

# Productive Consumables and Equipment Solution for the Rebuilding of Sugar Cane Mill Crusher Rolls







Worldwide there are over 3000 sugar cane mills. Many of them are looking for a mechanized process to clad the rollers more efficiently and less demanding for welders, replacing commonly applied SMAW. A state-of-the-art system is now available from voestalpine Böhler Welding and Fronius.

## UTP Maintenance

### Tailor-Made Protectivity™

UTP Maintenance stands for decades of industry experience and application know-how in the areas of repair as well as wear and surface protection. Innovative and customer-tailored products guarantee customers increased productivity and protection of their components.

Our range of flux- and metal-cored wires for the rebuilding of worn sugar cane crusher rolls continues this tradition. Developed in close co-operation with specialized repair companies and mill maintenance departments – they feature welding characteristics that are fully dedicated to the rebuilding and protection of crusher rolls.

### Complete solution

voestalpine Böhler Welding can supply welding consumables only to increase productivity with existing equipment, but also a total solution developed for the mechanized hardfacing of sugar cane crusher rolls. This dedicated package of equipment and consumables was developed by Fronius GmbH in Austria, in close co-operation with voestalpine Böhler Welding Soldas do Brazil Ltda. Extensive field-testing was performed by a major specialized repair and maintenance company - in the repair shop with rolls taken out of production, but also on rolls in operation in sugar cane mills. The heavy duty and user-friendly equipment enables the mechanized welding of all steps in the rebuilding of rolls, including the arcing of the flanges of the teeth. It significantly improves work conditions for welders, while meeting labour laws that prohibit workers to stay near crushers in operation.

# Specialized Consumables Designed to bring Productivity and Protection

Sugar cane is acidic with a pH of around 5 and carries up to 5 % soil which is harvested with the cane. As a result, the mill rolls are exposed to a combination of abrasive and corrosive wear and require hardfacing to repair them periodically. The hardfacing alloy must provide good wear characteristics and add to the good grip on the sugar cane and bagasse (the fibrous by-product) provided by a special roller profile.

The repair of crusher rolls can take the form of a complete overhaul in a repair workshop – often performed off season or on a stock of spare rollers – or on rolls in operation in the actual crushing of sugar cane in mills. In the latter case, arcing is a commonly applied technique to increase

the grip of the rollers on the bagasse, consisting of the deposition of a great number of droplets onto the flanges of the teeth. The arcing operation with stick electrodes requires welders to be near rotating rollers – a work situation which is potentially dangerous and therefore increasingly subjected to restrictive labour laws.

A full overhaul involves a four-step rebuilding procedure, see figure on page 3, for which voestalpine Böhler Welding developed a set of three dedicated hard surfacing cored wires and procedures for mechanized welding described in the table below. In step 1, the laterals, are deposited to strengthen and protect the sides of the teeth against abrasion, using UTP AF DUR 600-MP in diameter 1.2 mm.

## Sugar cane mill repair of rollers

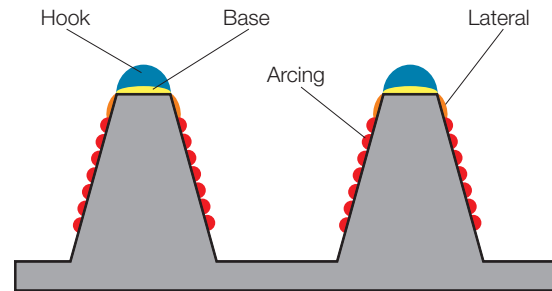
Sugar mill application and function		Consumables & typical welding parameters	
Step 1	<b>Lateral</b> <ul style="list-style-type: none"> <li>Strengthen and protect the sides of the teeth</li> <li>Providing a wider underground for step nr. 2 – the base weld</li> </ul>		<b>UTP AF DUR 600-MP</b> <b>Ø 1.2 mm</b> Position: Vertical-down Current (A): 150-170 Voltage (V): 25-28 Stickout length (mm): 18 Travel speed (cm/min): 36 Weaving width (mm): 12-20 Number of torches: 1 or 2
	<b>Base</b> <ul style="list-style-type: none"> <li>Sealing top of teeth</li> <li>Preparing underground for hook weld</li> </ul>		<b>UTP AF DUR 600-MP</b> <b>Ø 1.6 mm</b> Position: Downhand Current (A): 160-220 Voltage (V): 25-28 Stickout length (mm): 20 Travel speed (cm/min): 64 Weaving width (mm): 0 Number of torches: 1
Step 3	<b>Hook</b> <ul style="list-style-type: none"> <li>Protection of top of teeth</li> <li>Providing firm grip on bagasse</li> <li>Higher crushing efficiency</li> </ul>		<b>UTP AF LEDURIT 60</b> <b>Ø 1.6 mm</b> Position: Downhand Current (A): 150-180 Voltage (V): 25-28 Stickout length (mm): 20 Travel speed (cm/min): 54 Weaving width (mm): 0 Number of torches: 1
	<b>Arcing</b> <ul style="list-style-type: none"> <li>Providing further improved grip on bagasse</li> <li>Protection of teeth profile</li> <li>Enabling repair while crushing</li> </ul>		<b>UTP AF VANADIUM 500</b> <b>Ø 2.8 mm</b> Position: Vertical down Current (A): 250-350 Voltage (V): 28-36 Stickout length (mm): 40-60 Travel speed (rounds/min): 4-6 Weaving width (mm): 0 Number of torches: 1 or 2

This cored wire gives a very hard weld metal. The same wire, in diameter 1.6 mm, is used in step 2 to seal the top of the teeth and provide a firm underground for the next step. In step 3 the hook is deposited with UTP AF Ledurit 60 diameter 1.6 mm giving a weld metal with resistance to very high abrasion. This part of the teeth catches the sugar cane and bagasse and largely determines the output of a sugar mill in terms of tonnage of sugar cane processed or juice and bagasse produced.

Step 4 involves the arcing with UTP AF Vanadium diameter 2.8 mm. This special, large diameter cored wire operates in the spray arc mode at relatively low currents depositing a high amount of weld metal droplets of exact size. It is used with a relatively long stick-out length and produces a very powerful arc, which also enables the welding of the rolls in the presence of large quantities of juice and bagasse, while in operation during the harvesting season.

The use of UTP cored wires makes the whole repair procedure much more efficient. Deposition rates and duty cycles are much higher than in procedures with stick electrode welding. Also when compared to mechanized welding with solid wires, repair times can be significantly shorter.

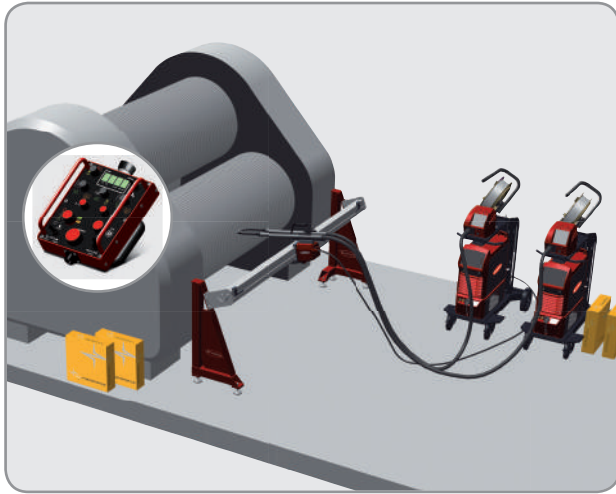
#### Operation Modus "Hook"



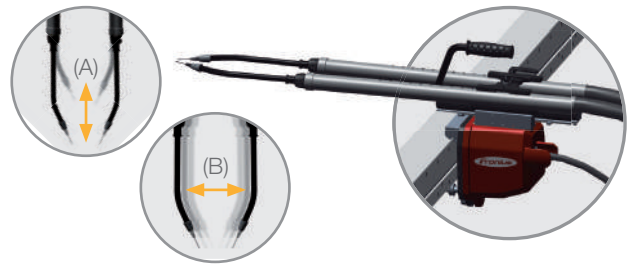
Consumable product data		Consumable description			
Classification	DIN 8555: MF 6-GF-60	Metal-cored wire for the hardfacing of components subjected to a combination of compression, friction and impact. The weld metal is machinable by grinding.			
Polarity	DC+				
Shielding gas	Ar/CO <sub>2</sub> : M21, M22 / CO <sub>2</sub> : C1	Alternative SMAW/MMA: UTP 670			
Weld hardness	55-60 HRC				
Typical chemical composition all weld metal (%)					
C	Si	Mn	Cr	Ni	Mo
0.6	0.6	0.8	7.0		1.0
		Alternative SMAW/MMA: UTP 670			
Classification	DIN 8555: MF 6-GF-60/ MF 10-GF-60-GR	Metal-cored wire for the hardfacing of components subjected to high abrasion combined with moderate impact and compression. High chromium and carbon alloying gives a structure rich in chromium-carbides.			
Polarity	DC+				
Shielding gas	self-shielded	Alternatives SMAW/MMA: UTP 7100, UTP Ledurit 68, UTP 713			
Weld hardness	57-62 HRC				
Typical chemical composition all weld metal (%)					
C	Si	Mn	Cr	Ni	Mo
4.4	0.3	0.3	27.0		
Classification	–	Metal-cored wire specially developed for the arcing of sugar cane mill rolls. With a diameter of 2.8 mm, it operates in the spray arc mode at relatively low currents providing weld metal droplets of exact size. The powerful arc enables welding of the rolls submerged in sugar cane juice and in the presence bagasse, while in operation during the harvesting season. A high amount of chromium-vanadium carbides in the micro structure gives the arcing surface an excellent resistance against abrasion. An alternative cored wire for increased droplet size is UTP AF Vanadium SG.			
Polarity	DC+ or AC				
Shielding gas	self-shielded	Alternative SMAW/MMA: UTP Vanadium 500, UTP Vanadium SG			
Weld hardness	60-66 HRC				
Typical chemical composition all weld metal (%)					
C	Si	Mn	Cr	V	
2.0	1.8	1.2	7.0	0.5	



# User-friendly Equipment for Heavy Duty Work



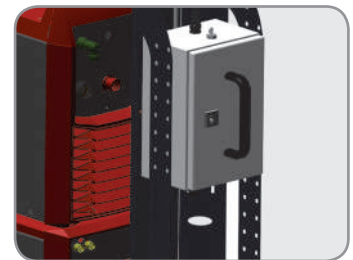
The Fronius Arcing system is special developed for the mechanized hard facing of teeth of sugar mill rolls in the sugar & ethanol industry. Due to its lightweight and mobile design, it can be used for repair task in workshops as well as on-site during crushing. The use of latest Fronius technology guarantees highest quality standards and best welding.



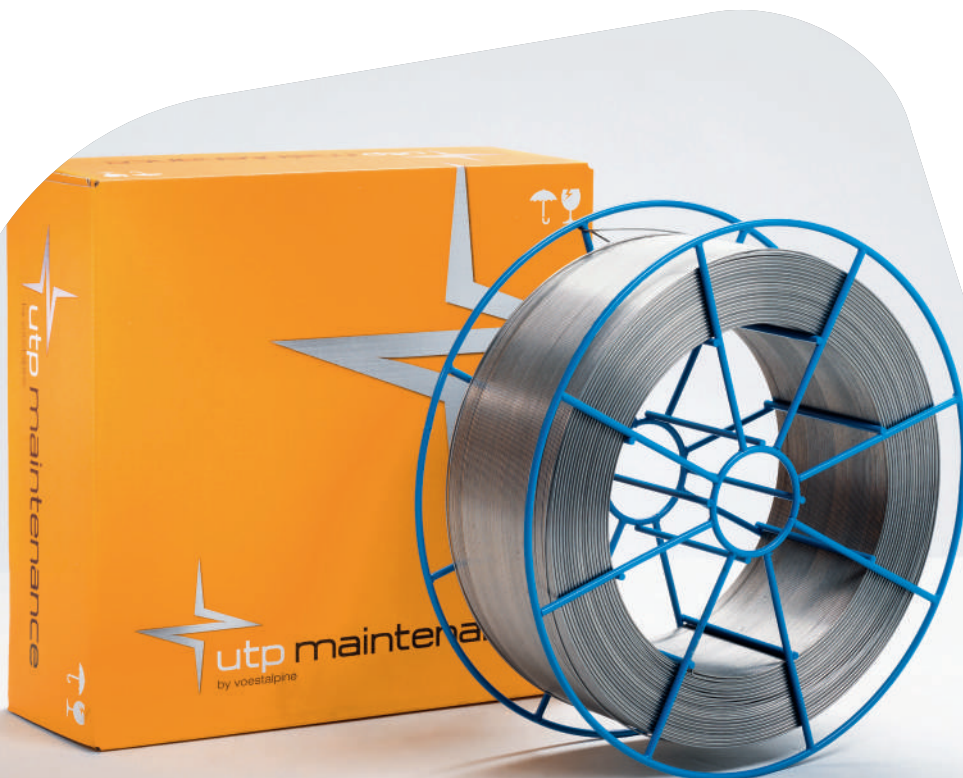
## Fronius Arcing System benefits

- Specially designed for heavy duty sugar mill applications
- Lightweight yet sturdy, mobile design
- Servo motor driven torch carriage for secure positioning
- Cross beam angle adjustable for optimal torch positioning
- Latest Fronius TPS/i power source technology
- Excellent arc ignition
- Synergic lines for UTP cored wires
- Parameter sets pre-programmable
- All functions available on remote control

The heart of the Fronius equipment solution is the tandem MAG welding torch that allows simultaneous welding of both flanges of the tooth. It can handle wires with diameters from 1.2 up to 2.8 mm and can easily be adjusted for tooth width.



Fronius TPS/i power source with arcing controller.



# voestalpine Böhler Welding

## Welding know-how joins steel

Customers in over 120 countries join the expertise of voestalpine Böhler Welding (formerly the Böhler Welding Group). Focused on filler metals, voestalpine Böhler Welding offers extensive technical consultation and individual solutions for industrial welding and soldering applications. Customer proximity is guaranteed by 40 subsidiaries in 28 countries, with the support of 2,200 employees, and through more than 1,000 distribution partners worldwide. voestalpine Böhler Welding offers three specialized and dedicated brands to cater our customers' and partners' requirements.



**Böhler Welding** – More than 2,000 products for joint welding in all conventional arc welding processes are united in a product portfolio that is unique throughout the world. Creating lasting connections is the brand's philosophy in welding and between people.



**UTP Maintenance** – Decades of industry experience and application know-how in the areas of repair as well as wear and surface protection, combined with innovative and custom-tailored products, guarantee customers an increase in the productivity and protection of their components.



**Fontargen Brazing** – Through deep insight into processing methods and ways of application, Fontargen Brazing provides the best brazing and soldering solutions based on proven products with German technology. The expertise of this brand's application engineers has been formulated over many years of experience from countless application cases.

forwarded by:

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**voestalpine**

ONE STEP AHEAD.