SULCORTE

HSS
CIRCULAR SAW BLADES

www.sulcorte.com.br

Completing 25 years of tradition in the metalworking industry, Sul Corte is positioned as the leading company in Latin America in the manufacture of HSS Circular Saw Blades and Tipped Circular Saw Blades (CERMET and CARBIDE), besides being the leader in the industrialization and commercialization of Band Saws and Industrial Cutting Machines in Brazil. The structure of the Sul Cortes has a modern factory park distributed in 12,000 square meters of area in the city of Caxias do Sul - RS and its two subsidiaries: Joinville - SC and Valinhos - SP.

With latest technology, Sul Corte offers high quality products and services, coupled with excellence in the pursuit of total customer satisfaction. In addition to all this, Sul Corte has been ISO 9001 certified for over ten years.

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001

ISO 9001:2015

FROM BRAZIL TO THE WORLD

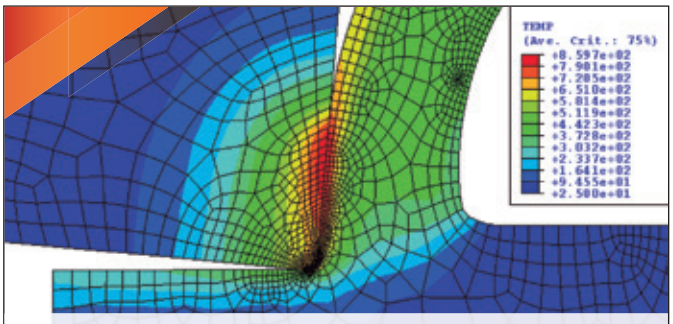
TRADITION AND QUALITY

Already consolidated in the national market, the company also has a network of representatives and distributors that operate worldwide. Circular saws from Sul Corte are already present in more than 20 countries, with sales to South America, North America, Europe, Africa, Asia and Oceania.

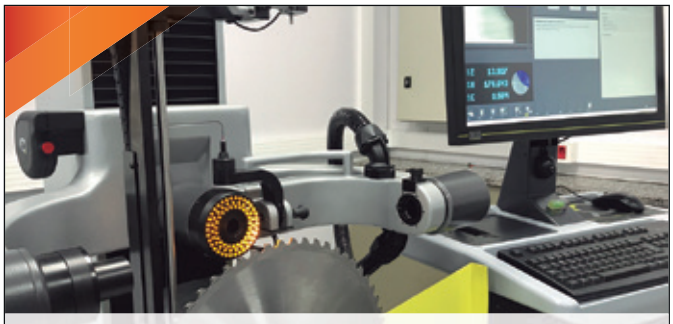
PRODUCT QUALITY

Sul Corte's circular saws are manufactured using the know-how acquired through studies and tests developed over the years. Knowledge-based technology enables us to offer our customers the best cutting solutions. Continuous improvement delivers superior quality to ensure the best blade performance. Our quality control is fully aligned with production, verifying and analyzing all the saws produced to the highest quality standards.

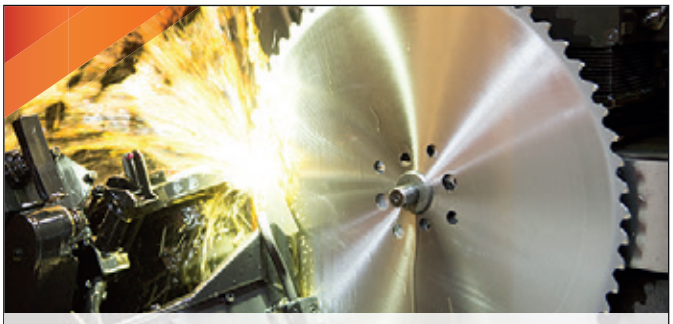
PRECISION ENGINEERING



RESEARCH AND DEVELOPMENT



CUTTING EDGE TECHNOLOGY



QUALITY

PVD COATING

BLACK and CHROME coatings are among the most advanced PVD (physical vapor deposition) technologies, with specific characteristics for each type of cut. These coatings increase surface hardness, wear and temperature resistance and decrease the friction generated during cutting by providing:

- HIGHER PERFORMANCE
- SHORTER CUTTING TIME
- HIGHER PRODUCTIVITY
- INCREASED BLADE LIFE

BLACK COATING

The ideal choice for cutting conditions where the saw is subjected to high load levels under high temperatures. A high hardness coupled with high toughness provides excellent protection against erosion and abrasive wear. Its nano structure guarantees a low friction coefficient ideal for high cutting speeds.

CHROME COATING

This coating has been specially developed for the most demanding cutting conditions. Its microstructure results in an extremely tough and stable coating, providing superior results in dry cutting. Its resistance to oxidation under high temperatures allows even higher cutting rates and feed rates.

DIAMOND LINE

DIAMOND

These blades are not coated and are mainly used in manual and semi-automatic cutting machines. They are ideal for cutting profiles and solid sections (round and square) of non-ferrous materials.

APPLICATION	EFFICIENCY
Aluminum, bronze, copper, brass and plastic.	

BLACK DIAMOND

Due to the characteristics of its PVD coating, this tool can be used to cut several materials, covering a wide range of applications. Its high surface hardness and low friction coefficient ensure good resistance to abrasive and erosion wear.

APPLICATION	EFFICIENCY
Low, medium and high carbon steel; Stainless steel; Cast iron; Hard steels and high cutting speeds.	

CHROME DIAMOND

It has an innovative PVD coating that guarantees better tool performance. Besides providing excellent results in dry machining, it grants better process productivity.

APPLICATION	EFFICIENCY
Medium and high carbon steels; Stainless steel; Hard steels and high cutting speeds.	

RUBY LINE

RUBY

The Ruby blade, without coating, guarantees a better performance for non-ferrous cutting, since the features of the M35 high speed steel guarantee a longer life for the tool.

APPLICATION	EFFICIENCY
Aluminum, bronze, copper, brass and plastic.	

BLACKRUBY

The high hardness of the coating and the benefits of the M35 HSS allow a better protection of the blade against abrasive wear and corrosion. It was developed to withstand high cutting speeds due to the low friction coefficient.

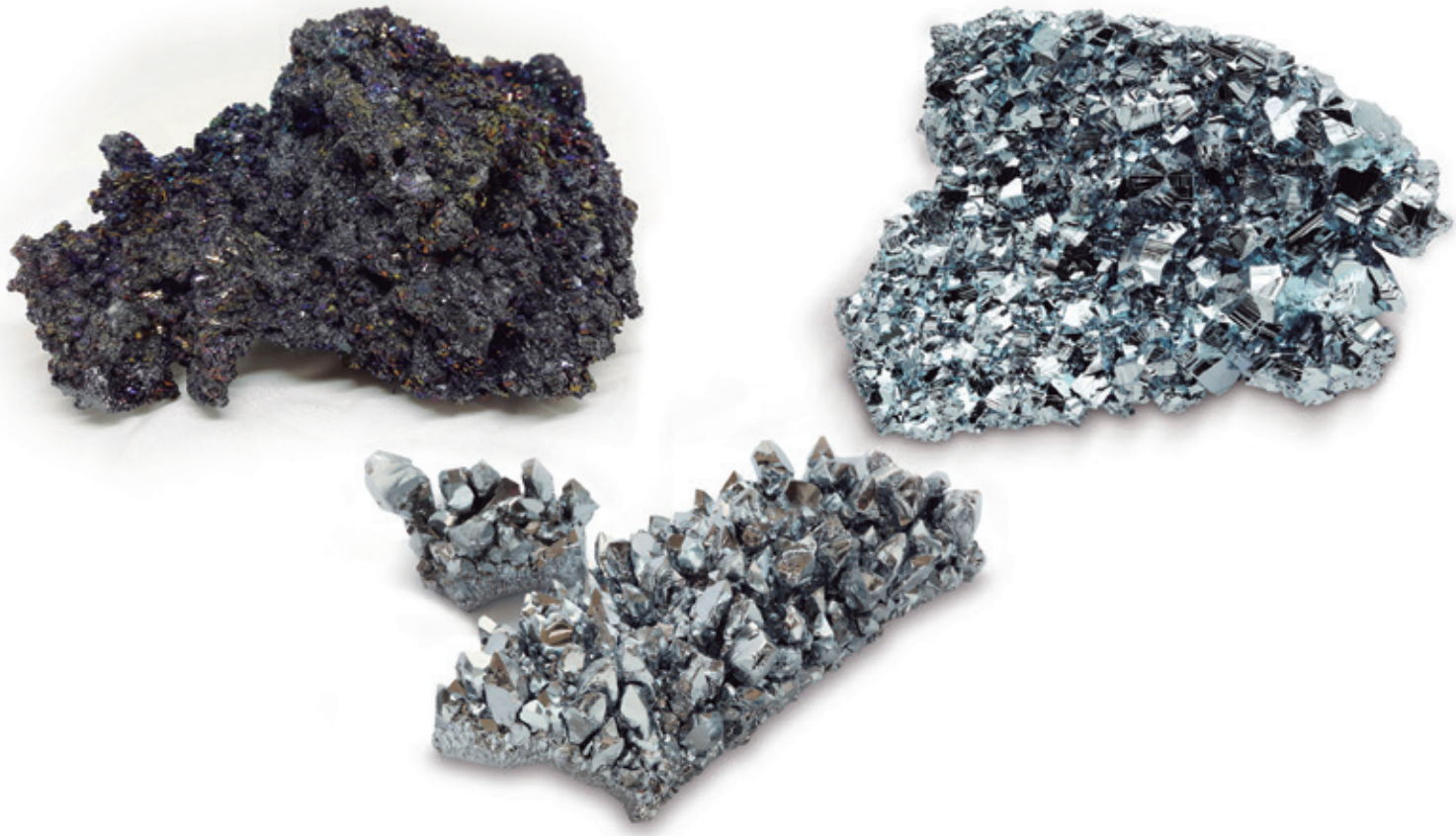
APPLICATION	EFFICIENCY
Low, medium and high carbon steel; Stainless steel; Cast iron; Hard steels and high cutting speeds.	

CHROMERUBY

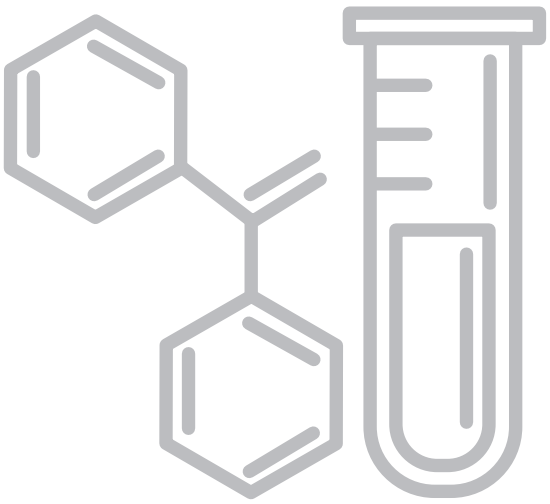
The excellent quality of the M35 high speed steel combined with the latest generation of PVD coatings contribute to an excellent performance result. The high performance in the cutting of steels of low machinability attests the quality of this tool.

APPLICATION	EFFICIENCY
Medium and high carbon steels; Stainless steel; Hard steels and high cutting speeds.	

HSS - HIGH SPEED STEEL



QUALITY OF RAW MATERIAL

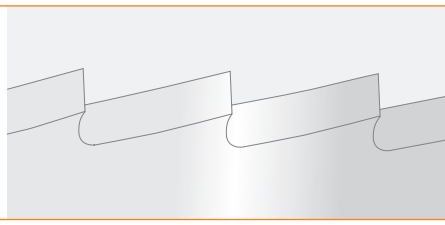


In order for the final product result to be as good as possible, every detail is important. Therefore, the raw material that constitutes the body of the saws, comes from the most advanced centers of the world in the production of high speed steel. The thermal treatment and the chemical composition of the steel are essential factors that define the final quality of the saw. The main elements, Chromium, Tungsten, Molybdenum, Vanadium and Cobalt, combined in the correct proportions and linked to Iron and Carbon, form a steel of excellent mechanical properties with resistance to high working temperatures, high hardness, wear resistance and relatively high toughness.

TYPES OF TEETH AND APPLICATIONS

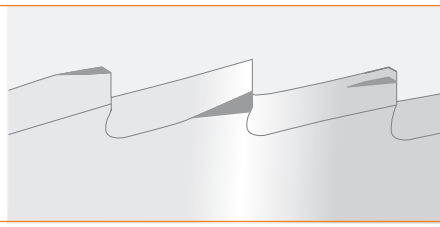
TYPE A

Type A tooth is commonly used for milling applications in non-ferrous alloys, jewelry and screw grooves.



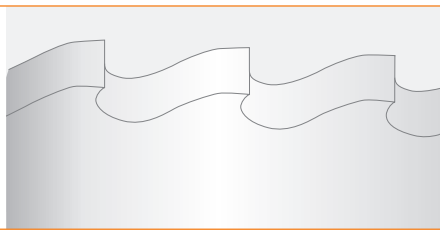
TYPE AW

The tooth type AW, unlike the type A, is alternately chamfered, thus optimizing the breaking of the chip. It is particularly suitable for higher removal rates.



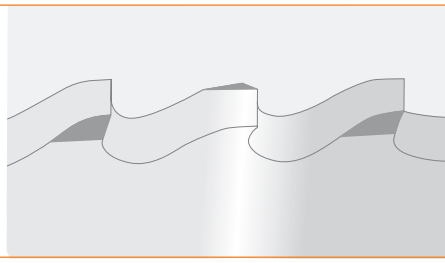
TYPE B

Type B tooth is mainly used on thin saws to cut thin-walled tubes, where chip removal is not a problem.



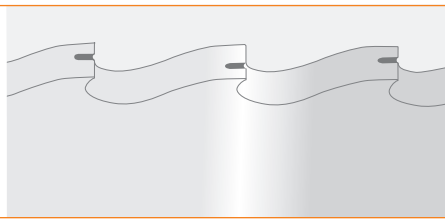
TYPE BW

The tooth type BW is used for cutting pipes and profiles with greater wall thicknesses. The tooth is alternately bevelled at 45 °, breaking the chip into two parts and ensuring a good flow.



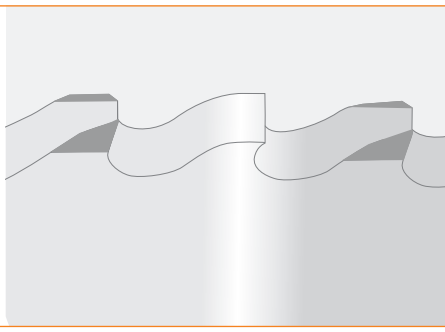
TYPE BS

The type BS tooth was developed for the cutting of low thickness pipes. It has double the number of cutting edges, guaranteeing better finishing for the section.



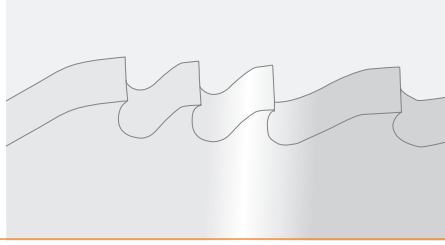
TYPE C

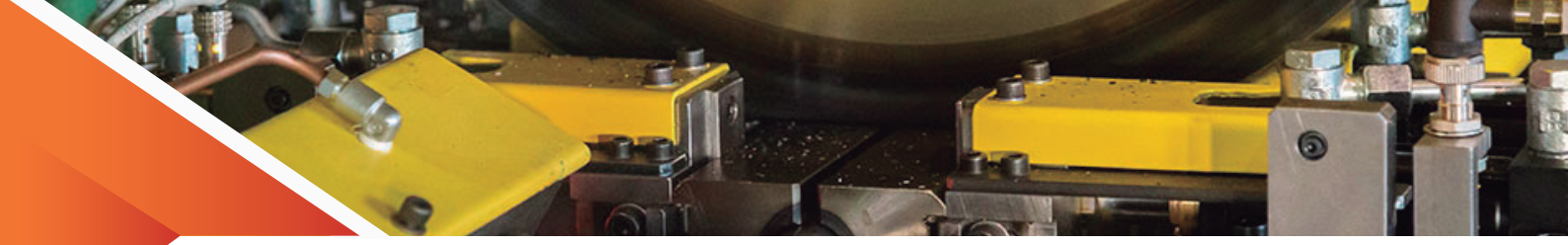
The type C tooth is used for solid sections or very thick wall tubes. The chip is broken into three parts. A slightly higher tooth with two chamfers, one on each side, is responsible for pre-cutting. The next tooth, without bevel, is responsible for the finish.



TYPE VP

The type VP tooth has variable pitch. ilt is used to out very irregular sections that cause vibrations and noise. It guarantees a softer contact and offers excellent durability with reduced vibration.





TECHNICAL SPECIFICATIONS

Ø Diameter	Ø Central Bore	Ø Flange	Thickness	Ø Pin Holes
160	32	75	1,2 / 1,5 / 2,0	2/8/45 + 2/11/63
175	32	75	1,2 / 1,5 / 2,0	2/8/45 + 2/11/63
				Chaveta/keyway
200	32	90	1,0 / 1,2 / 1,5 / 1,6 / 1,8 / 2,0 / 2,5	2/8/45 + 2/11/63
				2/8/45 + 2/9/50 + 2/9/56 + 2/11/63 + 2/11/75 + 2/11/80
210	32	90	2,0	2/8/45 + 2/11/63
225	32	100	1,2 / 1,5 / 1,6 / 1,8 / 1,9 / 2,0 / 2,5	2/8/45 + 2/11/63
				2/8/45 + 2/9/50 + 2/9/56 + 2/11/63 + 2/11/75 + 2/11/80
	40	100	1,8 / 1,9 / 2,0 / 2,5	2/8/55 + 4/12/64
250	32	100	1,0 / 1,2 / 1,5 / 1,6 / 2,0 / 2,5 / 3,0	2/8/45 + 2/11/63
				2/8/45 + 2/9/50 + 2/11/63
				Chaveta/keyway
				2/8/45 + 2/9/50 + 2/9/56 + 2/11/63 + 2/11/75 + 2/11/80
	40	100	2,0 / 2,5 / 3,0	2/8/55 + 4/12/64
275	32	100	1,2 / 1,6 / 2,0 / 2,5 / 3,0	2/8/45 + 2/11/63
				2/8/45 + 2/9/50 + 2/11/63
				2/8/45 + 2/9/50 + 2/9/56 + 2/11/63 + 2/11/75 + 2/11/80
	40	100	1,6 / 2,0 / 2,5 / 3,0	2/8/55 + 4/12/64
300	32	100	1,6 / 2,0 / 2,5 / 3,0	2/8/45 + 2/11/63
				2/8/45 + 2/9/50 + 2/11/63
				2/8/45 + 2/9/50 + 2/9/56 + 2/11/63 + 2/11/75 + 2/11/80
	40	100	1,6 / 2,0 / 2,5 / 3,0	2/8/55 + 4/12/64
315	32	100	1,6 / 2,0 / 2,5 / 3,0 / 3,5	2/8/45 + 2/11/63
				2/8/45 + 2/9/50 + 2/11/63
				2/8/45 + 2/9/50 + 2/9/56 + 2/11/63 + 2/11/75 + 2/11/80
	40	100	1,6 / 2,0 / 2,5 / 3,0 / 3,5	2/8/55 + 4/12/64
325	32	120	2,0 / 2,5 / 3,0	2/8/45 + 2/11/63
	40	120	2,0 / 2,5 / 3,0	2/8/55 + 4/12/64
350	32	120	1,8 / 2,0 / 2,5 / 3,0 / 3,5	2/8/45 + 2/11/63
				2/8/45 + 2/9/50 + 2/11/63
				2/8/45 + 2/9/50 + 2/9/56 + 2/11/63 + 2/11/75 + 2/11/80
	40	120	1,8 / 2,0 / 2,5 / 3,0 / 3,5	2/8/55 + 4/12/64
	50	120	1,8 / 2,0 / 2,5 / 3,0 / 3,5	4/15/80 + 4/14/85
370	32	120	2,5 / 3,0	2/8/45 + 2/11/63
	40	120	2,5 / 3,0 / 3,5	2/8/55 + 4/12/64
	50	120	2,5 / 3,0	4/15/80 + 4/14/85
400	40	120	2,5 / 3,0 / 3,5	2/8/55 + 4/12/64
	50	120	2,5 / 3,0 / 3,5 / 4,0	4/15/80 + 4/14/85
425	40	120	2,5 / 3,0 / 3,5	2/8/55 + 4/12/64
	50	120	2,5 / 3,0 / 3,5 / 4,0	4/15/80 + 4/14/85
450	40	130	2,5 / 3,0 / 3,5 / 4,0	2/8/55 + 4/12/64
				4/15/80
	50	130	2,5 / 3,0 / 3,5 / 4,0	4/15/80 + 4/14/85
500	40	130	3,0 / 3,5 / 4,0 / 5,0	2/8/55 + 4/12/64
	50	130	3,0 / 3,5 / 4,0 / 5,0	4/15/80 + 4/14/85
525	50	140	3,5 / 4,0	4/15/80 + 4/14/85
550	50	140	3,5 / 4,0 / 5,0	4/15/80 + 4/14/85
	90	200	4,0 / 5,0	3/12,5/160
	140	225	4,0 / 5,0	4/17,5/170
570	50	180	4,0 / 5,0	4/15/80 + 4/14/85
600	50	200	4,0 / 5,0	4/15/80 + 4/14/85
	90	200	4,0 / 5,0	3/12,5/160
	140	225	4,0 / 5,0	4/17,5/170
620	140	225	4,0 / 5,0	4/17,5/170

MACHINE'S CHARACTERISTICS

Machine	∅ Saw	∅ Central Bore	∅ Pin Holes
ADIGE SALA	200-250	32	4/9/50
	275-315	32	2/9/50 + 2/11/63
	315-350	40	4/12/64
	400-425	50	4/15/80
BAIER	175-250	32	Chaveta/keyway
BERG & SCHMID	250-350	32	2/8/45 + 2/11/63
	315-350	40	2/8/55 + 4/12/64
BEWO	250-300	32	2/8/45 + 2/11/63
	315-350	40	2/8/55 + 4/11/63
BIMAX	100-300	32	2/8/45
BONAK	250-350	40	2/8/55 + 4/12/64
BROBO WALDOWN	225-250	32	2/8/45 + 2/11/63
	300	38	2/9/55
	300-400	40	2/8/55 + 4/12/64
	500	40	2/8/55 + 4/12/64 + 2/12/80
CONNI / C.T.S.	200 - 315	32	2/8/45 + 2/11/63
	400-425	40	4/11/63
	400-500	50	4/15/80
DALLY	250-500	40	2/8/55 + 4/12/64 + 2/12/80
DEMURGER	160-300	25,4	---
	200-250	32	2/8/45 + 2/11/63
	225-350	40	2/8/55 + 4/12/64
DONG JIN	225 - 350	32	2/8/45 + 2/11/63
	275-370	40	2/8/55 + 4/11/63
DORINGER	300-350	40	2/8/55 + 4/12/64
EISELE	200-370	40	2/8/55 + 4/12/64
	400-425	40	4/12/64 + 2/15/80
	450-500	40	2/15/80 + 2/15/100
FABRIS	225-350	32	2/8/45 + 2/11/63
FEMI	225-315	32	2/8/45 + 2/11/63
FONG HO	250-275	32	2/8/45 + 2/9/50 + 2/11/63
	300-400	32	4/11/63
	360	40	2/11/63 + 3/11/65
GERNETTI	250-350	40	4/11/63
	350-400	50	4/15/80
	500	50	4/18/100
HÄBERLE	225	32	2/8/45
	225-450	40	2/8/55 + 4/12/64
IBP PEDRAZZOLI	200-350	32	2/8/45 + 2/11/63
	425	50	4/15/80
IMET	250-350	32	2/8/45 + 2/11/63
	315-350	40	2/8/55 + 4/12/64
KALTENBACH	250	32	---
	350-450	50	4/15/80
KASTO	250-350	32	2/8/45 + 2/11/63
	400-425	50	4/15/80 + 4/14/85
MAC	300	32	2/9/50
	370-450	40	4/11/63
MACC	225-350	32	2/8/45 + 2/11/63
	350-450	40	2/8/55 + 4/12/64

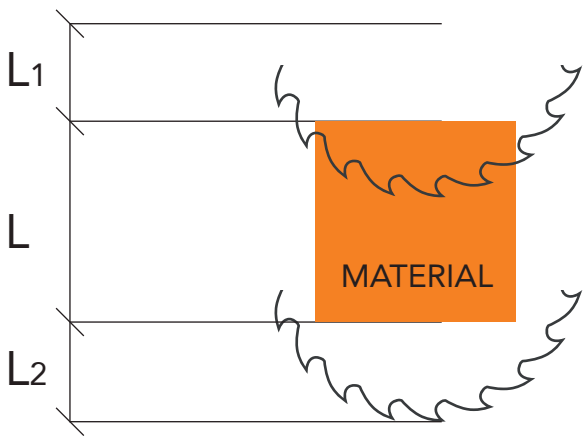
Machine	∅ Saw	∅ Central Bore	∅ Pin Holes
MACO	315-425	50	4/15/80
MAIR		32	2/8/45 + 2/11/63
	300-350	40	2/8/55 + 4/12/64
MEP	225-350	32	2/8/45 + 2/11/63
METORA	250-350	32	2/11/80
MBM MERCURY	300-350	32	---
MTM	300	32	2/8/45
	400	40	4/12/64
	400	50	4/15/80
	450 - 550	90	3/12,5/160
OMES	250-370	32	2/8/45 + 2/11/63
OMP	250-370	32	2/8/45 + 2/11/63
	400-525	50	4/15/80
OTO MILLS	315-370	32	2/8/45 + 2/11/63
	450-500	50	4/15/80
	550-620	140	4/17/170
RGA	225-275	25,4	---
	250-370	40	2/8/55 + 4/12/64
ROBEJO	250-350	32	2/8/45 + 2/11/63
ROHBI	175-300	32	2/8/45 + 2/11/63
RURACK OTTO	300-350	40	2/8/55 + 4/12/64
SCOTCHMAN INDUSTRIES	250-315	32	2/8/45 + 2/11/63
	275-350	40	2/8/55 + 4/12/64
SIMEC	200-350	32	2/8/45 + 2/11/63
SINICO	350-370	32	2/8/45 + 2/11/63
SOCO	250-370	32	2/8/45 + 2/11/63
STARTRITE	250	32	2/9/56 + 2/12/64
	300-315	32	2/11/80
STAYER	225	32	---
	300-350	32	---
THOMAS	225-350	32	2/8/45 + 2/11/63
TOMET	225-350	32	2/8/45 + 2/11/63
TRENNJÄGER	250	32	2/9/50
	250-315	40	4/12/64 + 2/8/55
	315-450	50	4/14/85 + 4/15/80
	450-525	50	4/18/100
ULMIA	200-300	32	---
	250-400	40	4/11/63
VIEMME	250-350	32	2/8/45 + 2/11/63
	500	40	4/11/196
VOUCHER	275	35	2/13,5/57,2
WAGNER	200-315	32	4/9/50
	350	50	4/14/85 + 4/15/80
WAHLEN	250-400	40	2/8/55 + 4/11/63
WEIDMANN	210-275	32	2/8/45 + 2/11/63
WINTER	250-315	40	2/8/55 + 4/11/63
WUNSCH	210-250	32	2/8/45 + 2/11/63
	210-400	40	2/8/55 + 4/12/64

CUTTING OPTIMIZATION

Besides using the best tools, it is also necessary to perform the control of the cutting process so that each saw reaches its full potential. In the next chart, see some important formulas that contribute to the selection of these parameters to obtain the best results in your process.

FORMULAS

1 - NUMBER OF TEETH	2 - PITCH
$Z = \frac{D \times 3{,}14}{P}$	$P = \frac{D \times 3{,}14}{Z}$
3 - RPM	**4 - FEED SPEED**
$RPM = \frac{Vc \times 1000}{D \times 3{,}14}$	$Av = AZ \times Z \times RPM$
5 - CONTACT TIME / PIECE	**6 - TOTAL CUTTING TIME**
$T_1 = \frac{L \times 60}{Av}$	$T_2 = \frac{(L_1 + L + L_2) \times 60}{Av}$
7 - PIECES PER MINUTE	**8 - COST PER PIECE**
$S = T_2 / 60$	$C = S \times Cm$



P: Pitch (mm)
RPM: Rotations per minute
Vc: Cutting speed (m/min)
D: Diameter of the blade (mm)
Av: Feed speed (mm/min)
Az: Feed per tooth (mm)
Z: Number of teeth
T: Contact time / piece (s)
L: Dimensions of the piece (if round L=D) (mm)
T: Total cutting time (s)
S: Piece/min
Cm: Machine's cost per minute ($/min)
C: Cost per piece ($)

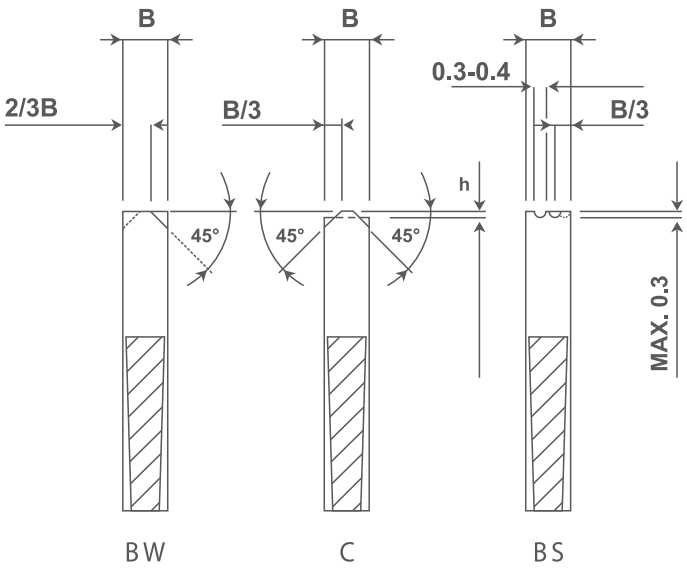
TEETH GEOMETRY AND CUTTING ANGLES

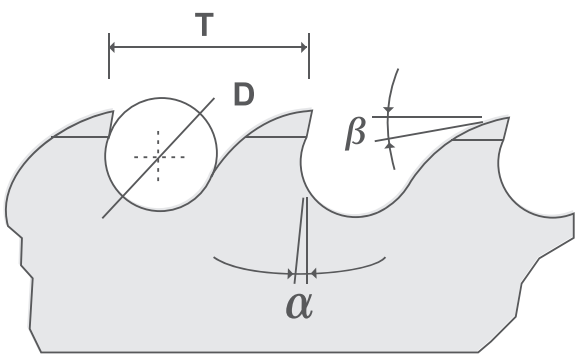
The choice of the type of sharpening and cutting angles is of fundamental importance, as it is related to the requirements of cutting finish and durability of the tool.

To assist in choosing the most suitable configuration for your process, Sul Corte provides a set of parameters for the sharpening of the HSS saws.

SYMBOL	DESCRIPTION
T	Tooth pitch
H	Difference C
α	Cutting angle
β	Relief angle
B	Blade Thickness
D	Diameter of tooth gullet

MATERIALS	ANGLE OF COURT	ANGLE OF FLOW
Steel up to 800 N/mm²	18°	8°
Steel up to 1200 N/mm²	16°	6°
Stainless steel	12°	6°
Cast Iron	12°	6°
Alloy Aluminum	25°	12°
Copper	20°	10°
Bronze	14°	8°
Brass	15°	10°
Titanium	17°	8°

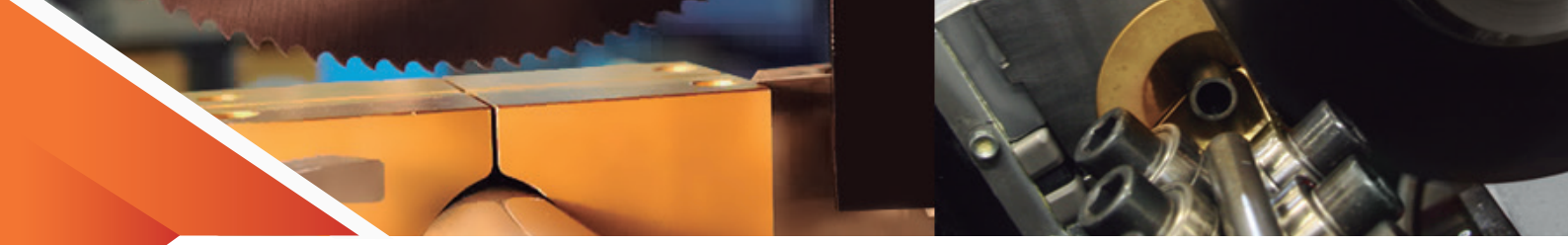




CUTTING PARAMETERS STATIONARY MACHINES

HSS SOLID STATIONARY CUTTING						TOOTH PITCH CHOICE						
		Feed Rate (mm/z)		Speed (m/min)		Section to be cut (mm)						
Material		Min.	Max.	**Black Diamond**	**Chrome Diamond**	10 - 20	20 - 40	40 - 60	60 - 90	90 - 110	110 - 130	130 - 150
Steel	< 500N/mm²	0,025	0,08	30 - 50	30 - 50	5	8	10	12	14	16	18
	< 800N/mm²	0,025	0,07	25 - 45	25 - 45	5	6	10	12	14	16	16
	< 1200N/mm²	0,02	0,06	15 - 25	15 - 25	5	6	8	10	12	14	14
Stainless Steel		0,01	0,06	10 - 30	10 - 30	5	6	8	11	14	16	16
Cast Iron		0,025	0,05	30 - 50	30 - 50	6	8	10	13	15	17	19
Aluminium		0,04	0,09	500 - 900	500 - 900	6	8	12	16	18	20	20
Bronze		0,04	0,07	200 - 400	200 - 400	6	8	10	13	15	17	19
Copper		0,04	0,06	200 - 300	200 - 300	6	8	10	13	15	17	19
Brass		0,04	0,08	400 - 600	400 - 600	8	10	12	14	17	19	20
Zinc Alloy		0,025	0,08	30 - 100	45 - 100	5	6	10	12	14	16	16
Inconel		0,025	0,05	16 - 45	20 - 50	5	6	8	10	12	14	14
Titanium		0,02	0,05	15 - 30	15 - 45	5	6	8	10	12	14	14

HSS TUBE STATIONARY CUTTING								TOOTH PITCH CHOICE					
		Feed Rate (mm/z)				Speed (m/min)		Tube's wall thickness (mm)					
Material		Min.	Recommended		Max.	**Black Diamond**	**Chrome Diamond**	<1	1 - 1,5	1,5 - 2	2 - 3	3 - 4	>4
Steel	< 500N/mm²	0,025	0,03	0,01	0,24	70 - 230	90 - 240	3	4	5	5	6	7
	< 800N/mm²	0,025	0,03	0,09	0,18	45 - 140	65 - 160	3	4	4	4	6	7
	< 1200N/mm²	0,02	0,025	0,07	0,12	25 - 100	40 - 110	3	3	4	4	5	6
Stainless Steel		0,01	0,015	0,06	0,12	16 - 80	20 - 90	3	4	5	5	6	6
Cast Iron		0,025	0,04	0,05	0,05	30 - 65	30 - 70						
Aluminium		0,025	0,03	0,07	0,12	1000 - 1600	1000 - 1600	4	5	6	7	8	8
Bronze		0,04	0,04	0,06	0,07	200 - 400	200 - 400	4	5	6	7	8	9
Copper		0,04	0,04	0,06	0,06	200 - 300	200 - 300	4	5	6	7	8	8
Brass		0,04	0,04	0,08	0,08	400 - 600	400 - 600	4	5	6	7	8	8
Zinc Alloy		0,025	0,025	0,06	0,08	30 - 100	45 - 100	3	4	5	5	6	7
Inconel		0,025	0,025	0,06	0,08	16 - 45	20 - 50	3	3	4	5	5	6
Titanium		0,02	0,02	0,06	0,08	15 - 30	15 - 45	3	3	4	5	5	5



CUTTING PARAMETERS FORMING MACHINES

HSS STANDARD TUBE FORMING PARAMETER													
		ST37						ST52					
Ø Tube	Wall thickness	Blade Speed (m/min)		Feed/Tooth (mm)		Pitch T		Blade Speed (m/min)		Feed/Tooth (mm)		Pitch T	
10	< 1	120	230	0,07	0,1	3	3,5	80	135	0,07	0,09	3	3,5
	1 - 1,5	120	225	0,06	0,1	3	4	80	135	0,06	0,09	3	4
	1,5 - 2	115	220	0,05	0,1	4	5	80	130	0,05	0,09	4	5
	2 - 3	115	215	0,05	0,09	4	5	80	130	0,05	0,08	4	5
	3 <	115	210	0,04	0,09	4	5	80	125	0,04	0,08	4	5
25	< 1	115	210	0,05	0,09	4	5	80	125	0,05	0,08	4	5
	1 - 1,5	110	205	0,04	0,08	4	5	75	120	0,04	0,07	4	5
	1,5 - 2	110	200	0,03	0,06	4	6	75	120	0,03	0,05	4	6
	2 - 3	105	190	0,04	0,08	5	7	75	115	0,04	0,07	5	7
	3 <	105	185	0,04	0,08	6	7	70	110	0,04	0,07	6	7
50	< 1	110	195	0,05	0,09	5	6	75	120	0,05	0,08	5	6
	1 - 1,5	105	190	0,04	0,08	5	7	70	115	0,04	0,07	5	7
	1,5 - 2	105	185	0,04	0,08	6	7	70	110	0,04	0,07	6	7
	2 - 3	100	180	0,03	0,07	6	8	70	105	0,03	0,06	6	8
	3 <	95	170	0,04	0,07	7	8	65	100	0,04	0,06	7	8
75	< 1	105	190	0,04	0,07	5	7	70	115	0,04	0,06	5	7
	1 - 1,5	100	180	0,04	0,08	6	7	70	110	0,04	0,07	6	7
	1,5 - 2	100	175	0,03	0,07	6	8	70	105	0,03	0,06	6	8
	2 - 3	95	170	0,03	0,07	7	8	65	100	0,03	0,06	7	8
	3 <	95	160	0,03	0,06	7	10	65	95	0,03	0,05	7	10
		Hard Steel < 1200 N/mm2						Stainless Steel					
10	< 1	50	80	0,05	0,08	3	3,5	20	50	0,04	0,07	3	3,5
	1 - 1,5	50	80	0,05	0,08	3	4	20	50	0,04	0,07	4	4
	1,5 - 2	50	80	0,04	0,07	4	5	20	49	0,03	0,07	4	4
	2 - 3	45	75	0,04	0,07	4	5	20	48	0,03	0,06	4	4
	3 <	45	75	0,03	0,06	4	5	19	47	0,03	0,06	4	4
25	< 1	45	75	0,04	0,07	4	5	19	47	0,03	0,05	4	4
	1 - 1,5	45	75	0,03	0,06	4	5	19	46	0,03	0,05	4	5
	1,5 - 2	45	70	0,03	0,06	4	5	19	45	0,02	0,04	4	5
	2 - 3	45	70	0,03	0,06	5	5	18	44	0,02	0,04	5	6
	3 <	45	65	0,03	0,06	6	6	18	43	0,02	0,04	5	7
50	< 1	45	70	0,04	0,07	4	5	19	45	0,03	0,06	4	5
	1 - 1,5	45	70	0,03	0,06	4	6	18	44	0,02	0,05	5	6
	1,5 - 2	45	65	0,03	0,06	5	6	18	43	0,02	0,05	5	6
	2 - 3	45	65	0,02	0,05	5	6	17	42	0,02	0,04	5	7
	3 <	40	60	0,02	0,05	5	7	17	41	0,01	0,04	6	7
75	< 1	45	70	0,03	0,06	4	6	18	44	0,02	0,05	5	6
	1 - 1,5	40	65	0,03	0,06	5	6	18	43	0,02	0,04	5	7
	1,5 - 2	40	65	0,02	0,05	5	6	17	42	0,02	0,04	6	7
	2 - 3	40	60	0,02	0,05	5	7	17	41	0,01	0,04	6	7
	3 <	40	60	0,02	0,05	6	7	16	40	0,01	0,03	7	8

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