

# Инструменты для обработки жаропрочных суперсплавов HRSA

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# Machining of Heat Resistant Superalloys – HRSA

## Machining Solutions

Turning • Hard Turning • Grooving • Milling • Boring



Precision tools from SPK Cutting Tools have played a key rôle in providing high-productivity machining solutions for cast iron components for over 70 years. Today, continuous developments in cutting tool materials enable reliable high-performance machining not only of cast iron materials, but also of heat-resistant superalloys and

hard materials. Whether it's turning, grooving, milling or boring, using standard or special tools - SPK Cutting Tools machining solutions focus on cost and productivity benefits combined with process reliability.

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SPK's  
**BIG FIVE**

# THAT'S ALL YOU NEED –

For your HRSA machining

1

#### CUTTING MATERIALS

- SiC-whisker ceramics
- SiAlON
- Polymorphic SiAlON

2

#### INSERTS

- Standard geometries
- Special geometries

3

#### TOOL HOLDERS

- Special tools
- Standard tools

4

#### ENGINEERING

- Tool layouts
- Tool designs
- Time calculations

5

#### PARTNER

- From the first chip
- To optimization
- And troubleshooting
- Worldwide – on-site

When it comes to machining HRSA materials, SPK Cutting Tools' Big Five offers everything you need from a single source to ensure that the machining of your HRSA components is as efficient and reliable as possible.



Aerospace



Gas & Oil



Energy

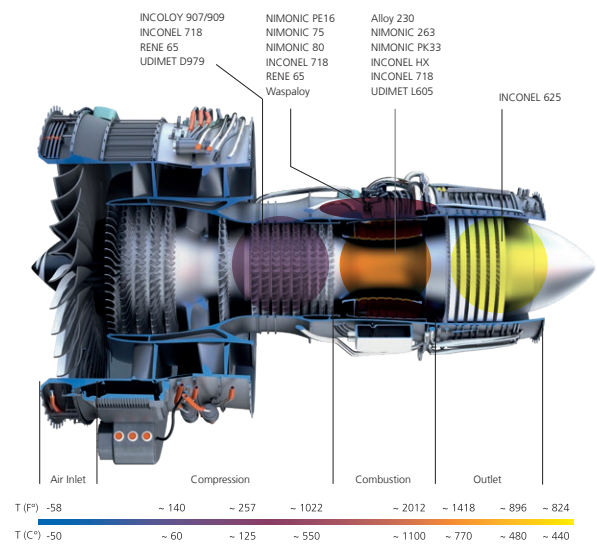


Process

## High productivity when machining heat resistant superalloys – HRSA

### Machining HRSA materials

HRSA (heat resistant superalloy) materials are used in a variety of industries. These materials are primarily used for components that have to retain their material properties such as high strength and hardness at high temperatures, sometimes even in corrosive environments. This is the case, for example, in the hot section of turbines or for joints and flanges in the oil & gas industry or process industry. HRSA materials can be divided into three groups of alloys: nickel, iron and cobalt based alloys. SPK cutting materials are designed for machining nickel and cobalt-based alloys.



## Cutting materials

SPK Cutting Tools offers various cutting material grades for machining HRSA materials. They are perfectly balanced between toughness and wear resistance. This leads to high cutting parameters during roughing and semi-finishing. Various chamfer geometries are available that are precisely matched to the application. Special geometries for turning and grooving inserts are available on request.



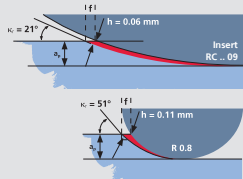
SPK Type	Cutting materials for turning			Cutting materials for milling
	RST 330	LST 320	LST 370	LSM 800
Cutting Material	SiC-whisker reinforced ceramic	SiAlON ceramic	Polymorphous SiAlON ceramic	SiAlON ceramic
Application	Turning, Grooving	Turning, Grooving	Turning	Solid ceramic endmills and cutting inserts
Machining	Roughing, Semi-finishing, Profiling, Broaching, Scale / no scale	Roughing, Semi-finishing, Profiling, Broaching, Scale / no scale	Semi-finishing, Profiling, No scale	Roughing, Semi-finishing
Materials	Nickel- and cobalt-based alloys	Nickel-based alloys	Nickel-based alloys	Nickel-based alloys

### Recommended cutting data range

SPK Type	Cutting materials for turning			Cutting materials for milling
	RST 330	LST 320	LST 370	LSM 800
Cutting Material	SiC-whisker reinforced ceramic	SiAlON ceramic	Polymorphous SiAlON ceramic	SiAlON ceramic
$v_c$ (m/min.)	250 - 400 m/min.	180 - 300 m/min	150 - 250 m/min	450 - 750 m/min
$f$ (mm)	0.10 - 0.20 mm	0.15 - 0.35 mm	0.10 - 0.25 mm	0.10 - 0.20 mm/z
$a_p$ (mm)	1.0 - 2.0 mm	2.0 - 3.0 mm	0.5 - 2.0 mm	0.5 - 2.0 mm
Coolant	yes	yes	yes	no

### QUICK TIP

Reduce load on insert by choosing largest applicable insert. This reduces breakage on cutting edge at same doc, feed and speed!



Insert size 9.52 mm



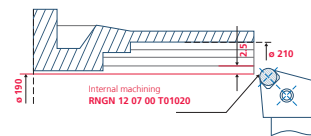
Corner radius 0.8 mm

Pictures not scaled

### Application example RST 330

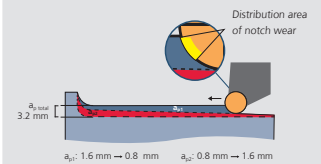
Workpiece: Bell  
Material: Inconel 718  
Internal turning with RST 330;  
Slightly interrupted cut  
Coolant supply  
Tool life: 4 cuts per cutting edge

**Cutting data:**  
 $v_c = 300$  m/min  
 $f = 0.20$  mm  
Length of cut,  $l = 85$  mm  
 $doc = 2.5$  mm



### QUICK TIP

When using SiC-whisker reinforced inserts for several cuts of the same length, ramping in longitudinal turning will avoid notching and increase tool life significantly.



# Ceramic cutting materials – SiAlON

INSERT	ISO	GRADE	K												H	S	P	SPK REF. NO.
			GJL	GJS	ADI	SI GJS	GJV	CHILLCAST IRON	DIE CASTING	STEEL								
	CNGN 12 07 08 T01020	LST 320	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.50.022.15.8
	CNGN 12 07 08 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.50.022.15.4
	CNGN 12 07 12 T01020	LST 320	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.50.023.15.8
	CNGN 12 07 12 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.50.023.15.4
	DNGN 12 07 16 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.50.024.15.4
	DNGN 15 07 08 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.50.077.15.4
	DNGN 15 07 12 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.50.078.15.4
	RCGX 06 06 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.42.331.15.4
	RCGX 09 07 00 T01020	LST 320	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.103.15.8
	RCGX 09 07 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.42.103.15.4
	RCGX 12 07 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.42.104.15.4
	RNCN 12 07 00 T01020	LSM 800	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.40.204.15.9
	RNGN 09 04 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.40.018.15.4

ISO Application group  
 K Cast iron  H Hard Materials  S HSRA  P Steel  Main application  Secondary application

INSERT	ISO	GRADE	K												H	S	P	SPK REF. NO.
			GJL	GJS	ADI	SI GJS	GJV	CHILLCAST IRON	DIE CASTING	STEEL								
	RNGN 12 07 00 T01020	LST 320	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.40.002.15.8
	RNGN 12 07 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.40.002.15.4
	RNGN 15 07 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.40.023.15.4
	RPGN 09 04 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.42.054.15.4
	RPGX 06 04 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.42.341.15.4
	RPGX 09 07 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.42.340.15.4
	RPGX 12 07 00 T01020	LST 320	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.337.15.8
	RPGX 12 07 00 T01020	LST 370	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	21.42.337.15.4
	SNGN 12 04 08 T01020	LST 320	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.10.009.15.8
	SNGN 12 04 16 T01020	LST 320	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.10.059.15.8

ISO Application group  
 K Cast iron  H Hard Materials  S HSRA  P Steel  Main application  Secondary application

## SiC-whisker reinforced ceramic RST 330

INSERT	ISO	GRADE	K												H	S	P	SPK REF. NO.
			GJL	GJS	ADI	SI GJS	GJV	CHILLCAST IRON	DIE CASTING	STEEL								
	CNGN 12 07 08 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.50.022.15.0
	CNGN 12 07 12 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.50.023.15.0
	CNGN 12 07 16 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.50.024.15.0
	DNGN 15 07 12 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.50.078.15.0
	RCGX 06 04 00 T00520	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.322.03.0
	RCGX 06 04 00 TX00520	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.322.49.0
	RCGX 06 06 00 S01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.331.18.0
	RCGX 06 06 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.331.15.0
	RCGX 06 06 00 TX00520	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.331.49.0
	RCGX 09 07 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.103.15.0
	RCGX 12 07 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.104.15.0
	RNGN 12 04 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.40.027.15.0

ISO Application group  
 K Cast iron  H Hard Materials  S HSRA  P Steel  Main application  Secondary application

INSERT	ISO	GRADE	K												H	S	P	SPK REF. NO.
			GJL	GJS	ADI	SI GJS	GJV	CHILLCAST IRON	DIE CASTING	STEEL								
	RNGN 12 07 00 S01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.40.002.18.0
	RNGN 12 07 00 S99	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.40.002.99.0
	RNGN 12 07 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.40.002.15.0
	RNGN 15 07 00 P86	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.40.023.86.0
	RPGN 09 07 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.342.20.0
	RPGX 06 04 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.341.15.0
	RPGX 09 07 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.340.15.0
	RPGX 12 07 00 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.42.337.15.0
	SNGN 12 07 16 T01020	RST 330	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	15.10.023.15.0

ISO Application group  
 K Cast iron  H Hard Materials  S HSRA  P Steel  Main application  Secondary application



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## HPC-Tooling System – machining with high pressure coolant

The special feature of our HPC tooling system is that the coolant is supplied through the clamping finger. The coolant outlets on the finger are designed to deliver coolant directly to the work area where it is needed.

A coolant pressure of up to 200 bar can be applied to the tool. It should be noted that there is no need for seals between the tool holder and the clamping element. The design takes care of the sealing.

Another advantage of high pressure cooling is that the chip can be broken quickly. Ribbon chips are avoided and process reliability is increased.

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Tools with high pressure cooling are available on request. Our sales representatives will be happy to answer your request.

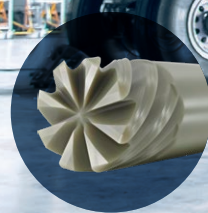


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## Milling of HRSA materials

### Milling systems

Face and contour milling, ramp and helix milling with high stock removal rates - that is what our milling systems are made for. With our end mills, screw-on and arbor mount milling cutters, we offer the right solution for any milling task.







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