

New Era in Aerospace Machining

# BIDEMICS

Patents Pending

## JX1

**Semi-finishing & Finishing  
Rough no scale**

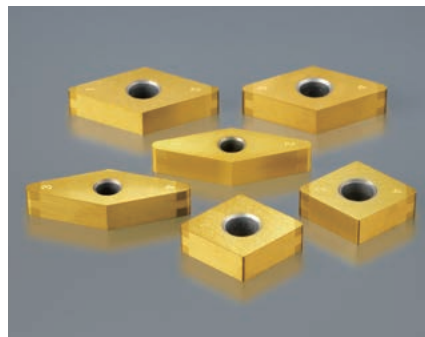
1600 SFM Speed Capability  
Longer Tool Life vs. Whisker  
Superior Surface Finishes vs. Whisker  
Able To Cut New Aerospace Materials

## JP2

**Finishing**

1700 SFM Speed Capability  
10 to 15 x Speed vs. Carbide  
Superior Surface Finishes vs. Carbide & CBN  
Coated Multi-tipped Brazed Inserts

**NTK**  
CUTTING TOOLS



## JX1

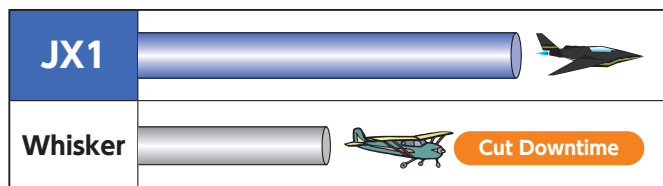
### Features

- Significantly extended tool life compared to whisker ceramics
- Double cutting speed potential compared to whisker ceramics
- Superior surface finish compared to whisker ceramics
- Applicable to powder-metallurgical heat resistant alloys

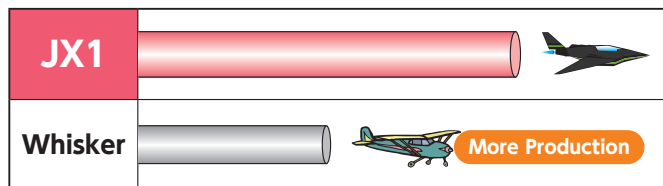
### Patents Pending

### Increase Productivity vs. Whisker Ceramics

#### ① Significantly extended tool life at same speed



#### ② Double speed capability



## JP2

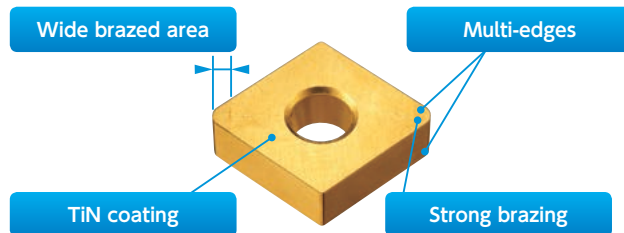
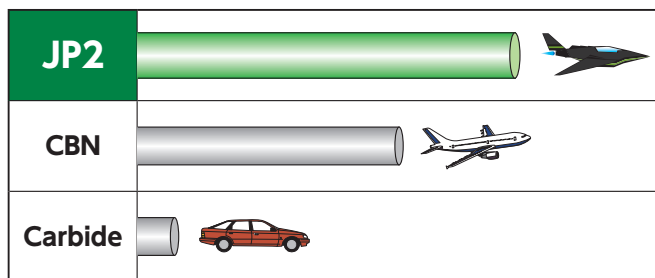
### Features

- High speed finish turning can be performed at 800SFM or higher
- Superior wear resistance compared to CBN's
- Superior notching resistance vs CBN or carbides
- Superior surface finishes vs CBNs and coated carbides

### Patents Pending

### Increase Productivity vs. Carbide

#### ① 10 to 15 times higher speed capability



Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR)	Depth of cut (inch)	DRY	WET
<b>JX1</b>	Heat Resistant Alloy	Turning	Rough no scale	600- <b>1600</b>	.005-.011	.040-.100		●
			Semi finishing	600- <b>1600</b>	.004-.010	.020-.080		●
<b>JP2</b>	Heat Resistant Alloy	Turning	Finishing	600- <b>1700</b>	.004-.010	.010-.040		●

## 1 Longer tool life

JX1's combination of High Hardness, Superior Thermal Conductivity and Improved Strength compared to whisker ceramics results in significantly longer tool life when applied at typical whisker ceramic speeds / feeds and depth of cut.

Turbine shaft (Inco718 Pre-machined)			
	Comp. whisker	JX1	
Shape	RNG45	←	
Cutting speed (SFM)	800	←	
Feed (IPR)	.008	←	
Depth of cut (inch)	.080	←	
	WET	←	
NTK : JX1		10 min	
Competitor's whisker ceramic		3 min	

## 2 Higher speeds

JX1's Superior Physical Properties compared to whisker ceramic enable you to increase speeds; potentially as much as 2X whisker ceramic speeds; increasing productivity and potentially offsetting needs for additional equipment to meet increasing demands.

Turbine disk (Inco718 rough)			
	Comp. whisker	JX1	
Shape	RPGX45	←	
Cutting speed (SFM)	650	1300	
Feed (IPR)	.006	←	
Depth of cut (inch)	.080	←	
	WET	←	
NTK : JX1		120 cc/min	
Competitor's whisker ceramic		60 cc/min	

JX1

Whisker Ceramic



Chips easily break at higher cutting speed vs typically continuous chips of Super Alloy materials. This makes more efficient chip removal.

## 3 Works well on wide range of High Temperature Alloys

JX1's Unique Physical Properties enables machining of newer compositions of difficult to machine High Nickel Alloys, High Nickel/Cobalt alloys, or powdered metallurgy alloys that are becoming more common in the market .

Turbine case (718Plus semi finish)			
	Comp. coated whisker	JX1	
Shape	RNG45	←	
Cutting speed (SFM)	800	←	
Feed (IPR)	.010	←	
Depth of cut (inch)	.020	←	
	WET	←	
NTK : JX1		3 pass	
Competitor's whisker ceramic		1 pass	

## 4 Superior Surface Finish

JP2's Outstanding Wear resistance and notching resistance results in workpiece surface finishes consistently superior to either CBN or Carbide

	JP2	CBN	Carbide
Machined surface			
Roughness			
	Ra 0.64 $\mu\text{m}$	1.18 $\mu\text{m}$	2.75 $\mu\text{m}$
	Rz 3.36 $\mu\text{m}$	5.56 $\mu\text{m}$	9.64 $\mu\text{m}$
Cutting speed	800 SFM	←	120 SFM
Feed rate	.006 IPR	←	←
Cycle time	3.3 min	←	14.7 min
Removed chip	48 cc	←	←



# JX1

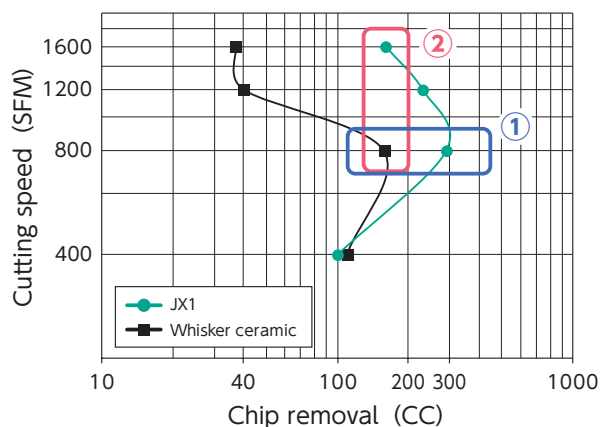
## New Composite Material for Super Alloy Machining



### Features

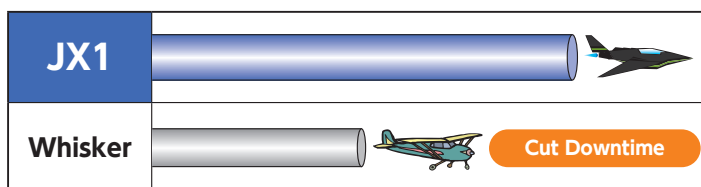
Patents Pending

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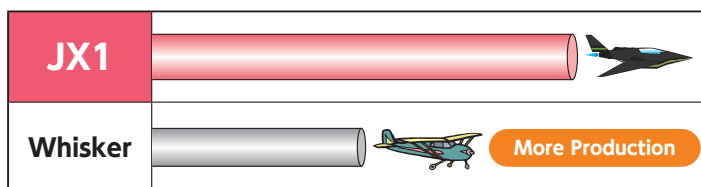


### Increase Productivity vs. Whisker Ceramics

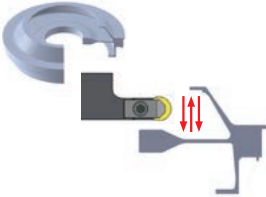
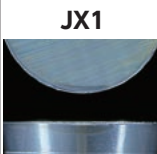
#### ① Significantly extended tool life at same speed

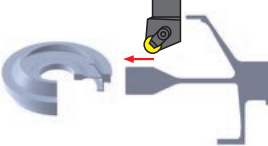






#### ② Double speed capability



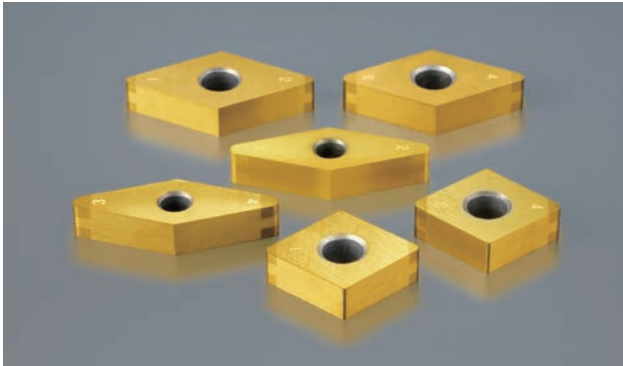
Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR)	Depth of cut (inch)	DRY	WET
JX1	Heat Resistant Alloy	Turning	Rough no scale	600-1600	.005-.011	.040-.100		●
			Semi finishing	600-1600	.004-.010	.020-.080		●

Turbine disk (Inco718 rough)			
	Comp. whisker	JX1	
Shape	RPGX45	←	
Cutting speed (SFM)	650	1300	
Feed (IPR)	.006	←	
Depth of cut (inch)	.080	←	
	WET	←	
NTK : JX1	120 cc/min		
Competitor's whisker ceramic	60 cc/min		

Turbine disk (Rene104 rough)			
	Comp. whisker	JX1	
Shape	RNG45	←	
Cutting speed (SFM)	700	←	
Feed (IPR)	.007	←	
Depth of cut (inch)	.040	←	
	WET	←	
NTK : JX1	 4 pass		
Competitor's whisker ceramic	 1 pass		

## JP2

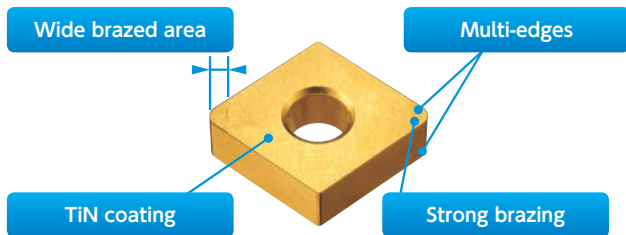
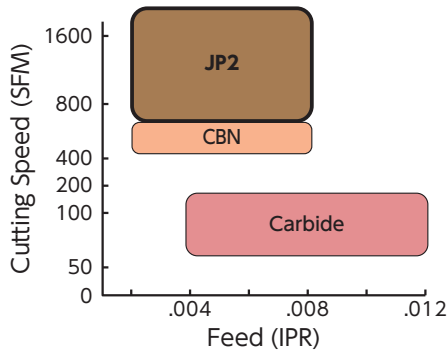
## Ultra High-Speed Finishing of Super Alloys



### Features

### Patents Pending

- High speed finish turning can be performed at 800SFM or higher
- Superior wear resistance compared to CBN's
- Superior notching resistance vs CBN or carbides
- Superior surface finishes vs CBNs and coated carbides



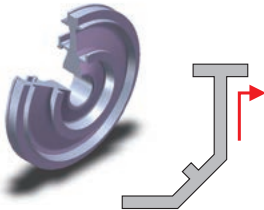
### Increase Productivity vs. Carbide

#### ① 10 to 15 times higher speed capability


JP2	
CBN	
Carbide	

Grade	Work material	Application	Purpose	Cutting speed (SFM)	Feed (IPR)	Depth of cut (inch)	DRY	WET
JP2	Heat Resistant Alloy	Turning	Finishing	600-1700	.004-.010	.010-.040		●

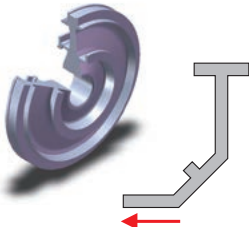
Disk (Inco718 Finishing)		
	Competitor's Coated Carbide	JP2
Shape	CNGG432	CNGA432
Cutting speed (SFM)	70	800
Feed (IPR)	.003	←
Depth of cut (inch)	.010	←
	WET	←
Tool life	1pc	←



NTK : JP2	525 cc/min
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Competitor's Coated Carbide	45 cc/min
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Disc (Inco718 Semi-finishing / Finishing)			
	Competitor's Coated Carbide	JP2	
Shape	CNGP432	CNGA432	
Cutting speed (SFM)	150	600	
Feed (IPR)	.0035	←	
Depth of cut (inch)	.015+.005	←	
	WET	←	
Tool life	1pc	4pcs	
NTK : JP2		4 pcs with 4 times higher productivity	
Competitor's Coated Carbide	1 pc		

# Machining High Temperature Alloys with BIDE MICS and Ceramics

## Solutions for the Aerospace Industry

### JX1 BIDE MICS

NEW



#### ■ Features

- Significantly extended tool life compared to whisker ceramics
- Double cutting speed potential compared to whisker ceramics
- Superior surface finish compared to whisker ceramics
- Applicable to powder-metallurgical heat resistant alloys

#### ■ Recommended Work Materials

- Inco 718
- 718 Plus
- MAR-M247
- Rene

#### ■ Recommended Applications

- Semi-Finish
- Profiling

	JX1	WA1
Notching	◎	
Flank Wear	◎	◎
Toughness	○	
Heat Shock		

#### ■ Profiling of Inco 718



Competitor's Whisker Ceramic

Tool Life : 3min



JX1

Tool Life : 10min



Turbine Shaft

RNG45, 800SFM, 008IPR,  
080DOC, WET,  
Inco 718 (pre-machined)

### SX5 SiAlON Ceramic

#### ■ Features

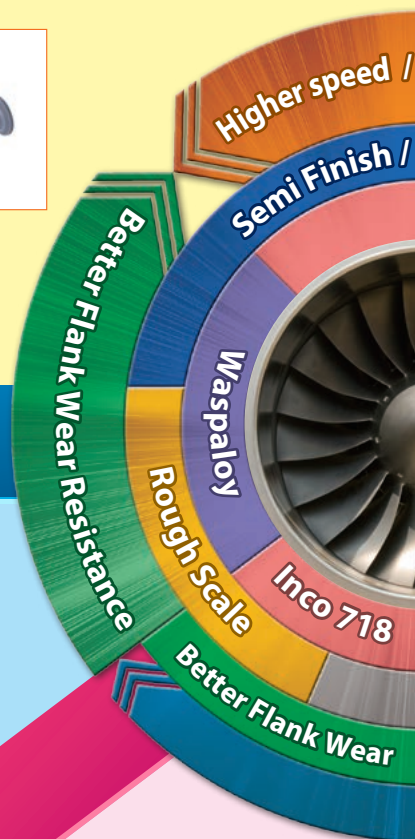
- Best grade for scale and interruptions
- Best grade for machining high-cobalt alloys

#### ■ Recommended Work Materials

- Waspaloy
- Udimet 720
- 718Plus
- Rene 41

#### ■ Recommended Applications

- Rough Turning with scale and interruptions



### SX9 SiAlON Ceramic



#### ■ Features

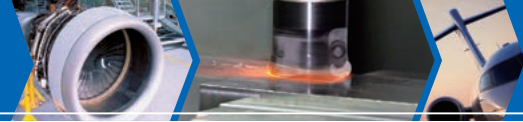
- Tougher when compared to whisker ceramics
- Extreme toughness makes higher feed and heavier DOC machining possible
- Best grade for machining Inco 718 with scale

#### ■ Recommended Work Materials

- Inco 718
- Inco 706
- Inco 713

#### ■ Recommended Applications

- Rough turning with scale
- Milling



# WA1 Whisker-Reinforced Ceramic

## ■ Features

- Versatile grade for machining of high temperature alloys
- Better flank wear resistance compared to SiALON ceramics
- Better notching resistance compared to competitor's whisker ceramics

## ■ Recommended Work Materials

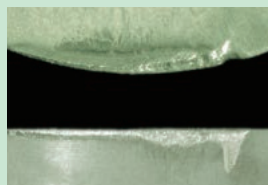
- Inco 718
- Inco 625

## ■ Recommended Applications

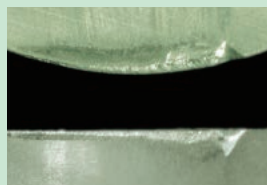
- Semi-Finish
- Grooving
- Profiling

SX7	SX9	SX5
◎	◎	○
○		
	◎	○
◎	◎	

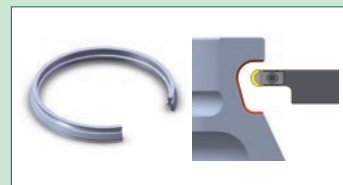
## ■ Profiling of Inco 718



Competitor's Whisker Ceramic

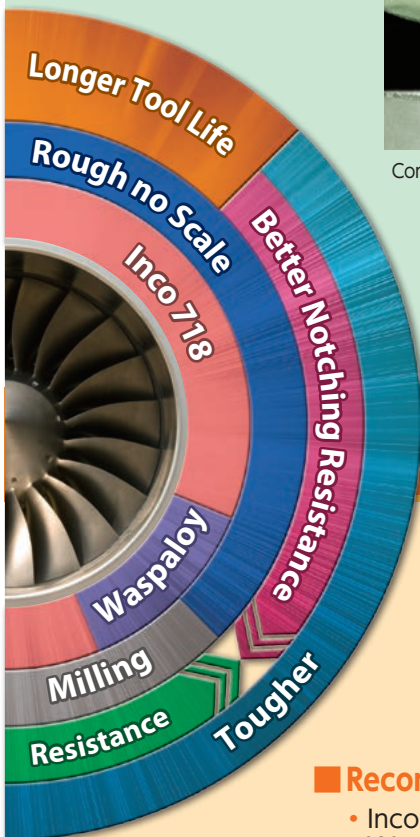


WA1



Turbine Case

Tool Life : 5.0min  
RPGX45, 800SFM, .006IPR., .040", Wet  
Inco 718 (pre-machined)



# SX7 SiALON Ceramic



## ■ Features

- Can run at same cutting condition vs whisker ceramics
- Better notching resistance compared to whisker ceramics
- No need to program ramping when compared to whisker ceramics
- Better flank wear resistance compared to competitor's SiALON ceramics
- Best grade for pre-machined Waspaloy
- Best grade for high-speed milling

## ■ Recommended Work Materials

- Inco 718
- Inco 625
- Waspaloy
- Udimet 720

## ■ Recommended Applications

- Semi-Finish
- Grooving
- Profiling

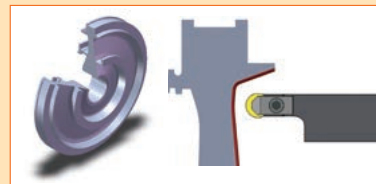
## ■ Profiling of Inco 718



Competitor's Whisker Ceramic



SX7















Turbine Disk

Tool Life : 4.5min  
RCGX45, 800SFM, .006IPR., .040", Wet  
Inco 718 (pre-machined)



## Applications

Application	Grade	Work material	Cutting speed				Feed				Depth of cut				Coolant
			600	800	1000	1200	1400	1600	.004	.008	.012	.016	.020	.020	
<div>Rough with Scale</div> 	SX5	Waspalloy													WET 
	SX9	Inco718	650 (600-800) SFM				.012 (.008-.014) IPR				.080 (.040-.200)*				
	SX7	Overall	800 (600-900) SFM				.008 (.004-.009) IPR				.080 (.040-.200)*				
<div>Rough no Scale</div> 	JX1	Overall													WET 
	SX7	Waspalloy	700 (600-900) SFM				.009 (.006-.012) IPR				.080 (.040-.100)*				
	WA1	Inco718	800 (600-1000) SFM				.008 (.005-.010) IPR				.070 (.040-.100)*				
<div>Profiling &amp; Semi-Finish</div> 	JX1	Overall													WET 
	SX7	Waspalloy	800 (600-900) SFM				.008 (.005-.010) IPR				.060 (.040-.080)*				
	WA1	Inco718	800 (600-1100) SFM				.008 (.004-.010) IPR				.060 (.040-.080)*				
<div>Finishing</div> 	JP2	Overall													WET 
<div>Grooving</div> 	SX5	Waspalloy									<div>When using SX7 / SX5, increase feed rates 100% vs. Whisker Ceramics</div>				WET 
	SX7	Inco718	750 (600-900) SFM				.0045 (.003-.006) IPR								
	WA1	Overall	800 (600-1100) SFM				.003 (.002-.004) IPR								

Application	Grade	Work material	Cutting speed						Feed					Depth of cut					Coolant
			1500	2000	2500	3000	3500	4000	.002	.003	.004	.005	.006	.020	.040	.060	.080	.100	
<div>Milling</div> <div></div>	SX7	Overall	<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div>2700 (2000-4000) SFM</div>						<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div>.004 (.003-.005) IPT</div>					<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div>.070 (.040-.100)*</div>					<div>DRY</div> <div></div>
	SX9	Overall	<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div>2500 (1500-3500) SFM</div>						<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div>.005 (.004-.006) IPT</div>					<div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div>.080 (.040-.100)*</div>					

**NGK** **NTK**  
 SPARK PLUGS TECHNICAL CERAMICS  
 NGK SPARK PLUGS (USA), INC.

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