

# MAXIVAL 188HS

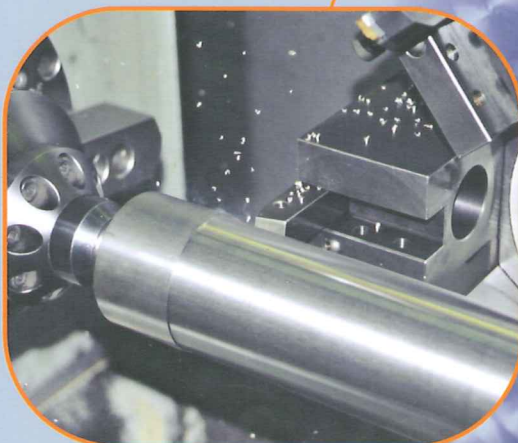
MAXIVAL 188HS

LONGER TOOL LIFE

FEWER REJECTIONS

HIGHER  
FEED AND SPEED

LESS MACHINE  
DOWNTIME



**ACCIAIERIE VALBRUNA**

The machinability depends on many variables such as:

- Type of machining operations
- Type of cutting fluid
- Type of tool
- Rigidity of tooling
- Sturdiness of fixture
- Steel grade

## MACHINABILITY OF AUSTENITIC STAINLESS STEEL

The difficulties in machining austenitic stainless steels are well known.

Compared to ferritic and martensitic steels, typical austenitic alloys have:

- **A high work hardening rate**
- **Toughness**
- **Ductility**
- **High friction coefficient**
- **Low thermal conductivity**

All these factors produce:

- **Long and tangled chips**
- **Chips wrap up around the tools making their removal difficult**
- **Higher temperatures developed in tools, have an effect on both wear and the risk of plastic deformation of cutting edge**
- **Large built - up edges due to the sticking of steel on the cutting edge**
- **Work hardened cut surface, due to deformation and mechanical stress**

## HOW TO SOLVE IT?

All these difficulties can be greatly reduced by using a free machining austenitic stainless steel.

Therefore, the right choice is: **MAXIVAL 188HS**

## WHAT IS MAXIVAL 188HS?

Machinists prefer to call it "free machined steel", metallurgists prefer to call it "a steel with a specified inclusion picture".

**MAXIVAL 188HS** is a new steel with better machinability than standard AISI 303.

This is achieved in the steelmaking process by:

- Modifying both sulphide and oxide inclusions favourable for machining
- Controlling the inclusions type, shape and composition
- Avoiding some kind of oxides which are extremely hard and cause abrasive wear of tool

The effect is obtained by:

- Using Calcium as the de-oxidizing agent
- Converting to softer Calcium inclusions which are enveloped by a soft sulphide case

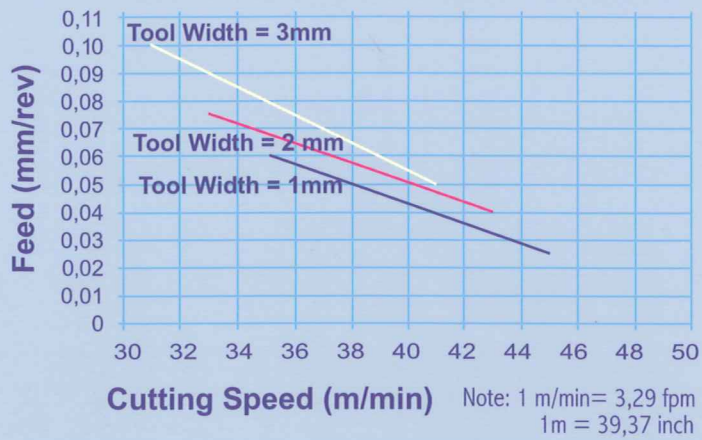
These oxy-sulphides cause less abrasive wear. At high and medium cutting speed they form a protective layer on the tool rake. This layer protects the tool against crater wear prolonging tool life, because these inclusions have lubricating properties and deform easily.



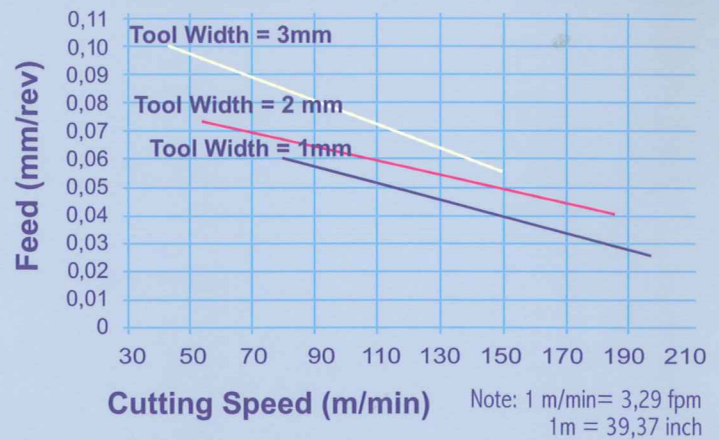


# CUTTING DATA RECOMMENDATIONS MAXIVAL 188HS

## Cutting Off Parameters HSS Tools

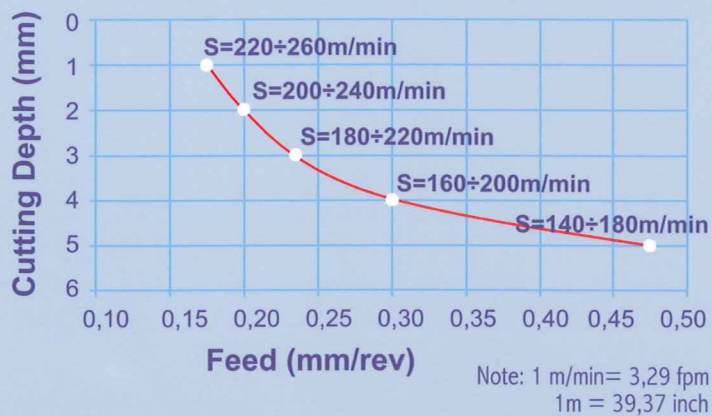


## Cutting Off Parameters Carbide Tools

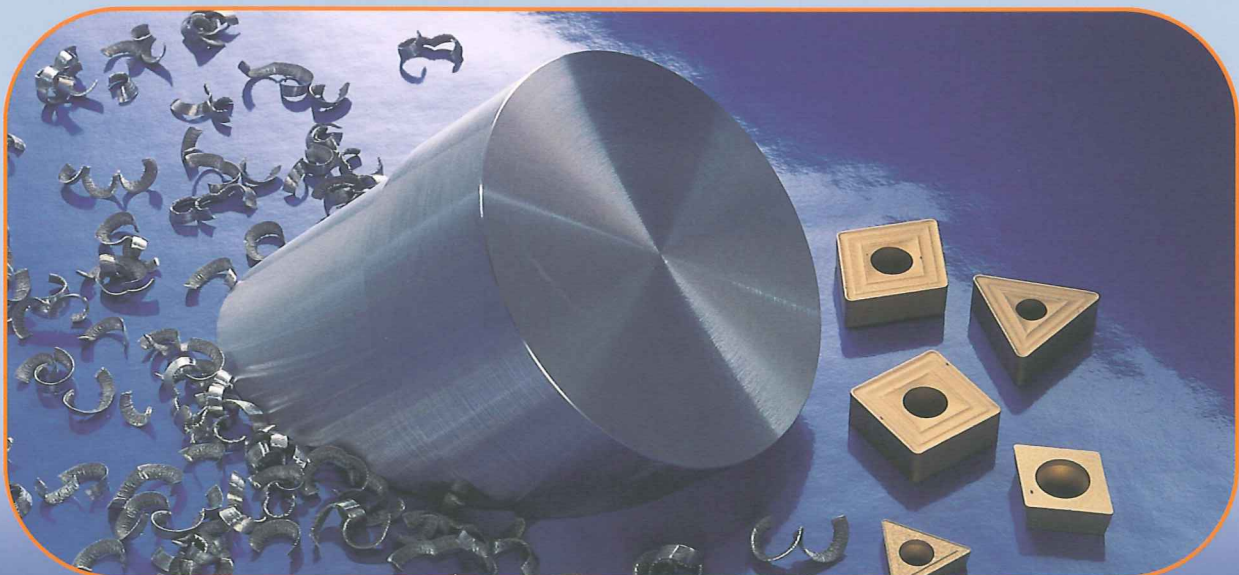
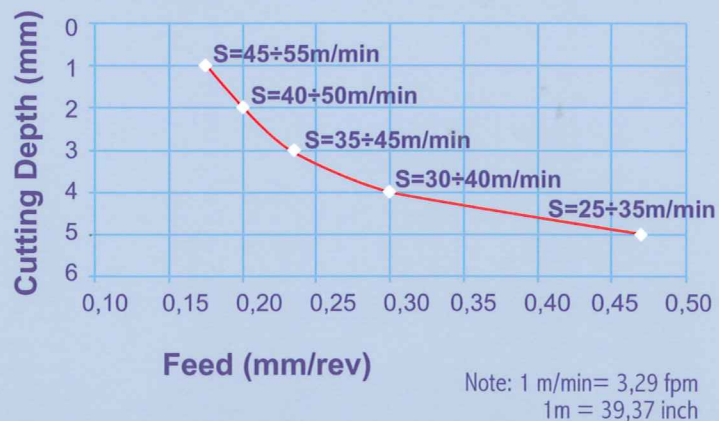


## TURNING

### Carbide Tools



### HSS Tools



## CUTTING DATA RECOMMENDATIONS MAXIVAL 188HS

DRILLING	DRILL DIA.		FEED		Cutting Speed (135° Point angle)				Indexable Insert Drills, Carbide Tools					
					HIGH-SPEED STEEL		CARBIDE TOOLS		DRILL DIA.		FEED		CUTTING SPEED	
	mm	inch	mm/rev	inch/rev	m/min	fpm	m/min	fpm	mm	inch	mm/rev	inch/rev	m/min	fpm
	1	0.004	0.05	0.002	17 ÷ 20	56 ÷ 66	35 ÷ 50	115 ÷ 164	20	0.79	0.12	0.0047	200 ÷ 260	658 ÷ 855
	3	0.12	0.10	0.004	20 ÷ 25	66 ÷ 82	40 ÷ 50	132 ÷ 164	30	1.18	0.14	0.0055	200 ÷ 260	658 ÷ 855
	5	0.20	0.20	0.008	25 ÷ 30	82 ÷ 98	40 ÷ 55	132 ÷ 181	40	1.57	0.16	0.0062	200 ÷ 260	658 ÷ 855
	10	0.40	0.30	0.012	25 ÷ 30	82 ÷ 98	50 ÷ 65	164 ÷ 214	50	1.97	0.22	0.0087	200 ÷ 260	658 ÷ 855
	15	0.59	0.35	0.014	25 ÷ 30	82 ÷ 98	50 ÷ 65	164 ÷ 214						
	20	0.79	0.40	0.016	25 ÷ 30	82 ÷ 98	55 ÷ 70	181 ÷ 230						
	30	1.18	0.45	0.018	25 ÷ 30	82 ÷ 98	55 ÷ 70	181 ÷ 230						

MILLING	MACHINING	High-speed steel				Cemented Carbide			
		FEED		CUTTING SPEED		FEED		CUTTING SPEED	
		mm/tooth	inch/tooth	m/min	fpm	mm/tooth	inch/tooth	m/min	fpm
	Face milling	0.15 ÷ 0.25	0.0059 ÷ 0.0098	35 ÷ 40	115 ÷ 132	0.15 ÷ 0.30	0.0059 ÷ 0.0118	150 ÷ 250	493 ÷ 822
	End milling	0.05 ÷ 0.20	0.0020 ÷ 0.0079	35 ÷ 40	115 ÷ 132	0.10 ÷ 0.20	0.0039 ÷ 0.0079	150 ÷ 220	493 ÷ 724

THREADING	TOOL	CUTTING SPEED	
		m/min	fpm
	Cemented Carbide	90 ÷ 150	296 ÷ 493
	High-Speed steel	30 ÷ 35	97 ÷ 115

### GENERAL GUIDELINE

- The cutting data is to be considered as base values that must be adapted to local conditions;
- cutting fluid must be selected to provide proper lubrication and heat removal;
- tooling and fixtures must be sturdy to avoid vibrations;
- cutting fluid must be directed to the cutting zone at higher flow rate to reduce the overheating;
- use insert with positive geometry and increase cutting speed to avoid the built-up edge;
- because the machined surface is work hardened, tool must work below this zone;
- drilling to depths more than 3 time the diameter, remove chips;
- using TiN-coated HSS drills, cutting speed can be increased by about 10÷20%, thanks to antisticking properties of coating;
- cutting data for indexable-insert drills-hole drilling: the manufacturer's recommendations must also be considered.



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## CLASSIFICATION

Free machining Austenitic stainless steel with better machinability than AISI 303 series.

### STANDARD COMPOSITION(%)

C	Mn	Si	Cr	Ni	S
0.04	1.7	0.5	17.5	8.2	0.32

### APPLICABLE SPECIFICATIONS

- AISI 303
- ASTM A582
- AMS 5640, Type 1
- W. No. 1.4305
- EN10088-3=X5CrNiS189

### PHYSICAL PROPERTIES

Density (20 °C):	7.9 Kg/dm <sup>3</sup> (0.286 lb/inch <sup>3</sup> )
Modulus of Elasticity	193.000 N/mm <sup>2</sup> (28,000 KSI)
Mean Coefficient of thermal expansion	20=> 600°C 19 x 10 <sup>-6</sup> m/m °C (68 => 1112 °F 10.5 x 10 <sup>-6</sup> in/in °F)
Thermal Conductivity (20 °C)	14.6 W/mK (8.4 Btu/ft/hr/°F)

### CORROSION RESISTANCE

**MAXIVAL 188HS** resists rusting in many kinds of atmosphere and organic and inorganic chemicals including weak acid solutions. The special steelmaking process controls the negative effect of sulphides by calibrated corrective elements. Residuals of cutting fluid must be completely removed by a degreasing process. As corrosion resistance is strongly influenced by surface conditions, all finished parts must be decontaminated and passivated in order to eliminate all particles of foreign materials.

### SOLUTION ANNEALING

**Heating** :1020÷1080°C (1870÷2150°F)

**Cooling** : Water

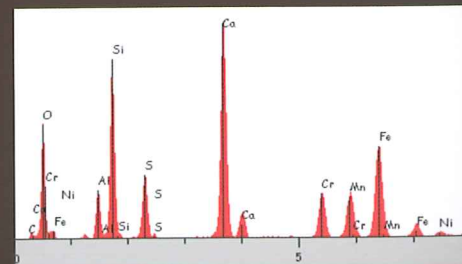
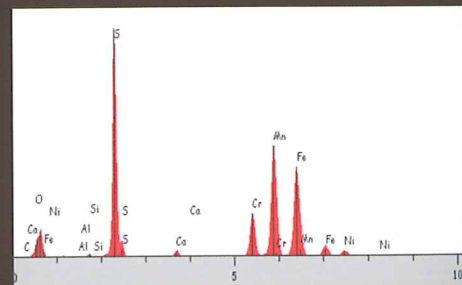
### MAGNETIC PERMEABILITY

**MAXIVAL 188HS** is paramagnetic as all austenitic grades.

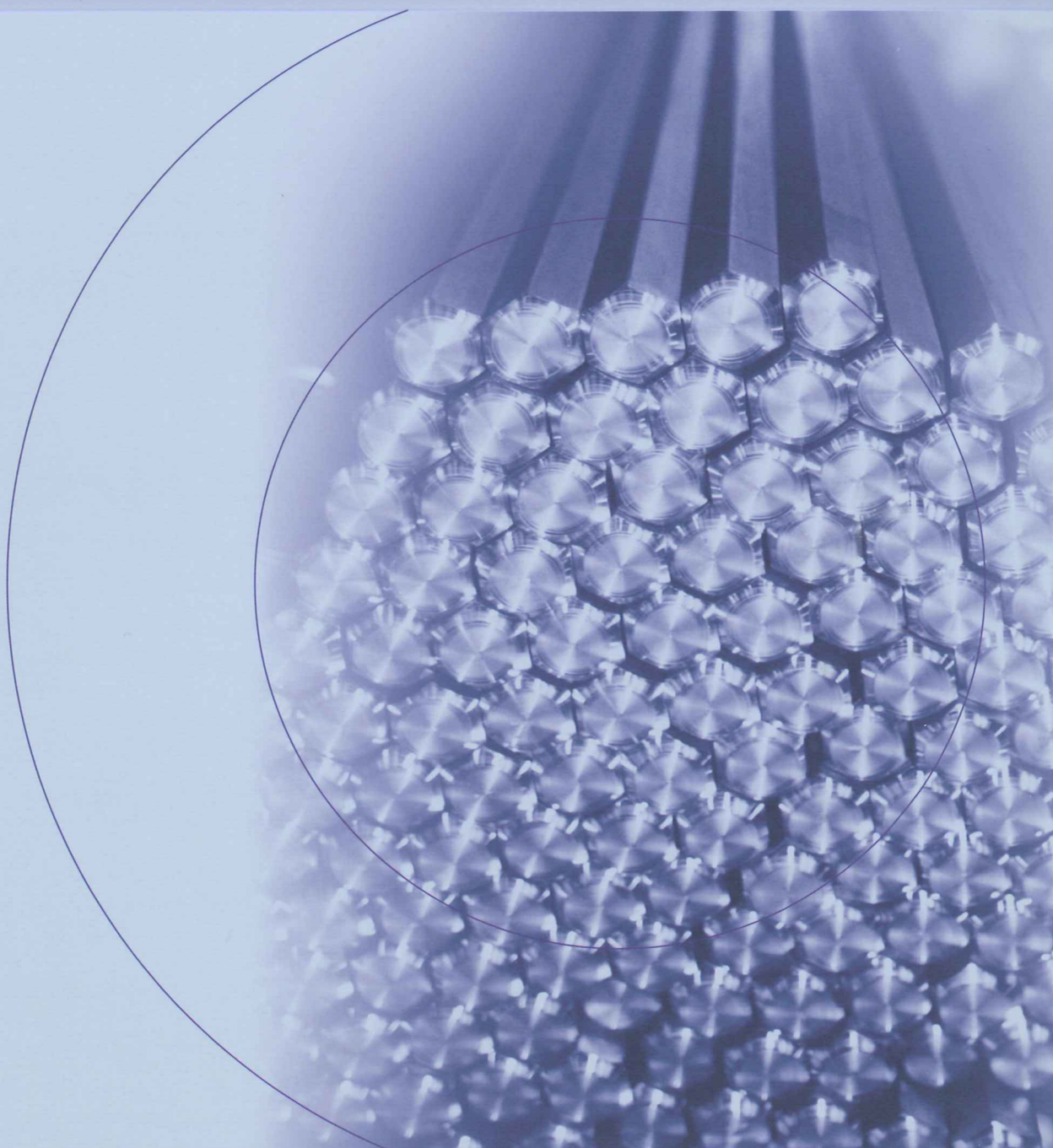
The magnetic permeability increases when cold worked and this ferromagnetic behavior depends on the rate of strain hardening.

### WELDING

**MAXIVAL 188HS** is designed to give best machinability and due to high sulphur content, it is not recommended for welding, because porosity may appear in fusion zone.



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