

## **Hot Dip Galvanized Case Study No. 16 W50 mine drilling machine**

### **The Application**

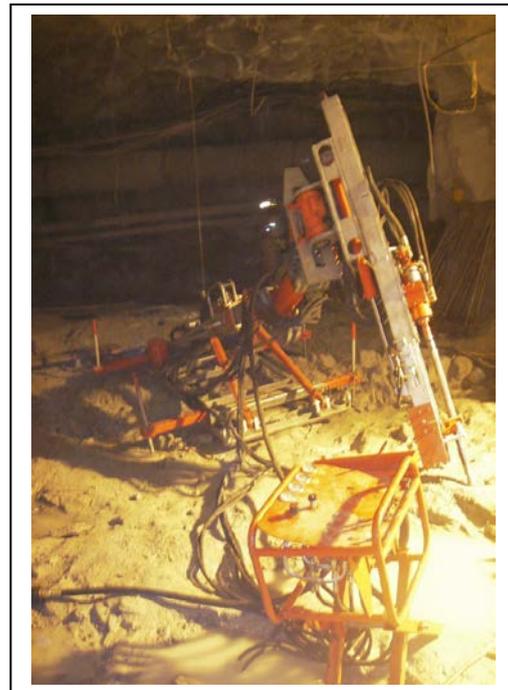
In the early years of mining, rock drilling, in all its forms, was a tedious manual labour intensive operation. From these beginnings, the industry as moved more and more towards the implementation of mechanical equipment aimed at the elimination of the human based process. Over the years, various forms of rock drilling machinery have been employed throughout the mining industry. Years of experience and usage of such equipment has highlighted both the advantages as well as the short comings of such equipment.

This case study traces the results of a new innovative prototype rock drilling machine that was hot dip galvanized in order to improve its service life performance within the harsh and corrosive mining environment.

The use of hot dip galvanizing for corrosion control of close tolerance machine components (rock drilling machine) is a relatively new and innovative development. The results achieved during the initial trials are very encouraging and performance indicators are well within the original parameter set during the project development. Current expectations are that new development will generate greater efficiencies, longer maintenance free shifts and corresponding economic benefits.



**The hot dip galvanized prototype rock drilling machine as supplied and the machine in operation**



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### Environmental Conditions

Environmental conditions in an underground mining environment can vary from severe to extremely corrosive. Conditions include hot humid atmospheres, cooling water contamination as well as being subjected to mechanical damage resulting from physical handling and actual working conditions at the working face. Experience has shown that the service life of mechanical mining equipment requires more regular maintenance than that encountered in most other harsh environments.

The use of hot dip galvanizing was motivated by the fact that painted equipment requires more regular maintenance, which in turn is expensive and a corresponding short working cycles within the harsh mining environment. Paint simply does not provide an extended service life within most mining conditions. Past experience has shown that a service life will range from a few weeks to 2 or 3 months maximum. Subsequent maintenance and refurbishment of equipment is far more difficult and costly as well as being disruptive to mining operations.

Refurbishment of painted equipment requires shot blast cleaning and a full repaint operation in order to achieve an acceptable and presentable product to the client. This requirement does not arise in the case of a hot dip galvanized machine. The intervals between maintenance periods are also extended and maintenance requirements are greatly simplified.



**Photograph taken of  
the drilling machine  
following 4 months of  
operational  
conditions**

### The Site

Two platinum mines were selected for testing the hot dip galvanized drilling machine. The machine spent three months at the first location followed by a further month at the second mine. After a period of four months in actual working conditions, the machine was recovered for maintenance at which time the effects of corrosion damage was examined.

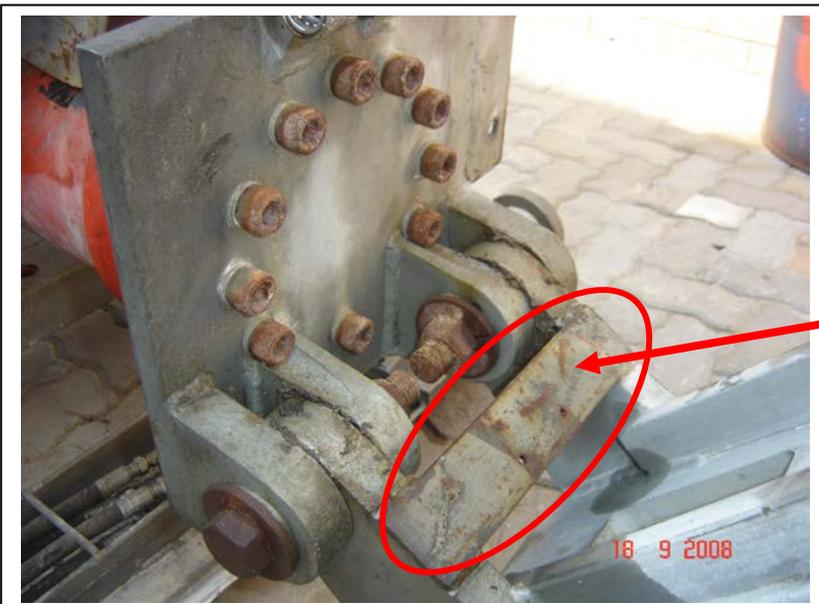
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### Findings

The hot dip galvanized steel components were standing up to the operational condition extremely well with no discernible deterioration of the hot dip galvanized coating. Comparisons to painted and uncoated components on the machine, clearly demonstrated the differences in corrosion control performance. Early performance indications were very encouraging and that potential economic benefits could be significant.



**Where hot dip galvanized fasteners were used the comparison to uncoated fasteners is clearly evident**



**Steel components, added after hot dip galvanizing, were silver painted again**

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**Mobility of the equipment, to the mine site as well as underground, is an important feature and therefore incorporated into the design**

### Conclusion

Hot dip galvanized steel's performance within the mining environment offers significant benefits for all structural steel components. These benefits reduce maintenance costs; extend the working life of equipment, which in turn has direct economic benefits for the mine owner.

Hot dip galvanizing of close tolerance machine components represents a significant departure from the past. The application of hot dip galvanizing steel should be seriously considered whenever environmental conditions are known to be highly corrosive.