

Stainless Steel in Self-Service Machines



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Why stainless steel?

Self-service machines – dispensers, vending machines, ticket machines etc. – must meet a number of requirements:

- When they are for food products, they must be inert and easy to clean.
- When placed in public locations, they are exposed to accidental damage, intrusion attempts and vandalism. The materials used for the body should have a high level of mechanical resistance. Even when the surface is scratched or dented, the damaged area should not become susceptible to corrosion.
- In outside locations, they must withstand humidity and UV radiation.

Stainless steel has an ideal profile and is available in many different suitable grades. The most common one is the classic chromium-nickel stainless steel 304. Its excellent weldability and formability facilitate fabrication. When cost is a concern, ferritic stainless steels are an option. They are essentially iron-chromium alloys. The lowest cost variant is 12 % chromium stainless steel. Its corrosion resistance is lower than that of type 304; however it is an excellent choice when the bodies of the machines shall be painted. It does not require primers or other protective layers prior to coating, which simplifies manufacturing significantly. Chromium-manganese stainless steels of the 200 series are found in mechanical parts because of their high strength properties.



Wall Mounted Water Vending Machine
Source: waterth.com



The first beer crate vending machine in Belgium.
Source: nieuwsblad.be

Vending machine fronts

Stainless steel front panels have multiple functions: not only do they look good; they are also a safety feature. Austenitic stainless steel, when deformed under great pressure and at high speed, develops a phenomenon known as work hardening, i.e. its mechanical strength increases. As stainless steel doors are more difficult to break open than carbon steel doors of the same wall thickness, they are often used for machines containing valuable products or cash money that is attractive for burglars.



Stainless steel front door of a wall-mounted machine.
Photo: Online Vending Machine Sales & Service, Inc. (USA),
www.onlinevending.com



Keypads

Vending machine keypads are exposed to wear and tear and must be mechanically resistant to ensure long-term reliable service. Stainless steel is recognized as the most suitable material for this purpose. Lettering can be provided by laser-etching. The resulting troughs in the surface are filled with special paints that are resistant to abrasion. An alternative is protrusive engraving. Stainless steel has outstanding formability, which makes it possible to reproduce the most subtle contours with a high degree of precision and repeatability. The stainless steel surfaces are insensitive to water and dirt; the electronic components on the rear are encapsulated in a special membrane. Stainless steel is the perfect solution to shield sensitive electronics from robust environments.

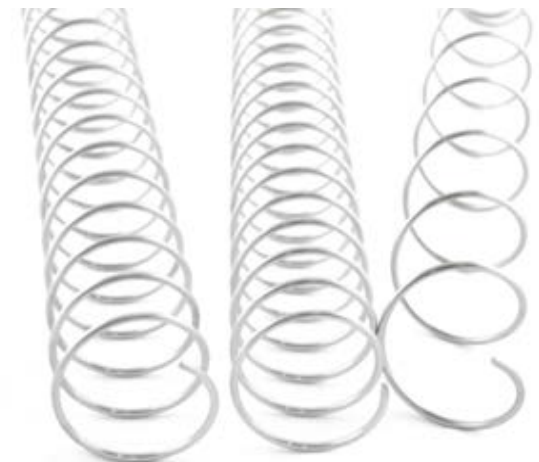


*Stainless steel numerical key pad.
Photo: Dupokey Electronic Co., Ltd. (PR China),
www.dupokey.com*

Mechanical parts

In vending machines, reliable delivery of the product is taken for granted. Products like chocolate bars are inserted vertically into spirals. Rotation of a spiral moves the product towards the front and makes it drop it into a chute from where the customer picks it up.

It is essential for the spirals to maintain their geometrical shape even after thousands of recharging operations and in the event of product jams. The wire used to make the spiral can be type 204 stainless steel. This grade is used specifically for its mechanical properties. The proof strength of this grade can be about 50% higher than that of standard 304 stainless steel. Yet, it retains enough formability for the wire to be shaped.



Stainless steel wire for the product transport spirals must have high mechanical strength to ensure trouble-free delivery of the product.

*Photos: Euro Inox (Belgium), www.euro-inox.org (above),
Colombi Mollificio (Italy), www.colombimollificio.com (below)*

Beverage dispensers

Stainless steel is an obvious choice for parts that come into direct contact with food or drink. It is also common for components that require regular cleaning. However, quality-minded customers specify stainless steel also for the body of their machines, even if the dispensers will eventually be spray-painted.

Manufacturing becomes more cost-efficient if the number of different materials used is minimised: only one type of stainless steel needs to be purchased, stocked and handled. Identical forming and joining techniques and consequently a single set of equipment can be used for visible and non-visible parts.

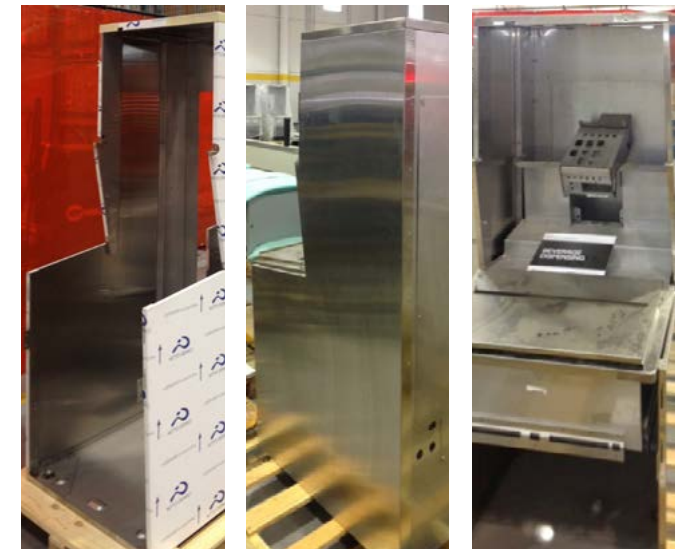
The full stainless steel approach avoids a number of design and fabrication issues: questions of galvanic compatibility between various metallic materials do not arise. The design does not need to take different rates of thermal expansion into account. Surface preparation prior to spray painting is minimal.

If a stainless steel body is damaged during transport and use, it will not rust, whereas in conventional models corrosion may spread underneath the coating and make it spall off. The use of stainless steel prolongs the service life of machines considerably.



It is common practice to refurbish dispensers after about 10 to 15 years of use. Worn or dated mechanical and electrical equipment is replaced. Re-painting makes the body fit again for a second life cycle.

Re-painting may also become necessary when machines change owners or when a new corporate design is introduced. In this case, stainless steel bodies are easy to strip and spray-paint again without any need for additional metallic corrosion protection layers.



In soft drink dispensers, stainless steel is used in both visible and non-visible parts.

Photos: MSM Manufacturing de Mexico (Mexico), www.maysteel.com



Drinking water dispensers and vending machines

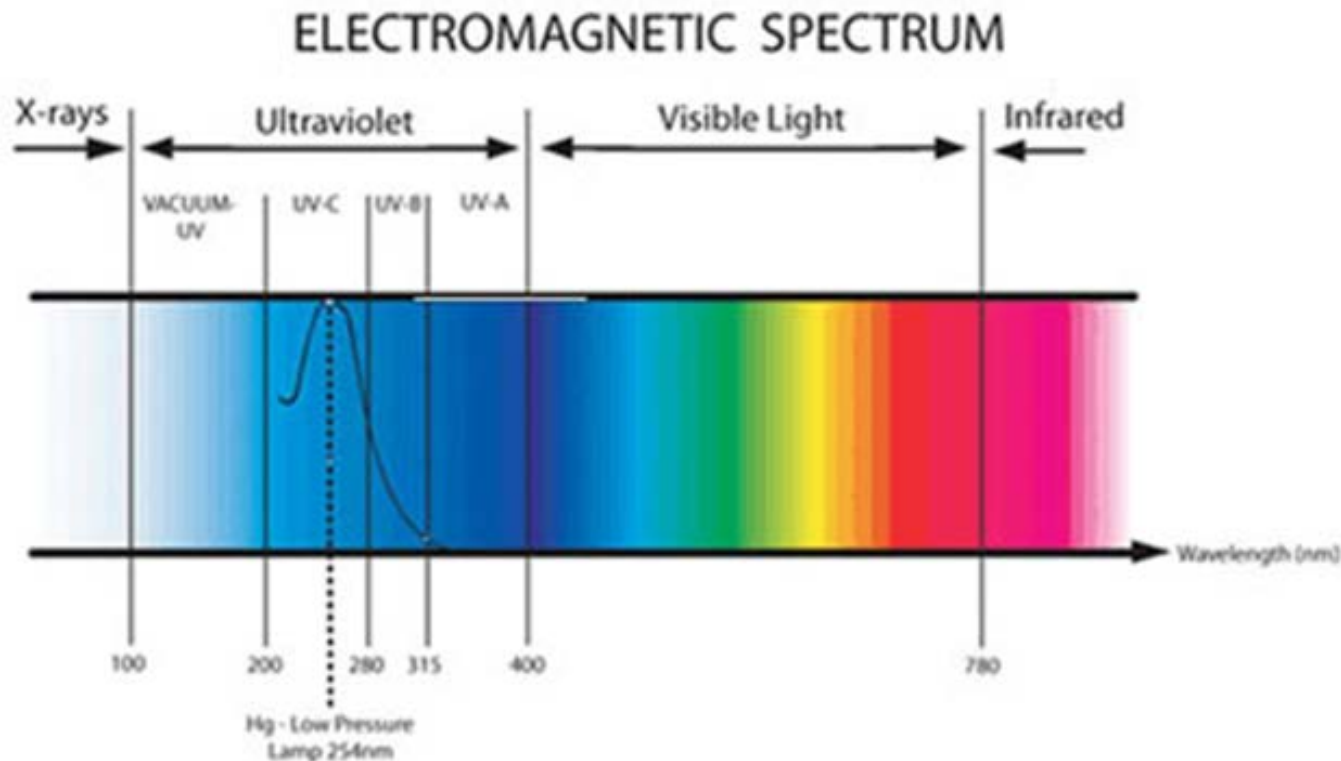
Perfect drinking water quality right from the tap cannot be guaranteed everywhere. Rising consumer requirements on the quality of drinking water have made the water industry a growing business. Sophisticated multi-stage purification and, if necessary, sterilisation of drinking water is provided by automated units from which customers can buy water, which is free of unwanted odours and tastes and also optimal from a microbiological point of view.



*Filtration and disinfection reassure consumers that their water is of optimal quality.
Photos: Liquid Action Systems Inc. (Canada) <http://www.liquidaction.com>*

For sterilisation, strong ultraviolet light of a specified wavelength – 254 nanometre – is used. It is exceptionally efficient in killing bacteria, viruses, yeasts and moulds. The reactors for this process are typically made from stainless steel, which is resistant to the UV radiation generated by the system and will not age under long-term exposure.

*Below: For water disinfection, UV light of 254 nm is effective.
Right: The stainless steel body of the water vending machine is indicative of the product quality.
Photos: Water Invention Company (Thailand),
www.waterth.com*



Milk vending machines

Milk vending stations have been available since the 1980s. With the rise of environmental concerns, consumers wished to reduce packaging waste by buying bulk products, where appropriate. There has also been growing awareness that buying regionally produced food minimises the environmental effect of transport. One of the answers is the “iron cow”. Customers bring their own containers and refill them. Bulk milk can be less expensive than packaged milk. Some farms and dairies also provide dispensers for specialties like milk with a natural fat content. Initially coin-operated only, modern machines incorporate up-to-date cash systems such as credit or debit card readers. They transmit data to the operator by a mobile phone link and alert the service staff when the product runs low or technical problems occur.

Stainless steel milk tankers on the road have made people associate dairy operations with stainless steel for decades. No wonder milk vending stations involve stainless steel in both the milk-contact surfaces and the body. The machines are suitable for indoor and weather-protected outdoor locations.

Milk is one of the most sensitive foodstuffs of all. Perfect hygiene and rigorous temperature control are pre-requisites of a safe supply chain. Proper logistics of bulk milk can be a challenge in rural areas. For the flexible delivery of fresh

milk in India, a farming company developed a novel system. Thermally insulated stainless steel mobile milk vending machines are mounted on vehicles. The tanks are filled with milk at the dairy and sealed with password protected digital locks to prevent tampering. The milk is dispensed at the customer’s doorsteps through an automatic vending machine attached to the mobile tank.



Mobile vending units are mounted to the delivery vehicles. The supply chain is tamper-proof. Photos: Progressive Farming Pvt. Ltd. (India), www.purensure.in



Bulk milk from vending machines is an economic and an environmentally friendly solution minimizing transport and packaging waste.

Photo: Risto (Germany), www.risto-gbr.com



Ticket machines and access control

Reliability requirements on ticket machines are extreme. They also contain valuable electronic equipment, and often cash money, making intrusion protection a priority. Ticket machines may be located outside on platforms or at bus stops and exposed to the elements. It is not surprising that many of them, even if they are painted to conform to the corporate identity scheme of the operator, are made from stainless steel. The doors provide multiple safety features, and material selection is one of them: as austenitic stainless steel work-hardens as it is deformed, it makes life difficult for criminals.



Photo right: The outside may be painted or have stainless steel or aluminium panels – the body is a full stainless steel design.

Photo: Höft & Wessel (Germany), www.hoeft-wessel.com



Ticket machines with turnstile for access control are often placed in humid environments – another reason to prefer stainless steel.

Photo: Wanzl Metallwarenfabrik GmbH



Coin-operated controls

Stainless steel is a good choice for coin or token-operated devices that control water or gas supplies. These machines are often used in wet humid environments like washrooms and should be easy to maintain.



Stainless steel cases for coin or token-operated controls contribute to a long and trouble free service life.

Photo: IHGE (Germany), <http://ihge.automaten24.info>



Summary

The reasons for using stainless steel in vending machines, dispensers and ticket machines are essentially economic in nature: simplified manufacturing, long service life, safety and ease of refurbishment. The wide range of stainless steel grades from the 300 (chromium nickel), 400 (chromium) and 200 (chromium manganese) series provides solutions for the body, mechanical components and food-contact parts. Attractive surfaces are an added advantage.



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About ISSF

The International Stainless Steel Forum (ISSF) is a non-profit research and development organisation which was founded in 1996 and which serves as the focal point for the international stainless steel industry.

Who are the members?

ISSF has two categories of membership: company members and affiliated members. Company members are producers of stainless steel (integrated mills and rerollers). Affiliated members are national or regional stainless steel industry associations. ISSF now has 65 members in 25 countries. Collectively they produce 80% of all stainless steel.

Vision

Stainless steel provides sustainable solutions for everyday life.

More information

For more information about ISSF, please consult our website worldstainless.org.

For more information about stainless steel and sustainability, please consult the sustainablestainless.org website.

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