

# The history of stainless steels

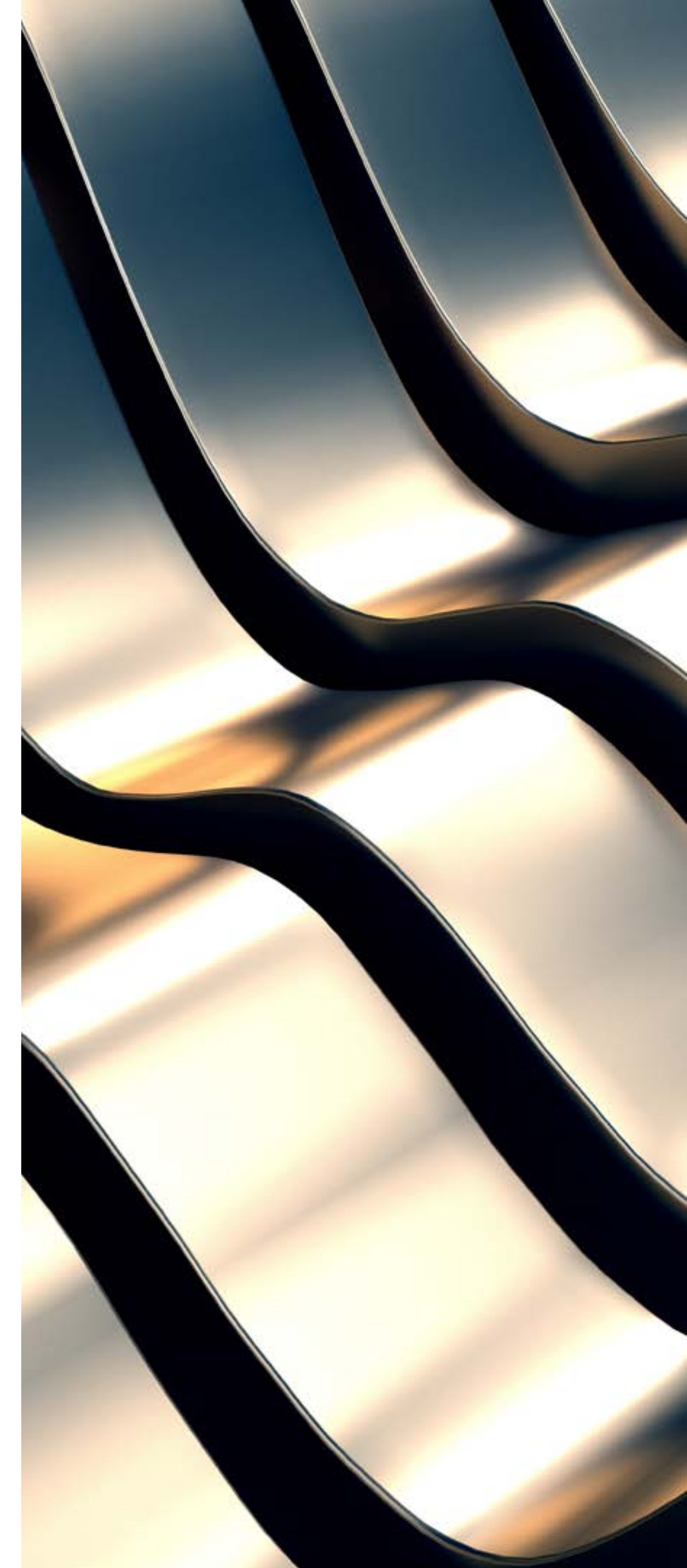
Mankind has utilised iron for thousands of years. Yet it is only within the past 150 years that metallurgists have learnt how to make steels, control their properties and mass-produce them with a consistent level of quality.

During the 19th century, a number of scientists discovered the excellent corrosion resistance of chromium alloyed steels. But it was not until the early decades of the 1900s that the first stainless steel was

patented and manufactured.

These events mark the start of the stainless steel industry. An industry that has, over the past 100 years, made a significant contribution to the development of our world.

Sources: [The History of Stainless Steel](#) (Harold M. Cobb), [British Stainless Steel Association](#), [Wikipedia](#), [The Avesta Works](#), [Japan Stainless Steel Association](#)



**4000 BC**

First evidence of the use of iron.

**3000 BC**

Chinese Qin dynasty uses chromium to strengthen weapons and protect them from corrosion.

**300 BC**

Wootz steelmaking technique develops in India and Sri Lanka. The technique spreads across the Arabian peninsula.

**1100 to 1300**

Wootz steel comes to the attention of Europeans in the form of Damascus swords

The swords are extremely strong, shatter-resistant and could be sharpened to a fine blade. Many people have attempted to replicate the steelmaking technique since, though no-one has yet succeeded.

| [Photo courtesy of wikipedia.org](https://www.wikipedia.org)

1400



Cutlery made of steel begins to appear in Britain

Today most cutlery in the Western world is made using stainless

steel owing to its hygienic properties and ease of cleaning ([more information](#)). Also chopsticks can be made of stainless steel ([more information](#))

| Photo courtesy of: Artefe Company

1740

Benjamin Huntsman develops the crucible-casting method, enabling mass-production of steel for the first time.

The production of stainless steel has grown rapidly since the end of WWII. Statistical information can be found at [worldstainless.org/statistics](http://worldstainless.org/statistics)

1751



Axel Fredrik Cronsted discovers nickel.

For further information visit [nickelinstitute.org](http://nickelinstitute.org)

| Photo courtesy of: [www.wikipedia.com](http://www.wikipedia.com)

1778



Karl Wilhelm Scheele discovers molybdenum.

For further information visit: [www.imoa.info](http://www.imoa.info)

| Photo courtesy of: International Molybdenum Association (IMOA)



1797



Nicolas-Louis Vauquelin discovers chromium

For further information visit [icdchromium.com](http://icdchromium.com)

[icdchromium.com](http://icdchromium.com)

Photo courtesy of the International Chromium Development Association

1821

Pierre Berthier publishes the results of his studies into chromium alloys and ferro-chromium.

1871

John T. Woods and John Clark recognise the commercial value of corrosion-resistant chromium alloys and obtain a British patent for a "Weather Resistant" alloy.

For further information visit [worldstainless.org](http://worldstainless.org)

1904 to 1911



Leon Alexandre Guillet publishes research into iron, chromium and nickel alloys that today would be classed as stainless steel.

Guillet did not however describe the passive layer, one of the most important characteristics of stainless steel.

For further information visit [worldstainless.org](http://worldstainless.org)

1907



First commercial electric arc furnace (EAF) established in the United States. Today, almost all stainless steel is produced using the EAF method.

For more information on how stainless steel is produced, please consult the different sources that are mentioned on [worldstainless.org](http://worldstainless.org)

| Picture courtesy of: ArcelorMittal

1909

Albert Marcel Portevin took over Guillet's research and, together with W. Giesen, publishes information on stainless steels that are roughly equivalent to modern austenitic, martensitic, and ferritic stainless steels.

As with Guillet, they did not describe the passive layer. For an entertaining explanation of what stainless steels are - iron-chromium alloys, whose range of applications can be extended by adding further elements like nickel or molybdenum: [youtu.be/l4Z1UVWm3DE](https://youtu.be/l4Z1UVWm3DE)

1910 to 1911

Philipp Monnartz and William Borchers obtain a German patent for stainless steel.

Monnartz publishes: A Study of Iron-Chromium Alloys with Special Consideration of their Resistance to Acids. He is the first to explain that stainless steel requires at least 12% chromium and a controlled amount of carbon. It will be many years before the passive chromium oxide layer theory is published. For an entertaining explanation of what stainless steels are - iron-chromium alloys, whose range of applications can be extended by adding further elements like nickel or molybdenum: [youtu.be/l4Z1UVWm3DE](https://youtu.be/l4Z1UVWm3DE)

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## 1911 to 1914

Frederick M. Becket and Christian Dantsizen discover a number of ferritic chromium stainless steels.

For more information on the different categories of stainless steel, visit [worldstainless.org](http://worldstainless.org)

## 1912

While working for Krupp, Eduard Maurer and Benno Strauss are granted patents on two chromium-nickel stainless steels.

The first alloy is a martensitic grade, while the second is an austenitic grade. For more information on the different categories of stainless steel, visit [worldstainless.org](http://worldstainless.org)

## 1913



Harry Brearley discovers martensitic chromium stainless steel while seeking a corrosion-resistant alloy for gun

barrels.

He casts the first commercial martensitic chromium stainless steel. In 1915 Brearley obtains Canadian, French and US patents. For more information on the

different categories of stainless steel, visit [worldstainless.org](http://worldstainless.org)

Since Brearly hometown was known for manufacturing cutlery, he immediately saw an opportunity to test his new invention. He met up with an old schoolmate by the name of Ernest Stuart who at the time was a manager at Mosley's Portland Works. After a serious of test, Stuart named it "stainless steel"-since then the name never changed.

Picture courtesy of the British Stainless Steel Association



1919



Elwood Haynes obtains a patent on martensitic stainless steel.

His first application in 1911 was denied because the US

Patent Office had already registered Brearley's patent and others on chromium steels. For more information on the different categories of stainless steel, visit [worldstainless.org](http://worldstainless.org)

Photo courtesy of the Elwood Haynes Museum Archives

1919 to 1923



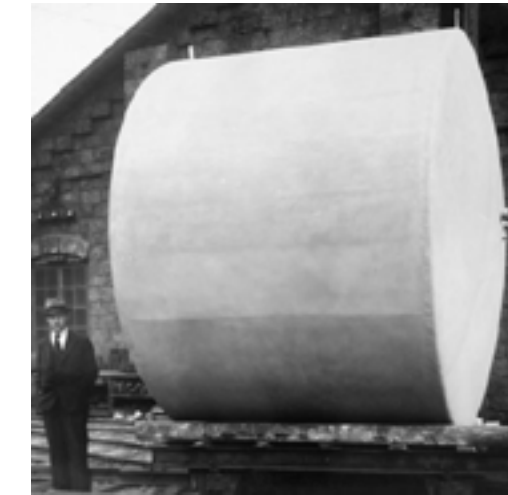
Sheffield cutlers start regular production of stainless steel cutlery, surgical scalpels and tools. Early stainless tableware such as

dishes and bowls also started to appear at this time.

For more information visit [worldstainless.org](http://worldstainless.org)

Photo courtesy of the British Stainless Steel Association

1925



Stainless steel is used for a chemical tank for the storage of nitric acid.

Generally speaking it is the ability

to withstand attack by highly corrosive chemicals that creates such a high level of demand for these alloys within the chemical and petrochemical industrial sectors. More detailed information can be found at [worldstainless.org](http://worldstainless.org)

Photo courtesy of Outokumpu

1926

A stainless steel having 18% chromium and 8% nickel is introduced into surgical implant applications.

The material is noted to be much more resistant to bodily fluids and stronger than the vanadium steel introduced by Sherman for his fracture-fixation plates. The ease with which stainless steel surgical instruments and appliances can be kept clean and sterile provides an obvious illustration of the way the material helps to safeguard our health. However, there are so many less obvious ways in which the contribution of stainless steel to our well-being is of growing importance.

More information on [worldstainless.org](http://worldstainless.org)

1927



Heil Truck of Milwaukee (USA) produces a welded stainless steel tank of chromium stainless steel.

The modern dairy industry requires the use of cleanable, corrosion-resistant stainless steel equipment to meet the needs of milk product consumers everywhere:

[worldstainless.org](http://worldstainless.org)

Photo courtesy of Turid Bjørnsen on fotolia.com

1928



The brewery industry installs the first stainless steel fermenting vessel.

The discovery of stainless steel early in the 20th

century was a milestone event for the food and drink processing industries. This wonderfully hygienic and durable alloy has become a favourite in domestic kitchens and for the very same reasons, it is the material of choice in industries as diverse as the processing of milk and dairy products, beer and wine making, confectionery, cooked meats and many, many more. More on [worldstainless.org](http://worldstainless.org)

Photo courtesy of Ewwwgenich1 on fotolia.com

1929

William J. Kroll of Luxembourg is the first to discover precipitation-hardening stainless steel.

He used titanium. Kroll developed the Kroll process for refining titanium and zirconium. For more information on the different categories of stainless steel, visit:

[worldstainless.org](http://worldstainless.org)

1930



Duplex stainless steel is produced for the first time at the Avesta Ironworks (Sweden). The microstructure of the alloy consists

of both ferrite and austenite.

Duplex stainless steels account today for about 1% of the total stainless steel production. For more information about these steels and their fabrication, visit:

[worldstainless.org](http://worldstainless.org)

Photo courtesy of: Calle Eklund on wikipedia.com



1930



Chrysler Building, with its decorative stainless steel capping, becomes the tallest building in the world.

The title of tallest building passes to the Empire State Building just eleven months later. Today the use of stainless steel cladding for building exteriors is no longer an exception. More information and examples can be found at [worldstainless.org](http://worldstainless.org)

Photo courtesy of: Catherine Houska, Nickel Institute

1930



Avesta Jernverk receives a record order during the early 1930s for stainless steel heavy plate.

The order for 1,500 tonnes of stainless steel plate was for use at the Aswan Dam in Egypt to protect the original dam while its height was raised.

[worldstainless.org](http://worldstainless.org)

Picture courtesy of Sharaf Al Deen via Wikimedia Commons

1931



The world's first stainless steel aircraft, the Pioneer, is built by Edward G. Budd Manufacturing Company in Philadelphia.

For more information visit: [worldstainless.org](http://worldstainless.org)

Photo courtesy of: Andrew Bossi on wikipedia.com

1932



The Supermarine S6B gives the Royal Air Force its third consecutive win in the Schneider Trophy race for seaplanes, thus ensuring the

trophy remains forever in the UK.

The Rolls-Royce aero engine which powered this achievement had stainless steel shafts, rods, valves and spindles. [worldstainless.org](http://worldstainless.org)

Photo courtesy of wikipedia.com

1934



SS Queen Mary is launched, with stainless steel featuring strongly in her kitchens, swimming pools, interior decor and turbine engines.

Although stainless steel is very rarely considered as a candidate for ships' hulls, its uses throughout the ship and boat-building industry are many and varied: [worldstainless.org](http://worldstainless.org)

| Photo courtesy of the British Stainless Steel Association

1935



In approximately 1935, sinks made of 18-8 stainless steel begin to be installed in new homes, instead of porcelain-enamelled cast

iron sinks.

For more information visit [worldstainless.org](http://worldstainless.org)

| Photo courtesy of the Japan Stainless Steel Association

1936



Six Deluxe Sedan stainless steel cars roll off the Ford production line in Detroit.

After driving more than 320,000 km

the vehicles were sold to private owners in 1946. Four of the vehicles still exist. The stainless steel bodies have outlasted most of the non-stainless parts of the vehicle. Although modern cars do not use stainless steel extensively, they do make use of stainless steel components in common with trains, ships and airplanes. More information on how stainless steel helps the world move can be found at [worldstainless.org](http://worldstainless.org)

| Photo courtesy of the British Stainless Steel Association

1941



A pier in Progreso, Mexico using stainless steel reinforcement is erected. Ever since it has been maintenance free.

Why use stainless steel reinforcement? An interesting question, that is answered by the following website: [stainlesssteelrebar.org](http://stainlesssteelrebar.org)

| Picture courtesy of the Nickel Institute



1942



Type 430 stainless steel, a ferritic chromium alloy, is used to make wire 0.1mm in diameter for voice-recording machines.

Thousands of miles of this wire were used for this purpose during World War II. Stainless steel bars and wires enable the world to communicate. In this animation you can discover how much stainless steel is used in the small parts of tools we use every day. More details on [worldstainless.org](http://worldstainless.org)

| Photo courtesy of Yio on fotolia.com

1952



Stainless steel turbine blades are a leading feature of the world's first gas turbine driven railway locomotive.

More information on stainless steel in railways: [worldstainless.org](http://worldstainless.org)

| Photo courtesy of Don Ross

1953



Oxygen breathing apparatus in stainless steel helps Hillary and Tensing to conquer Mount Everest.

Stainless steel also contributes to our health in everyday life through its hygienic properties: [worldstainless.org](http://worldstainless.org)

| Photo courtesy of the Royal Geographic Society

1954



The first stainless steel underwater TV camera is made.



1956



The first stainless steel razor blades are introduced by Wilkinson Sword in England.

Stainless steel is the perfect

material for those situations where hygiene is important. Find out more about stainless steel and hygiene at [worldstainless.org](http://worldstainless.org)

| Photo courtesy of: Black Beast

1956



The first major nuclear power plant opens in England.

More information about stainless steel and power

generation can be found at: [worldstainless.org](http://worldstainless.org)

| Photo courtesy of Sellafield Ltd

1958



Stainless steel is adopted in Japan for railway carriages.

Many railcar operators have chosen

to construct carriages from austenitic stainless steel, in preference to alternative materials such as carbon steel and aluminium alloys, as this choice carries several safety-related benefits. [worldstainless.org](http://worldstainless.org)

| Photo courtesy of Tokyu Car Corporation

1966



The world's first tidal power station, near St. Malo, France is completed with stainless steel turbine blades.

More information about stainless steel and power generation can be found at [worldstainless.org](http://worldstainless.org)

| Photo courtesy of [altenergymag.com](http://altenergymag.com)

## 1967 to 1973



NASA uses stainless steel in all 13 Saturn V rockets used as part of the Apollo space programme. In 1969, Apollo 11 brought the first

stainless steel to the moon.

Stainless steel is still used for aerospace applications: [worldstainless.org](http://worldstainless.org)

| Photo courtesy of: NASA (National Aeronautics and Space Administration)

## 1980



Italian buses begin using type 304 stainless steel in construction.

The buses are 10% lighter, have a 10% improvement

in crash worthiness of the passenger compartment, require less maintenance, and are more fuel-efficient. In 2008, 80% of the buses are stainless.

These days stainless steels are increasingly used in the body and chassis structures of buses and coaches worldwide. More information on [worldstainless.org](http://worldstainless.org)

| Picture courtesy of Custom Coaches

## 1980



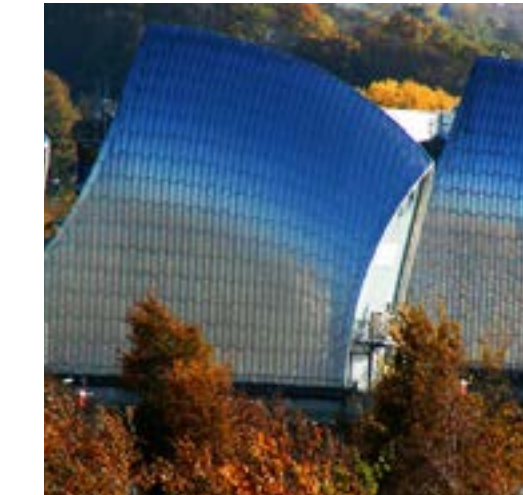
In 1980, to combat the scourge of leaks, the city of Tokyo in Japan, instituted a three part solution to the problem:

- replace the existing pipes with type 316 stainless steel and cast iron mains with ductile iron
- improve leakage detection
- improve response time when a leak is detected

The leaks in the city were reduced from 15% to 2%. More information on [worldstainless.org](http://worldstainless.org)

| Picture by Philippe De Putter

## 1982 to 1986



The Thames Barrier in London becomes the longest movable flood barrier in the world. The ten stainless steel gates protect an

area of 125 square kilometers from storm surge tides.

The title of longest flood barrier passes to the Oosterscheldekering dam when it opens in 1986. The dam includes 62 steel doors. Stainless steel does not only help protect us from water, it is also an excellent material to provide us with clean water. More information can be found at [worldstainless.org](http://worldstainless.org)

| Photo courtesy of: Judith Duddle, provided by the British Stainless Steel Association



1984



The Ford Motor Company mass-produces partial stainless steel exhaust systems.

Before the turn of the century, all cars produced in North America will have exhaust systems made completely of stainless steel. More on stainless steels and automotive applications on [worldstainless.org](http://worldstainless.org)

| Photo courtesy of: 3Desc, [www.fotolia.com](http://www.fotolia.com)

1989



Ferritic stainless steel is first used as a large scale roofing material.

For further information: [youtu.be/ZQledV2QFRY](https://youtu.be/ZQledV2QFRY)

| Photo courtesy of Jackin, [www.fotolia.com](http://www.fotolia.com)

1993



La Pyramide Inversée in front of the Louvre Museum in Paris is completed.

Individual glass panes in the pyramid, 30 mm thick, are connected by stainless-steel crosses 381 mm in length. After dark, the structure is illuminated by a frieze of spotlights.

| Photo courtesy of: Dr Nicole Kinsman, IMOA

1995



The building of the European Court of Human Rights is completed. The façade is made of stainless steel.

For further information: [worldstainless.org](http://worldstainless.org)

| Photo courtesy of: European Court of Human Rights



1998



Stainless steel is used extensively in the Petronas Towers. At 452m, the buildings remain the tallest in the world until 2004.

Stainless steels are not only used for their corrosion resistance, but also for their strength. Therefore they are an excellent material for structural applications. More information can be found on [worldstainless.org](http://worldstainless.org)

| Photo sources from Shutterstock

2006



China becomes the biggest stainless steel producer in the world.

For more statistics on stainless steel production, visit

[worldstainless.org](http://worldstainless.org)

| Photo courtesy of Anton Balazh, [www.fotolia.com](http://www.fotolia.com)

2006



First flight of the Lockheed-Martin Joint Strike Fighter.

For more information on the different categories of stainless steel,

visit [worldstainless.org](http://worldstainless.org)

| Photo courtesy of: Lockheed-Martin

2006



The Atomium in Brussels, Belgium was renovated with stainless steel cladding.

Many beautiful artworks are

clad with or completely out of stainless steel. More examples can be found at: [worldstainless.org](http://worldstainless.org)

| Photo sources from Shutterstock

2010



The Burj Khalifa in Dubai is opened on 4 January 2010. At 829.84m in height, it is currently the tallest structure in the world.

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| Photo courtesy of Philipus, [www.fotolia.com](http://www.fotolia.com)

2019



Stainless steel microwaveable boxes see the light. These containers have had their corners specially designed so they do not cause

problems when used in a microwave oven. More information on [worldstainless.org](http://worldstainless.org)

| Photo courtesy of Black+Blum

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## About worldstainless

worldstainless is a not-for-profit research and development association which was founded in 1996 as the International Stainless Steel Forum.

Its primary roles are to undertake stainless steel industry beneficial tasks that are better coordinated centrally in the fields of

- Promoting industry and material sustainability benefits
- Conserving resources and promoting the circular economy
- Providing economic and industry-leading statistics
- Support industry health & safety needs and developments
- Outlining market development and expansion opportunities
- Maintaining brand reputational positioning
- Materials education

## Contact

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## Disclaimer

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