



NTK CUTTING TOOLS

# Solutions for the Aerospace Industry

Machining High Temperature Alloys with Ceramics

**Introducing New Silicon Nitride SX7 !**



NTK Produces The World's Most Advanced Ceramic  
Cutting Tool Materials for the Aerospace Industry



# Solutions for Aerospace Industry

## Recommended Cutting Conditions by Application

Application	Grade	Coolant	Cutting Speeds					Feed					Depth of Cut				
			400 120	600 180	800 240	1000 300	1200 360	.004 0.1	.008 0.2	.012 0.3	.016 0.4	.020 0.5	.040 1.0	.060 1.5	.080 2.0	.100 2.5	.120 3.0
Rough Turning Scale 	SX5	WET 	650 (450-800) sfm 200 (130-240) m/min					.012 (.008-.014) ipr 0.30 (0.20-0.35) mm/rev					.080 (.040-200)" 2.0 (1.0-5.0) mm				
	SX7		800 (600-1000) sfm 240 (180-300) m/min					.008 (.004-.010) ipr 0.20 (0.10-0.25) mm/rev					.080 (.040-200)" 2.0 (1.0-5.0) mm				
	SX9		650 (450-800) sfm 200 (130-240) m/min					.012 (.008-.014) ipr 0.30 (0.20-0.35) mm/rev					.080 (.040-200)" 2.0 (1.0-5.0) mm				
Rough no Scale 	SX5	WET 	700 (600-900) sfm 210 (180-270) m/min					.014 (.008-.016) ipr 0.35 (0.20-0.40) mm/rev					.080 (.040-100)" 2.0 (1.0-2.5) mm				
	SX7		900 (700-1100) sfm 270 (210-330) m/min					.010 (.006-.014) ipr 0.25 (0.15-0.35) mm/rev					.080 (.040-100)" 2.0 (1.0-2.5) mm				
	SX9		700 (600-900) sfm 210 (180-270) m/min					.014 (.008-.016) ipr 0.35 (0.20-0.40) mm/rev					.080 (.040-100)" 2.0 (1.0-2.5) mm				
Profiling & Semi-Finish 	SX5	WET 	700 (600-900) sfm 210 (180-270) m/min					.008 (.004-.012) ipr 0.20 (0.10-0.30) mm/rev					.060 (.040-.080)" 1.5 (1.0-2.0) mm				
	SX7		900 (700-1100) sfm 270 (210-330) m/min					.006 (.003-.010) ipr 0.15 (0.08-0.25) mm/rev					.060 (.040-.080)" 1.5 (1.0-2.0) mm				
	SX9		700 (600-900) sfm 210 (180-270) m/min					.008 (.004-.012) ipr 0.20 (0.10-0.30) mm/rev					.060 (.040-.080)" 1.5 (1.0-2.0) mm				
Grooving 	WA1	WET 	900 (600-1200) sfm 270 (180-360) m/min					.002 (.002-.004) ipr 0.05 (0.05-0.10) mm/rev									

Application	Grade	Coolant	Cutting Speeds					Feed					Depth of Cut				
			2000 600	2500 750	3000 900	3500 1050	4000 1200	.002 0.05	.003 0.08	.004 0.10	.005 0.12	.006 0.15	.020 0.5	.040 1.0	.060 1.5	.080 2.0	.100 2.5
Milling 	SX7	DRY 	3500 (2500-4000) sfm 1050 (750-1200) m/min					.004 (.003-.005) ipr 0.10 (0.08-0.12) mm/rev					.060 (.040-100)" 1.5 (1.0-2.5) mm				
	SX9		3000 (2000-3500) sfm 900 (600-1050) m/min					.006 (.004-.006) ipr 0.15 (0.10-0.15) mm/rev					.060 (.040-100)" 1.5 (1.0-2.5) mm				



# SX7 SiAlON Ceramic

**New**

## ■ Features

- Better notching resistance compared to Whisker Ceramics
- No need to program ramping like Whisker Ceramics require
- Better flank wear resistance compared to SiAlON Ceramics
- Best grade for pre-machined Waspaloy
- Best grade for high-speed milling

## ■ Recommended Work Materials

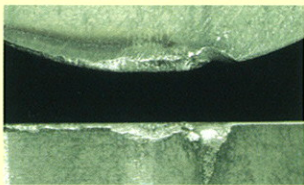
- Inco 718
- Waspaloy
- Inco 625
- Udimet 720

## ■ Recommended Applications

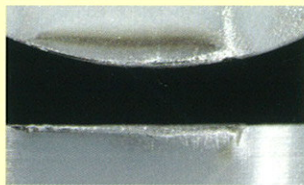
- Semi-Finish
- Milling
- Profiling

	SX5
Notching	○
Flank Wear	
Toughness	○
Heat Shock	

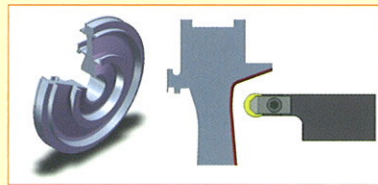
## ■ Profiling of Inco 718



Competitor's Whisker Ceramic



**SX7**



Turbine Disk

Tool Life : 4.5min

RCGX45, 800sfm .006ipr, .040", Wet

RCGX120700, 240m/min, 0.15mm/rev, 1.00mm, Wet

Inco 718 (pre-machined)

# SX5 SiAlON Ceramic

## ■ Features

- Tougher when compared to Whisker Ceramics
- Best grade for machining Waspaloy with scale

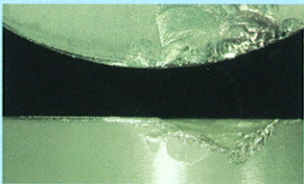
## ■ Recommended Work Materials

- Waspaloy
- 718Plus
- Udimet 720
- Rene 41

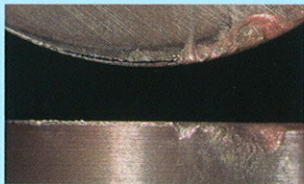
## ■ Recommended Applications

- Rough Turning with scale and interruptions

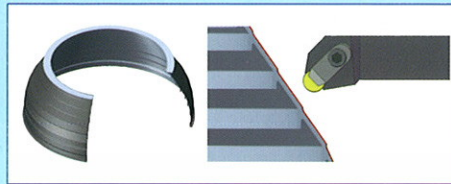
## ■ Rough Turning of Waspaloy with Scale



Competitor's Whisker Ceramic



**SX5**



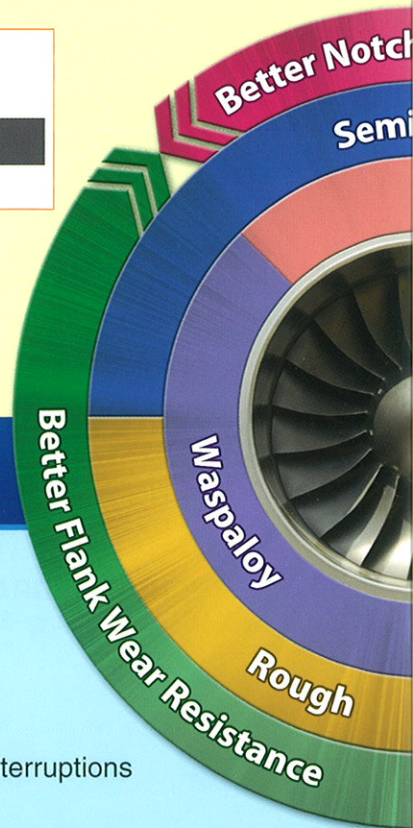
Turbine Case

Tool Life : 2.0min

RNG65, 950sfm .012ipr, .150", Wet

RNGN190700, 285m/min, 0.30mm/rev, 3.80mm, Wet

Waspaloy with Scale





## WA1 Whisker-Reinforced Ceramic

SX7	SX9	WA1
○	○	
○		○
	○	
○	○	

### ■ Features

- Versatile grade for machining of high temperature alloys
- Better flank wear resistance compared to SiAlON Ceramics
- Better notching resistance compared to competitors' Whisker Ceramics

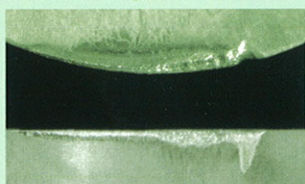
### ■ Recommended Work Materials

- Inco 718
- Inco 625

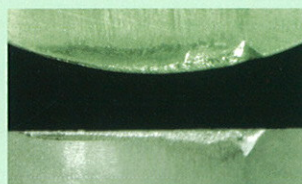
### ■ Recommended Applications

- Semi-Finish
- Profiling
- Grooving

### ■ Profiling of Inco 718



Competitor's Whisker Ceramic

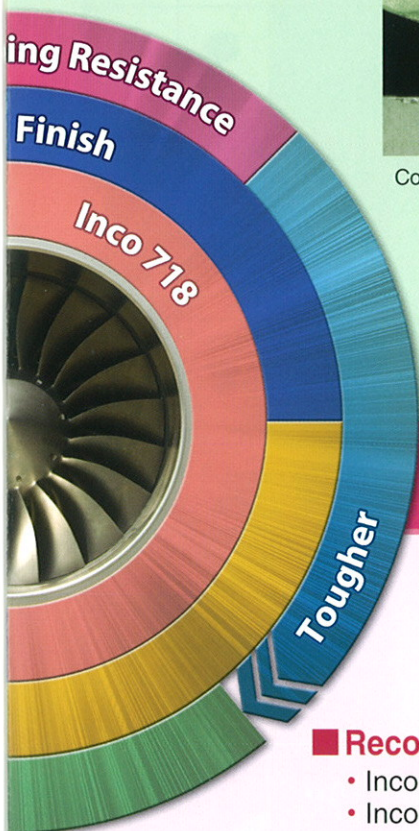


WA1



Turbine Case

Tool Life : 5.0min  
 RPGX45, 800sfm .006ipr, .040", Wet  
 RPGX120700, 240m/min, 0.15mm/rev, 1.00mm, Wet  
 Inco 718 (pre-machined)



## SX9 SiAlON Ceramic

### ■ Features

- Tougher when compared to Whisker Ceramics
- Extreme toughness makes higher feed and heavier D.O.C machining possible
- Best grade for machining Inco 718 with scale

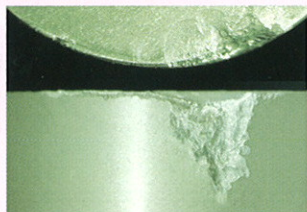
### ■ Recommended Work Materials

- Inco 718
- Inco 706
- Inco 713

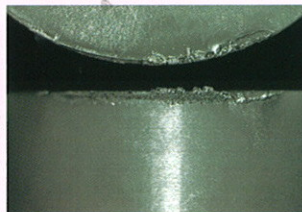
### ■ Recommended Applications

- Rough turning with scale
- Milling

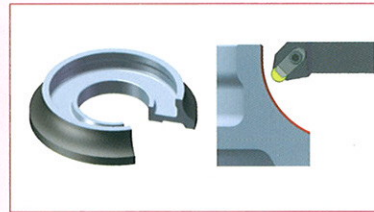
### ■ Rough Turning of Inco 718 with Scale



Competitor's Whisker Ceramic



SX9








Cover Shield

Tool Life : 3.0min  
 RNG65, 800sfm .010ipr, .150", Wet  
 RNGN190700, 240m/min, 0.25mm/rev, 3.80mm, Wet  
 Inco 718 with Scale



# Recommended Insert Grade by Work Material

Application	Grade	Inco625	Inco706	Inco713	Inco718	Inco901	Inco903	IN100	Udimet720	Rene41	Waspaloy	718Plus
Rough Turning Scale 	SX5			●	●	●	●	●	●	●	●	●
	SX7	●	●			●	●					
	SX9	●	●	●	●			●	●	●	●	●
Rough no Scale 	SX5					●	●	●	●	●	●	●
	SX7	●	●	●	●	●	●	●	●	●	●	●
	SX9	●	●	●	●							
Profiling & Semi-Finish 	SX5					●	●	●	●	●	●	●
	SX7	●	●	●	●	●	●	●	●	●	●	●
	SX9	●	●	●	●							
Grooving 	WA1	●	●	●	●	●	●	●	●	●	●	●

Application	Grade	Inco625	Inco706	Inco713	Inco718	Inco901	Inco903	IN100	Udimet720	Rene41	Waspaloy	718Plus
Milling 	SX7	●	●	●	●	●	●	●	●	●	●	●
	SX9	●	●	●	●	●	●	●	●	●	●	●

 1st Choice    
  2nd Choice