

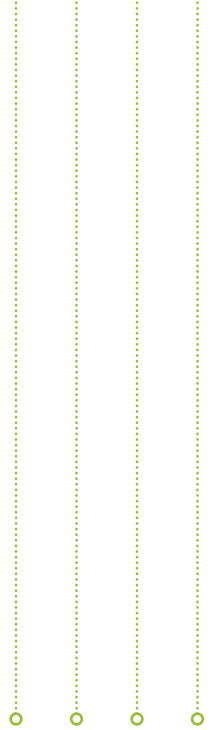
ISSF

INTERNATIONAL
STAINLESS STEEL



YEARBOOK OF STAINLESS STEEL APPLICATIONS

2006



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GENERAL INTRO

Message from the Chairman of the ISSF Market Development Committee Jean-Yves Gilet

One of the ultimate objectives for ISSF is to grow the market profitably. The Market Development Committee is in charge of identifying and driving market development projects. The very first task for the Committee, when it was formed in 1996, was to exchange examples of use of stainless steel between various markets around the world. This has been done ever since, in many different ways.

The Committee conducts regular brainstorming sessions to develop new ideas. In 2005, one recommendation was to initiate an exchange of ideas by creating a Yearbook of New Applications. The purpose of the Yearbook would be to inspire and help stainless steel marketers to grow the market by learning from each other and find inspiration for new developments on their home market, taking advantage of applications developed in other parts of the world. In producing such a publication, ISSF would amply fulfil its role of promoting stainless steel as a material of choice for all economic sectors.

The task was given to an ISSF Stainless Steel Fellow, Junji Madokawa, from Nippon Yakin Kogyo. He subsequently spent four months in Brussels, working hard to develop the first Yearbook of New Applications – which you now hold in your hands.

This booklet groups applications from many sectors of the market, as well as from most parts of the world. The Yearbook is thus truly global.

I would like to thank Junji and all ISSF members, as well as the numerous local Stainless Steel Development Associations, for their contributions to this Yearbook.

I sincerely hope that this will help us all to grow the market profitably. I also hope it will be the first Yearbook of many!

Jean-Yves Gilet
Head of Stainless Steel World
Arcelor

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 “304” grade – to use the American Iron and Steel Institute (AISI) 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 roughly 50% ferritic, 50% austenitic microstructure. They are mostly used in the process industry and in seawater applications.

Martensitic

Like ferritic grades, martensitic grades contain 12% -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 for turbine blades, cutlery, razor blades, etc.

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 No. 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 more readily polished than No. 1 or No. 2D.
BA	Bright Annealed	2R	BA finish produced by performing bright annealing in inert atmosphere after cold-rolling and light cold rolling. Smoother and brighter than No. 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 then buffing with a very fine buffing compound. The surface is essentially free of grit lines 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 irregular surface.

(NB: the above table is not official and should be used only as a guide)



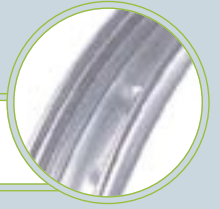


Motorcycle
wheel rim



The "Nido" safe car:
a stainless steel "nest"

AUTOMOTIVE



MOTORCYCLE WHEEL RIM

Motorcycle wheel rims have to be tough. The strength of stainless steel amply meets this requirement. Also, carbon steel needed corrosion-resistant coating, while the inherent corrosion resistance of stainless steel eliminates the need for coating. Stainless steel has gained acceptance in the motorcycle components industry for its corrosion resistance, durability and reliability.

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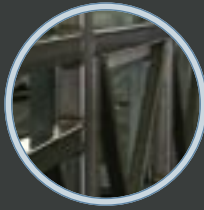
LOCATION/ENVIRONMENT	India – outdoor
PRODUCT	Sheet
FABRICATION PROCESS	Roll forming, welding
GRADE	AISI 202 (18Cr-9Mn-5Ni-N)
SURFACE	Polished
COMPETING MATERIAL	Carbon steel (periodic corrosion-resistant coatings)
DATE OF COMPLETION	June 2003
MANUFACTURING COMPANY	Autonix Auto Industries (P) Ltd.
MATERIAL SUPPLIER	Salem Steel Plant (SAIL)
SOURCE OF INFORMATION	Indian Stainless Steel Development Association (ISSDA)
REMARKS	



THE "NIDO" SAFE CAR: A STAINLESS STEEL "NEST"

Stainless steel is suitable for car structures because of its high energy absorbing capacity in the event of collision and its strain hardening properties (the faster the loading the more its resistance to deformation increases). A new frame concept has been developed, replacing the traditional floor tray, tunnel and firewall with a structure made from a stainless steel sheet. A major eco-friendly feature of this car is that stainless steel is completely recyclable.

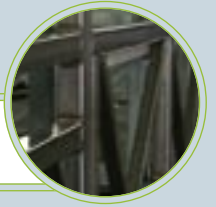
LOCATION/ENVIRONMENT	Italy - outdoor
PRODUCT	
FABRICATION PROCESS	
GRADE	EN 1,4301 / AISI 304 (18Cr-8Ni)
SURFACE	2B
COMPETING MATERIAL	Carbon steel, aluminium
DATE OF COMPLETION	2004
MANUFACTURING COMPANY	Pininfarina SpA
MATERIAL SUPPLIER	ThyssenKrupp Acciai Speciali Terni SpA Acciaierie Valbruna Ilta Inox
SOURCE OF INFORMATION	Centro Inox
REMARKS	



Bus
bodies

TRANSPORTATION

TRANSPORTATION



BUS BODIES

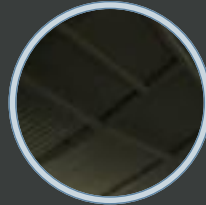
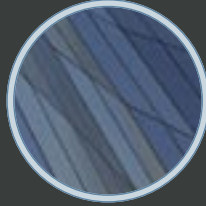
The stringent requirements that public transport buses must meet regarding costs and environmental impact are huge considerations. Stainless steel's strength can allow weight saving on the vehicle body, bringing fuel efficiency and helping meet Euro III exhaust emission standards. The material's durability and corrosion resistance also help reduce maintenance costs (fewer inspections and less damage to be repaired).

LOCATION/ENVIRONMENT	Australia - outdoor (coastal, marine environment)
PRODUCT	
FABRICATION PROCESS	
GRADE	304 (18Cr-8Ni)
SURFACE	
COMPETING MATERIAL	Carbon steel (coated)
DATE OF COMPLETION	2003
MANUFACTURING COMPANY	Custom Coaches
MATERIAL SUPPLIER	Fagersta Steels
SOURCE OF INFORMATION	Australian Stainless Steel Development Association (ASSDA)
REMARKS	

The Sage, Gateshead
Rainscreen panel system

Wales Millennium Centre
Cardiff Roofing

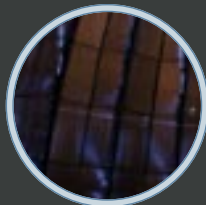
Stainless steel "sail"
for building



Roofing and
dewatering system



University of Hertfordshire
Roofing & external
wall cladding



New ferritic lamp
for Seoul Plaza



All stainless steel
fastener system

Arch for
the new Malizia
Bridge in Siena

Stainless steel
indoor cladding
for concert hall

Platform screen door

BUILDING & CONSTRUCTION



Pedestrian bridge
for Stockholm



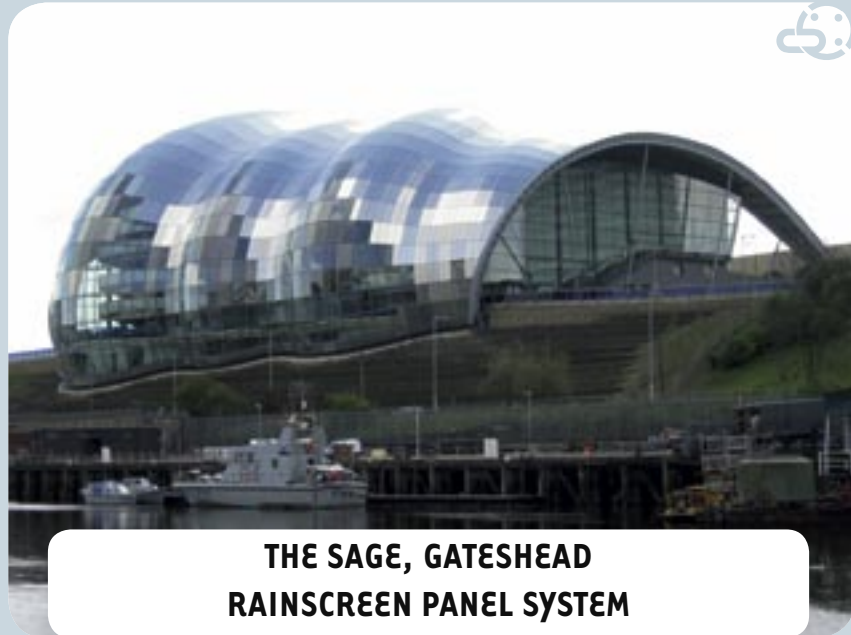
Riverwalk
floating walkway



Reinforcement
for concrete



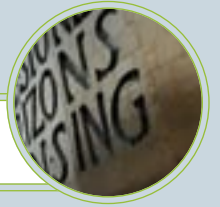
External
tunnel cladding



THE SAGE, GATESHEAD RAINSCREEN PANEL SYSTEM

The external cladding of The Sage includes 10,200 m² of stainless steel, made up of 3,043 panels, all of slightly different trapezoidal shape. The surface treatment, carried out during cold rolling, produced the linen embossed finish. Stainless steel was the most suitable material to realise the unique appearance of the building design and to ensure longevity of performance in this potentially harsh environment, close to the coast.

LOCATION/ENVIRONMENT	UK - outdoor (urban riverside, near coast)
PRODUCT	Cold rolled, bright annealed stainless steel sheet
FABRICATION PROCESS	Flat rectangular panels, cut to tight dimensional tolerances, to fit the grid plan of the roof. Underside of sheets ground-polished to provide key for adhesive bonding to built-up insulated panel system below.
GRADE	EN 1.4401/AISI 316 (17Cr-12Ni-2Mo)
SURFACE	Bright annealed with 1-side fine linen pattern rolled texture
COMPETING MATERIAL	Aluminium
DATE OF COMPLETION	Construction began 1997. Completed 2004.
MANUFACTURING COMPANY	Waagner Biro Stahl-Glas-Technik AG Architect: Foster & Partners
MATERIAL SUPPLIER	ThyssenKrupp Stainless
SOURCE OF INFORMATION	British Stainless Steel Association (BSSA)
REMARKS	Integrated insulated roofing & cladding system developed for the project, using 0.8 mm thick stainless steel outer skin.

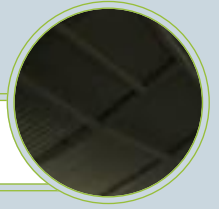


WALES MILLENNIUM CENTRE CARDIFF ROOFING

This landmark for the arts is all the more attractive for the use of stainless steel on the roof and fascia cladding. Special texturing and colouring of the stainless steel has added to the aesthetic impact of the design. The durability of stainless steel will help maintain the striking appearance of the building and ensure a long life in the rigorous local conditions.

LOCATION/ENVIRONMENT	Cardiff Bay, UK - outdoor (coastal)
PRODUCT	Cold rolled bright annealed stainless steel sheets.
FABRICATION PROCESS	Precision-cut flat rectangular panels, to fit the grid plan of the roof. No pre-curving was necessary, as the roof curvature was taken up by fixing, with open gaps for drainage, to the waterproof metal membrane deck below.
GRADE	EN 1.4401/AISI 316 (17Cr-12Ni-2Mo) EN 1.4301/AISI 304 (18Cr-8Ni)
SURFACE	Gold colour patina surface produced by electro-chemical processing, with fine-grid, 2-side pressed dimple pattern surface texture
COMPETING MATERIAL	Weathering steel and aluminium
DATE OF COMPLETION	Completion June 2004. Formal opening 26th November 2004.
MANUFACTURING COMPANY	Kelsey Roofing Industries / Euroclad
MATERIAL SUPPLIER	Avesta Polarit (Outokumpu Stainless) Rimex Metals (UK) Ltd
SOURCE OF INFORMATION	British Stainless Steel Association (BSSA)
REMARKS	The rainscreen cladding system was researched and developed by Capita Percy Thomas Architects and the patina colour was developed specifically for the project.

BUILDING & CONSTRUCTION

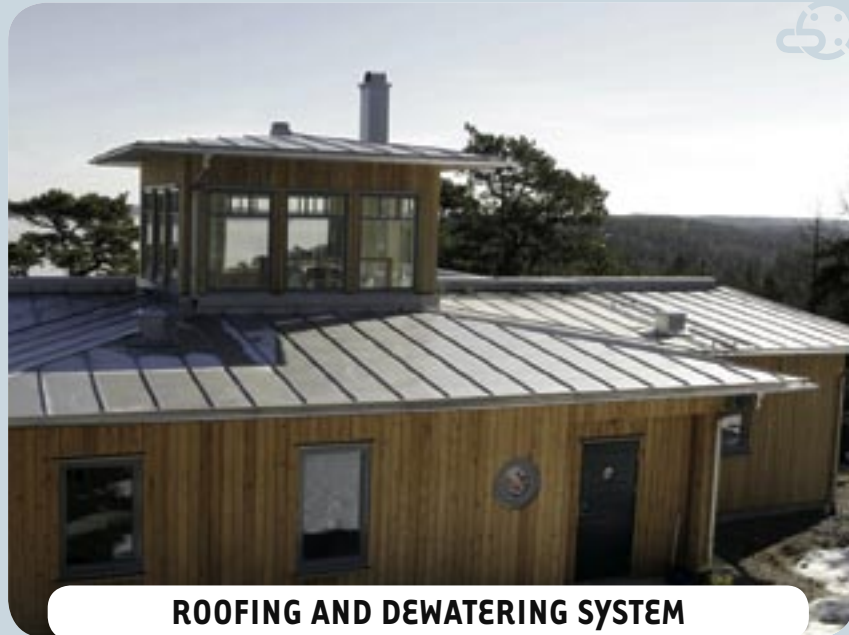
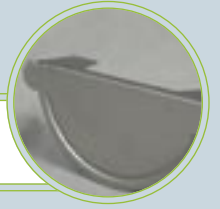


STAINLESS STEEL "SAIL" FOR BUILDING

This office building has an amazing sail-like stainless steel "cover". From the top of the building, the stainless steel plating descends dramatically, looking like a wind-filled spinnaker. Some 35 tons of stainless steel were needed for the 1,200 m² surface. Where the "sail" passes windows, it is micro-perforated and broken up by glass inserts, to let light through. To avoid reflections, EN 1.4404 (AISI 316L) stainless steel with special matt laminate finishing was chosen.

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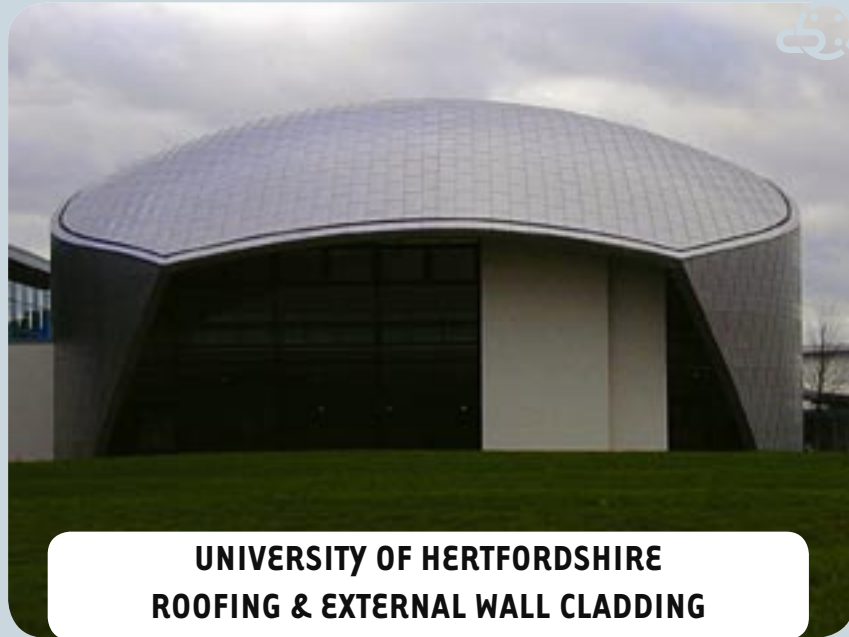
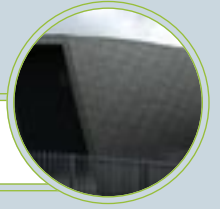
LOCATION/ENVIRONMENT	Italy - outdoor
PRODUCT	
FABRICATION PROCESS	
GRADE	EN 1,4404 / AISI 316L (17Cr-12Ni-2Mo-Low C)
SURFACE	Special matt rolling finish
COMPETING MATERIAL	
DATE OF COMPLETION	2005
MANUFACTURING COMPANY	Project: Dante O. Benini & Partners Architects Structural engineering consultant: ARUP Italia Srl
MATERIAL SUPPLIER	Metallic cladding of the sail and windows frames: Metalsigma Tunesi SpA Sheets: Ugine & Alz
SOURCE OF INFORMATION	Centro Inox
REMARKS	



ROOFING AND DEWATERING SYSTEM

As roofing and dewatering systems are always exposed to wind and rain, corrosion resistance is an important factor. Also, being by no means solely practical, they are often considered an architectural feature. Stainless steel can meet all the design requirements of both client and architect, thanks to its corrosion resistance, strength, weldability and formability. It also offers long life and a unique and attractive appearance.

LOCATION/ENVIRONMENT	Tyresö, Sweden – outdoor
PRODUCT	
FABRICATION PROCESS	
GRADE	ASTM 316 (17Cr-12Ni-2Mo)
SURFACE	
COMPETING MATERIAL	Carbon steel
DATE OF COMPLETION	
MANUFACTURING COMPANY	
MATERIAL SUPPLIER	
SOURCE OF INFORMATION	Outokumpu Oyj
REMARKS	Photo: Kent Lindström, Fotografen i Avesta AB



UNIVERSITY OF HERTFORDSHIRE ROOFING & EXTERNAL WALL CLADDING

Stainless steel was chosen for the deHavilland Auditorium because it is well suited to the form of the building and is perceived as high quality, providing a visually distinctive appearance. Because of its excellent corrosion resistance and inherent durability, the overall appearance should not radically change with time. A low reflective finish was produced by the surface processing, producing a quality of lustre that is not achieved with other metals.

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LOCATION/ENVIRONMENT	UK - outdoor (urban/rural, inland)
PRODUCT	Cold rolled stainless steel sheet Thickness: 0.4 & 0.5 mm
FABRICATION PROCESS	Site-formed interlocking shingles on the walls and standing seam on the roof area
GRADE	EN 1.4401/AISI 316 (17Cr-12Ni-2Mo)
SURFACE	Cold rolled softened & descaled & 2-side matt rolled texture
COMPETING MATERIAL	Zinc sheet
DATE OF COMPLETION	Officially opened September 2003
MANUFACTURING COMPANY	Carillion plc - SIAC - Pace Roofing Architect: RMJM
MATERIAL SUPPLIER	Ugine & ALZ UK Ltd
SOURCE OF INFORMATION	British Stainless Steel Association (BSSA)
REMARKS	



NEW FERRITIC LAMP FOR SEOUL PLAZA

Carbon steel lamp posts over 20 years old in Seoul have deteriorated and become corroded. Stainless steel is being used for these new lamp posts because of its durability and aesthetic qualities.

LOCATION/ENVIRONMENT	Seoul, Korea – outdoor
PRODUCT	Pipe
FABRICATION PROCESS	Welding
GRADE	STS 439 (18Cr-0.3Ti-0.03Mo)
SURFACE	Electropolished
COMPETING MATERIAL	Carbon steel
DATE OF COMPLETION	June 2005
MANUFACTURING COMPANY	Sungwoo Industry Co. Ltd.
MATERIAL SUPPLIER	POSCO
SOURCE OF INFORMATION	Korea Iron and Steel Association (KOSA)
REMARKS	Model project for Hi Seoul 2005 Festival



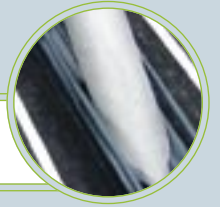
ALL STAINLESS STEEL FASTENER SYSTEM

Inferior materials are sometimes used to fasten stainless steel panels and components (especially in building and architecture). Galvanic cells are formed if galvanised or aluminium fasteners come into contact with large stainless steel surfaces and an electrolyte (for example, atmospheric humidity) is present. The galvanic reaction makes fasteners corrode quickly. Stainless steel fasteners dramatically reduce this problem.

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LOCATION/ENVIRONMENT	Spain and throughout the world - outdoor and indoor
PRODUCT	Wire
FABRICATION PROCESS	Cold drop forging
GRADE	AISI 304 (18Cr-8Ni), AISI 316 (17Cr-12Ni-2Mo)
SURFACE	2B, BA
COMPETING MATERIAL	Carbon steel, aluminium
DATE OF COMPLETION	2000
MANUFACTURING COMPANY	BRALO, S.A.
MATERIAL SUPPLIER	Inoxfil
SOURCE OF INFORMATION	Cedinox
REMARKS	The prize jury acknowledged the award winner's commitment to making full stainless steel solutions economically viable.

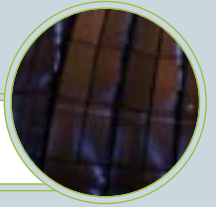
BUILDING & CONSTRUCTION



ARCH FOR THE NEW MALIZIA BRIDGE IN SIENA

The reconstruction of the Malizia bridge arose from the need to improve traffic flow and the wish to create an important new architectural feature for Siena. The durability, formability and corrosion resistance properties of stainless steel were attractive. A functional and technologically innovative solution for the bridge, which crosses over the railway, was found in the construction of a large arch, between the two previously built carriageways.

LOCATION/ENVIRONMENT	Italy - outdoor
PRODUCT	
FABRICATION PROCESS	
GRADE	URANUS 35N (23Cr-4Ni-N-Low C, duplex)
SURFACE	The external surface was shot-blasted using grit and protected by means of adhesive plastic.
COMPETING MATERIAL	Carbon steel
DATE OF COMPLETION	April 2005
MANUFACTURING COMPANY	Production and installation: Costruzioni Cimolai Armando SpA
MATERIAL SUPPLIER	Duplex plates supplied by: Industeel Italia Srl (Arcelor Group)
SOURCE OF INFORMATION	Centro Inox
REMARKS	



STAINLESS STEEL INDOOR CLADDING FOR CONCERT HALL

The use of stainless steel wire mesh as indoor cladding has achieved an ideal combination of acoustic features and design in this concert hall. It also fulfils all fire-resistance technical requirements.

LOCATION/ENVIRONMENT	Germany - indoor
PRODUCT	Wire mesh
FABRICATION PROCESS	
GRADE	EN 1.4401 / X4CrNiMo17-12-2 (17Cr-12Ni-2Mo)
SURFACE	
COMPETING MATERIAL	Aluminium, copper, plastic
DATE OF COMPLETION	
MANUFACTURING COMPANY	Gebr. Kufferath AG
MATERIAL SUPPLIER	
SOURCE OF INFORMATION	Informationsstelle Edelstahl Rostfrei (ISER)
REMARKS	



PLATFORM SCREEN DOOR

Seoul underground stations are being equipped, for safety and comfort, with platform screen doors, which will protect passengers from accidents and the rush of air when a train comes in. The stainless steel used for these screen doors provides excellent visual effect and durability and gives a clean impression.

LOCATION/ENVIRONMENT	Korea – indoor
PRODUCT	Cold sheet
FABRICATION PROCESS	Welding
GRADE	STS 439 (18Cr-0.3Ti-0.03Mo)
SURFACE	HL
COMPETING MATERIAL	Aluminium
DATE OF COMPLETION	December 2005
MANUFACTURING COMPANY	Hyundai Elevator Co. Ltd.
MATERIAL SUPPLIER	POSCO
SOURCE OF INFORMATION	Korea Iron and Steel Association (KOSA)
REMARKS	Model project for Dongmyo station



PEDESTRIAN BRIDGE FOR STOCKHOLM

The 62 metre-long Apaté bridge over the Sickla canal provides access for pedestrians and cyclists to a new residential area in Stockholm, Sweden. As the nearby sea causes considerable risk of corrosive attack to the structure, an austenitic-ferritic (duplex) stainless steel was selected. This material has exceptional strength and corrosion resistance. Stainless steel also greatly contributes to the bridge's sophisticated look.

LOCATION/ENVIRONMENT	The Sickla canal in Stockholm, Sweden – outdoor (near the sea)
PRODUCT	Hot rolled plate
FABRICATION PROCESS	Bending, welding
GRADE	SAF 2205 (22Cr-5.5Ni-3Mo-N-Low C)
SURFACE	
COMPETING MATERIAL	Carbon steel
DATE OF COMPLETION	2002
MANUFACTURING COMPANY	Architects: Erik Andersson Arkitektbyrå, Stockholm, Sweden Structural engineering: Skandiakonsult AB, Luleå Steel Contractor: Stålmonteringar AB Stålab, Trollhättan, Sweden
MATERIAL SUPPLIER	Outokumpu Stainless AB (Hot Rolled Plate and PSC Nordic, Degerfors, Sweden)
SOURCE OF INFORMATION	Outokumpu Oyj
REMARKS	In 2003, the bridge won the European Steel Design Award and the Swedish Steel Design Award. Photo: Åke E-son Lindman

BUILDING & CONSTRUCTION



RIVERWALK FLOATING WALKWAY

Stainless steel's corrosion resistance means durability and low maintenance for the balustrading, posts, cables and floating pontoons of Brisbane's "RiverWalk" floating walkway. Using carbon steel reinforcement in the pontoons could have led to corrosion and concrete deterioration, in the marine environment. This application generated a specification and trialing that has since been used for stainless barrier structures in marine environments across Australia.

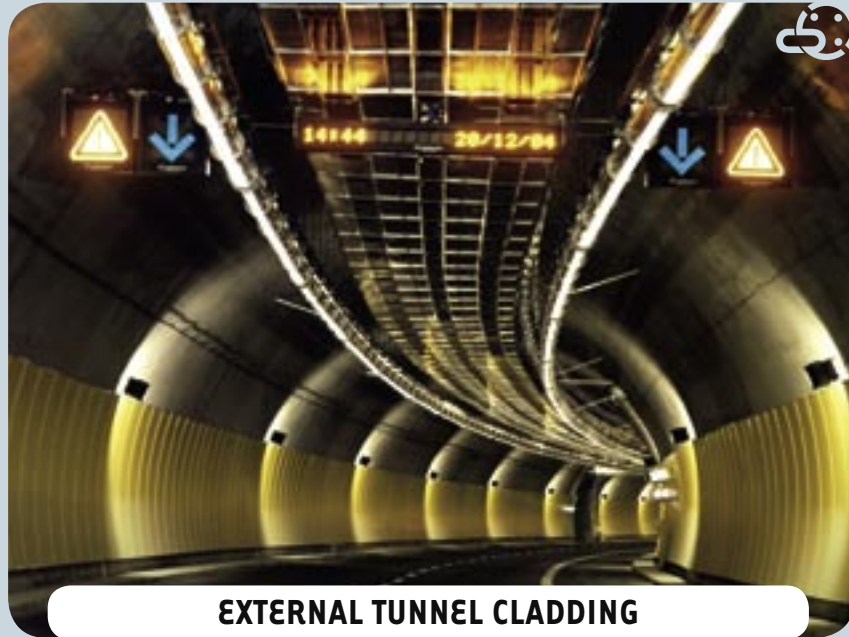
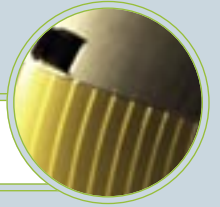
LOCATION/ENVIRONMENT	Australia - marine environment
PRODUCT	Rebar (reinforcement of pontoons)
FABRICATION PROCESS	
GRADE	316 (17Cr-12Ni-2Mo)
SURFACE	Smooth (balustrading, posts)
COMPETING MATERIAL	Carbon steel (reinforcement of pontoons)
DATE OF COMPLETION	December 2003
MANUFACTURING COMPANY	Pryde Fabrication - Arminox Australia - Ronstan International - Condamine Wellscreens
MATERIAL SUPPLIER	Sandvik - Atlas Speciality Metals - Johnson Screens - Tom Stoddart Pty Ltd.
SOURCE OF INFORMATION	Australian Stainless Steel Development Association (ASSDA)
REMARKS	



REINFORCEMENT FOR CONCRETE

In many cases, the main reason for cracking of reinforced concrete is swelling of the reinforcement bar, due to corrosion. Most concrete reinforcement uses carbon steel, which is easily attacked by chlorides, in humid environments. In such cases, stainless steel is the best choice for the reinforcement. Its high strength and high corrosion resistance bring durability, low maintenance costs and safety.

LOCATION/ENVIRONMENT	Inside concrete – indoor or outdoor
PRODUCT	Rebar
FABRICATION PROCESS	Cold rolling for ribbed wire or rebars up to 20 mm diameter and hot rolled rebars for diameter between 20 to 40 mm
GRADE	URANUS 35N (23Cr-4Ni-N-Low C) URANUS 45N (22Cr-5Ni-3Mo-N-Low C)
SURFACE	Polished, electropolished
COMPETING MATERIAL	Carbon steel rebars with protection system against corrosion
DATE OF COMPLETION	2003
MANUFACTURING COMPANY	Ugitech and FUMIREX
MATERIAL SUPPLIER	Ugitech and FUMIREX
SOURCE OF INFORMATION	Ugitech
REMARKS	



EXTERNAL TUNNEL CLADDING

Stainless steel is the best solution for cladding and fastening in tunnels, for several reasons. In tunnels, exhaust gases and humidity cause severe corrosion environments, fire resistance is a huge safety factor, reflections of other vehicles must be avoided and the back of cladding panels is inaccessible for maintenance and cleaning. Stainless steel with an organic coating is corrosion-resistant, fire-resistant, low-maintenance and non-reflective.

LOCATION/ENVIRONMENT	Italy – outdoor
PRODUCT	Sheet
FABRICATION PROCESS	Coil Coating
GRADE	AISI 430 (17Cr)
SURFACE	Pre-coated
COMPETING MATERIAL	Carbon steel, aluminium
DATE OF COMPLETION	December 2004
MANUFACTURING COMPANY	Realisation: S.P.A.I. Srl and Technical SpA and Ansaldo SpA
MATERIAL SUPPLIER	ThyssenKrupp Acciai Speciali Terni SpA
SOURCE OF INFORMATION	Centro Inox - ThyssenKrupp Acciai Speciali Terni SpA
REMARKS	

Flue-gas
desulfurisation units



Monophase step
voltage regulator



Hydrometer



Pressure piping
for high-rise building

INDUSTRIAL MACHINERY OR EQUIPMENT

INDUSTRIAL MACHINERY OR EQUIPMENT



FLUE-GAS DESULFURISATION UNITS

Flue-gas desulfurisation devices are attached to thermal-powered generating stations to prevent atmospheric pollution. The inside of these scrubbers, at a coal-fired power plant, is a highly corrosive environment, due to the high concentrations of chlorides from the concentrations of chlorine in the fuel. Duplex stainless steels are able to deliver long, inexpensive service lives. Besides, duplex stainless steel is a cheaper solution than coated carbon steel and high-nickel alloy.

LOCATION/ENVIRONMENT	Industrial
PRODUCT	Plate
FABRICATION PROCESS	Cold forming , welding
GRADE	UNS32205 (22Cr-5Ni-3Mo-N-Low C)
SURFACE	HRAP (Hot rolled, annealed and pickled - No.1)
COMPETING MATERIAL	Coated carbon steels, high nickel alloys
DATE OF COMPLETION	First use of duplex in FGD was Tennessee Valley Authority, Paradise Power Station
MANUFACTURING COMPANY	PSP USA
MATERIAL SUPPLIER	Industeel
SOURCE OF INFORMATION	Industeel
REMARKS	Photo shows a typical flue-gas desulfurisation unit (not at TVA Paradise Power Station).

INDUSTRIAL MACHINERY OR EQUIPMENT



MONOPHASE STEP VOLTAGE REGULATOR

Unstable power supply (voltage and load) is a problem for industrial plant, affecting stability of operations and energy consumption. A new monophase step voltage regulator, useable in many different environments, has been developed to stabilize incoming power supply. The corrosion of carbon steel reduces the durability of the equipment and increases maintenance costs. Stainless steel's mechanical strength and corrosion resistance improve length of life and profitability.

LOCATION/ENVIRONMENT	Various environments (coastal, rural, urban, industrial), always installed outdoor
PRODUCT	Sheet
FABRICATION PROCESS	
GRADE	Type 316L (17Cr-12Ni-2Mo-Low C)
SURFACE	2B
COMPETING MATERIAL	Carbon steel
DATE OF COMPLETION	2005
MANUFACTURING COMPANY	Toshiba Corporation
MATERIAL SUPPLIER	Acesita – service centres
SOURCE OF INFORMATION	Nucleo Inox
REMARKS	

INDUSTRIAL MACHINERY OR EQUIPMENT



HYDROMETER

Every address (home, office, factory, etc.) in Brazil must have a hydrometer, to measure water consumption. The hydrometer is installed on a support, enclosed by a protection box. Stainless steel is superior to competing materials both for the box and the hydrometer support, being cheaper than copper and painted carbon steel (though more expensive than plastic). Its excellent mechanical properties and corrosion resistance provide durability and reduce leaks.

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LOCATION/ENVIRONMENT	Various environments (coastal, rural, urban, industrial), always installed outdoors
PRODUCT	Sheet (box), casting (hydrometer support)
FABRICATION PROCESS	
GRADE	AISI 430, 304 or 316 (box), AISI 304 (support)
SURFACE	2B (box)
COMPETING MATERIAL	Phosphatised and epoxy painted carbon steel (box) Nickel plated copper alloy (mainly bronze) and plastic (support)
DATE OF COMPLETION	Both prototypes were ready in 2005
MANUFACTURING COMPANY	Sanderinox (box) - Fundimazza (support)
MATERIAL SUPPLIER	Acesita - service centres
SOURCE OF INFORMATION	Nucleo Inox
REMARKS	Demand for the assembly (support and box) is around 600,000 units/year in the metropolitan region of São Paulo alone.

INDUSTRIAL MACHINERY OR EQUIPMENT

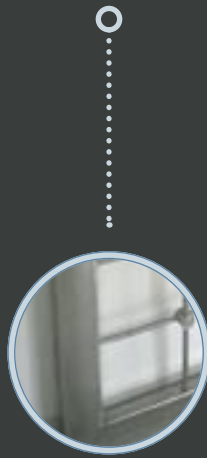


PRESSURE PIPING FOR HIGH-RISE BUILDING

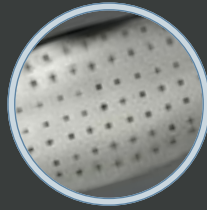
In this high-rise building, plant costs are reduced by supplying water (both potable and for fire services) up to the 70th floor with one powerful pump, located in the basement. Copper piping cannot withstand very high pressure, but stainless steel's high strength enables the pump to supply high-pressure water right to the top floor. Stainless steel piping also satisfies water quality requirements. This precludes the use of galvanised and other traditional materials.

LOCATION/ENVIRONMENT	"The Aurora" in Australia - indoor
PRODUCT	Pipe
FABRICATION PROCESS	
GRADE	316 (17Cr-12Ni-2Mo)
SURFACE	
COMPETING MATERIAL	Copper
DATE OF COMPLETION	2006 (estimated year of completion)
MANUFACTURING COMPANY	Blucher Australia
MATERIAL SUPPLIER	
SOURCE OF INFORMATION	Australian Stainless Steel Development Association (ASSDA)
REMARKS	

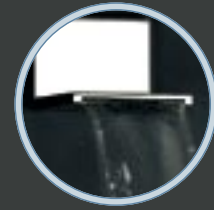
Sliding
partition door



Door lock
product



Shower
specially designed
for outdoor use



Taps

HOME AND OFFICE APPLIANCES

HOME AND OFFICE APPLIANCES



SLIDING PARTITION DOOR

This product is a sliding door with a locking arrangement, installed in a residence. Stainless steel's durability and corrosion resistance bring trouble-free maintenance, while its surface finish adds aesthetic beauty.

LOCATION/ENVIRONMENT	Kolkata (Calcutta), India – indoor
PRODUCT	Rectangular tubes, bar
FABRICATION PROCESS	Welding
GRADE	AISI 304 (18Cr-8Ni)
SURFACE	Brush
COMPETING MATERIAL	Carbon steel (painted)
DATE OF COMPLETION	May 2005
MANUFACTURING COMPANY	Tayal Furniture
MATERIAL SUPPLIER	Jindal Stainless Ltd.
SOURCE OF INFORMATION	Indian Stainless Steel Development Association (ISSDA)
REMARKS	

HOME AND OFFICE APPLIANCES

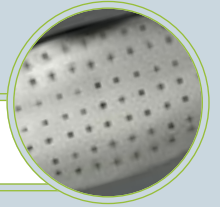


DOOR LOCK PRODUCT

Door-lock ware has to undergo complicated manufacturing processes, such as deep drawing, hydraulic pressing, heat treatment, etc. Moreover, it must stay clean after repeated contact with people's hands. Austenitic stainless steels offer excellent formability and surface cleanliness.

LOCATION/ENVIRONMENT	Taiwan, China - indoor, outdoor
PRODUCT	Cold sheet
FABRICATION PROCESS	Deep drawing
GRADE	SUS 304 (18Cr-8Ni), SUS 304Cu (18Cr-8Ni-1Cu)
SURFACE	2B
COMPETING MATERIAL	Copper
DATE OF COMPLETION	2005
MANUFACTURING COMPANY	Tong Lung Metal Industry Co. Ltd. Taiwan Fu Hsing Industrial Co. Ltd.
MATERIAL SUPPLIER	Japanese company – Yieh United Steel Corporation (YUSCO)
SOURCE OF INFORMATION	Yieh United Steel Corporation (YUSCO)
REMARKS	

HOME AND OFFICE APPLIANCES

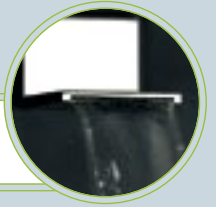


SHOWER SPECIALLY DESIGNED FOR OUTDOOR USE

This shower is usually installed at leisure areas (e.g. at swimming pools or in a garden) in various environments (seaside, rural, urban, industrial, etc.). In such environments, both superior mechanical resistance and corrosion resistance are important to assure durability. Stainless steel was selected because of these attributes.

LOCATION/ENVIRONMENT	Brazil – outdoor (swimming pools, gardens, seaside, industrial, etc.)
PRODUCT	Sheet, tube
FABRICATION PROCESS	
GRADE	Type 304 (18Cr-8Ni)
SURFACE	Polished finishing
COMPETING MATERIAL	Stainless steel was the first choice
DATE OF COMPLETION	2004
MANUFACTURING COMPANY	Comisa
MATERIAL SUPPLIER	Acesita – service centres
SOURCE OF INFORMATION	Nucleo Inox
REMARKS	The shape of the shower is inspired by the flower of a plant, whose scientific name is Paepalanthus. This plant is threatened with extinction.

HOME AND OFFICE APPLIANCES



TAPS

These products combine pleasant aesthetics and innovative design with size flexibility and excellent functioning. Their particularly square, angular lines were inspired by a blade, as was the shape of the water movement. Stainless steel has all the properties necessary for the realisation of the concept.

LOCATION/ENVIRONMENT	Italy - indoor (home)
PRODUCT	
FABRICATION PROCESS	
GRADE	EN 1,4301 (AISI 304) (18Cr-8Ni)
SURFACE	Polished, brushed
COMPETING MATERIAL	Chromium plated brass
DATE OF COMPLETION	2003
MANUFACTURING COMPANY	Designed by: Peter Jamieson Production: Rubinetterie Ritmonio Srl
MATERIAL SUPPLIER	
SOURCE OF INFORMATION	Centro Inox
REMARKS	



Multifuel
biomass
cooking stove

FOOD & BEVERAGE



MULTIFUEL BIOMASS COOKING STOVE

A single-pot cooking stove has been designed especially for low-income rural environments. The stove can be fed with traditional solid fuels such as briquettes, charcoal or wood. The material is cost-effective 12% chromium steel. The corrosion and high temperature resistance properties of the metal are perfectly adequate for the purpose. The result is a cost-effective solution that suits the “appropriate technology” concept.

LOCATION/ENVIRONMENT	South Africa – indoor (kitchens) and outdoor
PRODUCT	Cold sheet
FABRICATION PROCESS	Laser cutting, CNC punching, blanking, pressing, rolling, spot welding
GRADE	3CR12 (12Cr-Ni-Low C), AISI 409 (12Cr-Ti)
SURFACE	2B, BA (the outer shell is 4-colour printed)
COMPETING MATERIAL	Galvanised sheet, tin-plated mild steel.
DATE OF COMPLETION	November 2003
MANUFACTURING COMPANY	Crispin Pemberton-Pigott / Rina King, Vesto, Greenside (Republic of South Africa) New Dawn Engineering (Swaziland)
MATERIAL SUPPLIER	Various
SOURCE OF INFORMATION	Southern African Stainless Steel Development Association (SASSDA)
REMARKS	The product was awarded a Runner-up Merit in the 2004 Stainless Steel Awards, presented by the Southern African Stainless Steel Development Association (SASSDA). Also in 2004, the Vesto was a winner in the Housewares category and was awarded the first ever Chairman’s Award by the Design Institute of South Africa (DISA).



Transfer trolley

COOKWARE, HOLLOWWARE, CUTLERY

COOKWARE, HOLLOWWARE, CUTLERY



TRANSFER TROLLEY

The transfer trolley is a new application for stainless steel drawn wire. These trolleys are used to store and transfer GN (Gastronorm) containers between different kitchen areas. The use of stainless steel makes the trolleys washable in dishwashers, which brings hygiene and safety and reduces washing time.

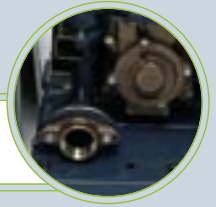
LOCATION/ENVIRONMENT	France – indoor
PRODUCT	Drawn wire, bars
FABRICATION PROCESS	3D forming and welding
GRADE	UGINE 304L (18Cr-8Ni-Low C), UGINE 244 (17Cr-3Mn-2Cu)
SURFACE	Polished, electropolished
COMPETING MATERIAL	
DATE OF COMPLETION	November 2003
MANUFACTURING COMPANY	3bornes ARCHITECTES
MATERIAL SUPPLIER	Ugitech
SOURCE OF INFORMATION	Ugitech
REMARKS	In 2003 the Ugitech transfer trolley was awarded one star in the “Observateur du Design awards”.



Domestic electric
well pump

ELECTRICAL MACHINERY OR EQUIPMENT

ELECTRICAL MACHINERY OR EQUIPMENT

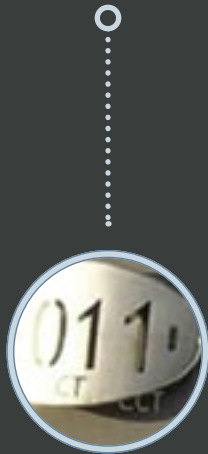


DOMESTIC ELECTRIC WELL PUMP

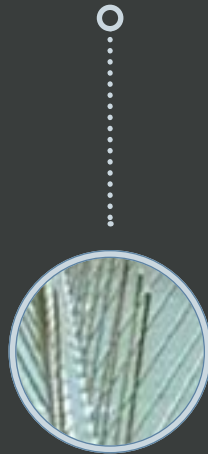
The use of well pumps is especially common in rural areas, for watering flower beds and vegetable gardens. To enable cost-effective mass production of these pumps, the designers selected a modified type SUS XM7 stainless steel. The alloy composition and special surface treatment of this stainless steel made it the softest available austenitic grade. Its use in the pump has also demonstrated the excellent workability of this material for other deep drawing operations.

LOCATION/ENVIRONMENT	Japan - outdoor
PRODUCT	Cold rolled plate, sheet and strip
FABRICATION PROCESS	Deep drawing
GRADE	SUSXM7 Modified (17Cr-8Ni-3Cu-1.7Mn-Low C)
SURFACE	Lubrication
COMPETING MATERIAL	Coated steel
DATE OF COMPLETION	September 2003
MANUFACTURING COMPANY	Hitachi Home & Life Solution Co. Ltd.
MATERIAL SUPPLIER	Nisshin Steel Co. Ltd.
SOURCE OF INFORMATION	Japan Stainless Steel Association (JSSA)
REMARKS	The product received a prize in the "Products" category of the 2003 Stainless Steel Awards of the Japan Stainless Steel Association (JSSA).

Wall sculpture at
Chennai port cargo terminal



Spikes
to prevent birds



Stainless
steel soap



Stainless steel
jewellery: rings,
bracelets, earrings, etc.



Stainless steel
art in China



Digital art
printed on stainless
steel sheet

OTHERS



WALL SCULPTURE AT CHENNAI PORT CARGO TERMINAL

This wall sculpture is located at the cargo terminal of Chennai (Madras) sea port. Stainless steel was chosen for its aesthetic qualities, for the fact that it is available in different surface finishes and because it resists the corrosive effects of a marine environment.

LOCATION/ENVIRONMENT	Chennai (Madras), India – the port
PRODUCT	Sheet
FABRICATION PROCESS	
GRADE	AISI 316 (17Cr-12Ni-2Mo)
SURFACE	Glass bead blast finish, 2B, mirror, etc.
COMPETING MATERIAL	
DATE OF COMPLETION	February 2004
MANUFACTURING COMPANY	Batliwala Process Engineering
MATERIAL SUPPLIER	Salem Steel Plant (SAIL)
SOURCE OF INFORMATION	Indian Stainless Steel Development Association (ISSDA)
REMARKS	

OTHERS



SPIKES TO PREVENT BIRDS

These stainless steel spikes are installed on trusses, ledges, awnings, window air-conditioners, lighting equipment, etc., to prevent birds perching and thus avoid bird droppings. Birds are not hurt and this simple product saves the user time and money and keeps his building attractive. Mild steel spikes were found to rust within 6 months, whereas corrosion-resistant stainless steel means zero maintenance.

LOCATION/ENVIRONMENT	India – indoor and outdoor
PRODUCT	Wire
FABRICATION PROCESS	Wire embedded plastic strips
GRADE	AISI 316 (17Cr-12Ni-2Mo)
SURFACE	Bright
COMPETING MATERIAL	Mild steel
DATE OF COMPLETION	January 2004
MANUFACTURING COMPANY	Austenitic Steels Pvt Ltd
MATERIAL SUPPLIER	Mukand Ltd
SOURCE OF INFORMATION	Indian Stainless Steel Development Association (ISSDA)
REMARKS	

OTHERS



STAINLESS STEEL SOAP

This special “soap” is made of SUS 304 stainless steel. The hygienic, stainless steel soap naturally removes odours from your hands – and never wears out. Fish, garlic, onion and smoke smells will all vanish from your hands. The odours are attracted to and bind with one or more of the metals in stainless steel. This soap is actually more friendly to the environment than chemical soap.

LOCATION/ENVIRONMENT	Taiwan, China; China, Germany
PRODUCT	Bar
FABRICATION PROCESS	
GRADE	SUS 304 (18Cr-8Ni)
SURFACE	
COMPETING MATERIAL	Organic soap
DATE OF COMPLETION	2005
MANUFACTURING COMPANY	Hangzhou Xiaoshan Import & Export Trading Co. Ltd.
MATERIAL SUPPLIER	Company in Germany
SOURCE OF INFORMATION	Yieh United Steel Corporation (YUSCO)
REMARKS	

OTHERS



STAINLESS STEEL JEWELLERY: RINGS, BRACELETS, EARRINGS, ETC.

Stainless steel can be made into fascinating shapes with beautiful surfaces. It also has superior mechanical resistance, never peels (no coating is applied) and is considered environmentally friendly, as it uses no electroplating.

LOCATION/ENVIRONMENT	In contact with skin
PRODUCT	Strip and wire
FABRICATION PROCESS	
GRADE	300 series (mainly type 304)
SURFACE	Varying from bright to dull. Final polishing is done manually on the assembled piece of jewellery.
COMPETING MATERIAL	Copper alloys (mainly brass) nickel and chromium plated
DATE OF COMPLETION	2003
MANUFACTURING COMPANY	Approximately 10 companies of a group of 30 companies that form the most important jewellery nucleus in Latin America, operating in the city of Limeira (150 km from São Paulo)
MATERIAL SUPPLIER	Service centres and distributors
SOURCE OF INFORMATION	Nucleo Inox
REMARKS	More refined and expensive pieces are made using precious stones and/or gold encrusted in stainless steel.

OTHERS



STAINLESS STEEL ART IN CHINA

The surface finish of stainless steels is one of the material's most important properties, here enabling an artist to create remarkable images.

LOCATION/ENVIRONMENT	China – indoor
PRODUCT	Cold sheet
FABRICATION PROCESS	Sculpting and laser etching
GRADE	SUS 304 (18Cr-8Ni)
SURFACE	2B, BA
COMPETING MATERIAL	Wood
DATE OF COMPLETION	2005
MANUFACTURING COMPANY	Mrs. Cheung Yat-Man (artist)
MATERIAL SUPPLIER	Local company in China – Yieh United Steel Corporation (YUSCO)
SOURCE OF INFORMATION	Yieh United Steel Corporation (YUSCO)
REMARKS	

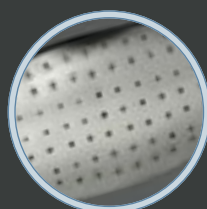
OTHERS

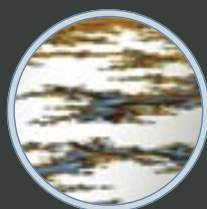
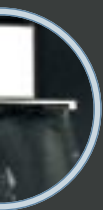
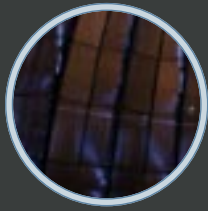
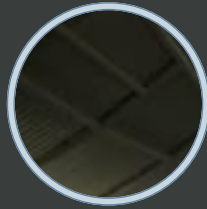


DIGITAL ART PRINTED ON STAINLESS STEEL SHEET

Only stainless steel makes it possible for the artist to create these exceptionally beautiful images, by the combined effect of design, colour and the stainless steel surface itself.

LOCATION/ENVIRONMENT	On walls – usually indoor
PRODUCT	Sheet
FABRICATION PROCESS	
GRADE	Type 304 (18Cr-8Ni)
SURFACE	BB, mirror and buffing bright
COMPETING MATERIAL	Several alternative materials were tested but the best results were achieved with stainless steel
DATE OF COMPLETION	2004
MANUFACTURING COMPANY	The artist, Rubens Castro, uses a plotter (piezzo technology) with instant-drying UV paint.
MATERIAL SUPPLIER	Acesita – service centres
SOURCE OF INFORMATION	Nucleo Inox
REMARKS	The colours of the computer-generated images, created using a technique developed by the artist over a ten-year test period, have a unique “metallic” appearance.





MORE INFORMATION

Australia	Australian Stainless Steel Development Association(ASSDA) http://www.assda.asn.au E: assda@assda.asn.au	T: +61 7 3220 0722 F: +61 7 3220 0733
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Germany	Informationsstelle Edelstahl Rostfrei (ISER) http://www.edelstahl-rostfrei.de E: info@edelstahl-rostfrei.de	T: +49 211 67 07 835 F: +49 211 67 07 344
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Italy	ThyssenKrupp Acciai Speciali Terni S.p.A. http://www.acciaiterni.it E: marketing.ast@thyssenkrupp.com	T: +39 0744 490867 F: +39 0744 490879
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