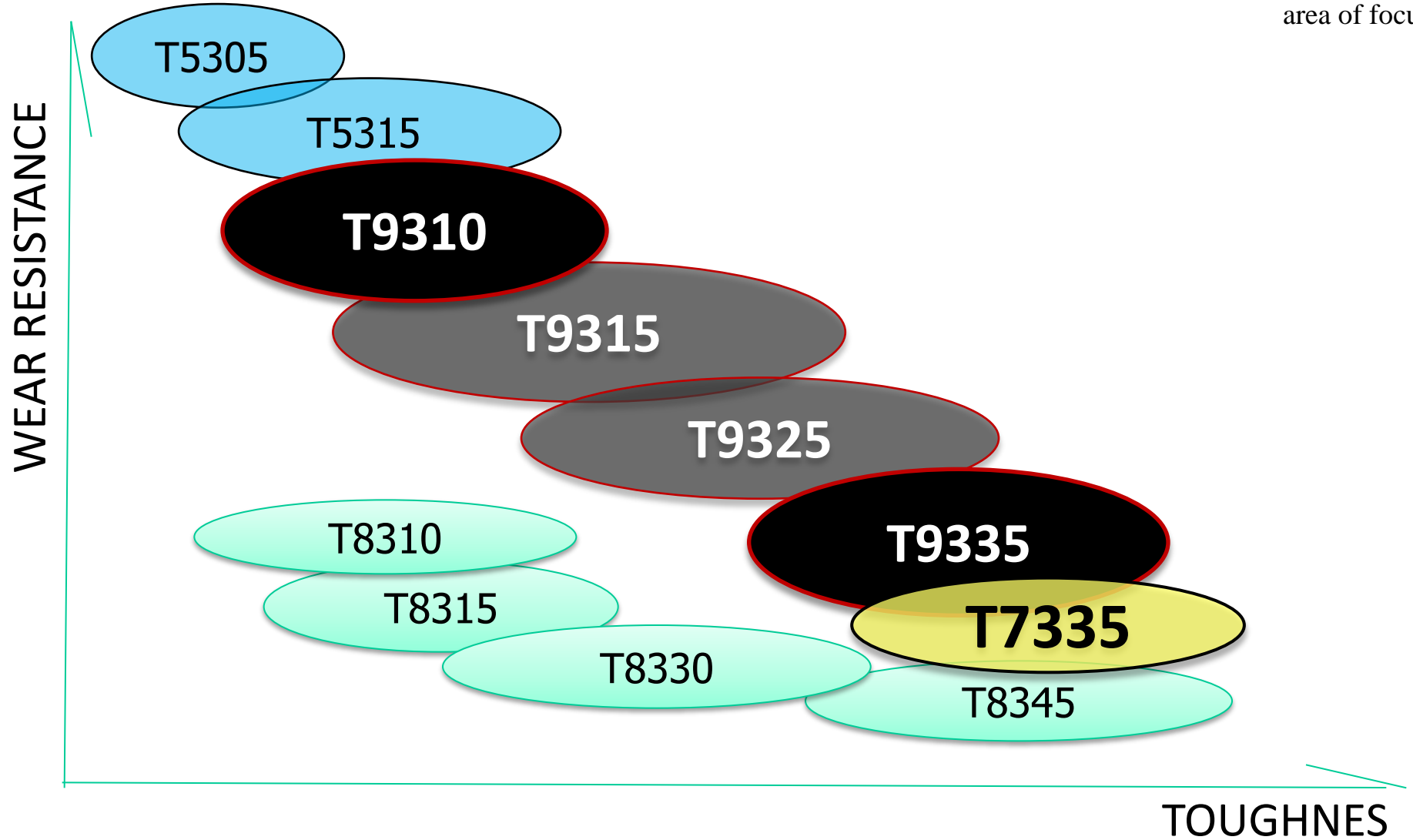




# **GRADES for TURNING**

# new grades for turning

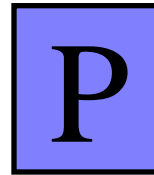
area of focus



# new grades for turning

T9310 - substrate

## T9310



01-15



05-20

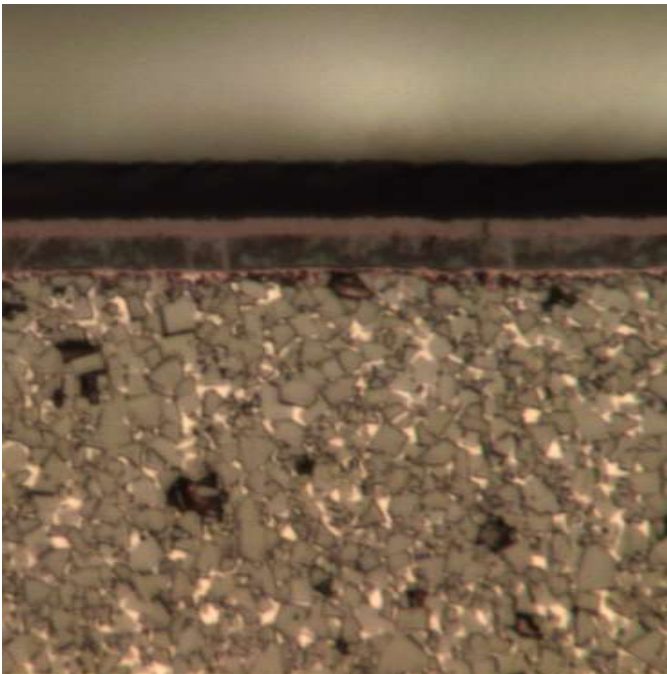


10-20

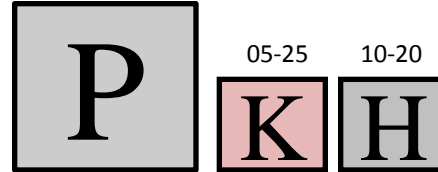
- fine grain size
- functional gradient
- low content of cobalt
- Thick MT-CVD coating with unique  $\text{Al}_2\text{O}_3$  top layer warrants extra-ordinary thermal, chemical stability and protection of substrate
- Special final treatment after coating
- Machining of material group P, conditionally K, H
- Finishing, continuous and modestly interrupted cut



# T9315

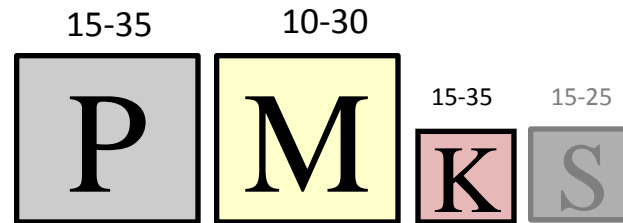
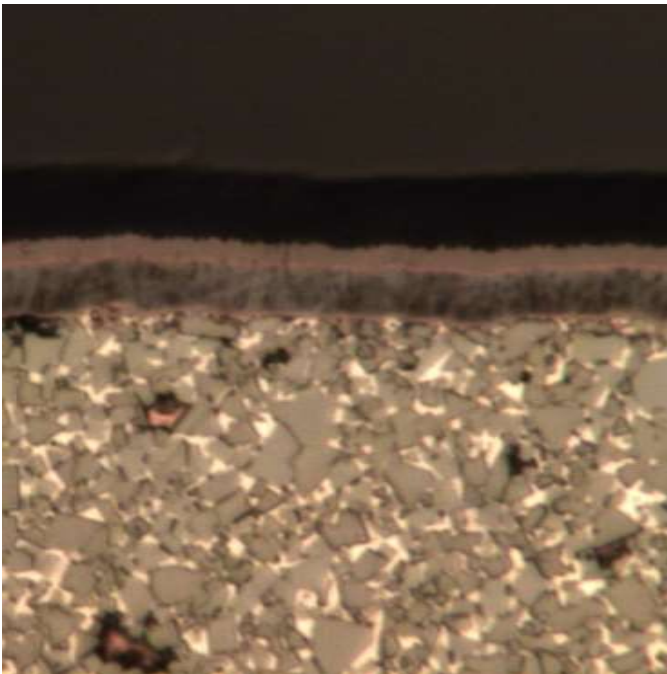


05-25



- New material of generation T9300 characterized by high wear resistance with considerable toughness
- Functional gradient substrate with relatively low content of cobalt binder phase
- Thick MT-CVD coating with unique Al<sub>2</sub>O<sub>3</sub> top layer warrants extra-ordinary thermal, chemical stability and protection of substrate
- Special final treatment after coating
- Machining of material group P, conditional K, H
- Finishing, continuous and modesty interrupted cut
- High stability of cutting edge
- High and moderate cutting speed

# T9325



- The most versatile grade of new generation T9300
- Functional gradient substrate with moderate content of cobalt binder phase
- Medium thick MT-CVD coating with unique Al<sub>2</sub>O<sub>3</sub> top layer warrants extra-ordinary thermal and chemical stability and protection of substrate
- Special final treatment after coating
- Machining of material group P, M conditionally K, S
- Versatile application
- Unfavourable cutting conditions, continuous and/or interrupted cut
- Medium and higher cutting speed



# new grades for turning

T9335 - substrate

## T9335



20-45



15-40



15-25

- medium grain size
- functional gradient
- medium content of cobalt
- Medium thick MT-CVD coating with unique  $\text{Al}_2\text{O}_3$  top layer warrants extra-ordinary thermal, chemical stability and protection of substrate
- Special final treatment after coating
- Machining of material group P, conditionally M (S)
- Finishing, continuous and modestly interrupted cut

# new grades for turning

T7335 - substrate

# T7335



20-40



20-40

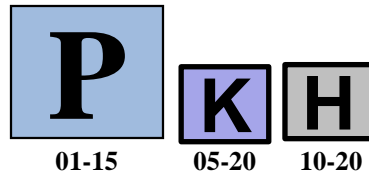


15-25

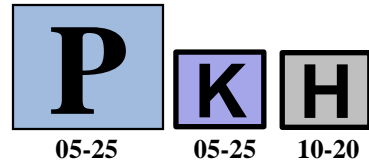
- medium grain size
- functional gradient
- medium content of cobalt
- Medium thick MT-CVD coating with unique  $\text{Al}_2\text{O}_3$  top layer warrants extra-ordinary thermal, chemical stability and protection of substrate
- Special final treatment after coating
- Machining of material group M, conditionaly P (S)
- Finishing, continuous and modesty interrupted cut



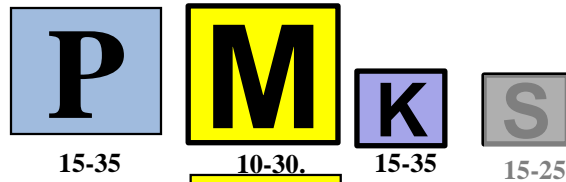
**T9310**



**T9315**



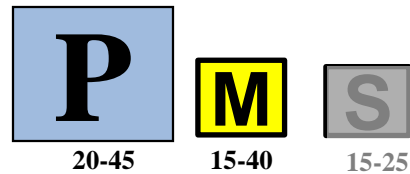
**T9325**



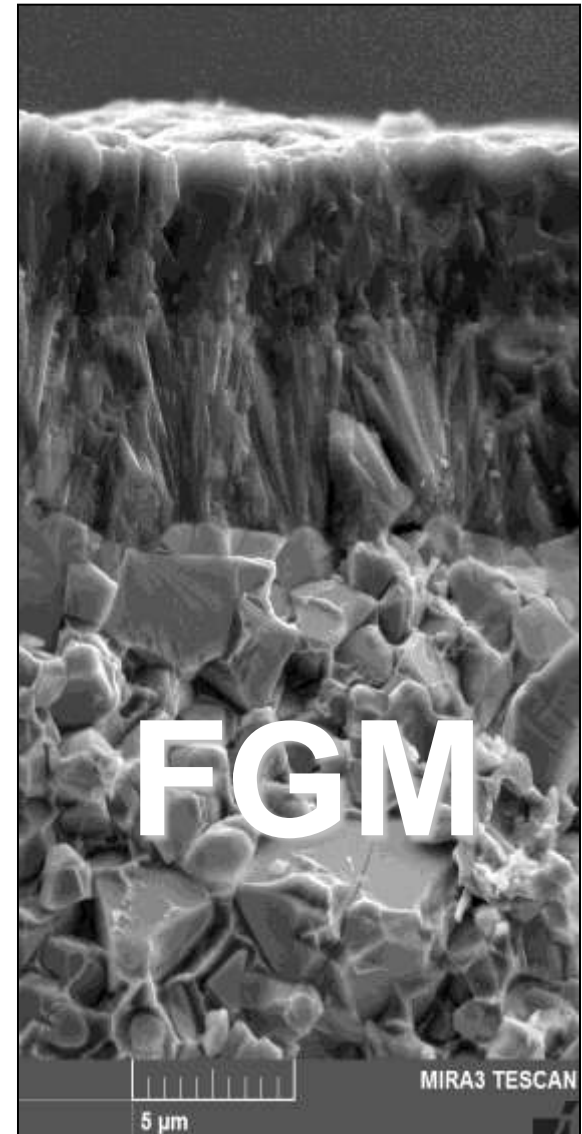
**T7335**



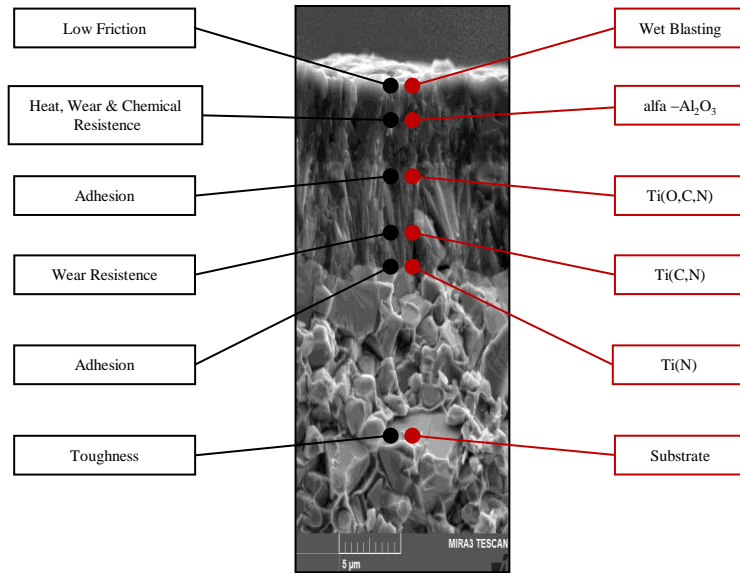
**T9335**



Application area



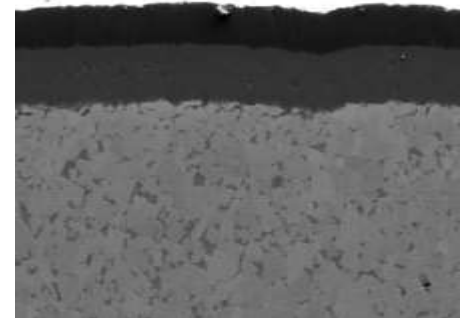
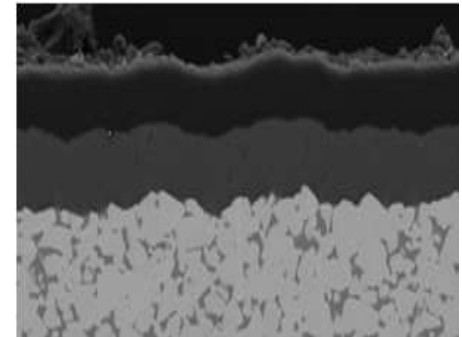
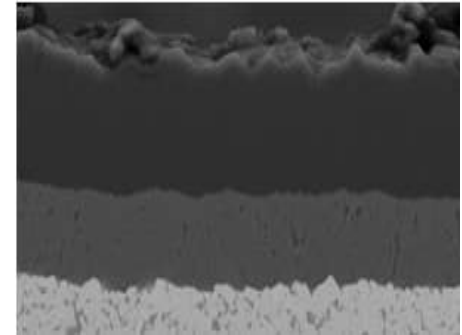




**T9310 T9315**

**T9325 T9335**

**T7335**

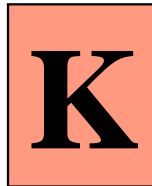


Differences in coating thickness  
 Same coating platform  
 High oxidation resistance  
 High adhesion to substrate  
 High thermal stability

# T5305



05-15



01-15



15-20

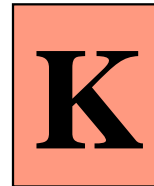
# T5315



10-25



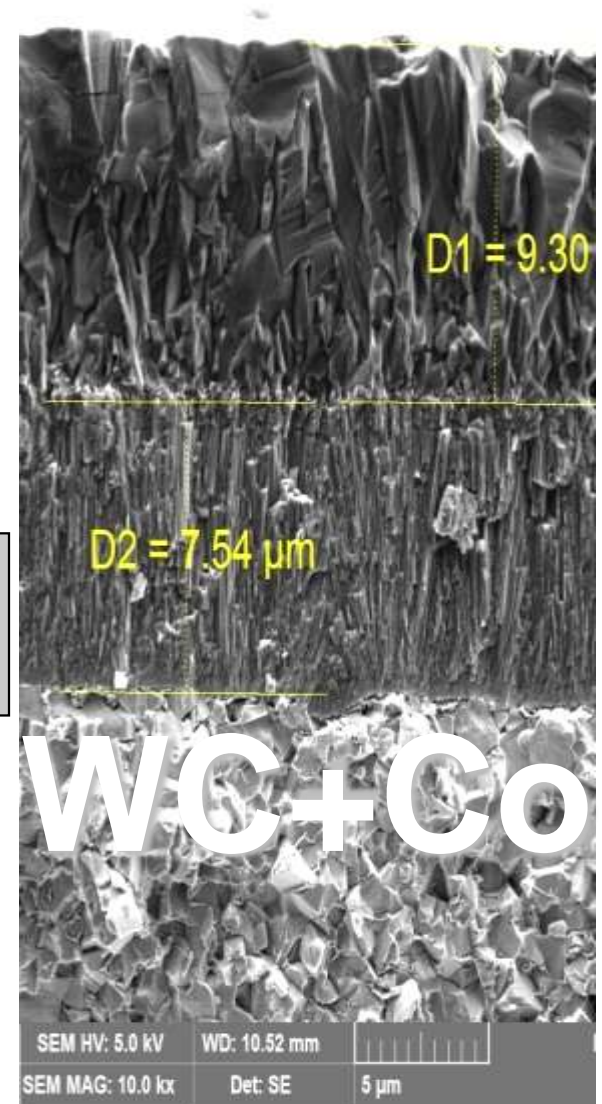
05-15

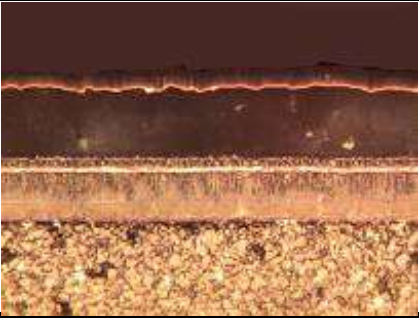

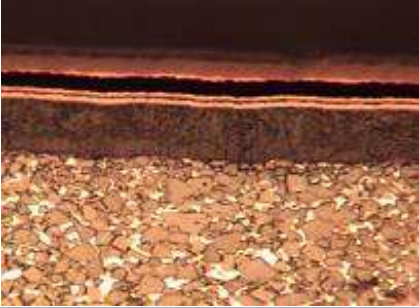
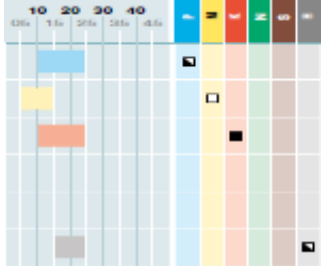





10-25



15-25



designation	microstructure	aplication area	Grade description and recommended application
<b>T5305</b>			<ul style="list-style-type: none"> <li>- fine-grained substrate with a low cobalt content</li> <li>- thick layer of MT-CVD coating with a layer of <math>Al_2O_3</math> on the surface</li> <li>- special finish for coating</li> <li>- designed for machining materials in groups K, P, and H</li> <li>- top performance for machining grey cast iron</li> <li>- material with the highest abrasion resistance of the 5300 series</li> <li>- high cutting speeds</li> <li>- continuous and slightly interrupted cut</li> </ul>
<b>T5315</b>			<ul style="list-style-type: none"> <li>- fine-grained substrate with a modified cobalt content to increase strength</li> <li>- thick MT-CVD coating combining the advantages of TiCN and <math>Al_2O_3</math> layers</li> <li>- special finish for coating</li> <li>- versatile material designed primarily for turning grey and ductile cast iron</li> <li>- can also be used for machining material groups P and H</li> <li>- supplementary for also machining group M</li> <li>- suitable for finishing and roughing</li> <li>- medium to high cutting speeds</li> <li>- suitable for continuous and interrupted cut</li> </ul>

 Main application
  Other applications
  Conditional applications

Substrate

Hardness / Higher speed / Performance

low content of Co

## T5305

**fine-grained structure**

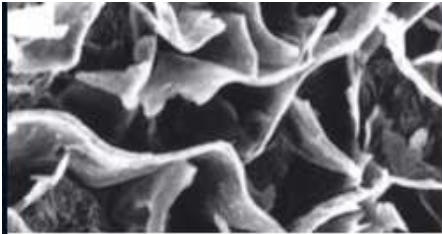
low content of Co

## T5315

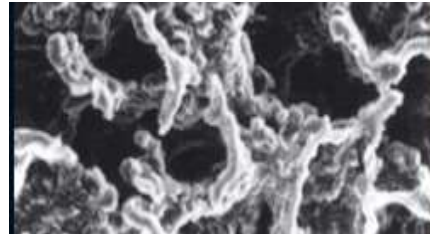
**fine-grained structure**

T9310

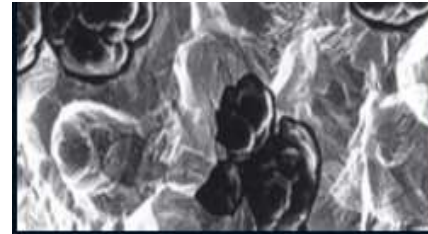
T9315....



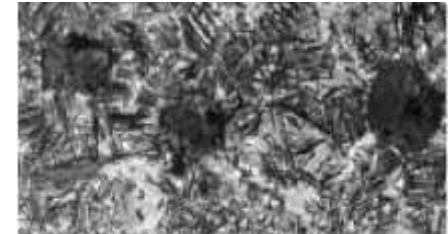
GG...



GGV...



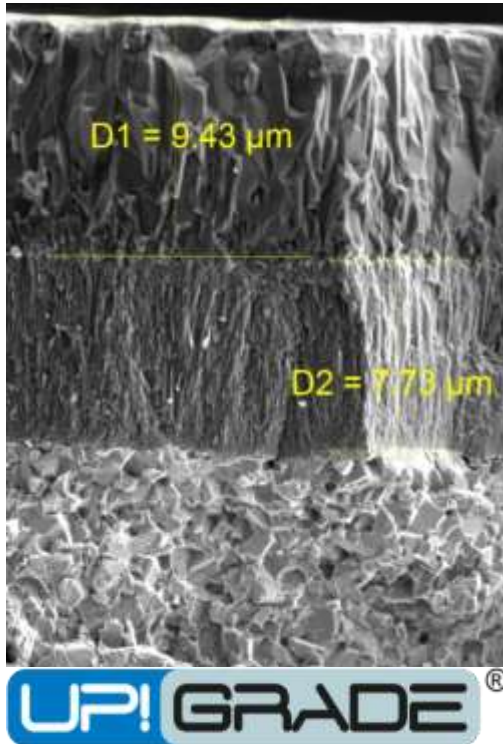
GGG...



ADI

Toughness / Unsteady cutting cond. / Reliability

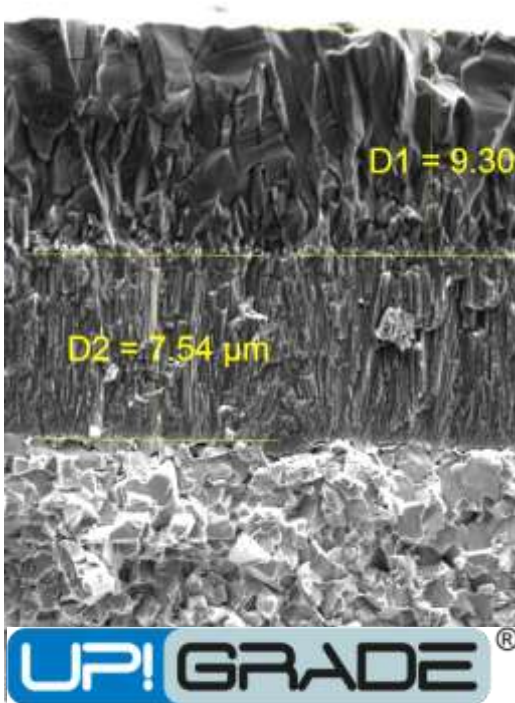
## T5305 – new member in UPGRADE family



- the most wear resistant grade aimed for cast iron turning,
- new fine-grained substrate with low content of cobalt,
- thick MTCVD coating with modern Al<sub>2</sub>O<sub>3</sub> outer layer,
- special treatment after coating,
- suitable for machining of materials group K, H and P,
- peak performance in gray cast irons,
- high cutting speeds,
- continuous and moderately interrupted cuts,
- launching date on 1<sup>st</sup> of April 2014.

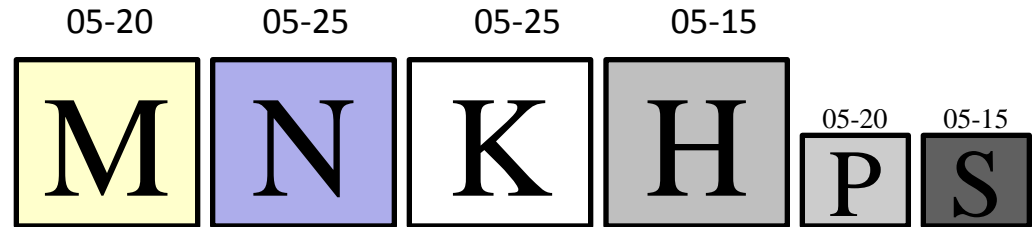
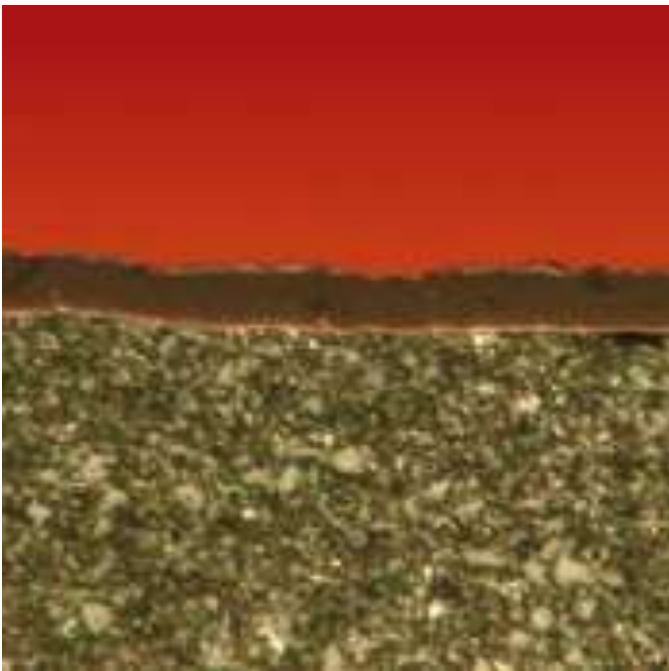


## T5315 – new member in UPGRADE family



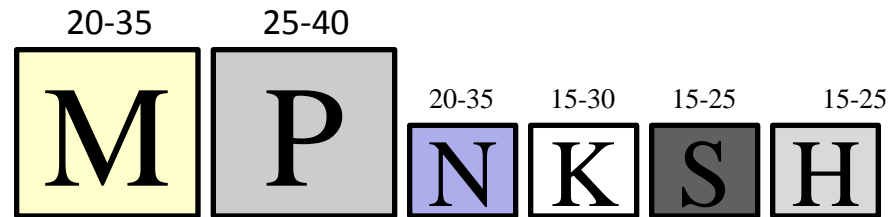
- universal grade aimed for both grey and ductile cast irons turning,
- fine-grained substrate with adapted cobalt content,
- thick MTCVD coating combining advantages of TiCN and Al<sub>2</sub>O<sub>3</sub> layers,
- special treatment after coating,
- suitable for machining of materials group K, H, P and M,
- for finishing up to roughing,
- medium to high cutting speeds,
- good for continuous and interrupted cuts,
- launching date on 1<sup>st</sup> of April 2014.

# T8315



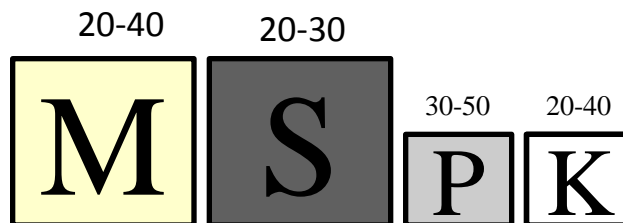
- The most wear resistant of T8300 generation
- Submicron substrate with relatively low cobalt content
- Nanostructured gradient PVD coating
- Increased hardness while decreased internal stress
- Improved resistance against notch wear
- Higher cutting speeds
- Small up to medium chip cross section
- Suitable for machining of materials group M, K, N, H, conditionally P, S
- Steady cutting conditions

# T8330



- The most universal of T8300 generation
- Submicron substrate with relatively high cobalt content
- Nanostructured gradient PVD coating
- Increased hardness while decreased internal stress
- Improved resistance against notch wear
- Medium cutting speeds
- Suitable for machining of materials group M, P, K, conditionally N, S, H
- Less favourable cutting conditions

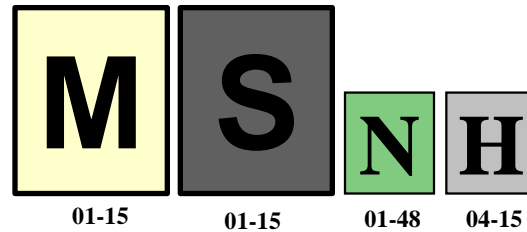
# T8345



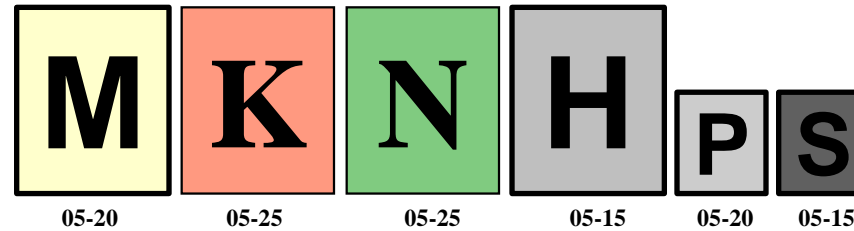
- The most tough of T8300 generation
- Submicron substrate with high cobalt content
- Nanostructured gradient PVD coating
- Increased hardness while decreased internal stress
- Improved resistance against notch wear
- Medium to lower cutting speeds
- Medium to bigger chip cross section
- Suitable for machining of materials group M, S, conditionally P, K
- Unstable cutting conditions

Application area

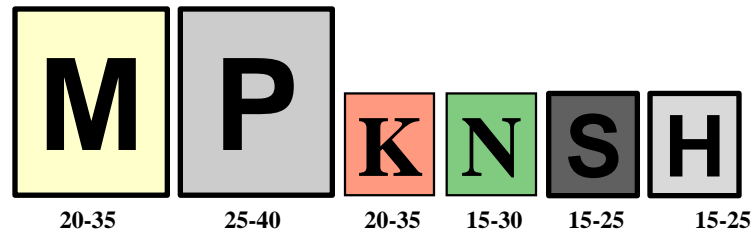
## T8310



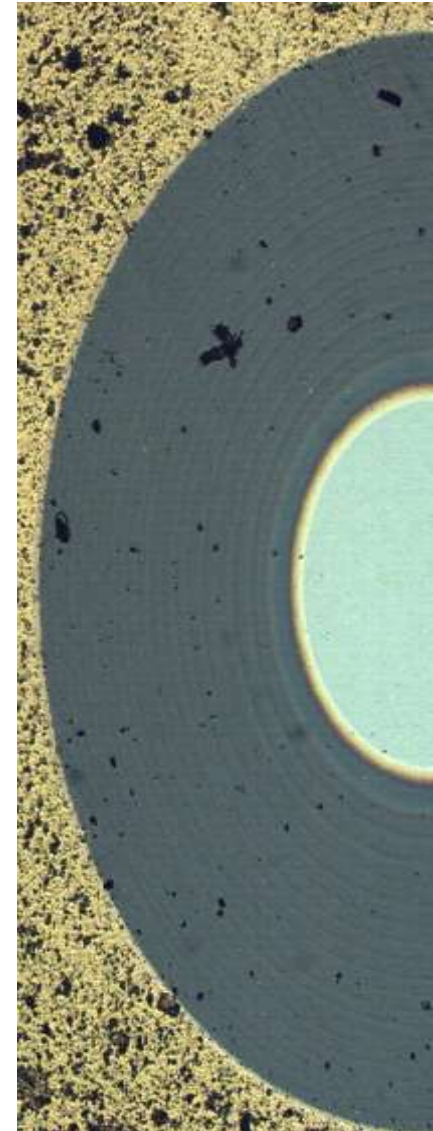
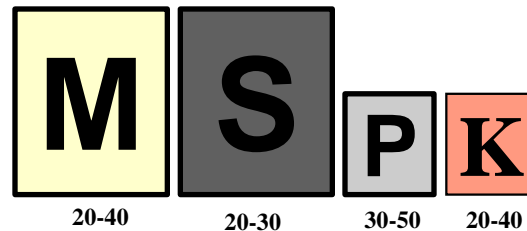
## T8315



## T8330



## T8345





**SUBSTRATE**

**Hardness / Higher speed / Performance**

low content of Co

**T8310**

ultra-submicron

low content of Co

**T8315**

submicron

medium content of Co

**T8330**

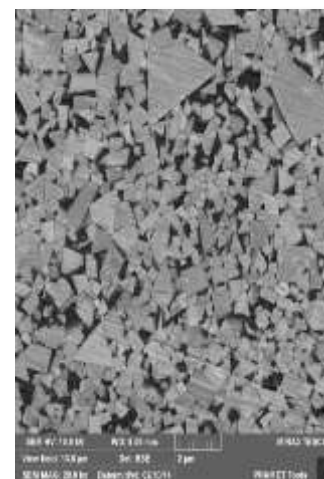
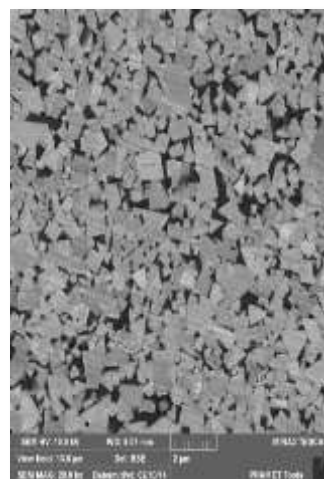
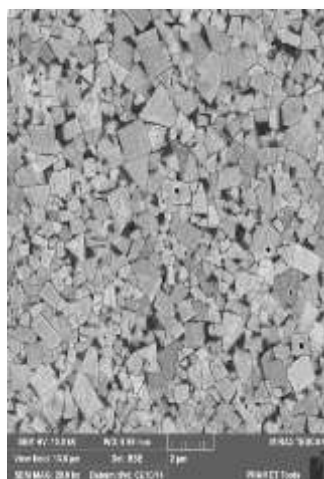
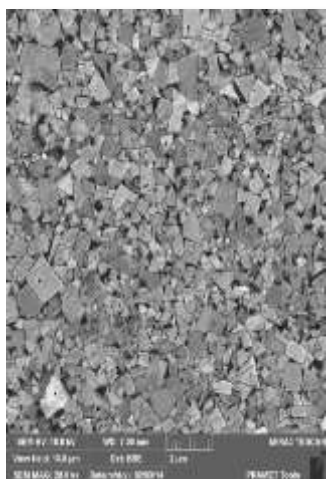
submicron


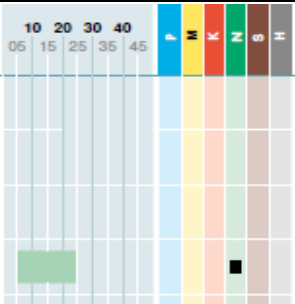
high content of Co

**T8345**

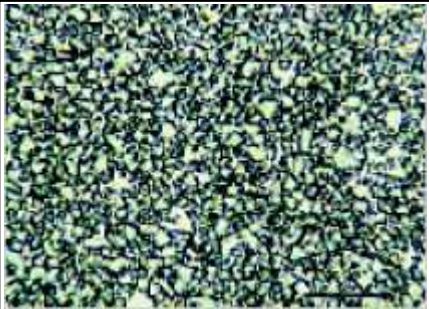
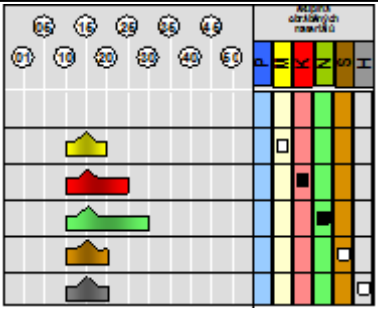
submicron

**Toughness / Unsteady cutting cond. / Reliability**



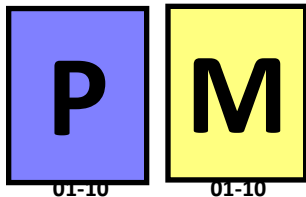
designation	microstructure	aplication area	Grade description and recommended application
T0315			<ul style="list-style-type: none"> <li>- sub-micron substrate with a relatively low bonding-agent content</li> <li>- coating with a very low friction coefficient, applied by PVD method</li> <li>- specific cutting edge finish</li> <li>- material specially developed for machining materials in group N</li> <li>- requires relatively stable machining conditions</li> <li>- finishing and semi-roughing operations</li> </ul>

Main application
  Other applications
  Conditional applications

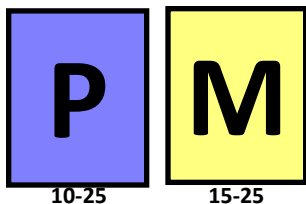
Designation	microstructure	application area	Grade description and recommended application
HF7			<ul style="list-style-type: none"> <li>- submicron grade without cubical carbides with low content of cobalt</li> <li>- general-purpose grade, suitable for all groups of work piece material except P</li> <li>- small up to medium chip cross section</li> <li>- steady cutting conditions</li> </ul>

Main application
  Other applications
  Conditional applications

**TT010**



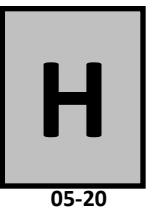
**TT310**



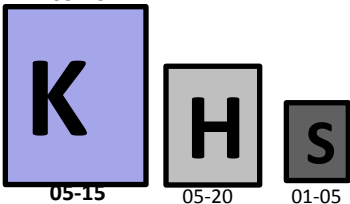
**D720**



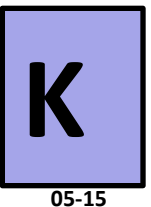
**TB310**



**TC100**



**SN100**



**CERMETS**

**PCD**

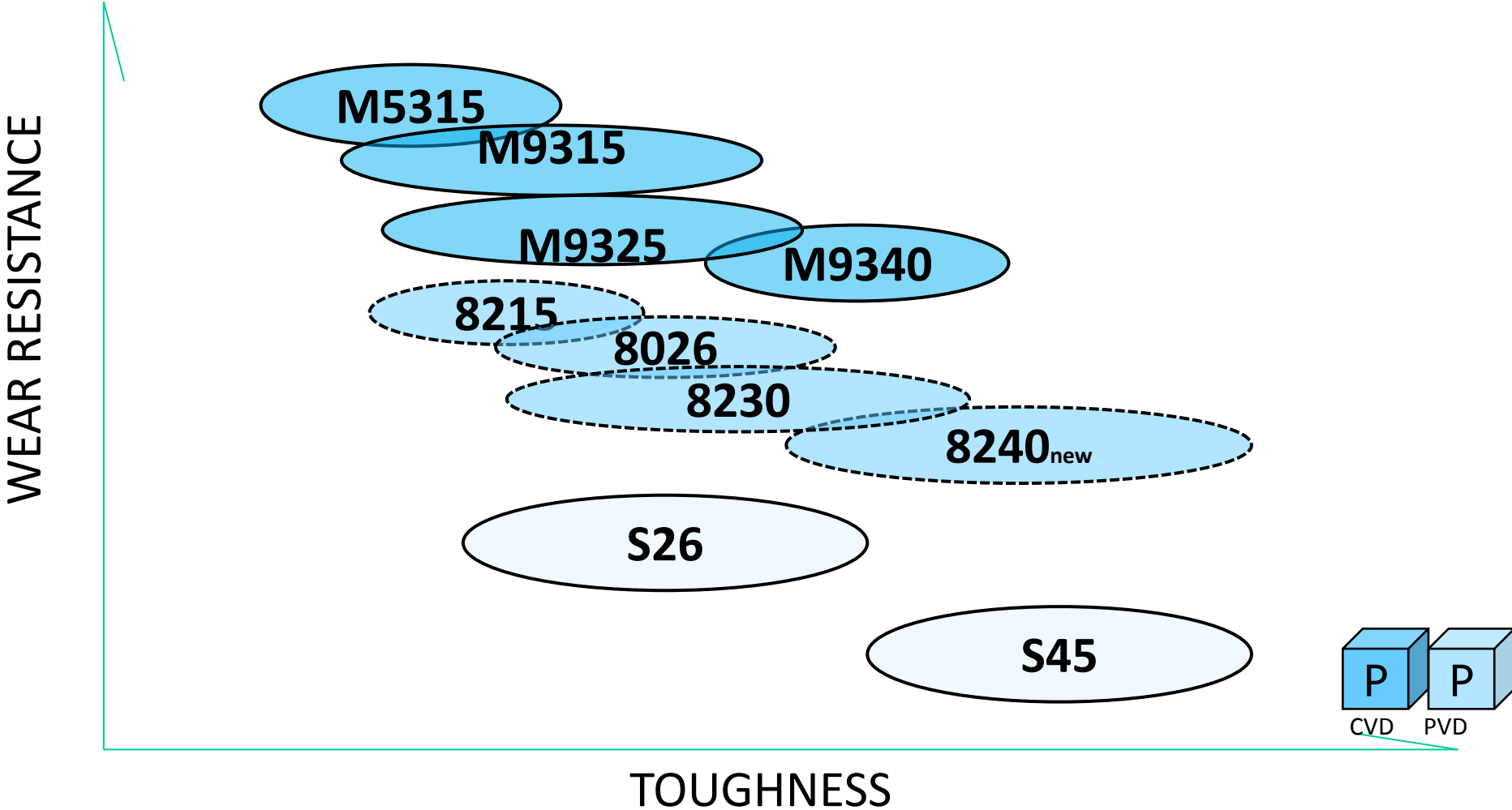
**CBN**

**CERAMICS**



# **GRADES for MILLING**





designation	microstructure	aplication area	Grade description and recommended application
8215			<ul style="list-style-type: none"> <li>- the most wear resistant grade among 8000 grades</li> <li>- submicron substrate without cubical carbides, low content of cobalt</li> <li>- nanostructural coating applied by PVD method</li> <li>- suitable for cutting conditions with high thermal stress</li> <li>- general-purpose grade</li> <li>- small up to medium chip cross section</li> <li>- high cutting speed</li> <li>- steady cutting conditions</li> </ul>
8230			<ul style="list-style-type: none"> <li>- Versatile cutting grade.</li> <li>- Submicron substrate type H.</li> <li>- Nanostructural thin PVD coating with high content of Al.</li> <li>- Combines good wear resistance and good operational reliability.</li> <li>- Applicable on all material groups.</li> <li>- Medium cutting speeds.</li> <li>- Suitable for unstable working conditions.</li> </ul>
8240			<ul style="list-style-type: none"> <li>- The toughest grade among 8000 grades.</li> <li>- Submicron substrate type H with high content of cobalt.</li> <li>- Nanostructural thin PVD coating with high content of Al.</li> <li>- For operations characterized by high mechanical stress on cutting edge.</li> <li>- Machining of materials groups P, M, S and K.</li> <li>- Low up to medium cutting speeds.</li> <li>- Suitable for unstable working conditions.</li> </ul>

Main application
  Other applications
  Conditional applications

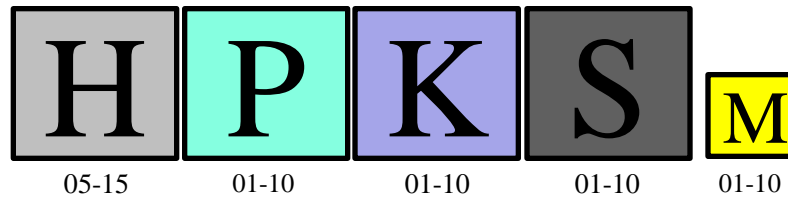
designation	microstructure	aplication area	Grade description and recommended application
7010			<ul style="list-style-type: none"> <li>- fine grained substrate without cubical carbides with very low content of cobalt</li> <li>- multi-layered nanostructural coating with high content of Al, applied by PVD method</li> <li>- suitable for cutting conditions with high thermal stress</li> <li>- general-purpose grade</li> <li>- small up to medium chip cross section</li> <li>- high cutting speed</li> <li>- steady cutting conditions</li> </ul>
7025			<ul style="list-style-type: none"> <li>- substrate with high content of cubical carbides</li> <li>- multi-layered nanostructural coating with high content of Al, applied by PVD method</li> <li>- suitable for machining of materials groups P, M, conditionally for K</li> <li>- medium and higher feed</li> <li>- medium up to high cutting speed</li> <li>- steady cutting conditions</li> </ul>
7040			<ul style="list-style-type: none"> <li>- substrate without cubical carbides</li> <li>- multi-layered nanostructural coating with high content of Al, applied by PVD method</li> <li>- combines good wear resistance and good operational reliability</li> <li>- general-purpose grade</li> <li>- medium cutting speed</li> <li>- for less favourable cutting conditions</li> </ul>

Main application
 Other applications
 Conditional applications

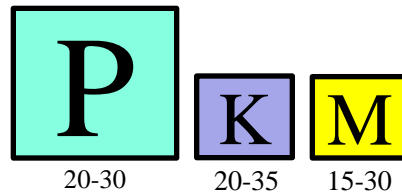
designation	microstructure	aplication area	Grade description and recommended application
7205			<ul style="list-style-type: none"> <li>- Ultra submicron substrate without cubical carbides (type H) with very low content of cobalt.</li> <li>- High hardness by keeping up bending strength.</li> <li>- Very good resistance against mechanical wear.</li> <li>- New type of PVD coating with increased resistance against oxidation and unique slide properties.</li> <li>- High cutting speed and lower up to medium chip cross-section.</li> <li>- Stable working conditions.</li> <li>- Applicable on all material groups excluding super alloys (group S).</li> </ul>
7215			<ul style="list-style-type: none"> <li>- Submicron substrate without cubical carbides (type H) with low content of cobalt.</li> <li>- New gradient PVD coating.</li> <li>- Unique slide properties.</li> <li>- Medium up to higher cutting speed and lower up to medium chip cross-section.</li> <li>- Higher resistance against oxidation.</li> <li>- Stable working conditions.</li> <li>- Applicable on all material groups.</li> </ul>
7230			<ul style="list-style-type: none"> <li>- Submicron substrate without cubical carbides (type H) with higher content of cobalt.</li> <li>- New gradient PVD coating with increased resistance against oxidation.</li> <li>- Unique slide properties.</li> <li>- Medium cutting speed and lower up to medium chip cross-section.</li> <li>- Worse working conditions.</li> <li>- Applicable on all material groups.</li> </ul>

Main application
 Other applications
 Conditional applications

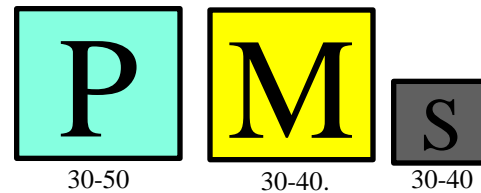
**M8310**



**M8325**

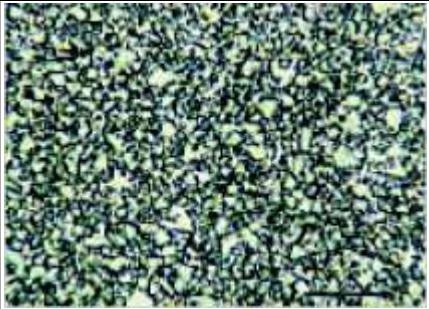
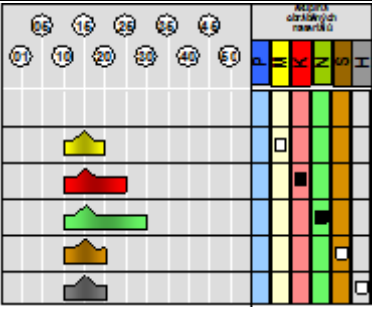
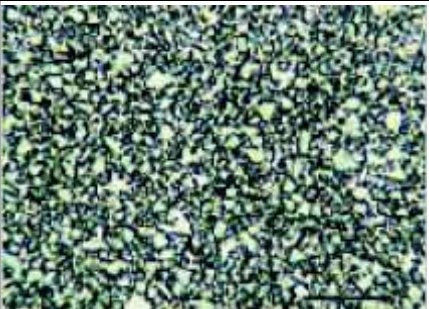
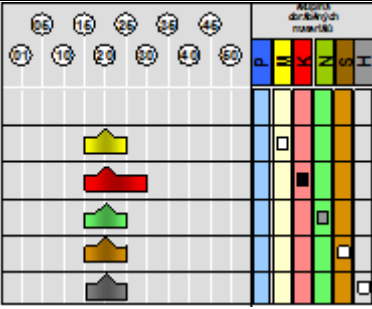


**M8345**



Main application
  Other applications
  Conditional applications



designation	microstructure	aplication area	Grade description and recommended application
HF7			<ul style="list-style-type: none"> <li>- submicron grade without cubical carbides with low content of cobalt</li> <li>- general-purpose grade, suitable for all groups of work piece material except P</li> <li>- small up to medium chip cross section</li> <li>- steady cutting conditions</li> </ul>
H10			<ul style="list-style-type: none"> <li>- grade without cubical carbides with low content of cobalt</li> <li>- general-purpose grade, suitable for all groups of work piece material</li> <li>- small up to medium chip cross section</li> <li>- steady cutting conditions</li> </ul>

Main application
  Other applications
  Conditional applications



**M5315**

**M9315**

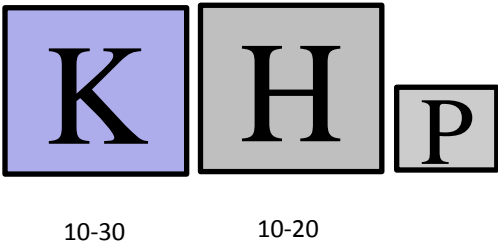
**M9325**

**M9340**

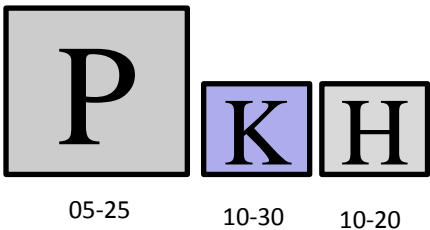
TOUGHNESS



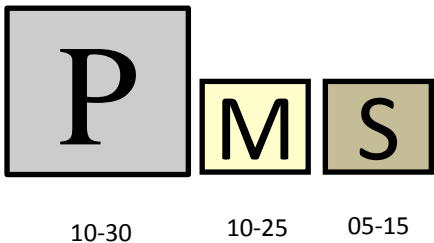
○ M5315



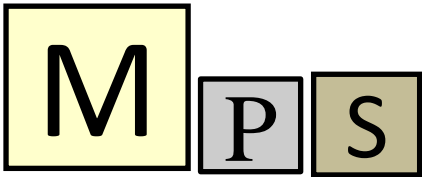
○ M9315



○ M9325



○ M9340

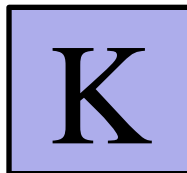


# NEW MT-CVD MILLING GRADES

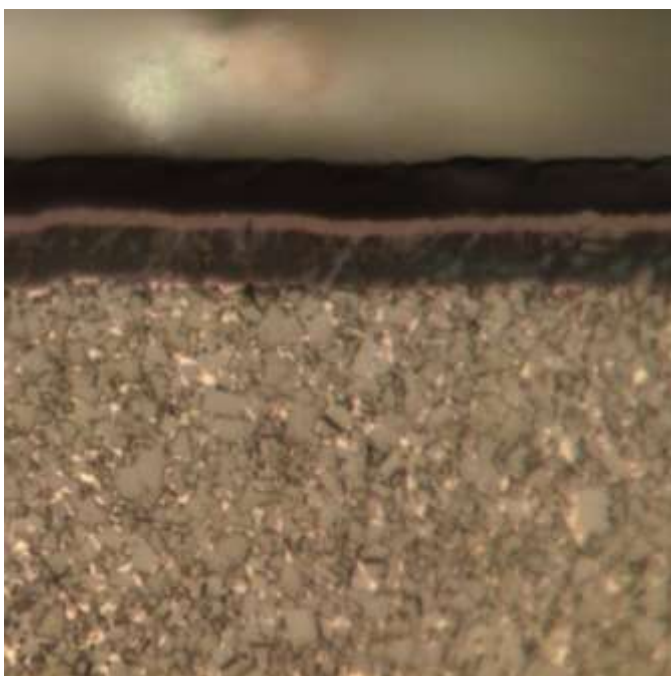
M5315

## M5315

10-30



FIRST CHOICE IN CAST IRON MILLING



- Substrate type H with low cobalt content.
- Thin MTCVD coating with a unique Al<sub>2</sub>O<sub>3</sub> layer.
- First choice for milling of gray and nodular cast irons.
- Medium up to bigger chip cross-section.
- Medium to high cutting speeds.
- Excellent wear resistance.
- Ability to work with and without coolant.

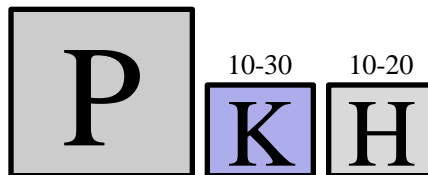
# NEW MT-CVD MILLING

## GRADES

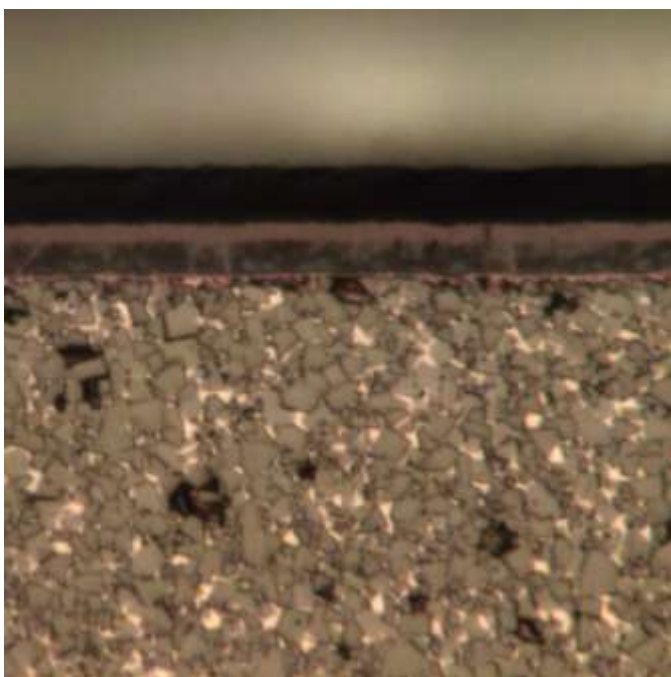
M5315

# M9315

05-25



EXCELLENT WEAR RESISTANCE  
WITH REASONABLE TOUGHNESS.



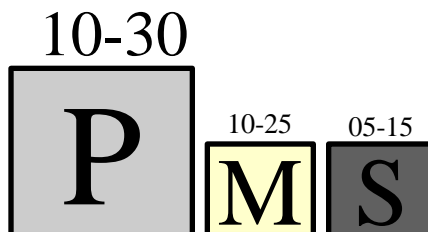
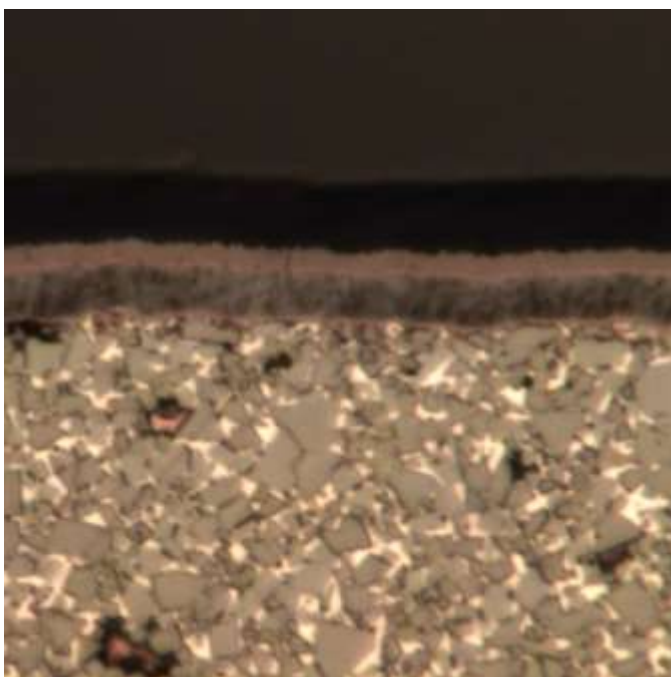
- Fine grained substrate with relatively low content of cobalt binder phase
- Thin MT-CVD coating with unique  $\text{Al}_2\text{O}_3$  layer
- Machining of materials of group P, conditionally K and H
- Medium to high cross-chips
- Medium to high cutting speeds
- Ability to work with and without coolant
- Excellent wear resistance with reasonable toughness



# NEW MT-CVD MILLING GRADES

M5315

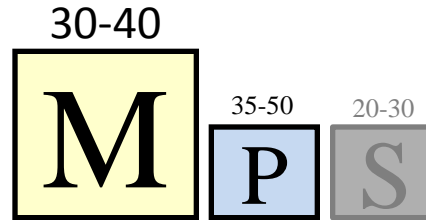
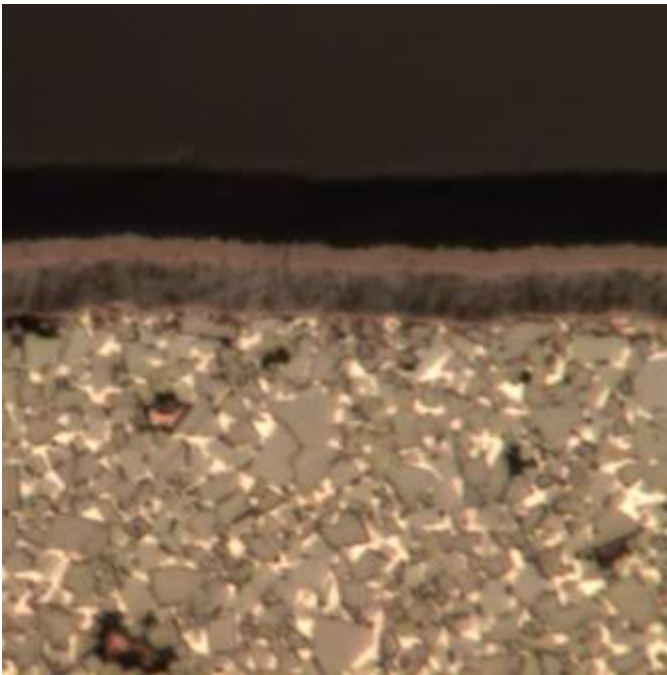
## M9325



### HIGH TOUGHNESS AND RELIABILITY

- Fine-grained substrate with higher content of cobalt binder phase
- Thin coating applied by MT-CVD method with unique  $\text{Al}_2\text{O}_3$  layer
- Machining of materials P and conditionally for groups M and S
- Medium to high cross-chips
- Medium to high cutting speeds
- With and without cooling
- High toughness and reliability
- Good wear resistance

# M9340



The most toughness grade from M9300 line

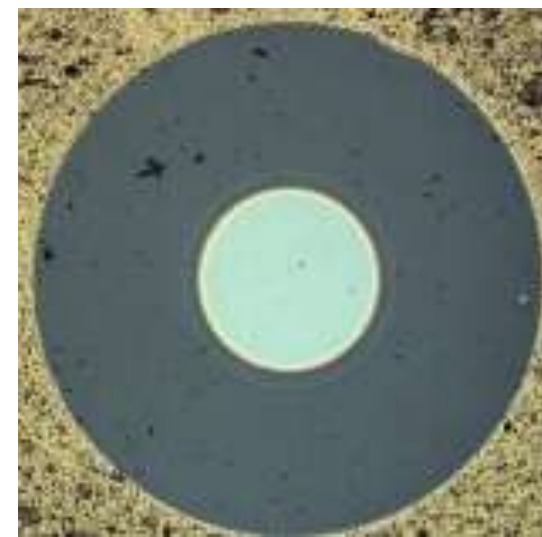
- Medium-grained substrate with high content of cobalt binder phase
- Thin coating applied by MT-CVD method with unique  $\text{Al}_2\text{O}_3$  layer
- Machining of materials M and conditionally for groups P and S
- Low and medium cutting speeds
- Ability to work with and without coolant
- for unstable conditions, vibrations or interrupted cuts



# **GRADES for DRILLING**

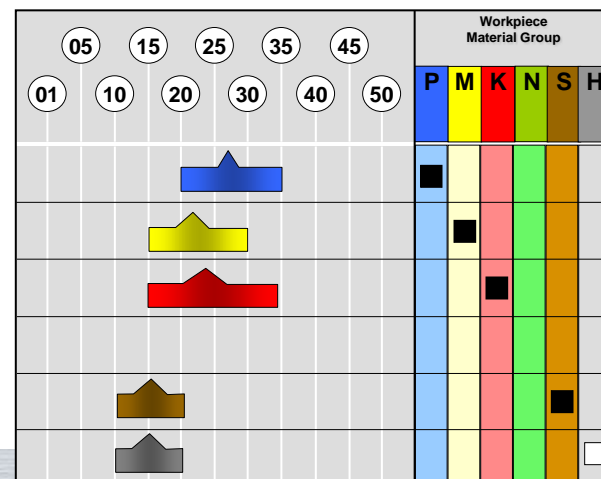
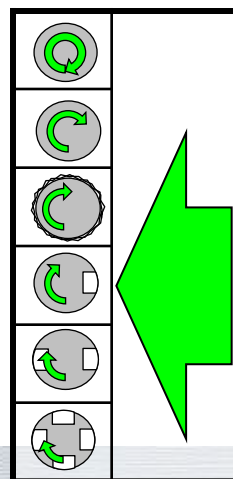


- + optimal material for peripheral inserts
- + the first choice for unstable cutting conditions
- + high universality (P, M, K, S, H)



<b>substrate</b>	<b>„H“</b>
<b>grain [μm]</b>	<b>0,6-1,2</b>
<b>%Co</b>	<b>10,0</b>
<b>% c.c.</b>	<b>0,5</b>

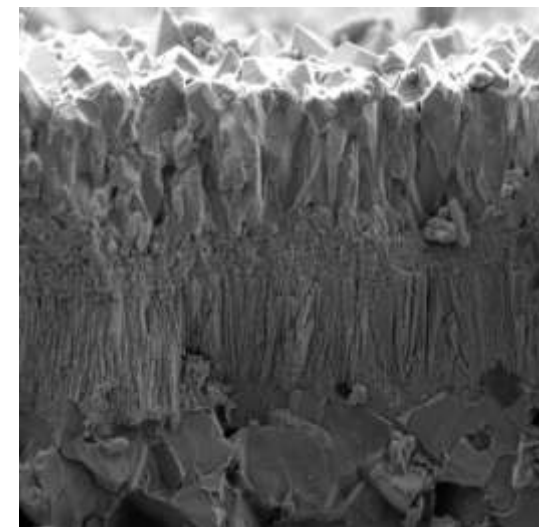
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19		
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05		
04		Nano-vrstevný povlak TiN/TiAlN gradientní vrstva tloušťka 5,5 – 6,5 μm
03		
02		
01		





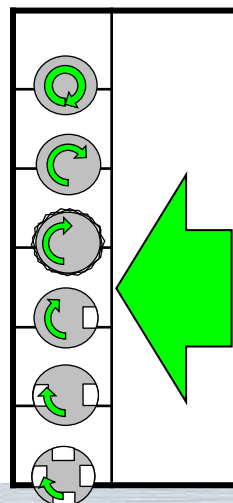
# D9335

- + universal grade for peripheral insert
- + high wear resistance with good operational reliability
- + very good for higher cutting speeds



substrate	„FGM“
grain [μm]	1,6-3,0
%Co	9,0
% C.C.	8,4

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03		
02		
01		
α Al <sub>2</sub> O <sub>3</sub> 2,5 ÷ 3,5 μm		
Ti(O,C,N)		
Ti(C,N) 2,5 ÷ 3,5 μm		



Workpiece Material Group											
05 15 25 35 45						P M K N S H					
01	10	20	30	40	50	P	M	K	N	S	H



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