

Caster Exfoliation Reduces Corrosion Rates

A North American integrated Steel Mill was experiencing severe corrosion in their Continuous Caster Spray Chamber. The corrosion was causing support structure and other components to degrade with the appearance of delamination. The actual form of corrosion was determined to be exfoliation.

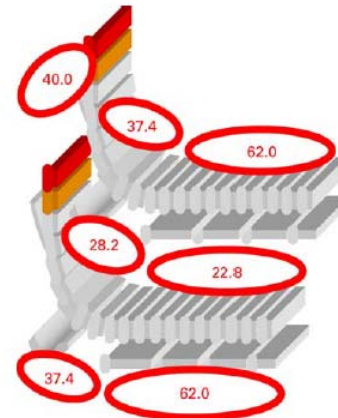
The corrosion mechanism involves transport and concentration of chlorides on the metal surfaces of the spray chamber (structure and components). The spray water is distributed within the caster and the radiant heat from the slab produces a concentration mechanism through evaporation.

The concentration of chlorides can exceed 250,000 ppm (mg/L) at the metal surface. The result is exfoliation corrosion of support structure, segment components, walkways and other sections of the caster system.

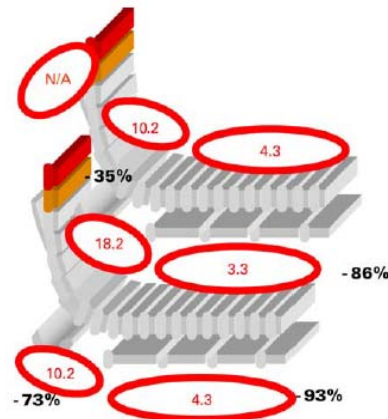
Over the past two years, exfoliation has continued to damage various areas of the caster structure and equipment. Maintenance diligence is necessary to maintain the equipment and quality of the product produced. After reviewing the successes and limitations of various mechanical options considered and implemented and the realization that the chloride levels would continue to vary seasonally and increase annually, additional steps needed to be taken to reduce the rate of metal loss.

A treatment alternative was presented as potentially controlling the exfoliation and reducing the overall corrosion rate. This alternative was designed to be easy to feed by injecting into the spray water header downstream of the flume flush takeoff. In order to address the concerns and potential risks, phases for investigating the potential treatment program were planned. Adjustments were made based on observations, results and additional questions raised throughout the study.

Corrosion rates were significantly reduced with the addition of the treatment program. Exfoliation was controlled and the only corrosion observed was



Corrosion Rate : Before Treatment.



Corrosion Rate : After Treatment.

general in nature. Overall corrosion rates were reduced by 35 – 93% and exfoliation was only observed to a slight level on 3 of the 44 coupons installed during latest phase of study. Previously, 36 of 44 coupons would show various degrees of exfoliation.

The various phases of this project clearly demonstrated that the treatment program controlled the exfoliation throughout the continuous caster on the test coupons and reduced the overall corrosion rates. The treatment program will be implemented to minimize the effects of exfoliation on new steel in this critical system. By controlling the exfoliation, the life of the caster will be extended and maintenance costs will be reduced.



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