

AUSTRALIAN STAINLESS

SPECIALISING IN STAINLESS STEEL AND ITS APPLICATIONS

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ASSDA

BIG FISH SWIMMING IN A SMALL POND



Northern Territorians know their barramundi, which is why ASSDA Accredited Fabricator Northern Stainless had to get it absolutely right when they reeled in the contract to design and fabricate this 1030mm specimen.

"The silver fish" has a mythical reputation in the NT, not least because of its shimmering, silver appearance.

Northern Stainless' operations manager Darren Colbert said they had no hesitation in saying they could get the job done to their client's satisfaction, because of their ability to create the barra's mesmerising shimmer in stainless steel.

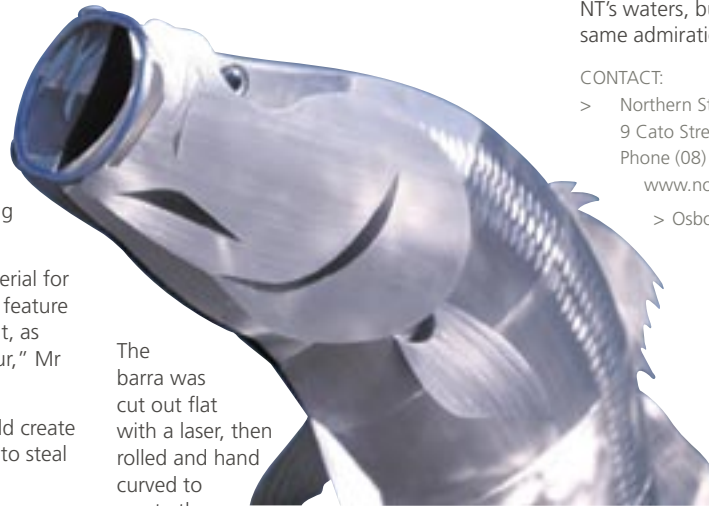
"We knew stainless was the right material for the job because we needed the water feature to last in Darwin's tropical environment, as well as best represent the barra's colour," Mr Colbert said.

"We promised the client that we would create something that everyone would want to steal and I reckon we delivered."

The fish, which was commissioned for Osborne Family Holdings' "Hastings over Mindil" apartment complex in Fannie Bay, Darwin, was fabricated from around 15kg of 316 stainless steel with a No. 4 finish. It was then regreined

and the scales were polished into it. A 6mm tube sits inside, enabling the water to spray the gill plate.

Mr Colbert said one of the challenges of the project was converting a graphic design program to create a laser file.



The barra was cut out flat with a laser, then rolled and hand curved to create the three dimensional sculpture.

When it is installed in situ (expected to be late October 2006), there will be a fishing rod mounted on the wall of the water feature,

with an optic fibre fishing line threaded with a stainless steel fly hook. The entire sculpture will rock slightly, creating turbulence in the water and giving the impression that the barra is working hard against being reeled in.

This barra may not enjoy the freedom of the NT's waters, but it will certainly garner the same admiration as the real thing.

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MAINTENANCE CRITICAL TO STAINLESS' PERFORMANCE



The growth in the use of stainless steel over recent decades has been a real success story, predominantly due to its aesthetic appeal and, of course, its resistance to corrosion.

However, the continuing performance of stainless steel, particularly in harsh coastal environments, relies not only on the intrinsic features of the material, but also on appropriate maintenance.

ASSDA Accredited Fabricator Bell Stainless from Kunda Park on the Sunshine Coast, Qld has had extraordinary success both nationally and internationally, being the only company in the world to have won multiple South Africa Stainless Steel Development Association Awards – one of only two Australian companies to win.

Bell Stainless general manager David Vine said they took the ongoing maintenance of their work very seriously and cited their installation several months ago of the balustrade for the HMAS Brisbane memorial at Alexandra Headland on the Sunshine Coast as a key example.

Mr Vine said they used two products from ASSDA member Cyndan Rapelle Pty Ltd – an Australian industrial chemical manufacturer

– to keep this type of installation looking good:

- Cyndan Stainless Steel Cleaner, which uses a combination of phosphoric acid and ammonium bifluoride, providing deep cleansing of grime, mineral salts, leaching, oxidation and other stains, particularly tea stains; and
- Cyndan Rapelle Stainless Steel Sentry - a protective treatment that fuses with the surface forming a water repellant film to reduce corrosive build up of salts.

He said they have used Cyndan products since 1999 and found them time effective, easy to manage and safe to use.

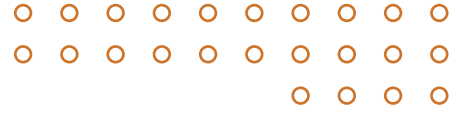
Cyndan Chemicals was founded in Australia in 1978 and has partnered with Rapelle Pty Ltd to market their products internationally.

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DUPLEX TO SHINE IN DNA DESIGN



An Australian-led design consortium will put a new twist on bridge construction with a 280 metre long stainless steel pedestrian bridge spanning across Marina Bay, the foreshore to Singapore's CBD. The bridge will link the highly anticipated Marina Bay Sands resort to a bayfront promenade linking major cultural, tourist and recreational sites.

Selected from a field of 36 international teams, the design team, incorporating Australian architects the Cox Group, engineers Arup and Singapore-based Architects 61, has designed an entirely new concept in bridge construction, based on the double helix structure of DNA.

The double helix will carry a metre wide pedestrian walkway running parallel to a six lane vehicular bridge, which is part of the same \$68 million project.

Arup senior associate Greg Killen said the pedestrian bridge was a true world first, in that it did not use any of the known support mechanisms which categorise all bridges built to date. The shape of the bridge can be described as two slinkies, one stretched out slightly further than the other, flipped, and then placed inside the first. This shape is then doubly bent to form a smooth curve.

"As far as we know, this design direction has not been explored before," Mr Killen said.

An Arup-designed structural optimisation program confirmed the unique design concept offered substantial structural performance.

Mr Killen said the helix tubes touch only under the deck and the unravelling forces were captured elsewhere by light stiffening rings that hold the opposing tubes apart (rather than together) in a kind of 'structural magnetism'.



Source: Arup + Cox + Architects 61

The concept enabled the use of five times less steel than a conventional box girder bridge of the same length, which meant the budget would run to the use of stainless steel.

"We chose to design in duplex stainless because we've used it on a number of projects before and while the strength is comparable to structural mild steel, the maintenance costs are reduced and the total life of the bridge is extended beyond 100 years," Mr Killen said.

"There is a perception in the marketplace that the cost of grade 2205 duplex is much more than austenitic varieties such as 316. This is not the case and while there is great fluctuation in both prices, the fabrication costs are similar (although some of the processes are slightly different).

"The higher strength of 2205 makes a big difference, especially on longspan structures where the self weight is often the major design driver. 2205 also has superior durability including resistance to the tea staining that plagues many austenitic structures."

Singapore, a busy air hub with a very small land area, has become well respected for the quality of their buildings and infrastructure.

"Singapore is not only clean and leafy, there is a noticeable emphasis on quality urban design. The urban landscape includes extensive use of materials such as stone, glass and metals where Australian cities may favour cheaper, less durable solutions. This makes Singapore the perfect platform for the world's first double helix bridge," Mr Killen said.

The project will use 370 tonnes of duplex stainless steel for the superstructure, including pipe, and welded plate and tapered sections. Stainless finishes selected by the Cox Group include a combination of bead blasting and polishing, with one of the "slinkies" to be highly polished and the other bead blasted, using olivine, a magnesium silicate medium.

The project, which is currently out to tender, is expected to begin construction at the end of this year and be completed in 2009.

CONTACT:

- > Architects 61 - www.a61.com.sg
- > Arup - Greg Killen +61 7 3023 6000
- > Cox Group - Philip Cox +61 2 9267 9599



Source: Arup + Cox + Architects 61



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TECHNICAL ARTICLE: DESIGN SOFTWARE VS BACK TO BASICS



NEW TECHNOLOGY TO ASSIST WITH ACCURATE DESIGN IS ALWAYS WELCOME, BUT IT IS IMPORTANT THAT USERS PROCEED WITH CAUTION WHEN USING INTERNATIONAL DESIGN TOOLS.

There is no doubt that designing with stainless steel offers endless opportunities for architects and engineers to be both creative and functional. At the same time, it is critical that the design is right for the application.

Thanks to the internationally-recognised research of an Australian expert, as well as some design software now available free online, getting the design right for stainless steel structures has never been easier. However, as outlined below, it is more important than ever for design engineers to use caution when using international technology.

HISTORY OF DESIGN IN AUSTRALIA

The Australian Standard for design of stainless steel structures, AS/NZS 4673:2001 "Cold-formed stainless steel structures" was first published in 2001 and provides methods for design calculations. Applicable to cold-formed structures, including construction with tubular hollow sections, it provides a means of designing light and innovative structural solutions.

Traditionally, design engineers have reached for 'load tables' – or, strictly, Member Capacity Tables. Most design offices have tables with the results of calculations for various steel sections and loading regimes, generally published by suppliers of carbon steel.

But carbon steel has different properties from stainless steel, so these tables are not right for stainless steel – they may be too conservative or not conservative enough.

Another problem is that some engineers have

assumed because they can find a section in carbon steel load tables, they can source it in stainless steel – only to discover they can't, after doing an expensive design.

DESIGNING WITH SOFTWARE

Load tables for stainless steel are available from the Steel Construction Institute in the UK. The SCI is an independent, technical, member-based organisation with over 850 corporate members in 40 countries around the world.

Now the SCI has made available free software for design calculations for stainless steel members, using the methods of the European Design Manual, published by Euro-Inox.

Available over the web at <http://www.steel-stainless.org/software/>, the software speeds structural design calculations for a range of sections and stainless steel grades.

However, a word of warning: the software uses methods in compliance with parts of Eurocode 3 "Design of steel structures". The Australian code for design of stainless steel structures, AS/NZS 4673:2001, follows the methods of the USA code, not the Eurocode. This is logical, as the Australian codes for the design of cold-formed carbon steel structures are also aligned with the USA codes and the trend in the Australian construction industry is to employ cold-formed steel to achieve lightness, material efficiency and enhanced strength.

So the SCI software must be used with some caution – it is the best available, but not ideal. The software should not be used in conjunction with the Australian code AS/NZS 4673:2001,

as mixing clauses of different specifications is not an acceptable practice. This caution applies particularly to the design of welded structural members, which is catered for by the SCI software but not within the scope of the Australian Standard.

FUTURE IMPROVEMENTS

In January 2005, Professor Kim Rasmussen of Sydney University was appointed chairman of the American Society of Civil Engineers (ASCE) Standards Committee responsible for the American "Specification for the design of cold-formed stainless steel structural members". This is the Standard that formed the basis of AS/NZS 4673:2001.

The ASCE Standards Committee will be updating the American Standard and Professor Rasmussen will present the new rules implemented in AZ/NZS4673 to the American committee, together with design recommendations derived from recent and ongoing research at Sydney University.

The ASCE Committee is expected to adopt the new rules and recommendations. Subsequently, there is likely to be an update to AZ/NZS 4673 – so there is an ongoing cycle of improvement, helped along by the world-class research in stainless steel structures undertaken by Professor Rasmussen and his students at the University of Sydney.

WHAT DOES ALL THIS MEAN?

In short, international design tools such as the free software available from the SCI can provide some assistance in getting the design right for stainless steel structures, but they don't provide all the answers and can even complicate matters. Sometimes good design means getting back to basics.

This ASSDA technical article was written by Dr Alex Gouch, Development and Technical Manager of Austral Wright Metals.

ASSDA acknowledges the assistance and contribution of Professor Kim Rasmussen from the School of Civil and Mining Engineering, University of Sydney.



Source: Steel Construction Institute

445M2: A NEW GENERATION STAINLESS STEEL



THIS ARTICLE IS THE FIRST IN A SERIES SHOWCASING THE USES OF 445M2 STAINLESS STEEL.

Australians' love of the water has always provided challenges to the construction industry, particularly when it comes to choosing materials that can be used in aggressive environments such as near the coast or swimming pools.

Stainless steel grades 316 and 304 have long been the obvious solution in these applications, but the key factors of formability, cost and corrosion resistance are now shining the spotlight on an alternative grade.

445M2 stainless steel has been used in Australia for a number of years for roofing and walling applications, and its characteristics are now proving useful for a broader range of applications.

The material, supplied by ASSDA member Austral Wright Metals, is being used by Dunning Engineering Services Pty Ltd for a range of stainless steel pergola brackets.

Dunnings - a South Australian based manufacturer of builders' and plumbers' hardware, who also operate a sheet metal pressing and fabrication facility - developed the range in response to the growing demand for better corrosion-resistant products that can be used in aggressive environments.

The company experimented with punching and bending various grades of stainless steel, including 316, but it was 445M2's formability that provided the crisp, clean angles they were seeking, with the advantage of reduced tool wear. Dunnings was also able to fabricate with existing tooling and machinery, avoiding the prohibitive cost of new dies and tooling.

More importantly, 445M2 is a marine grade stainless steel with the corrosion resistance



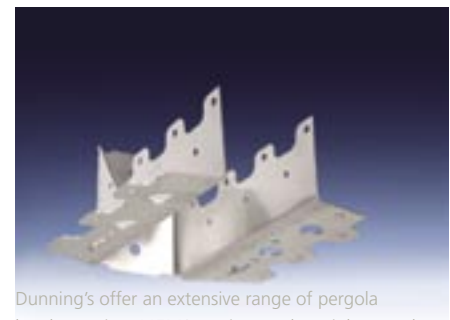
of 316 or better and a cost that falls between 304 and 316.

Dunning spokesperson John Gill said 445M2 resisted the salt from the surf, and gave safe performance over a long life - even when painted.

"Due to the formability of 445M2, the savings to our business have been enormous and we are now looking at other areas where 445M2 could be applied."

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Dunning's offer an extensive range of pergola brackets using 445M2 marine grade stainless steel.

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QUALITY FABRICATION KEEPS THE MEAT ROLLING



FABRICATION QUALITY WITHIN THE FOOD INDUSTRY IS FIRMLY IN THE SPOTLIGHT WITH THE RELEASE OF ASSDA'S FOOD SPECIFICATION. THIS ISSUE WE FEATURE AN ASSDA ACCREDITED FABRICATOR'S QUALITY WORK IN THE FOOD INDUSTRY.

Loss in production due to installation of new equipment is always undesirable, which is why an upgrade on the scale of Australia Meat Holdings' recent boning room expansion at Aubigny (west of Toowoomba, Qld) was even more remarkable.

The project, managed by Wiley & Co, more than doubled the size of AMH's existing boning room, improved work place ergonomics and provided for future growth – all without interruption to production.

The expansion incorporated more than \$4 million worth or 100 tonnes of stainless steel, around half of which was fabricated by ASSDA Accredited Fabricator G & B Stainless from Crestmead, Qld.

G & B Stainless director John van Koeverden said their company's work on the project involved 20 to 30 people in their workshop and eight people on site for around 5 months.

The company fabricated and installed the majority of conveyor equipment, including the product conveyors, empty carton conveyors and packed carton conveyors.



Mr van Koeverden said mainly 304 and some 316 stainless was used for the double and triple tier conveyors.

"One of the unique features of the job was the two 60 metre long boning conveyors and integral slicing tables, which we designed specifically for this application," he said.

"The tables incorporate over 100 stations and feature pneumatic lifts to raise the tables up to 90 degrees for ease of cleaning."

G & B Stainless used a glass bead blast finish over most of the stainless steel, primarily to remove weld stain and further enhance the hygiene features of stainless steel.

Wiley & Co project engineer Scott Hebbard said the fact that G & B Stainless was ASSDA Accredited played a role in their selection to fabricate the majority of the stainless steel equipment in the new boning room.

Four other fabricators shared the remainder of the work, including the fully enclosed walkways and the conveyors up to and taking away from the vacuum packing equipment.

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FOOD SPECIFICATION IMPROVES FABRICATION PRACTICES



Hygiene and the 'cleanability' of equipment used in the production of food are paramount. The widespread use of stainless steel equipment in the food industry goes some way towards ensuring these criteria are met – but the assurances provided by stainless steel are only as good as the fabrication quality of the equipment.

Following a presentation at ASSDA's annual conference in 2003 on the quality of food fabrications, particularly in the dairy industry, it became apparent that fabrication specifications, if they existed, were often inadequate and inconsistent.

As a result, ASSDA launched a co-operative venture, working closely with many fabricators involved in the food industry, to create the recently released "ASSDA Food Specification: Fabrication and Installation of Stainless Steel Process Plant and Equipment in the Food and Beverage Industries".

The title may be complex, but the intention is simple: used in conjunction with ASSDA's Accredited Fabricator scheme, it will standardise fabrication practices in Australia and improve efficiency and reliability by raising the standard of quality delivered.

ASSDA's Food Spec is not intended to replace accepted national and international standards. Instead, it reflects their requirements in the design and fabrication process specifically for food and beverage plant. The specification is intended as a step forward from the more generic advice offered by the well-known



"Blue Book", published by ASSDA's sister organisation NZSSDA.

The Food Spec supplements the purchaser's specification and contract, with the purchaser's performance criteria and the supplier's design being the default conditions. There are prescriptive sections, such as those relating to spacing for access or acceptable levels of heat tint. However, best practice is flagged with the expectation that a contrary decision must be well supported. The consistent theme throughout is the delivery of cleanable surfaces in a hygienic environment.

The specification can be broken into four sections:

1. Scope, definitions, interpretation, document hierarchy and supplier systems required;
2. Design requirements with both general rules and specific items for process equipment, process piping and other piping;
3. Fabrication requirements for:
 - overall necessities of grade, materials care, welding and finishing procedures;
 - process vessel fabrication, whether by the supplier or others;
 - the handling, welding and finishing of process tubing at ambient or elevated pressures; and
 - the fabrication of non-product contact pipework at low or high pressures.
4. Practicalities such as transport, installation, commissioning and insurance.

The specification includes two appendices that list relevant standards and a discussion on the pros and cons of autogenous and filler metal use in welding of tubing.

FIGURE 1

Example

Requirements for product contact surfaces include:

- specific slopes for tanks and pipes to cause drainage;
- restricted dead leg lengths;
- crevices and threads are prohibited from product contact;
- drainage or splashing from opening lids may not enter product areas;
- cleaning design must avoid potentially unclean shadows; and
- specific surface roughness limits and the need for passivation following welding and mechanical removal of material.

However, there are also significant hygiene requirements specified for non-product contact areas including, for example, consideration of single support ladders or adequate clearance below plant and equipment to permit adequate cleaning.

There is no doubt that ASSDA's Food Specification fills a void in the food industry. It is now up to operators in the industry to use it to improve practices in both their own businesses and the industry as a whole.

Copies of the specification are available from the ASSDA office on (07) 3220 0722. Details of the complementary Accredited Fabricator scheme are available from the ASSDA website www.assda.asn.au or Tina Fraser at the ASSDA office.

This article was written by ASSDA's technical adviser, Dr Graham Sussex.

The ASSDA Food Specification has drawn on the work of many operators in the industry and their assistance in time and documents is gratefully acknowledged.



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PACRIM STAINLESS 2006

A FULL PROGRAM OF EVENTS



An impressive line-up of speakers will present at ASSDA's conference being held at the Hyatt Regency Coolum, Australia from 25-27 October 2006:

- > Mark Perrins, Outokumpu Stainless Distribution (UK) and BSSA: "Stainless Steel - a UK and Service Centre Perspective"
- > Megan Lilly, AIG: "World Class Skills for World Class Industries"
- > Staffan Malm, ISSF: "The Role of ISSF in Australia"
- > Richard Matheson, ASSDA: "Modern Training for the Stainless Steel Industry: ASSDA's E-learning Stainless Steel Specialist Course"
- > Stephen Barnett, Nickel Institute: "Nickel: material of choice for a bright future."
- > Rohan Kendall, ABARE: "The Outlook for World Nickel Markets"
- > Bill Stoddart, Tom Stoddart Pty Ltd: "Attracting Youth to the Stainless Steel Trades"

- > Ian Bailey, CQPA: "Port of Gladstone: Future Planning for Today"
 - > Ron Blackwell, Facet Consulting Engineers: "Spectacular stainless steel structures signify success; finding future forms - the role of alliteration."
 - > John Dunn, Allegheny Ludlum: "AL 2003 Lean Duplex Stainless Steel: Technical and Economic Advantages versus 316L"
 - > Paul Montague, Atlas Specialty Metals: "Stainless Steel Reinforcing - An Australian Story"
 - > Alex Gouch, Austral Wright: "ASSDA Accreditation - New Category: Food"
 - > Michael Jones, Bega: "The Way Forward - A 'Stainless' Standard"
 - > Brian Leslie, SSINA & Metal Mark: "Building the Future - A North American Perspective"
 - > Gavin Becker, Gladstone Pacific Nickel: "The Gladstone Nickel Project - Part of the 21st Century Nickel Supply Solution"
- Conference papers will be available from ASSDA after the conference for \$55 (members) and \$66 (non-members).

THE LOWDOWN ON 200 SERIES STAINLESS STEELS

Nickel prices have been relatively high over the last couple of years. As a result, there has been increased interest in low-nickel or no-nickel grades of stainless steel.

One such family of stainless steels is the 200-series and use of these has doubled this decade. They have become popular in China and South East Asia, particularly. However, this has not been without problems.

Because the 200-series grades are austenitic, they are not magnetic and are therefore very difficult to distinguish from the widely used 300-series grades, such as 304 or 316, which are also non-magnetic. This has led to confusion in the marketplace, including cases

of incorrect labeling, etc, with 200-series material being sold as 304.

Most growth in 200-series use over recent years has been in low-nickel and therefore low-chromium versions which have less corrosion resistance than 304. The end result has been corrosion failures in some applications and dissatisfied customers. In addition, there are concerns that this 200-series material may contaminate the existing stainless steel recycling circuit which is based on 304.

The 200-series is a technically valid family of stainless steels but, like all stainless steel grades, they have their limitations. If you are considering the use of a 200-series material

then you should ensure you have all the necessary data you require to make a rational judgment – mechanical and physical properties, corrosion performance in your environment, etc. And it is strongly recommended that you deal only with reputable and knowledgeable suppliers who can provide high quality material of known origin.

This is an extract from an article written by David Jenkinson, Nickel Development Institute.

For the full article, please visit <http://www.assda.asn.au>

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MORE INFORMATION

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