

## **Optimising actuator hygienic design for food & beverage production**

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**Food and beverage manufacturers are requiring cleaner, safer machine designs from their OEM machine builders. As the linear mover in many production applications, it's crucial that actuators are designed to ensure optimum hygiene, preventing the build-up of bacteria with the ability to withstand aggressive washdowns. When specifying an electric actuator, it's also vital that they ensure lasting use without the need for extensive, time consuming maintenance.**

Gerard Bush of motion specialist, INMOCO, explains the key considerations in actuator design.

Within food & beverage production, when linear motion is required, actuators are commonly present. As such, linear actuators are used in applications from packaging to handling the product itself, with processes such as forming, cutting, and slicing. The trend from food & beverage manufacturers to increasingly require cleaner, safer designs from their OEM machine builders, particularly within higher-risk processing environments, such as meat, cheese, dairy, seafood and poultry, is in turn pushing this demand to machine component manufacturers. For actuator designs, this means they must be optimised for hygienic use, while ensuring accurate performance, reliability, and long-life.

The design entry benchmark is to ensure legal compliance. Depending on geographical markets and end use, typically this will include adherence to the European Hygienic Engineering Design Group (EHEDG), as well as the 3A sanitary standards that represent the United States Department of Agriculture (USDA) and the Food & Drug Administration (FDA).

However, before looking at the specifics of actuator design, the first consideration is how the actuator should integrate with the wider machine in order to optimise hygiene. Open-frame machine architecture enables optimisation of the clean in place (CIP) principles, ensuring visibility for effective cleaning, as well as the ability to clean all required areas, in particular those in contact with or proximity to the product.

Coinciding with open machine design, the actuator requires stainless steel construction, with 316 stainless steel considered 'food grade' for its qualities in resistance to corrosion. Actuators such as Tolomatic's RSH design can withstand regular washdown with aggressive chemicals without developing corrosion blemishes that could harbour bacteria. In addition, the design form must avoid crevices and sharper angles that can accumulate bacteria and debris. Instead, rounded edges prevent food particles from collecting and pooling, while sanitary solutions can easily drain away after washdown.

Combined with stainless steel construction, robust seals are required to ensure that an actuator achieves an IP69K rating, signifying protection against dust and water ingress, including high pressure water jets used during washdown. Surrounding the actuator's thrust rod, seals prevent ingress that would otherwise cause corrosion and harbour bacteria. In order to minimise maintenance downtime and ensure actuator long-life, seals must also be durable to withstand washdown conditions. Polyurethane seals are suitable for most applications, with high tolerance of

abrasives like salt and sugar, but for use with the most abrasive caustic chemicals, polyurethane with UHMWPE should be used. For ease of maintenance, a cartridge design, like that used on Tolomatic's RSH actuator, enables quick seal replacement without the need for specialized tools, while its dual seal system increases protection.

To ensure effective operation and long life, an actuator for use in food & beverage applications also has to be able to withstand varying temperatures. Dealing with potentially freezing conditions through to high extremes, a versatile actuator for food & beverage production should be able to cope with a range spanning from -10° through to 40C°.

Additionally, an important design consideration is whether to integrate the motor or use a more traditional approach with a separate device. The advantage of an integrated system is a sealed unit, reducing potential points of ingress and with fewer points for bacteria collection. This design also increases the unit's protection, reducing maintenance requirements and increasing actuator longevity.

Following machine design and eventual installation, attention to appropriate ongoing maintenance should also be undertaken in order to maintain optimum hygiene and long-lasting operation. Typically, actuators are lubricated at the factory, ready for installation. However, the internal screw will require re-lubrication at pre-determined intervals. Actuators with grease ports, such as Tolomatic's stainless steel designs, help ensure optimum operating condition by allowing fast and simple lubrication without disassembly or the need for special tools.

For additional support on machine design and ongoing care, including actuators and motion control devices for hygienic food & beverage applications, INMOCO's engineers have extensive experience supporting OEM designers achieve the

requirements. While the demands of the food & beverage manufacturers continue to increase, by carefully following hygienic design principles, the value that machine builders provide can rise to the challenge with careful component specification.

**Image captions:**



**Image 1:** High standards define hygienic design principles for machines and components avoiding bacterial contamination of food and beverage products.



**Image 2:** Tolomatic RSH Hygienic Electric Rod Style Actuators.

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## About INMOCO

Established in 1987, INMOCO now offers an extensive range of motion control equipment including: compact servo amplifiers, position controllers, stepper motors, PLC controllers, linear motors, sensors, electric actuators and gearheads. INMOCO's product portfolio is supported by extensive applications and technical expertise, in addition to customer-specified electro-mechanical development and sub-assembly services; including calibrating and testing in a class 10,000 clean room facility.

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