



Hot Dip Galvanized Case Study No. 12 Douglas Colliery Conveyors

The Application

As overland conveyors form the lifeblood of the supply of material used in many process plants, the general lack of future coating maintenance is often neglected. Coal dust conditions, and in many cases the extraordinary length of the conveyor installation, together with the potential for inadequate surface preparation for maintenance painting, corrosion control may well be compromised.

In the application described, hot dip galvanized conveyor frames were accepted as the corrosion control system that offers a maintenance free service life in excess of 20 years.

The V3, V4 and V5 overland conveyors at Douglas Colliery are such a system. Although the hot dip galvanized coatings are performing admirably, the coatings on the idler frames, were painted with the zinc electro-plated fasteners, are in the process of failing.



General view of Douglas Colliery



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Environmental Conditions

From an atmospheric corrosion perspective the general conditions of the surrounding areas would normally be classified as a C2 category in terms of ISO 9223:2012. Estimated zinc corrosion rates in a C2 atmosphere is less than $1\mu\text{m}$ per year with service life well in excess of 30 years.

Coal dust subjected to moisture resulting in localised areas of corrosion during the time of wetness. When such isolated sites dry out corrosion will cease. From the evidence gathered on site, the overall conditions found on the conveyors indicate that the corrosion rate of zinc is in the order of $1\mu\text{m}$ per year and that the hot dip galvanized coating is providing a service life that has become the norm expected from most designers who have specified hot dip galvanized steel for corrosion control.



A photograph of the V3 overland conveyor that has been exposed to the atmospheric conditions for the past 20 years and is estimated to continue for a minimum of another 10 years

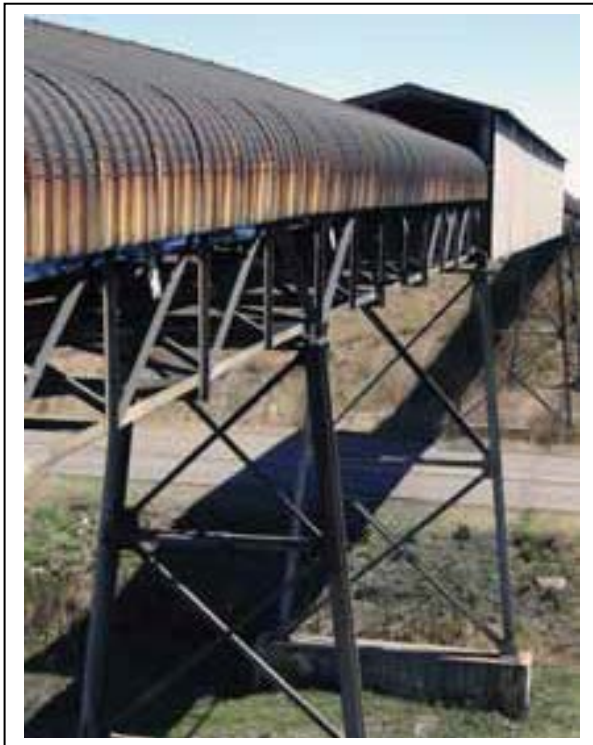
Hot Dip Galvanized Case Study No. 12 Douglas Colliery Conveyors

The Site

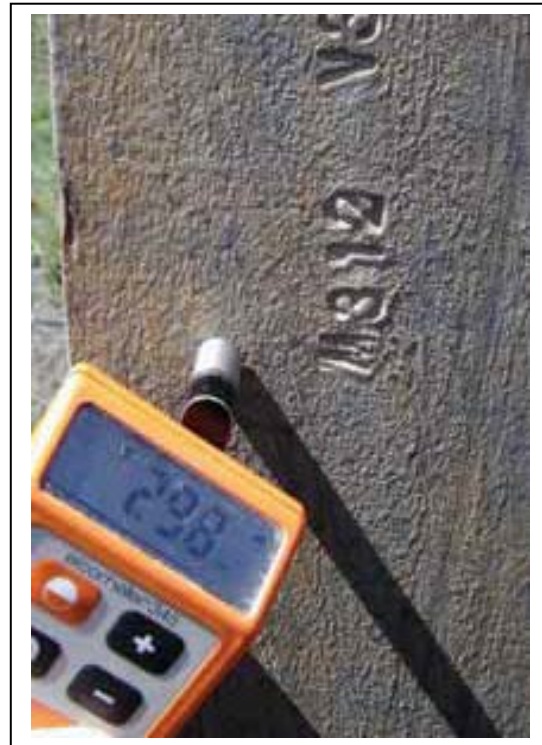
Douglas Colliery is situated on the Witbank coal fields located 23 kilometres south East of the city of Witbank, Mpumalanga. The mine complex is 550 kilometres from Richards Bay Coal Terminal. The mining complex is large and consists of three colliers, Doulas, Vandyksdrift and Wolwekrans, consolidated into a single administrative unit. The mining area extends for 20 kilometres on an East – West axis; and 15 kilometres from North to South.

Findings

Following several visits to sections of the V3, V4 and V5 conveyor it was established that the hot dip galvanized coating on the horizontal and vertical members were in excellent condition. Coating thickness measurements were in a range of 117 to 279 μm with a mean coating thickness of 140 μm . In total 108 coating thickness readings were taken on both the horizontal, vertical and angle support members. All measurements were well in excess of that required by the specification SANS 121 (ISO 1461:1999). In total 108 coating thickness readings were taken on both the horizontal, vertical and angle support members.



The hot dip galvanized structural steel supports at an access road, is in exceptional condition 20 years after installation, not so the sheeting that would in all probability have been a Z275 material with $\pm 20\mu\text{m}$ per side



Coating thickness readings (298 μm) taken on the supporting structure that remains in excess of the specification requirement

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Conclusion

The hot dip galvanized coating on the overland conveyor steelwork has over the 20 year period, performed exceptionally well and if required, based on the residual coating thickness, will provide a further 40 to 60 years of maintenance free life. If necessary, the painted idler frames, which are showing signs of corrosion, may be selectively removed, abrasive blasted to remove the residual paint coating and then hot dip galvanized, providing a durable, predictable coating of extended maintenance free life. All fasteners if necessary should soon be replaced with hot dip galvanized equivalents if it is decided that the idler steelwork is hot dip galvanized.

Based on the actual corrosion control performance of the hot dip galvanized conveyor support structure after 20 year in operation, and the estimated years of future service life, this case study is a prime example of the application of hot dip galvanizing for long haul conveyor systems used in collieries.



Installation of a new long haul overland conveyor system as part of coal mining in the Witbank area

All the structural support steel was hot dip galvanized for corrosion control and an extended service life