

Industrial coatings for steel structures

Owners and operators of high-value assets need to understand the cost implications of ignoring the effects of corrosion that pose a threat to all infrastructure through the degradation of structures such as buildings, roads, bridges, pipelines and towers. The economic impact of corrosion represents an annual cost of many billions of dollars to the economy.

Some of the advantages of planning for corrosion control and mitigation at the design phase include extending the life of an asset - thus making it more profitable - and reducing maintenance time and costs, thereby increasing an asset's utilisation.

According to the Director of Napier Sandblasting (NSB) in New Zealand, **Craig Ross**, some construction contractors sought to save money on infrastructure projects by using substandard coatings with the result that some buildings, towers and bridges are already showing signs of fatigue and distress.

"While most of the shoddy coatings applicators have gone, many of their structures already require remediation," he said. "Luckily, changes in regulations and better enforcement of standards mean that new designs should have a much longer operational life."

Coatings consultant at Remedy Asset Protection, **Justin Rigby** added that steel structures within industrial facilities are usually located in "aggressive" environments.

"Owners of offshore platforms or dock cranes exposed to a marine environment cannot afford for corrosion to degrade their assets," he said.

Ross added that even relatively non-reactive stainless steel requires protection in certain situations.

"NSB does a lot of work in the hide tanning industry and other really severe environments, generally where acid attack or abrasion is an issue," he said.

Cathodic protection is one technology that can be used to impress a current into a structure to alter the surface reactive characteristics of a metal to minimise corrosion.

According to Rigby, it is important that a protective coating project is carefully planned.

Protective coatings projects are usually unsuccessful for relatively simple reasons. Planners often do not fully comprehend the technical complexity of many coatings projects, especially if the coating is to be applied to an existing steel structure; even more so if the site is in a remote location. Consequently, they fail to invest the time and resources to manage it effectively which results in substantial cost implications when things go wrong.

Protective coatings are not just paint. Coatings are engineered products that undergo rigorous testing and refinement to provide specific properties that will protect a structure from its service environment.

"A simplistic analogy would be to a structure that is plastic coated," Rigby said.

There is a wide selection of coating products available to the market so it is essential that the appropriate coatings system is chosen. There is no single product that meets every coating situation so during the planning of a project, a compromise may need to be made and not to be fooled by 'one size fits all' claims made by some manufacturers.

Modern technology has developed active pigments which are being incorporated into primers to provide additional protection. Active anticorrosive pigments are added to primers which can give further protection for areas with coating damage. These pigments prevent corrosion of a metal substrate by building up permanently passive conditions at the metal surface and/or by a build-up of solid compounds which fill the damaged area of the coating.

It is important to be flexible and adaptable when developing protective coating projects. While identifying areas of risk at the start of a project is an extra expense, it will help ensure a project's success.

The Australasian Corrosion Association (ACA) works with companies like Remedy and NSB, along with academia, to research all aspects of corrosion to provide an extensive knowledge base that supports best practice in corrosion management, ensuring all impacts of corrosion are responsibly managed, the environment is protected, public safety enhanced and economies improved.





“The quality of the finished project is dependent on how skilfully and effectively a coating is applied,” Rigby said.

The technicians chosen to apply a coating must have apt skills. A less obvious criterion, especially for any sort of tower structure, is abseiling skills; technicians might have to be in a harness and suspended in mid-air which requires a particular mix of physical and psychological attributes.

When planning protective coatings, it is also important to take account of factors such as the geography, access to the structure and climate, all of which impact the cost of the project.

According to Rigby, there are a range of quality tests available that comply with Australian and international standards, many of which are covered in the ACA’s NACE Inspector courses. A good coating specification will reference AS/NZ 2312 as a minimum and categorise the service environment according to its corrosivity and then nominate a coating system based on the desired design life of the coating.

One vital aspect of coatings projects is to have certification that the job complies with all the appropriate legislation, regulations and standards. There are two ways to achieve this; to pay for third party inspection and engage a contracting firm that has a PCCP accreditation. This ensures they have staff with the necessary skills and accredited processes, providing peace of mind to customers that quality is ‘built-in’ throughout project planning and execution.

The cost to coat a structure with an appropriate and effective protective material varies depending on whether it is applied in a workshop or onsite and averages between \$80 and \$300 per square metre.

“This is a relatively minor cost compared to the cost of not coating the steel,” said Ross.

“However, cost is very much relative to what the required durability expectation is, the level of aesthetics required and how harsh the environment is.”

If a structure to be protected is in a remote location, it will be necessary to select the most cost-effective means of transporting

materials and personnel to the site. Additionally, remote sites may be exposed to climatic extremes which impact on applying a coating. For example, monsoonal rains in tropical regions would make it difficult to spray a coating onto any type of structure.

The health and safety analysis of a project must look at how to effectively protect a structure and address any environmental considerations. It must also consider how to properly apply the coating to minimise its effects on the surrounding areas as well as protect the technician who might be working in a harness tethered metres above the ground.

The ACA is a not-for-profit, membership association that disseminates information on corrosion and its prevention through the provision of training courses, seminars, conferences, publications and other activities. The vision of the ACA is that corrosion is managed sustainably and cost-effectively to ensure the health and safety of the community and protection of the environment. For further information, visit <http://www.corrosion.com.au>

