**Pneumatic automation in the food industry**

The food industry is a vast sector that covers different production phases that are often automated, ranging from sourcing raw materials to market distribution, having passed through the transformation process. The production cycle involves machines and systems that use different technologies that often relate to pneumatic and mechatronic technology.

In addition to being high quality and reliable, components used in this environment must have special characteristics for specific use.

For example, when components come into contact with food, they must not contaminate it or affect its taste. As a result, suitable products that have been endorsed for use in a food environment must be used.

It must also be considered that machines and systems used to produce food are often washed or disinfected with aggressive chemicals, therefore components must be made of materials that are chemical-resistant, or at least protected from chemical attack.

**Automation in the food industry and material selection**

Automation has become indispensable, and has its own characteristics in each industry. In the food industry a particularly important aspect concerns the materials used, as industrial components are continually in contact with products, or form part of equipment used to process them.

Metal alloys are very suitable materials, especially stainless steels. The most widespread are AISI 303 and AISI 304, because they offer a good compromise between resistance to corrosion and workability. There is also AISI 316, which is more resistant to corrosion but more difficult to work with, and AISI 316L, where L stands for low-carbon, which is useful for preventing the precipitation of [chromium](https://it.wikipedia.org/wiki/Carburi) carbides [and](https://it.wikipedia.org/wiki/Cromo) therefore [corrosion](https://it.wikipedia.org/wiki/Corrosione).

Brass is used frequently because it is resistant to corrosion, has good ductility and workability features, and is therefore cost-efficient. However the issue of metal contamination has to be tackled, including lead. There are various low-lead alloys on the market, such as CW510L, which can be used directly or after specific lead sealing processes in the case of very stringent requirements, such as for the USA market.

Surface treatment and protection can help considerably in solving issues of compatibility with food and/or resistance to corrosion.

The choice of material for seals on pneumatic components with continuous sliding elements is also very important, and rubber approved by the FDA or other recognised body is often used. Some of the most common compounds used in this sector include FKM/FPM, EPDM and PTFE.

Finally, not to be forgotten are lubricants, which are nearly always present in pneumatic and mechatronic components and should also be approved, by the FDA for example.

**Components in contact with food or areas that undergo wash cycles**

Actuation forms the basis of automation, and pneumatic cylinders are often the components that are in contact with food. Metal Work provides a wide range of stainless steel cylinders, with diameters of 16, 20 and 25 mm and compliant with standard ISO6432; with diameters between 32 and 125 mm and compliant with standard ISO15552; and round cylinders with diameters from 32 to 63 mm. Seals made of polyurethane can be used where necessary, which is excellent at high speeds and has a long lifetime, or FKM/FPM, for temperatures up to 150°C and/or resistance against corrosion.

To accompany these cylinders Metal Work recently introduced a wide range of top quality fittings and accessories made of AISI 316L stainless steel. The quick-release clamp fittings include straight, curved, rotating and T fittings. The standard threads available range from 1/8” to 3/8”, with pipe guides from ø4 to ø10. There is also a series of fittings with threaded connections and push-on pipe connections. The most common accessories include flow regulators and check valves.

Metal Work also provides a series of cylinders with high corrosion resistance (HCR) for the food industry, with considerable levels of resistance at a lower price than that of stainless steel cylinders. This series was developed on the basis of specific requirements in the dairy industry, and is the result of extensive testing with different materials and treatments in collaboration with Brescia University. It behaves extremely well in applications where there is exposure to aggressive environments (dairy, fruit and veg etc.), or wash cycles with aggressive detergents (caustic soda, hydrochloric acid, lactic acid etc.). HCR cylinders are compatible with alkaline solutions with a maximum pH of 12, with acidic solutions with a minimum pH of 2.5, and in salt sprays for 500 hours, in accordance with standard DIN 50021. The white colour of the heads makes these cylinders distinct from the standard models.

Other essential components for use with liquids in the food industry are fittings. As an alternative to stainless steel fittings, Metal Work recently reviewed its series of brass fittings for the food industry. This review led to the development of a series suitable for the European market known as the F-E series. It is made of unleaded brass, the surface is treated, and typically shiny grey in colour. The F-NSF series has also been designed for the European and USA markets, made of low-lead brass with an additional lead removal process and no surface treatment, and is identifiable with its yellow colour. In both series NSF-approved Viton® seals are used.

The anti-corrosion Syntesi series is available for compressed air treatment units, filters, regulators, shut-off valves etc. Metal parts are made of brass or stainless steel, and the rest is made of high-performance technical polymers. This product is therefore suitable for use in environments where there are sprays of water or detergents that are not particularly aggressive.

There are also various stainless steel models that resist corrosion and washing in the case of pneumatic solenoid valves. The most attractive solution consists of islands of solenoid valves designed to be inserted into machines. Metal Work provides HDM or EB 80 valve islands for splash affected areas. The underlying concept is based on splitting the system into two - the area with fittings for air pipes within the machine section that will undergo washing cycles, and the area with electrical connections and fully-fledged valves outside this area, which therefore does not need to be resistant to water or cleaning fluids. A technical polymer flange in treated aluminium or stainless steel (as required) keeps the two areas separate with a seal. This offers the benefit of being able to wash the inside of the machine freely, without exposing the electro-pneumatic parts of the solenoid valves to damage or infiltrations.

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IMAGES

STAINLESS STEEL compact guided cylinders

STAINLESS STEEL fittings

Valves for the splash area