

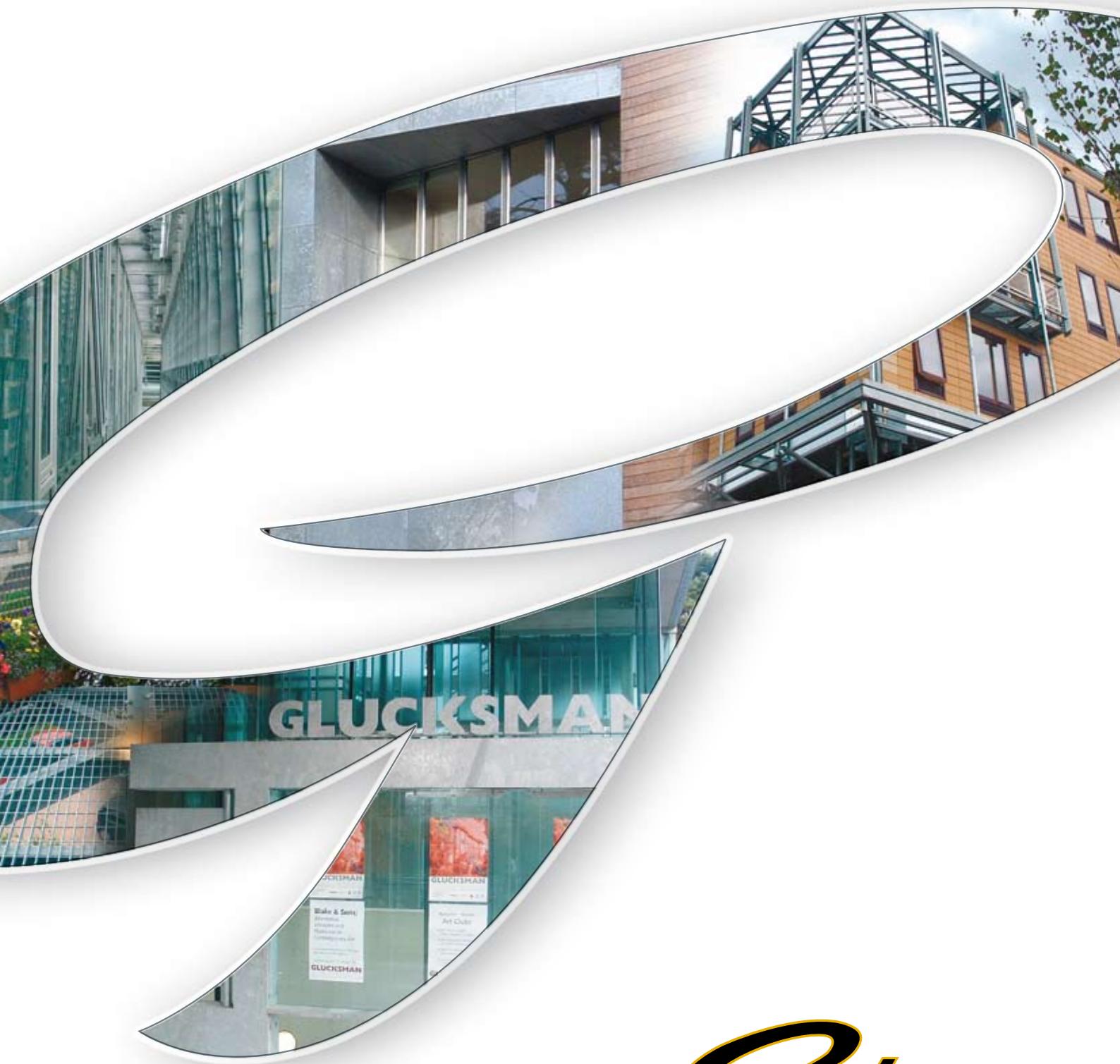
Galco

Galvanizing Review





40 YEARS OF EXPERIENCE
IN HOT DIP GALVANIZING



Galco

Galvanizing Review

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Dear Reader,

Hot Dip Galvanizing is arguably the most environmentally-friendly process available to protect steel against corrosion and has many inherently sustainable features that we will explore. This review highlights some of the most innovative and exciting projects recently constructed in Ireland, projects which will define the architectural and cultural landscape of Ireland for several generations to come. Galco are proud to have been involved in contributing to these buildings and in so doing helping to push the boundaries of design and sustainability.

These projects include several award winning designs such as the new Cork Civic Offices and the Glucksman Gallery at UCC, both winners of the Annual Galvanizing Awards in 2008 and 2006 respectively. Another important building is the innovative Navan Credit Union which is one of our most environmentally sustainable buildings and one of a select group presented at the World Sustainable Building Conference in Tokyo. We also feature the Fermoy Toll Plaza which follows the NRA's standard template which will form an instantly recognisable part of our expanding road infrastructure and the Barna Waste Composting facility which is a critical part of how we must deal with waste management for the future.

We also include some interesting examples of how steel and galvanizing can be used to great creative effect and look at the ornamental features of the new 'Ritz-Carlton' hotel in Powerscourt which were Hot Dip Galvanized and then painted in-house by Galco using GALVACOAT® paint, the only recommended one-coat paint system for galvanized steel. Finally we feature the new Elephant Breeding Unit in Dublin Zoo which is now home to two breeding females and their new born calves.

Full details of the environmental aspects of Hot Dip Galvanizing and how it contributes to sustainable construction are contained in another publication; 'Galvanizing and Sustainable Construction, A Specifiers' Guide' copies of which are available through our website www.galco.ie. This guide has been compiled by Prof. Tom Wooley, previously Professor of Architecture at Queens University Belfast and now Professor at the Graduate School of the Environment at the Centre for Alternative Technology in Wales.

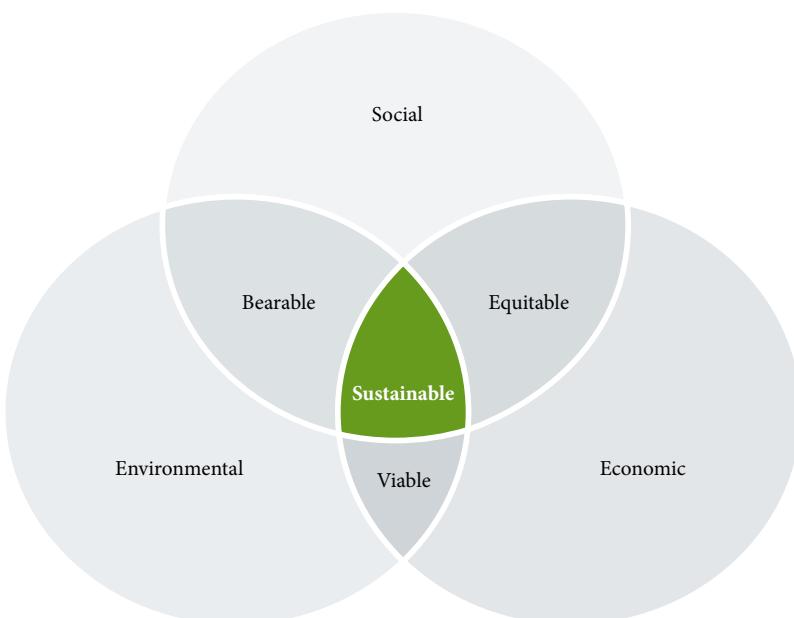
Ed Byrne
Sales & Marketing Manager

HOT DIP GALVANIZING IN A SUSTAINABLE FUTURE

Sustainable Development has become a societal, regulatory and market trend. The environmental and social attributes of materials and products are increasingly affecting design and purchasing in building and construction. There is a marked shift toward high performance and environmentally responsible products.

Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but in the indefinite future. The term was used by the Brundtland Commission which coined what has become the most often-quoted definition of sustainable development as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs¹."

Today's growth brings economic prosperity and welfare – but also a continuously growing demand for materials. Thus, a trade-off arises between societal benefits and the depletion of natural resources.



Scheme of sustainable development: at the confluence of three preoccupations.

The Brundtland Commission, formally the World Commission on Environment and Development (WCED), known by the name of its Chair Gro Harlem Brundtland, was convened by the United Nations in 1983. The commission was created to address growing concern about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development.

In order to make this growth sustainable the materials used need to be either renewable or recyclable. Hot Dip Galvanised building products can last for generations, and after their useful life they can be recovered and re-used over and over again. Therefore renewability and recyclability are complementary – and not conflicting – contributions to a sustainable future.

Galvanizing is a versatile process. Articles ranging from nuts and bolts to long structural sections can be treated. Allowing for the ability to bolt or weld fabrications after galvanizing, almost any size of structure can be galvanized. Complex shapes, open vessels and most hollow articles can be galvanized, inside and out, in one operation. When the length or depth of the item exceeds the size of the bath, special techniques may be employed to facilitate dipping.

1. United Nations. 1987. "Report of the World Commission on Environment and Development." General Assembly Resolution 42/187, 11 December 1987.

RECYCLING OF ZINC

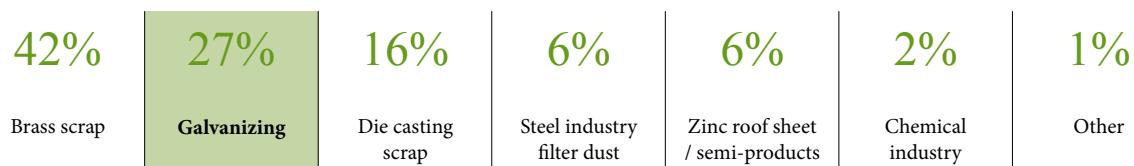
Zinc is the principal raw material in galvanizing. Zinc is an inherently recyclable non-ferrous metal. It can be recycled indefinitely without any loss of physical or chemical properties. This is a major advantage for the hot dip galvanizing process ensuring its environmental sustainability and its cost effectiveness.

About 30% (3 million tonnes) of the world's zinc consumption is from recycled sources. A figure that is increasing with increased environmental awareness and improvements in recycling technology. Estimates suggest that 80% of zinc available for recycling is in fact recycled. This means that much of the zinc in use today has probably been used before.

For example, the car you drive contains up to 10 kg of recycled zinc in its galvanized body panels and when it is discarded these panels can be readily made into new parts of identical quality. Even the zinc oxide used to cure your tyres is recoverable to make new tyres.

The table below describes the percentage of recovered zinc from various products manufactured with zinc.

Recycling of Galvanized Products



Source: International Zinc Association

The presence of a zinc coating on steel does not restrict its recyclability. Galvanized steel is recycled with other scrap steel as part of the steel production process; it volatilizes early in the process and is collected for reprocessing.



CORK CIVIC OFFICES WINS THE GALVANIZING AWARDS

For the second time in three years an Irish project has been the overall winner of the Galvanizing Awards. These awards are organised by the Galvanizers Association and are open to entries from projects in both the UK and Ireland. Like the previous winner from 2006 the Glucksman Gallery in UCC (see pg 16, 17), this project is a major public building in Cork City and is an appropriate continuation of Cork's previous role as European City of Culture.



**Galvanizing Awards 2008
Overall Winner and
Sustainable Award
Winner**

2007 November
**- Design Award from
OPUS, in the over €10m
category**

2007 September
**- Runner-up for the
annual national RIBA
Sustainability Award
in the UK**

2007 June
**- European Award from
RIBA**



- ▶ **Promoter:** Cork City Council
- ▶ **Architects:** ABK
- ▶ **Main Contractor:** Cleary Doyle Contracting Ltd.
- ▶ **Steelwork:** Feldhaus (Germany),
Damag Engineering Ltd. (Ireland).



This project was originally conceived by Cork City Council and in late 2004. Cleary Doyle Contracting were awarded the 'Design and Build' contract. The Architects behind this innovative design were ABK Architects in Dublin. Considerable thought went into creating a functional yet sustainable design which would complement the buildings position and standing in Cork City. The form of the building is the product of a holistic environmental strategy which integrates the latest technology to create a good working environment. Free heating and cooling are provided using a geothermal heating system to gently heat or cool all levels of the building in winter or summer and the double faade generates a microclimate allowing staff to open perimeter windows during the coldest months.

The building is wrapped in a double faade which modifies light and air for the internal environment. The outer screen is constructed of a fine lattice of galvanized steel flats suspended from cantilevered galvanized steel trusses. Glass sheets are fitted with a solar control pattern and clamped by steel beads to form a light elegant faade to the building.

John Parker of ABK chose hot dip galvanized steel as he believed its strong colour and texture offset the glass better than the more refined palette of stainless steel or aluminium would. "We were looking for something more tactile and attractive. Galvanizing provided the perfect marriage of aesthetics, performance and cost effectiveness".



Paul Leech

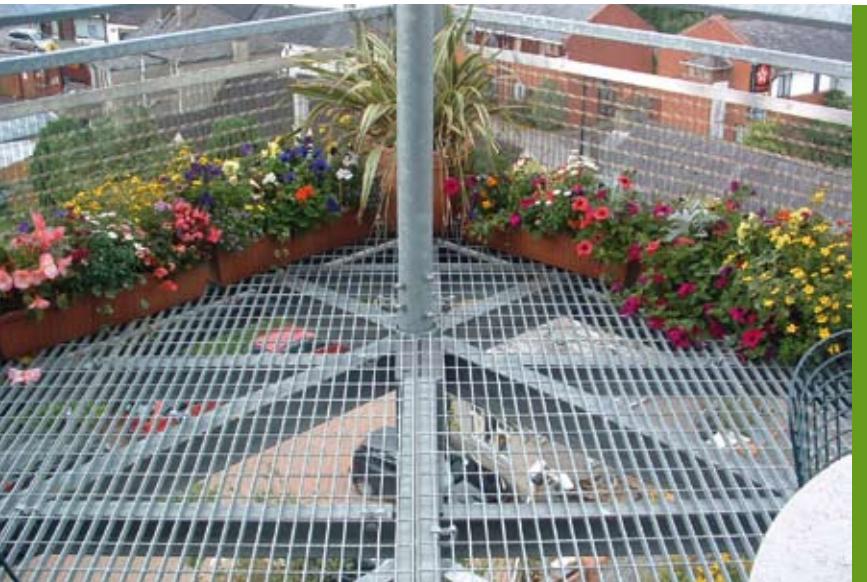
"THE future must be green or we won't have a future," says Paul Leech, Ecotect, Architect and Engineer.

GALCO SCORES WITH 5 STOREY SUSTAINABILITY AT NAVAN

"THE future must be green or we won't have a future," says Paul Leech, Ecotect, Architect and Engineer. A man passionate about promoting sustainable construction in Ireland. Paul is principal director of architects GAIA Ecotecture and a founding member of éasca, the Environmental and Sustainable Construction Association, which was set up to promote the viability of sustainable construction in Ireland. Paul believes Ireland's commitment to reducing national emissions levels under the Kyoto Protocol is beginning to force the hand of the construction industry. Éasca was formed to respond to this growing demand for information on services, materials and technologies geared towards high levels of energy efficiency, occupant health and comfort and environmental performance.

Techno optimism

Paul believes that Ireland has to take the challenge of sustainable construction seriously. "The imminence of the threat is intellectually clear, it's not politically or commercially clear, because of the vested interests, but it is understood." His message is to embrace sustainable construction now: "Just do it! Don't sit around talking about it because we don't have time. If we don't do something our children and their children will be facing the equivalent of the New Orleans disaster in Ireland." But Paul is also a techno optimist: "I believe we can cleverly get through the crisis. I think the country is changing, in the last five years there's a new vigour, a new confidence."



Project: Navan Credit Union

St Mary's Credit Union in Navan, Co. Meath (NCU) is Ireland's most innovative sustainable building to date and Ireland's first 5-storey timber-frame building. It was one of a handful of cutting-edge projects selected for presentation at the World Sustainable Building Conference in Tokyo. NCU has also been highly commended at the Galvanizing Awards.

GAIA Ecotecture took a holistic approach to the building's design, engineering and construction. They wanted the new building to act as a living structure, its natural elements interacting and adapting to the needs of the building's users and the challenges thrown up by shifting weather conditions.



Strategic steel

"It's a solar building, the apex is south facing and the steel is strategic. We used galvanized steel to set up the 'Abraham Screen' which supports the overhang of the topmost level of the *brise soleil* and provides deciduous shading, allowing Wisteria to climb along three levels. In years to come, the Wisteria will grow and it should turn into a green bower. It's a highly engineered space, the cybernetically controlled vents at the top allow solar gain in winter and none in summer. The plant room is a solar roof with a solar chimney. At the north duct, we used pre-galvanized cold-pressed sections to keep the embodied energy down to the absolute minimum. The whole ductwork is galvanized steel and runs to the solar chimney, a lot of the solar panels are bedded in galvanized steel."

Paul admits that sometimes they refuse work that doesn't comply with their ethos and that it can be tough. But he believes that the business opportunities and technical innovation are an earner. "Ireland is finding it hard to see the reality of the sustainable agenda. We have a buoyant economy but we don't yet have a fair society. People who have the know-how to do things in an ecological way are going to get market share ultimately or we won't have either.

CORROSION PROTECTION

Hot Dip Galvanizing is widely regarded as one of the most effective methods of corrosion protection for steel and is the most popular protective process for all external steelwork. The principle reason for this is a combination of cost effectiveness and the extended life expectancy provided by effective corrosion control.

Hot Dip Galvanizing is unique, tough, long lasting, self-healing and covers internal and external surfaces.

Hot Dip Galvanizing provides a barrier between all internal and external steel surfaces and their environment. The steel is given maximum protection through the formation of continuous, tough, alloy layers that result in a metallurgically bonded coating.

Protection by sacrificial action

Zinc corrodes in preference to steel and sacrifices itself to protect the steel. If the steel is damaged the corrosion products from the zinc are deposited on the damaged area resealing it from the atmosphere and therefore preventing the sideways creep of corrosion. Hot Dip Galvanizing differs from paints in this respect as most paints give no protection at points of damage and only provide barrier protection.

Atmospheric corrosion resistance

Barrier protection

The resistance of zinc to atmospheric corrosion depends on a protective film, which forms on the surface of the zinc. This zinc coating reacts with the atmosphere to form zinc compounds that form a protective, chemically inert, layer that inhibits further reaction with the metal beneath.

The corrosion rate for zinc is generally linear for a given environment. A major advantage of this is that it allows predictions of ultimate life to be made on the basis of interim assessments of coating thickness.

The unique nature of the galvanizing process provides a tough and abrasion resistant coating which means less site damage and speedy erection of structures.

It is estimated that corrosion costs economies around 4% of Gross Domestic Product.

Every 90 seconds, across the world, one tonne of steel turns to rust.

Of every two tonnes of steel produced, one tonne is made to replace one that has rusted.

The use of hot dip galvanizing to prevent rust means that for every one tonne of steel protected we conserve enough energy to satisfy an average family's energy needs for several weeks.



*Every 90 seconds,
across the world,
one tonne of steel
turns to rust.*



USING LIFE CYCLE ASSESSMENTS (LCA) TO COMPARE CORROSION PROTECTION SYSTEMS

When it comes to possible corrosion prevention systems for steel structures, the choice often lies between hot dip galvanizing and paint. In addition to classical criteria for selecting suitable systems such as service life, functionality or costs, ecological considerations are also increasingly important.

A study by the Environmental Technology Systems Department of the Institute for Environmental Protection Technology at the Technical University of Berlin involved a comparison between a paint coating (EN ISO 12944) and hot dip galvanizing (EN ISO 1461) on the basis of a life cycle assessment.

Comparative life cycle assessment

The ecological life cycle assessment is a recognised method in accordance with EN ISO 14040 ff., which can be used to compare products or product systems in ecological terms. It is based on the entire life cycle of the product, i.e. manufacture, use, conversion and/or disposal. This involves analysing all environmentally relevant substances which are extracted from the environment (e.g. ores, crude oil) together with substances which enter the environment (e.g. wastes, emissions) and listing them in a life cycle inventory. The inventory data are converted into several so-called effect categories, which constitute the result of a Life Cycle Amount. The effect category best known to the public is the greenhouse effect, a measure of the emission of greenhouse gases and the global warming of the atmosphere.

Findings

The study shows that the life cycle assessment is a meaningful method, based on actual practice of ecological comparison of products. It brings out marked differences between two established corrosion prevention systems for steel structures. The hot dip galvanizing corrosion prevention system displays lower environmental impact for a steel structure with a long service life, as against a paint system. Long service life and freedom from maintenance, the well-known advantages of hot dip galvanizing, are the basis for the environmental benefits of the process.

Summary

Life cycle assessment (LCA) is a practical and scientific tool for ecological product comparison. Hot Dip Galvanizing has significant advantages for long life application and other studies show that over an even shorter lifetime of 40 or 20 years the results do not change significantly.

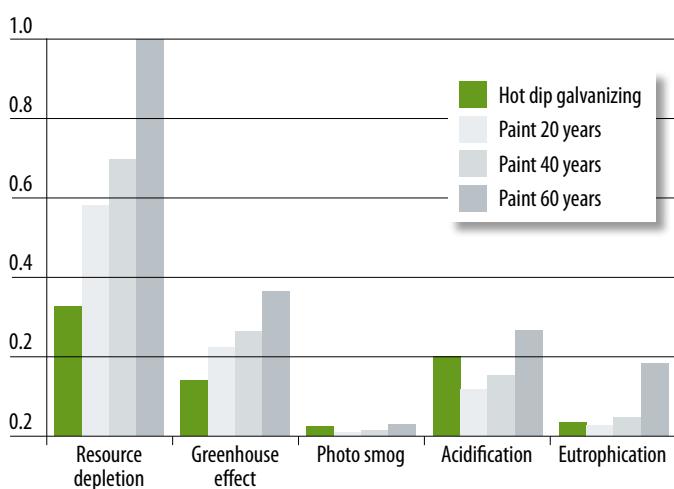
Hot Dip Galvanizing Process Efficiency and Recycling

In the galvanizing process, iron or steel articles are dipped into a bath containing molten zinc just above its melting point. Any zinc that does not form a coating on the metal remains in the bath for further re-use. Galvanizing residues, which consist of dross – a mix of zinc and iron, and zinc ash, are recovered and zinc recycled for further use, often within the galvanizing process.

As well as the zinc recovered from these residues, recycled zinc from other sources, such as zinc scrap, if often used in galvanizing. Galvanized steel can be recycled easily with other scrap as part of in the steel production process. Zinc volatilises early in the process, is collected as dust and is then recycled.

Improvements in gas burner technology have also undoubtedly improved energy efficiency in heating the galvanizing bath. Exhaust heat is not wasted and is used to heat pre-treatment chemicals or dry work prior to immersion.

The galvanizing industry is committed to understanding and improving the life-cycle environmental performance of its process and products. Galvanizers Association has recently helped establish a Pan-European Life Cycle Inventory database for general galvanizing. This LCI will allow Environmental Product Declarations and other life cycle assessments to be made on structures involving galvanized steel.



GALVANIZING THE GLUCKSMAN

Lewis Glucksman Gallery, Cork

The Lewis Glucksman gallery is a showcase for UCC's art, ethnographic and scientific collections and the personal initiative of UCC president, Gerry Wrixon. A wooded limestone precipice overlooking the Lee's meandering south channel dominates the campus, once the site of an ancient Augustinian abbey. Perched on the cliff top is a three-sided, south-facing Gothic quad of white limestone quarried from the escarpment.

Mindful of the heritage and the natural beauty of the Leeside setting, architects O'Donnell and Tuomey have created a building that has been described as "a brilliant diamond set in the city's tiara". The base of the building is a limestone clad concrete structure with galvanised steel windows cut into the solid plinth. Timber clad gallery spaces are supported on a concrete 'table' structure cantilevered from columns to protect the root structure of the surrounding trees. Granite aggregate concrete was sandblasted to reveal reflective mica in the surface of the structure. Angelim de Campagna, a sustainably sourced hardwood, is bent around the external envelope of the gallery structure with galvanised steel bay windows peeling out from the wall surface. Services are routed in the thickness of the walls and floors to minimise extraneous visual intrusion in the gallery spaces. The intention is that the natural finish materials (sawn limestone, galvanised steel and untreated timber) should age and weather into the landscape.

„(...) as the timber weathers over time the hot dip galvanized panels also change. They work well, both weathering together.“



Architect Jitka Leonard joined the Glucksman project soon after it started and explains how well hot dip galvanized steel works with untreated timber. *"Galvanizing is a natural finish for steel. We didn't want a secondary finish like paint; we chose it because as the timber weathers over time the hot dip galvanized panels also change. They work well, both weathering together."*

The Galco Factor

"We were a little bit worried about the quality of the galvanizing because it's not always a perfect finish. But Galco were really encouraging and brought out a big sample of galvanized sheeting which looked very good and was exactly what we wanted to achieve. It was a perfect piece." Detailed discussions between architect and galvanizer resulted in the optimum selection of steel thickness, panel size and quality control procedures to ensure the desired results were achieved.



An exercise in quality control

Jitka inspected literally hundreds of pieces individually approving only the best quality material. "Galco was aware that they would have to re-do a piece if it wasn't approved. If a piece wasn't up to scratch it could be remedied before being shipped to Cork. Each piece was checked, sometimes twice. It was time-consuming but it saved time in the end for the team in Cork."

Like so many architects, O'Donnell & Tuomey appreciate the sustainability of hot dip galvanizing as well as its softer finish compared with stainless steel. It is more cost-effective than stainless steel too. Jitka has the last word. "If we see something we like or think is the right finish for a project we're working on, we'll use it, or remember it and use it on future projects."

Sheila O'Donnell and John Tuomey, architects of the Lewis Glucksman established their partnership in 1988. The practice has developed an international reputation for cultural and educational buildings including the Irish Film Centre, Ranelagh Multi Denominational School and the Furniture College, Letterfrack. Mark Irving's book '1001 Buildings You Must See Before You Die', published in October 2007 ranks the Lewis Glucksman Gallery as one of the world's greatest achievements in architecture.

LEWIS GLUCKSMAN GALLERY AWARDS

- RIAI Best Public Building in Ireland 2005
- RIBA 2005 award winner European category
- 2005 Project of the Year, UK Buildings Services Awards
- 2006 Hot Dip Galvanizing Awards overall winner

I'VE GOT A CRUSH ON YOU!

The investment by Dublin Zoo of over €4.5 million in a new 8,000 square metre elephant enclosure demonstrates the importance attached to this world-leading breeding programme of Asian elephants. The elephant enclosure was recently opened to the public by An Taoiseach, Bertie Ahern who praised the Zoo's work in elephant conservation. The enclosure will house Bernhardine, Yasmin, Anak and new arrival Asha, the first elephant born in Ireland.

The elephant house, which was erected by ODS in Tipperary, is a fairly straightforward galvanized steel frame structure with metal clad roof. Internal gantries support the pen divisions and gates and all the internal steelwork and fittings are galvanized. Galvanizing makes sense in the corrosive environment of an animal enclosure. It provides a lifetime guarantee and the sort of maintenance-free solution appropriate for these magnificent animals who themselves have a life span of over 75 years.

Key to the Dublin Zoo breeding programme is a need to examine the elephants regularly through their pregnancy to maintain them in perfect breeding condition. Elephants in captivity have particularly sensitive feet and regular pedicures are essential, as well as other veterinary treatments and pregnancy checks.

Examining a 4.5 tonne elephant in a safe manner is a tricky business and Carlow company, O'Neill Engineering took plenty of advice from zoo staff before crafting their specifications into 10 tonnes of galvanized steel genius.

The design is simple yet functional. The crush chute has an array of safety features so that both the elephant and the veterinary care staff are safe when the elephant is undergoing an examination. Panels in the crush open in infinitely variable sections to allow veterinary staff safe access to all parts of the elephant's body. Crush width can be adjusted to suit all sizes and ages of elephant so that complex procedures can now be carried out without stress or sedation. International elephant expert, Alan Roocroft has described the crush as an essential tool in the integral management of the veterinary and breeding process of an elephant in conservation.

Asha, the baby elephant was born at the Dublin Zoo on 9 May, 2007 and was the first elephant ever born in the Republic of Ireland.



I'VE GOT A CRUSH ON YOU!



HOT DIP GALVANIZED TOLL PLAZA WILL LAST OVER 100 YEARS

As the costs of major infrastructure projects soar, public-private partnerships in construction have been an effective way to deliver much-needed bypasses to the towns of Ireland. A consequence of course is the requirement for toll collecting plazas.

Cork's Rathcormac to Fermoy bypass opened in October 2006 and the National Roads Authority (NRA) provided an outline design for its toll plaza based on the earlier Drogheda Bypass. Detailed specifications were drawn up by Fehily Timoney & Company (FTC), a Cork based Irish environmental engineering and scientific consultancy. The need for the toll plaza to be hot-dip galvanized was clear. Engineer Tim O'Shea from FTC explains. "*We specified galvanizing from Galco Steel because it was going to be exposed to the elements and in particular it needed protection from de-icing salt. The structure is designed to last 120 years, so we needed a long-life solution.*" It was shortlisted for the Galvanizing Awards 2008.

*Designed to last
120 years*



*There is nearly
9 tonnes of steel
in each of six
10 metre high curved
trusses that form
the backbone
of the plaza.*





With a long history in complex structural steel projects, Thompson Structures Ltd., from Carlow were selected to fabricate the plaza. There is nearly 9 tonnes of steel in each of six 10 metre high curved trusses that form the backbone of the plaza. The main steel cords were rolled and placed into a jig to form the shape of the truss. The infill components were gas cut to a development template and Mig welded in position. Butt welds were passed by ultrasonic testing and the fillet welds by M.P.I. before sections were sent to Galco for Hot Dip Galvanizing.

On return the arches were finished in gleaming white paint for maximum visibility so motorists can see the toll plaza from a distance. Sections were finally bolted together on site. Curved metal-clad canopies, designed to provide protection from bad weather and support for toll signage completed the project. Access to the toll booths is provided via galvanized steel stairs.

Director of Thompson Structures, Christy Kelly, was delighted with the finish of the steel after hot dip galvanizing. *"I'm very happy with Galco. The quality of their product is excellent. If something is exposed to the elements, Hot Dip Galvanizing extends its life."*

ZINC – NATURE'S PART IN HOT DIP GALVANIZING

Zinc occurs naturally in the environment and is the 27th most common element in the earth's crust. Most rocks contain zinc in varying amounts and zinc exists naturally in air, water and soil. Due to natural weathering and erosion of rocks, soils and sediments together with volcanic eruptions and forest fires, a small but significant fraction of natural zinc is continuously being mobilised and transported in the environment.

The natural concentrations of zinc in different environments are referred to as background levels and can vary considerably between locations. The animal and plant species within a particular area have evolved to take up zinc from their environment and use it for specific functions in their metabolism. Consequently, all organisms are conditioned to the bio-available zinc concentrations in their environment that are not constant but subject to seasonal variations. Organisms have mechanisms to regulate their internal zinc levels. If uptake levels drop too low, deficiency can occur and adverse effects may be observed.

What happens to Zinc in the environment?

A major part of zinc present in surface waters ends up deposited in sediments of rivers, estuaries and coastal areas where it binds to organic and inorganic matter; which reduces its mobility and bio-availability. Only a finite amount of zinc can be dissolved in a given amount of water depending on many factors such as temperature and pH. It is only the dissolved zinc and not the total zinc that is bio-available and therefore of ecological significance. Zinc bound in suspended organic matter will generally settle so that top sediment layers mirror the zinc levels in the overlying water.

Studies of ice cores from Greenland show the levels of atmospheric zinc deposition as well as other metals going back thousands of years. Since the late 18th century industrial activity has resulted in anthropogenic (man-made) input of zinc to the environment. The results obtained show that this reached a peak in the 1960's and has markedly decreased since then. This downward trend is a direct result of more efficient emission control within the zinc industry and ambient air zinc levels seem to be returning to pre-industrial levels.

atomic number	30	atomic weight	65.39
symbol	Zn	name	zinc
[Ar] 3d ¹⁰ 4s ²			electron configuration
 equal relative strength (acid-base properties of higher-valence oxides)			 hexagonal (crystal structure)
 solid (physical state at 20°C [68°F])			 transition metals



Industry's Commitment to Research

The galvanizing industry has contributed to extensive research to develop clear predictive models to quantify zinc bioavailability in waters, sediments and soils*.

There have been specific studies of contamination of soil and water from corrosion of galvanized products in the outside environment. Even in locations where many sources of zinc exist, such as at roadsides (where zinc can arise from tyre debris, lubricants, road wear and corrosion), these studies have shown that these releases do not give rise to adverse effects.

* Review of Bioavailability Studies in the European Union Risk Assessment for Zinc. F van Assche and A Green, Edited Proceedings of 21st International Galvanizing Conference, Naples, Italy (2006).

WHO/IPCS Zinc Task Force Position

Recently, the International Programme on Chemical Safety (IPCS) a world forum under the auspices of the WHO (World Health Organisation), the ILO (International Labour Organisation) and UNEP (United Nations Environment Programme) - formed a Task Force on Zinc to establish Environmental Health Criteria For Zinc. Among its conclusions, the Task Force states:

"Zinc is an essential element in the environment. The possibility exists for both a deficiency and excess of this metal. For this reason it is important that regulatory criteria for zinc, while protecting against toxicity are not set so low as to drive zinc levels into the deficiency area."

Zinc – Essential for Health and the Environment

Zinc is essential to life. It is a natural element found in all plants and animals and plays a crucial part in the health of our skin, teeth, bones, hair, nails, muscles, nerves and brain function. Zinc and its chemistry is found in over 200 enzymes and hormones in man.

Zinc is essential for growth. It is used to control the enzymes that operate and renew the cells in our bodies. The formation of DNA, the basis of all life on our planet, would not be possible without zinc.

Zinc and zinc compounds are of major importance in skin care. Some of its vital uses are:

- ▶ To soothe nappy rash and itching thanks to its astringent and drying properties.
- ▶ As a sun-block to protect the skin from the sun's harmful rays.
- ▶ As an effective treatment for acne.
- ▶ In the relief of cold sore symptoms.
- ▶ To aid the healing of wounds, like surgical incisions, burns and other skin irritations.
Many adhesive plasters contain zinc oxide for this reason.
- ▶ As an anti-inflammatory to relieve the discomfort from sunburn, blisters and gum disease.
- ▶ As an insect repellent.
- ▶ Helping to protect body tissue from damage by stimulating the transport of Vitamin A from the liver to the skin,
- ▶ As bactericides in high quality cosmetics and toiletries.
- ▶ To help heal leg ulcers through addition to the diet.

In respect of efficient protection of the environment and prudent use of natural resources, the Hot Dip Galvanizing process stands up to scrutiny and can be considered as a major contributor towards sustainable construction.



POWERSCOURT RITZ CARLTON HOTEL - ITALIAN ICING ON THE SUGAR LOAF

Placing a luxury hotel in the heart of the Garden of Ireland was always likely to be a challenging project. But after ten years of planning, and not without some controversy, Treasury holdings has created a building which pays homage to the Italianate influence of the original Powerscourt Estate created in 1731 but is brave enough to make some bold architectural statements of its own.

The Ritz-Carlton Powerscourt Hotel, which opened in October 2007, is a lavish €200 million development offering an unprecedented level of luxury for guests. The crescent-shaped 28,000 square metre marble clad building has been designed in a neo-classical Palladian style. The interior is by contrast Georgian inspired and contains 200 luxury bedrooms, a presidential suite and a 2,800 square metre spa. With Gordon Ramsey's name over the restaurant, some of the biggest and most expensive hotel rooms in the country and the Sugar Loaf Mountain providing a dramatic backdrop, Ireland's first Ritz-Carlton, is designed to impress, and it does.

James Toomey Architects were responsible for the design and have employed a number of clever architectural devices to make the building appear much smaller than it is. While from a distance it looks like three storeys, close up the full seven storeys are apparent. The visual deception continues with concealed underground car parks accessed by lifts that emerge to the front of the hotel.



Galvacoat®

is a tough, single application polyurethane top coat specifically formulated to adhere to non-ferrous metals such as zinc.





On arrival patrons are protected from the elements by a unique laminated cedar and copper clad porte-cochère*. This was a distinct deviation from the traditional columns and portico style of the original plan and became the subject of considerable internal debate during the project. The result is a triumph and gives a light and airy feel to the entrance of the hotel.

Limerick based, Bridge Engineering was responsible for the fabrication of this exquisite feature. With low maintenance in mind, the steel was hot dip galvanized and then coated in black GALVACOAT® paint by Galco. GALVACOAT® is a tough, single application polyurethane top coat specifically formulated to adhere to non-ferrous metals such as zinc. It is available in a wide range of colours so where aesthetics demand, GALVACOAT® offers architects a limitless palette. At Powerscourt it is used to achieve an elegant, crisp wrought iron effect to complex steelwork.

Gerry O'Neill, Director of Bridge Engineering has used Galco's hot dip galvanizing and GALVACOAT® service on other projects and believes strongly in its time saving benefits. "GALVACOAT® is a great idea.

Galco just drops it out to the site, packaged and ready to go. GALVACOAT® needs no etch primers so it saves us a substantial amount of time and effort."

Essential features for a formal Italian style garden are embraced at Powerscourt with some nice additional Celtic influences. Solid geometric terraced sections contain a Celtic harp sculptured water feature and seating areas for guests. The hot dip galvanizing and GALVACOAT® combination is favoured by Bridge Engineering for all the steelwork throughout the gardens. It gives a maintenance free elegance to all the plant clad structures. Steel balustrades featuring Newgrange inspired Celtic swirls surround a hidden garden. Ivy-clad gazebos, pergolas and trelliswork support a variety of plants aimed to soften the appearance of the building and blend it in further with the Wicklow landscape.

*A porte cochère or "coach door", as the French name indicates, was originally an entrance or gateway to a building large enough to permit a coach to be driven through it into the interior courtyard beyond. These gateways were popular features of the large public and private buildings of the Renaissance.



Winner

- **Best In-town retail scheme, BCSC Gold Awards 2006**

Winner

- **Best Commercial Building of the Year, Louth County Council Design and Conservation Awards 2006**

Highly Commended
- **Opus Architecture and Construction Awards 2006**

Finalist

- **Property Week Retail and Leisure Property Awards 2006**

SCOTCH HALL

*„For our first waterfront regeneration development we wanted to create a place with a real heart on the South Bank - a place that lives and breathes 24 hours a day, 365 days a year. Douglas Wallace has achieved this with passion and imagination.” **Gerry Barrett, Edward Holdings***

Developed by Edward Holdings and designed by Douglas Wallace, Scotch Hall is a landmark 200-million Euro mixed-use development on the Banks of the Boyne in Drogheda. This comprehensive redevelopment of the Drogheda Docklands capitalises on its unparalleled location on the river and has invigorated the retail experience of Drogheda town. Scotch Hall provides 18,000 sq m of retail space, 3,000 sq m of office space and 80 apartments.

The design team have made the most of the waterfront location. A modern and contemporary landmark in the form of an elegant new pedestrian bridge over the River Boyne now links ‘the old’ with ‘the new’ shopping heart of Drogheda. The focus of the bridge is a large wishbone painted steel arch, sweeping elegantly from one side of the river to the other connecting the Marsh Road and Dublin Road.

The local planning authority was keen to see the creation of a 24-hour living environment and so the need to create public spaces was vital to the overall design of Scotch Hall. As a result Douglas Wallace focused on conceiving a riverfront walkway that boasts restaurants, bars and a 100 bedroom, luxury four-star hotel.

Elegant white railings sweep along the quayside pedestrian walkways. Complex in construction they are inclined away from the river for both safety and aesthetics. Such a corrosive seaboard location demanded the protection of galvanizing if maintenance costs were to be minimised. Additionally after fabrication, the railings were shot blasted to roughen the surface. This increases the zinc pick-up by about 50% in the galvanizing process giving the steel even greater protection. After Hot Dip Galvanizing they were finished by Galco with white GALVACOAT®. GALVACOAT® is a tough single application polyurethane top coat specifically formulated to adhere to non-ferrous metals such as zinc. It has excellent performance characteristics including UV protection and anti-graffiti properties.



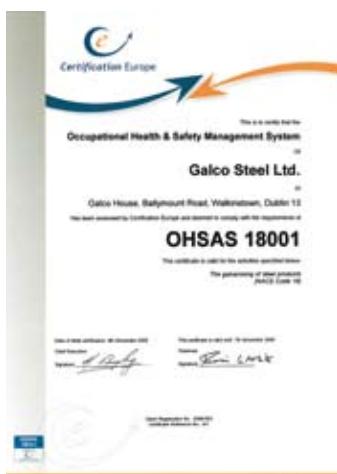
GALCO ACHIEVES ISO 9001, ISO 14001 AND OHSAS 18001

GALCO is leading the pack as the only company in the industry to have achieved all three certifications: ISO 9001 for Quality Management, ISO 14001 for Environmental Management and OHSAS 18001 for Health & Safety Management.



*"Achieving health and safety, environment and quality standards is not just about documentation and procedures, it's about understanding the hazards and risks, having a safe place of work, complying with the law, improving on previous years and making continual improvements."**

Galco Steel Ltd was accredited in 1999 with the internationally recognised Quality Management standard, ISO 9001, by the National Standards Authority of Ireland, NSAI. The NSAI is Ireland's official standards body and is a partner of IQNet, the international certification network. On going management commitment to the ISO 9001 standard combined with regular surveillance audits by NSAI have ensured uninterrupted certification which was last registered in 2006.



*"Galco is required to have a licence to operate in their industry and must have an environmental management system in place. Galco must demonstrate good housekeeping practice, good waste practice and show that it does not have a negative impact on the environment. The plan was to become operationally effective while reducing paperwork. Galco did everything in-house, they had the expertise. Theirs is a complex business with expansions, new warehouse, product changes, new products."**

Certification Europe were engaged to assist and guide Galco to achieve accreditation simultaneously for the internationally recognised Environmental Management and Health & Safety Management standards, ISO 14001 and OHSAS 18001. Certification Europe, who are an authorised intermediary providing accreditation services to Irish and European organisations, carried out training, audits and assessments before awarding both certifications to Galco Steel Ltd in 2006. Continuation of the certification has been maintained since then through regular surveillance audits by Certification Europe and on going management commitment to the ISO 14001 and OHSAS 18001 standards."

**Dr John Ryan,
Founder/ Director of Certification Europe*

CROKE PARK REDEVELOPMENT

Croke Park Stadium, with a capacity of 82,300, is one of the largest in Europe now that its redevelopment is complete. Only three venues in Europe are bigger. This immense stadium was built in four phases, which are now finished.

The large triangular-shaped roof trusses, fabricated from circular hollow section, are supported by twin sets of compression posts, fixed to a complex concrete knuckle at the rear of the top tier of the stand and tension members fixed back to the rear leg of the concrete Y-frame above the upper concourse level.

Secondary planar arched trusses span between the main frames, from which galvanized steel purlins are hung. These pick up the metal deck/roof-glazing element. The decking falls into gutters hung along the line of the bottom booms of the main trusses.



There are numerous complex steel stairs within the new Croke Park stadium, which have galvanized steel elements.

The design of these steel stairs has involved extensive coordination and discussion to ensure their aesthetic requirements were met within the structural design.

Another interesting application of galvanized steel was in the construction of the corporate box level. This is an inverted steel-framed structure, suspended from the underside of the upper concourse level concrete structure.

There are numerous complex steel stairs within the new Croke Park stadium, which have galvanized steel elements. The design of these steel stairs has involved extensive coordination and discussion to ensure their aesthetic requirements were met within the structural design.

A stair of particular interest structurally, is one that cantilevers off the rear of the Canal End Stand.

It was a challenging design, with the main connections to the concrete structure being critical elements.

The tubular handrailing and grid in-fill panels have been hot dip galvanized to provide long lasting corrosion protection, also galvanizing can be found in the new crowd control barriers, balustrading and support columns.

The most recent development was the installation of the floodlighting at the end of 2006. This project was completed in time for the first rugby matches ever held in Croke Park.



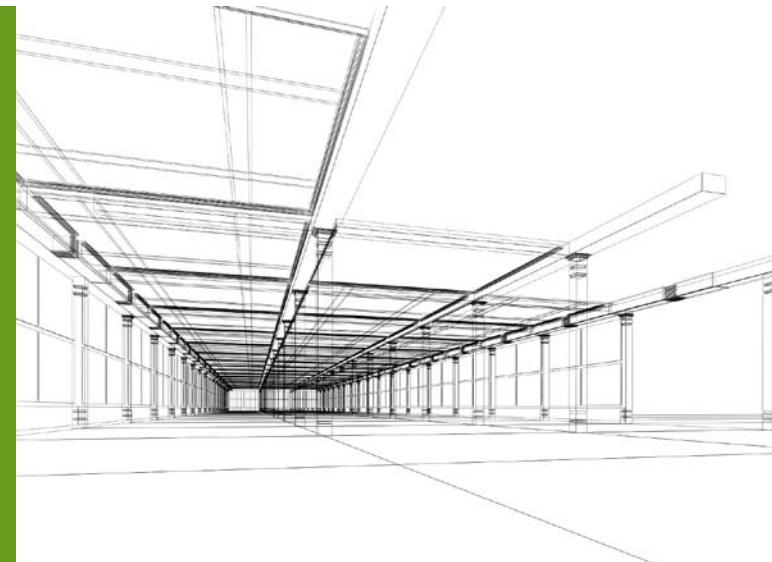
- ▶ **Architects:** Gilroy McMahon
- ▶ **Structural Engineers:** Horgan Lynch & Ptns
- ▶ **Main Contractor:** John Sisk & Sons

BARNA WASTE COMPOSTING FACILITY

One of the most difficult challenges facing us today is finding new and sustainable ways of dealing with waste disposal. Barna Waste in Galway believe that composting is a viable alternative to landfill and incineration. So confident are they in the process, that they commissioned a large new composting facility on the Headford Road in Galway. Pierce McGann & Co., Consulting Engineers were given the task of designing the new facility.

One of the first issues that they had to contend with was how to protect the steel frame of the building against the corrosive atmosphere that was anticipated. Due to the nature of the composting process it was predicted that there would be high acidity combined with high humidity. This would lead to serious problems achieving the required design life of twenty five years. Following consultation with the Galvanizers Association and Galco, it was agreed that the annual corrosion rate of a Hot Dip Galvanized coating in such a harsh environment would be in excess of 4 microns per annum. Therefore it was decided that a coating thickness of 140 microns would be desirable.

Hot Dip Galvanizing relies on the alloying reaction between zinc and iron when heated to 450°. The two factors that critically affect the thickness of the alloy layers are the thickness of the steel section and the silicon content of the steel. The silicon content is hard to determine at the design stage and will vary from steel producer to steel producer and from batch to batch.

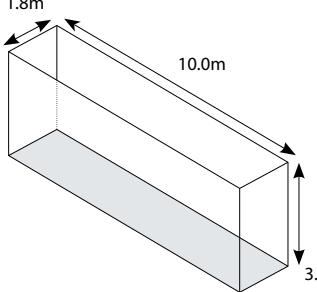
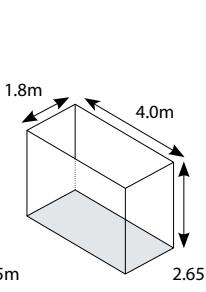
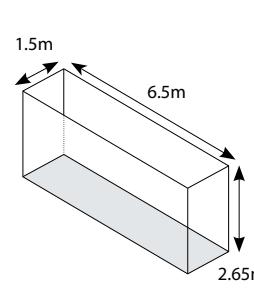


In order to ensure that 140 microns was achieved it was agreed to roughen the surface. The relevant standard, I.S. EN ISO 1461: 1999 suggests that you can increase the coating thickness by up to 50% by grit blasting the steel prior to galvanizing. This increases and roughens the surface area of the steel thereby allowing a greater reaction between the iron and zinc. By following this procedure we were able to attain the required coating thickness and in many cases this was well exceeded. All steelwork was batch tested on site and certificates of conformity were issued by Galco as part of their quality assurance policy.

The other requirement was to fabricate and galvanize the 600 tonnes of steel within an acceptable time frame. This was agreed at 60 tonnes per week over a ten week period. Due to the increased capacity in our Dublin plant this was easily achieved without disruption to our other customers.



BATH SIZES

Dublin	Cork	Waterford
<p>Bath No. 1</p>  <p>1.8m</p> <p>10.0m</p> <p>3.25m</p> <p>Lifting Capacity: 6,400 kg</p> <p>Technical Standards: I.S. EN ISO 1461:1999 ISO 9001, ISO 14001, OHSAS 18001 EPA IPPC Licence</p>	<p>Bath No. 2</p>  <p>1.8m</p> <p>4.0m</p> <p>2.65m</p> <p>Lifting Capacity: 4,000 kg</p> <p>Technical Standards: I.S. EN ISO 1461:1999 EPA IPPC Licence</p>	 <p>1.5m</p> <p>6.5m</p> <p>2.65m</p> <p>Lifting Capacity: 4,000 kg</p> <p>Technical Standards: I.S. EN ISO 1461:1999 EPA IPPC Licence</p>

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GALVANIZING CPD FAXBACK

Presented at your office the presentation lasts about 45 minutes including a question & answer session.

Seminar Synopsis

- The Galvanizing Process
- Sustainability
- Corrosion Protection
- Coating Characteristics
- Design for Galvanizing
- Specifications & Standards
- Costs & Economics
- Case Studies
- Galvacoat Paint System

Your details:

Title First Name Last Name

Job Title Company

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- Please contact me about an in-house presentation
- Please send me a copy of the Engineers & Architects's Guide to Hot Dip Galvanizing
- Please send me a copy of Galvanizing and Sustainable Construction Specifiers Guide
- Please send me up-to-date information & newsletters

Please fax this form to: **+353 [0] 1 424 7001** or submit a form online at galco.ie





Galvacoat® THE ONLY PAINT SYSTEM SPECIFICALLY DESIGNED TO GIVE PERFECT ADHESION TO HOT DIP GALVANIZED STEEL



Galvacoat Features

One Coat Paint System for use on Hot Dip Galvanized Steelwork

- ✓ Specifically designed for Hot Dip Galvanized Steel
- ✓ No etch primers required
- ✓ Can be applied directly to freshly galvanized steel
- ✓ Available in all RAL and BS colours
- ✓ Suitable for all spray systems and brush applications
- ✓ Offers gloss level that will satisfy the most demanding projects
- ✓ Simple and quick to apply
- ✓ Can be easily applied on-site after erection

Technical Data - A Two-Pack Polyurethane paint system for use on galvanized steel

- ✓ Dust free 1 hour Tack free 4 hours Hard dry 20 hours
- ✓ Recoatable after 12 hours Theoretical spreading rate @ 50 microns DFT: 8sq metres per kg Volume solids 58%
- ✓ Thinner: Galvacoat thinners

Paint & Galvanizing under one roof – In-house Paint Facility

- ✓ Steel galvanized and painted under one roof
- ✓ Quality controlled process
- ✓ Faster lead-times
- ✓ Reduced transport costs
- ✓ Large and small projects catered for

AFTER HOURS

*"Sculpture is the art of the intelligence",
Pablo Picasso.*

*Inspired by nature, immortalised in
wrought iron and molded into
a work of art*

*Creativity has reached new
levels with sculptures using
Hot Dip Galvanizing*

*Sculptures can be used not only
to capture the moment but to
transform it into something
timeless.*

"Rusts a Must"
C. Paul Dillon

Mighty ships upon the ocean,
Suffer from severe corrosion.
Even those moored at the dockside,
Are rapidly becoming oxide.
Alas, that piling in the sea,
Is mostly Fe_2O_3 .
And where the ocean meets the shore,
You'll find there's Fe_3O_4 .
Cause when the wind is salty and gusty,
Things are getting awful rusty.

Pan wire mesh sculpture by Gwen Wilkinson



Galvanized Hippos - Tallaght, Dublin





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