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Himont Roll Cladding

ROLLER FOR CONTINUOUS SLAB CASTERS

Welding of new and worn rollers for steel and allied industries requires the knowledge and experience of specialists in this type of work.

HIMONT personnel have experience in weld surfacing of rollers for steel mills and continuous casting plants worldwide. Himont avails of many welding consumables with excellent performance results.

1. INTRODUCTION

There has been much debate about and has been paid to problems associated with rollers incorporated within continuous slab casters.

Since it is now acknowledged that these rollers play a significant part in the production of internally sound and externally smooth slabs they have become of interest to production management, while being of continuing interest to maintenance and engineering personnel.

Various thoughts exist as to the ideal form of roller design to meet the exacting requirements of the application. Many of these views are based on personal experience.

2. SERVICE REQUIREMENTS

Rollers have to:

- Provide support to the slab:
 - in a very hot plastic state where high bulging forces are to be resisted,
 - through the arc of the machine where the direct weight to be supported increases.
- Maintain a parallel slab cross- section.
- Hold a uniform size with their neighbouring rollers to prevent pulling or pushing effects and to maintain a uniform casting radius.
- Provide tractive effort to the strand.
- Straighten a curved strand (or bend a straight strand).
- Carry out functions in an environment of water sprays, high temperature and scaling without detrimental effects and with a minimum of maintenance (preferably none).

Obviously not all of these conditions are necessarily encountered by all of the rollers in each strand, but generally as the relevance of one requirement decreases the magnitude of another increases. The ideal roller would probably, therefore, embody all the following attributes:

- High strength at elevated temperatures – for example, slab loads of around 50 tons at 900/1000 °C.
- Resistance to thermal fatigue – wear surface cycles from say 650 °C to 20 °C.
- High wear resistance.
- Good corrosion resistance.
- Low cost of material and manufacture.

Such rollers would then have sufficient properties to perhaps allow simplified designs to be adopted (reducing initial and replacement costs) and have enough life and reliability to make inroads into the maintenance costs and allow lower stock levels of spares.

It has been shown that problems with the rollers and associated parts can contribute approximately 30 % of total maintenance costs for slab casters and therefore, any improvement in performance would be welcomed.

3. THE POSSIBILITIES OFFERED BY WELD SURFACING

3.1. RECLAMATIONS

The weld surfacing of slab caster rollers has been adopted by many operators as a means of simply bringing rollers back to original dimensions. Some, perhaps most, of these steelworks currently employing welding as a reclamation technique have further investigated the potential benefits or applying a material with wear properties superior to those of the original roller.

Applications: continuous caster rolls, wrapped rolls, mill spindles, scale breaker rolls, back up rolls, conveyor rolls, pinch rolls, edger rolls, table rolls, secondary work rolls, spool rolls, guide rolls, plate leveller rolls, coil box rolls, primary mill work rolls, crane wheels, tension.

3.2. CONSTRUCTION

If reclamation of worn rollers can produce a roller with superior properties compared to traditional roller materials, it follows that the same considerable benefits of clad be applied to the construction of new casters of rollers. Many casters manufacturers offer the option of clad rollers thus enabling the customers to reap these benefits from day one of operation.

4. CHOICE OF MATERIAL

Selecting the material for surfacing, whether for new construction or reclamation of existing rollers, obviously requires some thought.

Apart from the performance requirements outlined already, attention has to be paid to the weldability of the material desired. Experience with thick weld deposits and their heat treatment led away from some possible candidates.

COMMON HIMONT MATERIALS USED IN CONTINUOUS CASTERS AND MILLS
(Typical applications and characteristics).

Material: **FILTUB 1**

- General hot and cold applications, blooming, slabbing mill rolls, scale breaker rolls and auxiliary rolls.
- General purpose alloy which combines moderate resistance to abrasion with good thermal fatigue properties.

Material: **FILTUB 3**

- Continuous caster rolls, hot strip mill table rolls, continuous billet rolls, run out rollers.
- Super Chrome alloy specially designed to combine excellent resistance to thermal fatigue and corrosion in continuous casters with very good wear properties.

Material: **FILTUB 4**

- Blooming and slabbing mill rolls, early roughing stands, tube mill elongator rolls, Bronx reeler rolls, plate mill leveler, back - up rolls, hot strip mill pinch rolls.
- Special alloy developed for improved resistance to abrasion when compared to FILTUB1, excellent thermal fatigue properties. Equivalent wear properties as double poured and differentially hardened cast steels.

Material: **FILTUB 10**

- General application where the requirement does not call for superior wear and thermal fatigue properties. Some blooming applications, journal repairs and use as a buffer material.
- Low alloy weld metal with similar properties to forged steel. Hardness approximately 25 Rc.

Material: **FILTUB 11**

- Table rolls, crane wheels.
- Special low alloy designed to give good combination of toughness and tensile strength. Hardness approximately 30 Rc.

Material: **FILTUB 15**

- Buffer material for use on rolls with high Carbon content prior to hardfacing.
- Special low alloy weld material which enables steel with up to 1.4 % carbon to be welded successfully.

Material: **FILTUB 17**

- Backs up rolls, pinch rolls.
- Modified tool steel type with alloy additions to give good wear and thermal fatigue properties.

Material: **Universal FLUX**

- To be used with all Himont submerged arc welding wires.
- A fully basic agglomerated all mineral non – alloying flux. Excellent hot slag release, especially suitable for continuous welding operations.

WELDING OF CONTINUOUS CASTING ROLLERS

Welding process: submerged arc

Welding materials: wire – FILTUB 3
FLUX – universal flux

Specifications – nominal compositions

FILTUB 3	C	Mn	Si	Cr	Ni	Mo	Nb	V	Cu
	0.12	1.0	0.4	12.0	2.5	1.0	+ Additions		
Universal Flux	SiO ₂ + TiO ₂	CaO + MgO	Al ₂ O ₃ + MnO		CaF ₂				
	20	38	17		19				
	Basicity – 2.7								

Preheat – 200 / 250 degrees Centigrade

Heat treatment after welding – Depending on required surface hardness. Typically - 585 degrees Centigrade hold 8 hours – 38-42 Rc.

- Hardness range – 35 – 45 Rc – depending on heat treatment.





