Case History
No. 02/2005

HOT DIP GALVANIZED STEELWORK USED TO WIDEN THE STORMS RIVER BRIDGE IN DECEMBER 1986

The original rationale

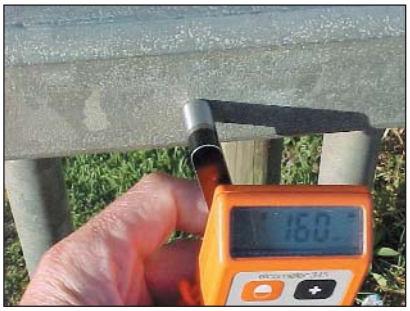
"Hot dip galvanizing to SABS 763, heavy duty coating - 105µm, (now SABS ISO 1461 or SANS 121) was selected as the method of rust prevention for the balustrades, hollosec guardrails, stanchions, box girder ribs, drainage channels, some of the fasteners and the 'Vastrap Plate' footwalks. According to HHO Africa, then known as Hawkins, Hawkins and Osborn, hot dip galvanizing was primarily selected for its, "Long service life to first maintenance and lowest lifetime costs. Other reasons included, competitive first costs, reliability of the hot dip galvanizing process, which in agreement was monitored by the South African Bureau of Standards, speed of application compared to paint coatings, coating toughness, complete coverage of the hollow sections and good resistance to handling damage."

The Storms River Bridge is to many bridge designers and contractors alike, a symbol of bridge construction in South Africa, and it is only fitting that it should continue to play its role for many years to come.

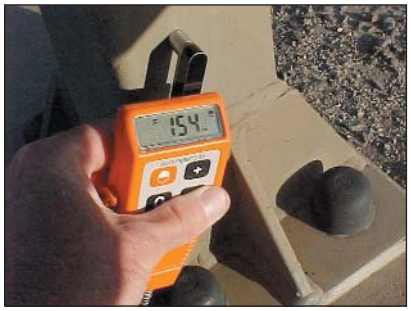
Brief history and factual data

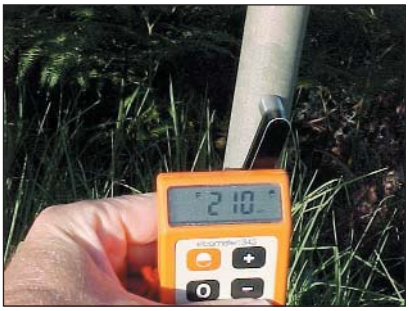
The Storms River Bridge was the first major bridge to be constructed on the section of the N2 from Plettenburg Bay to Port Elizabeth. The design was prepared by an Italian engineer, Dr Ricordo Morandi. The construction of the widening and strengthening of the bridge was carried out in the beginning of January 1986 and was opened on schedule to two-way traffic in time for the December 1986 holidays. The completed project was handed over to the client on 3 February 1987.

The conceptual design method used to widen and strengthen the existing 100m concrete arch was entirely original. The overall width of the deck was increased from 8,180m to 11,450m, using lightweight plate girder cantilever



Photos 1 and 2 – Coating thickness readings on the side (160µm) and top of the handrailings (171µm).





Photos 3 and 4 – Coating thickness readings on guard rail support (154µm) and balustrade transome (210µm) respectively.

Hot Dip Galvanizers Association Southern Africa
Unit U4 (Upper Level), Quality House, St. Christopher Road, St. Andrews, Bedfordview
P.O. Box 2212, Edenvale, 1610 • Website: www.hdgasa.org.za • E-Mail: hdgasa@icon.co.za

rib supporting the precast concrete slabs to minimize the extra dead weight on the arch rib. The arch rib itself was strengthened by the addition of externally bonded steel plates at the crown and springing, which at the time was thought to be original.

The Storms River Bridge is to many bridge designers and contractors alike, a symbol of bridge construction in South Africa, and it is only fitting that it should continue to play its role for many years to come.

Environmental conditions

The location of the site is approximately within 10 kilometres from the coast and about 130m above sea level. Corrosion conditions are moderate coastal as in C4, according to ISO 9223.

Our findings

In general the coating is in excellent condition and coating thickness readings were all far in excess of the heavy duty coating (105µm) originally requested. See table and photos 1 to 17.

Conclusion

After approximately 18 years of service, the hot dip galvanized coating is providing the maintenance free life, originally specified by the client. Some fasteners, which were originally inadequately protected require coating repair. See photo 18. Should an adequate repair to these minor areas be done, the bridge will continue to provide effective corrosion protection for many, many years to come.

Other specifying requirements of reliable performance and coating toughness, with respect to handling damage have also been provided, as no coating damage could be found.

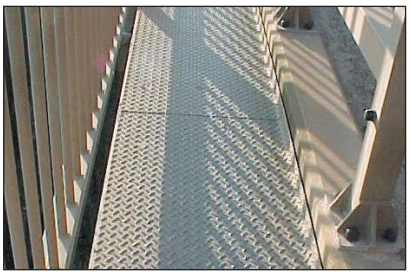
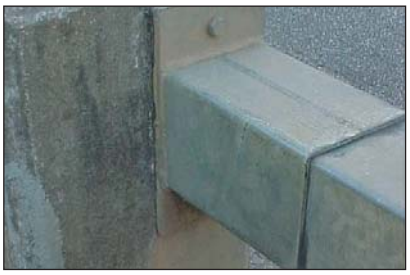


Photo 5 shows the general view of the "Vastrap Plate" walkway and photo 6 shows the general coating thickness, measured adjacent to the anti-skid ridges (149µm).

Photo 7 shows the close-up appearance of the "Vastrap Plate" and photos 8 and 9 show the coating thickness readings taken on the anti-skid ridges of the "vastrap plate" (11,6 to 140µm).



Photos 10 to 13, indicate how slip joint designs can eliminate the requirement for unnecessary site alterations and consequent coating repair.

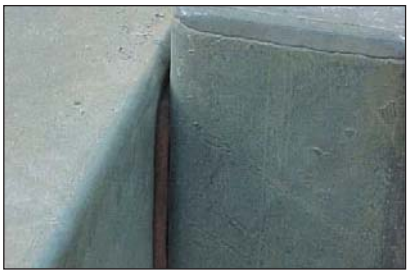


Photo 14. In order to avoid the possibility of crevice corrosion at construction joints, organic washers have been introduced.

Photo 15. In order to increase the maintenance free life of the main fasteners, plastic covers were introduced, filled with a silicon sealant and then pressed home. Note the insufficiently coated washer (possibly electro-plated), which is now showing signs of corrosion.

Hot Dip Galvanizers Association Southern Africa
Unit U4 (Upper Level), Quality House, St. Christopher Road, St. Andrews, Bedfordview
P.O. Box 2212, Edenvale, 1610 • Website: www.hdgasa.org.za • E-Mail: hdgasa@icon.co.za

Photo 16 indicates a fastener that has lost its cover and 17 a damaged plastic cover and rusting washer.

Photo 18. Some fasteners, which were originally inadequately protected require coating repair.

FACTUAL DATA

Height above river	123,48m
Span of arch	91,46m
Rise of arch	20,12m
Overall width of arch	7,93m
Width of road #	6,70m
Length of road	191,46m
Width of footpath	0,6m
Approximate cost of bridge (1956)	R200 000
Cost of widening the bridge (1986)	R2 217 500
Approx. cost of building a new bridge without extra width	R9 000 000

Coating Inspectors Course

Hot dip galvanizing is one of the most widely used methods of protecting steel from corrosion. As a final step in the process, the hot dip galvanized coating is inspected for compliance with the appropriate specifications.

This Coating Inspectors Course has been designed to provide delegates with sufficient knowledge to test, inspect and interpret test results.

Following the course and successful result in a three-part exam, the delegate will be issued with a certificate, and if required, registered as an approved HDGASA inspector. Registration will be confirmed on an annual basis. Successful inspectors will become Individual members of the Association for the year.

The course will be run from the Hot Dip Galvanizer's Association Offices in Kelvin, Sandton. Bookings are limited (maximum 20 people) and will be treated on a first-come-first-serve basis.

COURSE CONTENT

- Introduction to corrosion
- Understanding zinc coatings
- Inspection before hot dip galvanizing
- Inspection after hot dip galvanizing
- Quality assurance in coating applications including report writing

COURSE DURATION

This is a 2-Day Course comprising lectures on the first day, a Plant Tour in the morning of the second day, and the qualifying examination in the afternoon.

DATE AND TIME

Courses commence at 08h00 sharp and end at 16h30, on the following dates: March 8 & 9; April 10 & 11; June 29 & 30 and September 19 & 20.
Lunch and refreshments will be provided. Comprehensive course notes can be collected from our offices two weeks before the course.

COURSE COST AND PAYMENT TERMS

R2 394.00 per person inclusive of VAT. Should you have 2 or more delegates from the same company, course costs will be R2166.00 per person inclusive of VAT. Please note that payment is due on the first day of training. Cheques to be made payable to "Hot Dip Galvanizers Association SA". Members qualify for a discount.

SHOULD YOU BE INTERESTED, KINDLY CONTACT SASKIA SALVATORI AT THE ASSOCIATION.

A group of students completing the test at the end of a recent course.

Hot Dip Galvanizers Association Southern Africa
Unit U4 (Upper Level), Quality House, St. Christopher Road, St. Andrews, Bedfordview
P.O. Box 2212, Edenvale, 1610 • Website: www.hdgasa.org.za • E-Mail: hdgasa@icon.co.za