

TurnLine

AH8000 SERIES

www.tungaloy.com

Tungaloy Report No. 437-G

AH8000 SERIES

Outstanding performance in
machining heat-resistant alloys



Member IMC Group
Tungaloy

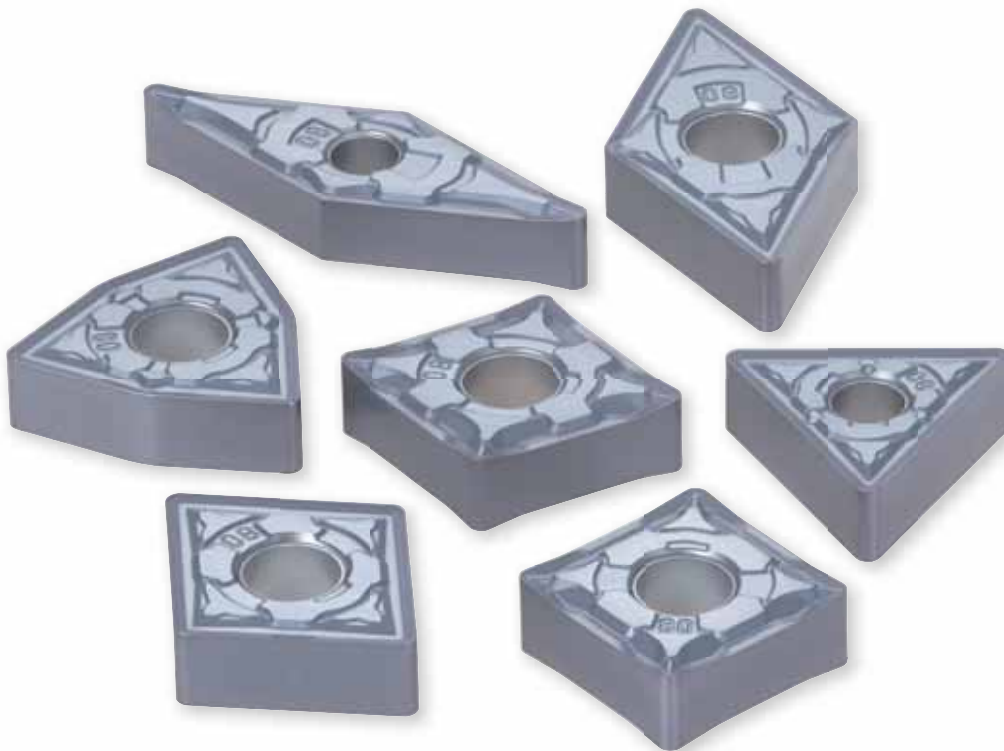


ACCELERATED MACHINING

TurnLine

AH8000 SERIES

TUNGALOY



New chipbreakers with innovative coating technology deliver **highly stable machining of heat-resistant alloys.**

Incredible reliability in turning of heat-resistant alloys

PREMIUMTEC

TUNGALOY

Special surface technology

Nano-multi-layered AlTiN coating with high Al content

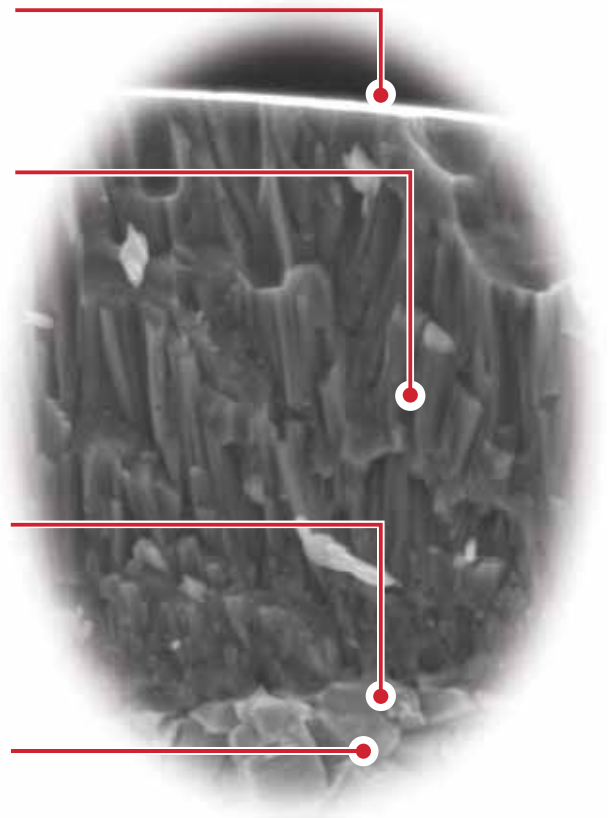
- Increases hardness by 20%
- Prevents micro cracks from developing

→ Long tool life & stable machining

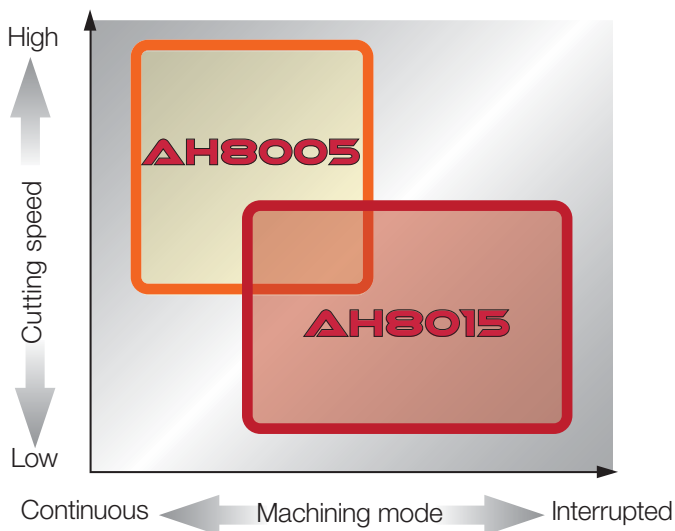
Improved adhesion strength

→ Prevents notch wear that tends to occur in machining heat-resistant alloys

Newly developed substrates



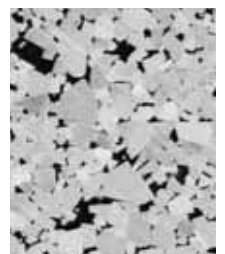
APPLICATION AREA



AH8015

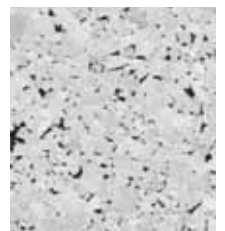
The 1st recommendation for heat-resistant alloys

Versatile grade with high wear and fracture resistance



AH8005

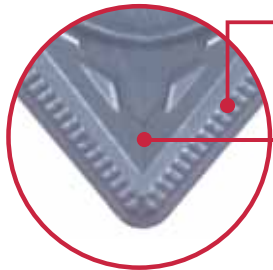
Grade with high hardness and excellent wear resistance



CHIPBREAKERS

HRM For finishing to medium cutting

The 1st recommendation



Unique protrusions on the rake face

Reduce the contact area of rake face and chips

Optimized rake face geometry and protrusion

Provide low cutting force and stable chip control

HRF For finishing



Special protrusion

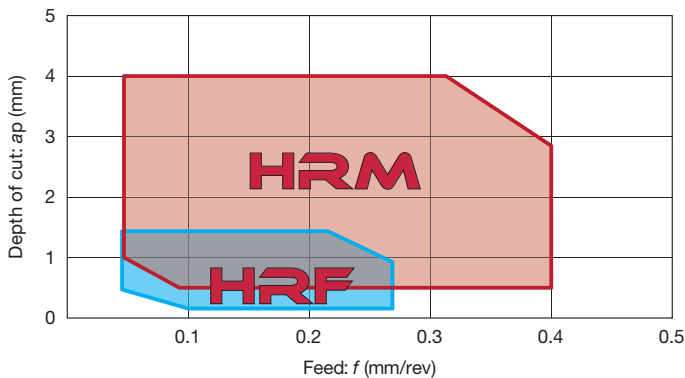
Provides excellent chip control in machining depth of cut less than the corner R

Large rake angle and inclination

Reduce cutting force

APPLICATION AREA AND CHIP CONTROL

Chipbreakers for negative inserts

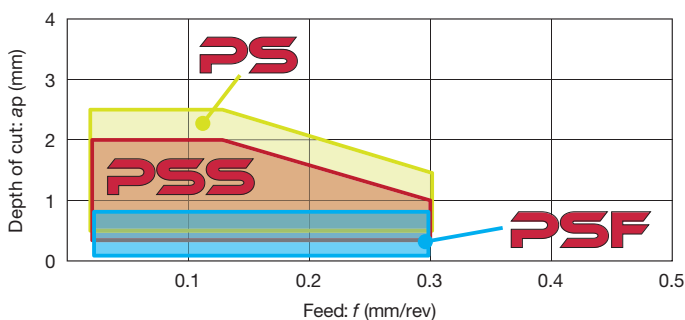


HRF and HRM chipbreakers cover finishing to medium cutting.

* If the D.O.C. is 4 mm or over, the insert with the I.C. dia. more than $\phi 12.7$ mm is recommended.

New Main chipbreakers for positive inserts

(CCMT, CPMT, DCMT, VCMT)



- PSF, PSS, and PS chipbreakers cover finishing to medium cutting.
- Complementary chipbreaker: All-round type

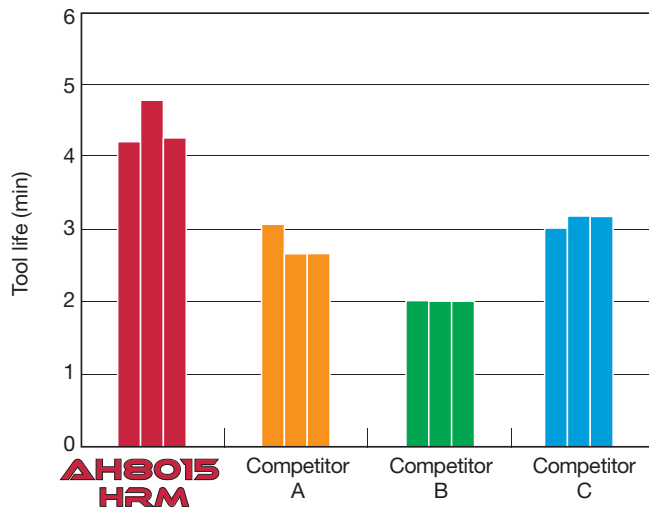
CUTTING PERFORMANCE

AH8015 / HRM

- General machining condition

Insert : CNMG120408-**
 Cutting speed : $V_c = 60$ m/min
 Feed : $f = 0.2$ mm/rev
 Depth of cut : $a_p = 1.0$ mm
 Machining : External turning
 Coolant : Wet

S Inconel 718



After 4 min.



AH8015 / HRM

After 2 min.



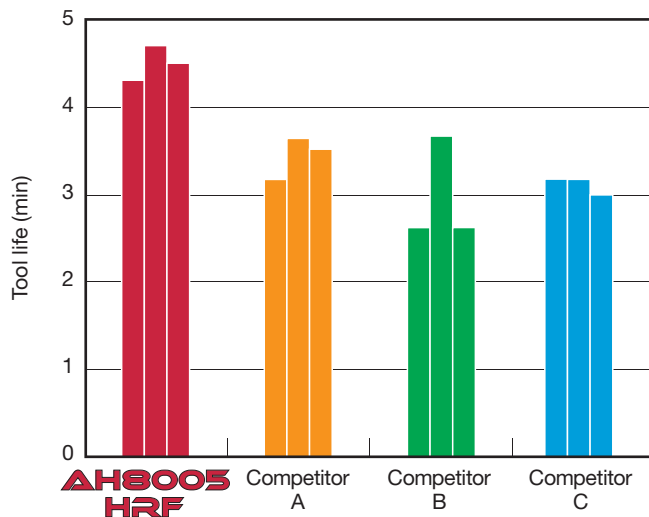
Competitor B

AH8005 / HRF

- High-speed cutting

Insert : CNMG120408-**
 Cutting speed : $V_c = 100$ m/min
 Feed : $f = 0.15$ mm/rev
 Depth of cut : $a_p = 0.3$ mm
 Machining : External turning
 Coolant : Wet

S Inconel 718



After 2.7 min.



AH8005 / HRF

After 2.7 min.



Competitor B

GRADES

Application	Grade Application code	Substrate			Coating layer	
		Specific gravity	Hardness (HRA)	T.R.S. (GPa)	Main composition	Thickness (µm)
S	AH8005	15.0	93.0	2.2	(Al,Ti)N	3.5
	S01 - S10					
	AH8015					
	S10 - S20	14.9	91.8	3.1	(Al,Ti)N	3.5

STANDARD CUTTING CONDITIONS

Chipbreakers for negative inserts

Chipbreaker	Corner radius $r\epsilon$	Depth of cut ap (mm)	Feed f (mm/rev)	Cutting speed: V_c (m/min)	
				AH8005	AH8015
HRF	0.4	0.2 - 1.5	0.05 - 0.23	40 - 100	20 - 80
	0.8	0.2 - 1.5	0.05 - 0.25	40 - 100	20 - 80
	1.2	0.2 - 1.5	0.07 - 0.27	40 - 100	20 - 80
HRM	0.4	0.5 - 4.0	0.05 - 0.30	40 - 100	20 - 80
	0.8	0.5 - 4.0	0.07 - 0.33	40 - 100	20 - 80
	1.2	0.5 - 4.0	0.10 - 0.35	40 - 100	20 - 80
	1.6	0.5 - 4.0	0.15 - 0.40	40 - 100	20 - 80

* Values for the inserts with 12.7 mm I.C. dia.

New Chipbreakers for positive inserts

Chipbreaker	Corner radius $r\epsilon$	Depth of cut ap (mm)	Feed f (mm/rev)	Cutting speed: V_c (m/min)	
				AH8005	AH8015
PSF	0.4	0.05 - 0.5	0.02 - 0.20	40 - 100	20 - 80
	0.8	0.05 - 0.5	0.02 - 0.30	40 - 100	20 - 80
PSS	0.4	0.3 - 2.0	0.02 - 0.20	40 - 100	20 - 80
	0.8	0.3 - 2.0	0.03 - 0.30	40 - 100	20 - 80
	1.2	0.3 - 2.0	0.05 - 0.30	40 - 100	20 - 80
PS	0.4	0.5 - 2.5	0.02 - 0.20	40 - 100	20 - 80
	0.8	0.5 - 2.5	0.03 - 0.30	40 - 100	20 - 80
	1.2	0.5 - 2.5	0.05 - 0.30	40 - 100	20 - 80
All-round	0.4	0.5 - 3.0	0.08 - 0.20	40 - 100	20 - 80
	0.8	0.5 - 3.0	0.08 - 0.30	40 - 100	20 - 80
	1.2	0.5 - 3.0	0.08 - 0.30	40 - 100	20 - 80
RS		0.5 - 1.5	0.03 - 0.30	40 - 100	20 - 80
61		0.5 - 2.0	0.20 - 0.60	40 - 100	20 - 80

* Values for the inserts with 9.525 mm I.C. dia.

SELECTION GUIDE

Chipbreakers for negative inserts

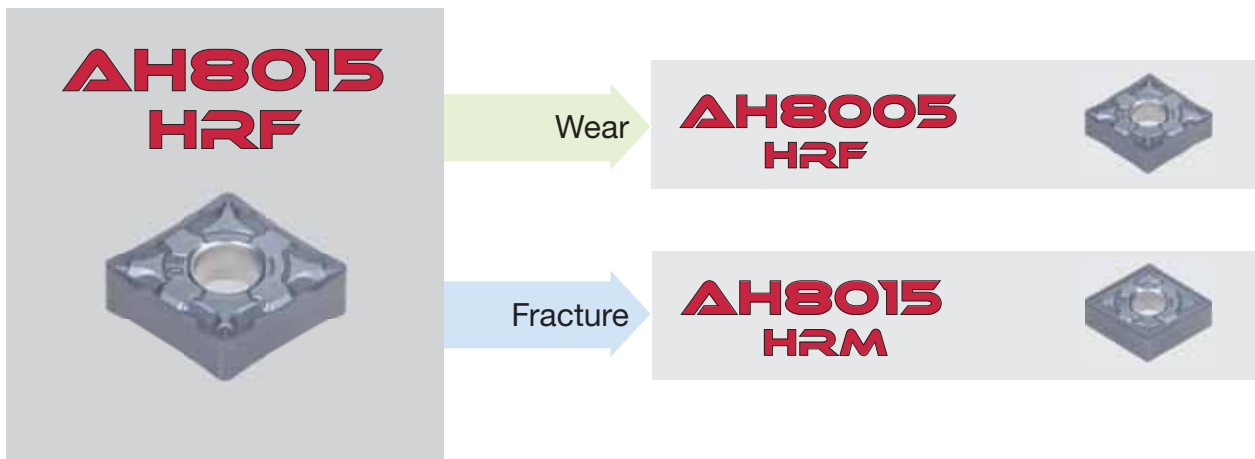
- For finishing to medium cutting ($a_p = 0.5 - 4.0$ mm)

The 1st recommendation



- For finishing ($a_p = 0.2 - 1.5$ mm)

The 1st recommendation



Note: This is a general guide and may not be applicable under the specific conditions.

New Chipbreakers for positive inserts

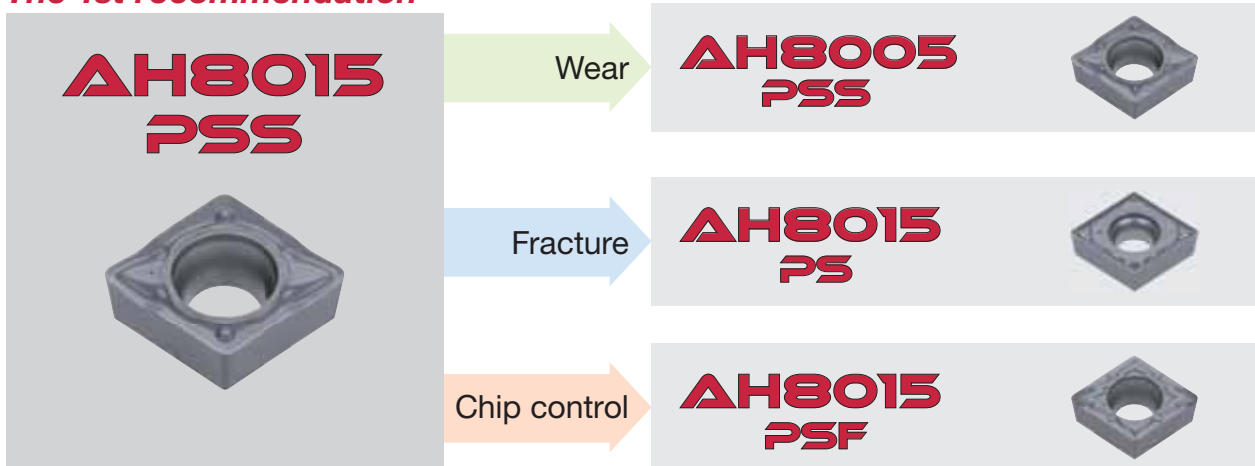
- For finishing to medium cutting ($a_p = 0.5 - 2.5$ mm)

The 1st recommendation



- For finishing ($a_p = 0.3 - 2.0$ mm)

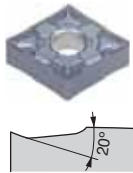
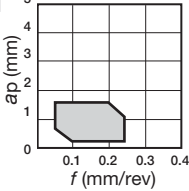
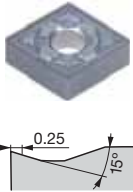
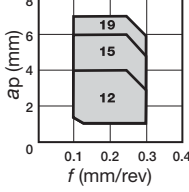
The 1st recommendation



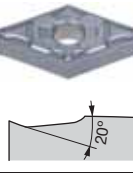
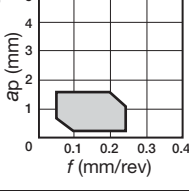
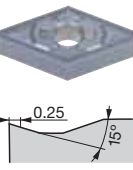
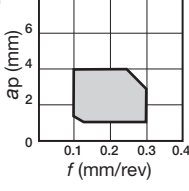
Note: This is a general guide and may not be applicable under the specific conditions.

INSERT: NEGATIVE TYPE

Rhombic 80°

Application	Chipbreaker Appearance (Cross section)	$f - ap$	Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
				Coating					
				AH8005	AH8015				
Finishing			CNMG120404-HRF	✓	✓	12.7	4.76	5.16	0.4
			*CNMG120408-HRF	✓	✓	12.7	4.76	5.16	0.8
			CNMG120412-HRF	✓	✓	12.7	4.76	5.16	1.2
Finishing to medium cutting			CNMG120404-HRM	✓	✓	12.7	4.76	5.16	0.4
			*CNMG120408-HRM	✓	✓	12.7	4.76	5.16	0.8
			CNMG120412-HRM	✓	✓	12.7	4.76	5.16	1.2
			CNMG160608-HRM	✓	✓	15.875	6.35	6.35	0.8
			CNMG160612-HRM	✓	✓	15.875	6.35	6.35	1.2
			CNMG190612-HRM	✓	✓	19.05	6.35	7.93	1.2
			CNMG190616-HRM	✓	✓	19.05	6.35	7.93	1.6


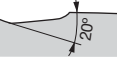
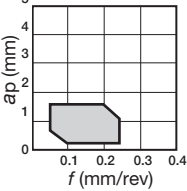

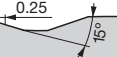
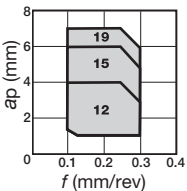
Rhombic 55°

Application	Chipbreaker Appearance (Cross section)	$f - ap$	Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
				Coating					
				AH8005	AH8015				
Finishing			DNMG150404-HRF	✓	✓	12.7	4.76	5.16	0.4
			*DNMG150408-HRF	✓	✓	12.7	4.76	5.16	0.8
			DNMG150604-HRF	✓	✓	12.7	6.35	5.16	0.4
			DNMG150608-HRF	✓	✓	12.7	6.35	5.16	0.8
Finishing to medium cutting			DNMG150404-HRM	✓	✓	12.7	4.76	5.16	0.4
			*DNMG150408-HRM	✓	✓	12.7	4.76	5.16	0.8
			DNMG150412-HRM	✓	✓	12.7	4.76	5.16	1.2
			DNMG150604-HRM	✓	✓	12.7	6.35	5.16	0.4
			DNMG150608-HRM	✓	✓	12.7	6.35	5.16	0.8
			DNMG150612-HRM	✓	✓	12.7	6.35	5.16	1.2

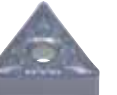
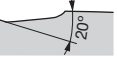
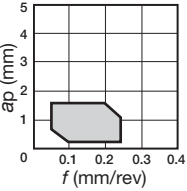

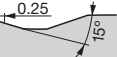
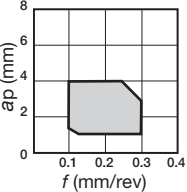
*Note: Cross section shows the chipbreaker of the designation with *.

✓ : Stocked items

Square 90°

Application	Chipbreaker Appearance (Cross section)	f - ap	Designation	Grades		I.C. dia. ød	Thick- ness s	Hole dia. ød1	Corner radius r _ε
				Coating					
				AH8005	AH8015				
Finishing	 		*SNMG120408-HRF	✓	✓	12.7	4.76	5.16	0.8
			SNMG120412-HRF	✓	✓	12.7	4.76	5.16	1.2
Finishing to medium cutting	 		*SNMG120408-HRM	✓	✓	12.7	4.76	5.16	0.8
			SNMG120412-HRM	✓	✓	12.7	4.76	5.16	1.2
			SNMG150608-HRM	✓	✓	15.875	6.35	6.35	0.8
			SNMG150612-HRM	✓	✓	15.875	6.35	6.35	1.2
			SNMG190612-HRM	✓	✓	19.05	6.35	7.93	1.2
			SNMG190616-HRM	✓	✓	19.05	6.35	7.93	1.6

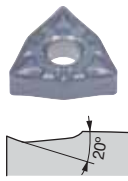
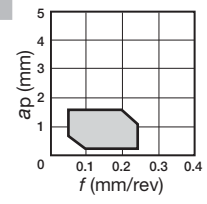
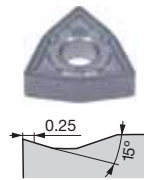
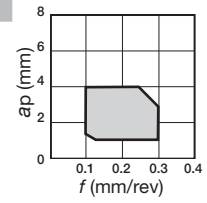
Triangular 60°

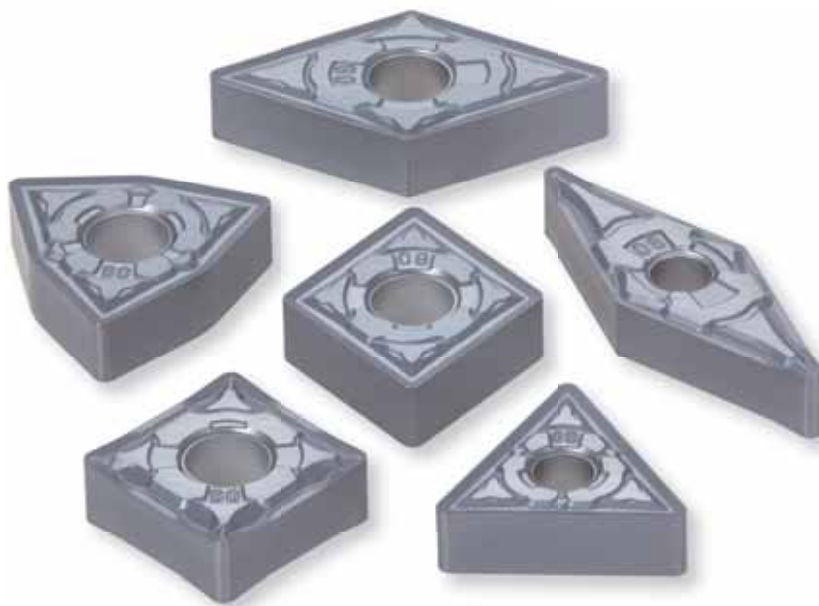
Application	Chipbreaker Appearance (Cross section)	f - ap	Designation	Grades		I.C. dia. ød	Thick- ness s	Hole dia. ød1	Corner radius r _ε
				Coating					
				AH8005	AH8015				
Finishing	 		TNMG160404-HRF	✓	✓	9.525	4.76	3.81	0.4
			*TNMG160408-HRF	✓	✓	9.525	4.76	3.81	0.8
Finishing to medium cutting	 		TNMG160404-HRM	✓	✓	9.525	4.76	3.81	0.4
			*TNMG160408-HRM	✓	✓	9.525	4.76	3.81	0.8
			TNMG160412-HRM	✓	✓	9.525	4.76	3.81	1.2

*Note: Cross section shows the chipbreaker of the designation with *.

✓ : Stocked items

Trigon 80°

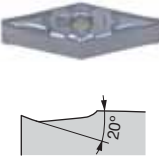
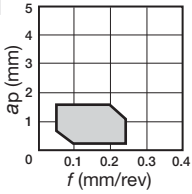
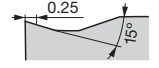
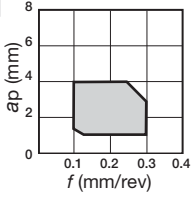
Application	Chipbreaker Appearance (Cross section)	$f - a_p$	Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
				Coating					
				AH8005	AH8015				
Finishing			WNMG080404-HRF	✓	✓	12.7	4.76	5.16	0.4
			*WNMG080408-HRF	✓	✓	12.7	4.76	5.16	0.8
Finishing to medium cutting			WNMG080404-HRM	✓	✓	12.7	4.76	5.16	0.4
			*WNMG080408-HRM	✓	✓	12.7	4.76	5.16	0.8
			WNMG080412-HRM	✓	✓	12.7	4.76	5.16	1.2



*Note: Cross section shows the chipbreaker of the designation with *.

✓ : Stocked items

Rhombic 35°

Application	Chipbreaker		Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
	Appearance (Cross section)	$f - a_p$		Coating					
				AH8005	AH8015				
Finishing	HRF 		VNMG160404-HRF	✓	✓	9.525	4.76	3.81	0.4
			*VNMG160408-HRF	✓	✓	9.525	4.76	3.81	0.8
Finishing to medium cutting	HRM 		VNMG160404-HRM	✓	✓	9.525	4.76	3.81	0.4
			*VNMG160408-HRM	✓	✓	9.525	4.76	3.81	0.8
			VNMG160412-HRM	✓	✓	9.525	4.76	3.81	1.2

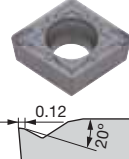
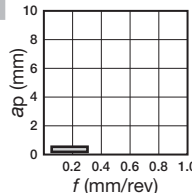
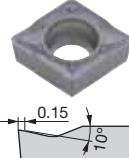
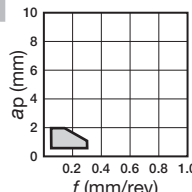
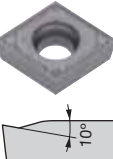
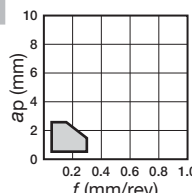


*Note: Cross section shows the chipbreaker of the designation with *.

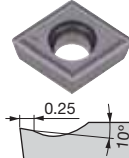
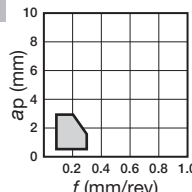
✓ : Stocked items

INSERT: POSITIVE TYPE

New Rhombic 80°, Positive 7°

Application	Chipbreaker		Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
	Appearance (Cross section)	$f - a_p$		Coating					
				AH8005	AH8015				
Finishing	PSF 		CCMT060204-PSF	✓	✓	6.35	2.38	2.8	0.4
			*CCMT09T304-PSF	✓	✓	9.525	3.97	4.4	0.4
Finishing to light cutting	PSS 		CCMT060204-PSS	✓	✓	6.35	2.38	2.8	0.4
			CCMT060208-PSS	✓	✓	6.35	2.38	2.8	0.8
			*CCMT09T304-PSS	✓	✓	9.525	3.97	4.4	0.4
			CCMT09T308-PSS	✓	✓	9.525	3.97	4.4	0.8
Finishing to medium cutting	PS 		CCMT060204-PS	✓	✓	6.35	2.38	2.8	0.4
			CCMT060208-PS	✓	✓	6.35	2.38	2.8	0.8
			CCMT09T304-PS	✓	✓	9.525	3.97	4.4	0.4
			CCMT09T308-PS	✓	✓	9.525	3.97	4.4	0.8
			*CCMT120404-PS	✓	✓	12.7	4.76	5.5	0.4
			CCMT120408-PS	✓	✓	12.7	4.76	5.5	0.8

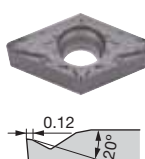
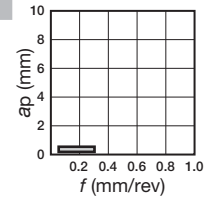
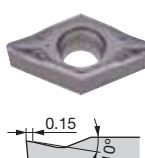
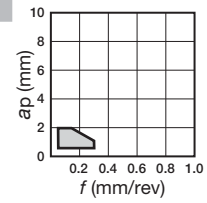
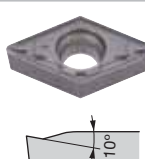
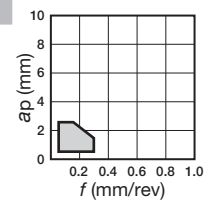
New Rhombic 80°, Positive 11°

Application	Chipbreaker		Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
	Appearance (Cross section)	$f - a_p$		Coating					
				AH8005	AH8015				
Medium cutting	All-round 		*CPMT120408	✓	✓	12.7	4.76	5.5	0.8

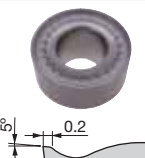
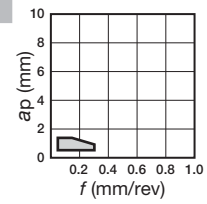
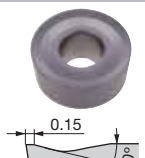
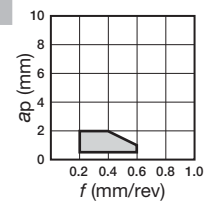
*Note: Cross section shows the chipbreaker of the designation with *.

✓ : Stocked items

New Rhombic 55°, Positive 7°

Application	Chipbreaker		Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
	Appearance (Cross section)	$f - a_p$		Coating					
				AH8005	AH8015				
Finishing	PSF 		DCMT11T304-PSF	✓	✓	9.525	3.97	4.4	0.4
			*DCMT11T308-PSF	✓	✓	9.525	3.97	4.4	0.8
Finishing to light cutting	PSS 		DCMT11T304-PSS	✓	✓	9.525	3.97	4.4	0.4
			*DCMT11T308-PSS	✓	✓	9.525	3.97	4.4	0.8
			DCMT11T312-PSS	✓	✓	9.525	3.97	4.4	1.2
Finishing to medium cutting	PS 		DCMT11T304-PS	✓	✓	9.525	3.97	4.4	0.4
			*DCMT11T308-PS	✓	✓	9.525	3.97	4.4	0.8
			DCMT11T312-PS	✓	✓	9.525	3.97	4.4	1.2

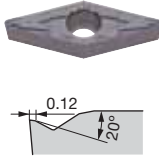
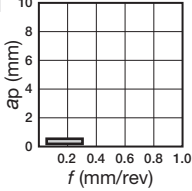
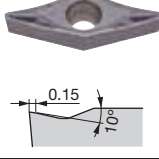
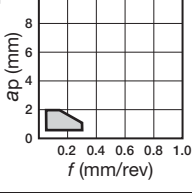
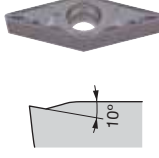
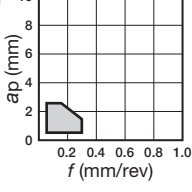
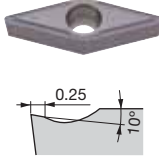
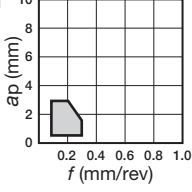
New Round with hole, Positive 7°

Application	Chipbreaker		Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Corner radius r_ϵ
	Appearance (Cross section)	$f - a_p$		Coating					
				AH8005	AH8015				
Finishing to light cutting	RS 		RCMT10T3M0-RS	✓	✓	10	3.97	4.4	-
			*RCMT1204M0-RS	✓	✓	12	4.76	4.4	-
Medium cutting	61 		RCMM1003M0-61	✓	✓	10	3.18	3.6	-
			*RCMM1204M0-61	✓	✓	12	4.76	4.2	-

*Note: Cross section shows the chipbreaker of the designation with *.

✓ : Stocked items


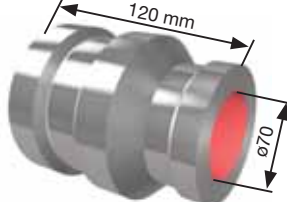
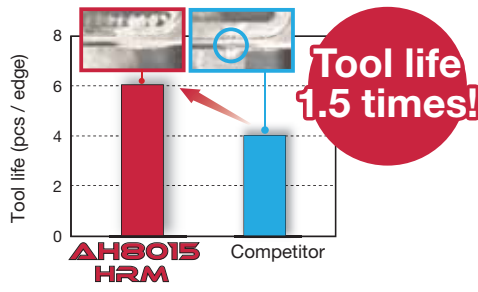
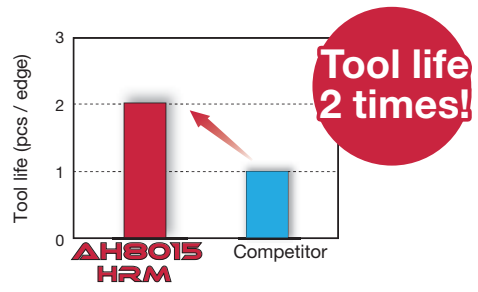
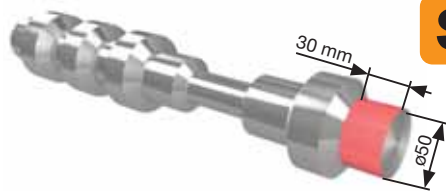
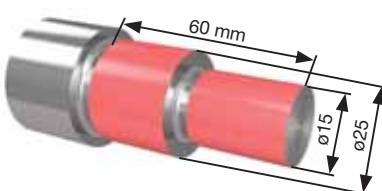
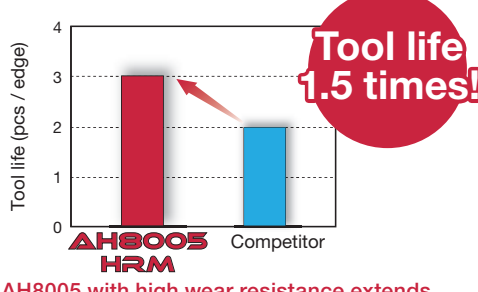

New Rhombic 35°, Positive 7°

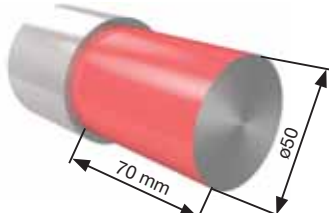
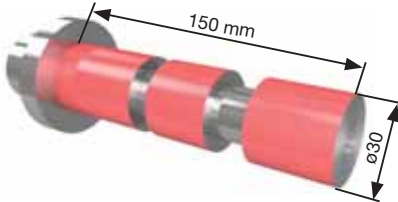
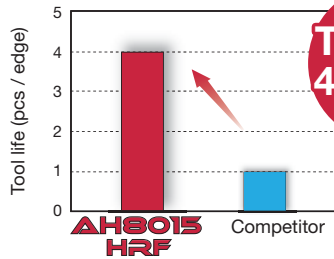
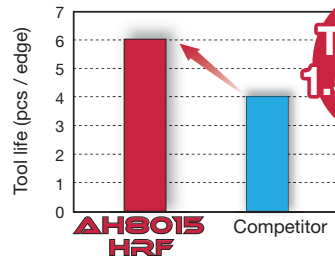
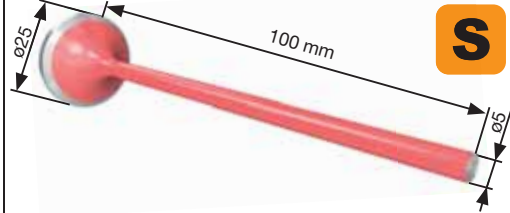

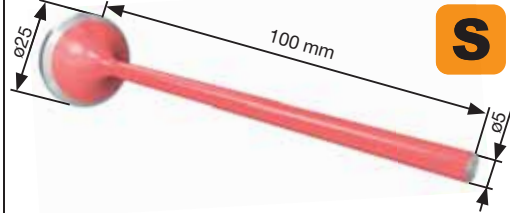

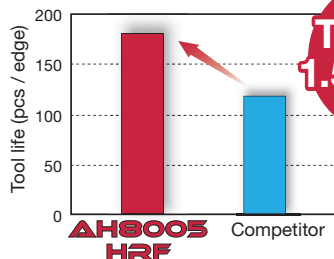
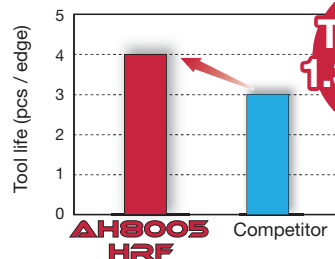
Application	Chipbreaker		Designation	Grades		I.C. dia. ϕd	Thick- ness s	Hole dia. ϕd_1	Cormer radius r_ϵ
	Appearance (Cross section)	$f - a_p$		Coating					
				AH8005	AH8015				
Finishing	PSF 		VCMT160404-PSF	✓	✓	9.525	4.76	4.4	0.4
			*VCMT160408-PSF	✓	✓	9.525	4.76	4.4	0.8
Finishing to light cutting	PSS 		VCMT160404-PSS	✓	✓	9.525	4.76	4.4	0.4
			*VCMT160408-PSS	✓	✓	9.525	4.76	4.4	0.8
Finishing to medium cutting	PS 		VCMT160404-PS	✓	✓	9.525	4.76	4.4	0.4
			*VCMT160408-PS	✓	✓	9.525	4.76	4.4	0.8
Medium cutting	All-round 		VCMT160404	✓	✓	9.525	4.76	4.4	0.4
			*VCMT160408	✓	✓	9.525	4.76	4.4	0.8
			VCMT160412	✓	✓	9.525	4.76	4.4	1.2

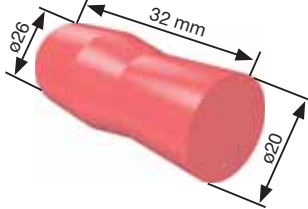
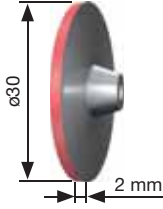
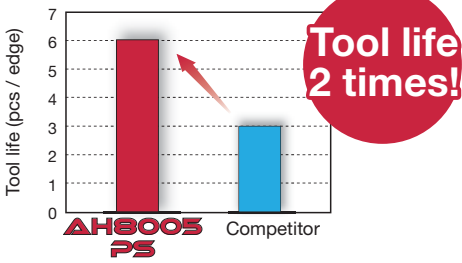
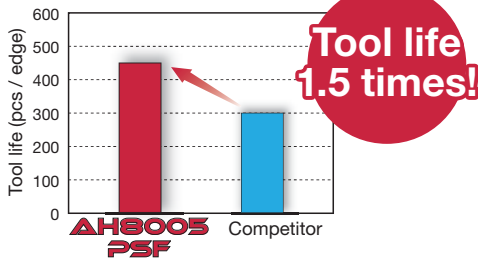
*Note: Cross section shows the chipbreaker of the designation with *.

✓ : Stocked items

PRACTICAL EXAMPLES

Workpiece type	Valve parts	Aircraft parts	
Insert	CNMG120408-HRM	CNMG120408-HRM	
Grade	AH8015	AH8015	
Workpiece material	Inconel 625	Inconel 718	
Workpiece material			
Cutting conditions	Cutting speed: V_c (m/min)	30	40
	Feed : f (mm/rev)	0.2	0.22
	Depth of cut : a_p (mm)	1.5	2.0
	Coolant	Wet	Wet
Results	 <p>AH8015 with HRM chipbreaker greatly reduces notch wear and extends tool life by 1.5 times.</p>	 <p>AH8015 that is well-balanced between wear and fracture resistance doubles tool life.</p>	
Workpiece type	Shaft parts	Valve parts	
Insert	CNMG120408-HRM	CNMG120408-HRM	
Grade	AH8005	AH8005	
Workpiece material	Inconel 718	Inconel 718	
Workpiece material			
Cutting conditions	Cutting speed: V_c (m/min)	50	80
	Feed : f (mm/rev)	0.28	0.20
	Depth of cut : a_p (mm)	3.5	1.0 - 1.5
	Coolant	Wet	Wet
Results	 <p>AH8005 with high wear resistance extends tool life by 1.5 times.</p>	 <p>Due to outstanding wear resistance, AH8005 extends tool life by 1.2 times.</p>	

Workpiece type	Tube parts	Aircraft parts	
Insert	CNMG120408-HRF	CNMG120412-HRF	
Grade	AH8015	AH8015	
Workpiece material	Hastelloy 276	Inconel 909	
			
Cutting conditions	Cutting speed: V_c (m/min)	80	55
	Feed : f (mm/rev)	0.10	0.30
	Depth of cut : a_p (mm)	1.5 mm x 8 pass	0.5
	Coolant	Wet	Wet
Results	 <p>AH8015 HRF Competitor</p> <p>AH8015 has good balance between wear and fracture resistance, increasing tool life by 4 times.</p>	 <p>AH8015 HRF Competitor</p> <p>AH8015 provides better surface finish and extends tool life by 1.5 times.</p>	
			
Workpiece type	Valve parts	Aircraft parts	
Insert	CNMG120408-HRF	CNMG120408-HRF	
Grade	AH8005	AH8005	
Workpiece material	Inconel 718	Inconel 718	
			
Cutting conditions	Cutting speed: V_c (m/min)	100	70
	Feed : f (mm/rev)	0.11 - 0.14	0.17
	Depth of cut : a_p (mm)	0.3	0.5
	Coolant	Wet	Wet
Results	 <p>AH8005 HRF Competitor</p> <p>AH8005 delivers outstanding wear resistance, increasing tool life by 1.5 times.</p>	 <p>AH8005 HRF Competitor</p> <p>AH8005 with excellent wear resistance provides good surface quality and extends tool life by 1.3 times.</p>	

Workpiece type	Seal pin	Turbine parts	
Insert	VCMT160408-PS	CCMT09T304-PSF	
Grade	AH8005	AH8005	
Workpiece material	Inconel 718	Inconel 718	
			
Cutting conditions	Cutting speed: V_c (m/min)	45	100
	Feed : f (mm/rev)	0.20	0.12
	Depth of cut : a_p (mm)	0.5	0.07
	Machining	External turning and facing	External turning
	Coolant	Wet	Wet
Results	 <p>AH8005 with PS chipbreaker improves productivity by 1.3 times due to increased feed rate and speed, doubling tool life.</p>	 <p>AH8005 with PSF chipbreaker provides excellent chip control and wear resistance, extending tool life by 1.5 times.</p>	

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EC97J1123
Tungaloy Corporation
26/11/1997

Produced from Recycled paper

May, 2016 (TJ)