TIZ IMPLEMENTS RED LINE

NANOGRADES INSERTS
FOR HRSA AND AEROSPACE MATERIALS

Contents Spis treści

Introduction Wprowadzenie

We are pleased to present the overall activity of TIZ IMPLEMENTS

We manufacture WC/Co powder nanocomposites in a novel manufacturing process, producing and applying them to entire cutting tools such as inserts, end mill, etc.

We produce both cemented carbide and cermet alloy from nanocomposite WC/Co powder which offer the highest quality cutting tools.

We will keep developing our new nanocomposite powder technology and do our best to meet customer needs.

In addition to devoting all efforts to the needs of the market with the unlimited spirit of challenges and quality management. Your continued interest and encouragement will be greatly appreciated.

HRSA - Heat Resistant Super Alloy

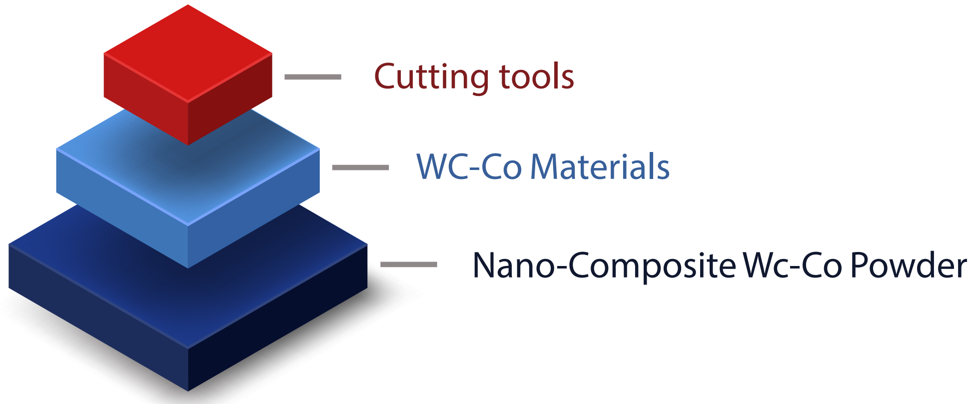
Factor of tool life deterioration

- High fuse inclibation with cutting tool
- Plastic deformation
- High heat and wear resistance
- Low productivity
- High hardness and toughness

Weakness of existing cutting tools

- Low tool life
- Low productivity
- Decrease machining accurary
- Increase unit cost component

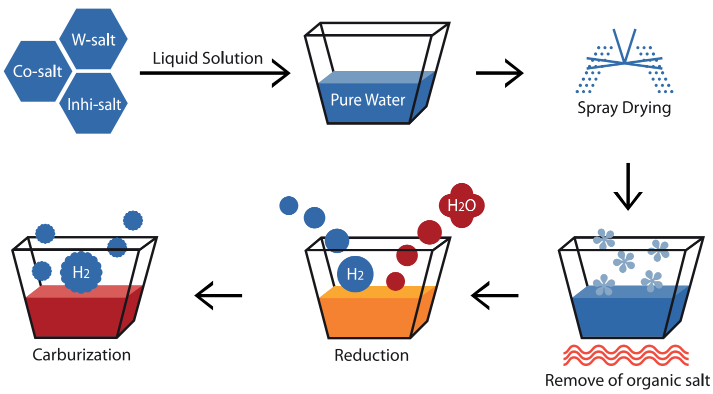
TIZ Nanotechnology Nanotechnologia TIZ



Spray Conversion Method

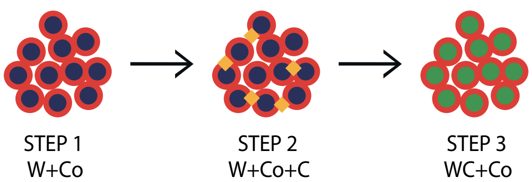
-Develop uniform WC-Co composite powder

-Achieve nano size WC-Co powder

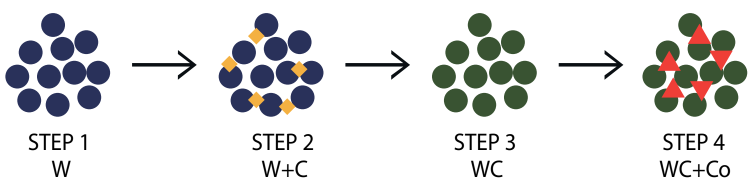


Uniform WC-Co Composite Powder

-Nanotech process

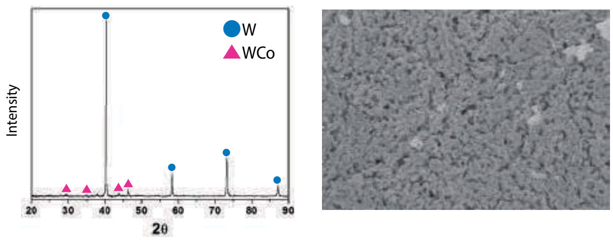


-General process

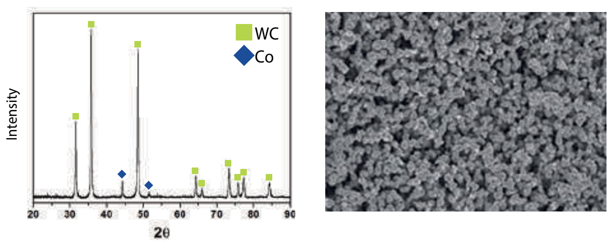


Uniform WC-Co Composite Powder

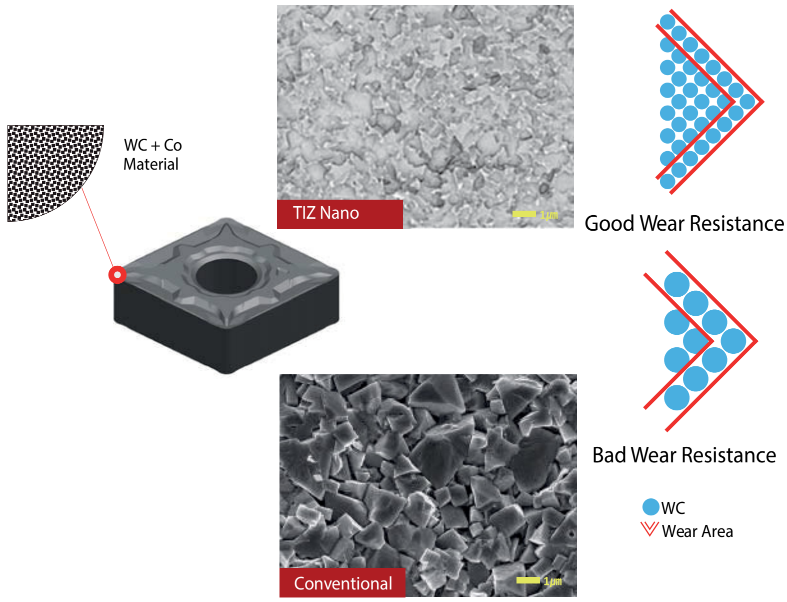
-W+Co powder



-WC+Co powder



Nano WC-Co Material



Material grades Gatunki materiałów

GRADE P405

MATERIAL GRADE: ULTRAFINE

COATING: AlTiN

- Excellent wear resistance in heat-resistant alloy & stainless steel machinining
- Suitable for high speed, continuous machining, increase productivity

<table>
<tr><th></th><th>01</th><th>05</th><th>10</th><th>15</th><th>20</th><th>25</th><th>30</th><th>35</th><th>40</th><th>45</th><th>50</th></tr>
<tr><td>P</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>M</td><td colspan="3">M05</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>K</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>H</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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GRADE P410

MATERIAL GRADE: ULTRAFINE

COATING: AlTiN

-Possible to apply speed, continous machining, increase productivity

-Excellent wear resistance build up edge

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<tr><th></th><th>01</th><th>05</th><th>10</th><th>15</th><th>20</th><th>25</th><th>30</th><th>35</th><th>40</th><th>45</th><th>50</th></tr>
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GRADE P415

MATERIAL GRADE: ULTRAFINE

COATING: TiAlN

- Great for deep depth of cut, high feed cutting in heat-resistant alloy & stainless steel machining
- Suitable for complex geometry machining, excellent toughness

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<tr><td>S</td><td></td><td></td><td></td><td></td><td colspan="4">S30</td><td></td><td></td><td></td></tr>
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GRADE P420

MATERIAL GRADE: ULTRAFINE

COATING: TiAlN

-Possible to apply with wide rande in heat-resistant alloy, stainless steel, steel machining

-Excellent wear resistance and toughness high efficiency

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<tr><th></th><th>01</th><th>05</th><th>10</th><th>15</th><th>20</th><th>25</th><th>30</th><th>35</th><th>40</th><th>45</th><th>50</th></tr>
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<tr><td>H</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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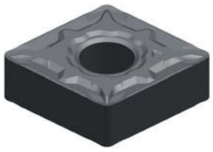
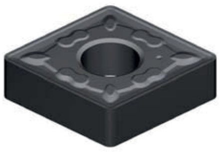
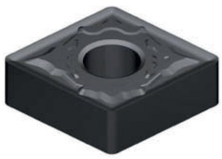
TURNING INSERT
PŁYTKI DO TOCZENIA

Chip breakers for negative insert Łamacze wiórów dla ujemnych płytek

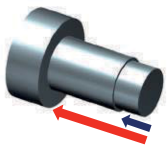
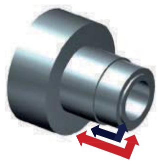
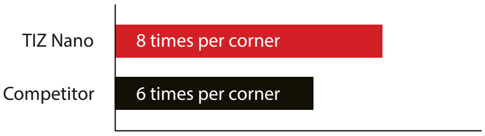
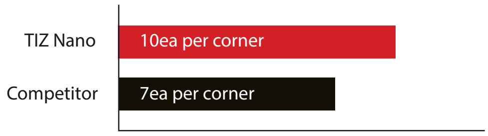
Chip Breaker	Chip Breaker Design		Features
C461 (Finishing)			- Optimized in finishing machining ISO S, M materials - Prevents B.U.E with sharp edge - Enhanced chip evacuation - High rake angle applied in side cutting edge (Minimize cutting forces and heat resistance)
C462 (Medium)			- Optimized in ISO S, M materials - Prevents B.U.E with sharp edge - Strong cutting edge - reduce boundary damage - Wide chip pocket (Stable chip evacuation)
C463 (Roughing)			- Optimized in roughing machining ISO S, M materials - Excellent for cutting edge strength - Designed for deep depth of cut (Excellent for deep depth of cut at high feed)
C464 (Medium)			- Optimized in medium machining ISO S, M materials - Prevents B.U.E with sharp edge - Sharp cutting edge & low cutting force - Stable chip pocket (Reduce force of chip evacuation)
C465 (Medium/Finishing)			- Universal chip breaker - Prevents B.U.E with sharp edge - Sharp cutting edge & low cutting force - Enhanced chip breaker (Excellent chip evacuation at Low feed, depth of cut)
C466 (Medium)			- Optimized in medium machining ISO S, M materials - Prevents B.U.E with sharp edge - Sharp edge & low cutting force - Stable chip pocket (Reduce force of chip evacuation)
C467 (Roughing)			Roughing) - Optimized in roughing machining ISO S, M materials - Excellent cutting edge strength - Designed for deep depth of cut (Excellent for deep depth of cut at high feed)
C468 (Finishing) G class			- Optimized in medium machining ISO S, M materials - Prevents B.U.E with sharp edge - Sharp edge & low cutting force - Waved cutting edge (Reduce cutting force)

Chip breakers for positive insert Łamacze wiórów dla dodatnich płytek

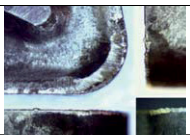
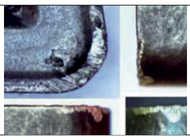
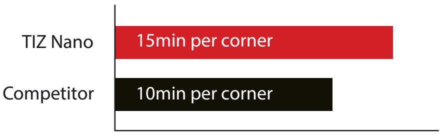
Chip Breaker	Chip Breaker Design		Features
C461 (Finishing)			- Optimized in finishing machining ISO S, M materials - Prevents B.U.E with sharp edge - Enhanced chip evacuation (Stable chip evacuation in Finishing)
C462 (Medium)			- Optimized in ISO S, M materials - Prevents B.U.E with sharp edge - Strong cutting edge - reduce boundary damage - Wide chip pocket (Stable chip evacuation)
C463 (Roughing)			- Optimized in roughing machining ISO S, M materials - Excellent cutting edge strength - Designed for deep depth of cut (Great for deep depth of cut at high feed)
C465 (Medium/Finishing)			- Universal chip Breaker - Prevents B.U.E with sharp edge - Sharp edge & low cutting force - Enhanced chip breaker (Excellent chip evacuation at Low feed/depth of cut)
C469 (Medium/Finishing) G/M class			- Optimized in ISO S, M materials Finishing and Medium - Prevents sharp edge adhesion - Enhanced chip evacuation - G class machining - G/M class (Selectable)

Case study Wyniki testów

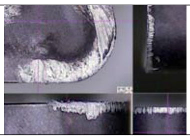
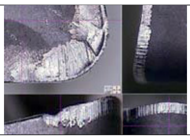
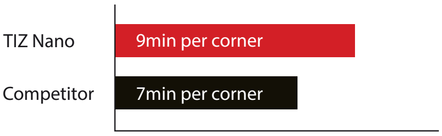
Internal/External test - Aerospace

Internal test - Inconel		Internal Test - Stainless steel	
	Machining Inconel - Workpiece : Inconel718 - Cutting conditions vc=60m/min, fn=0.15mm/rev, ap=1.5mm, wet - Item : CNMG120408-C461 P410		Facing complex (Stainless steel) - Workpiece : SUS304 - Cutting conditions vc=120m/min, fn=0.20mm/rev, ap=2.0mm, wet - Item : CNMG120408-C462 P410
			

External Test 1. (Aerospace, C263 Nimonic263)

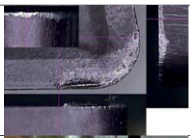
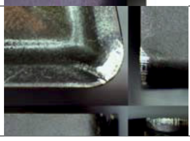
	C463 P410	Competitor	Aerospace Parts Flange Type Housing
Image			- Workpiece : nimonic263 (forging), max. dia 680mm - Cutting condition : vc75m/min, fn0.25mm/rev, ap1~2mm - Machining type : vertical, O.D, facing, wet - Item : CNMG120412-C463 P410
Tool life			
Result	Increased tool life 150%		

External Test 2. (Aerospace, Mixed_Inconel718+RENE)

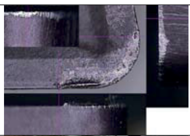
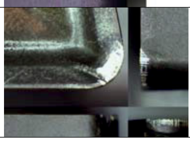
	C463 P410	Competitor	Aerospace Parts Flange Type Housing
Image			- Workpiece : Mixed (inconel718+RENE), max. dia 900mm - Cutting condition : vc32m/min, fn0.1mm/rev, ap0.45mm - Machining type : vertical, O.D, facing, wet - Item : CNMG120408-C462 P410
Tool life			
Result	Increased tool life 120%		

Case study Wyniki testów

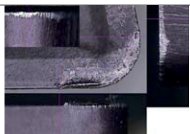
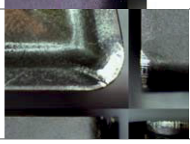
External Test 3. (Aerospace, RENE41)

	C466 P410	Competitor	Aerospace Parts_Seal-A/O, Trans
Image			- Workpiece : RENE41, max. dia 880mm - Cutting condition : vc32m/min, fn0.1mm/rev, ap0.45mm - Machining type : vertical, O.D, wet - Item : WNMG080408-C466 P410
Image			
Result	Better wear resistance		

External Test 4. (Aerospace, Mixed_Inconel718+RENE)

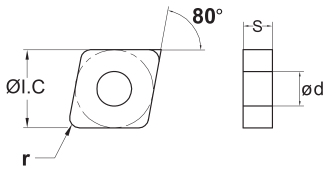
	C469 P410	Competitor	Aerospace Parts_Seal-A/O, Trans
Image			- Workpiece : mixed (inconel718+RENE), max. dia 880mm - Cutting condition : vc33m/min, fn0.1~0.15mm/rev, ap0.5mm - Machining type : vertical, facing, wet - Item : VCGT160408-C469 P410
Image			
Result	Excellent wear resistance in equal machining		

External Test 5. (Aerospace, Inconel718, Heat Treatment)

	C462 P410	Competitor	Aerospace Parts_Stack-Ring
Image			- Workpiece : inconel718, max. dia 495mm - Cutting condition : vc45m/min, fn0.15mm/rev, ap1.0mm - Machining type : vertical, O.D, wet - Item : DNMG150612-C462 P410
Image			
Result	Excellent wear resistance in equal machining		

NEGATIVE INSERTS PŁYTKI UJEMNE

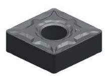
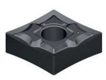
CN



	P405	P410	P415	P420
P				
M	●	●	◕	⊗
K				
N				
S	●	●	◕	⊗
H				

CNMG		L	I.C.	S	d
09	03	9.7	9.525	3.18	3.81
12	04	12.9	12.7	4.76	5.16

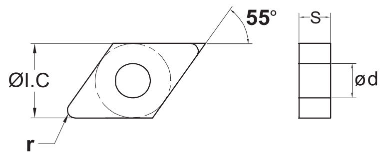
●	Ideal machining conditions Idealne warunki obróbki
◕	Normal machining conditions Normalne warunki obróbki
⊗	Unfavourable machining conditions Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	CNMG120404C461	0.4	0.12	1.20	0.06	0.24	○	●	○	●
		CNMG120408C461	0.8	0.12	1.20	0.12	0.32	○	●	○	●
	MEDIUM	CNMG120408C462	0.8	0.60	4.50	0.12	0.36	○	●	○	●
		CNMG120412C462	1.2	0.60	4.50	0.12	0.45	○	●	○	●
		CNMG120416C462	1.6	0.60	4.50	0.12	0.50	○	●	○	●
	ROUGH	CNMG120408C463	0.8	2.40	6.00	0.18	0.48	○	●	○	●
		CNMG120412C463	1.2	2.40	6.00	0.18	0.48	○	●	○	●
		CNMG120416C463	1.6	2.40	6.08	0.18	0.50	○	●	○	●
		CNMG190612C463	1.2	2.40	8.00	0.18	0.45	○	●	○	●
		CNMG190616C463	1.6	2.40	8.00	0.18	0.55	○	●	○	●
	MEDIUM	CNMG090304C461	0.4	0.10	1.00	0.06	0.20	○	●	○	●
		CNMG120404C464	0.4	0.50	3.00	0.10	0.22	○	●	○	●
		CNMG120408C464	0.8	0.50	3.00	0.12	0.30	○	●	○	●
	MEDIUM/FINISH	CNMG090308C465	0.8	1.2	4.0	0.25	0.40	○	●	○	●
	MEDIUM	CNMG120408C467	0.8	0.70	3.80	0.12	0.35	○	●	○	●
		CNMG120412C467	1.2	0.70	3.80	0.18	0.45	○	●	○	●
	FINISH	CNGG120402C468	0.2	0.30	3.00	0.08	0.14	○	●	○	●
		CNGG120404C468	0.4	0.30	3.00	0.08	0.20	○	●	○	●
		CNGG120408C468	0.8	0.30	3.00	0.08	0.40	○	●	○	●

●	Stocked item
○	Order made item

NEGATIVE INSERTS PŁYTKI UJEMNE

DN



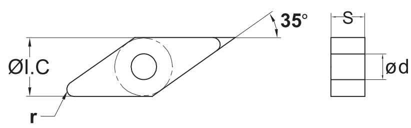
	P405	P410	P415	P420
P				
M	●	●	◑	✣
K				
N				
S	●	●	◑	✣
H				

DNMG		I.C.	S	d
11	04	9.525	4.76	5.16
15	04	12.7	4.76	5.16
15	06	12.7	6.35	5.16

● Ideal machining conditions / Idealne warunki obróbki
◑ Normal machining conditions / Normalne warunki obróbki
✣ Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape / Kształt płytki		Description / Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	DNMG150404C461	0.4	0.12	1.20	0.06	0.24	○	●	○	●
		DNMG150408C461	0.4	0.12	1.20	0.12	0.32	○	●	○	●
		DNMG150604C461	0.4	0.12	1.20	0.06	0.24	○	●	○	●
		DNMG150608C461	0.4	0.12	1.20	0.12	0.32	○	●	○	●
	MEDIUM	DNMG110408C462	0.8	0.60	3.00	0.12	0.40	○	●	○	●
		DNMG150408C462	0.8	0.60	4.00	0.12	0.40	○	●	○	●
		DNMG150412C462	1.2	0.60	4.00	0.12	0.45	○	●	○	●
	ROUGH	DNMG150408C463	0.8	2.40	4.50	0.18	0.45	○	●	○	●
		DNMG150412C463	1.2	2.40	4.50	0.18	0.45	○	●	○	●
		DNMG150608C463	0.8	2.40	4.50	0.18	0.45	○	●	○	●
		DNMG150612C463	1.2	2.40	4.50	0.18	0.45	○	●	○	●
	MEDIUM	DNMG150404C464	0.4	0.30	2.00	0.12	0.25	○	●	○	●
		DNMG150604C464	0.4	0.30	2.20	0.12	0.25	○	●	○	●
		DNMG150408C464	0.8	0.30	2.00	0.20	0.30	○	●	○	●
		DNMG150608C464	0.8	0.30	2.20	0.20	0.30	○	●	○	●
		DNMG150412C464	1.2	0.30	2.00	0.25	0.40	○	●	○	●
		DNMG150612C464	1.2	0.30	2.20	0.25	0.4	○	●	○	●

VN



	P405	P410	P415	P420
P				
M	●	●	◑	✣
K				
N				
S	●	●	◑	✣
H				

VNMG		I.C.	S	d
16	04	9.525	4.76	3.81

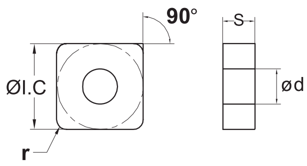
● Ideal machining conditions / Idealne warunki obróbki
◑ Normal machining conditions / Normalne warunki obróbki
✣ Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape / Kształt płytki		Description / Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	VNMG160404C461	0.4	0.12	1.20	0.06	0.24	○	●	○	●
		VNMG160408C461	0.8	0.40	3.50	0.18	0.40	○	●	○	●
	MEDIUM	VNMG160404C462	0.4	0.48	3.20	0.12	0.32	○	●	○	●
		VNMG160408C462	0.8	0.60	3.20	0.12	0.36	○	●	○	●

● Stocked item
○ Order made item

NEGATIVE INSERTS PŁYTKI UJEMNE

SN



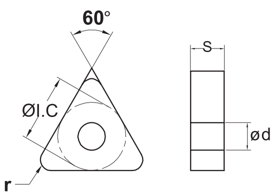
	P405	P410	P415	P420
P				
M	●	●	◒	✤
K				
N				
S	●	●	◒	✤
H				

	SNMG	I.C.	S	d
09	03	9.525	3.18	3.81
12	04	12.7	4.76	5.16
19	06	19.05	6.35	7.93

● Ideal machining conditions / Idealne warunki obróbki
◒ Normal machining conditions / Normalne warunki obróbki
✤ Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	SNMG090304C461	0.4	0.12	1.20	0.06	0.20	○	●	○	●
	FINISH	SNMG120404C461	0.4	0.12	1.20	0.06	0.24	○	●	○	●
	FINISH	SNMG120408C461	0.8	0.12	1.20	0.12	0.32	○	●	○	●
	MEDIUM	SNMG120408C462	0.8	0.60	5.00	0.12	0.36	○	●	○	●
	MEDIUM	SNMG120412C462	1.2	0.60	5.00	0.12	0.45	○	●	○	●
	ROUGH	SNMG120408C463	0.8	2.40	6.00	0.18	0.44	○	●	○	●
	ROUGH	SNMG120412C463	1.2	2.50	5.50	0.30	0.60	○	●	○	●
	ROUGH	SNMG190612C463	1.2	2.40	8.00	0.18	0.48	○	●	○	●
	ROUGH	SNMG190616C463	1.6	2.40	8.00	0.18	0.55	○	●	○	●
	MEDIUM/FINISH	SNMG090308C465	0.8	1.20	4.00	0.25	0.40	○	●	○	●

TN



	P405	P410	P415	P420
P				
M	●	●	◒	✤
K				
N				
S	●	●	◒	✤
H				

	TNMG	I.C.	S	d
16	04	9.525	4.76	3.81

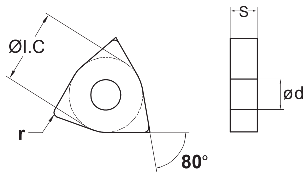
● Ideal machining conditions / Idealne warunki obróbki
◒ Normal machining conditions / Normalne warunki obróbki
✤ Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	TNMG160404C461	0.4	0.12	1.20	0.06	0.24	○	●	○	●
	FINISH	TNMG160408C461	0.8	0.12	1.20	0.12	0.32	○	●	○	●
	MEDIUM	TNMG160408C462	0.8	0.50	3.00	0.14	0.35	○	●	○	●
	MEDIUM	TNMG160412C462	1.2	0.60	4.00	0.16	0.50	○	●	○	●
	ROUGH	TNMG160408C463	0.8	2.40	4.30	0.18	0.44	○	●	○	●
	ROUGH	TNMG160412C463	1.2	2.40	4.30	0.18	0.45	○	●	○	●

● Stocked item
○ Order made item

NEGATIVE INSERTS PŁYTKI UJEMNE

WN



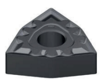
	P405	P410	P415	P420
P				
M	●	●	◐	✱
K				
N				
S	●	●	◐	✱
H				

WNMG		I.C.	S	d
06	04	9.525	4.76	3.81
08	04	12.7	4.76	5.16

● Ideal machining conditions
Idealne warunki obróbki

◐ Normal machining conditions
Normalne warunki obróbki

✱ Unfavourable machining conditions
Niekorzystne warunki obróbki

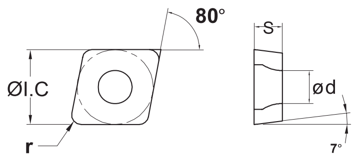
Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	WNMG060404C461	0.4	0.60	2.00	0.12	0.25	○	●	○	●
	FINISH	WNMG060408C461	0.8	0.60	2.00	0.18	0.40	○	●	○	●
	FINISH	WNMG080404C461	0.4	0.60	1.60	0.12	0.25	○	●	○	●
	FINISH	WNMG080408C461	0.8	0.12	1.20	0.12	0.32	○	●	○	●
	FINISH	WNMG080412C461	1.2	0.12	1.20	0.12	0.45	○	●	○	●
	MEDIUM	WNMG060408C462	0.8	0.60	2.50	0.12	0.36	○	●	○	●
	MEDIUM	WNMG080404C462	0.4	0.12	1.20	0.10	0.30	○	●	○	●
	MEDIUM	WNMG080412C462	1.2	0.60	3.20	0.18	0.48	○	●	○	●
	ROUGH	WNMG080408C463	0.8	2.40	3.20	0.18	0.35	○	●	○	●
	ROUGH	WNMG080412C463	1.2	2.40	3.20	0.18	0.48	○	●	○	●
	MEDIUM	WNMG080408C466	0.8	0.30	2.50	0.15	0.30	○	●	○	●
	ROUGH	WNMG080408C467	0.8	0.60	3.50	0.12	0.35	○	●	○	●
	ROUGH	WNMG080412C467	1.2	0.60	3.50	0.12	0.40	○	●	○	●

● Stocked item

○ Order made item

POSITIE INSERTS PŁYTKI DODATNIE

CC



	P405	P410	P415	P420
P				
M	●	●	Normal	Unfavourable
K				
N				
S	●	●	Normal	Unfavourable
H				

CC**		I.C.	S	d
06	02	6.35	2.38	2.8
09	T3	9.525	3.97	4.4
12	04	12.7	4.76	5.5

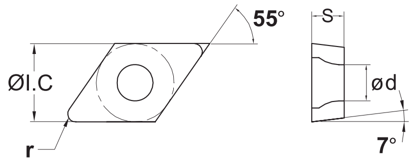
● Ideal machining conditions / Idealne warunki obróbki
Normal machining conditions / Normalne warunki obróbki
Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	CCMT060202C461	0.2	0.07	1.35	0.05	0.09	○	●	○	●
	FINISH	CCMT060204C461	0.4	0.12	1.35	0.06	0.15	○	●	○	●
	FINISH	CCMT060208C461	0.8	0.16	1.35	0.08	0.18	○	●	○	●
	FINISH	CCMT09T302C461	0.2	0.10	1.60	0.05	0.12	○	●	○	●
	FINISH	CCMT09T304C461	0.4	0.13	1.60	0.07	0.18	○	●	○	●
	FINISH	CCMT09T308C461	0.8	0.18	1.60	0.10	0.24	○	●	○	●
	FINISH	CCMT120404C461	0.4	0.17	1.92	0.08	0.22	○	●	○	●
	MEDIUM	CCMT060204C462	0.4	0.24	1.92	0.07	0.15	○	●	○	●
	MEDIUM	CCMT060208C462	0.8	0.28	1.92	0.10	0.18	○	●	○	●
	MEDIUM	CCMT09T304C462	0.4	0.30	2.50	0.10	0.20	○	●	○	●
	MEDIUM	CCMT09T308C462	0.8	0.60	2.50	0.12	0.25	○	●	○	●
	MEDIUM	CCMT120404C462	0.4	0.35	3.00	0.11	0.22	○	●	○	●
	MEDIUM	CCMT120408C462	0.8	0.50	3.00	0.15	0.30	○	●	○	●
	MEDIUM/FINISH	CCGT060202C465	0.2	0.12	1.30	0.02	0.10	○	●	○	●
	MEDIUM/FINISH	CCGT060204C465	0.4	0.40	1.60	0.10	0.25	○	●	○	●
	MEDIUM/FINISH	CCGT09T302C465	0.2	0.08	1.30	0.03	0.10	○	●	○	●
	MEDIUM/FINISH	CCGT09T304C465	0.4	0.40	2.00	0.10	0.20	○	●	○	●
	MEDIUM/FINISH	CCGT09T308C465	0.8	0.60	2.40	0.14	0.30	○	●	○	●
	MEDIUM/FINISH	CCGT120404C465	0.4	0.40	3.50	0.10	0.20	○	●	○	●

●	Stocked item
○	Order made item

POSITIE INSERTS PŁYTKI DODATNIE

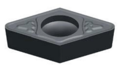
DC



	P405	P410	P415	P420
P				
M	●	●	◐	✤
K				
N				
S	●	●	◐	✤
H				

DC**		I.C.	S	d
07	02	6.35	2.38	2.8
11	T3	9.525	3.97	4.4

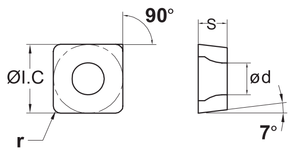
● Ideal machining conditions / Idealne warunki obróbki
◐ Normal machining conditions / Normalne warunki obróbki
✤ Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	DCMT070202C461	0.2	0.08	1.20	0.04	0.10	○	●	○	●
	FINISH	DCMT070204C461	0.4	0.10	1.20	0.06	0.15	○	●	○	●
	FINISH	DCMT11T302C461	0.2	0.10	1.60	0.05	0.12	○	●	○	●
	FINISH	DCMT11T304C461	0.4	0.13	1.80	0.10	0.20	○	●	○	●
	FINISH	DCMT11T308C461	0.8	0.18	1.80	0.10	0.24	○	●	○	●
	MEDIUM	DCMT070204C462	0.4	0.23	1.20	0.07	0.15	○	●	○	●
	MEDIUM	DCMT070208C462	0.8	0.40	1.20	0.10	0.20	○	●	○	●
	MEDIUM	DCMT11T304C462	0.4	0.35	2.20	0.10	0.20	○	●	○	●
	MEDIUM	DCMT11T308C462	0.8	0.60	2.50	0.12	0.25	○	●	○	●
	MEDIUM	DCMT11T312C462	1.2	0.72	2.20	0.14	0.32	○	●	○	●
	ROUGH	DCMT11T308C463	0.8	1.20	3.00	0.14	0.28	○	●	○	●
	ROUGH	DCMT11T312C463	1.2	1.40	3.00	0.17	0.35	○	●	○	●
	MEDIUM/FINISH	DCGT070202C465	0.2	0.12	1.30	0.02	0.10	○	●	○	●
	MEDIUM/FINISH	DCGT070204C465	0.4	0.60	2.20	0.10	0.22	○	●	○	●
	MEDIUM/FINISH	DCGT11T301C465	0.1	0.12	0.80	0.02	0.05	○	●	○	●
	MEDIUM/FINISH	DCGT11T302C465	0.2	0.12	1.30	0.02	0.05	○	●	○	●
	MEDIUM/FINISH	DCGT11T304C465	0.4	0.40	2.50	0.10	0.22	○	●	○	●
	MEDIUM/FINISH	DCGT11T308C465	0.8	0.40	2.50	0.14	0.30	○	●	○	●

● Stocked item
○ Order made item

POSITIE INSERTS PŁYTKI DODATNIE

SC



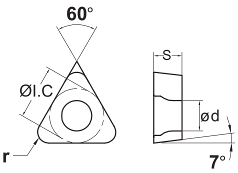
	P405	P410	P415	P420
P				
M	●	●	◐	✠
K				
N				
S	●	●	◐	✠
H				

SC**		I.C.	S	d
09	T3	9.525	3.97	4.4

● Ideal machining conditions / Idealne warunki obróbki
◐ Normal machining conditions / Normalne warunki obróbki
✠ Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	SCMT09T304C461	0.4	0.13	1.60	0.07	0.18	○	●	○	●
	FINISH	SCMT09T308C461	0.8	0.18	1.60	0.10	0.24	○	●	○	●
	MEDIUM	SCMT09T304C462	0.4	0.28	2.40	0.10	0.20	○	●	○	●
	MEDIUM	SCMT09T308C462	0.8	0.60	2.40	0.12	0.24	○	●	○	●

TC



	P405	P410	P415	P420
P				
M	●	●	◐	✠
K				
N				
S	●	●	◐	✠
H				

TCMT		I.C.	S	d
06	T1	3.97	1.98	2.2
09	02	5.56	2.38	2.5
11	02	6.35	3.18	2.8
11	03	6.35	3.18	2.8
16	T3	9.525	3.97	4.4

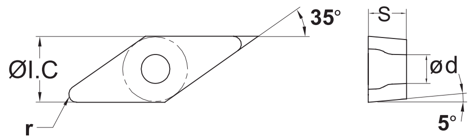
● Ideal machining conditions / Idealne warunki obróbki
◐ Normal machining conditions / Normalne warunki obróbki
✠ Unfavourable machining conditions / Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	TCMT06T102C461	0.2	0.07	1.20	0.05	0.09	○	●	○	●
	FINISH	TCMT06T104C461	0.4	0.10	1.20	0.06	0.15	○	●	○	●
	FINISH	TCMT06T108C461	0.8	0.13	1.20	0.07	0.18	○	●	○	●
	FINISH	TCMT090202C461	0.2	0.07	1.35	0.05	0.10	○	●	○	●
	FINISH	TCMT090204C461	0.4	0.12	1.35	0.06	0.15	○	●	○	●
	FINISH	TCMT110204C461	0.4	0.12	1.35	0.06	0.15	○	●	○	●
	FINISH	TCMT110302C461	0.2	0.07	1.35	0.05	0.10	○	●	○	●
	FINISH	TCMT110304C461	0.4	0.12	1.35	0.06	0.15	○	●	○	●
	FINISH	TCMT110308C461	0.8	0.16	1.35	0.08	0.21	○	●	○	●
	FINISH	TCMT16T304C461	0.4	0.15	1.60	0.08	0.18	○	●	○	●
	MEDIUM	TCMT090204C462	0.2	0.23	1.80	0.07	0.15	○	●	○	●
	MEDIUM	TCMT090208C462	0.8	0.46	1.80	0.10	0.18	○	●	○	●
	MEDIUM	TCMT110308C462	0.8	0.50	2.00	0.11	0.21	○	●	○	●
	MEDIUM	TCMT16T304C462	0.4	0.30	2.50	0.10	0.18	○	●	○	●
	MEDIUM	TCMT16T312C462	1.2	0.80	2.50	0.14	0.32	○	●	○	●
	MEDIUM/FINISH	TCMT16T308C465	0.8	0.60	3.50	0.14	0.35	○	●	○	●

● Stocked item
○ Order made item

POSITIE INSERTS PŁYTKI DODATNIE

VB



	P405	P410	P415	P420
P				
M	●	●	◐	✚
K				
N				
S	●	●	◐	✚
H				

VB**	I.C.	S	d
11 03	6.35	3.18	2.8
16 04	9.525	4.76	4.4

● Ideal machining conditions
Idealne warunki obróbki

◐ Normal machining conditions
Normalne warunki obróbki

✚ Unfavourable machining conditions
Niekorzystne warunki obróbki

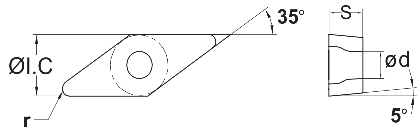
Insert shape / Kształt płytki		Description / Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	VBMT110302C461	0.2	0.07	1.35	0.05	0.10	○	●	○	●
	FINISH	VBMT110304C461	0.4	0.12	1.35	0.06	0.15	○	●	○	●
	FINISH	VBMT110308C461	0.8	0.16	1.35	0.08	0.21	○	●	○	●
	FINISH	VBMT160404C461	0.4	0.12	1.45	0.06	0.16	○	●	○	●
	FINISH	VBMT160408C461	0.8	0.17	1.45	0.08	0.22	○	●	○	●
	MEDIUM	VBMT160404C462	0.4	0.28	2.20	0.08	0.16	○	●	○	●
	MEDIUM	VBMT160408C462	0.8	0.54	2.20	0.11	0.22	○	●	○	●
	MEDIUM	VBMT160412C462	1.2	0.65	2.20	0.13	0.26	○	●	○	●
	ROUGH	VBMT160412C463	1.2	1.30	2.70	0.16	0.30	○	●	○	●
	FINISH	VBGT160404C461	0.4	0.12	1.45	0.06	0.16	○	●	○	●
	MEDIUM/FINISH	VBGT160404C469	0.4	0.20	1.60	0.05	0.12	○	●	○	●
	MEDIUM/FINISH	VBGT160408C469	0.8	0.20	1.60	0.08	0.25	○	●	○	●
	MEDIUM/FINISH	VBGT160412C469	1.2	0.20	1.60	0.10	0.30	○	●	○	●

● Stocked item

○ Order made item

POSITIE INSERTS PŁYTKI DODATNIE

VC



	P405	P410	P415	P420
P				
M	●	●	◐	✖
K				
N				
S	●	●	◐	✖
H				

VCMT		I.C.	S	d
11	03	6.35	3.18	2.8
16	04	9.525	4.76	4.4

● Ideal machining conditions
Idealne warunki obróbki

◐ Normal machining conditions
Normalne warunki obróbki

✖ Unfavourable machining conditions
Niekorzystne warunki obróbki

Insert shape Kształt płytki		Description Oznaczenie	r	a_p min	a_p max	f_z min	f_z max	P405	P410	P415	P420
	FINISH	VCMT110304C461	0.2	0.12	1.50	0.06	0.15	○	●	○	●
	FINISH	VCMT160404C461	0.4	0.12	1.50	0.06	0.16	○	●	○	●
	FINISH	VCMT160408C461	0.8	0.16	1.60	0.10	0.22	○	●	○	●
	MEDIUM	VCMT110304C462	0.4	0.35	2.40	0.12	0.20	○	●	○	●
	MEDIUM	VCMT160404C465	0.4	0.60	3.20	0.10	0.25	○	●	○	●
	MEDIUM	VCMT160408C465	0.8	0.60	3.20	0.14	0.35	○	●	○	●
	MEDIUM/FINISH	VCGT110302C465	0.4	0.12	1.30	0.02	0.10	○	●	○	●
	MEDIUM/FINISH	VCGT110304C465	0.2	0.40	2.50	0.10	0.20	○	●	○	●
	MEDIUM/FINISH	VCGT160402C465	0.2	0.12	1.30	0.03	0.10	○	●	○	●
	MEDIUM/FINISH	VCGT160404C465	0.4	0.40	3.20	0.10	0.25	○	●	○	●
	MEDIUM/FINISH	VCGT160408C465	0.8	0.40	3.20	0.14	0.30	○	●	○	●

●	Stocked item
○	Order made item

GROOVING INSERT
PŁYTKI DO ROWKOWANIA

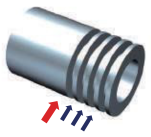
CHIP BREAKERS ŁAMACZE WIÓRÓW

Chip Breaker	Chip Breaker Design	Features
C470 (light cutting)		Sharp edge & low cutting force - Machining type : grooving / parting off - Features : low cutting force (low-load machining) - Application : optimized in ISO S, M materials
C471 (multi)		Various machining type & excellent tool life & chip evacuation - Machining type : grooving / turning / parting off - Features : excellent chip evacuation - Application : optimized in all materials
C472 (light cutting)		Sharp cutting edge & Improved chip control - Machining type : grooving / parting off - Features : low cutting force / excellent chip control - Application : optimized in ISO S, M materials
C473 (radius type profile machining)		Various machining type & excellent tool life & chip evacuation - Machining type : grooving / profiling - Features : excellent chip evacuation - Application : optimized in all materials

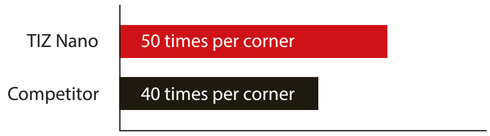
Case study Wyniki testów

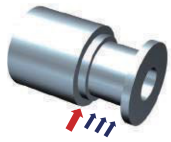
Internal/External test - Aerospace

Internal test - Inconel

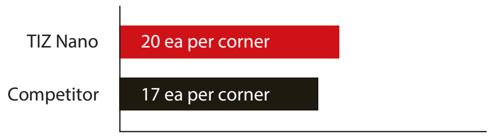


Grooving machining (inconel)
- Workpiece : inconel718
- Cutting conditions
vc=45m/min, fn=0.1mm/rev,
ap=5.0mm, wet
- Item : CED02004C470P410

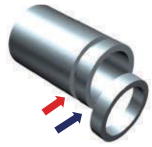




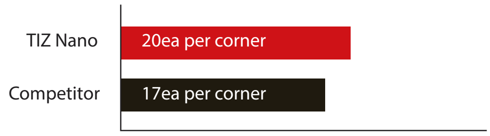
Grooving machining (Inconel)
- Workpiece : Inconel718
- Cutting conditions
vc=50m/min, fn=0.1mm/rev,
ap=6.0mm, wet
- Item : CED02004C470P410

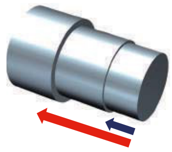


Internal Test - Stainless steel

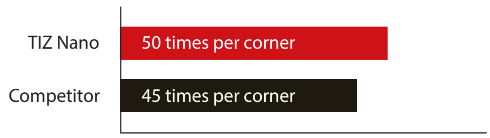


Cut-off machining (stainless steel)
- Workpiece : SUS316
- Cutting conditions
vc=120m/min, fn=0.12mm/rev,
ap=4.0mm, wet
- Item : CED02004C471P410

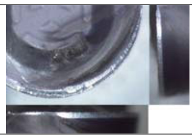
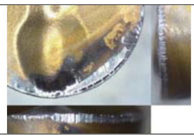
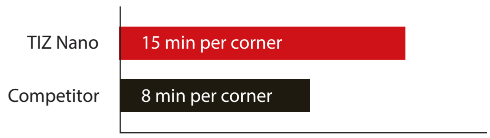




O.D. machining (Stainless Steel)
- Workpiece : SUS316
- Cutting conditions
vc=100m/min, fn=0.15mm/rev,
ap=1.0mm, wet
- Item : CED02004C471P410



External Test 1. (Aerospace, Inconel718)

	C471 P410	Competitor	Aerospace Parts Flange Type Housing
Image 8 min			- Workpiece : inconel718, max. dIA 570mm - Cutting condition : vc45m/min, fn0.1mm/rev, ap2.0mm - Machining type : O.D, facing, profiling, wet - Item : CED02525C473P410
Tool life			
Result	Increased tool life 180%		

Case study Wyniki testów

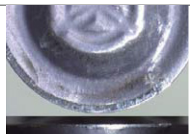
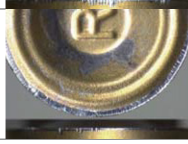
External Test 2. (Aerospace, Inconel718)

	C470 P405	Competitor	Aerospaceparts Case, HPT STTR
Image 10min			- Workpiece : inconel718, max. dia 680mm - Cutting condition : vc35m/min, fn0.15mm/rev, ap5~8mm - Machining type : vertical, O.D, grooving, shouldering, wet - Item : PED03008C470P405
Image 10min			
Result	Excellent wear resistance and toughness		

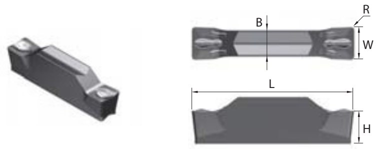
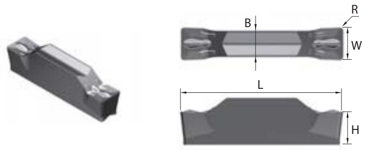
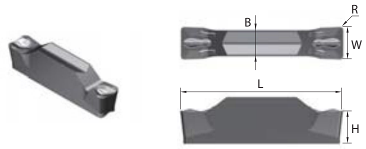
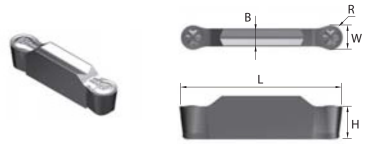
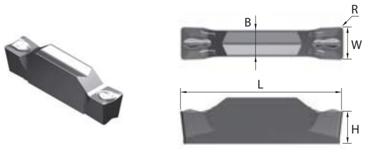
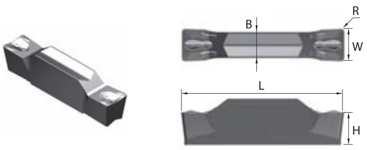
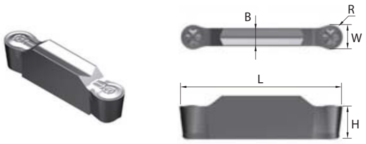
External Test 3. (Aerospace, Inconel718)

	C473 P405	Competitor	Aerospaceparts Flange Type Housing
Image 8min			- Workpiece : inconel718, max. dia 570mm - Cutting condition : vc60m/min, fn0.12mm/rev, ap2.0mm - Machining type : O.D, facing, profiling, wet - Item : CED02525C473P405
Tool life	TIZ Nano: 15 times per corner Competitor: 15 times per corner		
Result	Excellent wear resistance		

External Test 4. (Aerospace, Inconel718)

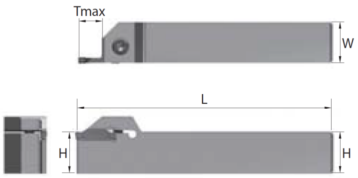
	C462 P410	Competitor	Aerospaceparts Case, Comp AFT Inner STG
Image 13 min			- Workpiece : inconel718, max. dia 542mm - Cutting condition : vc40m/min, fn0.15mm/rev, ap0.7mm - Machining type : vertical, O.D, facing, profiling, wet - Item : CED02525C473P410
Image 7min			
Result	Excellent wear resistance and toughness		

Grooving inserts Płytki do rowkowania

Insert shape / Kształt płytki	Class	Description / Oznaczenie	Dimensions (mm) W	R	B	L	H	P405	P410	P420	Cutting condition (mm/rev)
	MOLD CLASS	CFDM3004C470	3.0	0,40	2.2	20	4.00	○	●	○	0.05 ~ 0.20
		CGDM4004C470	4.0	0,40	3.2	20	4.00	○	●	○	0.05 ~ 0.20
		CGDM4008C470	4.0	0,80	3.2	20	4.00	○	●	○	0.05 ~ 0.25
		CHDM5002C470	5.0	0,20	4.0	25	4.85	○	●	○	0.05 ~ 0.12
		CHDM5008C470	5.0	0,80	4.0	25	4.85	○	●	○	0.05 ~ 0.25
		CFDM3004C471	3.0	0,40	2.2	20	4.00	○	●	○	0.05 ~ 0.25
		CGDM4004C471	4.0	0,40	3.2	20	4.00	○	●	○	0.05 ~ 0.25
		CGDM4008C472	4.0	0,80	3.2	20	4.00	○	●	○	0.05 ~ 0.20
		CHDM5008C472	5.0	0,80	4.0	25	4.85	○	●	○	0.05 ~ 0.25
		PFDM3015C473	3.0	1,50	2.2	20	4.00	○	●	○	0.05 ~ 0.20
	GRINDING CLASS	CBDG2002C470	2.0	0,20	1.7	20	3.70	○	●	○	0.03 ~ 0.12
		CBDG2004C470	2.0	0,40	1.7	20	3.70	○	●	○	0.05 ~ 0.20
		CEDG2708C470	2.7	0,80	2.2	20	4.00	○	●	○	0.05 ~ 0.25
		CFDG3004C470	3.0	0,40	2.2	20	4.00	○	●	○	0.05 ~ 0.20
		CFDG3008C470	3.0	0,80	2.2	20	4.00	○	●	○	0.05 ~ 0.25
		CGDG4004C470	4.0	0,40	3.2	20	4.00	○	●	○	0.05 ~ 0.20
		CGDG4008C470	4.0	0,80	3.2	20	4.00	○	●	○	0.05 ~ 0.25
		CHDG5008C470	5.0	0,80	4.0	25	4.85	○	●	○	0.05 ~ 0.25
		CKDG6002C470	6.0	0,20	5.0	25	4.85	○	●	○	0.03 ~ 0.12
		CKDG6004C470	6.0	0,40	5.0	25	4.85	○	●	○	0.05 ~ 0.20
		CKDG6008C470	6.0	0,80	5.0	25	4.85	○	●	○	0.05 ~ 0.25
		CLDG8004C470	8.0	0,40	6.0	30	7.50	○	●	○	0.05 ~ 0.20
		CLDG8008C470	8.0	0,80	6.0	30	7.50	○	●	○	0.05 ~ 0.25
		CLDG8012C470	8.0	1,20	6.0	30	7.50	○	●	○	0.05 ~ 0.30
		CHDG5002C472	5.0	0,20	4.0	25	4.85	○	●	○	0.03 ~ 0.12
		CHDG5004C472	5.0	0,40	4.0	25	4.85	○	●	○	0.05 ~ 0.20
		CHDG5008C472	5.0	0,80	4.0	25	4.85	○	●	○	0.05 ~ 0.25
		PFDG3015C473	3.0	1,50	2.2	20	4.00	○	●	○	0.05 ~ 0.20
		PHDG5025C473	5.0	2,50	4.0	25	4.85	○	●	○	0.05 ~ 0.25
		PKDG6030C473	6.0	3,00	5.0	25	4.85	○	●	○	0.05 ~ 0.25
		PLDG8040C473	8.0	4,00	6.0	30	7.50	○	●	○	0.05 ~ 0.30

●	Stocked item
○	Order made item

Grooving holders Narzędzia do rowkowania

External holder Narzędzie do obróbki zewnętrznej	Description Oznaczenie	Dimensions (mm)				
		SEAT SIZE	H	W	L	TMAX
	QEDR/L202012509	2.0	20	20	125	9
	QEDR/L202012513	2.0	20	20	125	13
	QEDR/L252515009	2.0	25	25	150	9
	QEDR/L252515013	2.0	25	25	150	13
	QEDR/L252515015	2.0	25	25	150	15
	QEDR/L202012009	3.0 (2.7)	20	20	120	9
	QEDR/L202012011	3.0 (2.7)	20	20	120	11
	QEDR/L252515009	3.0 (2.7)	25	25	150	9
	QEDR/L252515011	3.0 (2.7)	25	25	150	11
	QEDR/L252515015	3.0 (2.7)	25	25	150	15
	QEDR/L253215015	3.0 (2.7)	32	25	150	15
	QEDR/L253215020	3.0 (2.7)	32	25	150	20
	QEDR/L202012511	4.0	20	20	125	11
	QEDR/L252515011	4.0	25	25	150	11
	QEDR/L253215015	4.0	32	25	150	15
	QEDR/L253215020	4.0	32	25	150	20
	QEDR/L253215015	5.0	32	25	150	15
	QEDR/L253215020	5.0	32	25	150	20
	QEDR/L323217020	5.0	32	32	170	20
	QEDR/L253215025	5.0	32	25	150	25
	QEDR/L252515020	6.0	25	25	150	20
	QEDR/L253215020	6.0	32	25	150	20
	QEDR/L323217020	6.0	32	32	170	20
	QEDR/L323217030	8.0	32	32	170	30

*Holder is specially designed according to customer order.

IMPLEMENTS

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