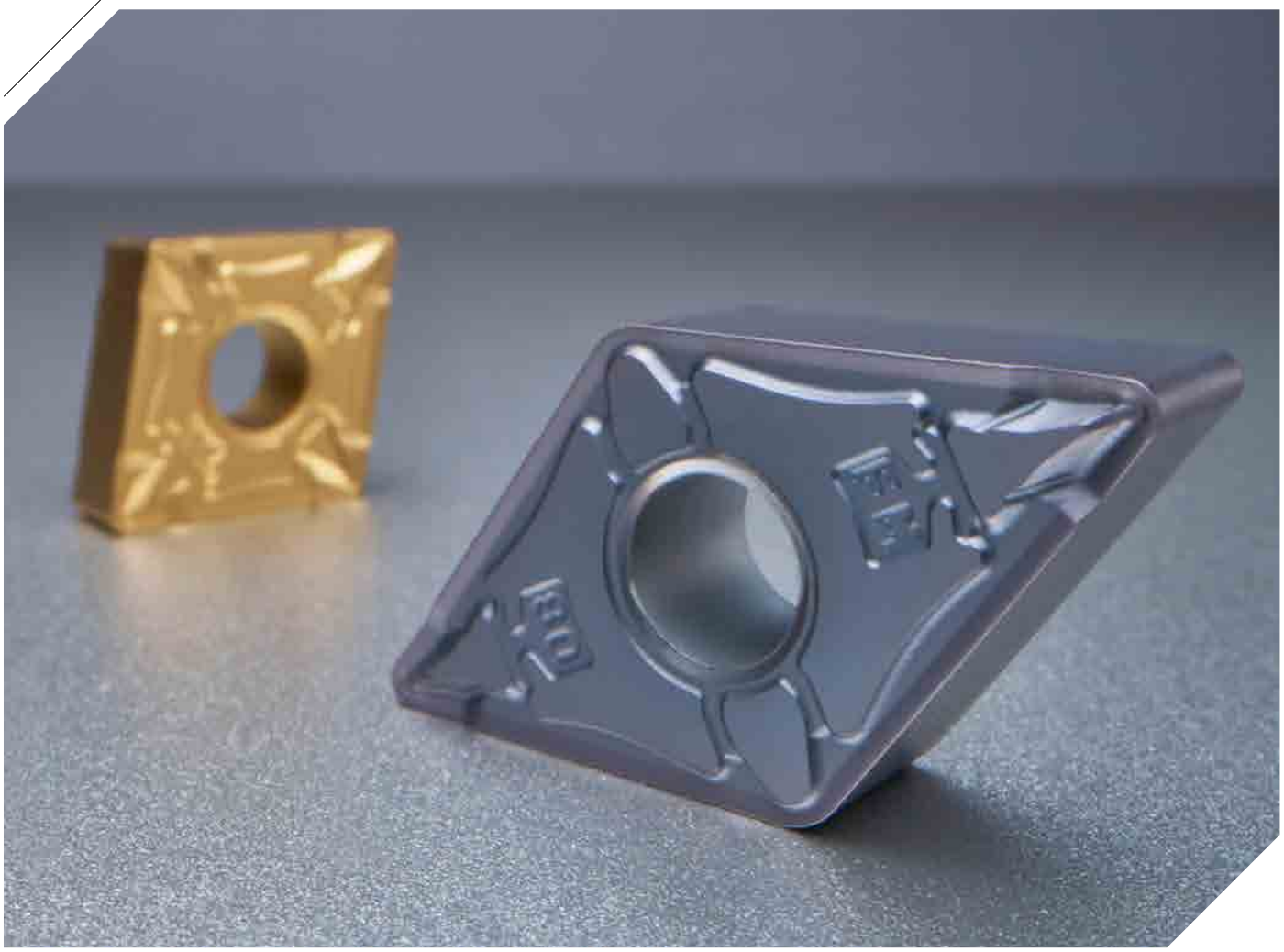
KORLOY TECH-NEWS

FM Chip Breaker

Negative

Negative Turning Insert for Stainless steel (enhanced chip control in finishing)

- Excellent tool life improvement through optimized cutting edge and anti-built-up edge technology
- Securing stable chip management with a side V-shaped cutting edge and concave projection design



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Negative Turning Insert for Stainless steel
(enhanced chip control in finishing)

FM Chip Breaker (Negative)

Stainless steel, known for its excellent toughness and corrosion resistance, is widely used in various industries such as aerospace and automotive. However, it is considered to be a hard-to-machine material since the cutting process often causes severe work hardening, chip adhesion, and high shear resistance, leading to issues such as tool wear, reduced tool life, and chip entanglement. As a result, precise techniques and optimized tool selection are essential for machining stainless steel.

KORLOY has launched the FM chip breaker, featuring an optimized cutting edge design and advanced anti-welding technology for finishing stainless steel. This innovation significantly improves tool life and ensures stable chip control.

The **FM chip breaker** maximizes chip management during low depth-of-cut and low feed machining with its side V-shaped cutting edge and concave projection design. The anti-welding suppression geometry on the bottom dramatically enhances tool life when machining stainless steel. In addition, due to its high manufacturing quality, it offers outstanding dimensional accuracy.

Furthermore, the **FM chip breaker** is also an optimal solution for machining difficult-to-cut materials. By applying a variable land design to secure rigidity at the vulnerable engagement boundary, it effectively prevents chipping and breakage, simultaneously achieving stable tool life and an excellent surface finish.

» Significantly improved tool life through advanced anti-adhesion technology

- Delays adhesion due to the optimized cutting edge
- Geometry designed to suppress adhesion propagation

» Superior dimensional accuracy and surface finish

- Minimized variation between corners through high manufacturing quality
- Strengthened cutting edge by increasing rigidity at the engagement boundary

» Stable chip control in the finishing range

- Optimized chip breaking with a side V-shaped cutting edge
- Smooth chip evacuation due to the concave projection design

» Maximized heat dissipation to reduce thermal load

- Optimized cutting edge geometry for coolant inflow (coolant guide)

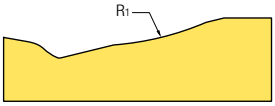
Chip breaker features

FM chip breaker (for finishing)

- Tool life improved due to optimized cutting edge that delays adhesion and a geometry that suppresses adhesion spreading.
- Stable chip management in the finishing area with a side V-shaped cutting edge and concave projection structure
- Increased chipping and breakage resistance at the engagement boundary by increasing rigidity at this section
- Maximized heat dissipation through an optimized cutting edge geometry for coolant inflow (coolant guide)

Concave projection

- Prevents chip entanglement between the workpiece and the tool through smooth chip evacuation

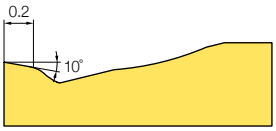


Side V-shaped cutting edge

- Ensures stable chip control even in the challenging low-feed/low-depth-of-cut range

Optimized cutting edge & geometry for suppressing adhesion propagation

- Delays in adhesion occurrence
- Suppression of adhesion spreading



Variable land, increased rigidity at the engagement boundary

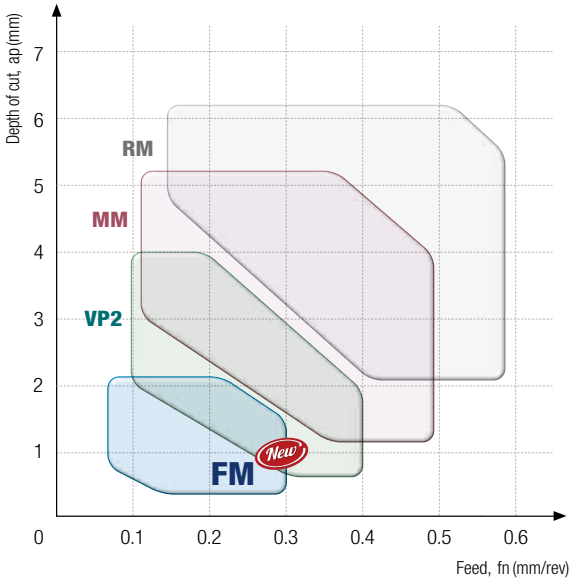
- Prevents from chipping/breakage at the boundary
- Excellent surface finish due to enhanced cutting edge durability

Optimized cutting edge geometry for coolant inflow (coolant guide)

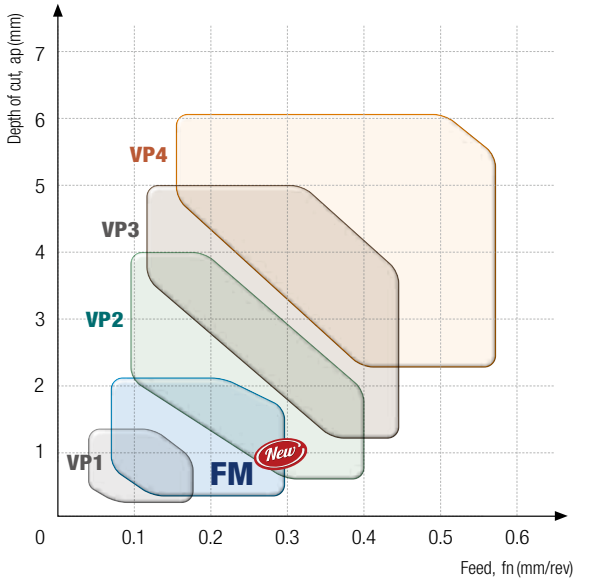
- Reduced thermal load by maximizing heat dissipation

Application range

M Stainless steel



S HRSA



Recommended cutting conditions

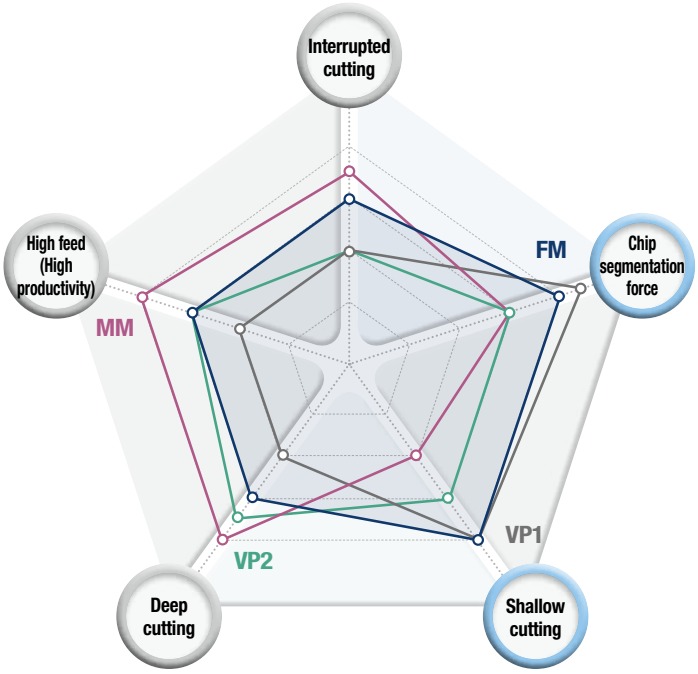
Workpiece					Specific cutting force Kc1 (N/mm^2)	Brinell hardness (HB)	Grade					Chip breaker	
							PVD				CVD		
ISO	Workpiece material		ISO	AISI			SPC810	PC8105	PC8110	PC5300	SNC805	FM	
							vc (m/min)					fn (mm/rev)	ap (mm)
M	Austenitic	C≤0.08%, Cr 18~20%, Ni 8~10.5	X5CrNi18-9	304	600 ~ 700	180 ~ 220	125	120	110	90	135	0.3	0.3 ~ 2
							150	**190**	**175**	**140**	**160**	**0.2**	
							190	260	240	190	200	0.1	
		C≤0.03%, Cr 16~18%, Ni 10~14, Mo 2~3	X5CrNiMo17-12-2	316	600 ~ 700	180 ~ 220	120	120	110	90	130	0.3	
							160	**190**	**175**	**140**	**170**	**0.2**	
							180	260	240	190	190	0.1	
	Martensitic	C≤0.15%, Cr 11.5~13.5%	X12Cr13	410	700 ~ 800	200 ~ 250	135	150	135	110	145	0.3	
							170	**235**	**215**	**170**	**180**	**0.2**	
							210	320	295	230	220	0.1	
	Ferritic	C≤0.12%, Cr 16~18%	X8Cr17	430	500 ~ 600	150 ~ 200	135	150	135	110	145	0.3	
							230	**235**	**215**	**170**	**240**	**0.2**	
							340	320	295	230	350	0.1	
S	Titanium alloy	Ti, Al 6%, V 4%	5832-11	Ti-6Al-4V	900 ~ 1000	334 ~ 379	40	50	50	40	40	0.3	
							75	**75**	**70**	**55**	**85**	**0.2**	
							110	100	90	70	130	0.1	
	Ni base	Ni 50–55%, Cr 17–21%, Fe 17–19%, etc	9723	7718	1200 ~ 1300	330	25	40	40	30	30	0.3	
							60	**60**	**55**	**45**	**70**	**0.2**	
							90	80	70	60	110	0.1	

Grade features

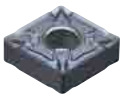
PVD Coated grade	ISO	Feature
SPC810	S10~S20	• An ultra fine grain substrate and PVD coating are applied for enhanced high speed performance and chipping resistance.
PC8105	M05~M15 S01~S10	• For high speed and continuous finishing of hard-to-cut materials and STS • Excellent cutting performance with high wear resistance and oxidation resistance • Ultra fine substrate and the new TiAlN coating layer
PC8110	M10~M20 S05~S15	• For high speed and continuous medium cutting of hard-to-cut materials and STS • Excellent tool life with high wear/plastic deformation resistance at high temperature • New TiAlN coating layer and substrate with excellent thermal resistance
PC5300	M20~M30 S15~S25	• Universal grade for Stainless, HRSA, Steel and interrupted Cast iron machining • High chipping and welding resistance for longer tool life • New TiAlN coating and ultra fine grain substrate adopted

CVD Coated grade	ISO	Feature
SNC805	S05~S15	• An ultra fine grain substrate and PVD coating are applied for enhanced high speed performance and wear resistance.

Negative chip breaker selection guide



FM New

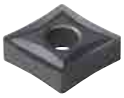


- For finishing (enhanced for tool life & chip control)
- Improved tool life through advanced anti-adhesion technology
- Stable chip control in the finishing area with a side V-shaped cutting edge and concave projection design
- Higher machining dimensional accuracy compared to conventional M-class

VP1

- For finishing (enhanced for cutting performance & chip control)
- Excellent cutting performance during low depth-of-cut, high speed machining
- Minimizes the load generated during cutting by reducing the contact area between the rake face and the chip

VP2



- For medium finishing (enhanced chip control type)
- Chip control suitable for medium finishing with sharp cutting edges and a wide chip pocket design
- Stable chip control in variable depth-of-cut machining through a high positive cutting edge design

MM

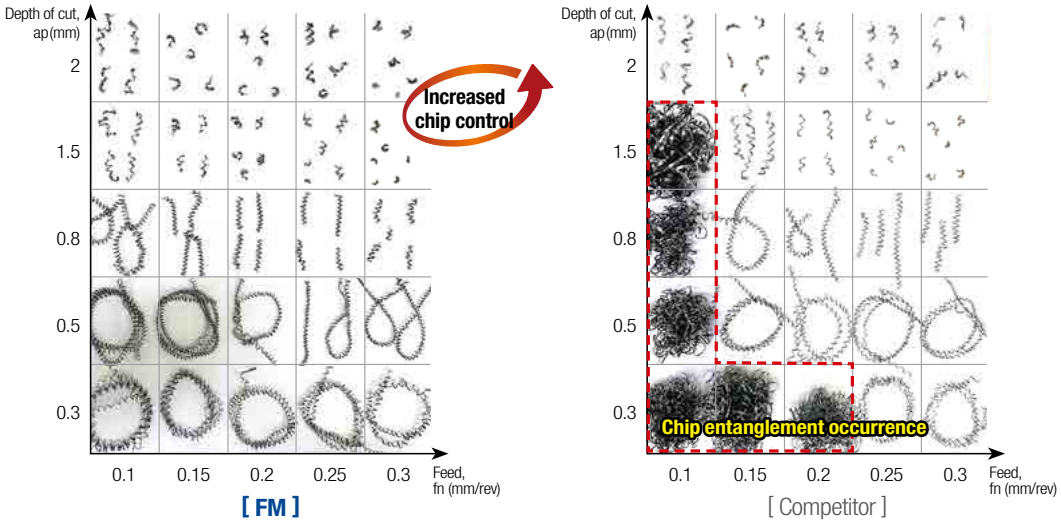
- For medium machining (cutting performance & toughness balance)
- Improved tool life by harmonizing cutting performance and toughness through the application of a dual land
- Stable chip evacuation during high depth-of-cut/high feed machining with a wide chip pocket

ISO	Cutting range	Chip breaker	Interrupted cutting	Chip segmentation force	Shallow cutting	Deep cutting	High feed (High productivity)
M	Finishing	FM New	★★★	★★★★	★★★★	★★★	★★★
	Medium to finishing	VP2	★★★	★★★	★★★	★★★☆	★★★☆
	Medium cutting	MM	★★★☆	★★★	★★	★★★★	★★★★
S	Finishing	FM New	★★★	★★★★	★★★★	★★★	★★★
		VP1	★★	★★★★	★★★★	★★	★★
	Medium to finishing	VP2	★★★	★★★	★★★	★★★☆	★★★☆

Performance evaluation

Chip control

Workpiece	Martensitic (X12Cr13), Ø100 External cutting
Cutting condition	vc (m/min) = 150, fn (mm/rev) = 0.1~0.3, ap (mm) = 0.3~2, Wet
Tool	**Insert** DNMG150608-FM (PC8110) **Holder** DDJNL2525-M15



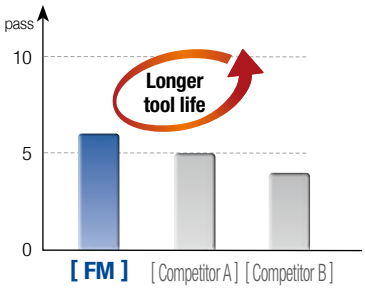
[FM] [Competitor]

» Stable chip management and prevention of chip entanglement are achieved by the side V-shaped cutting edge and concave projection.

Wear resistance

Workpiece	Austenitic (X5CrNi18-9), Ø300 External cutting
Cutting condition	vc (m/min) = 150, fn (mm/rev) = 0.2, ap (mm) = 1, Wet
Tool	**Insert** DNMG150608-FM (PC8110) **Holder** DDJNL2525-M15

[FM] [Competitor A] [Competitor B]



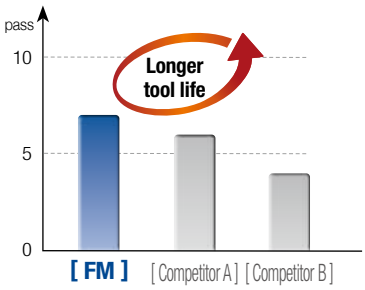
※ Metal removal volume per pass : 30 ㎠

» Tool life improved by 20% compared to competitor A, and 50% compared to competitor B.

Fracture resistance

Workpiece	Martensitic (X12Cr13), Ø300 Interrupted external cutting
Cutting condition	vc (m/min) = 150, fn (mm/rev) = 0.1, ap (mm) = 1, Wet
Tool	**Insert** CNMG120408-FM (PC8110) **Holder** DCLNL2525-M12

[FM] [Competitor A] [Competitor B]



※ Metal removal volume per pass : 27.6 ㎠

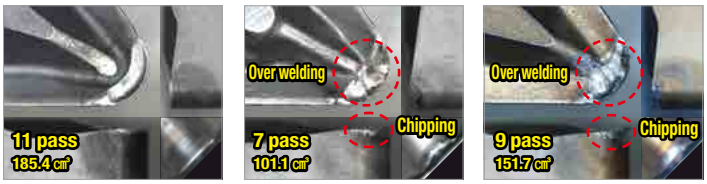
» Securing rigidity at the engagement boundary effectively prevents chipping and breakage at the boundary.

» Tool life was improved by 17% compared to competitor A, and 75% compared to competitor B.

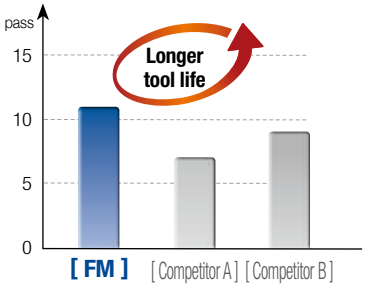
Performance evaluation

Wear resistance

Workpiece	Titanium alloy(5832-11), Ø115 Copying
Cutting condition	vc(m/min) = 85, fn(mm/rev) = 0.2, ap(mm) = 1, Wet
Tool	Insert DNMG150608-FM(SPC810) Holder DDJNL2525-M15



[FM] [Competitor A] [Competitor B]



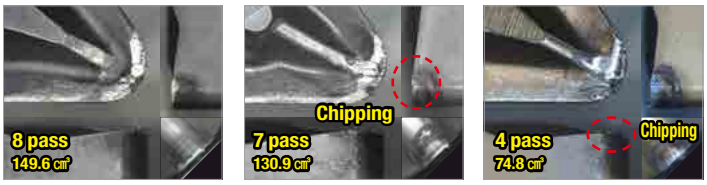
※ Metal removal volume per pass : 16.9㎤

» The application of anti-adhesion technology significantly reduces adhesion, delaying cutting edge dulling dramatically extending tool life.

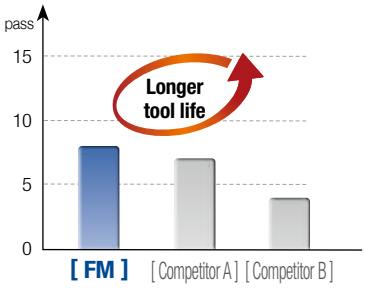
» Tool life was improved by 57% compared to competitor A, and 22% compared to competitor B.

Wear resistance

Workpiece	Inconel(9723), Ø300 Copying
Cutting condition	vc(m/min) = 50, fn(mm/rev) = 0.2, ap(mm) = 0.5, Wet
Tool	Insert DNMG150608-FM(SPC810) Holder DDJNL2525-M15



[FM] [Competitor A] [Competitor B]



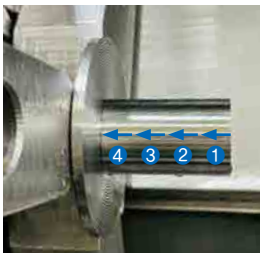
※ Metal removal volume per pass : 18.7㎤

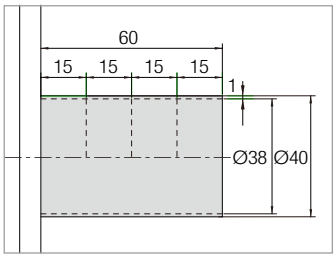
» The application of anti-adhesion technology significantly reduces adhesion, delaying cutting edge dulling and dramatically extending tool life.

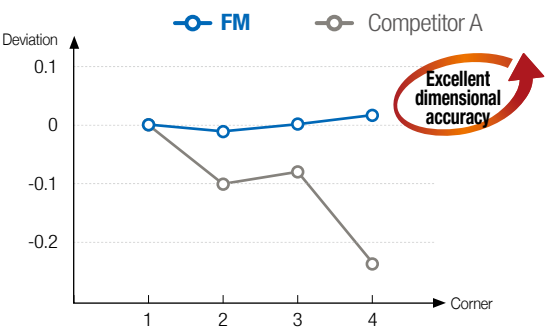
» Tool life was improved by 43% compared to competitor A, and 250% compared to competitor B.

Dimensional accuracy

Workpiece	Martensitic(X12Cr13), Ø40→Ø38 External cutting
Cutting condition	vc(m/min) = 150, fn(mm/rev) = 0.2, ap(mm) = 1, Wet
Tool	Insert CNMG120408-FM(SPC810) Holder DCLNL2525-M12





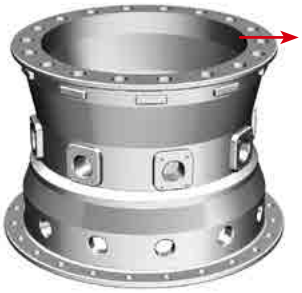


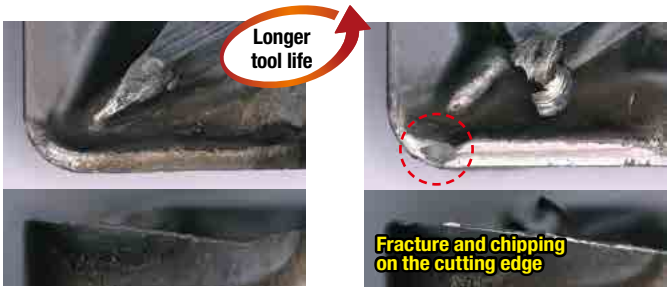
» Measurement of machined dimensional quality based on the deviation among the four corners within a 60mm range.

Application examples

High performing stainless steel (Jethete M152)

Workpiece use	Aerospace components
Cutting condition	vc (m/min) = 150, fn (mm/rev) = 0.3, ap (mm) = 2, Wet
Tool	**Insert** SNMG120408-FM (PC8110) **Holder** DSBNR2525-M12



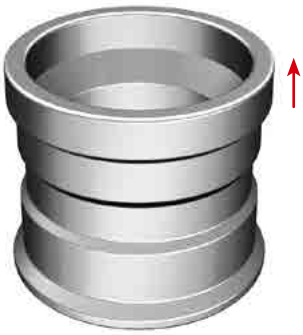


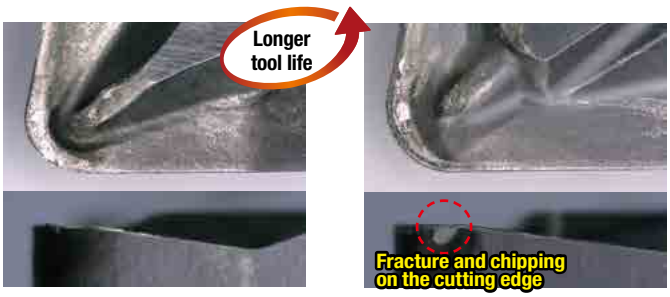
[FM] [Competitor]

- Material removal rate Q(cm^3/min): 90
- Cutting time (min): 15

High performing stainless steel (Jethete M152)

Workpiece use	Power generation industry components
Cutting condition	vc (m/min) = 160, fn (mm/rev) = 0.25, ap (mm) = 1, Wet
Tool	**Insert** WNMG080408-FM (PC8110) **Holder** DWLNR2525-M08





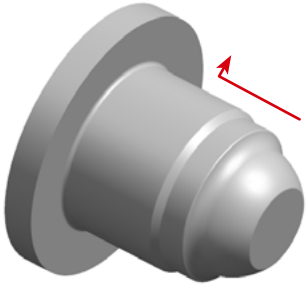
[FM] [Competitor]

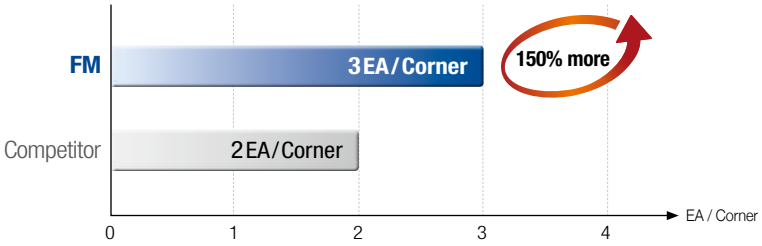
- Material removal rate Q(cm^3/min): 40
- Cutting time (min): 10

Application examples

Inconel (2.4631)

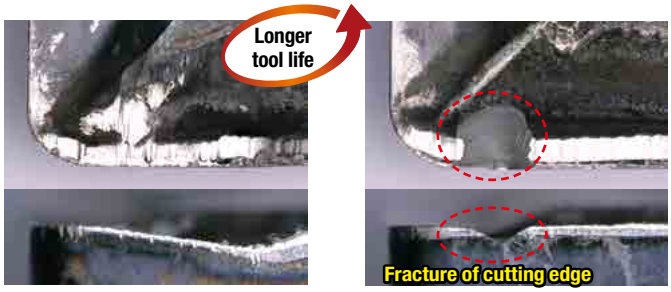
Workpiece use	Power generation nozzle
Cutting condition	vc(m/min) = 56, fn(mm/rev) = 0.15, ap(mm) = 2, Wet
Tool	Insert CNMG120408-FM(SPC810) Holder DCLNR2525-M12





Inconel (9723)

Workpiece use	Aircraft engine components
Cutting condition	vc(m/min) = 40, fn(mm/rev) = 0.28, ap(mm) = 2, Wet
Tool	Insert SNMG120408-FM(SPC810) Holder DSBNR2525-M12

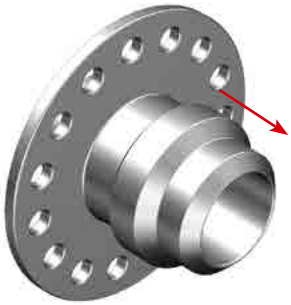


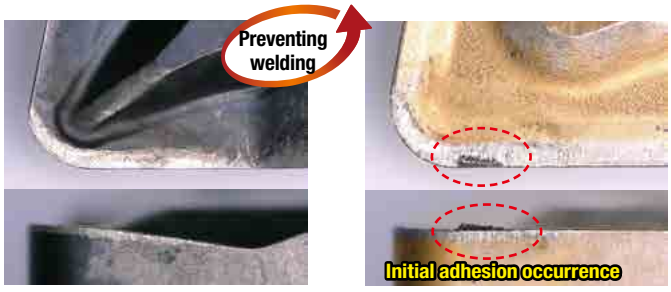
[FM] [Competitor]

- Material removal rate Q(cm^3/min) : 22.4
- Cutting time(min) : 12

Titanium alloy (5832-11)

Workpiece use	Aircraft components
Cutting condition	vc(m/min) = 50, fn(mm/rev) = 0.21, ap(mm) = 2, Wet
Tool	Insert CNMG120408-FM(SPC810) Holder DCLNR2525-M12

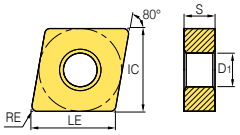
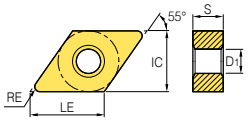
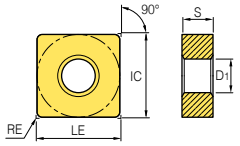
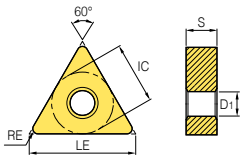
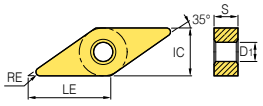
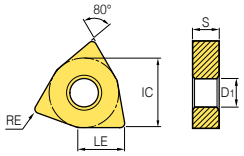




[FM] [Competitor]

- Material removal rate Q(cm^3/min) : 21
- Cutting time(min) : 6

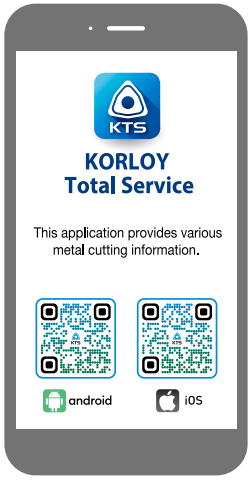
Stock items

Picture	Designation		Coated					Dimension (mm)					Cutting condition		Geometry
			PVD				CVD								
			SPC810	PC8105	PC8110	PC5300	SNC805	IC	RE	S	LE	D1	fn (mm/rev)	ap (mm)	
	**CNMG**	120404-FM	●	○	○	●	●	12.7	0.4	4.76	12.896	5.16	0.1~0.3	0.3~2	
		120408-FM	●	○	○	●	●	12.7	0.8	4.76	12.896	5.16	0.1~0.3	0.5~2	
		120412-FM						12.7	1.2	4.76	12.896	5.16	0.1~0.3	0.5~2	
	**DNMG**	150404-FM				●		12.7	0.4	4.76	15.508	5.16	0.1~0.3	0.3~2	
		150408-FM				●		12.7	0.8	4.76	15.508	5.16	0.1~0.3	0.5~2	
		150604-FM	●	○		●		12.7	0.4	6.35	15.508	5.16	0.1~0.3	0.3~2	
		150608-FM	●	○	○	●	●	12.7	0.8	6.35	15.508	5.16	0.1~0.3	0.5~2	
	**SNMG**	120404-FM				●		12.7	0.4	4.76	12.7	5.16	0.1~0.3	0.3~2	
		120408-FM	●	○	○	●	●	12.7	0.8	4.76	12.7	5.16	0.1~0.3	0.5~2	
		120412-FM		○				12.7	1.2	4.76	12.7	5.16	0.1~0.3	0.5~2	
	**TNMG**	160404-FM				●		9.525	0.4	4.76	16.498	3.81	0.1~0.3	0.3~2	
		160408-FM	●	○	○	●		9.525	0.8	4.76	16.498	3.81	0.1~0.3	0.5~2	
		160412-FM		○				9.525	1.2	4.76	16.498	3.81	0.1~0.3	0.5~2	
	**VNMG**	160404-FM	●	○		●		9.525	0.4	4.76	16.606	3.81	0.1~0.3	0.3~2	
		160408-FM	●	○	○	●		9.525	0.8	4.76	16.606	3.81	0.1~0.3	0.5~2	
	**WNMG**	080404-FM				●		12.7	0.4	4.76	8.687	5.16	0.1~0.3	0.3~2	
		080408-FM	●	○	○	●	●	12.7	0.8	4.76	8.687	5.16	0.1~0.3	0.5~2	
		080412-FM		○				12.7	1.2	4.76	8.687	5.16	0.1~0.3	0.5~2	

●: Stock item
○: Planned release – March 2026

⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasses or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the tools can be pulled out due to centrifugal force while high speed machining.



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