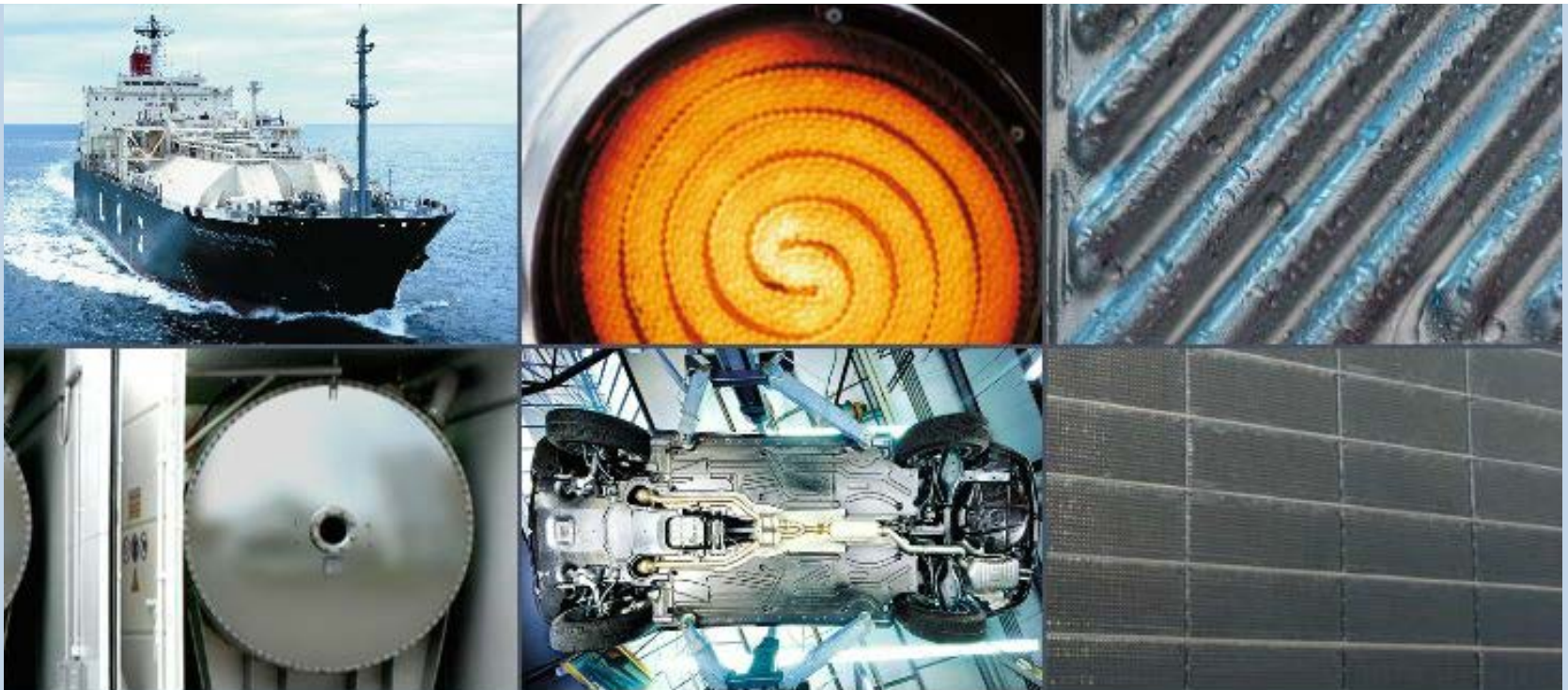


Stainless Steel for a cleaner world



Stainless steel plays a key role in environmental control technology.

Not only is it a sustainable, fully recyclable material, it also helps us reconcile the requirements of modern societies with the need to protect the Earth and use its resources responsibly. Here are just a few examples of how stainless steel can improve the environment.

Stainless Steel for a cleaner world

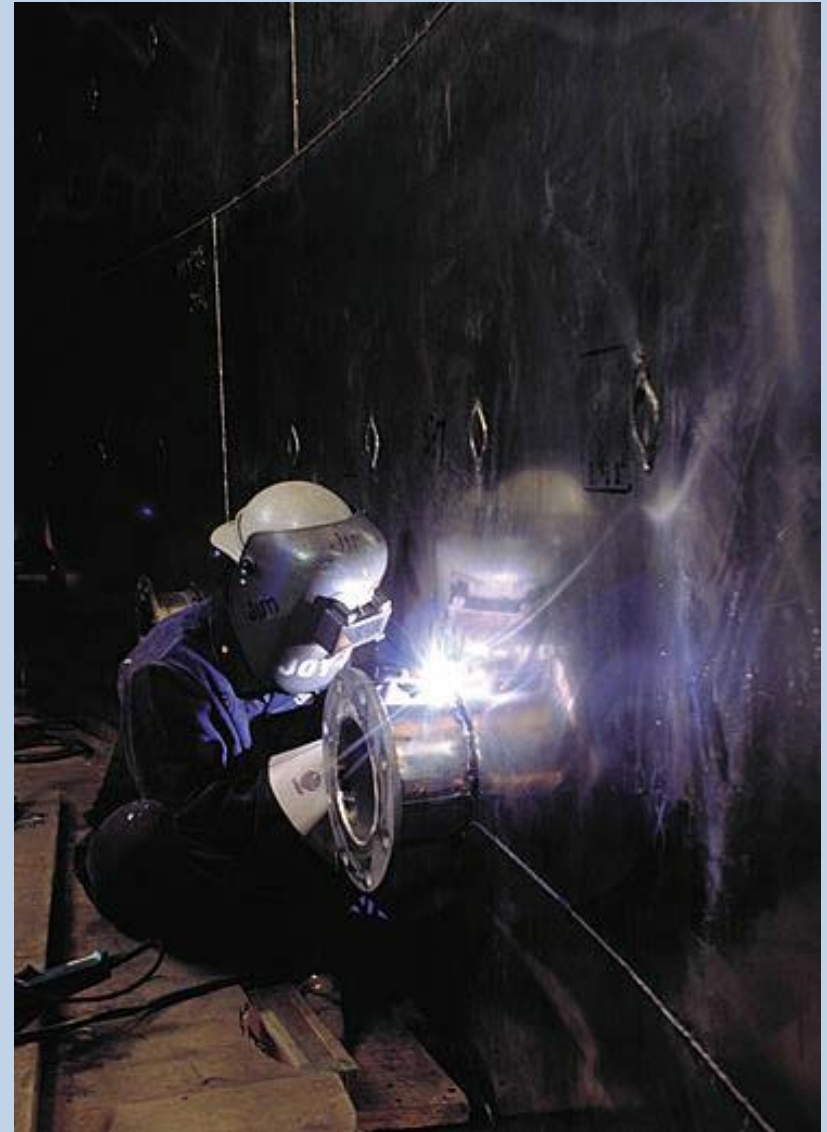
Coal-fired power plants

Stainless steel in coal-fired power plants

The most abundant fossil energy source is coal. However, its sulphur content used to be a cause for concern, since it was known to be the major cause of acid rain.

Modern flue-gas scrubbers have solved the problem. The sulphuric acid is extracted and neutralised before the flue-gas leaves the chimney.

Because the conditions in scrubbers are highly corrosive, high alloyed stainless steels and nickel alloys are required, to make the process work.



Photos: Enerfab, Nickel Institute

Stainless Steel for a cleaner world

All-stainless scrubber for bituminous emulsions

An all-stainless scrubber for a new fuel

One energy generating plant, that has been converted from heavy oil to an aqueous bitumen-emulsion, now uses stainless steel for the absorber throughout, for the first time.

The stainless steel grade used is S32205. In addition to the classic assets of austenitic-ferritic (duplex) grades - outstanding corrosion resistance and high strength combined - this nitrogen-alloyed grade also shows improved ductility.



Stainless Steel for a cleaner world

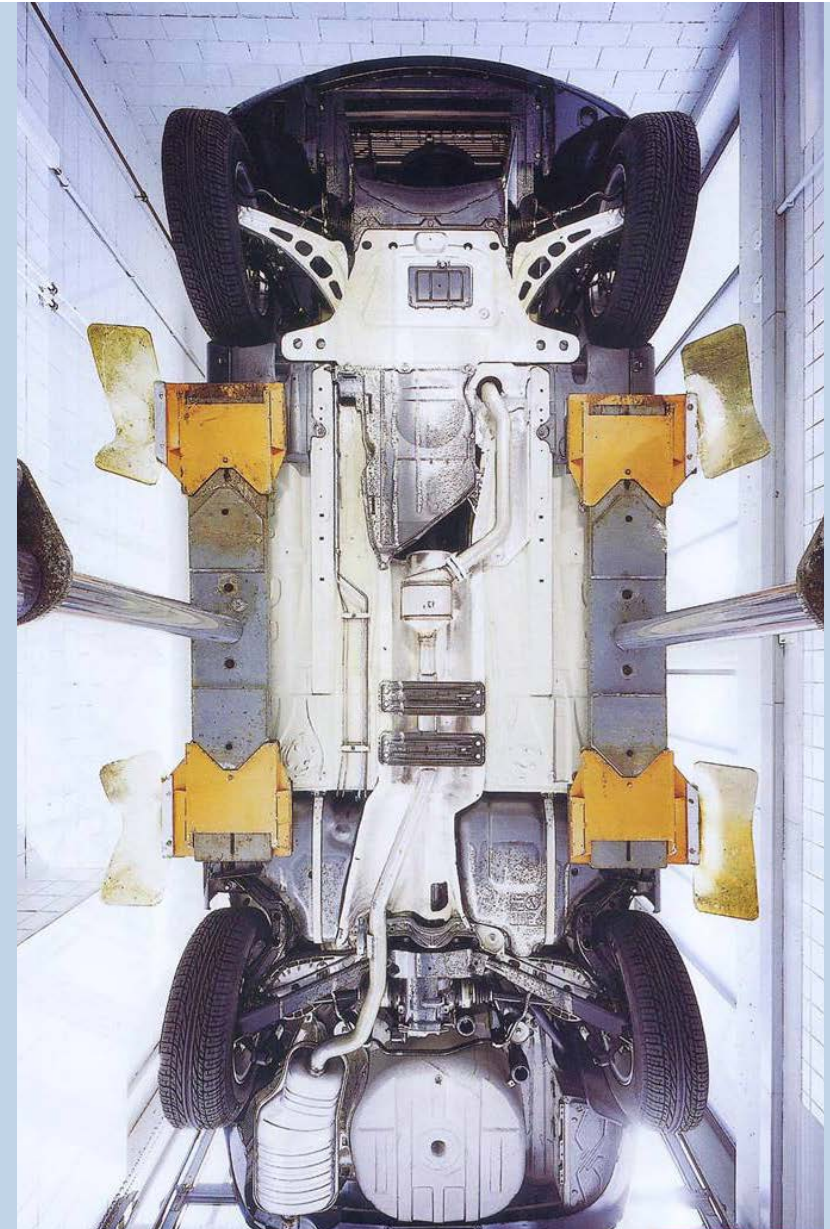
Catalytic converters for passenger cars

Today's catalytic converters depend on stainless steel

The introduction of catalytic converters for passenger cars has been a major step in improving air quality.

However, the catalytic converter changes temperature conditions in the system in such a way that only highly corrosion resistant materials are able to cope.

Without stainless steel, the current level of pollution reduction would not have been possible.



Photos: Christoph Seeberger

Stainless Steel for a cleaner world

All-stainless catalytic converters

Full performance right from the start

The latest generation of catalytic converters uses stainless steel not only for the housing, but also as a carrier material for the catalytic substance. They are lighter than classic ceramic models, almost unbreakable and more energy efficient.

As the metallic foil, which may be as thin as 30 micrometers, is an electrical conductor, it can be used as a heating element. All-stainless catalytic converters reach maximum efficiency immediately the engine has been started.



Photos: VDM

Stainless Steel for a cleaner world

Diesel particulate matter filter for light utility vehicles

Stainless steel helps trucks quit smoking

Diesel engines of trucks, commercial vehicles and passenger vehicles are a major source of soot emissions into the environment.

A new, lightweight diesel particle filter can eliminate 95% of black smoke and 85% of soot particles from diesel exhaust gases.

Ranging in weight from 2 to 43 kg, the filter consists of 90% stainless steel (grades 304 and 302). Over 8,000 units are currently in use in the Yokohama area.



Stainless Steel for a cleaner world

Diesel particulate matter filter for passenger cars

Stainless steel makes diesel passenger cars more ecofriendly

The exhaust gas of diesel vehicles is particularly noxious, containing microscopic particulate matter that penetrates deep into the respiratory system. Some automotive producers, especially in countries with a high percentage of diesel vehicles in their passenger car fleet (as high as 75% in some European countries) have anticipated impending environmental regulations and equipped exhaust systems with low-maintenance diesel particulate matter (DPM) filters. These filters can remove soot almost completely. Thanks to their excellent temperature resistance, manufacturability and economic qualities, ferritic stainless steels like 409 have proven to be the optimal solution for the DPM filter housings.



Stainless Steel for a cleaner world

Condensing boilers

Condensing boilers: stainless steel is a must

Condensing boilers are today's most energy-efficient heating method. They can achieve fuel-efficiency in excess of 100%.

The secret lies in the extraction of heat from the flue gas. By causing it to condense, the evaporation energy contained in the gas is released and made available for heating.

However, since the process involves inducing condensation, a highly corrosion-resistant stainless steel flue-gas system is required throughout.



Stainless Steel for a cleaner world

Rooftop solar panels

The sun: a source of free energy

Reducing the use of fossil fuel is good; dispensing with it altogether is even better.

Stainless steel solar panels can account for a considerable part of the energy needed for the preparation of potable hot water and room heating.



Stainless Steel for a cleaner world

Integrated solar panels

Stainless steel makes solar panels look good

Black chromated all-stainless steel solar panel modules can be used for roofing and cladding.

Besides providing energy, they even become an architectural feature.



Stainless Steel for a cleaner world

Fuel cells

Stainless steel in fuel cells

Fuel cells are the source of energy of tomorrow. Working from either natural gas or hydrogen, they generate heat and electricity with only one emission - water.

Fuel cells cannot only be used in cars. Their use in domestic heating systems is in development - with stainless steel and nickel-based alloys as necessary ingredients.



Photos: Tokyo Gas

Stainless Steel for a cleaner world

Photovoltaic cells

Stainless steel - a basis for green electricity

Stainless steel is also a suitable substrate for photovoltaic roofs and facades.

Especially in sunny climates, the use of classic fuels can be drastically reduced.

Photoelectric power generation can make a major contribution to energy saving.



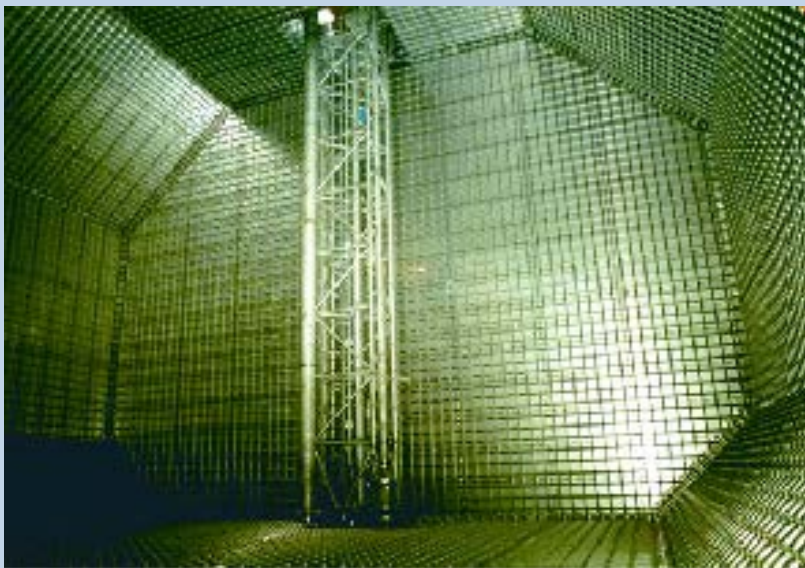
Stainless Steel for a cleaner world

Liquefied Natural Gas transport

Liquefied Natural Gas - stainless steel makes LNG more accessible

Liquefied Natural Gas (LNG) is a clean source of energy. In Japan, it accounts for some 10% of the entire energy supply. The gas is transported at a temperature of -163°C .

Even at these cryogenic temperatures, stainless steel (typically 304) does not become brittle. Thanks to its mechanical strength, a wall thickness of 1,2 mm is not only enough but even gives a comfortable safety margin.



Stainless Steel for a cleaner world

Industrial waste water plants

Air-conditioning becomes environmentally friendly with stainless steel

Globally, more energy is spent on cooling than on heating. Deep water cooling systems reduce the energy requirement by 75%.

The systems carry water from the water table, which (depending on geological conditions) may have a consistent temperature as low as 4°C. Through heat exchangers, the warm air produced in office buildings - by solar radiation, human beings, lighting and office equipment - is cooled down.

As stainless steel (typically grade 316) is neutral, the water can then be made available to the municipal water supply system. In one location in Toronto, Canada, the system prevents the production of 40,000 tonnes of carbon dioxide per year.



Photos: APV Solutions and Services

Stainless Steel for a cleaner world

Municipal waste water plants

Stainless steel is made to last - in sewage treatment too

Sewage treatment is an achievement of our technical civilisation that is essential to protect rivers and oceans and keep the population healthy. However, the composition of the waste water (there is a complex interaction between chemical, biological and mechanical factors) can make corrosive conditions extremely demanding. The production of hydrogen sulphide, especially, is a challenge to most materials.

Durability and maintenance-friendliness being key factors in life-cycle costing, municipal and industrial waste water treatment today involves stainless steel in pipe-work and process equipment. Grade 316 is the most widely used stainless steel for this application.



Photos: Butting

Stainless Steel for a cleaner world

Waste water decontamination

Stainless steel decontaminates waste water

In the case of waste water, ozone and UV treatment units ensure that the industrial and urban waste water is chemically and bacteriologically safe before it goes back into rivers and the soil.

Efficient waste water preparation requires corrosion-resistant materials, since the composition of waste water is often unpredictable.



Photos: Trojan Technologies

Stainless Steel for a cleaner world

Prefabricated waste water plant

Prefabricated stainless steel waste water plant

The planning and erection of waste-water treatment plants is, typically, a long process. However, there can be situations where the need to introduce or improve waste water treatment becomes urgent. Peaks in the number of tourists flooding small seaside resorts, sudden and dramatic changes in the ecosystems of rivers and lakes or the failure of existing plants can require quick intervention.

For these situations, there are prefabricated stainless steel waste-water treatment units, that can be erected very quickly. In this installation, in San Martino di Castrozza (Italy), grade 304 has proved adequate and cost-effective.



Photos: Centro Inox, Milan, Italy

Stainless Steel for a cleaner world

Composting

Composting is good for nature, but a challenge to metals

Waste separation is now standard in many parts of the world - the organic fraction of waste being made available for composting. What is good for the environment, however, is a challenge to the materials used in composting plants, since the composting process releases strongly corrosive gases.

Stainless steel - otherwise used mainly for its decorative qualities - is selected because it makes the buildings last longer and is therefore more economic.



Stainless Steel for a cleaner world

Paper and cardboard recycling

Stainless steel brings paper and cardboard recycling to a new level

The recycling of cardboard and paper is a major contribution to the reduction of the waste stream, on the one hand, and the protection of our woodland (the source of cellulose fibres) on the other. The process involves temperatures of up to 100°C and aggressive chemicals for the de-inking and cleaning of the pulp.

Grade 304 and 316 have been used successfully, as in the Saudi Arabian example shown here.



Stainless Steel for a cleaner world

Urban separate waste collection system

Stainless steel convinces citizens of recycling

Recycling the paper, plastic, metal, glass and organic waste of private households requires the active support of citizens and their willingness to accept separate collection. In the Spanish city of Ponferrada, authorities have installed numerous recycling points all over the town. These consist of large underground containers into which people can drop recyclable materials, through stainless steel collectors. As street furniture, they are perceived as attractive enough to be placed in the elegant main shopping precinct and the tourist hotspot of the medieval old town.

Making recycling installations attractive and resistant, stainless steel helps protect the environment and keep the city clean.



Photos: City of Ponferrada (León), Spain

Stainless Steel for a cleaner world

Stainless Steel - Water for the growing world

Water is mankind's most precious resource.

Stainless steel is an ideal material to handle this element of life.

Let us take you on a guided tour of the known and more obscure applications of this material in a water context:

- Production
- Storage
- Distribution
- Use
- Sewage

Introduction

- A scarce resource

Production

- Desalination of sea water
- Sanitisation: Healthy water
- Pulp and paper production
- Production and treatment

Storage

- Water reservoirs
- Seismic design

Distribution

- Underground pipework

Use

WATER 1 Selfrunning

Water for the growing world

The Recycling of Stainless Steel

Today, environmental issues are important criteria for material selection.

The stainless steel industry has an excellent environmental track record.

In evaluating the environmental properties of a material, recycling is a key element.

Let us look at the recycling of stainless steel in greater detail.

We:

- Use primary energy sparingly
- Save non-renewable resources
- Reduce the waste stream

- Introduction
- Worthwhile recovery
- A worldwide market
- Re-melting
- Recycled content
- Input composition
- Time lag
- Growth in production
- Quality maintained
- Summary

Credits

RECYCLING Selfrunning

The Recycling of Stainless Steel