

Phalaborwa Copper Mine

The application

Like most established organisations, Phalaborwa mining operation has its own in-house corrosion prevention specifications. In the mid eighties the mine called for tenders for the supply of certain cable ladders for use on the mine. Not being able to offer the specified multi-coat, solution paint system, due to several technical reasons, O-line Support Systems offered to supply the cable ladders coated according to their own in-house developed duplex powder coating system. The mine was at first sceptical but entertained the bid as long as the new system was placed alongside their tried and tested system for future performance evaluation. The performance of the new system in time proved to be superior, which resulted in the mine altering its specification to include the duplex coated cable ladders.

The environmental conditions

Phalaborwa Copper Mine is situated in Phalaborwa, midway on the western border of the Kruger National Game Park. General atmospheric conditions at hand are dry and dusty and appeared to be a typical C1 to C2 environment. However it was confirmed that aggressive conditions exist in the acid and zinconia plant which produce a number of corrosive chemicals, including sulphuric acid and can be categorised as a C5I environment. Mr Koos Horn, a recently retired superintendent from the mine, originally responsible for specifying the duplex protective system, had this to say: "This method of corrosion control, since first specifying the duplex system, has outlasted all other coatings and materials used previously in all conditions of the mine including the acid and zirconia plant" (See Corrosion Categories in terms of ISO 9223, table 4, page 10).

Our findings

Due to the age of the original installation and subsequent staff retirements and changes, etc., the original parallel installation could not

be located. However, we did find a cable ladder system that was installed in the mid eighties, using the proprietary powder coated duplex system. The cable ladders were reported to be the original O-line system, which was hot dip galvanized and then overcoated with an epoxy polyester powder. The cable ladders are no longer in use due to the building being declared redundant.

In spite of the relatively non-corrosive environment in this instance, the powder paint is still adhering to the hot dip galvanized substrate and on cross-cutting the coating to ascertain paint adhesion, the coating remained intact despite trying to lift it at the cross-cut. There were however, several other coatings on components located at the site that were in the process of breaking down.

Conclusion

After 20 odd years of service at Phalaborwa Copper Mine, the duplex coated cable ladders are still performing well in that the powder paint is still adhering well to the hot dip galvanized substrate.

Editors comment

Subsequent to our visit and discussions with Mr Horn, we understand that there are many kilometres of cable racking that are duplex coated, still performing adequately after 18 to 20 years in many other operational parts of the mine.

The investment made in powder coating technology by O-line Support Systems some twenty years ago, has proved to be well spent in terms of the success the company has had in applying duplex coating technology.



Insitu cable ladders in the redundant Transfer Station No. 1.



Total coating thickness reading on the cleaned up side rail of the cable ladder.



Cable ladder cross rung.



Exposed powder coating subjected to a cross cut adhesion test.

