

# AUSTRALIAN

# STAINLESS

ASSDA  
NO 28 MAY 2004

SPECIALISING IN STAINLESS STEEL AND ITS APPLICATIONS



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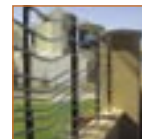
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## STAINLESS DELIVERS SAVINGS FOR SYDNEY WATER

**Cleaner beaches and major water savings will be the chief benefits of the largest Sydney Water construction project ever undertaken on the New South Wales south coast.**

The \$197 million Illawarra Wastewater Strategy will see an overhaul of the 40-year-old Wollongong sewage treatment plant (STP) including the construction of a major new water recycling plant, high level (tertiary) treatment processes and ultraviolet disinfection systems.

ASSDA member, Roladuct Spiral Tubing, supplied approximately 60 tonnes of grade 316 and 316L stainless spiral tubing and associated fittings in 2mm to 5mm thicknesses for the project.

These materials were provided to Total Process Services for use throughout the Wollongong STP for the majority of the above-ground process lines.

An additional supply of 35 tonnes of grade 316 stainless tube and pipe fittings were provided by ASSDA Major Sponsor, Atlas Specialty Metals.

Sydney Water's head contractor for the project is the Walter-Veolia Joint Venture.

Walter Construction Group (Walter) is responsible for managing the delivery of the project and undertaking civil infrastructure construction at the treatment plants.

Veolia Water Systems Australia (Veolia) is responsible for the process, mechanical and electrical design, supply, installation, commissioning and operational advice.

The project's most dramatic transformations are taking place at the Wollongong sewage treatment plant, where a 21 million litre bioreactor forms the centre-piece of the upgraded plant.

Designed to remove organic impurities and nutrients from wastewater, the base of the bioreactor tank was poured over a continuous 15-hour period.

The design approach redirects wastewater from treatment plants at Bellambi and Port Kembla to the Wollongong facility. The Bellambi and Port Kembla plants will be converted to specialised storm-flow treatment facilities which will be used only in extreme wet weather.

The new Wollongong plant will also operate

a reuse facility - supplying high quality treated wastewater to BlueScope Steel and cutting demand for fresh water from the local Avon Dam by about 20 percent.

The upgraded sewage treatment plant is due for completion in mid 2005.

The Illawarra Wastewater Strategy is part of WaterPlan 21, Sydney Water's long-term strategy for sustainable water and wastewater management.

*ASSDA provides technical advice and access to resources on the water and wastewater industries - for details phone 07 3220 0722.*

*ASSDA Major Sponsor, The Nickel Institute, can provide essential information on waste water including 'Guidelines for the Use of Stainless Steel in Municipal Waste Water Treatment Plants'. This information is available for download from [www.stainlesswater.org](http://www.stainlesswater.org).*

*Standards Australia distributes the Water Services Specification (WS-SPEC:2000) incorporating guidelines for stainless steel. Visit [www.standards.com.au](http://www.standards.com.au) for purchase.*



ABOVE: The Wollongong Sewage Treatment Plant will provide additional wet weather treatment, deep bed sand filtration and ultraviolet disinfection in addition to existing physical and biological treatment processes.



## NATIONAL GALLERY OF VICTORIA: SHOWCASING ART WITH STAINLESS

PHOTOS COURTESY OF THE NATIONAL GALLERY OF VICTORIA

**The National Gallery of Victoria (NGV) houses one of Australia's most important visual arts collections. However, with the passage of time, the collection had outgrown its facilities.**

Since the existing building opened in 1968, the collection had doubled in size and only five percent of the Gallery's collection was on display at any one time.

As part of a major upgrade and renovations to the existing Gallery, the Victorian State Government called on construction company Baulderstone Hornibrook to lead the project.

Architect Mario Bellini, from Milan, with Australian firm, Metier 3, used stainless steel to stunning effect in a design framework that seamlessly integrates the contemporary 'metallic' look of stainless whilst keeping much of the original heritage feature intact.

ASSDA Major Sponsor, Sandvik supplied 10 tonnes of 304 stainless steel including solid bar, hot rolled flat and heavy angles for the project.

Most of the stainless steel was surface finished by Silverstone and some was electropolished by ASSDA member MME Surface Finishing.

Applied Manufacturing fabricated glazed ramps and walkways, solid staunchens, glass panel frames and door surrounds for the courtyard in addition to balustrading, external handrails, rigging systems and feature mesh screens.

Fractal Systems supplied an imported stainless steel mesh product for the ceilings in the foyer and feature walls in the Federation Court.

This type of mesh consists of stainless steel rods in one direction and has stainless steel ropes threaded/woven in the other. Mesh was used for three reasons. Firstly it is semi-transparent, secondly it reflects light and finally it has an appealing visual texture, all dramatically influencing the ultimate sense of place.

In the feature walls, the mesh was mounted in panels framed with stainless steel angle frames

bolted to the substructure. In the ceilings, the mesh was stretched over a curved sub-structure and tensioned at both ends.

Other than these two main elements, stainless steel was used as floor cladding in locations where visual transition was required between two types of flooring (eg. parquetry and glass floors), as cladding to ceiling bulkheads and for struts in the glass roof trusses and cast hold-down 'spiders'.

Zorana Zankasar from Metier 3 Architects, Victoria said that "stainless steel is almost a necessary component of the contemporary design. It is hard to imagine a major contemporary building without stainless steel.

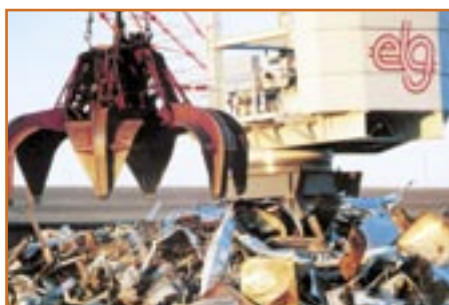
"I believe that because stainless steel offers trouble-free maintenance combined with the look of metallic", said Zankasar.

The project started in January 2001 and the gallery was re-opened to the public in December 2003.



TOP RIGHT: Walls and walkways where stainless steel and patterned glass have been used to stunning effect.

ABOVE: Stainless steel mesh walls create a distinctive effect in contrast with the 'heritage' walls and glass ceiling.



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## CLEANING OF EXTERIOR STAINLESS STEEL

BY GRAHAM SUSSEX, ASSDA TECHNICAL SPECIALIST

The visual performance of outdoor stainless steel depends on five interrelated factors:

- **Surface finish - smooth and clean and free of crevices.**
- **Grade selection - appropriate for environment.**
- **Good design - rain washing and uniform draining.**
- **Maintenance program - regular cleaning.**
- **End user expectations.**

This technical article provides suggestions on a maintenance program for cleaning of exterior stainless steel, together with some recommendations for remedial action if stains occur beyond regular maintenance or where such maintenance has not been performed.

### Maintenance: routine removal of grime

Stainless steel holds its appearance best if it is washed regularly. When washing use soap or detergent or 1% ammonia solution in warm, low chloride water with cloths or soft brushes to avoid scratching the surface.

Smears will be reduced if the surface is dried afterwards. This treatment applies to bare stainless steel but care should be taken with coloured surfaces.

Coloured and very smooth finished (eg BA or No. 8) surfaces subjected to excessive brushing or rubbing may lose gloss or even become scratched. Bleaches are not recommended.

Simply wiping with a damp cloth is not adequate as it smears corrosive deposits without removing them.



ABOVE: A successful stainless steel installation in a coastal application, with no tea staining.

Table 1 from the ASSDA 'Tea Staining' Technical Bulletin provides a guide to the recommended frequency for cleaning exterior stainless steel. This Bulletin is available for viewing or download from ASSDA's website.

TABLE 1: RECOMMENDED CLEANING INTERVALS FOR 304 STAINLESS STEEL*				
Building Element	Roof or wall washed by rain		Eave, soffit or under-eave wall not washed by rain	
	No deposits	Deposits accumulate	No deposits	Deposits accumulate
Structure	No deposits	Deposits accumulate	No deposits	Deposits accumulate
Cleaning+ in rural, suburban and residential areas	1/year	1/year	1-2/year	2-12/year
Cleaning+ for seaside#, industrial and severe areas	1/year	1/year	3-4/year	4-12/year

Notes:

- \* Cleaning frequency may be less for highly alloyed grades but is dependent on surface finish, design details, environment, cleaning procedure and expectations of performance.
- + Cleaning involves washing with potable, low chloride water or washing with a neutral detergent followed by rinsing with potable water. For details see NiDI publication 12013.
- # This listing does NOT imply that it is recommended that 304 stainless steel is satisfactory in marine environments.

### Grease, oily films and other organic contamination

Oils and grease may be removed by alkaline formulations or hot water and detergents or, if necessary, by hydrocarbon solvents such as alcohol, acetone or thinners or eucalyptus oil.

In all cases the surface should be rinsed with clean water and preferably dried.

For directionally grit polished finishes, wiping along the polish direction with very hot clean water and a soft, absorbent cloth is a good final step to reduce smears.

Heat from a hair dryer or glue gun may soften adhesive remnants from labels or protective films for removal.

After exposure to UV degradation from sunlight, adhesives may require similar treatment to grease stains or even abrasion, with the probability of a bright or scratched spot.

### Adherent Scales and Mortar

Adherent scales and mortar may be removed chemically but NOT using chemicals containing chlorides.



NEVER use brick cleaning liquids that contain hydrochloric acid. Hot 25% acetic acid (vinegar) or warm 10% phosphoric acid are effective in removing hard water scales and dried mortar splashes.

Following the acid wash, the surface should be neutralised with dilute ammonia or sodium bicarbonate solution, rinsed and dried.

**Remedial Work**

The brown surface stains that can occur on stainless steel during atmospheric exposure are simply cosmetic rust stains.

This brown 'tea staining' on stainless steels will not progress to potential structural damage as could occur with a carbon steel structure.

The procedures outlined below may enable you to remove the tea staining. However, if the progression of damage is beyond these recommendations it is advisable to employ an experienced contractor.

**Cleaning Rust Stained Flat Surfaces**

Early action after the onset of tea staining is desirable, before the appearance of the underlying surface is changed.

If the surface is pitted, then it is probable that it will require mechanical repolishing. After mechanically cleaning off tea staining, it is preferable to passivate the surface by using a nitric acid gel or, if the item is portable, by immersion in a nitric acid bath. For marine exposures, passivation is very strongly recommended.

In contrast to other acids, nitric acid is a strong, oxidising acid cleaner and has the added advantage that it is a passivating agent.

The Nickel Institute has suggested that rust may be removed by the use of a 10% phosphoric or oxalic acid followed by a 1% ammonia solution neutralisation and then a water rinse.

Alternatively a mild acid based cleaner such as sulphamic acid (used in some saucepan cleaners) can be used with some care to avoid local changes in appearance. NEVER EVER use hydrochloric or sulphuric acids.

There are also proprietary chemical cleaning treatments often based on citric acid or other chelating compounds. Although these agents passivate in the sense of removing free iron and other foreign matter, they do not augment the surface oxide film.

Use of liquid acids on site is generally unsatisfactory as contact time is short and the acid may run off and damage adjacent components.

Unlike the hydrofluoric acid pickling process used after welding, a nitric acid passivation process does not normally change the surface appearance of stainless steel, although it may cloud a mirror polished surface. Careful trials on inconspicuous areas are recommended prior to full scale cleaning.

Electropolishing is also used by some contractors to smooth rough edges and both clean and passivate the surface. It can be carried out on site or, more usually, in purpose-built tanks.

**Afterwards – prevention of recurrence**

If tea staining has occurred, one or more of the five factors outlined in the introduction have not been considered carefully enough when the structure was designed and/or built.

To improve the structure, the following steps may be taken to prevent recurrence:

- Increase the frequency of maintenance.
- Improve the surface finish - mechanical polishing and chemical treatment on-site.
- Alter the design of the structure - redesign and replace the affected part of the structure.
- Improve grade selection - replace the structure with a more suitable grade of stainless steel.

If consideration of the aforementioned steps indicates an uneconomic result, the stainless steel can be painted.

Paint systems using lacquers and polyurethane top coats are available and have been used successfully, but care and understanding is required.

Painting the stainless steel is a step that should only be used as a last option as it is irreversible.

*This technical article is an extract of a Technical FAQ on 'Exterior Cleaning of Stainless Steel' that will soon be available in print and online.*

*For technical support and advice contact ASSDA on 07 3220 0722 or email [assda@assda.asn.au](mailto:assda@assda.asn.au).*



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ABOVE: A successful stainless steel installation in an outdoor application.

## STAINLESS TECHNOLOGY TO REMEMBER WAR HEROES

PHOTOS COURTESY OF DEPARTMENT OF VETERANS AFFAIRS AND DESIGN AND SURVEY NEON

### The Australian War Memorial in Hyde Park Corner, London stands as a symbol of freedom and an enduring spirit of strength.

To commemorate the men and women who fought and died for Australia alongside Britons in the two World Wars, Australian architectural firm Tonkin Zulaikha Greer and artist Janet Laurence designed the Memorial to reflect the sweep of the Australian landscape.

The result was a highly durable structure featuring a long, curved wave wall constructed out of West Australian green granite and supported by grade 316L stainless steel.

ASSDA Major Sponsor, Atlas Specialty Metals, and ASSDA members, M & S Stainless Supplies and Dalsteel Stainless supplied approximately 9000 kilos of stainless steel for the structure including 8mm plate, pipe, angles and 3mm sheet.

Grade 316L was specified for its corrosion resistance, particularly as the Memorial comprises a water feature that periodically cascades water across the wall to highlight the names of the hometowns of our soldiers.

Stainless steel was used primarily in the construction of stainless steel cradles which were fabricated in Australia, shipped, positioned and lifted into place to support the granite.

All welds were pickled and passivated to provide protection from the bromine and chlorine's likely to be deposited on the frames from the water forms built into the Memorial.

Australian-based firm Design and Survey Neon (DSN) played a leading role in the design and manufacture of the supporting structure by using 3D modelling techniques.

The 3D modelling allowed the manufacture of components and assembly of the job to become a seamless process.

DSN modelled the granite wave wall and supporting cradles. The templates for the granite blocks and their fixings were then lifted from the model to enable the fixings to be pre-drilled prior to assembly.

The use of laser cutting and CNC technologies allowed DSN to fabricate to near machining tolerances.

Laser etching of assembly notches were added for simple fabrication and installation.

Coordinates for supporting cradles from the model were used to determine correct on-site positioning via electronic theodolites.

The granite blocks were positioned with a 6mm gap vertically and horizontally to a tolerance of plus or minus 1mm.

Precise accuracy was required to avoid accumulation of errors because of its wave like design.

Most of the components for the Memorial were imported from Australia. Water features and water effects were created by Waterforms International and all the stone work was assembled by Australians.



ABOVE: The Australian War Memorial 'Dedication Day Wreaths' placed in front of the curved granite wave wall. Photo courtesy of the Department of Veterans Affairs, copyright Commonwealth of Australia reproduced by permission. TOP RIGHT: 316 stainless steel cradles were lifted into place to support the granite blocks that form the wave wall.

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## STAINLESS MAKES WAVES AT MENTONE GIRLS GRAMMAR

PHOTO COURTESY OF NORTH EAST WELDING COMPANY

**Mentone Girls Grammar School, beside Melbourne's Port Philip Bay, set out to make a statement in stainless by turning what was an unused area of the school into an asset that is now making waves with drivers along the popular Beach Road.**

Inspired by the coastal environment of Port Philip Bay, architects from Environmental Resources Management Australia (ERM) prepared a masterplan that comprised a feature rendered block wall with curved stainless steel infill panels and entry gates between piers.

The landscape design for Mentone Girls Grammar School called for a new entry to Beach Road, a popular local road running along the edge of Port Phillip Bay.

It involved the fabrication of a series of curves using 12mm diameter grade 316 stainless steel bars to simulate waves.

ERM architect, Chris Bell said that the sculptural nature of stainless steel and its ability to withstand the harsh coastal climate played an important role in its selection.

"We wanted to use a material that was robust enough to withstand the harsh coastal environment, that could be used to create a sculptural look and was low maintenance.

We tried to keep things simple to reduce costs. By using standard metal sizes we were able to create something that was cost effective and visually striking," said Bell.

ASSDA Major Sponsor, Sandvik, supplied 316 L stainless steel to North East Welding Company. A nylon die was used to form the bars which were fabricated with fully adjustable hinges.

To give the job a high quality and highly corrosion resistant finish, North East Welding Company specified electropolishing on the infill panels and gates. This was performed by ASSDA member, MME Surface Finishing.

ERM wanted a flexible material with a strong architectural and sculptural feel to the design.

Stainless steel was ideal for this purpose with positive feedback from motorists driving along Beach Road.



## SOLVING THE PUZZLE WITH STAINLESS MAINLINE FITTINGS

PHOTOS COURTESY OF PIERCE AUSTRALIA

**Choosing mainline fittings for irrigation applications can often seem like building a giant puzzle with elbows, tees, crosses and coupler sets - various fittings required to connect irrigation pipework together.**

However, Geoff Mellows from Yarrawonga Irrigation in Victoria may have solved the puzzle by using stainless steel mainline fittings - something that plastic fittings cannot yet match.

Poly, pvc and avs fittings are common materials in irrigation applications but because they are



produced out of a mould, the combinations of size and outlet configuration are restricted.

Mellows said that by using stainless mainline fittings by ASSDA member, Pierce Australia, he can now "manipulate the angle, the shape, the variation and combination of outlets."

The difference is simple. PVC and poly are bolted on, or welded and glued - making it difficult to change fittings".

Stainless steel mainline fittings are the only rubber-ring jointed fittings available on the marketplace manufactured to the customers specific needs and can be fitted on any other combination because they are fabricated.

Stainless steel mainline fittings also provide flexibility of design in the angle of the fittings. This also applies to the combination of outlets on those fittings and any other additional connections to that fitting.

With versatile stainless steel fittings, Mellows advice to customers is simple - "lay the pipe first and worry about the fittings later!"



**CONTACT DETAILS FOR FIRMS  
APPEARING IN THIS ISSUE****Applied Manufacturing Pty Ltd**  
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**Environmental Resources Management Australia**

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## PACRIM STAINLESS 2004: A SEAT AT THE TABLE

**The First International Stainless Steel Forum  
Focussing on the Asia-Pacific Region.**Date: 3-5 November 2004  
Venue: Hyatt Regency Resort  
Sanctuary Cove, Gold Coast

This event will be held in conjunction with ASSDA's 12th National Stainless Steel Conference and Exhibition.

ASSDA's annual conference has become known as the premier occasion for the stainless steel industry to share knowledge and expertise.

Strong support has been received from the Conference sponsors - Macquarie Bank, Atlas Specialty Metals, BHP Billiton and Nickel Australasia.

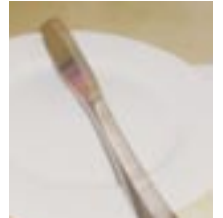
Important and prominent speakers have committed to participate.

Trade and product exhibitions will be available for both Australian and overseas participants.

Industry members from Australia and the world will come together for expert information sessions interspersed with exciting social events.

For more information about PacRim Stainless 2004 and opportunities for sponsorship, exhibition and speaker presentations contact ASSDA - phone 07 3220 0722.

Registration information will be issued in July.



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ISSN 1328 - 1232