PRESS RELEASE KH4

All about the quality. More to hot dip galvanizing than an attractive surface appearance

Hot dip galvanizing is a corrosion control mechanism. Yet, as with many things, hot dip galvanized articles are frequently – and inaccurately – judged on their surface appearance only.

"All international standards related to the evaluation and specifications for hot dip galvanizing state that aesthetics is not important. However, the common perception remains that, if an article looks aesthetically pleasing, it must be of high quality. It is imperative that for the attainment of effective corrosion control, focus on the adherence to standards must be vigorously promoted," advises Robin Clarke, Executive Director of the Hot Dip Galvanizers Association Southern Africa (HDGASA).

"In a medium-corrosion environment, carbon steel which is left unprotected will corrode at a rate of 25 to 50 microns per annum. In contrast, when hot-dip galvanized, the zinc coating will only corrode at 0.7 to 2.1 microns per annum. So, a well-galvanized piece of steel with a coating of 120 microns - in an environment where you are losing around one micron per annum – will have a coating service life of more than 80 years," Clarke explains.

In South Africa, the SANS 121 standard is the benchmark for testing the coating - and the specifications are determined by this standard. "The perception that it is possible to apply 185 microns of zinc on a piece of steel - or 120 microns on another - to produce a 'good, better or best' product, is incorrect. The process - which is driven by chemical and metallurgical factors – does not allow one to do that. High-quality hot dip galvanizing must be done to the same high standard consistently and repeatedly," he adds.

Supply chain links

The most important requirement for meeting the specifications in the SANS 121 standard is good steel. Another key factor is close collaboration between the designer, fabricator and galvanizer: "Everyone must do their bit so that we can predict the outcome and service life with a high degree of confidence. The corollary is: poor steel selection and poor design will lead to poor coating development - or even uncoated areas."

This applies especially to hyper-reactive steels with high phosphorous levels or silicon content. While reactive steels may appear to be of good quality, they either produce very poor surface finishes or chip, exposing the substrate. Designers and architects must therefore not only choose the right materials, but design to provide the galvanizer the best chance of a good outcome.

Clarke also says that there are variations when it comes to finishing. Known as fettling, this requires the smoothing of zinc drainage spikes after steel has been galvanized.

"The best way to ensure quality outcomes and reduce costs is to educate customers to choose the best steel possible, ensure good project design and fabrication techniques - and to control the galvanizing process as tightly as possible. A galvanized article managed by the entire supply chain - and processed efficiently - does not require hours of fettling. The resulting surface finish is enhanced, with the attendant benefits of net cost reduction and customer expectations which have been successfully met.

In Europe, there is a strong focus on process control from the fabricator - through adherence to ISO 14713 prescriptions - and from the galvanizer, paying close attention to best practices for surface cleaning and fluxing prior to galvanizing.

Even though official quality standards play down aesthetics, Clarke concedes that nothing detracts more from a high-quality galvanized object than poor welding seams, jagged pin holing, discontinuities or the use of mismatching materials. For these reasons, he admits there is growing emphasis on achieving attractive finishes. "With a collaborative approach from engineers, architects, fabricators and the galvanizers, we *can* achieve a high aesthetic standard consistently – and repeatedly. However, this still requires the correct selection of good material, to enable the fabricator to include the correct vent and rain holes, and to design so that there is only one submergence in the galvanizing bath, with no oxide lines," he notes.

Quality - the real challenge

As local steel production volumes fall and imports increase, quality issues predominate. While Clarke is not overly concerned that the finished product galvanized offshore will fail to meet the global standards on which South Africa's are also based, he is worried about an influx of poor-quality steel ahead of galvanizing.

"If a merchant receives a mixed bag of steel, this will impact the entire supply chain. An architect may order the right quality steel and provide us with the certificates. However, when we test the steel, we will discover that the certificates do not accurately represent the entire material," he notes.

Clarke has also encountered instances where reputable suppliers have inadvertently mixed up their own metallurgy. If the HDGASA spots a trend, this is traced back to the source and a solution is found. This underscores the important industry monitoring role of the HDGASA – and the importance of education and training.

Quality training

To this end, he calls on all hot dip galvanizers to strongly encourage designers, specifiers and fabricators to attend HDGASA training courses to better understand corrosion control:

" Our courses take participants through the fundamentals - so that they can understand why the quality standards are written in the way they are. We also focus heavily on the science and on first principles, including the original concept of cathodic protection, and why zinc provides high levels of protection to a carbon steel substrate.

Most importantly, our training courses help participants to understand why - and how - to achieve quality hot dip galvanizing, ensuring they can consistently meet customers' expectations of product service life," Clarke concludes.