



# Book of New Applications



2011





# Book of New Applications



2011

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## MESSAGE FROM THE CHAIRMAN OF THE ISSF MARKET DEVELOPMENT COMMITTEE

Since its creation in 1996, ISSF's Market Development Committee (MDC) has identified and driven a number of successful projects to fulfil our reason for being: to grow the market for stainless steel profitably. One of the most successful has been the ISSF Book of New Applications, and I am very pleased to launch this fourth edition. Since its inception, the Book of New Applications has aimed to increase awareness of the many attributes of stainless by showcasing some of the many products that exploit its unique properties.

There seems little that stainless can't do. In this edition you will find examples of stainless steel utilised in applications you might expect, such as water supply pipes and building applications, and many that you might not. In Thailand we find stainless has been utilised to renovate one of the most revered Buddhist sites in Asia, while in Sweden, stainless has given long-distance skaters a technical edge that will take them further using less energy. The applications in this edition cover many different sectors and most parts of the world. Two new market segments have been added to this edition of the Book of New Applications: Water and Green Energy. In both areas, stainless steel has an important role to play if the world is to meet targets for renewable energy generation and water conservation. The applications featured in these sections are truly innovative and demonstrate how stainless steel is already helping to conserve the Earth's finite resources.

The purpose of this publication has always been to inspire by spreading ideas and helping the world stainless steel market to grow. It would not be possible to create the document without the invaluable support of ISSF member companies, and the many stainless steel development associations (SSDAs) that exist around the world. The task of preparing the fourth Book of New Application was again given to an ISSF Stainless Steel Fellow: Xiaopeng Xie from Taiyuan Iron & Steel (Group) Co., Ltd. in China. Xiaopeng has spent nine months in Brussels working to develop this edition.

I would like to thank Xiaopeng for his hard work, and congratulate the ISSF members and SSDAs who contributed to this Book of New Applications. I sincerely believe it will help everyone to understand the advantages of using stainless, and the contribution stainless steel makes to our world.



Clemens Iller  
Chairman, ISSF Market Development Committee and  
Chairman of the Management Board, Global Stainless Business Area, ThyssenKrupp AG



# THE FOUR TYPES OF STAINLESS STEEL

## **Austenitic**

Austenitic stainless steels contain a significant amount of chromium, and sufficient nickel or manganese to stabilise the austenite microstructure that gives these steels good formability and ductility (and makes them non-magnetic). A typical composition is 18% chromium and 8% nickel, as found in the popular AISI 304 grade. (AISI is an abbreviation of American Iron and Steel Institute and is commonly used as a grade designation.) Austenitic grades can be highly durable and corrosion resistant and have high ductility, low yield stress, relatively high tensile strength and good weldability. They have a very wide range of uses.

## **Ferritic**

Ferritic stainless steels have properties similar to those of mild steel but show better corrosion resistance. Most common are 11% and 16% chromium containing grades – the former used mostly in vehicle exhaust systems and the latter mostly in cooking utensils, washing machines and indoor architecture.

## **Austenitic-Ferritic (Duplex)**

These stainless steels, which contain high chromium and some nickel, have a microstructure that is roughly 50% ferritic and 50% austenitic. They are mostly used in the process industry and in seawater applications.

## **Martensitic**

Like ferritic grades, martensitic grades contain 12 to 16% chromium. However, they have higher carbon content and are subjected to specific heat treatments during production, making them very hard and strong. They are used in applications such as turbine blades, cutlery and razor blades.

## SURFACES

Surface finishing treatments applied to stainless steels can take many forms. The main surface finishes are described below.

Description	ASTM	EN 10088-2	Notes
Hot rolled	1	1E/1D	A comparatively rough, dull surface produced by hot rolling to the specified thickness, followed by annealing and descaling.
Cold rolled	2D	2D	A dull, cold rolled finish produced by cold rolling to the specified thickness, followed by annealing and descaling. May also be achieved by a final light pass on dull rolls.
Cold rolled	2B	2B	A bright, cold rolled finish commonly produced in the same way as the 2D finish, except that the annealed and descaled sheet receives a final cold roll pass on polished rolls. This is a general purpose cold rolled finish and is easier to polish than 1 or 2D.
Bright Annealed	BA	2R	Produced by performing bright annealing in inert atmosphere after cold-rolling and light cold rolling. Smoother and brighter than 2B.
Brushed or dull polished	No. 4	1J/2J	A general-purpose bright, polished finish obtained by finishing with a 120-150 mesh abrasive, following initial grinding with coarser abrasives.
Satin polished (matt)	No. 6	1K/2K	A soft satin finish having lower reflectivity than brushed (or dull polished) finish. It is produced by Tampico brushed (or dull polished) finish, using a medium abrasive.
Bright polished (mirror)	No. 8	1P/2P	The most reflective finish commonly produced. It is obtained by polishing with successively finer abrasives followed by buffing with a very fine buffing compound. The surface is essentially free of grit lines which are caused by preliminary grinding operations.
Electropolished surfaces	-	-	This surface produced by electrolysing in electrolytic solution. This electrochemical process improves the surface finish by removing the peaks of the irregular surface.

*Note: The above table is provided as a guide only.*



## **BUILDING AND CONSTRUCTION**

- Anti-seismic Reinforcement
- Buddha
- Bus Shelter
- Deck Roof
- Desalination Plant
- Elevator Door
- Elevator Structure
- Facade - Adjustable
- Facade - Brazil
- Facade - Double Skin
- Facade - Annealed Finish
- Facade - Incinerator
- Facade and Roof - Factory
- Facade and Roof - Service Centre
- Foundation Clasps
- Fractal Tiles
- Hand Rails in Airport Terminal
- Lightning Rod
- Lining Jacket for Sea Pillars
- Metro Station Canopy
- Pillar Cladding
- Planter Borders
- Rebar Support for GRC Panels
- Sea Defence Wall
- Spillway Control System
- Spiral Staircase
- Sports Complex Roof and Walls
- Stadium for Asian Games
- Water Supply Pipes
- Water Wall

## ANTI-SEISMIC REINFORCEMENT

8



The five-storey *Pagoda of the Minobusan Kuonju Temple* in Japan was originally constructed from wood in the 13<sup>th</sup> Century and did not meet modern standards of anti-seismic design. Stainless steel was used during the recent renovation of this historical building. While corrosion resistance was one factor in the choice of stainless, damage from future earthquakes was another. During an earthquake, stainless steel deforms, which gradually increases its strength. However, the stainless maintains its ductility which prevents brittle fractures from forming. This reduces the chances that the building will collapse during a future seismic event.



Location | JAPAN

Environment | OUTDOOR

Product | STAINLESS SHAPES, PLATES, BARS AND BOLTS

Fabrication process | WELDING AND BOLTING

Grade/surface | SUS304/NO 1 (PICKLED)

Material thickness/diameter

Weight | 8,600 KG

Competing material | COATED CARBON STEEL

Date of Completion | MAY 2008

Manufacturer | AICHI STEEL CORPORATION

Material Supplier | AICHI STEEL CORPORATION

Source of Information | AICHI STEEL CORPORATION

Remarks | IN ORDER TO PROTECT THE WOODEN STRUCTURE AGAINST FIRE, WELDING AND FUSING WAS UNDERTAKEN AWAY FROM THE SITE.

## Building and Construction

### BUDDHA



The Phra That Phanom Chedi (pagoda) is located in the north-east of Thailand. Built in the 16<sup>th</sup> Century, the pagoda is believed to house Buddha's breastbone, making it one of the most revered Buddhist sites in Asia. In 1976, reconstruction work was undertaken. However, by 2008, much of the umbrella covering the statue of Buddha and the fence surrounding it needed to be replaced. Stainless steel was selected for the renovation due to its excellent outdoor performance. The titanium mirror gold finish was chosen because of the importance of gold to the Buddhist religion. The patterns on the umbrella and the elegance of the new base were completed using a laser-cut perforation process.

**Location** | THAILAND

**Environment** | OUTDOOR

**Product** | STAINLESS STEEL SHEET

**Fabrication process** | CUTTING, FORMING, LASER PERFORATION, TITANIUM COATING AND WELDING

**Grade/surface** | AISI 304/MR AND TITANIUM COATING

**Material thickness/diameter** | MAINLY 2 MM THICK

**Weight** | 500 KG

**Competing material** | WOOD, CONCRETE, TILES, CARBON STEEL AND ALUMINIUM

**Date of Completion** | 2008

**Manufacturer** | THAPANIN CO., LTD

**Material Supplier** | THAINOX STAINLESS PUBLIC CO., LTD.

**Source of Information** | TSSDA

**Remarks** | THE RENOVATION HAS INSPIRED THE USE OF STAINLESS STEEL IN MANY OTHER BUDDHIST TEMPLES IN THE REGION.



## BUS SHELTERS FOR RAPID TRANSIT NETWORK

10



Sixty bus shelters have been installed in Ahmedabad by the Ahmedabad Municipal Corporation. Stainless steel was utilised as it met the Corporation's key requirements for corrosion resistance, durability, crash resistance, fire-safety, ease of cleaning and maintenance, and visual attractiveness.



Location | AHMEDABAD, INDIA

Environment | OUTDOOR

Product

Fabrication process

Grade/surface | SS 304

Material thickness/diameter | 125 MM DIAMETER

Weight | 1.3 TONNES

Competing material

Date of Completion | MARCH 2009

Manufacturer | M/S NILA INFRASTRUCTURES LIMITED

Material Supplier

Source of Information | M/S NILA INFRASTRUCTURES LIMITED

Remarks

## DECK ROOFS FOR FAMILY HOUSING



11

Stainless steel sheeting is being offered as an optional specification for the roofing of residential properties in Japan. This type of roofing material is in demand for use in the construction of up-market residences. The stainless steel sheeting is highly desirable due to its low carbon content. In recent years many residents have installed solar panels on their roofs. Therefore, they require roofing materials that are at least as durable as the panels themselves.

Location | JAPAN

Environment | OUTDOOR

Product | COLD ROLLED SHEET

Fabrication process | FORMING

Grade/surface | NSS445M2 (EQUIVALENT TO SUS445J1)/DULL FINISH

Material thickness/diameter | 0.6 MM

Weight | 700 KG PER HOUSE

Competing material | PVC-COATED CARBON STEEL

Date of Completion | 2001

Manufacturer | SEKISUI CHEMICAL CO., LTD

Material Supplier | NISSHIN STEEL CO., LTD

Source of Information | JAPAN STAINLESS STEEL ASSOCIATION

Remarks





## Building and Construction

# DESALINATION PLANT



12

When it came time to build the first desalination plant in the United Kingdom, duplex stainless was chosen. Duplex grade 1.4462 was selected for its ability to endure throughout the 60-year lifespan of the plant. Additional benefits included lower overall weight and lower maintenance costs. The plant was constructed in Beckton near London and will treat brackish water. Up to 150 million litres of fresh drinking water will be produced each day.



**Location** | LONDON, UNITED KINGDOM

**Environment** | OUTDOOR

**Product** | LASER WELDED BEAMS AND ANGLES

**Fabrication process** | LASER FUSION WELDING AND BOLTING

**Grade/surface** | DUPLEX 1.4462/STAINLESS GRIT BLAST

**Material thickness/diameter** | BEAMS 512 MM X 132 MM X 6 MM X 13 MM X 18 M SPAN

**Weight** | APPROXIMATELY 80 TONNES

**Competing material** | MILD STEEL COATED BEAMS OVER 700 MM HIGH

**Date of Completion** | 2009

**Manufacturer** | MONTANSTAHL AG

**Material Supplier** | MILLSTOCK STAINLESS LTD

**Source of Information** | MILLSTOCK STAINLESS LTD

**Remarks**

## Building and Construction

# ELEVATOR DOOR



Incorporating various types of surface processing technology, this unique three-dimensional elevator door has been designed according to the specifications of the customer. Stainless steel has been used due to its sturdiness and cleanliness.

**Location** | TAIWAN, CHINA

**Environment** | INDOOR

**Product** | COLD ROLLED SHEET

**Fabrication process** | GRINDING, SANDBLASTING, TITANIUM-COATING, 3D COMPLEX

**Grade/surface** | 316/NO 8

**Material thickness/diameter** | 1.0-2.0 MM

**Weight** | 700 KG PER HOUSE

**Competing material** | TITANIUM-COATED STEEL

**Date of Completion** | 2007

**Manufacturer** | TIKING TI-GOLD TECHNOLOGY CO., LTD

**Material Supplier** | YUSCO

**Source of Information** | THE VENETIAN MACAO

**Remarks** | THE MATERIAL SELECTION CAN BE MODIFIED ACCORDING TO THE CUSTOMER'S PREFERENCE OR PURPOSE.



## Building and Construction

# ELEVATOR STRUCTURE



14

Renovations to Mexico City's *Monumento a la Revolución* were undertaken to commemorate the 100<sup>th</sup> anniversary of the Mexican revolution. Part of the work involved the construction of this stunning new elevator structure inside the monument. Built with a stainless steel frame, the elevator stands at 50.7 metres high. Stainless steel was also used in the construction of hand rails for an adjoining staircase, and in the museum located in the basement of the monument.



**Location** | MEXICO CITY, MEXICO

**Environment** | INDOOR

**Product** | COLD ROLLED STAINLESS STEEL SHEET

**Fabrication process** | CUTTING, BENDING AND JOINING WITH MIG WELDING, VHB TAPE AND EPOXY GLUE

**Grade/surface** | 304 P3 AND 430 BA

**Material thickness/diameter** | 304 P3 - 1.9 MM AND 430 BA - 0.74 MM

**Weight** | 12 TONNES

**Competing material** | GALVANISED STEEL

**Date of Completion** | NOVEMBER 2010

**Manufacturer** | OBRAS, ARTE, INVENTOS, SUEÑOS

**Material Supplier** | THYSSENKRUPP MEXINOX

**Source of Information** | IMINOX

**Remarks** | ARCHITECT: ENRIQUE ESPINOSA FERNÁNDEZ

## Building and Construction

### **FACADE - ADJUSTABLE**



15

Stainless steel was chosen for this project due to its versatility, durability and sustainability. The system is composed of panels fixed on to an adjusted frame. The frame is designed to be mounted horizontally with invisible fastenings. Stainless helps to highlight the contemporary architecture of the building.

**Location** | BRAZIL

**Environment** | OUTDOOR

**Product**

**Fabrication process** | BENDING PANELS

**Grade/surface** | AISI 444/NO 4 BRUSHED

**Material thickness/diameter** | 0.8 MM

**Weight** | 35 TONNES

**Competing material** | ALUMINIUM, COMPOSITE MATERIALS

**Date of Completion** | 2010

**Manufacturer** | SULMETAIS FORROS E FACHADAS

**Material Supplier** | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

**Source of Information** | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

**Remarks** | PHOTO © SULMETAIS FORROS E FACHADAS.  
ARCHITECT: TETRA ARQUITETURA.



## FACADE - BRAZIL



16

This office building is located 2 km from the sea and required extensive renovation. The existing masonry facade was replaced with a new curtain wall consisting of stainless steel cladding and solar shade elements. The frame of the external cover was made with AISI 444 grade stainless which can withstand the corrosive effect of the nearby sea.



Location | RIO DE JANEIRO, BRAZIL

Environment | OUTDOOR

Product

Fabrication process | FORMING

Grade/surface | AISI 444/NO 4 BRUSHED

Material thickness/diameter | 0.8, 1.2 AND 1.5 MM

Weight | 31 TONNES

Competing material | ALUMINIUM, PAINTED CARBON STEEL

Date of Completion | 2008

Manufacturer | ALGRAD

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks

## Building and Construction

# FACADE - DOUBLE SKIN



17

This Parisian office building was built in the 1970s and required extensive renovation to improve insulation and amenities. To enhance the thermal insulation, a double-skin glass and stainless steel facade has been installed. The new facade consists of 140 fixed and sliding panels which cover an area of 345 m<sup>2</sup>. Perforated stainless steel panels form the outer skin, while the inner panel is made of glass set into a stainless steel frame. The use of stainless steel gave the building additional strength and a beautiful facade that is easy to clean.

**Location** | PARIS, FRANCE

**Environment** | OUTDOOR

**Product**

**Fabrication process** | PERFORATIONS (8 TO 12 MM DIAMETER) AND SEALING BETWEEN TEMPERED GLASS SHEETS

**Grade/surface** | AISI 430

**Material thickness/diameter** | 0.5 MM

**Weight**

**Competing material**

**Date of Completion** | 2010

**Manufacturer** | STRATOBEL- MAAST ARCHITECTES

**Material Supplier** | APERAM STAINLESS STEEL EUROPE

**Source of Information** | APERAM STAINLESS STEEL EUROPE

**Remarks**





Building and Construction  
**FACADE - ANNEALED FINISH**

18



Stainless steel has been used for the gateway and street-side facade of this office building in Paris. The use of stainless with a bright annealed finish creates a play of light on the façade. The combination stainless steel and clear and coloured double-glazing, echoes the reflections of the nearby Seine River.



Location | PARIS, FRANCE

Environment | OUTDOOR

Product

Fabrication process | BENDING

Grade/surface | AISI 304/BA

Material thickness/diameter

Weight

Competing material

Date of Completion | 2010

Manufacturer | AGENCE X-TU

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS STEEL EUROPE

Remarks | IMAGE: © JEAN-MARIE MONTHIERS

## Building and Construction

# FACADE - INCINERATOR



19

When the Incinerator Hera designed its new building, the company chose AISI 316 stainless with a mirror finish for the facade. Stainless steel was selected because it is an environmentally friendly material and fully recyclable.

**Location** | FORLI, ITALY

**Environment** | OUTDOOR

**Product**

**Fabrication process**

**Grade/surface** | AISI 316/MIRROR FINISH

**Material thickness/diameter** | 1.5 MM

**Weight** | 53 TONNES

**Competing material**

**Date of Completion** | 2010

**Manufacturer** | GAE AULENTI ASSOCIATED ARCHITECTS

**Material Supplier** | APERAM STAINLESS STEEL EUROPE

**Source of Information** | APERAM STAINLESS STEEL EUROPE

**Remarks**





Building and Construction  
**FACADE AND ROOF - FACTORY**

20



Stainless steel was selected for the roof and facade of a stainless supplier in Brazil. Stainless was chosen for its durability, thermal insulation properties, and because it is an environmentally friendly and fully recyclable material.



Location | SAO PAULO, BRAZIL

Environment | INDOOR AND OUTDOOR

Product

Fabrication process | PROFILING

Grade/surface | AISI 439/2B

Material thickness/diameter | ROOF: 0.4 MM, FAÇADE: 0.5 MM

Weight | 60 TONNES

Competing material | ALUMINIUM, PAINTED CARBON STEEL

Date of Completion | 2010

Manufacturer | ARCELORMITTAL PERFILOR

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks

Building and Construction

## **FACADE AND ROOF - SERVICE CENTRE**



21

Stainless steel was selected for the roof and facade of ArcelorMittal's Sumaré Service Centre, primarily due to its aesthetic and thermal insulation properties. The fact that stainless is fully recyclable at the end of its life was also an important consideration.

Location | BRAZIL

Environment | OUTDOOR

Product

Fabrication process | PROFILING

Grade/surface | AISI 439/2B

Material thickness/diameter | 0.65 MM

Weight | 45 TONNES

Competing material | PAINTED CARBON STEEL, ALUMINIUM

Date of Completion | 2010

Manufacturer | ARCELORMITTAL PERFILOR

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks



## Building and Construction

# FOUNDATION CLASPS



22

Foundation clasps are placed between the concrete foundation and the lower structures of newly built homes to provide ventilation. Stainless steel clasps offer many advantages over competing materials. These include a very long product life and excellent resistance to earthquakes.



Location | JAPAN

Environment | INDOOR/OUTDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING

Grade/surface | SUS443J1, UNS NO.S44330

Material thickness/diameter | 0.8 MM

Weight | 0.2 KG PER UNIT

Competing material | SYNTHETIC RESIN

Date of Completion | JANUARY 2007

Manufacturer | HOSHINO PLANNING CO., LTD

Material Supplier | JFE STEEL CORPORATION

Source of Information | JAPAN STAINLESS STEEL ASSOCIATION

Remarks

## Building and Construction

### FRACTAL TILES



23

These fractal tiles come in packs of 36 tiles and are intended for do-it-yourself installation. The pack includes all of the tools necessary for customers to create their own individual design or pattern. Fractal tiles can be installed indoors on any flat surface. The reflection of light off the stainless steel creates a feeling of spaciousness and light.

Location | MEXICO

Environment | INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | JOINING

Grade/surface | 430 P4

Material thickness/diameter | 0.61 MM

Weight | 51 G PER TILE

Competing material | WOOD, GLASS, CONCRETE AND CERAMIC TILES

Date of Completion | OCTOBER 2009

Manufacturer | THYSSENKRUPP MEXINOX

Material Supplier | THYSSENKRUPP MEXINOX

Source of Information | IMINOX

Remarks



## HAND RAILS IN AIRPORT TERMINAL

24



Approximately 33 kilometres of stainless steel handrails have been installed in Delhi's new airport terminal building in India. They provide a chic and modern finish to one of the largest and busiest airport terminal in the world.



Location | DELHI, INDIA

Environment | INDOOR

Product

Fabrication process

Grade/surface | SS 304 WITH SATIN FINISH

Material thickness/diameter

Weight

Competing material

Date of Completion | AUGUST 2010

Manufacturer | M/S FABRINOX-ARCHITECTURE DIVISION OF DHARAM INDUSTRIES

Material Supplier

Source of Information | M/S FABRINOX-ARCHITECTURE DIVISION OF DHARAM INDUSTRIES

Remarks

## Building and Construction

# LIGHTNING ROD



This stainless steel lightning rod is used to direct lightning bolts and for telecommunications. The stainless can withstand the intense bursts of energy from lightning, resists corrosion and remains safe and reliable. Stainless steel makes the rod sleek, yet easy to install.

**Location** | MADRID, SPAIN

**Environment** | OUTDOOR

**Product** | WIRE ROD

**Fabrication process** | HOT ROLLED, ANNEALED, PICKLED AND STRAIGHTENED

**Grade/surface** | 1. 4404/ANNEALED AND PICKLED

**Material thickness/diameter** | DIAMETER: 9 MM

**Weight**

**Competing material** | COPPER

**Date of Completion**

**Manufacturer** | ROLDÁN S.A.

**Material Supplier** | ACERINOX S.A.

**Source of Information** | CEDINOX

**Remarks**



## Building and Construction

# LINING JACKET FOR SEA PILLARS



26

The expansion of Haneda Airport in Japan has required the construction of a new runway over the sea. Stainless steel has been used to protect the pillars that support the runway. The decision to use stainless steel was based on its durability and high-resistance to seawater corrosion. Both of these factors give stainless steel a superb lifecycle cost advantage.



**Location** | HANEDA AIRPORT, JAPAN

**Environment** | OUTDOOR/UNDERWATER

**Product** | COLD ROLLED STAINLESS STEEL SHEET

**Fabrication process** | FORMING AND WELDING

**Grade/surface** | SUS312L, UNS N08354

**Material thickness/diameter** | 0.4 MM

**Weight** | APPROXIMATELY 5,000 TONNES

**Competing material** | TITANIUM-CLAD MATERIALS

**Date of Completion** | AUGUST 2010

**Manufacturer** | CONSORTIUM OF CONSTRUCTION AND ENGINEERING COMPANIES

**Material Supplier** | NIPPON STEEL & SUMIKIN STAINLESS STEEL CORPORATION, NIPPON YAKIN KOGYO CO.,LTD.

**Source of Information** | JAPAN STAINLESS STEEL ASSOCIATION

**Remarks**

## Building and Construction

# BUS STATION CANOPIES



27

Stainless steel has been used in the construction of several new metro stations in New Delhi. The stations are used intensively by many thousands of people each day. The stainless steel elements resist wear, have very low maintenance and are easy to keep clean and hygienic.

**Location** | DELHI, INDIA

**Environment** | OUTDOOR

**Product**

**Fabrication process**

**Grade/surface** | SS 304 WITH SATIN FINISH

**Material thickness/diameter** | 219 MM DIAMETER

**Weight** | 6 TONNES

**Competing material** | TITANIUM-CLAD MATERIALS

**Date of Completion**

**Manufacturer** | M/S JINDAL ARCHITECTURE LIMITED

**Material Supplier**

**Source of Information** | M/S JINDAL ARCHITECTURE LIMITED

**Remarks**





## PILLAR CLADDING



28

With an area of half a million square metres (5.4 million feet<sup>2</sup>), Delhi's new airport terminal is one of the largest in the world and is expected to handle 34 million passengers annually. The pillars of the terminal are clad in 5,000 m<sup>2</sup> of stainless steel - just one of many examples of the use of stainless steel inside the new building. Stainless steel was selected because it provides a classic finish while remaining hard-wearing and easy to maintain.



Location | DELHI, INDIA

Environment | INDOOR

Product

Fabrication process

Grade/surface | SS 304 WITH SATIN FINISH

Material thickness/diameter

Weight

Competing material

Date of Completion | AUGUST 2010

Manufacturer | M/S FABRINOX-ARCHITECTURE, A DIVISION OF DHARAM INDUSTRIES

Material Supplier

Source of Information | M/S FABRINOX-ARCHITECTURE, A DIVISION OF DHARAM INDUSTRIES

Remarks

## PLANTER BORDERS



29

Stainless steel borders provide an unusual yet attractive feature to separate pavements from planted areas in the historic city of Mechelen, Belgium. Not only do the borders save space, but they are also virtually maintenance free. Permanent contact with soil and concrete foundations, and occasional exposure to de-icing salts, were some of the factors taken into account when choosing the grade of steel to be used for the border.

**Location** | MECHELEN, BELGIUM

**Environment** | OUTDOOR

**Product** | HOT ROLLED STRIP

**Fabrication process** | MECHANICALLY JOINED USING CUSTOMISED CLIPS FOR ALIGNMENT

**Grade/surface** | 316, SHOT PEENED (DENTED)

**Material thickness/diameter** | 8 MM

**Weight** | 3.6 TONNES

**Competing material** | NATURAL STONE

**Date of Completion** | 2009

**Manufacturer**

**Material Supplier**

**Source of Information** | EURO INOX

**Remarks** | OWNER: CITY OF MECHELEN, BELGIUM  
DESIGNERS: SECCHI-VIGANÓ, MILAN, ITALY



Building and Construction  
**REBAR SUPPORT FOR GRC PANELS**

30



Glass-fibre-reinforced concrete (GRC) panels are light, strong and flexible, enabling them to be adapted to almost any architectural design. The GRC panels are usually attached to the building using treated metal fittings or epoxy-coated reinforced bar. For the Nippon Keidanren Building in Tokyo, ferritic stainless steel (SUS410-SD) was selected due to its high corrosion resistance, consistent quality and cost advantages.



Location | TOKYO, JAPAN

Environment | OUTDOOR

Product | STAINLESS STEEL REBAR

Fabrication process | CUTTING AND BENDING

Grade/surface | NSSD410-295 (SUS410-SD)/PICKLED

Material thickness/diameter | DIAMETER 10 MM

Weight | APPROXIMATELY 60 TONNES

Competing material | EPOXY COATED REBAR

Date of Completion | APRIL 2009

Manufacturer | ASAHI BUILDING WALL CO., LTD.

Material Supplier | NIPPON STEEL & SUMIKIN STAINLESS STEEL CORPORATION

Source of Information | JAPAN STAINLESS STEEL ASSOCIATION

Remarks

## Building and Construction

### SEA DEFENCE WALL



31

A three kilometre sea defence wall was constructed to protect the city of Blackpool in the north west of England. Stainless steel reinforcing bar was used instead of carbon steel reinforcing bar in critical areas. This allowed concrete coverage to be reduced in these places, but will still guarantee a long service life for the protective wall.

**Location** | BLACKPOOL, UNITED KINGDOM

**Environment** | OUTDOOR

**Product** | STAINLESS STEEL REINFORCING BAR

**Fabrication process** | CUTTING AND BENDING

**Grade/surface** | 1.4301/HOT ROLLED AND DESCALED

**Material thickness/diameter** | DIAMETER: 16 AND 20 MM

**Weight** | OVER 1,000 TONNES

**Competing material** | CARBON STEEL REINFORCING BAR

**Date of Completion** | 2011

**Manufacturer** | BIRSE CIVILS LTD

**Material Supplier** | ACCIAIERIE VALBRUNA

**Source of Information** | VALBRUNA UK LTD

Remarks



Building and Construction  
**SPILLWAY CONTROL SYSTEM**

32



The 33-year old Little Para Dam provides water for the city of Adelaide, Australia. The dam required an upgrade in order to increase its capacity, and to comply with modern dam safety standards. Engineers from Hydroplus Australia created a new design which met demands for carbon neutrality and a lifespan of 100 years with virtually no maintenance. The design utilises a 6 m high stainless steel composite wall section fixed to a 0.5 m thick pre-cast concrete base. The solution reduced construction time on site and overall cost when compared to a conventional dam constructed from reinforced concrete.



**Location** | ADELAIDE, AUSTRALIA

**Environment** | OUTDOOR

**Product** | DUPLEX STAINLESS STEEL: LDX 2101®

**Fabrication process** | LASER CUTTING, MIG WELDING

**Grade/surface** | COLD ROLLED COIL/2E FINISH, PICKLED, CUT EDGE

**Material thickness/diameter** | MAINLY 4 MM COIL

**Weight** | APPROXIMATELY 80 TONNES

**Competing material** | REINFORCED CONCRETE

**Date of Completion** | MARCH 2010

**Manufacturer** | LWA ENGINEERING /HYDROPLUS AUSTRALIA/SANDVIK MATERIALS TECHNOLOGY

**Material Supplier** | OUTOKUMPU

**Source of Information** | WD HAKIN (HYDROPLUS AUSTRALIA)

**Remarks**

## SPIRAL STAIRCASE



33

The construction of this staircase in the stylish new Moksha Plaza shopping mall in Mumbai utilised 4.5 tonnes of stainless steel grades SS304 and SS316. Several forms were utilised including spiders, trapezoids and tubes.

**Location** | MUMBAI, INDIA

**Environment** | INDOOR

**Product**

**Fabrication process**

**Grade/surface** | SS 304/316

**Material thickness/diameter** | 5 MM THICK/600 MM DIAMETER

**Weight** | 4.5 TONNES

**Competing material**

**Date of Completion** | SEPTEMBER 2008

**Manufacturer** | M/S TARINI ENGINEERING PVT LTD - MUMBAI

**Material Supplier**

**Source of Information** | M/S TARINI ENGINEERING PVT LTD - MUMBAI

**Remarks**



Building and Construction  
**SPORTS COMPLEX ROOF AND WALLS**



34

Grade STS 445 has been used in the construction of the roof and walls of the new KAIST Sport Complex building in Daejeon, Korea. The use of stainless steel gives the building a feeling of grandeur.



Location | DAEJUN, KOREA

Environment | OUTDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING (BENDING)

Grade/surface | STS445/BA SHEET (BEAD-BLASTING TREATMENT)

Material thickness/diameter | ROOF 0.3 MM, WALLS 1.2 MM

Weight | 70 TONNES

Competing material | CARBON STEEL, COATED STEEL

Date of Completion | FEBRUARY 2010

Manufacturer | KYERYONG CONSTRUCTION IND. CO. LTD

Material Supplier | POSCO

Source of Information | POSCO

Remarks | MATERIAL SELECTION WAS GUIDED BY POSCO



Building and Construction

## STADIUM FOR ASIAN GAMES



35

The 16<sup>th</sup> Asian Games took place during November 2010 in this magnificent stadium in Guangzhou, China. Designed by the Guangdong Provincial Architectural Design and Research Institute, the stadium was completed just a few months before the opening of the largest Asian Games ever. The roof of the stadium utilises Chinese-made high ferritic stainless steel, a first for this type of architectural roofing. As the colour of the dull-finished B445R stainless coils can be inconsistent between lots, it is important that all panels come from the same production lot or that panels from the same lots are grouped together. The B445R panels may also show a grain. For this reason the panels must be aligned in the same direction.

Location | CHINA

Environment | OUTDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING AND WELDING

Grade/surface | B445R/2B AND 2D – MECHANICALLY POLISHED AND BRUSHED FINISH

Material thickness/diameter | 0.5 TO 2.5 MM

Weight

Competing material | ALUMINIUM-MAGNESIUM ALLOY, CARBON STEEL

Date of Completion | 2009

Manufacturer

Material Supplier | STAINLESS STEEL BUSINESS UNIT, BAOSHAN IRON & STEEL CO., LTD.

Source of Information | STAINLESS STEEL BUSINESS UNIT, BAOSHAN IRON & STEEL CO., LTD.

Remarks





## Building and Construction

# WATER SUPPLY PIPES



36

Using a newly developed construction method, stainless steel water supply pipes are replacing the commonly used polyvinyl-chloride alternatives. The new method allows builders to tailor the length of vertical pipes to the height of the building. Smaller diameter pipes are used to offset the larger flow-coefficient of stainless steel pipes.

The use of stainless means that the water arrives clean and uncontaminated. The pipes are not easy to break which reduces both failures and maintenance costs significantly. Stainless pipes also offer excellent performance in earthquakes.



Location | JAPAN

Environment | INDOOR

Product | LIGHT GAUGE STAINLESS STEEL TUBES

Fabrication process | FORMING AND WELDING

Grade/surface | SUS304 TPD

Material thickness/diameter | 1.5 TO 3.0 TONNES/76.3 TO 216.3 MM

Weight | APPROXIMATELY 5 KG PER HOUSE

Competing material | POLYVINYL CHLORIDE

Date of Completion | APRIL 2010

Manufacturer | HASEKO CORPORATION

Material Supplier | NISSHIN STEEL

Source of Information | NISSHIN STEEL

Remarks

## Building and Construction

# WATER WALL



37

Standing at eight-metres high, this indoor water wall has been constructed from mirror-polished stainless steel mesh. Even with long-term contact with the water, stainless steel will remain free of corrosion and the wall will maintain its beautiful appearance. The stainless will not leach any harmful substances into the water or the environment.

Location | SALEM, GERMANY

Environment | OUTDOOR

Product | RING MESH

Fabrication process | FORMING AND WELDING

Grade/surface | 316 L/MIRROR POLISHED

Material thickness/diameter | 1.1 MM, RING DIAMETER 12.0 MM

Weight | 3.2 KG/M<sup>2</sup>

Competing material | ALUMINIUM, BRONZE

Date of Completion | 2010

Manufacturer | METALLATELIER FUCHS

Material Supplier | PROMESH GMBH

Source of Information | PROMESH GMBH

Remarks | THE STAINLESS STEEL MESH COVERS A TOTAL OF 30 M<sup>2</sup>.



02

## **ELECTRIC MACHINERY AND EQUIPMENT**

- Heat Recovery Exchanger
- Nuclear Pool Lining
- Wall Flues

## HEAT RECOVERY EXCHANGER



40

Welded or seamless stainless steel tubes are used for this heat recovery exchange system in a hot rolling steel mill. Seamless tubes are used for recovery systems that are fed by hot air (above 450°C). If the system is fed by cold air (up to 450°C) welded stainless tubes suit the requirements of the plant's maintenance department.



**Location** | FOS-SUR-MER, FRANCE

**Environment** | INDOOR

**Product** | STAINLESS STEEL TUBES

**Fabrication process** | WELDING

**Grade/surface** | AISI 304L

**Material thickness/diameter** | 3 MM THICK, 60.3 MM IN DIAMETER

**Weight** | 21 TONNES FOR HOT ROLLING MILL

**Competing material**

**Date of Completion** | 2010

**Manufacturer** | AZUR INDUSTRIES

**Material Supplier** | APERAM STAINLESS SERVICES & SOLUTIONS TUBES EUROPE

**Source of Information** | APERAM STAINLESS STEEL EUROPE

**Remarks**

## NUCLEAR POOL LINING



41

According to the French RCC-M Level II code for nuclear plants, stainless steel sheets (up to 2 m wide) are required for the lining of nuclear waste-water pools. Grade 304L is utilised as it meets special requirements for chemical analysis in this application.

Location | CHINA

Environment | INDOOR

Product

Fabrication process | WELDING

Grade/surface | AISI 304L

Material thickness/diameter | 2 TO 12 MM/HR 2B

Weight | 470 TONNES FOR HONGYANNE AND NINGDE NUCLEAR POWER PLANTS.

Competing material

Date of Completion | 2010

Manufacturer | ACP

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS STEEL EUROPE

Remarks



## WALL FLUES

42



External chimney flues have traditionally been made with stainless steel grades such as AISI 304 or 316. However, ferritic stainless grades such as AISI 441 or 444 offer significant advantages. These include price stability over the longer term due to the low-levels of expensive alloys found in non-ferritic grades.

The ferritic grades also exhibit good mechanical properties including lower thermal expansion, higher thermal conductivity, corrosion resistance (depending on fuel burnt), and fire resistance to around 1,500°C.



Location | EUROPE

Environment | OUTDOOR

Product

Fabrication process | BENDING AND FORMING

Grade/surface | AISI 441 – OUTER TUBE, AISI 444 – INSIDE TUBE.

Material thickness/diameter | 0.50 TO 1.00 MM

Weight

Competing material | AISI 304 OR AISI 316

Date of Completion | 2010

Manufacturer | MK

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS SERVICES & SOLUTIONS CENTRAL & EASTERN EUROPE

Remarks





03

## **AUTOMOTIVE**

- A pillar for Car Door
- Exhaust Systems
- Fuel Union Component
- Motorcycle Frame

Automotive  
**A-PILLAR FOR CAR DOOR**



46

Stainless steel grade AISI 301 can be used for the A-pillar of the body in white (BIW) of production vehicles. The use of AISI 301 will lighten the A-pillar by 1.8 kg (24%) compared to DP 600 carbon steel which has been used in this application until now. AISI 301's high level of formability enables parts integration and shape optimisation for vehicle manufacturers.



Location | EUROPE

Environment | OUTDOOR

Product

Fabrication process | STAMPING AND WELDING

Grade/surface | AISI 301

Material thickness/diameter | 1.1 MM

Weight

Competing material | DP 600 CARBON STEEL (1.4 MM)

Date of Completion | 2010

Manufacturer

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS STEEL EUROPE

Remarks | A NEW CONCEPT DEVELOPED AS PART OF ACELORMITTAL'S S-IN MOTION PROJECT FOR CAR MARKERS WHO WISH TO CREATE LIGHTER, SAFER, AND MORE ENVIRONMENTALLY VEHICLES FOR THE 21TH CENTURY.

Automotive

## EXHAUST SYSTEMS



47

The development of AISI 444 provides vehicle exhaust manufacturers with an alternative for hot applications. These include the hot parts of vehicle exhaust systems such as manifolds, tubes, particulate filters, catalytic converters and turbochargers shells. Existing grades (such as 1.4509, 1.4828 and 1.4835) have lower temperature limits.

Location | EUROPE

Environment | OUTDOOR

Product

Fabrication process | STAMPING

Grade/surface | AISI 444

Material thickness/diameter

Weight

Competing material

Date of Completion | 2010

Manufacturer | BENTELER

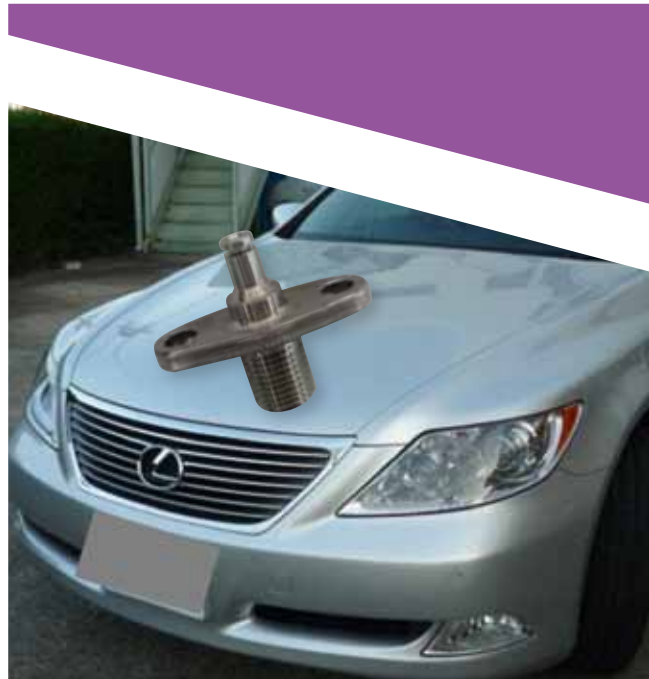
Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS STEEL EUROPE

Remarks



Automotive  
**FUEL UNION COMPONENT**



48

This fuel-union component was designed to be made of two welded pieces (free-cutting stainless steel and carbon steel). Low productivity (due to constraints in the welding process) and cost disadvantages meant the product was uneconomical to make.

A new technique was needed to make this complex-shaped component. The component is now made by intensively cold-forging large-diameter stainless steel wires in an integrated mould.



Location | JAPAN

Environment | OUTDOOR

Product | STAINLESS STEEL WIRE

Fabrication process | COLD FORGING

Grade/surface | NSSC 160R (EQUIVALENT TO SUS430J1L)/PICKLED

Material thickness/diameter | DIAMETER 18 MM

Weight | APPROXIMATELY 0.1 KG PER UNIT

Competing material | FREE-CUTTING STAINLESS STEEL AND CARBON STEEL

Date of Completion | JULY 2006

Manufacturer | SUMIKIN PRECISION PRODUCTS CO., LTD.

Material Supplier | NIPPON STEEL & SUMIKIN STAINLESS STEEL CORPORATION

Source of Information | JAPAN STAINLESS STEEL ASSOCIATION (JSSA)

Remarks

Automotive

## MOTORCYCLE FRAME



49

The main frame of the Highland 450cc Supermoto is made from austenitic HyTens1200® (1.4310 C1200) while the engine cradle and rear sub-frame are made from duplex LDX 2101® (1.4162) box sections.

Both of these high-strength stainless steels have excellent formability in the cold condition. This means there are few limitations to component shapes, allowing considerable weight savings in the structure.

LDX 2101® tubing features a combination of high-strength and formability, unmatched by competing tubular products. They also require no surface treatment. The chassis weight is 20% lower than that of the best rival motorcycles.

Location | FINLAND

Environment | OUTDOOR

Product

Fabrication process | FORMING, BENDING AND WELDING

Grade/surface | 1.4310 C1200, 1.4162

Material thickness/diameter

Weight

Competing material | ALUMINIUM, CARBON STEEL

Date of Completion | 2006

Manufacturer | HIGHLAND GROUP AB

Material Supplier | OUTOKUMPU

Source of Information | OUTOKUMPU

Remarks



04

## **TRANSPORT**

- Helicopter Docking System
- Metro Coach Interior
- Rail Carriage Structural Parts
- Subway Carriages



## HELICOPTER DOCKING SYSTEM



52

The Aircraft Ship Integrated Secure and System Traverse (ASIST-TRACK) is an intelligent docking system which enables military helicopters to land on the deck of a moving ship. ASIST-TRACK enables both take-off and landing operations to take place without any human intervention. Helicopters are transferred from the deck to the hangar using a mono or double-rail that is welded inside a light modular track and integrated into the deck. Stainless grades XM-25 and 630 were chosen for this application due to their ability to resist corrosion in a marine environment, and their mechanical strength. Both types are able to counteract the considerable strains they are subjected to during aircraft movements.



**Location** | ITALY

**Environment** | OUTDOOR

**Product** | PRE-CUT BARS

**Fabrication process** | HOT EXTRACTION AND WELDING

**Grade/surface** | TYPE XM-25 OR 630

**Material thickness/diameter**

**Weight**

**Competing material** | ULTRA HIGH-STRENGTH STEEL

**Date of Completion**

**Manufacturer** | INDAL TECHNOLOGIES (ASIST-TRACK DESIGN AND PRODUCTION)

**Material Supplier** | SIDERVAL (HOT-EXTRUDED SECTIONS)

**Source of Information** | CENTRO INOX

**Remarks** | ASIST-TRACK IS INSTALLED ON THE HORIZON AND ANREA DORIA CLASS SHIPS IN THE ITALIAN NAVY.

Transport

## METRO COACH INTERIOR



53

Developed for the New Delhi metro, this railcar features a high-quality, and comfortable, stainless steel interior. The manufacturer specified stainless steel for its fire resistance, light weight and good resistance to corrosion. Another consideration was that the surface of the stainless steel does not require any coatings, further reducing maintenance and running costs.

**Location** | NEW DELHI, INDIA

**Environment** | OUTDOOR

**Product**

**Fabrication process**

**Grade/surface** | SS304

**Material thickness/diameter**

**Weight**

**Competing material**

**Date of Completion**

**Manufacturer** | M/S FABRICA - SUNRISE ARCHITECTURAL DIVISION

**Material Supplier**

**Source of Information** | M/S FABRICA - SUNRISE ARCHITECTURAL DIVISION

**Remarks**



## RAIL CARRIAGE STRUCTURAL PARTS



54

Stainless steel is selected for the complex structural parts of railway carriages because of its roll-forming capability, high mechanical properties, fatigue resistance and corrosion properties. Use of roll-forming to create the carriage shells means that additional functionality can be integrated and welding avoided.



Location | FRANCE

Environment | OUTDOOR

Product

Fabrication process | ROLL FORMING

Grade/surface | AISI 304L

Material thickness/diameter

Weight

Competing material | CARBON STEEL

Date of Completion | 2010

Manufacturer | ALSTOM, SADEF (PROFILER)

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS STEEL EUROPE

Remarks

Transport

## SUBWAY CARRIAGES



55

Stainless steel is utilised for these Brazilian subway carriages because of its mechanical and corrosion-resistance properties.

Location | BRAZIL

Environment | OUTDOOR

Product

Fabrication process | FORMING AND WELDING

Grade/surface | AISI 301LN

Material thickness/diameter | 0.8 TO 5.08 MM

Weight | 10 TONNES PER CARRIAGE

Competing material | PAINTED CARBON STEEL

Date of Completion | 2010

Manufacturer | CAF, BOMBARDIER, ALSTOM

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks



05

## **INDUSTRIAL MACHINERY**

- Tank Diaphragm
- Sugar Industry Machinery
- Textile Dyer

**TANK DIAPHRAGM**

58

Stainless steel membrane covers can provide protection for tanks of any type including stainless steel, carbon steel or reinforced concrete. The free-span light membrane is suitable for tank diameters of up to 50 metres. Although unsupported, the cover withstands heavy snow and wind loads. Besides being corrosion-resistant, the cover is also impermeable to gas and unaffected by UV radiation. It is also ideally suited for volatile and explosive materials. Prefabrication dispenses with on-site welding.



Location | GERMANY

Environment | OUTDOOR

Product | COLD ROLLED STAINLESS STEEL COIL

Fabrication process | WELDING

Grade/surface | GRADE 304

Material thickness/diameter | 0.8 MM THICK/22 M DIAMETER

Weight | 2,600 KG

Competing material | PLASTIC, FOIL

Date of Completion | 2009

Manufacturer | LIPP GMBH

Material Supplier

Source of Information | EURO INOX

Remarks

## SUGAR INDUSTRY MACHINERY



59

Many industrial processes in the sugar industry are affected by the abrasive and corrosive properties of sugar cane. Wear is a serious problem and productivity is often affected by interruptions and maintenance.

Stainless steel grade AISI 410 has replaced carbon steel in this sugar refinery in Brazil. Costs have been reduced and product quality enhanced.

The benefit of stainless steel can also be graphically. Initially carbon steel was used for the roller shown above. After two years of use, the steel had reduced from a thickness of 9.5 mm to 5.5 mm (42.1% reduction). By comparison, the 410D stainless roller had an initial thickness of 6.32 mm. After two years of use, this had reduced to 5.98 mm (5.4%).

Location | BRAZIL

Environment | OUTDOOR

Product

Fabrication process | WELDING

Grade/surface | AISI 410D

Material thickness/diameter

Weight

Competing material | CARBON STEEL

Date of Completion | 2010

Manufacturer

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks





## TEXTILE DYER



60

Stainless steel is utilised for this textile dyer, widely used in Bangladesh, Byelorussia, China, India, Pakistan and Russia.



Location | EUROPE

Environment | INDOOR

Product

Fabrication process | WELDING (TO REGULATION AD-2000W2 FOR PRESSURE VESSELS)

Grade/surface | UNS 32304/TYPE 2304

Material thickness/diameter

Weight

Competing material | 316L AND 316TI

Date of Completion | 2010

Manufacturer | THIES

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS STEEL EUROPE

Remarks



06

## **COOKWARE**

- Bain-marie
- Rice Washer

## BAIN-MARIE

64



Bains-marie are often utilised to prepare herbal medicines in Korea. This example is made with stainless grade SUS304. The aesthetic appeal and ease of cleaning make stainless the optimum choice for this kind of pot.



Location | KOREA

Environment | INDOOR

Product | SUS304/2B

Fabrication process

Grade/surface

Material thickness/diameter

Weight

Competing material | CARBON STEEL, CLAY

Date of Completion | 2007

Manufacturer | COEX EXHIBITION

Material Supplier | POSCO

Source of Information | POSCO

Remarks | MATERIAL SELECTION CAN BE MODIFIED DEPENDING ON THE CUSTOMER'S PREFERENCE OR PURPOSE.

Cookware

## RICE WASHER



Rice is a staple food in Korea and rice washers are an important tool in many commercial kitchens. SUS304 was utilised to make this example. Stainless is hard wearing and easy to clean, providing good hygiene in food preparation areas.

Location | KOREA

Environment | INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | COLD ROLLING

Grade/surface | SUS304/BA

Material thickness/diameter

Weight

Competing material | CARBON STEEL, PLASTIC

Date of Completion | 2007

Manufacturer | COEX EXHIBITION

Material Supplier | POSCO

Source of Information | POSCO

Remarks | MATERIAL SELECTION CAN BE MODIFIED DEPENDING ON THE CUSTOMER'S PREFERENCE OR PURPOSE.



07

## HOME AND OFFICE

- Boiler Tube
- Herbal Medication Pot
- Indoor and Outdoor Furniture
- Showcase
- Vacuum Flask
- Home Interior
- Electric Vehicle Charging Station



Home and Office  
**BOILER TUBE**



68

The use of stainless grade SUS304 with copper (Cu) and tungsten (W) inhibits pitting in these boiler tubes. Pitting causes localised small holes in the metal which weakens the structure.



Location | KOREA

Environment | INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING AND WELDING

Grade/surface | SUS304CUW/2B

Material thickness/diameter | 0.6 MM

Weight

Competing material | CARBON STEEL, STAINLESS GRADES 304 AND 316

Date of Completion | 2009

Manufacturer | KITURAMI BOILER CO., LTD.

Material Supplier | POSCO

Source of Information | POSCO

Remarks | MATERIAL SELECTION CAN BE MODIFIED DEPENDING ON THE CUSTOMER'S PREFERENCE OR PURPOSE.

Home and Office

## HERBAL MEDICATION POT



69

This electric Chinese herbal medication pot is very easy to use. Simply add the herbs and water and switch it on.

The pot will not boil dry.

The pot was designed in stainless steel so that it would be easy to clean, unbreakable, corrosion-resistant and easy to make.

Location | TAIWAN, CHINA

Environment | INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | PUMPING AND WELDING

Grade/surface | 304/BA

Material thickness/diameter | 0.3 TO 0.4 MM

Weight

Competing material | CERAMICS

Date of Completion | 2008

Manufacturer | JINNSIN CO., LTD.

Material Supplier | SHIN AN YU STEEL CO., LTD.

Source of Information | JINNSIN CO., LTD.

Remarks



**INDOOR AND OUTDOOR FURNITURE**

70

The Giorno Notte (Day Night) range of furniture was designed by a company which has operated for more than thirty years in the nautical industry. The goal of the designers was to create a collection of furniture that was perfectly suited to both elegant interiors and sophisticated outdoor living. The company selected stainless steel, a material that they utilise often in their nautical work. The use of stainless ensures that the furniture will remain durable and aesthetically pleasing for many years.

The Giorno Notte line of furniture now includes a deckchair, sun-bed, multi-functional chair, porch-swing, lamp, fire tray and a number of traditional chairs and tables.



**Location** | EUROPE

**Environment** | INDOOR AND OUTDOOR

**Product** | ROUND WELDED TUBES

**Fabrication process** | BENDING AND WELDING

**Grade/surface** | TYPE 316TI/POLISHED

**Material thickness/diameter** | 2 MM THICK/20 MM DIAMETER

**Weight**

**Competing material** | CAROB STEEL AND PLASTICS

**Date of Completion** | NAUTINOX LIVING

**Manufacturer**

**Material Supplier**

**Source of Information** | CENTRO INOX

**Remarks** | DESIGNERS: MARIAELENA MALLONE, ROBERTO MALLONE AND LUCA PEGOLO.

Home and Office

## SHOWCASE



71

This showcase is designed to be both sturdy and flexible. Stainless steel was chosen because it provided the showcase with both strength and a very high-class finish.

Location | GERMANY

Environment | INDOOR

Product | COLD ROLLED STAINLESS STEEL

Fabrication process | FORMING AND WELDING

Grade/surface | AISI304/GROUND AND ELECTRO-POLISHED

Material thickness/diameter | 1.5 MM THICK

Weight

Competing material | ALUMINIUM AND CARBON STEEL

Date of Completion | 2009

Manufacturer | W. MODERSOHN GMBH

Material Supplier

Source of Information | W. MODERSOHN GMBH

Remarks



Home and Office  
**VACUUM FLASK**



72

This vacuum flask is used to keep beverages at a constant temperature. An electronic thermometer enables the user to set and monitor the temperature of the liquid inside the flask. Stainless steel grade SUS304 is utilised for the inside, while the exterior is made from bright annealed SUS430 grade. Both grades are easy to clean, ensuring a hygienic interior and easy-to-clean exterior.



Location | TAIWAN, CHINA

Environment | INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | WELDING AND ROLLING

Grade/surface | 304/2B AND 430/BA

Material thickness/diameter | 0.1 TO 0.2 MM

Weight

Competing material | PLASTICS

Date of Completion | 2008

Manufacturer | JINNHSIN CO., LTD.

Material Supplier | SHIN AN YU STEEL CO., LTD./TANG CHIANG CO., LTD.

Source of Information | JINNHSIN CO., LTD.

Remarks

Home and Office

## HOME INTERIOR



73

For this home interior, architect Fernanda Marques opted to utilise durable materials such as stainless steel. The bookcases, wine cellar, lighting, and cabinet cladding were all created using stainless. The futuristic design was only made possible due to the versatility of the materials the architect employed.

Location | BRAZIL

Environment | INDOOR

Product

Fabrication process | FORMING AND WELDING

Grade/surface | SUS304

Material thickness/diameter | 1.5 MM

Weight | 3 TONNES

Competing material | ALUMINIUM, PAINTED CARBON STEEL, WOOD

Date of Completion | 2010

Manufacturer | MEKAL INDUSTRY

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks | THIS INTERIOR WAS RECOGNISED AS THE MOST SUSTAINABLE PROJECT IN THE 2010 CASACOR® (BRAZIL'S LEADING INTERIORS SHOW). PHOTO BY DEMAÏN GOLOVATY



## ELECTRIC VEHICLE CHARGING STATION



74

This electric-vehicle charging station was designed to be:

- 1 Easy to use
- 2 Vandal-resistant
- 3 Visually attractive.

Stainless steel was chosen because it was able to meet all three criteria. The cabinet accommodates a modular electronic system and can be adapted according to the location. Mobile phone technology is incorporated into the cabinet for authorisation and billing.



Location | GERMANY

Environment | OUTDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | LASER CUTTING, FORMING AND WELDING

Grade/surface | AISI304

Material thickness/diameter | 1.5 MM

Weight | 10 KG (CABINET ONLY WITHOUT ELECTRIC COMPONENTS)

Competing material | ALUMINIUM

Date of Completion

Manufacturer | ERO EDELSTAHL-ROHRTECHNIK GMBH

Material Supplier

Source of Information | ERO EDELSTAHL-ROHRTECHNIK GMBH

Remarks





08

## ART

- Caressing the Wind
- Pavilion
- Sky is the Limit
- Torres Bicentenario
- Unsquare
- Sculptures by Nathalie Decoster

## CARESSING THE WIND



78

Caressing the Wind is one-piece sculptural form that aims to show the potential of stainless to create beauty through its appearance and ease of formability. The piece is a whimsical shape, like silk caressed by the wind. Caressing the Wind was designed and manufactured by architect Enrique Espinosa Fernández. It comes in two forms. The gold-finish is designed to be applied to the outdoor version, while a P3 finish is utilised for the indoor.



**Location** | MEXICO

**Environment** | INDOOR OR OUTDOOR

**Product** | COLD ROLLED STAINLESS STEEL SHEET

**Fabrication process** | PRESSBRAKE FORMATION

**Grade/surface** | 304 FOR OUTDOOR (GOLDEN FINISH) AND 430 FOR INDOOR (P3 FINISHED)

**Material thickness/diameter** | GOLDEN: 3.05 MM AND, P3: 1.9 MM

**Weight** | GOLDEN: 55 KG AND, P3: 3.7 KG

**Competing material**

**Date of Completion** | 2010

**Manufacturer** | OBRAS, ARTE INVENOS, SUEÑOS

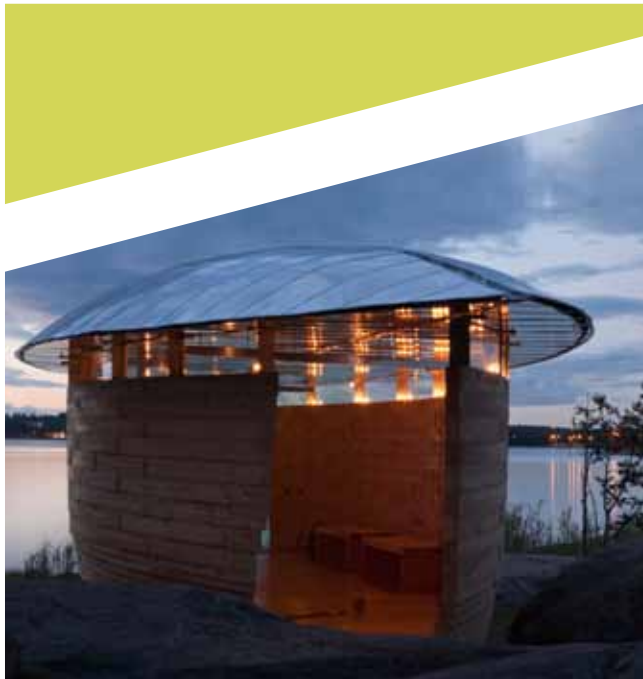
**Material Supplier** | INOXIDABLES Y PROCESOS (GOLDEN), INOXIDABLES DE SAN LUIS (P3)

**Source of Information** | IMINOX

**Remarks** | THIS PIECE CAN BE FORMED IN DIFFERENT DIMENSIONS. DIFFERENT FINISHES CAN ALSO BE APPLIED INCLUDING COLOURED AND MIRROR.

Art

## PAVILION



79

A small pavilion that will function as a meeting place has been built on the edge of the sea using stainless steel, wood and glass.

Stainless steel forms the roof and ceiling of the building while the the polished surface of the steel reflects the adjacent sea.

Location | HELSINKI, FINLAND

Environment | OUTDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | HANDCRAFTED

Grade/surface | 316 BA

Material thickness/diameter | 0.35 MM

Weight | 300 KG

Competing material

Date of Completion | 2010

Manufacturer | TURUN PLÄKKIPELTI OY

Material Supplier | OUTOKUMPU

Source of Information | OUTOKUMPU

Remarks



## SKY IS THE LIMIT



80

Sky is the Limit is the name of a sculpture by Balan Nambiar. The sculpture was built in the grounds of the Indian Oil Corporation's new headquarters.



**Location** | DELHI, INDIA

**Environment** | OUTDOOR

**Product**

**Fabrication process**

**Grade/surface** | 304

**Material thickness/diameter**

**Weight** | 3 TONNES

**Competing material**

**Date of Completion**

**Manufacturer** | M/S SSU FABRICATORS/MAGOD LASER MACHINING PVT LTD

**Material Supplier**

**Source of Information** | BALAN NAMBIAR, SCULPTOR

**Remarks**

Art

## TORRES BICENTENARIO



Torres Bicentenario is a monumental sculpture designed by Guillermo Maya López and built to commemorate the 200<sup>th</sup> anniversary of Mexican Independence.

Torres Bicentenario was covered with 9,000 stainless panels. The sculpture is 65 meters high and tapers from a diameter of 20 meters at the base to seven meters at the top.

Location | MEXICO

Environment | OUTDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | CUTTING AND JOINING WITH 3M™ VHB™ TAPE

Grade/surface

Material thickness/diameter

Weight

Competing material | CONCRETE

Date of Completion | 2010

Manufacturer

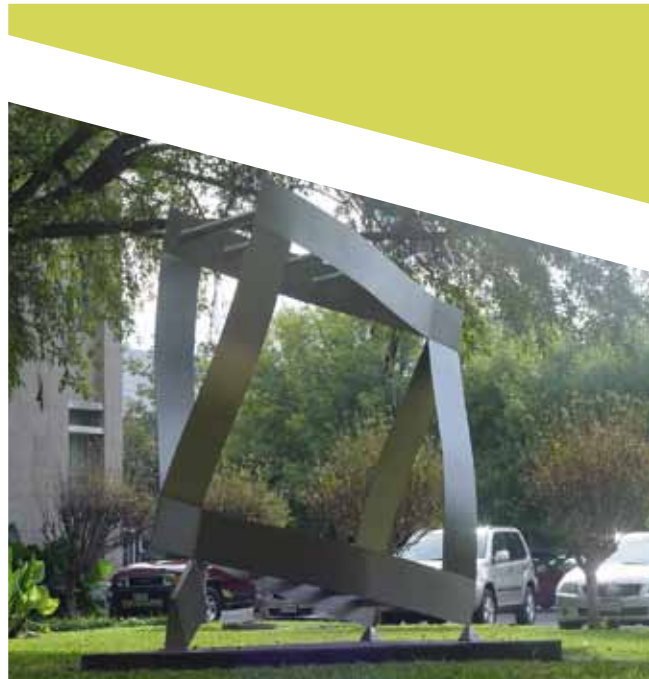
Material Supplier

Source of Information | IMINOX

Remarks | TORRES BICENTENARIO IS THE CENTRAL ELEMENT OF A COMPLEX BUILT TO COMMEMORATE THE BICENTENARY OF MEXICO. THE COMPLEX INCLUDES A WALL SHOWING A SERIES OF CHRONOLOGICAL IMAGES FROM THE 200 YEARS SINCE INDEPENDENCE, AN AUDITORIUM, MUSEUM, CIVIC PLAZA, DANCING FOUNTAINS, COFFEE SHOP, GARDENS AND PARKING

Photo | © RICARDO ESPONOSA





This sculpture was designed by Okairy Ortiz and Ingrid Villarreal to commemorate the 10<sup>th</sup> anniversary of Industrial Design Centre in the Tecnológico de Monterrey. Unsquare comes from the idea that industrial designers don't design for themselves, they design for others. The sculpture therefore represents different shapes, depending of the perspective of the viewer.



**Location** | MONTERREY, MEXICO

**Environment** | OUTDOOR

**Product** | STAINLESS PLATE AND TUBE

**Fabrication process** | CUTTING, AND JOINING WITH TIG WELDING

**Grade/surface** | 304 P3

**Material thickness/diameter** | PLATE - 4.7 MM THICK. TUBE - 57 MM DIAMETER AND 0.25 MM THICK.

**Weight** | 115 KG

**Competing material** | GALVANIZED STEEL

**Date of Completion** | 2010

**Manufacturer** | MANUFACTURAS LOZANO

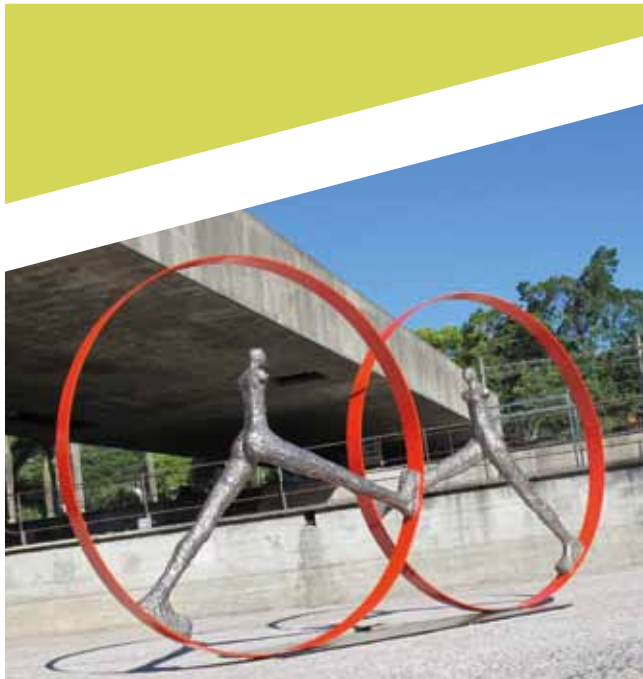
**Material Supplier** | ATRESA

**Source of Information** | IMINOX

**Remarks**

Art

## SCULPTURES BY NATHALIE DECOSTER



83

Nathalie Decoster uses recycled materials to create her sculptures, populated with figures that tell universal philosophical or humorous tales. They show the smallness of humanity compared to the universe, yet how important the universe is for life. Nathalie Decoster normally uses brass in her sculptures. These are some of the first examples of her work to utilise scrap stainless steel as a raw material.

Location | FRANCE AND BRAZIL

Environment | OUTDOOR

Product

Fabrication process | CASTING

Grade/surface | 304

Material thickness/diameter | SCRAP

Weight | 8 TONNES

Competing material | BRASS

Date of Completion | 2010

Manufacturer

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks





09

## **WATER**

- Drinking Water Fountain
- Fish Harvest System
- High Pressure Desalination Plant Pipes
- Hydroplus Fusegate System
- Municipal Water Storage Tanks
- Reverse Osmosis Desalination Plant
- Sewerage Treatment Plants

## DRINKING WATER FOUNTAIN



86

Tap water can be as good as bottled water, in terms of both hygiene and mineral content. To raise awareness of these facts, the Vienna Waterworks took advantage of the 2008 European Football Championship to install ten stainless steel drinking water dispensers in the historic centre. The dispensers were constructed from AISI 304 grade stainless with a polished finished. As well as looking beautiful, the dispensers were easy to clean and hygienic. The beautiful mirror finish reflected the city surrounding the fountain, helping it to blend in.



**Location** | VIENNA, AUSTRIA

**Environment** | OUTDOOR

**Product** | PIPE AND SHEET

**Fabrication process** | WELDING

**Grade/surface** | AISI 304/POLISHED

**Material thickness/diameter** | BASE PLATE: 20 MM. BODY: 4 MM SHEET  
WELDED INTO A 1 M DIAMETER PIPE

**Weight** | 280 KG

**Competing material** | PAINTED CARBON STEEL

**Date of Completion** | 2008

**Manufacturer** | HANS KUNZ GESMBH

**Material Supplier**

**Source of Information** | EURO INOX

**Remarks** | PHOTO: WIENER WASSERWERKE/C HOUDEK ®

Water

## FISH HARVESTING SYSTEM



87

As wild fish stocks decline globally, fish farming is becoming increasingly important. Stainless steel components are an integral part of a new fish harvesting system that has been developed to humanely harvest and kill the fish using automated percussive stun methods. Grade 316 stainless was chosen for the components primarily due to its corrosion resistance and strength. Other requirements included: no bacterial traps; robustness to withstand the harsh environment and repetitive shock loading; light enough to enable easy handling of the modules for cleaning; easy to dismantle and clean.

**Location** | MARINE

**Environment** | OUTDOOR

**Product** | STAINLESS STEEL PLATE USED FOR BASE, RAMP AND TRIGGER PLATE.

**Fabrication process** | LASER CUT, MANUALLY WELDED, POLISHED AND GLASS-BEAD BLASTED.

**Grade/surface** | 316

**Material thickness/diameter** | MOSTLY 3 MM

**Weight** | 15 KG PER UNIT

**Competing material** | NONE SUITABLE

**Date of Completion** | FIRST INTRODUCED 1998 BUT DESIGN HAS EVOLVED SINCE.

**Manufacturer** | PRYDE FABRICATION (ASSDA ACCREDITED). MANUFACTURED FOR SEAFOOD INNOVATIONS.

**Material Supplier** | VARIOUS

**Source of Information** | AUSTRALIAN STAINLESS (PUBLISHED BY ASSDA).

Remarks

## HIGH PRESSURE DESALINATION PLANT PIPES



88

In brackish-water desalination plants (BWDP) the use of AISI-316L SS in the feed side and AISI-904L in the brine side of the reverse osmosis train is required to avoid corrosion and to provide mechanical resistance to the fluid operating pressures.



Location | MALAGA, SPAIN

Environment | OUTDOOR

Product | PIPES AND FLANGES

Fabrication process | WELDING

Grade/surface | AISI-316L / 904L

Material thickness/diameter | DN350 TO DN25

Weight

Competing material | PLASTIC OR COATED CARBON STEEL PIPES

Date of Completion | 2003

Manufacturer | BEFESA AGUA, DEGREMONT

Material Supplier | CUÑADO/SIDSA

Source of Information | BEFESA AGUA, DEGREMONT

Remarks | THE IMAGE SHOWS THE EL ATABAL BWDP WHICH SUPPLIES WATER FOR ONE MILLION PEOPLE.

Water

## HYDROPLUS FUSEGATE SYSTEM



89

The upgrade of the Little Para Dam in South Australia utilised stainless steel as part of its unique design.

The upgrade incorporates a Hydroplus Fusegate System which feature a concrete design with stainless steel inlet wells and seal fixings to provide a 100 year life and virtually no maintenance. Intelligent design reduced materials required by 40%. Off-site fabrication reduced the amount of time spent on-site from 8 months to 6 weeks.

Grade LDX2101 was specified for the superstructure of the units as it has similar corrosion-resistance to 316, yet higher tensile strength and lower price.

**Location** | AUSTRALIA

**Environment** | OUTDOOR

**Product** | STAINLESS STEEL PLATES, RIBBING AND RODS

**Fabrication process** | COIL CUT TO LENGTH AND PLATES LASER-CUT TO WITHIN 0.2 MM ACCURACY. SPOT WELDING OF RIBS BEFORE PRE-SETTING AND STITCH WELDING. PLATE CAST INTO CONCRETE DURING PRE-CASTING AND CONTINUOUSLY WELDED ALONG SPLICE POINTS, THEN BOLTED INTO PLACE ON SITE.

**Grade/surface** | LDX 2101

**Material thickness/diameter** | PLATES 4 MM; RIBS: 4 TO 40 MM; ROD: 12 MM.

**Weight** | AROUND 70 TONNES

**Competing material** | 316

**Date of Completion** | 2010

**Manufacturer** | LWA ENGINEERING (ASSDA ACCREDITED)

**Material Supplier** | SANDVIK

**Source of Information** | AUSTRALIAN STAINLESS (PUBLISHED BY ASSDA)

**Remarks** | THE USE OF STAINLESS STEEL HELPED TO MAKE THE LITTLE PARA DAM UPGRADE ONE OF THE WORLD'S FIRST ZERO CARBON-FOOTPRINT WATER PROJECTS.



## MUNICIPAL WATER STORAGE TANKS



90

Two large tanks (6 m high, 31 m diameter) were installed to store drinking water for the town of L'Aquila in Italy. Thanks to the Aquawall technology adopted for this project, the tanks could be completed and installed in only 18 days. Three days were required to erect the prefabricated walls, while the remaining 15 days were devoted to the vertical welding of the walls and the installation and welding of the tank bottoms.

Aquawall is a double-wall panel that is lined with stainless steel. This patented technology allows the welding to be protected on both the visible and non-visible sides and guarantees the perfect adherence of stainless steel to concrete.



**Location** | L'AQUILA, ITALY

**Environment** | UNDERGROUND

**Product** | COLD ROLLED SHEETS, PREFABRICATED WALLS LINED WITH STAINLESS STEEL.

**Fabrication process** | BENDING, WELDING

**Grade/surface** | AISI 304

**Material thickness/diameter** | PANELS: 1,960 X 6,000 MM/1.5 MM; THICK. PILLARS: 500 MM DIAMETER.

**Weight** | 40,000 KG

**Competing material**

**Date of Completion**

**Manufacturer** | CONTRACTORS: I PLATANI SRL - GRUPPO PALMERINI.

**Material Supplier**

**Source of Information** | CENTRO INOX

**Remarks** | AQUAWALL PANEL AND BOTTOM INSTALLATION: DELLA CAGNOLETTA SRL. AQUAWALL PATENT: ANTONIOLI COSTRUZIONI

Water

## REVERSE OSMOSIS DESALINATION PLANT



91

The municipality of Reggio Calabria in Italy has a system of aqueducts that draw water from the groundwater table through wells. Many of the wells are situated near the coast and are characterised by high salt concentrations. The city of Reggio receives water from the well field of Calopinace. A reverse osmosis desalination plant has been built at Calopinace to purify the water. The plant can treat 180 litres of salty water each second. The water has an average chloride concentration of 5,000 mg/l. Stainless steel was used to create the round welded tubes, fasteners, flanges, pumps, bars, pipe fittings and union elbows used in the desalination plant. Various grades were used, depending on the level of corrosion-resistance required for each part.

**Location** | REGGIO CALABRIA, ITALY

**Environment** | OUTDOOR

**Product**

**Fabrication process** | WELDING, MECHANICAL JOINING, CASTING (PUMPS)

**Grade/surface** | 904L, EN 1.4593, EN 1.4462, EN 1.4517, AISI 316TI, EN 1.4408.

**Material thickness/diameter**

**Weight**

**Competing material** | PAINTED CARBON STEEL

**Date of Completion**

**Manufacturer** | ACCIONA AGUA S.A.

**Material Supplier**

**Source of Information** | CENTRO INOX

**Remarks**





## SEWERAGE TREATMENT PLANTS



92

In warm climatic regions like Spain, there can be long periods of drought followed by sudden violent thunderstorms and heavy rainfall. To ensure that the sewerage treatment system can cope, huge buffer basins are built to reduce the risk of flooding. When it does start raining, sand, dirt and pollutants, which may have accumulated over several months, are washed into the sewerage system. The system is designed to allow sedimentation of the solids, which can then be collected and disposed of safely with the stainless steel collection buckets. Stainless steel is utilised to prevent corrosion from pollutants such as hydrogen sulphide.



**Location** | SPAIN

**Environment** | OUTDOOR

**Product** | COLD ROLLED STAINLESS STEEL

**Fabrication process** | CUTTING, BENDING, WELDING

**Grade/surface** | GRADE 304 OR 316, DEPENDING ON PROXIMITY TO THE SEA. GLASS BEAD BLASTING IS USED FOR SURFACE FINISHING.

**Material thickness/diameter** | VARIOUS

**Weight** | FROM 100 TO 2,000 KG DEPENDING ON COMPONENT

**Competing material** | GALVANIZED CARBON STEEL

**Date of Completion** | 2008-2009

**Manufacturer** | HIDROSTANK

**Material Supplier** | INOXCENTER (GRUPO ACERINOX)

**Source of Information** | CEDINOX

**Remarks** | STAINLESS IS WIDELY USED IN OPEN AND CLOSED WASTE WATER INSTALLATIONS FOR COMPONENTS SUCH AS STORM TANKS, DETENTION BASINS, SEWER PUMP STATIONS, AND TIPPING BUCKETS. THE COMPONENTS ARE EXPOSED TO BOTH SEWAGE AND CORROSIVE ATMOSPHERIC CONDITIONS.





## GREEN ENERGY

- Agricultural Biomass Energy Generation Plant
- Experimental Nuclear Fusion Reactor
- Frame for Integrated PV Panels
- Gas Washer
- Integrated Solar Collector
- Photovoltaic Cell Lining
- Photovoltaic Panel Supports
- Solar Hot Water Boiler
- Solar LED Street Lighting
- Trigeneration Solar Power Plant

## AGRICULTURAL BIOMASS ENERGY GENERATION PLANT



96

An agricultural biomass energy generation plant generates thermal energy for use on the farm. Excess power that is not required can be fed into the national electricity grid.

The heart of the system is the fermenter where the biomass is broken down. The liquid and gases inside a fermenter are very aggressive. As a result, the tanks must be constructed from corrosion-resistant materials such as stainless steel.



**Location** | FARMS, MAINLY EUROPE

**Environment** | INDOOR/OUTDOOR

**Product** | COLD ROLLED AND WORK-HARDENED STAINLESS STEEL SHEET

**Fabrication process** | CONTOURING, STAMPING

**Grade/surface** | 1.4301, 1.4571 (ASTM TYPES 304, 316 TI)/2B AND 2R

**Material thickness/diameter** | 1.5 - 3.5 MM

**Weight** | VARIES

**Competing material** | CONCRETE, COATED CARBON STEEL

**Date of Completion** | CONTINUALLY IN PRODUCTION

**Manufacturer** | WELTEC BIOPOWER® GMBH

**Material Supplier** | THYSSENKRUPP NIROSTA GMBH

**Source of Information** | WELTEC BIOPOWER® GMBH

**Remarks** | DEPENDING ON OPERATIONAL DEMANDS, DIFFERENT GRADES OF STAINLESS STEEL CAN BE UTILISED IN THIS APPLICATION.

## EXPERIMENTAL NUCLEAR FUSION REACTOR



97

The International Thermonuclear Experimental Reactor (ITER) consists of a vacuum chamber, diverter, magnet support-structure, shielding blanket, feeding systems, and neutron diagnostic system. The total cost of the reactor is €4.6 billion and it will take ten years to complete. The first reactor should be completed in 2018 and will run for 20 years. Stainless steel was selected for many components of the ITER due to its inter-granular corrosion resistance, high tensile strength and low yield ratio, good fatigue resistance and fracture toughness. Stainless steel is one of the only materials that could meet regulatory requirements for the reactor's control mechanism and industry standards set by the American Society of Mechanical Engineers (ASME).

Location | CHINA

Environment | INDOOR

Product | HOT ROLLED STAINLESS STEEL

Fabrication process | ROLLING AND FORMING

Grade/surface | 316L/NO 1

Material thickness/diameter | 30 TO 300 MM THICK

Weight

Competing material

Date of Completion

Manufacturer

Material Supplier | TISCO

Source of Information | TISCO

Remarks



## FRAME FOR BUILDING INTEGRATED PV PANELS



98

Solartstyl® is a patented stainless steel solution for building-integrated photovoltaic (BIPV) panels. The frame is made of a thin, folded stainless steel sheet with integrated connectors. With excellent resistance to corrosion, the system is also airtight and waterproof.



Location | EUROPE

Environment | OUTDOOR

Product

Fabrication process | FOLDING, STAMPING AND LASER WELDING

Grade/surface | AISI 304, 316 AND 444

Material thickness/diameter | 0.5 TO 0.8 MM

Weight | 3 KG PER FRAME

Competing material | ALUMINIUM

Date of Completion | 2010

Manufacturer | APERAM ALLOYS & SPECIALTIES

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM ALLOYS & SPECIALTIES

Remarks

# Green Energy

## **GAS WASHER**



99

Gas washers are used to clean particulates and harmful chemicals from the exhaust systems of factories. Once the exhaust is washed, the clean air can be released into the atmosphere.

Stainless steel is utilised to prevent corrosion from the harmful gases and chemicals being removed from the air. Stainless helps to reduce maintenance interventions and abrasion wear. The stainless steel equipment is designed to last five times as long as carbon steel.

Location | BRAZIL

Environment | OUTDOOR

Product

Fabrication process | FORMING AND WELDING

Grade/surface | AISI 410D

Material thickness/diameter | 4.75, 6.35 AND 7.93 MM

Weight | 200 TONNES

Competing material | PAINTED CARBON STEEL

Date of Completion | 2010

Manufacturer | ALTA MOGIANA

Material Supplier | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Source of Information | APERAM STAINLESS & ELECTRICAL STEEL BRAZIL

Remarks





## INTEGRATED SOLAR COLLECTOR



100

This integrated solar collector has been made with a ferritic grade of stainless steel. The collector produces hot water for domestic consumption. The system is fully autonomous and utilises a recirculation pump powered by photovoltaic (PV) cells. All parts of the system are integrated within the absorber. This includes the 150 litre storage tank and PV recirculation system.



Location | EUROPE

Environment | OUTDOOR

Product

Fabrication process | STAMPING AND WELDING

Grade/surface | AISI 444/BA FINISH

Material thickness/diameter | 0.6 MM

Weight | 9.42KG

Competing material | 316L

Date of Completion | 2010

Manufacturer | SOTERNA S. COOP.

Material Supplier | APERAM STAINLESS STEEL EUROPE

Source of Information | APERAM STAINLESS SERVICES & SOLUTIONS IBÉRICA

Remarks

Green Energy

## PHOTOVOLTAIC CELL LINING



101

Stainless steel precision strip is widely used in the lining of flexible solar photovoltaic cells. Good corrosion resistance, a low expansion coefficient, and its imperviousness to ultraviolet and infra-red rays are just some of the reasons why stainless is commonly selected in this type of application.

Location | CHINA

Environment | OUTDOOR

Product | AUSTENITIC AND FERRITIC STAINLESS STEELS

Fabrication process | COLD ROLLING

Grade/surface | TR & BA

Material thickness/diameter | 0.02 TO 0.5 MM THICK

Weight

Competing material

Date of Completion

Manufacturer

Material Supplier | TISCO

Source of Information | TISCO

Remarks



## PHOTOVOLTAIC PANEL SUPPORTS



102

The Multipan support system enables photovoltaic panels to be installed on any flat surface. Each support system consists of two triangular stainless steel legs and a central reinforcement strut which are fixed together using bolted joints. The structures are also connected with aluminium profiles which are used to mount the photovoltaic panels. Cross tie-rods are fitted to the back, ensuring the stability of the whole structure. The Fixpan fixing system allows photovoltaic panels to be installed on any type of sloping roof. The panels can easily be adjusted for optimum inclination. The system is fixed to the roof frame with bolts.



**Location** | ITALY

**Environment** | OUTDOOR

**Product** | COLD ROLLED BENT SHEETS

**Fabrication process** | CUTTING, BENDING, WELDING AND MECHANICAL JOINING

**Grade/surface** | AISI 430, AISI 304

**Material thickness/diameter**

**Weight**

**Competing material** | ALUMINIUM, GALVANIZED STEEL

**Date of Completion**

**Manufacturer** | VMEC SRL

**Material Supplier**

**Source of Information** | CENTRO INOX

**Remarks** | PHOTOVOLTAIC PANELS CONVERT THE SUN'S RADIANT ENERGY INTO ELECTRIC POWER. THE PANELS MUST BE CORRECTLY ORIENTED AND TILTED SO THAT THE PHOTOVOLTAIC CELLS IN THE PANELS RECEIVE MAXIMUM EXPOSURE TO SOLAR RADIATION. EACH PANEL MUST BE INDIVIDUALLY ORIENTED TOWARDS THE SUN.

Green Energy

## SOLAR HOT WATER BOILER



103

Solar radiation is the most abundant source of clean energy available. The simplest way to exploit this free energy is through the use of solar water heating systems. Solar hot water generation systems typically include a solar panel (also known as a collector), and a boiler or storage tank. The collector absorbs the solar radiation, which is transferred to the water in the form of thermal energy. The warm water produced in the collector is stored in a well-insulated boiler, ready for use. Stainless steels' light weight, high yield strength, earthquake resistance and impact properties make it a good choice for hot water boilers.

**Location** | ITALY

**Environment** | OUTDOOR

**Product** | COLD ROLLED SHEETS

**Fabrication process** | FORMING AND WELDING

**Grade/surface** | AISI 316L/444

**Material thickness/diameter**

**Weight**

**Competing material**

**Date of Completion**

**Manufacturer** | BASSI SRL

**Material Supplier** | THYSSENKRUPP ACCIAI SPECIALI TERNI SPA

**Source of Information** | CENTRO INOX

**Remarks**



**SOLAR LED STREET LIGHTING**

104

LEDtree is a stainless steel street lamp that has been designed for use in both urban areas and remote locations. Shaped as a stylised tree, each street lamp is powered by nine solar panels, making it ideal for use in areas that are not connected to the local electricity grid. Each solar panel consists of several photovoltaic cells contained within a double layer of glass to protect them against bad weather. The panels power three 20-watt light-emitting diodes (LEDs) in each street lamp. The lamps are oriented so that their light falls on the ground and does not contribute to light pollution. Stainless was selected for this application as it has excellent aesthetic characteristics, resists corrosion, is easy to clean and can be recycled at the end of its useful life.



Location | ITALY

Environment | OUTDOOR

Product | ROUND WELDED TUBES

Fabrication process

Grade/surface | AISI 304 AND AISI 316

Material thickness/diameter | STAINLESS STEEL TUBE: 88.7 MM DIAMETER AND ABOUT 3.4 M IN HEIGHT.

Weight

Competing material | PAINTED CARBON STEEL, GALVANIZED STEEL

Date of Completion

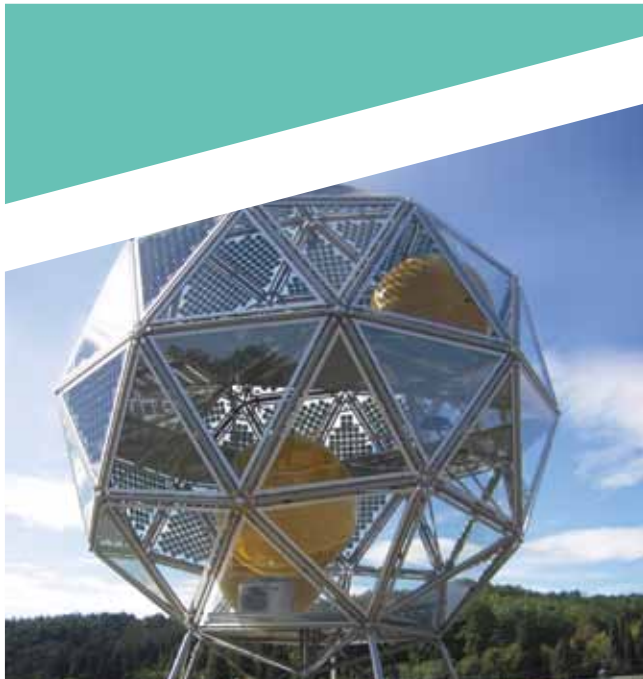
Manufacturer | MCE SPA ROSSETTI LIGHT.

Material Supplier

Source of Information | CENTRO INOX

Remarks | PLANNING AND INDUSTRIAL DESIGN BY ERREDESIGN DI ELISABETTA REDAELLI.

## TRI-GENERATION SOLAR POWER PLANT



105

Tri-generation is the simultaneous production of mechanical power (often converted to electricity), heat and cooling from a single heat source such as solar energy. This tri-generation power plant can be found in the gardens of the Villa di Pratolino north of Florence, Italy. The plant can produce 11 kilowatts of energy. That is enough to power the street-lamps which guide visitors through the park and the illumination of the Appennine Colossus sculpture by Giambologna. Stainless steel was selected for this application because of its good heat and corrosion resistance, and excellent mechanical properties.

**Location** | FLORENCE, ITALY

**Environment** | OUTDOOR

**Product** | SPIRAL ROPES, SPHERICAL JUNCTIONS, WIRE AND ROUND WELDED TUBES

**Fabrication process** | MECHANICAL JOINING AND WELDING

**Grade/surface** | AISI 316, AISI 316L, AISI 303

**Material thickness/diameter** | SPIRAL ROPES: 8 MM DIAMETER; ROUND WELDED TUBES: 101,6X4 MM CIRCULAR SECTION; SOLID METAL SPHERICAL JUNCTIONS: 132 MM-DIAMETER

**Weight**

**Competing material** | PAINTED CARBON STEEL

**Date of Completion** | 2009

**Manufacturer** | ENEL ENGINEERING AND THE INNOVATION DIVISION OF THE UNIVERSITY OF PISA

**Material Supplier**

**Source of Information** | CENTRO INOX

**Remarks**





## **OTHER**

- Ice Skates
- Outdoor Gym Equipment
- Pictoretank



Other  
**ICE SKATES**

108



The Swedish outdoor company Lundhags has developed a new type of long-distance skate that is made of one single piece of stainless steel. Known as the EXA, the skate has been designed to help the skater save energy on the ice. The skate has built-in vibration damping, made possible because of the choice of material.

The EXA skate is made from one piece of stainless steel. Traditional skates are made from two different materials joined together (typically aluminium and steel). The innovative design of the skate was possible due to the properties of the Hytens<sup>®</sup> grade of stainless steel.



Location | EUROPE

Environment | OUTDOOR

Product

Fabrication process | LASER CUTTING, BENDING, COLD AND TEMPER ROLLING, AND GRINDING

Grade/surface | HYTENS<sup>®</sup> (1.4310)/2H FINISH

Material thickness/diameter | 1.25 MM

Weight | 720 G PER PAIR

Competing material | CARBON STEEL

Date of Completion | 2010

Manufacturer | LUNDHAGS SKOMAKARNA AB

Material Supplier | OUTOKUMPU

Source of Information | LUNDHAGS SKOMAKARNA AB

Remarks

Other

## OUTDOOR GYM EQUIPMENT



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The stainless steel urban gym equipment is designed to be used in open areas such as beaches, parks and apartment complexes. Financed by sponsors, there are already 40 urban gyms installed at Rio de Janeiro's beaches. Stainless steel was chosen because it is easy to clean, has low maintenance costs and it resists the effects of rain, salt exposure and sunlight.

**Location** | RIO DE JANEIRO, BRAZIL

**Environment** | OUTDOOR

**Product**

**Fabrication process** | CUTTING, WELDING AND POLISHING

**Grade/surface** | AUSTENITIC TYPE 304/BRIGHT POLISHED

**Material thickness/diameter** | RECTANGULAR TUBES 100 MM X 60 MM X 2 MM

**Weight** | 125 KG

**Competing material** | PAINTED CARBON STEEL

**Date of Completion** | APRIL 2010

**Manufacturer** | MARCULA EQUIPAMENTOS DE MUSCULAÇÃO

**Material Supplier** | ZAMPROGNA/AÇOS CAPORAL

**Source of Information** | NUCLEO INOX

**Remarks**



## PICTURETANK AND COLOURTANK



110

Using a process called Pictoretank, polished stainless steel wine tanks can be hot-printed with an image. The client can choose almost any photo or art work.

Another, similar product is Colourtank. Using this technique, stainless steel tanks can be dyed any colour.

Both products can be applied to the tank without damaging the steel. The products can also be applied to existing stainless tanks.



Location | ITALY

Environment | INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process

Grade/surface | AISI 304 AND AISI 316

Material thickness/diameter

Weight

Competing material

Date of Completion | 2008

Manufacturer | ALBRIGI SRL

Material Supplier | THYSSENKRUPP ACCIAI SPECIALI TERNI

Source of Information | CENTRO INOX/EURO INOX

Remarks



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