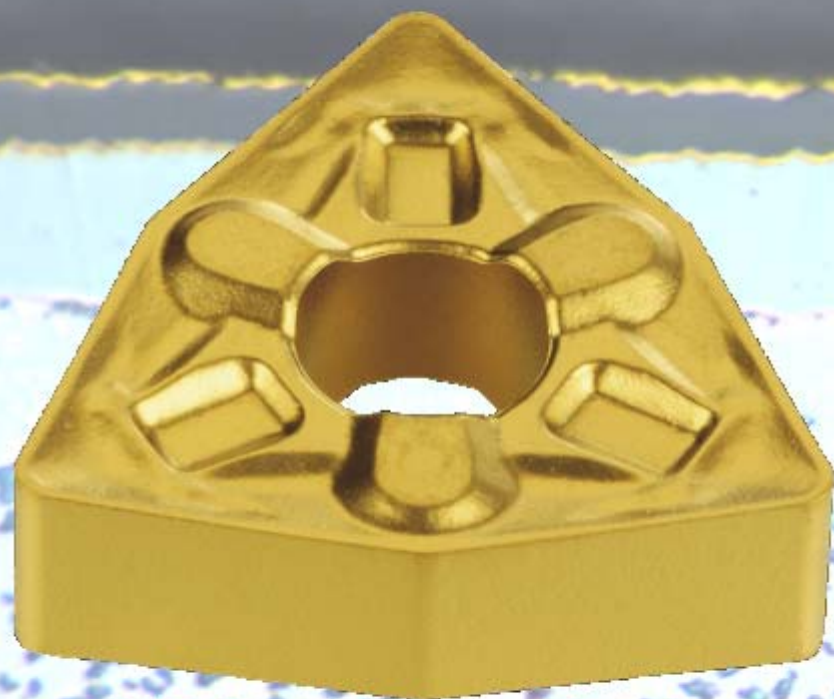
LAYDOWN LINE



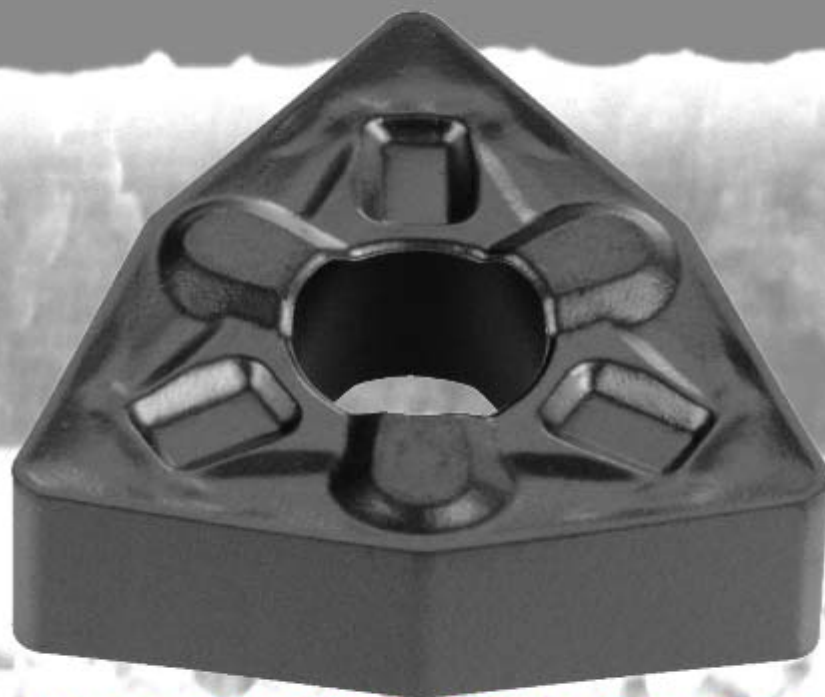
COATED GRADES

CVD Coated Grades CVD 涂层

PVD Coated Grades PVD 涂层



Good Edge Wear Resistance
切削刃耐磨性高



Good Edge Toughness
切削刃韧性高

令刀片既具备CVD 涂层耐磨性高的优点,又复合有PVD涂层韧性高的优点

SUMO TEC

New
MAGIC
from
ISCAR



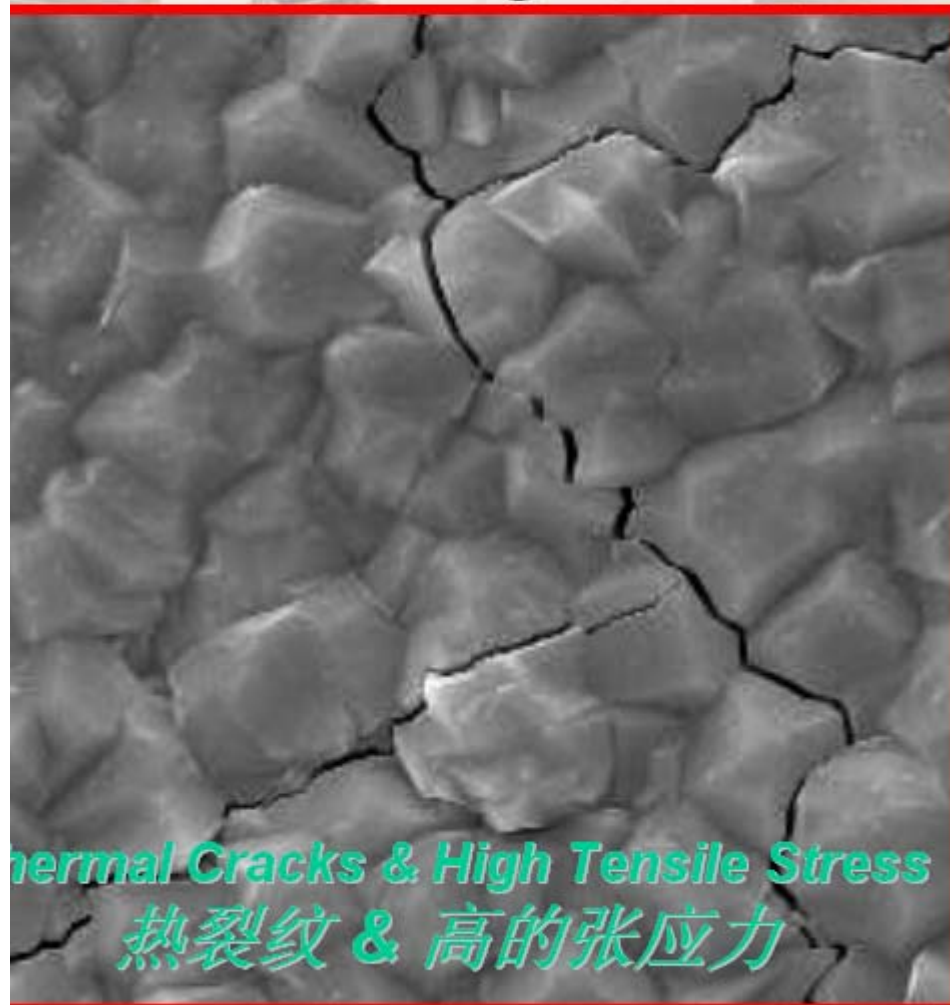
Member IMC Group



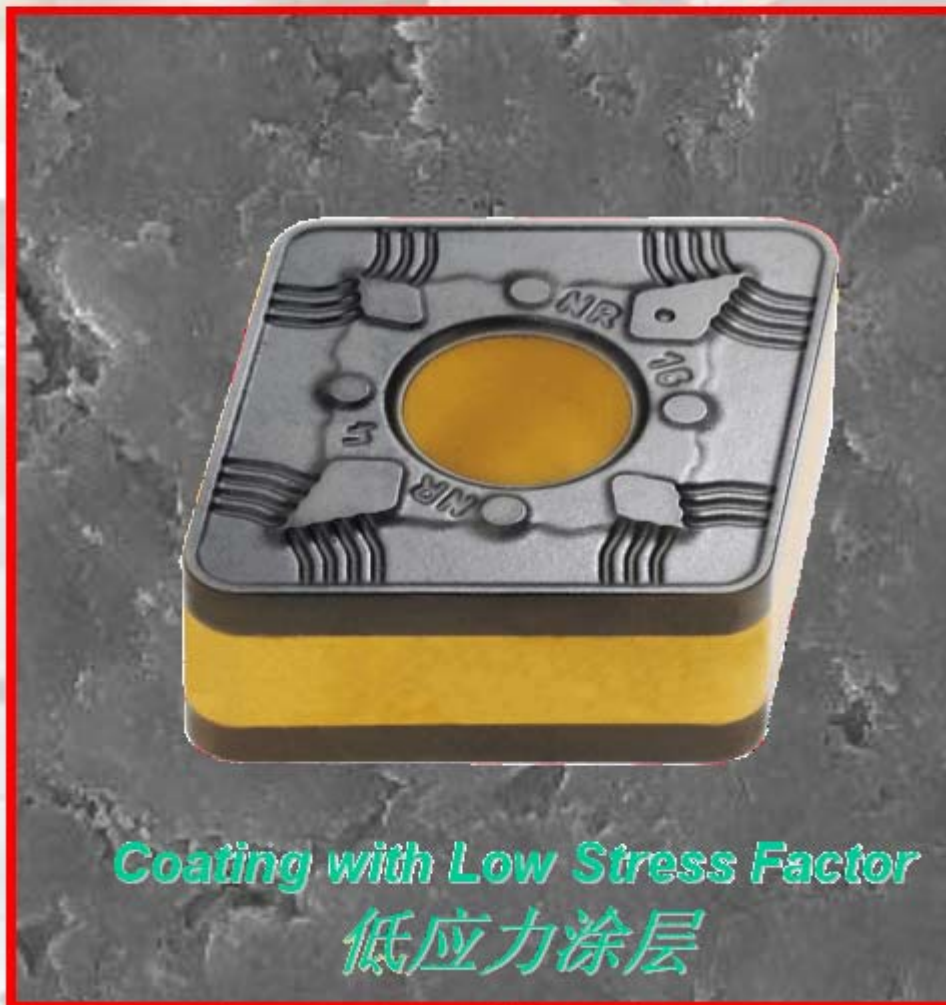
SUMO TEC

Special Surface Treatment 特别的表面处理技术
Standard Coating 常规涂层

SUMO TEC



Thermal Cracks & High Tensile Stress
热裂纹 & 高的张应力



Coating with Low Stress Factor
低应力涂层

Extended Tool Life 延长刀具寿命

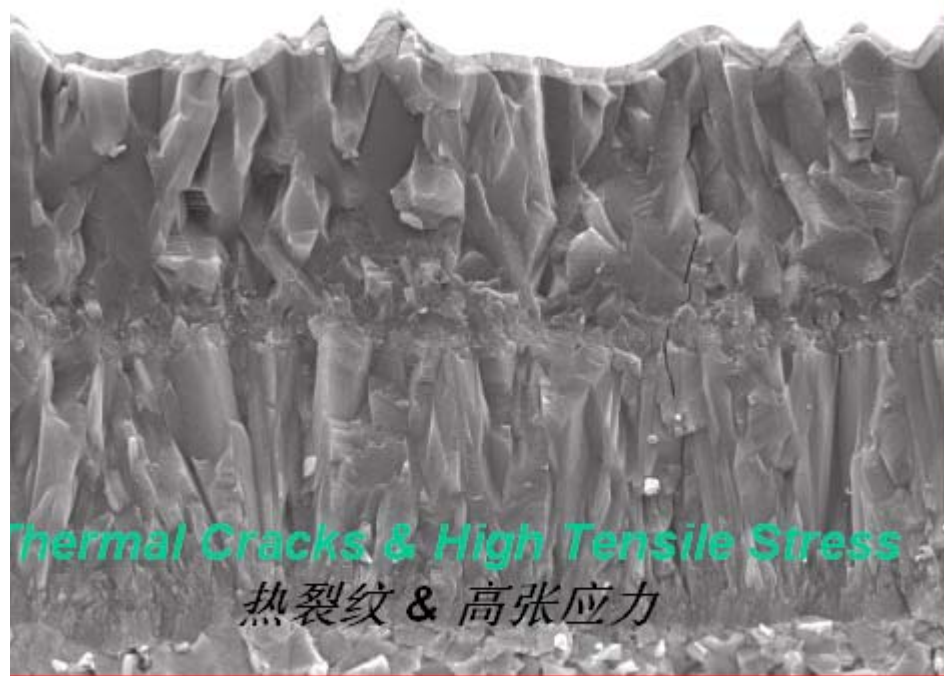
SUMO TEC

Special Surface Treatment
Standard Coating 常规涂层

特别的表面处理技术

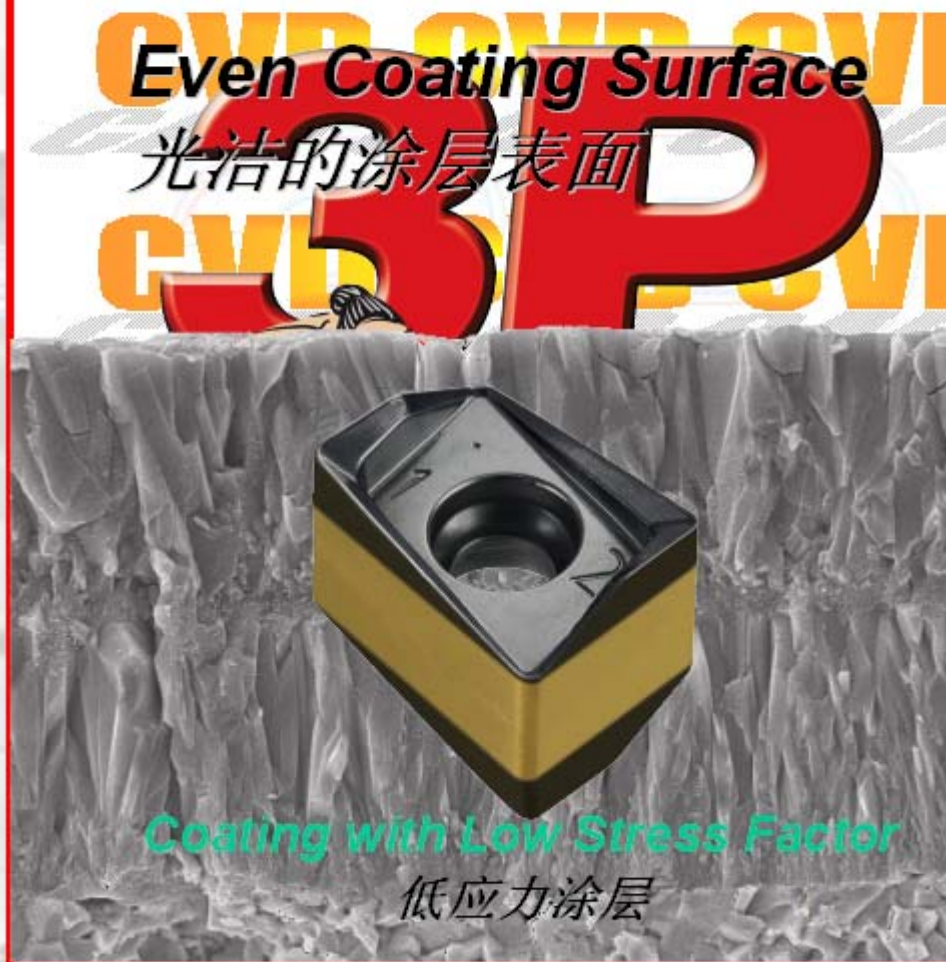
SUMO TEC

Uneven Coating Surface
不光洁的涂层表面



Thermal Cracks & High Tensile Stress
热裂纹 & 高张应力

Even Coating Surface
光洁的涂层表面



Coating with Low Stress Factor
低应力涂层

Extended Tool Life

延长刀具寿命

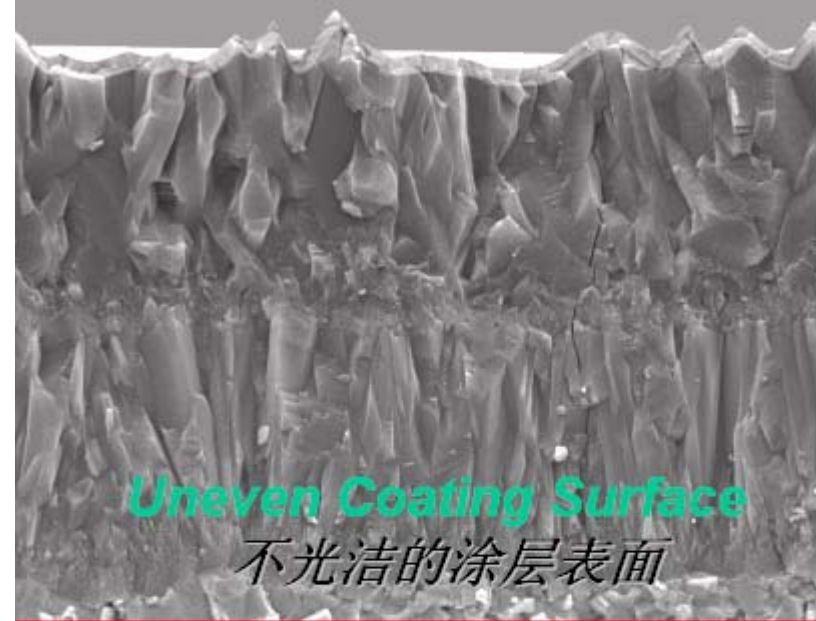
SUMO TEC

Special Surface Treatment
Standard Coating 常规涂层

特别的表面处理技术

SUMO TEC

Chip Flow Interruption 切屑受阻



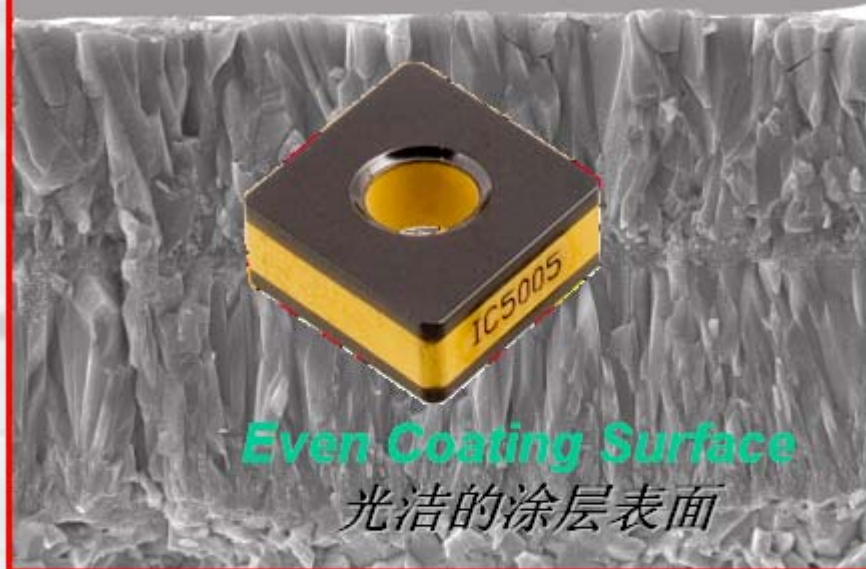
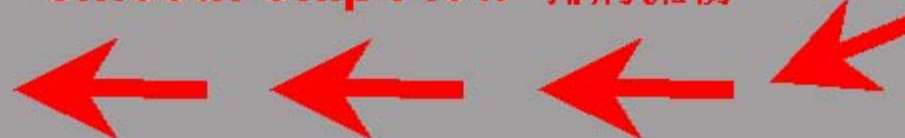
Uneven Coating Surface

不光洁的涂层表面

Interruption Creates Heat and Excessive Wear
中断会引起切削热及过度磨损

Extended Tool Life

Smooth Chip Flow 排屑流畅



Even Coating Surface

光洁的涂层表面

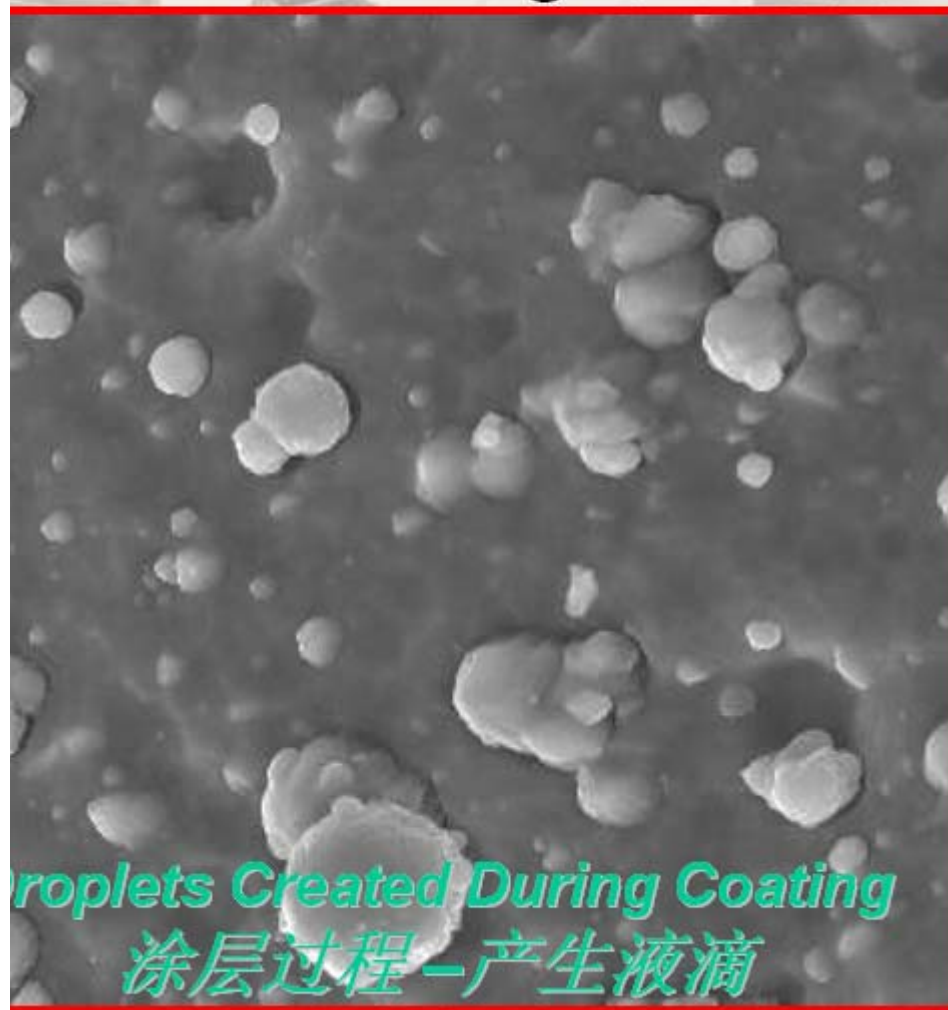
Smooth Surface Coating, no Interruption
光洁的涂层表面, 无阻断

延长刀具寿命

SUMO TEC

Special **Surface** Treatment 特别的**表面**处理技术
Standard Coating 常规涂层

SUMO TEC



Droplets Created During Coating
涂层过程-产生液滴

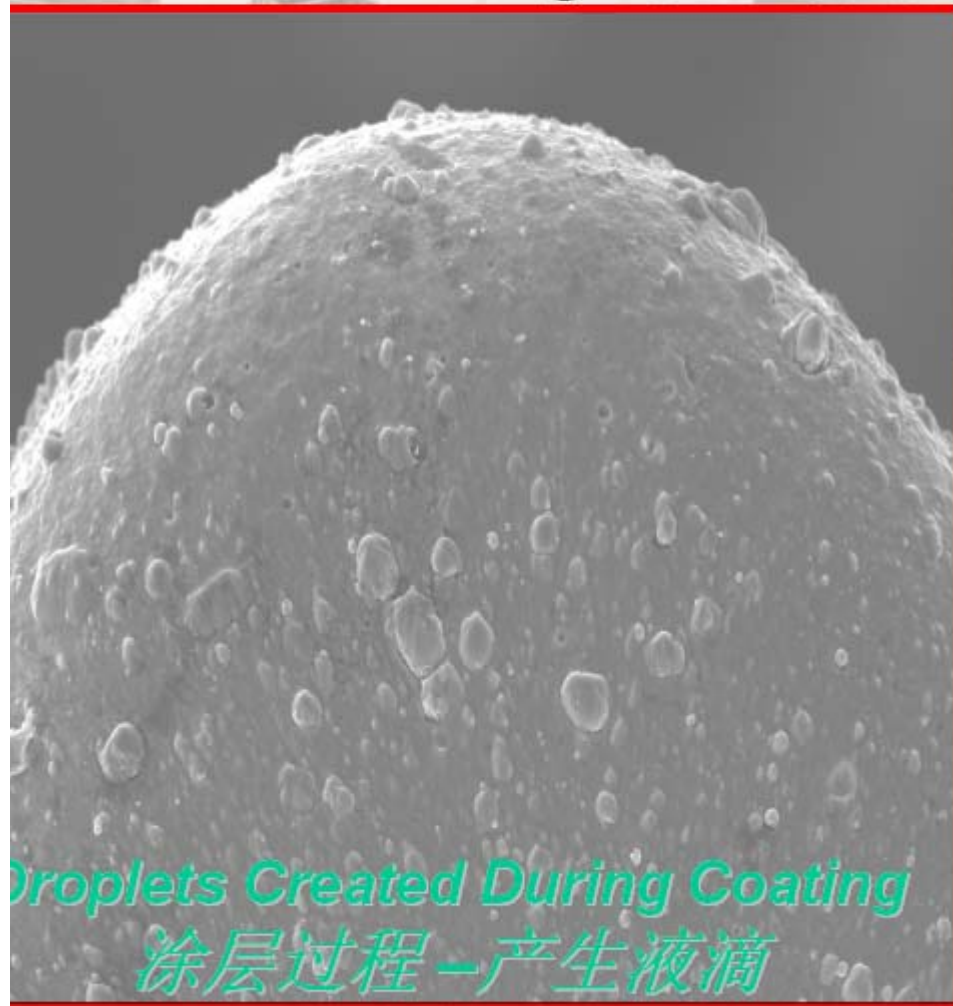


Surface Coating After Treatment
处理后的涂层表面

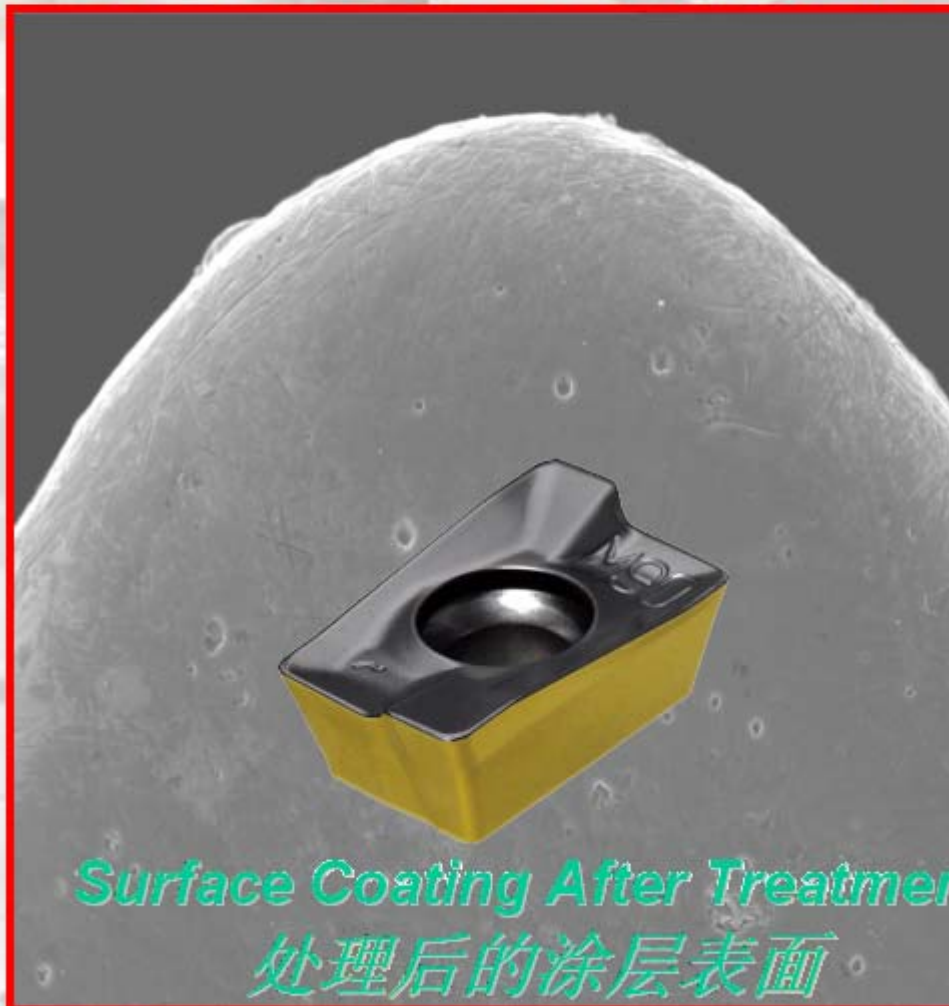
Extended Tool Life 延长刀具寿命

SUMO TEC

Special **Cutting Edge** Treatment 特别的**切削刃**处理技术
Standard Coating 常规涂层 **SUMO TEC** 束魔技术



Droplets Created During Coating
涂层过程—产生液滴



Surface Coating After Treatment
处理后的涂层表面

Extended Tool Life 延长刀具寿命

SUMO TEC

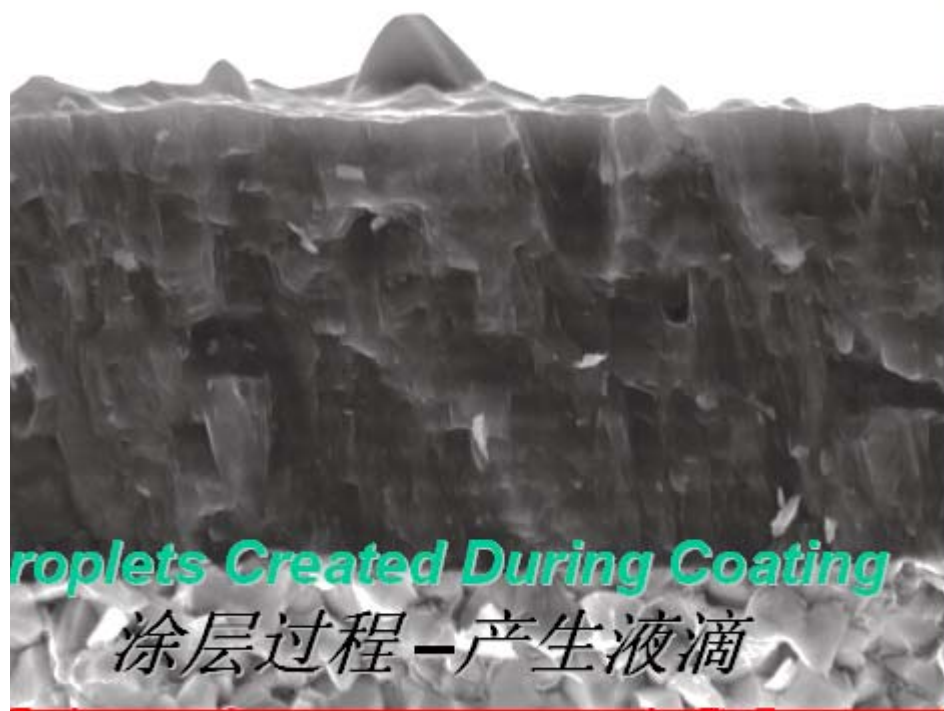
Special Surface Treatment

特别的表面处理技术

Standard Coating 常规涂层

SUMO TEC 束魔技术

Uneven Coating Surface
不光洁的涂层表面



Droplets Created During Coating
涂层过程—产生液滴

Even Coating Surface
光洁的涂层表面



Surface Coating After Treatment
处理后的涂层表面

Extended Tool Life 延长刀具寿命

SUMO TEC

CVD Coated Grades for Turning

用于车削的**CVD**涂层牌号

CVD COATED GRADES



SUMO TEC
5000

SUMO TEC
8000

Special Surface Treatment

特别的表面处理技术

SUMO TEC

Average Improvement of Flank Wear Resistance in **Turning** 整体提高 **车削** 抗后刀面磨损性
Alloy Steel (4340) at High Cutting Speed 高速车削 合金钢(4340)

Continues Cut 连续切削

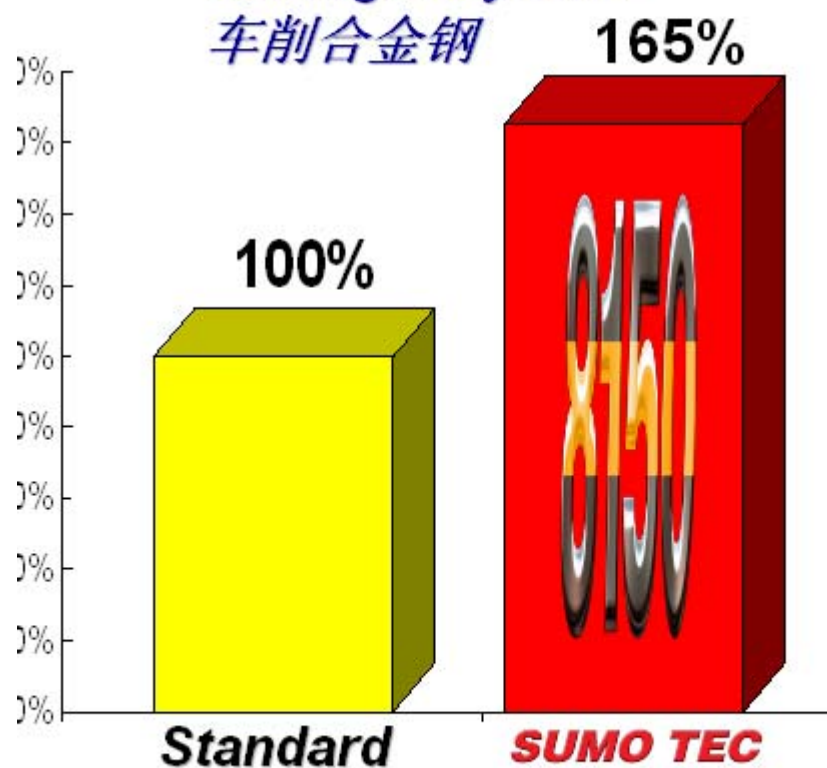
Wear Resistance 抗后刀面磨损

Standard Vs. **SUMO TEC**

常规涂层 VS. 束魔涂层

Turning Alloy steel

车削合金钢



Extended Tool Life 延长刀具寿命

SUMO TEC

Average Improvement of Flank Wear Resistance in Turning 整体提高车削抗后刀面磨损性能

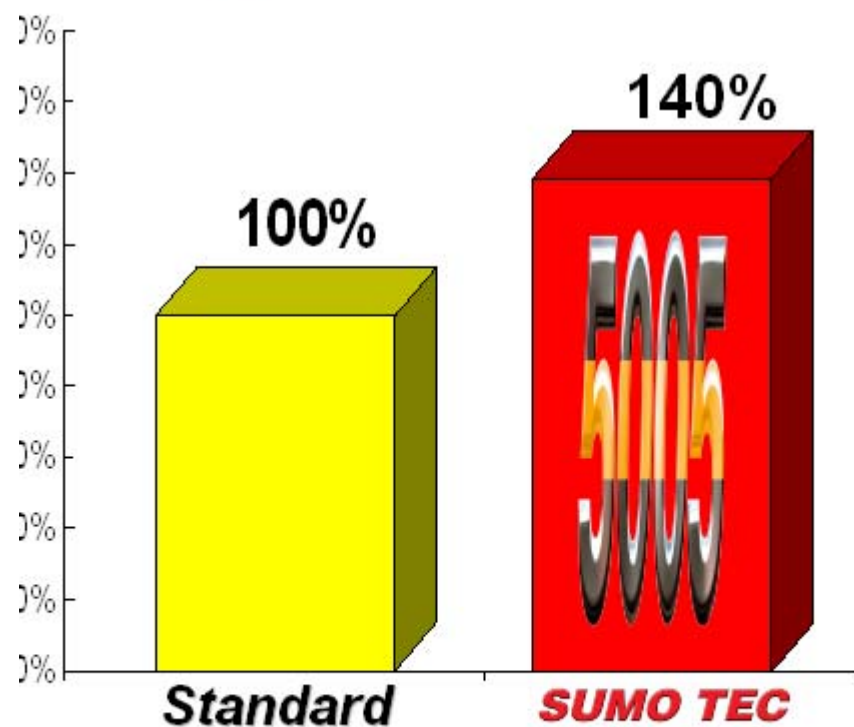
Nodular Cast Iron 球墨铸铁 (GGG50)

Wear Resistance 抗后刀面磨损

Standard Vs. SUMO TEC

常规涂层 VS. 束魔涂层

Turning Nodular Cast Iron 车削球墨铸铁



Extended Tool Life

延长刀具寿命

Convert Extended Tool life to Higher Speed = PRODUCTIVITY

SUMO TEC

Average Improvement of Flank Wear Resistance in **Turning** 整体提高车削抗后刀面磨损性能

Nodular Cast Iron 球墨铸铁 (GGG50)

Continuous Cut 连续切削

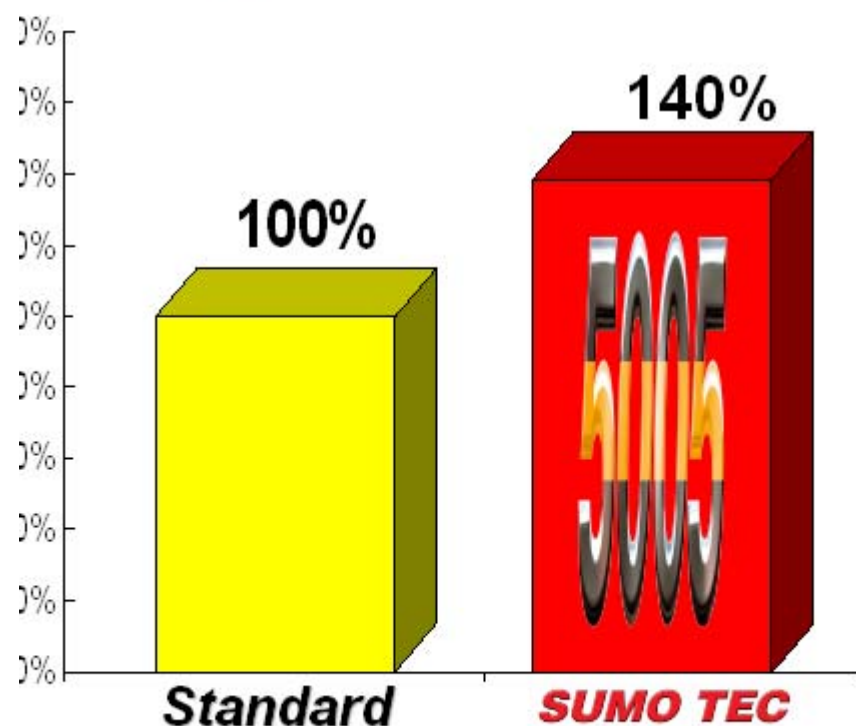
Interrupted Cut 断续切削

Wear Resistance 抗后刀面磨损

Standard Vs. **SUMO TEC**

常规涂层 VS. 束魔涂层

Turning Nodular Cast Iron 车削球墨铸铁

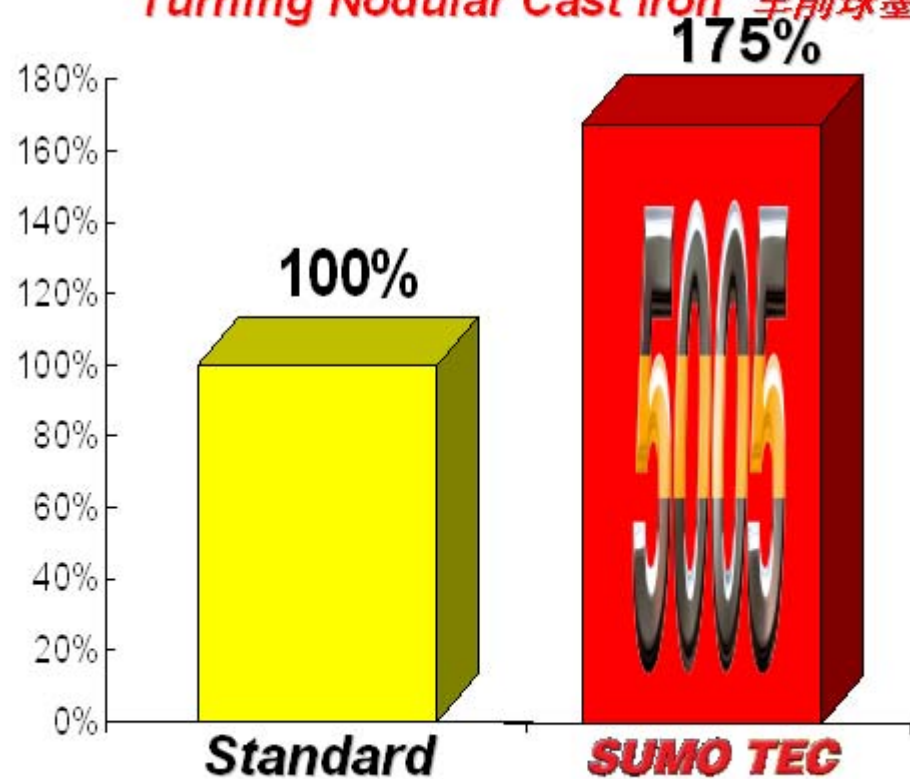


Wear Resistance 抗后刀面磨损

Standard Vs. **SUMO TEC**

常规涂层 VS. 束魔涂层

Turning Nodular Cast Iron 车削球墨



Extended Tool Life

延长刀具寿命

Convert Extended Tool life to Higher Speed = **PRODUCTIVITY**

SUMO TEC

Iscar Turning Carbide Grades **PVD Coated TiAlN** or **TiCN**

ISCAR车削硬质合金牌号, **TiAlN** 或 **TiCN** PVD涂层

PVD TiAlN Coated 涂层

For High Speeds Turning 用于高速车削

**807
808**

Submicro grade
超细颗粒牌号



PVD TiCN Coated 涂层

For Interrupted Cut 用于断续切削

330



TiAlN For Turning Super Alloys and Stainless Steels at High Speeds

TiAlN 用于高速加工高温合金和不锈钢

TiCN For Turning Stainless Steel, Low Carbon Steels and Super Alloys Machining at Low to Medium Speeds for High Feeds

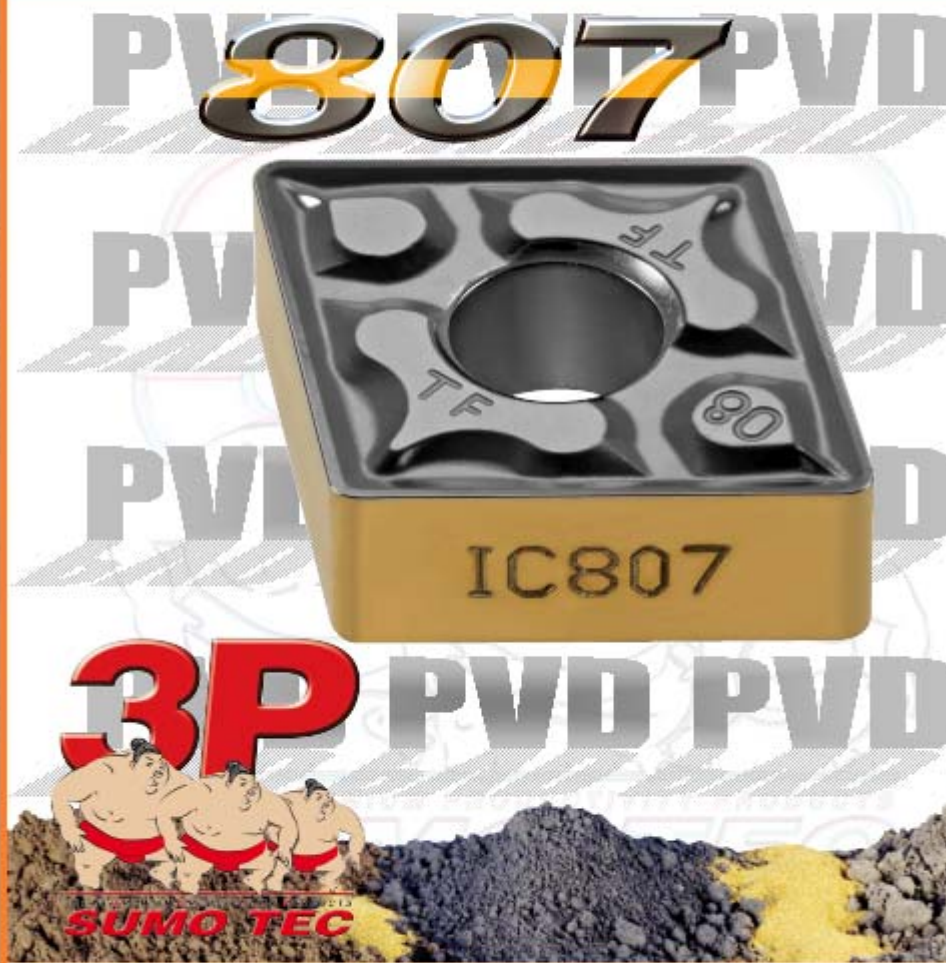
TiCN 用于低速至中速车削 不锈钢 低碳钢及超级合金

SUMO TEC

Average Improvement of Flank Wear Resistance in 整体提高抗后刀面磨损性能
Turning on Austenitic Stainless Steel 车削奥氏体不锈钢

Wear Resistance 抗后刀面磨损
Standard Vs. **SUMO TEC**
常规涂层 VS. 东魔涂层

Turning Austenitic Stainless Steel
车削奥氏体不锈钢



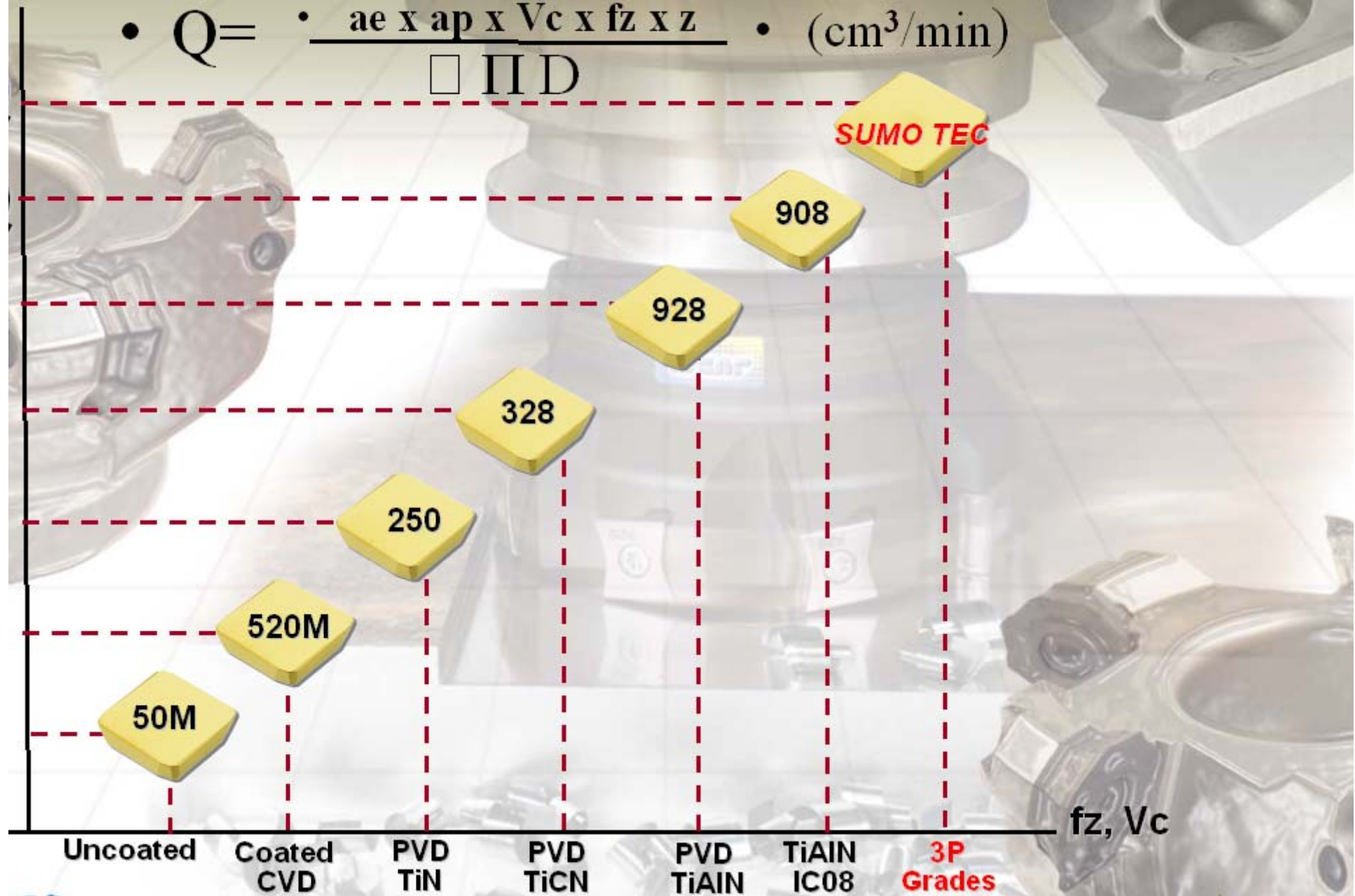
Convert Extended Tool life to Higher Speed = **PRODUCTIVITY**

高寿命 + 高速 = 高生产率

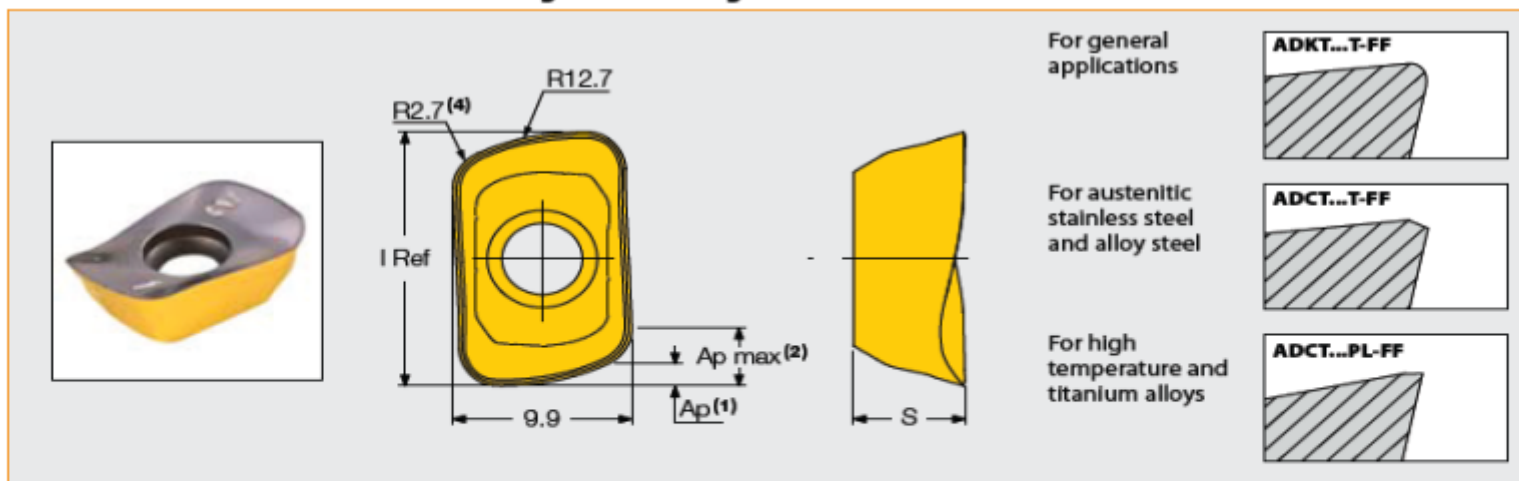
Carbide Grades that Influence

Metal Removal Rate

$$Q = \frac{a_e \times a_p \times V_c \times f_z \times z}{\square \text{ I I D}} \quad (\text{cm}^3/\text{min})$$



ADCT/ADKT 1505R8...FF Inserts for High Feed Milling



NEW
NEW

Designation	I	Ap ⁽¹⁾	Ap max ⁽²⁾	S	Tool Types	Type of Machining	IC830	IC928
ADKT 1505R8T-FF	15.9	1.5	3.5	6.2	1-2	Medium/Heavy	•	•
ADCT 1505R8PL-FF	15.8	1.5	3.5	6.1	1-2	Light/Medium	•	•
ADCT 1505R8T-FF	15.7	1.5	3.5	6.1	1-2	Medium	•	•
					P	Steel	✓	✓
					M	Stainless Steel	✓	✓
					K	Cast Iron	✓	✓
					N	Aluminum		
					S	High Temp. Alloys	✓	✓
					H	Hardened Steel		

⁽¹⁾ Depth range at which up to 1.5 mm/tooth feed may be applied.

⁽²⁾ At the ap to ap max depth range, a regular HELI2000 ADKT 1506 Insert feed recommendations should be applied.

⁽³⁾ The actual diameter of the tool is 0.5 mm larger than the nominal diameter when using this insert.

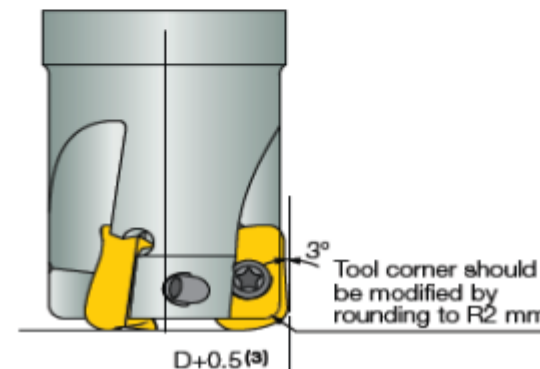
⁽⁴⁾ Radius for CNC programming should be considered as 2.8 mm.

Rampdown angles of the tools can be applied using these Inserts.

Standard Tool



Tool with a Modified Corner



加工案例 – 方肩铣

Tool: HM90 E90AD-D32-3-C32
Insert: ADCT 1505R8T-FF IC830

Workpiece: AISI/SAE 1020 (DIN W.-Nr. 1.1151)

$V_c = 180 \text{ m/min}$

$F_z = 1.5 \text{ mm/tooth}$

$A_p = 1.5 \text{ mm}$

$B = 22 \text{ mm}$

Coolant: Air

Tool life: 70 min

Metal removal rate= $266 \text{ cm}^3/\text{min}$

对比试验

The following is a comparison between the HM90 ADKT 1505PDR IC928 HELI2000 insert and the new **ADKT 1505R8T-FF IC928** insert in the same HM90 F90A D100-8-32 face mill cutter:

Workpiece material: SAE 4340
Cutter diameter: 100 mm
Number of teeth: 8
ae: 60 mm

With HM90 ADKT 1505PDR

Ap: 1.5 mm
Fz: 0.15 mm/tooth

Q: 55 cm³/min

With ADKT 1505R8T-FF

Ap: 1.5 mm
Fz: 1.0 mm/tooth

Q: 367 cm³/min

As shown above, when using the new FEEDMILL insert, the chip removal rate is **6.6 times** faster than when using the conventional HELI2000 insert.

ADKT 1505R8T-FF inserts should be your first choice for Fast Metal Removal when using HELI2000 milling cutters.



小 结

- 大进给刀具---轴向减薄切削技术
- 螺旋刃刀具---渐进式切削技术
- 束魔技术---涂层后处理技术部

扩展 --- 铣-车-钻-切槽

组合 --- 螺旋刃概念 + 大进给概念 + 束魔技术

HELMILL + FEEDMILL+SUMO TEC



THANK YOU