



ZTD and Arcing Mill Roller Technology for Increasing Mill Performance and Factory Capacity - Experiences of Indian Sugar Mill

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ABSTRACT

Arcing of mill rollers has been practiced to create roller roughness to improve gripping and also breaking of Open Cells of Juice on prepared cane fibre by creating friction between the roller grooved lateral surface. commercial welding technology which was introduced from Brazil popularly known as Azucar arching has limitations which is based on electrode dot deposition factors wherein the dilution with ductile iron at low voltage causes weak bonding thus tending to slippage and fall of dots from the surface, thus leads to stoppage and continuous re-welding of dots in wet conditions which is further creating very superficial bond. This process further leads to wear in middle depth area of the tooth and this further leads to regrooving every year shortening the roller diameter and subsequent leading to early re-shelling. All are manual arc electrodes whereas, the new technology as discussed in this paper is based on tubular flux cored wire to create higher deposition efficiency on cast iron roller surface. Apart from this suitable welding machine is also developed which is due to higher current increases the heat generation for metal fusion at 1450 °C and flux deposition rate which is four times higher than any conventional welding and the higher amperage machine (1250 amps) customized, plays a very vital role in dilution of the nickel chrome dots to the core of the ductile iron roller thus leading to excessive bond strength to withstand the high extraction inertia between the top and feed rollers. Above drawback leads to highly poor arcing of rollers, and objective of the roller arcing is not met in sugarcane milling performance and same has direct impact of primary extraction, capacity and bagasse moisture parameters in sugar mills. Apart from the above, it is also discussed in paper that how the landing teeth build with zuper tear drop (ZTD) helps in achieving the mill feeding and protection of the roller landing teeth.

Keywords: Mill roller, mill performance, sugar factory, zuper tear drop.

INTRODUCTION

Zuper W 6800 OA is a specially developed tubular flux cored wire used for superior arcing on nodular and grey cast iron sugar mill crusher rolls, improving the gripping efficiency and increasing the feeding rates of the sugar cane.

Zuper W 6800 OA gives great adherence of Cr-C (Chromium Carbide) drops of high density per square inch enabling much higher fiber drag and traction of bagasse, protecting the lateral side of the sugar mill

roll against severe abrasion delivering effective yield and juice efficiency.

Zuper R ZTD is a special electrode designed for tear drop applications on sugar mill rolls, with superior abrasion performance, these easy and fast to execute tear drops deliver increased life without detaching or breakage even at the highest milling speeds and soil contamination.

It is designed for controlled fluidity with good arc force resulting in well fused deposits as per the desired

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shape over the base metal. Its metallurgical structure is based on 45% chromium carbides and withstand high abrasion and corrosion at high roller speeds of upto 8-10 rpm.

Strong and quick arc control with easy arc striking and restriking resulting in giving the adequate tear drop shape and productivity while welding. Controlled fluidity and fast cooling results in uniform tear drop patterns. The best performance is achieved using negative current without over heating up to 230A in DC-ve.

Importance of welding technology in mill working

Sugar mill working and welding technology to be used has direct significance on the Mill working. As Entire milling extraction depends on roller friction, mill feeding and mill bagasse slippages due to higher imbibition % water used.

With the super tear drop, done on under feed grooved roller and top roller, which take the feed from mill donelly chute surface and prevents any chances of bridging in chute and give constant feeding to mill



Figure 1 : Roller arcing

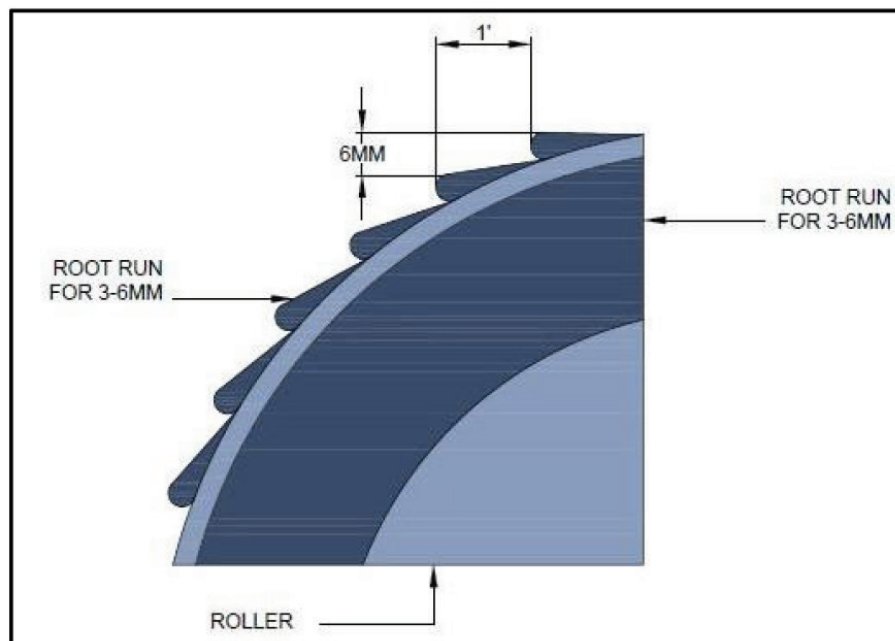


Figure 2 : Zuper tear drop geometry on roller landing



Figure 3 : ZTD rollers as cycle sprocket

opening and increase in mill fibre loading and increase of mill feeding coefficient.

All the grooved lateral, if welded with high chromium content wire and also higher deposition of flux per square inch area, will create the required breakage of open cell in the 1st mill and in the subsequent mill give the required gripping for achieving the mill capacity and performance.

Zuper wire technology and its propriety flux technology used to achieve the 95% deposition efficiency and 100% coverage of cast iron roller grooved lateral surface with no lean mean path for Juice and bagasse

particle to come in contact with cast iron portion. Conventional technology of any arcing process cannot achieve complete coverage of roller surface exposing roller surface to cane fibre erosion and corrosion due to juice. This has direct impact on roller life and undercut is required every season.

As during arcing, fusion temperature to be achieved with the CI Roller to deposit the chromium carbide flux on the rollers at high rate to create higher chromium carbide surface bonded with roller metal matrix. This fusion done with 1250 Amp, 95 VDC machine deliver the higher fusion temperature on a continuous basis at four times higher rate.

Type pf Machine	Machine Kw-hr under continuous duty	Kw-Hr Required for Fusion	Ratio
1250 Amp Special Machine	60	0.20	300
Commercial Machine in Mkt, 150- 600 Amp	15	0.20	75

Sugar mill experience

Above technology is practiced at Sahkarmahrshi Bhuasaheb Thorat SSK Ltd., Maharashtra and achieved following benefits :

- Increased breaking of bagasse open cell
- Higher juice extraction in all mills
- Increased roller life
- Zero stoppage for arcing during operation
- No regrooving required every season
- Additional life of roller before resheiling for one season

Table 1 : Parameters recorded during 21-22 and 22-23

Parameters	Season 22-23	Season 21-22
Crushing, TCD	10.5 lac	15.3 lac
Recovery, % Cane	12.03	10.52
Mill Extraction	96.08	95.96
Added Water % Cane	24.17	28.32
Mixed Juice % Cane	97.91	102.24
Primary Extraction%	71.8	71.20
Bagasse % Cane	25.97	25.78

Note : Recovery figure cannot be benchmark from season to season as it depends on many parameters.

Commercial benefits

Table 2 : Roller arcing for 7500 TCD plant with five mill tandem and GRPF

Parameters	Season 23-24
Number of Roller for Arcing	24
Welding Wire Consumption, Kgs	750-900
Cost with Labor etc	Rs. 8.5- 10 Lacs
Recovery Gain due to Primary and Secondary Extraction,	0.05% cane
Cane Crushed, Lacs Tons	10 Lac
Extra Bags of Sugar, 100 Kg Bags	Rs. 200 Lacs
Additional Life of Roller for One season	Rs. 48 Lacs
Total Saving	Rs. 248 Lacs

Note : Recovery gain is always disputable saving because of recovery cannot be measured in actual practical condition.

RESULTS AND CONCLUSION

Roller arcing is very important part of milling efficiency and this can allow milling system to operate at higher surface speed which is also necessity now to increase crush rate.

Selecting the zuper technology procedure for arcing and ZTD on Top and Under Feed Rollers can solve

mill feeding issues and increase the Juice drainage from the roller surface.

Roller Life is enhanced as complete coverage of roller with arcing and doesn't expose juice to grooves resulting in corrosion. Higher temperature imbibition can be practiced without any slippages.