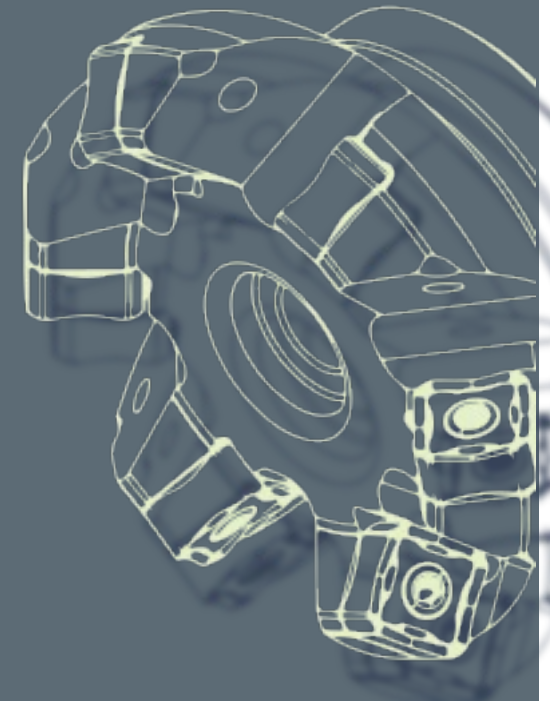




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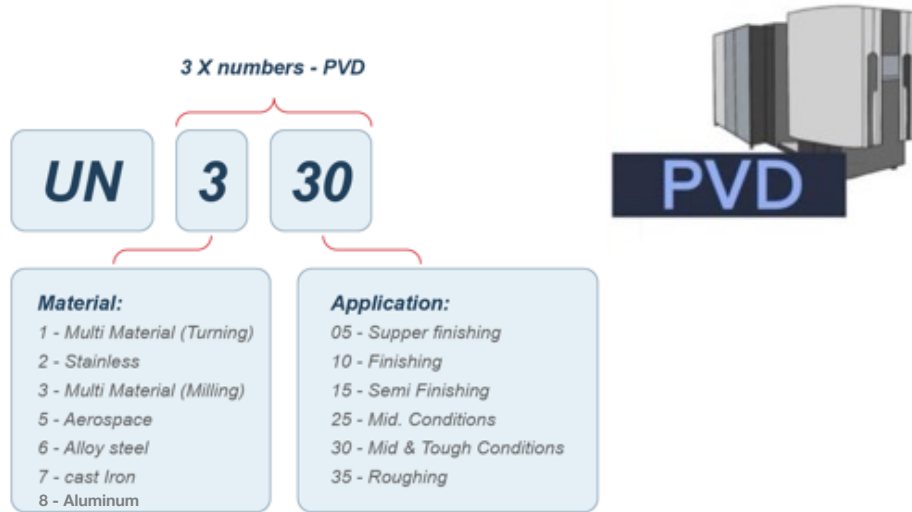
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SWISS BLUE

METRIC

GRADES

PVD Grades - Explained



- UN 330 **P**
- UN 330 **K**
- UN 230 **M**
- UN 830 **N**



- UN 110 **P**
- UN 110 **K**
- UN 210 **M**
- UN 810 **N**

CVD Grades - Explained



- UN 6010 **P**
- UN 6015 **P**
- UN 6025 **P**
- UN 7010 **K**



GRADES



PVD



MILLING

• UN 310

PVD

- A hard sub-micron substrate with TiAlN PVD coating on top
- A hard coating for finishing operations with extended tool-life



• UN 330

PVD

- A Tough sub-micron substrate with thick TiAlN PVD coating .
- Excellent combination of toughness and Hardness. A General purpose and first choice in most applications.



• UN 230

PVD

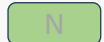
- A hard sub-micron substrate with TiAlN PVD coating on top
- First Choice for Stainless Steel Applications



• UN 830

PVD

- A Tough sub-micron substrate with Thin PVD coating .
- First Choice for non-ferrous and Aluminum Applications



TURNING

• UN 110

PVD

- A Tough sub-micron substrate with thick TiAlN PVD coating .
- Excellent combination of toughness and Hardness. A General purpose and first choice in most applications.



• UN 210

PVD

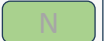
- A hard sub-micron substrate with TiAlN PVD coating on top
- First Choice for Stainless Steel Applications



• UN 810

PVD

- A Tough sub-micron substrate with Thin PVD coating .
- First Choice for non-ferrous and Aluminum Applications



GRADES



MILLING

• UN 6010

CVD

- A Very hard Over-micron substrate with Alpha Alumina based coating on top
- For finishing operations with extended tool-life



• UN 6015

CVD

- A Hard Over-micron substrate with thick Al₂O₃ CVD coating .
- Excellent combination of toughness and Hardness for finishing and Semi finishing applications



• UN 6025

CVD

- A Tough Over-micron Cobalt Enriched substrate with thick Al₂O₃ CVD coating .
- Excellent combination of toughness and Hardness. A General purpose and first choice for most applications.



TURNING

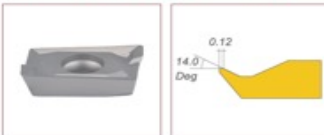
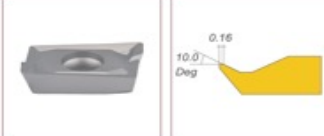
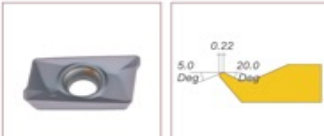

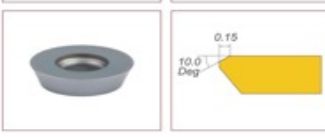
• UN 7010

PVD

- A Very hard Over-micron substrate with very thick Alpha Alumina based coating on top
- For cast Iron application











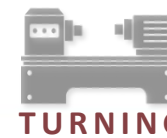
CHIP BREAKERS

Chip Breaker name and Geometry		Applications and Features
PF		<ul style="list-style-type: none"> • Sharp chip breaker • For finishing operations • Also adopted for sticky material and Stainless steel • in APKT, "Athens line", with original cutters create true 90 walls
PM		<ul style="list-style-type: none"> • Semi Finishing chip breaker for General machining • First choice for stable machining and light-Mid. cutting pressure • Smooth cutting due to positive chip breaker angles • in APKT, "Athens line", with original cutters create true 90 walls
(STD)		<ul style="list-style-type: none"> • Mid. cutting conditions - chip breaker for General machining • First choice for Un-stable machining with reasonable cutting pressure • Smooth cutting due to positive chip breaker angles • Is not intended to create 90 deg walls in shoulder machining
PR		<ul style="list-style-type: none"> • Roughing. chip breaker mostly used in high-feed machining • First choice for very Un-stable machining or for thick casting "skin" • Tough and reinforced cutting edge and chip breaker angles
(W)		<ul style="list-style-type: none"> • Flat top insert design • used mostly for high hardness die & Mold applications • Also adopted for cast iron machining • Tough and reinforced cutting edge



MILLING

Chip Breaker name and Geometry		Applications and Features
PF		<ul style="list-style-type: none"> • Sharp chip breaker • For finishing operations • Also adopted for sticky material and Stainless steel • Chip Control starts at Fz: 0.12
PM		<ul style="list-style-type: none"> • Semi Finishing chip breaker for General machining • First choice for stable machining and light-Mid. cutting pressure • Smooth cutting due to very positive chip breaker angles • Chip Control starts at Fz: 0.18
(STD)		<ul style="list-style-type: none"> • Mid. cutting conditions - chip breaker for General machining • First choice for Un-stable machining with reasonable cutting pressure • Reinforced chipbreaker allows for high shock resistance • Chip Control starts at Fz: 0.25
PR		<ul style="list-style-type: none"> • Roughing. chip breaker mostly used in tough machining applications • First choice for very Un-stable machining or for thick casting "skin" • Tough and reinforced cutting edge and chip breaker angles • Chip Control starts at Fz: 0.35
(A)		<ul style="list-style-type: none"> • Flat top insert design • used mostly for Cast iron applications • Chip Control starts at Fz: 0.15 • Use with UN 7010 grade for best results
(X)		<ul style="list-style-type: none"> • Sharp chip breaker • For finishing operations with performance similar to KNUX • Also adopted for sticky material, Stainless steel and Aerospace Material • Chip Control starts at Fz: 0.10
MF		<ul style="list-style-type: none"> • Sharp chip breaker - especially developed for stainless Applications • For finishing operations • Also adopted for very soft or sticky material • Chip Control starts at Fz: 0.10
MM		<ul style="list-style-type: none"> • Semi Finishing chip breaker - especially developed for stainless Applications • First choice for all stainless steel applications • Also adopted for very soft, sticky material and some Aerospace material • Chip Control starts at Fz: 0.14



TURNING

Material Groups

P



Steel

ISO P - Steel is the largest material group in the metal cutting area, ranging from unalloyed to high-alloyed material, including steel castings and ferritic and martensitic stainless steels. The machinability is normally good, but differs a lot depending on material hardness, carbon content, etc.

M



Stainless steel

ISO M - Stainless steels are materials alloyed with a minimum of 12% chromium; other alloys may include nickel and molybdenum. Different conditions, such as ferritic, martensitic, austenitic and austenitic-ferritic (duplex), create a large family. A commonality among all these types is that the cutting edges are exposed to a great deal of heat, notch wear and built-up edge.

K



Cast iron

ISO K - Cast iron is, contrary to steel, a short-chipping type of material. Grey cast irons (GCI) and malleable cast irons (MCI) are quite easy to machine, while nodular cast irons (NCI), compact cast irons (CGI) and austempered cast irons (ADI) are more difficult. All cast irons contain SiC, which is very abrasive to the cutting edge. •

N



Aluminium

ISO N – Non-ferrous metals are softer metals, such as aluminium, copper, brass etc. Aluminium with a Si-content of 13% is very abrasive. Generally high cutting speeds and long tool life can be expected for inserts with sharp edges.

S



Heat resistant alloys

ISO S - Heat-Resistant Super Alloys include a great number of high-alloyed iron, nickel, cobalt and titanium based materials. They are sticky, create built-up edge, harden during working (work hardening), and generate heat. They are very similar to the ISO M area but are much more difficult to cut, and reduce the tool life of the insert edges.

H



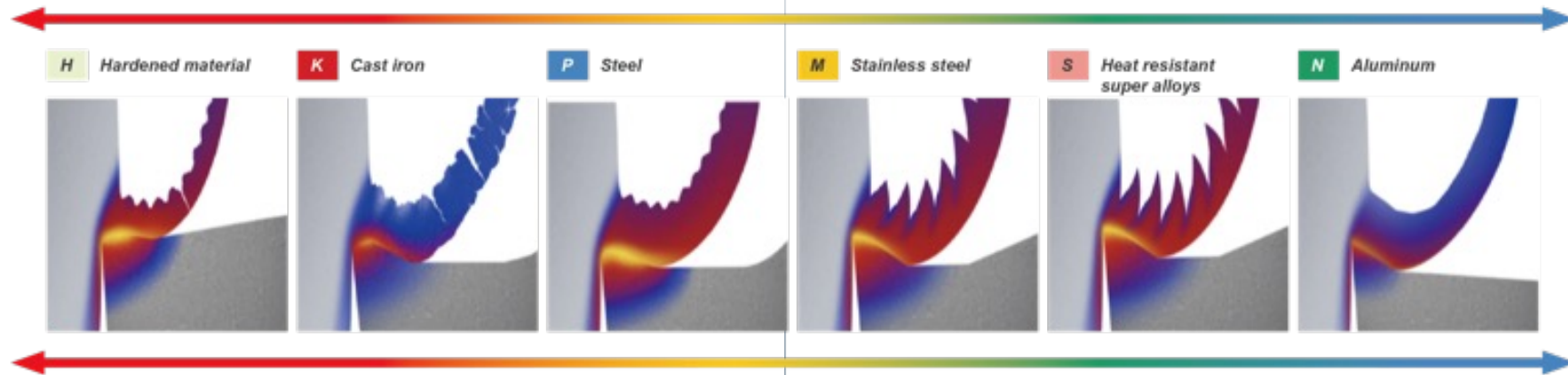
Hardened steel

ISO H - This group includes steels with a hardness between 45-65 HRC, and also chilled cast iron around 400-600 HB. The hardness makes them all difficult to machine. The materials generate heat during cutting and are very abrasive for the cutting edge.

CHIP FORMATION

Higher cutting Temp
CVD Grades Preferred

Lower cutting Temp
PVD Grades Preferred



Stronger Geometry Selection

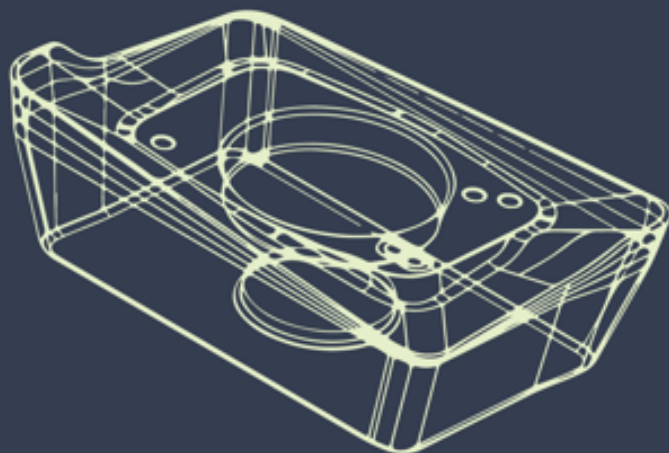
Sharper Geometry Selection

CHIP FORMATION

Image Reference :

* IMPROVING EFFICIENCY OF MACHINING THE GEOMETRICALLY COMPLEX SHAPED SURFACES BY MILLING WITH A FIXED SHIFT OF THE CUTTING EDGE", DOI: 10.15587/1729-4061.2019.163325

MILLING



APGT

Pg.013

APKT

Pg.015

APMT

Pg.019

RDMT / W

Pg.021

RPMT / W

Pg.023

SDMT

Pg.025

SEKN / R

Pg.027

SEGT

Pg.029

SEKT

Pg.031

SNMX

Pg.035

SPKN / R

Pg.037

TPKN / R

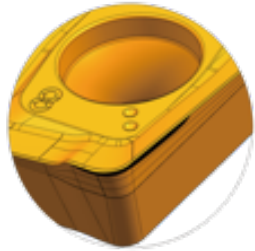
Pg.039

WNMX

Pg.041

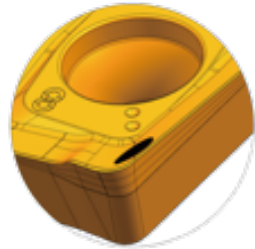
FAIL MODES & CORRECTION

Flank Wear



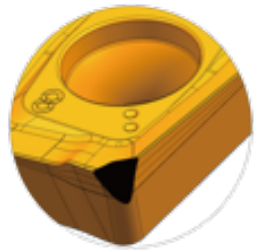
UN330 CHANGE TO UN310

Crater Wear



Not Likely
when using Swiss.Blue grades

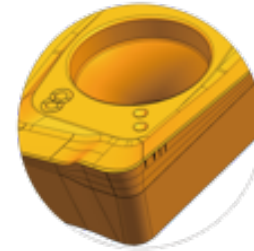
Edge Breakage



UN310 CHANGE TO UN330

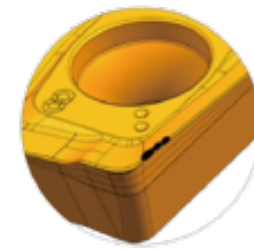
CHANGE TO Reduce Fz

Thermal Cracks



Not Likely
when using Swiss.Blue grades

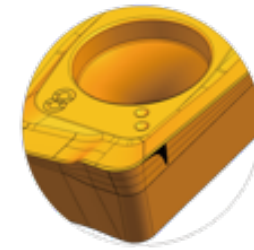
Built-Up Edge



CHANGE TO PF / UF

CHANGE TO Increase Fz

Notch Wear



CHANGE TO Reduce Fz

CHANGE TO Reduce Vc

STARTING POINT – FOR ANY JOB

Fz Fits the Chip-breaker

IMPORTANT

PF : Bigger than 0.11
PM : Bigger than 0.18
(STD) / (W) : Bigger than 0.25

Grade

UN 330 : PVD general Purpose

Vc

Vc: 150: Always below 180

Ap

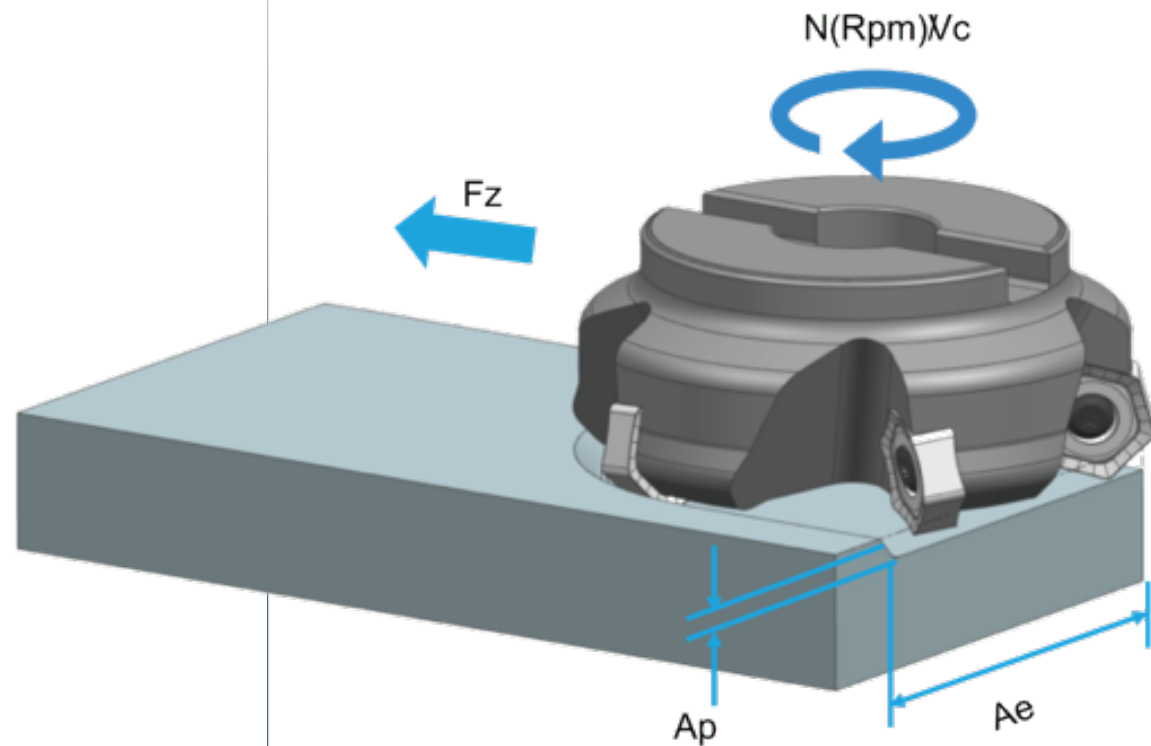
Depth of Cut : Any Depth

Coolant

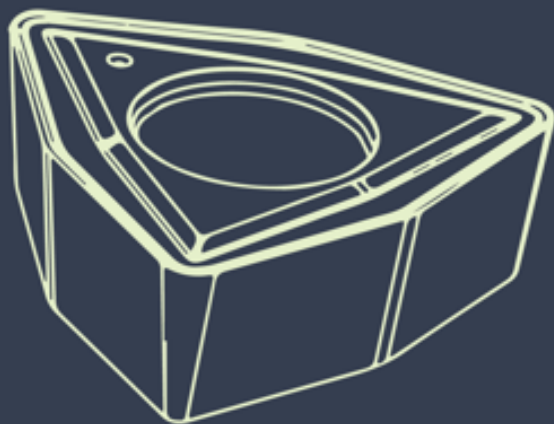
Always - OFF

Ae

Width of Cut: 2/3 Cutter Dia



DRILLING



SPMG

Pg.047

WCMX

Pg.051

DRILLING

	P	M	K	N	S	H
	UN330	UN330	UN330	UN330	UN330	UN330
DRILLING	Light Machining					
	FEED 0.04-0.10					
	Mid. Machining (GENERAL)					
	FEED 0.08-0.12					
	Heavy Machining					
	FEED 0.10-0.18					

CHIP BREAKERS

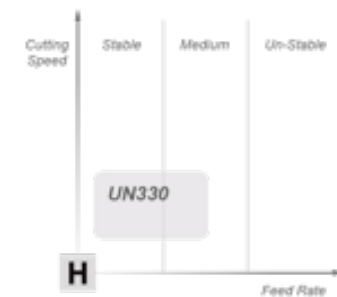
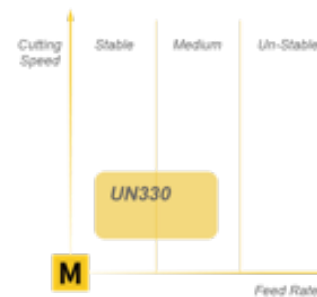
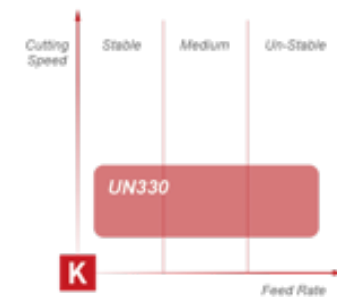
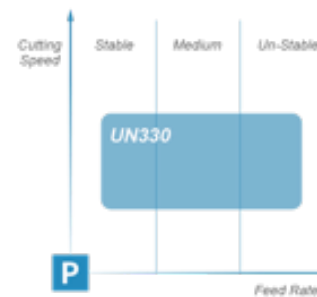
PM

- Semi Finishing chip Breaker for General Machining
- First Choice for all conditions
- **Recommended Feeds (Fz) are between: 0.05 - 0.13 (mm/tooth)**

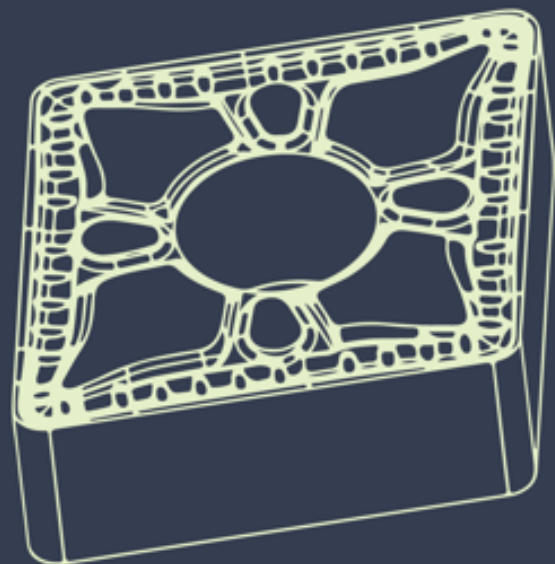
PR

- Mid. to Roughing chip Breaker
- First choice for aggressive and unstable drilling conditions
- **Recommended Feeds (Fz) are between: 0.09 - 0.18 (mm/tooth)**

GRADE	ISO	Features & Applications
UN330	P15 - P30	-For All Drilling Applications (Internal and External Inserts). -Applicable for Alloy Steel, Stainless steel, hardened material and Aerospace. -Extremely versatile grade for all conditions of cutting. -Should be used for all Drilling operations - with coolant.
	M20 - M40	
S20 - S35		
H10 - H20		
Sub micron PVD coated		



TURNING



CCMT	<i>Pg.071</i>
CNGG	<i>Pg.075</i>
CNMA	<i>Pg.077</i>
CNMG	<i>Pg.079</i>
DCMT	<i>Pg.087</i>
DNMG	<i>Pg.089</i>
TCMT	<i>Pg.093</i>
TNGG	<i>Pg.095</i>
TNMA	<i>Pg.097</i>
TNMG	<i>Pg.099</i>
TNUX	<i>Pg.105</i>
VBMT	<i>Pg.109</i>
VCMT	<i>Pg.111</i>
VNMG	<i>Pg.113</i>
WNMA	<i>Pg.115</i>
WNMG	<i>Pg.117</i>

PF	<ul style="list-style-type: none"> • Sharp Chip-breaker • for Finishing and sticky material 	<ul style="list-style-type: none"> • Fz min: 0.12 (mm/Rev) 	P M K
PM	<ul style="list-style-type: none"> • for Semi- Finishing • General Machining 	<ul style="list-style-type: none"> • Fz min: 0.18 (mm/Rev) 	P M K
(STD)	<ul style="list-style-type: none"> • Tough Chip-breaker • for Mid-tough machining 	<ul style="list-style-type: none"> • Fz min: 0.24 (mm/Rev) 	P K
PR	<ul style="list-style-type: none"> • Tough Chip-breaker • for General-tough machining 	<ul style="list-style-type: none"> • Fz min: 0.35 (mm/Rev) 	P K
MF	<ul style="list-style-type: none"> • Sharp Chip-breaker • Stainless Steel - Finishing 	<ul style="list-style-type: none"> • Fz min: 0.12 (mm/Rev) 	M S
MM	<ul style="list-style-type: none"> • for Semi- Finishing • Stainless steel -General Machining 	<ul style="list-style-type: none"> • Fz min: 0.18 (mm/Rev) 	M S
CNM(A)	<ul style="list-style-type: none"> • Flat top Chip Breaker • for Cast iron machining 	<ul style="list-style-type: none"> • Fz min: 0.15 (mm/Rev) 	K

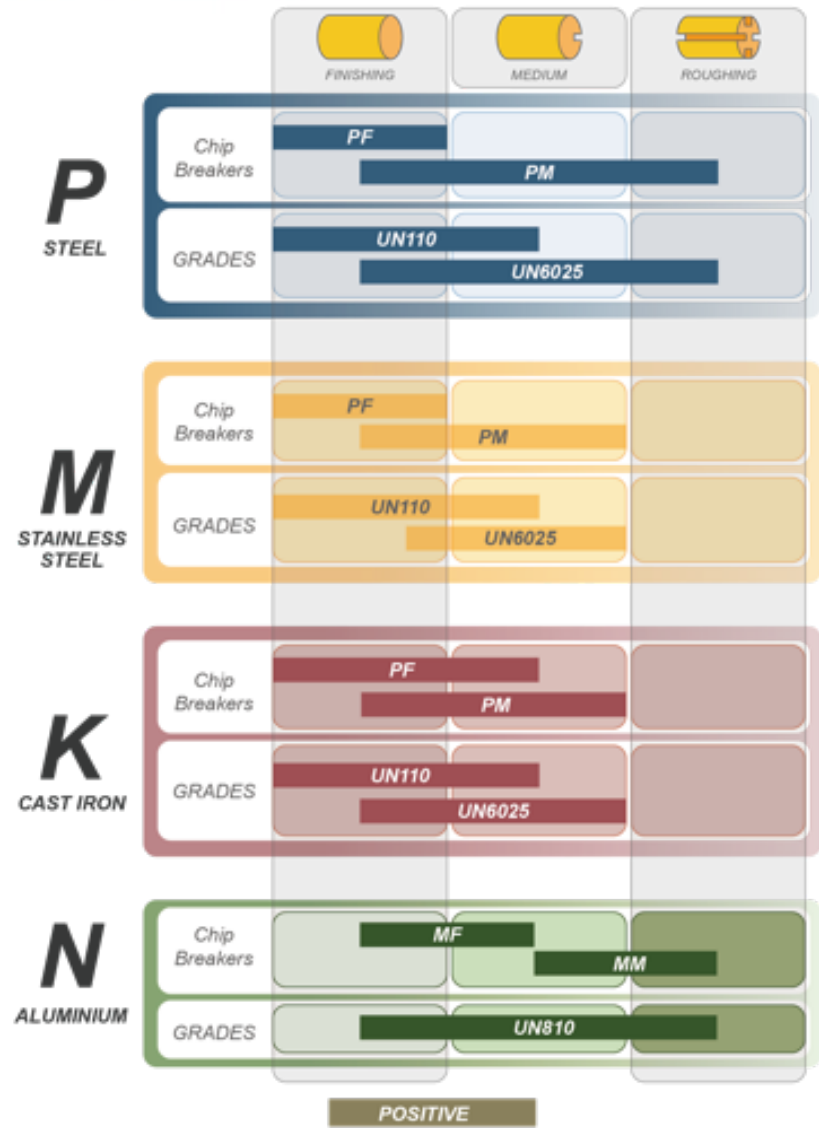
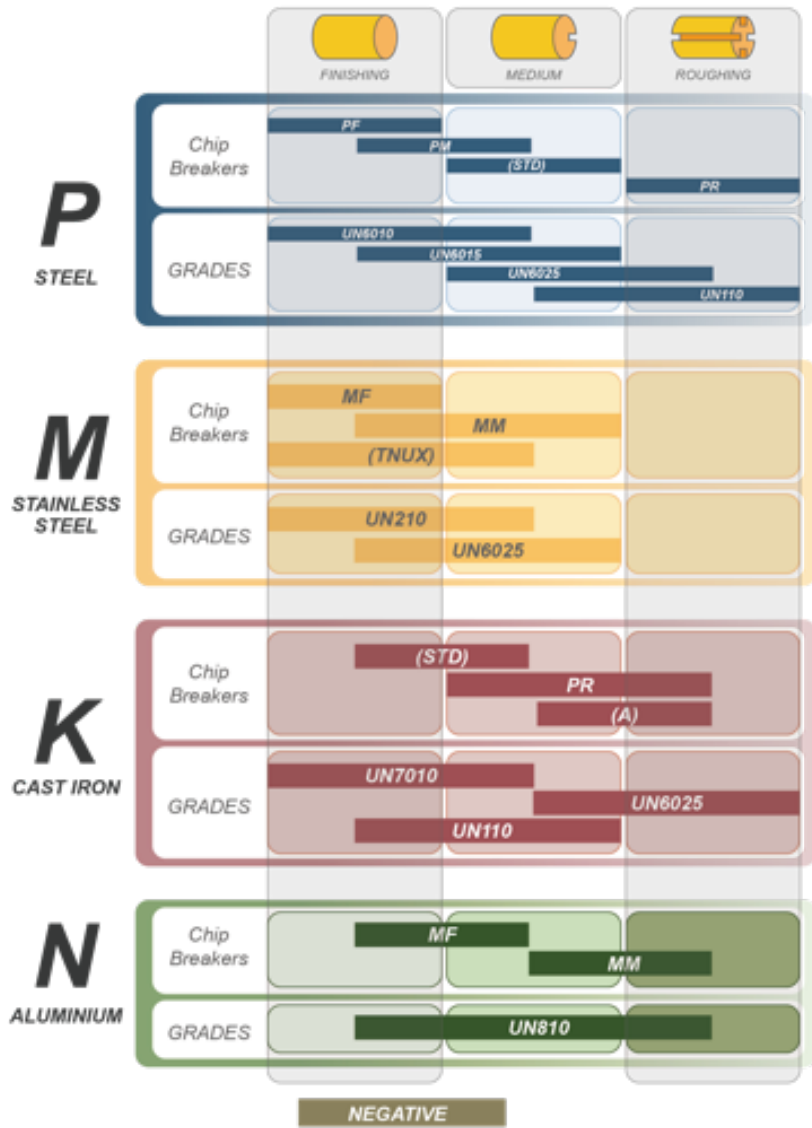
TNU(X) • Very sharp chip breaker like *KNUX*
 • for Low carbon steel & Stainless Steel

• **Fz min: 0.10** (mm/Rev)

P M

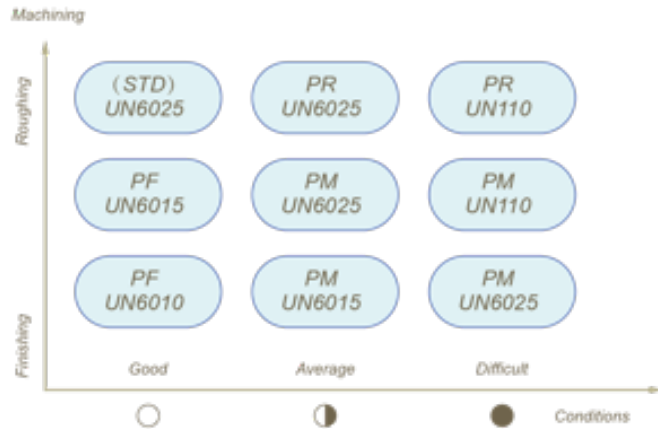
Chip Breaker name and Geometry			Applications and Features
PF			<ul style="list-style-type: none"> • Sharp chip breaker • For finishing operations • Also adopted for sticky material and Stainless steel • Chip Control starts at Fz: 0.12
PM			<ul style="list-style-type: none"> • Semi Finishing chip breaker for General machining • First choice for stable machining and light-Mid cutting pressure • Smooth cutting due to very positive chip breaker angles • Chip Control starts at Fz: 0.18
(STD)			<ul style="list-style-type: none"> • Mid cutting conditions - chip breaker for General machining • First choice for Un-stable machining with reasonable cutting pressure • Reinforced chipbreaker allows for high shock resistance • Chip Control starts at Fz: 0.25
PR			<ul style="list-style-type: none"> • Roughing chip breaker mostly used in tough machining applications • First choice for very Un-stable machining or for thick casting "skin" • Tough and reinforced cutting edge and chip breaker angles • Chip Control starts at Fz: 0.35
(A)			<ul style="list-style-type: none"> • Flat top insert design • used mostly for Cast iron applications • Chip Control starts at Fz: 0.15 • Use with UN 7010 grade for best results
(X)			<ul style="list-style-type: none"> • Sharp chip breaker • For finishing operations with performance similar to <i>KNUX</i> • Also adopted for sticky material, Stainless steel and Aerospace Material • Chip Control starts at Fz: 0.10
MF			<ul style="list-style-type: none"> • Sharp chip breaker - especially developed for stainless Applications • For finishing operations • Also adopted for very soft or sticky material • Chip Control starts at Fz: 0.10
MM			<ul style="list-style-type: none"> • Semi Finishing chip breaker - especially developed for stainless Applications • First choice for all stainless steel applications • Also adopted for very soft, sticky material and some Aerospace material • Chip Control starts at Fz: 0.14

OVER VIEW- CHIP BREAKERS & GRADES

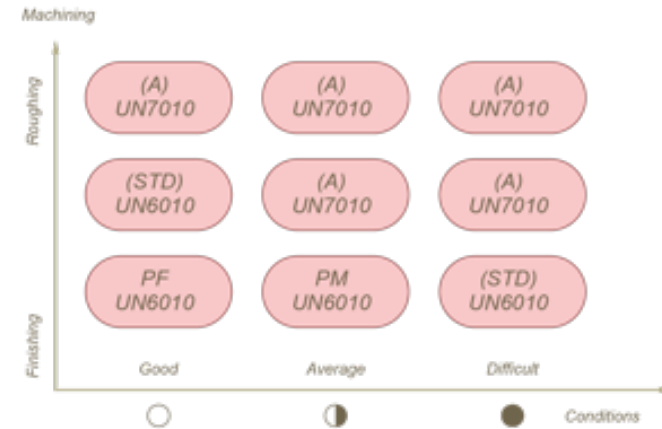


FIRST CHOICE – CHIP BREAKER & GRADE

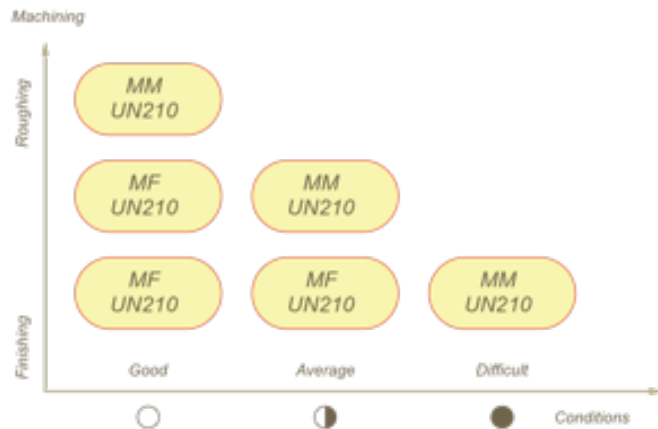
ISO P (Steel)



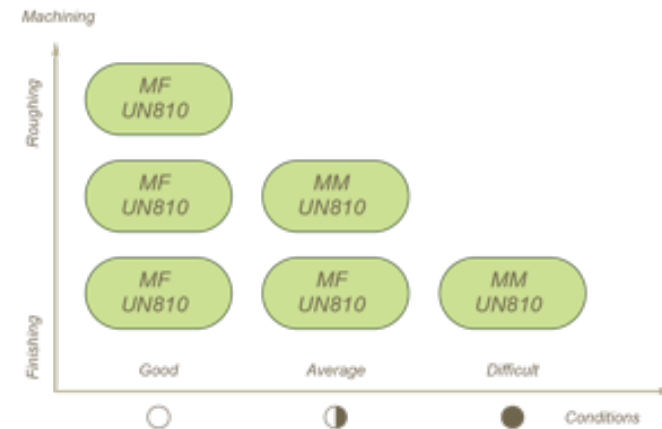
ISO K (Cast Iron)



ISO M (Stainless Steel)



ISO N (Aluminium)



STARTING POINT – FOR ANY JOB

Fz Fits the Chip-breaker

IMPORTANT

PF : Bigger than 0.11

PM : Bigger than 0.18

(STD) : Bigger than 0.25

PR: Bigger than 0.35

Grade

UN 6025 : CVD General Purpose

Vc

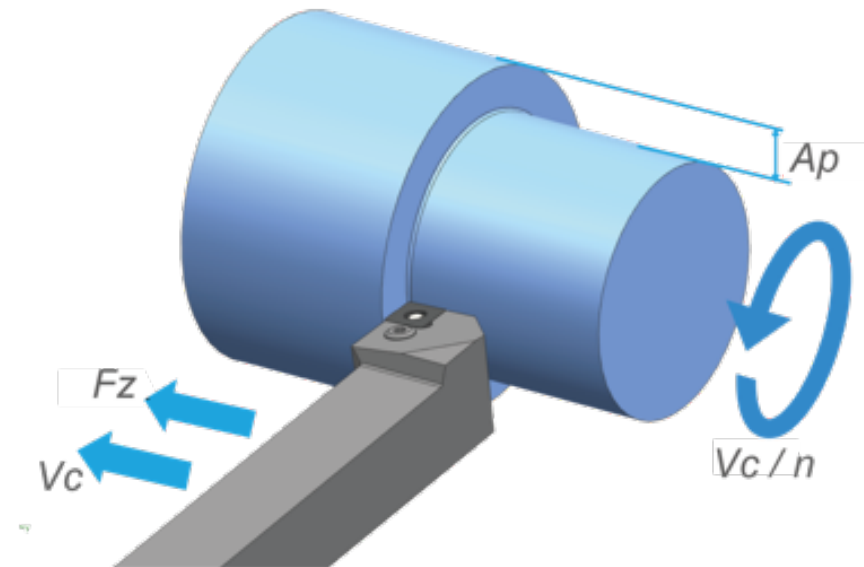
Vc: 220: Any Speed below 280

Ap

Depth of Cut : Any depth is fine

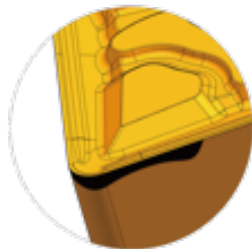
Coolant

Always - ON



FAIL MODES & CORRECTION

Flank Wear



UN6015 CHANGE TO UN6010

UN6025 CHANGE TO UN6015

Crater Wear

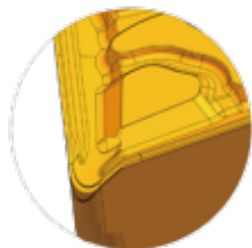


PVD grades

CHANGE TO

CVD grades

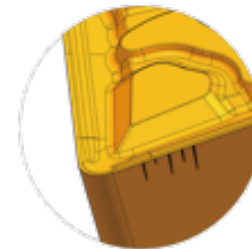
Plastic Deformation



CHANGE TO PVD grades

UN6025 CHANGE TO UN6015

Thermal Cracks

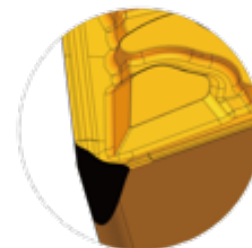


CVD grades

CHANGE TO

PVD grades

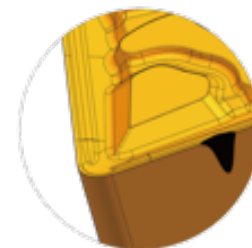
Edge Breakage



UN6015 CHANGE TO UN6025

CHANGE TO PVD grades

Notch Wear



CHANGE TO UN210