University Galvanized to Face the Future

As part of the Arts West Redevelopment project, the University of Melbourne has renovated the Arts faculty building on Medical Road in the main Parkville campus. A stunning visual feature of the new building is the louvered façade on three sides; the steel sections of each louvre have been shaped so that they form part of a series of 3D images that can be viewed from different angles as people walk around the building.

To protect the steel from corrosion and add visual appeal, the project team opted to galvanize the louvres. Industrial Galvanizers (IG), a member of the Galvanizers Association of Australia (GAA), was engaged to take the more than 480 individual steel sections and coat them in zinc prior to delivery to the construction site. The IG factory in suburban Campbellfield, north of the Melbourne CBD, returned each batch of the completed galvanization project to the steel fabricators, Fabmetal Specialists, with an average turnaround of 2-3 working days in plant. According to David Reilly, Sales Manager at IG, galvanization provides a long lasting, tough, durable coating that provides complete corrosion protection both inside and out in addition to enhancing the appearance.

Galvanization has been used for nearly two centuries and is a very effective method of protecting steel structures. Items to be coated are dipped into a bath containing a solution of molten zinc. The process provides three types of protection in the one coating: barrier protection, cathodic protection and a zinc patina providing long-lasting protection.

A GAA datasheet explains that a galvanized coating completely encapsulates all surfaces of a steel structure and acts as a barrier to the surrounding environment. The coating has a natural electrical potential which cathodically protects the steel from coating imperfections caused by accidental abrasion, cutting, drilling, or bending. The last critical component is the zinc patina itself which is relatively insoluble and passive, thus greatly reducing the corrosion rate.

"Galvanizing has a similar initial cost as any other surface protective coating, in many cases it is lower," said Peter Golding, CEO of GAA. "It is a myth that the process increases the cost of a project."

The stability of a galvanized surface means that the time between maintenance inspections is much longer which greatly reduces the life-cycle costs of the structure.

In today's environmentally conscious world, galvanization is a very sustainable process. "Both the metal substrate and the zinc coating can be

Some of the stylised figures embedded in the panels of the redeveloped University of Melbourne Arts faculty building.

A long view of one of the sides of the redeveloped Arts building.

The cramped construction site drop zone that had to be negotiated by the semi-trailers delivering the galvanized sections.

Sections of the galvanized façade being lifted into place by crane.

repeatedly recycled forever," Golding added. Galvanizing is carried out to Australian and New Zealand Standard AS/NZS 4680 ensuring minimum coating thicknesses are applied and making coating life and performance reliable and predictable.

The hot dip baths at IG can accommodate pieces up to 12 metres in length, 1.8 metres wide and 2.7 metres deep. "We can work with larger structures if they have been designed in sections that can be bolted together after galvanizing," Reilly said. "Alternatively, if an object exceeds the dimensions of our zinc bath, it is possible to progressively or 'double' dip larger single pieces."

Safety is always of utmost importance when IG staff are working in proximity to the molten zinc. "We spend the majority of the time checking that the item delivered for galvanizing meets the design and fabrication specifications," said Reilly. "We have to ensure that there are vents and holes in the appropriate places to make sure that excess hot liquids drain fully from the structure."

While the iconic façade on the Arts faculty building was being installed, Reilly had to contend with the constraints of restricted site access for the trucks delivering the oversize galvanized sections. The University of Melbourne is located in a leafy area north of Melbourne's CBD, but most of the buildings are nestled close together with narrow laneways between them making it difficult to manoeuvre large vehicles.

"All the façade sections were numbered as they had to be installed in a very precise sequence," Reilly added. "It was a challenge to get the semi-trailers in and unload the steel because they had to be taken off in such a way that they could be lifted up the building without double handling." The panels were packed with spacers and carpet so that the coating would not be damaged as the client wanted to maintain an "architectural" look and finish. The sequencing was a critical aspect of the project to ensure the shaped sections correctly formed the embedded image.

The durability of the galvanizing process meant stacks of panels could be stored on site with exposure to the elements and a construction environment. The coating has a unique metallurgical structure which gives outstanding resistance to mechanical damage in transport, erection and service.

Different environments are classified on a scale of C1 to C5, with C1 being a very benign location to C5 being extremely severe in terms of temperature extremes, humidity and corrosive components such as salt or chemicals. Average suburban areas—such as where the University of Melbourne is located—are mostly classified as C2.

The standard AS/NZS 4680 calls for minimum zinc deposition thickness of 85 microns for the items galvanized in this project. The estimated life-span and performance of a galvanized structure is calculated using the thickness of the zinc coating and the severity of the operating environment. Combining the results—Parkville being C2 and the zinc thickness meeting the requirements of the standard—gives the new façade an expected life-span of more than 99 years.

A galvanized structure lasts longer and requires less frequent inspections, so in the vast majority of cases is the cheapest process in the longer term. Every part of a galvanized article is protected, even recesses, sharp corners and inaccessible areas. No inorganic coating applied to a structure or fabrication after completion can provide the same protection. Maintenance requirements add to the life-cycle costs of any facility or structure, especially when plant shutdown or disruption to production is involved.

The majority of the steel that IG processes comes in fairly regular shapes, but the company also occasionally galvanizes sculptures and art installations. "The unusual shapes break up the monotony of I-beams and girders that come through," Reilly said. "Some of the stranger pieces get a raised eyebrow from a few of our staff though."

According to Reilly the choice of coating depends on what the client is after. Asset owners need to consider initial cost, life cycle costs, aesthetics and the environment when choosing a coating system. It is important to also remember that galvanization is not appropriate for every situation. "However, if it is made of steel we will do our best to galvanize it," he added. "While the metal was too thin to survive the process, a customer once even asked us to hot dip some standard coil bedsprings as part of an art installation."

The Galvanizers Association of Australia represents many of the leading galvanizing companies throughout Australia, New Zealand and Asia. Established in 1963, the Association works with companies like IG to ensure the highest standards in design and quality of galvanized products. GAA's objectives are to provide technical consulting services on a not for profit basis and to assist consumers achieve the economic benefits inherent in the correct design and application of the galvanization process.