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Stainless NZ

NEW ZEALAND STAINLESS STEEL DEVELOPMENT ASSOCIATION

Flowering Imagination

Attractive, durable and highly weather-resistant, stainless steel lends itself to creating dramatic outdoor sculptures. However, as well as gracing a park lawn or garden, stainless steel's famous tarnish-free reputation also makes it an excellent material for sculptures of the aquatic kind. For one multi-talented designer, the love of this shining material has been the seed for the growth of a thriving design business, all centred around stainless.

Two years ago, Mandy Hoggart, a designer in Mount Maunganui, had a problem. Wanting a stand-out water feature for her own garden, Mandy was unable to source a suitable sculpture in terms of the look and scale she required.

A bright idea

"I had wanted something that would look bright and have clean lines during the day, regardless of the time of year or the weather," says Mandy. "I also wanted something that could be lit to give a spectacular view from my lounge window at night. When this proved more difficult than expected, I decided to design my own."

The first piece, destined for her own garden, was in a balancing pyramid shape with water flowing over it. This was to be the beginning of a successful partnership between stainless steel and the England-born designer.

Cardboard concepts

"Having transferred my design skills from softer material applications, such as quilting, it was a learning curve to come to grips with this rugged material," says the designer. "I first created cardboard templates to work from before manufacturing the finalised water feature in stainless steel."

Once past the design process, the original inverted pyramid was developed and manufactured at Mandy's husband's sheet metal workshop – many landscape architects coming and going from the workshop for other reasons witnessed its creation.

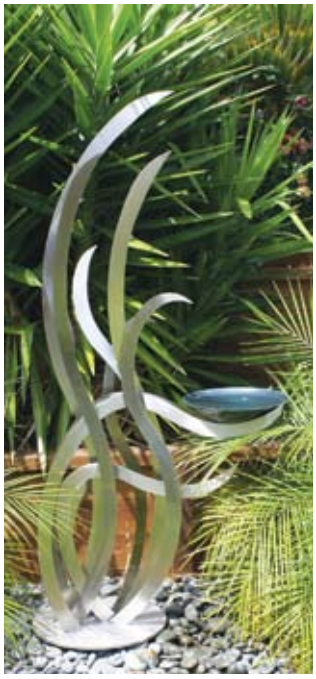
"From first designing that pyramid, and for another 18 months before my company Steelscapes was actually up and running, landscape architects would often ask me about potential water sculpture solutions for the various projects they were working on," she says. "When a year and a half had elapsed I finally took the bull by the horns and started my own design company centred on water features and other stainless steel elements."

Good taste travels well

Today Mandy designs all manner of objects in stainless, from custom furniture and domestic artworks to larger pieces, such as a wall-of-water sculpture at a church in Wellington. The designer has also had several works bought by clients overseas, including in the United States.

"Generally I use standard 304 stainless with a 2B finish for my water sculptures," says Mandy. "If the placement is directly by the sea, or in a sulphur-rich area such has Rotorua, then I will use 316 marine-grade quality stainless or higher."

While Mandy appreciates the durability of stainless, it is the materials aesthetic versatility which has captured her artistic imagination.



Fresh perspective

"Stainless steel is underrated, and has never really realised its potential here," says Mandy. "People are tired of the burnished look of copper, but stainless steel has many advantages – its shimmering presence means it never looks the same twice, picking up nuances that other materials won't."

This is no exaggeration, Mandy designs stainless steel sculptures with diverse finishes including (mirror), brushed, rustic and standard. Appropriately, the catch cry of her design business is: "bringing steel to life".

This Lotus Bud water feature, designed by Mandy Hoggart, is one of three in a large private Hamilton garden. The custom water sculptures are designed to suit the scale, outlook and conditions of the environment they are destined for.

This Issue:

Raising a glass to stainless

Some things are an important part of the social fabric, and a quiet beer is certainly one of them. So it follows, that when New Zealand's most prominent brewery relocates from its inner-city Khyber Pass address a short twenty kilometres across Auckland the output of the brewing giant had to continue unchecked.

Lion Breweries move to East Tamaki highlights the value of stainless steel for the versatile, durable, recyclable material that it is. Sue Bradley from multi-disciplinary engineering and project management consulting practice Beca outlines some aspects of the shift and the stainless elements that were involved.

Variety of brewing ingredients

"Stainless steel for the new Lion Breweries operation came from several sources," says Bradley. "In many cases the plant was purchased not because existing stainless steel elements had reached the end of their life, but because we had to have both the new and old plants operating at the same time until the new brewery was up and running at full capacity."

One of the largest stainless steel elements in the brewery was the cold stabilisation vessels – used after fermentation to let the beer settle down and mature. In all, twenty-four brand-new 2,400 and 1,200hL (240 and 120m^3) tanks were supplied by New Zealand company NDA for the new complex.

New Zealand beer in German pipeline

"In some cases, for the equipment supplier it was expedient and economical to source stainless steel equipment and piping from off shore," says Bradley. "Much of the pipe work was sourced from Germany, for example, where the design and fabrication of major brewing systems was conducted."

Typically large acquisitions of the German pipe work were supplemented with locally produced material.

It was mainly the fermentation vessels – 22 in all – that had to be doubled up on to keep the beer on tap for New Zealanders.

"Testament to the strength and endurance of stainless steel, the existing tanks – some over 30 years old – are being tested, cleaned and moved to the new site as the stepped programme allows," says Bradley. "The new tanks were also sourced in New Zealand."

Wrapping it up with stainless

Another aspect of the relocation was the packaging equipment, again almost all made of 316 stainless steel.

"Everything from existing stainless steel conveyer belts to packaging machinery has been reused in the new premises," says Bradley. " Equipment and piping that can't be integrated into the new plant will be sold second hand or recycled."

Almost every aspect of the brewery has stainless steel as an integral part of its make up. While several NZ stainless steel companies supplied some material for the brewery, one, Corus New Zealand, provided a considerable overall percentage. The outline of their contribution to various contractors provides a glimpse into the facets stainless steel applied to.

A snapshot of diversity

The company supplied NDA Engineering with stainless steel coil and plate for brewery and storage vessels; Steel & Tube Roofing with stainless steel coil for insulation cladding on tanks; HSM Engineering with stainless steel coil and plate for bright beer tanks; Calder Stewart Roofing with stainless steel coil for insulation cladding on tanks; Ideal Insulation with stainless steel coil cut to special sizes for insulating pipe work; Systems Projects with stainless steel fittings and flanges and heavy walled stainless steel square tube; lastly Consolidated Engineering with heavy walled stainless steel square tube, chequer plate for walkways and working platforms, as well as sheet and plate for lifting lugs and repairs to relocated vessels.

If tankards were still a thing of fashion, a stainless steel mug might be the appropriate vessel with which to raise a toast to the versatility and strength of our favourite sustainable steel alloy.

Surface attraction

The beauty stainless steel is so famous for is essentially skin deep

The micro-thin protective layer that forms on the surface of stainless steel when in contact with the air is the source of the bright alloy's fame. This passive layer, largely made up of chromium oxide, is thin, invisible and easily damaged, marring the look of the alloy and allowing corrosion to take hold.

Depletion of the chromium layer can take its toll on stainless in several ways:

High temperature oxidation, weld defects, iron contamination, uneven weld beads and grinding or blasting too heavily and finally organic contaminants may all play a part.

Gentle on the skin

One increasingly popular way to preserve the "skin" of stainless without risk of physical detriment is chemical pickling – this has the opposite effect, on the chromium oxide surface.

This involves first removing the damaged areas where the passive layer no longer provides full protection - pickling normally involves using an acid mixture containing 8-20 vol% nitric acid (HNO_3) and 0.5-5 vol% hydrofluoric acid (HF).

Considerations

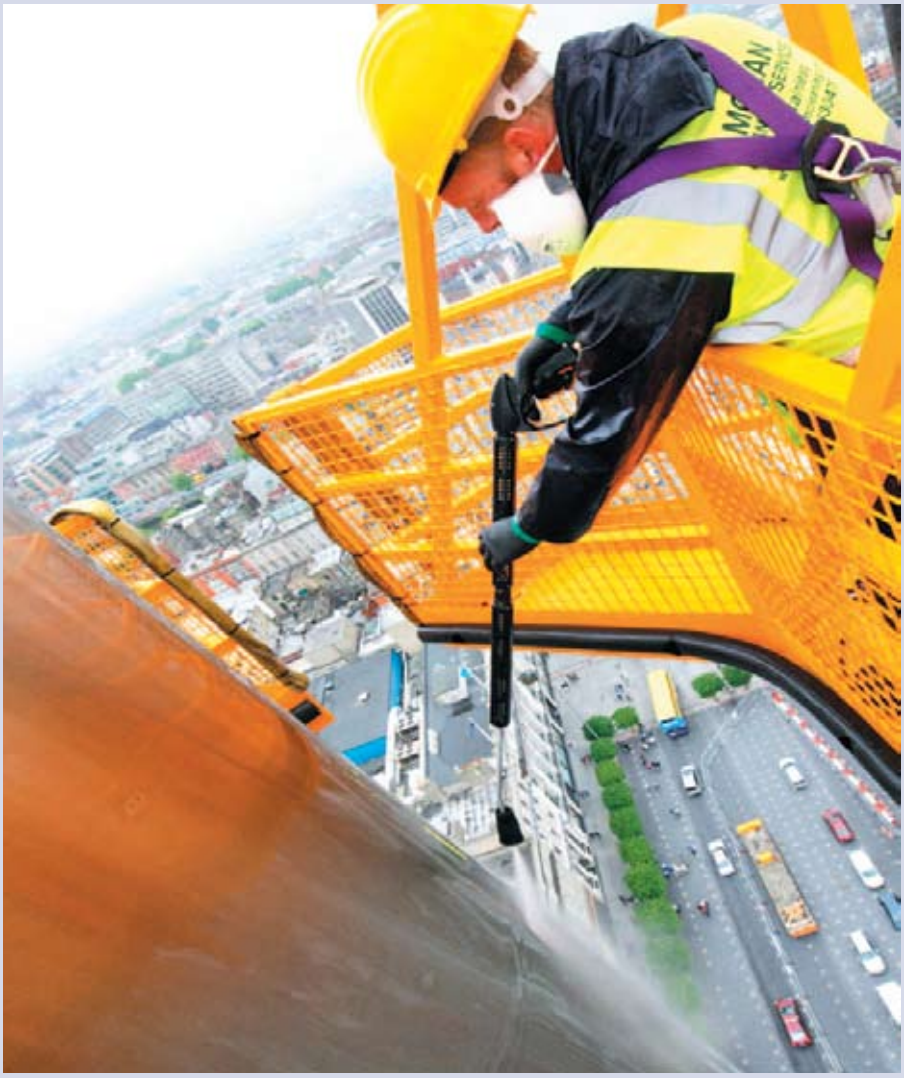
The effectiveness of pickling depends on several factors including temperature; the composition and concentration of the acid mixture; the steel grade – highly alloyed grades need a more aggressive acid mixture and/or higher temperature; the thickness and type of oxide layer; and lastly the surface finish – a rough hot rolled surface may be harder to pickle than a smooth cold rolled one.

Beauty treatments to consider

There are several pickling methods available with pickling in a bath a convenient method if suitable equipment is available. The composition of the acid mixture and the bath temperature (20-65°C) are chosen with regard to the stainless steel grade and the type of heat tint.

Pickling paste for stainless steels consists of an acid mixture with added binding agents. This is suitable for pickling limited areas, such as weld-affected zones. It is normally applied using an acid-resistant brush, but is not effective at low temperatures (5-10°C).

Lastly, pickling is done with a pickling solution containing surface active agents to obtain good thixotropy and the right viscosity. This method



is suitable for pickling large surfaces, such as when the removal of iron contamination is also required.

For pickling cleaning agents, safety products and the pickling equipment are all prerequisites.

Monument to pickling stainless

While pickling is gentler on stainless than more aggressive treatments, it also has the advantage of easy application in awkward environments. And, by example, few environments are more inaccessible than Dublin's Monument of Light, or Dublin's spike as it is known locally. At 120 metres, the Monument of Light is one of the world's tallest works of art. Inset with light emitting diodes at its tip, the spire tapers from a 3-metre diameter base to a top that is just 15 cm. Made from stainless steel, the spire was erected in February 2003 in the Irish capital. Rain, exhaust fumes and dust all led to the blast-treated spire becoming dirty and unattractive after a couple of years.

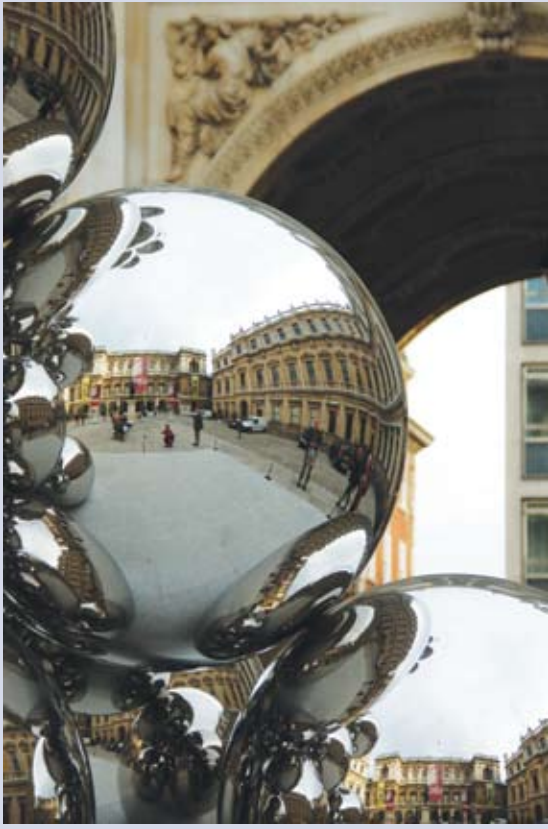
In June 2007 Mister Stainless, a Dublin-based company with long experience of cleaning, restoring and passivating stainless steel, returned the monument to its shining best.

MD of Mister Stainless Tom Petherbridge outlines the project "It was the spire's height that presented the greatest challenge. To reach the top, we had to use a large crane with a work cradle and work on days when there was no wind or rain."

When Dublin bought the spire, it was first thought that it would be self-cleaning. However, even stainless steel requires upkeep. Several pickling stages were involved in the revamp – with Mister Stainless using the Avesta range. Avesta Classic Cleaner 401 was used to wash the spire and the environment friendly Avesta FinishOne 630 was used to rebuild the protective passive layer.

Cleaning the spire took nine hours and required a team of 12 people. Without the use of pickling,- mechanically cleaning the job would have been time-consuming and dangerous, with the possibility of mixed results.

Global significance for Stainless Steel.



This gleaming sculpture – Tall Tree and The Eye – graces the Annenberg Courtyard exhibition space at the Royal Academy in London.

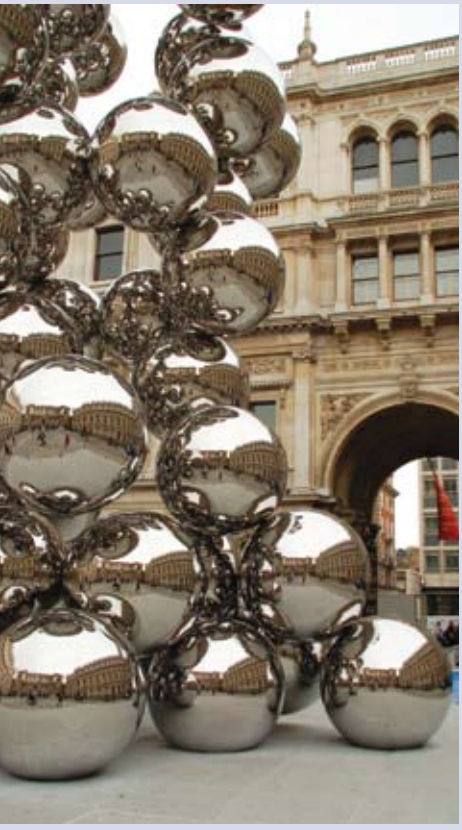
The arresting sculpture stands a staggering 15m tall – as high as the surrounding buildings – and consists of 76 highly polished balls that appear to bubble weightlessly up towards the sky. The mirror-like stainless spheres create constantly changing reflections of their surroundings, including of the visitors who throng to the exhibition.

The work is by Anish Kapoor, regarded as one of the most important and innovative sculptors of the 21st Century, and the subject of an exhibition at London's Royal Academy.

A request from afar

However, while the famous sculptor was born in Mumbai and resides in England, the shining globes were manufactured right here in New Zealand. Global Stainless Ltd was asked to create the balls for the sculpture and another New Zealand company, TP Engineering, was given the task of constructing them to form the sculpture. Manager of Global Stainless Lincoln Raikes explains how a big-city sculpture came to be made in our corner of a fast-shrinking world.

"Global Stainless took its name to heart 12 years ago and began advertising on the internet," say Raikes. "This is not the first custom we have received from overseas. In 2007 we were commissioned to create a giant 2.1m diameter ball for a showpiece in Monte Carlo.



Savvy selling of stainless

"The full story about the internet is really all about Mick Elmes of Engineeronline. I knew about Mick in early days and his engineering background together with his skill and knowledge of the internet at a time when most people hardly knew of its existence and even fewer had computers in their home.

"At this time I knew that we had something really good to offer to architectural artists around the world and the problem was to get it to them. Mick Elmes, also an engineer, saw that we had a marked breakthrough in the manufacture of spheres and he agreed to set up a web site, this was about 12 years ago and we have carried this relationship on to this day."

"For this project, Kapoor contacted us having viewed our website and – impressed with our techniques, the finishes we achieved and our costings – had a sample made and flown over so he could inspect it in person.

"Not long after that the request for all 76 balls came through."

Anish Kapoor was most likely taken with the test sphere for its finely polished, seamless finish – this is part of a patented process by Global Stainless. The balls are made from 316 marine grade stainless – after all they are to stand the test of time in a country not really known for its extended stretches of fine weather.

Perfectly formed

"The balls are formed after welding, a novel process that means there is no weld shrinkage - leaving a perfect sphere with no seams and a mirror finish when the process is complete," says Raikes. "The job took us around eight months to complete with five people working on the project at any given time."

From Global Stainless the job moved to TP Engineering, ball by ball as the manufacturing of each was complete. TP Engineering had the equally tricky job of joining the balls to Kapoor's specifications without showing the connecting elements.

"The balls were mounted on three masts of 80mm diameter high tensile shaft and bracing of the same size. The balls were threaded on to the masts and bracing at random positions so that the sculpture did not give away how it was supported and to maintain the graceful look of bubbles coming out of the ground."

Times are not changing – they've already changed!

Besides the patented construction of the balls which no doubt won the day with Anish Kapoor, the other great invention that made the job possible was, of course, the internet. Once the WWW was the domain of techno experts and the elite who owned a computer. But today access to the net is by anyone and everyone. It didn't take a plane trip, or even a telephone call to put Global Stainless under the nose of Kapoor.

All it took was for the sculptor to type the words "sphere", "stainless steel", and "polished" into Google, and then a few short exchanges later Global Stainless' sample New Zealand product was sitting on his front door step in London.

For membership application details, please contact:
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