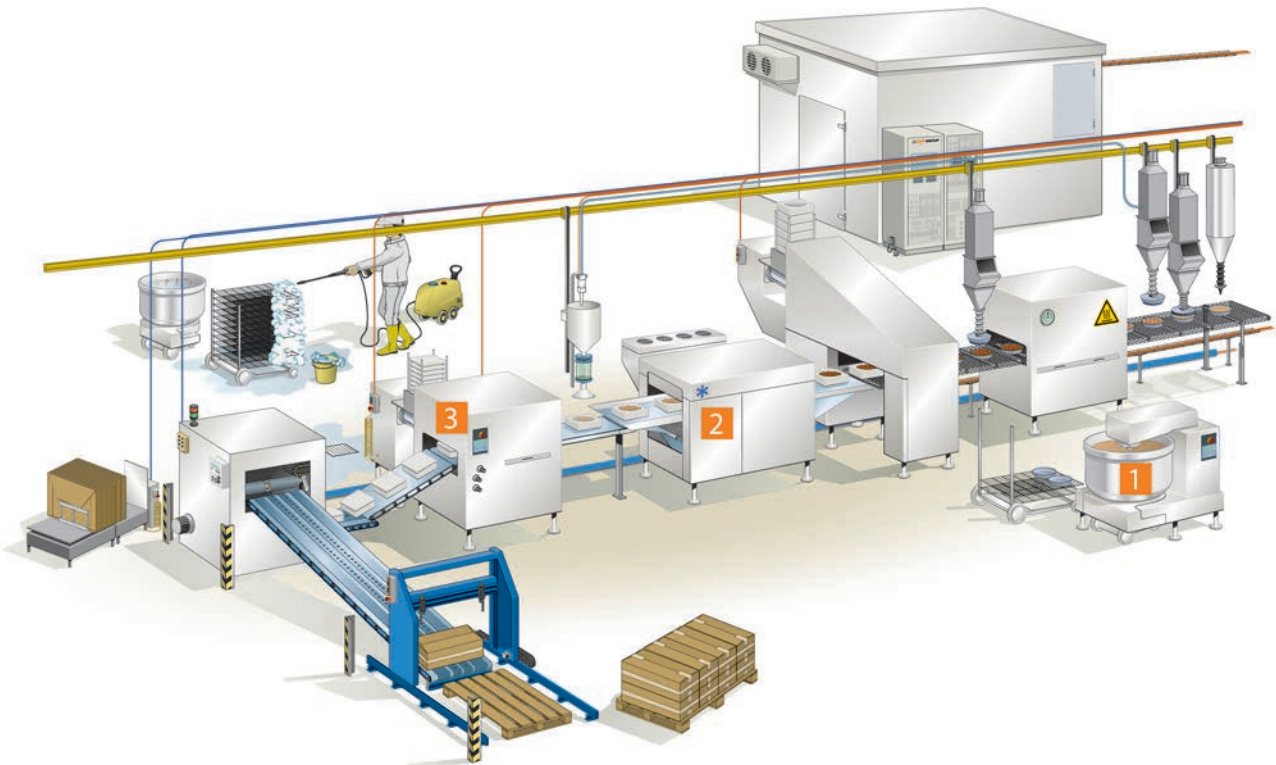




Cables and connectors for food and beverage industry

Wherever food is involved, hygiene is a priority. Thus, production facilities should follow the principles of hygienic design. This article talks about the cables, connectors and cable glands that play an important role in the process.

Minimising downtime, ensuring quality, providing maximum safety for employees – while these are priorities in all industrial sectors, they are particularly important in food production. In the food and beverage industry, if the processing of perishable foodstuff ceases, it not only leads to profit losses, but also high costs from waste disposal and recommencing production. Another extremely important factor for the industry is quality – if the quality is inadequate, consumers are not only dissatisfied, but they are also at a risk of developing health problems.

One of the crucial factors is regular cleaning of production facilities. When the cleaning crews use steam jets and acidic or alkaline cleaning agents to remove dirt and germs, the systems are subjected to high levels of strain. Another considerable burden is the common process of dry cleaning with aggressive

cleaning agents or dry ice, which is a rather new trend. Therefore, all components need to be designed in a way that makes them permanently sealed and functional, while being made from shapes and materials, which do not provide a breeding ground for germs.

Three hygiene zones

The first requirement is always to select and use the right components. Industrial work groups, such as the 'Safe Food Factory' in the Benelux states, have compiled recommendations for this requirement. While hygiene is always important, the extent of its importance varies. The closer a component comes to foodstuff, the higher the requirements.

Three types of hygiene zones are generally distinguished:

- **Hygienic design zone:** These regularly come into contact with foodstuffs. Examples include stirrers, filling nozzles, blades and cutters.
- **Spray zone:** These are areas and machines, which come into contact with foodstuff, for example, through spraying. Generally, a surveyor or the producer conducts a risk assessment to determine whether the food can return to the hygienic design zone.
- **Non-product zone:** These include all areas and facilities in a factory, which do not come into direct contact with the foodstuff. However, these areas are often cleaned together with the more sensitive areas, which in turn may result in high chemical and mechanical stresses.

Resistant to cleaning agents

In the spray zone and the hygienic design zone, the most stringent hygiene requirements apply. These zones need to be cleaned particularly frequently and thoroughly. This is generally the responsibility of the cleaning crews who work at piece rates and use strong cleaning agents such as corrosive acids and alkalis in different concentrations, or they may clean

surfaces by wiping them dry, or they might use hot steam jets.

A relatively new trend is dry-ice-cleaning. It is an alternative for those who want to work without aggressive cleaning agents. Dry-ice particles of -78°C temperature are blasted onto heavily soiled surfaces such as tanks, boilers or ovens, at pressures between 2 and 6 bar. Dirt freezes and gets brittle, which makes it easy to remove.

Few materials are able to withstand all of these various strains in the long-term. Stainless steel is a very popular material for use in the hygienic design zone, as it is unaffected by the strains described. Plastics and other materials, which are frequently used for cables or seals of components, present some particularly tough challenges. If plastics or elastomers are used when they are not suitable for frequent cleaning, there is a danger that, for instance, some system parts might lose their protection rating or a cable will lose its insulation properties. An extreme example in a bakery, outgassing from the dough had caused a cable sheath to swell and become brittle. The employees were, therefore, in acute danger because there was the risk of short circuiting and electric shocks. The quality of the products was also jeopardised because the plastic could have fallen into the dough.

Advt



Your Reliable Partner in Industrial Automation

Mifa Systems is one of the leading automation company in India. We evolve control systems using world best automation products.

With our expertise in a broad range of power integration solutions & other advanced technologies, we are able to evaluate, combine and apply technology to match your particular manufacturing and control requirements.

We give complete One Point & Customized Solution in:

- Excellent Controls Energy Savings • Accurate Speed & Positioning Control • Data Acquisition
- Analytical Solutions • Total Industrial Software Solutions
- Have dedicated team for injection moulding control solution from world leader **KEBA**

MIFA's, expertise lies in Industrial Verticals Like: • Plastic • Packaging • Pharmaceutical • Textiles • Oil & Gas • Cement • Steel • Dairy • Research Institute...

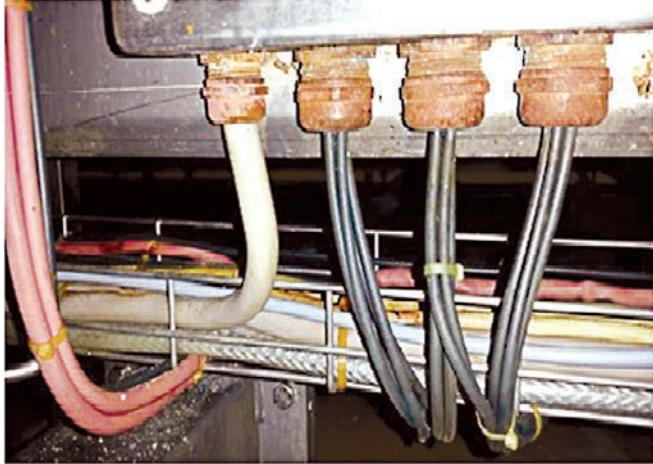


SERVING INDUSTRY SINCE 1992
MIFA SYSTEMS

702, 'AKIK', Sarkhej Gandhinagar Highway, Opp. Rajpath Club, Bodakdev, Ahmedabad-380 015 (Guj.) INDIA
TELE/FAX : +91 79 2687 0825 / 2687 0885 / 2687 1367, E-mail : sales@mifasystems.com, info@mifasystems.com

No. 508, Ground Floor, 5th Main Road, N.G.E.F. Layout, Nrupathunga Nagar, Nagarabhavi, Bangalore-560 072
TELE: +91 80 2321 2244, Mob. : +91 98459 96733, E-mail : info_blr@mifasystems.com

www.mifasystems.com



If unsuitable components are used, dangerous situations can quickly arise



Loops along cables trap dirt and are tough to clean and should be avoided in food production

Loose cabling works better

Beyond this, another main challenge is the installation type: cables are often bundled more tightly together than they ought to be, or they are not easily accessible. Loose cabling with a bit of 'play' would be ideal for easy cleaning. However, technical inspectors normally place great importance on the use of fixed installation – a happy medium needs to be found. The Safe Food Factory participants recognised that overly long cables represent a problem: cables are often installed with some excess length so that there is a reserve. While this is a comfortable approach, it is also problematic, firstly, in terms of electrical engineering (keyword bundling) and secondly, because the loops that form are often tough to clean and dirt gets trapped in them. The participants generally established that the cables should ideally be installed in such a way that they are as far away as possible from the intensive cleaning processes. Additionally, hybrid cables can be used. If several cables are combined into one, then there is less cable space and less intermediate space in which impurities can accumulate.

The Safe Food Factory recognised a further challenge involving contradictory requirements in the US. On one hand, companies wishing to export to the US face the NFPA requirements for maximum fire protection. On the other hand, the FDA is critical of cables with reduced flame-propagation since some fire-retardant additives are prone to outgassing and can, therefore, contaminate raw materials. This, too, needs to be considered on an individual basis.

The individual application counts

If cables are installed in the hygienic design zone, for example, for a temperature or level sensor in a fermenter, they need to be particularly well protected by installing them either in stainless steel pipes, or in protective conduits, which can be far more cost-effective. There is a further complication for applications with large temperature fluctuations, as condensation can form and collect in the protective conduit, which is unhygienic in the long-term. In this case, the better option is to use an openly installed and highly durable cable in connection with an appropriate cable gland that follows the principles of hygienic design.

This example highlights that there is no universally applicable best solution – each case needs to be individually assessed and the application consultants at Lapp help customers to find the best solution. For end users, it is crucial to also consider the interaction between components. It is, therefore, advisable to choose a supplier that can offer competent counselling about all aspects of connection technology and a very broad portfolio of connection solutions including cables, connectors and accessories, which fulfill the requirements of hygienic design.

Production facilities, which are constructed according to the principles of hygienic design represent a huge step forward in terms of optimising quality, safety and ultimately efficiency in the food and beverage industry. They are constructed in such a way that they do not allow germs to settle and can be



Specialised cabling solutions developed for the industry

cleaned easily. They are also particularly robust.

Fulfilling ECOLAB® requirements

The Lapp products that meet the particularly stringent requirements of hygienic design include, for instance, the cable gland SKINTOP® HYGIENIC. It follows the general design principles of DIN EN 1672-2 for the food and beverage industry and is certified according to the latest EHEDG testing. Furthermore, the cable entry – just like the cable conduit SILVYN® FG NM and the ÖLFLEX® ROBUST cable – meets the ECOLAB® requirements relating to resistance to cleaning agents and disinfectants. The SKINTOP® HYGIENIC does not provide any surfaces for contaminants to attack.

All seals are fixed tightly to the cable and connection point with no gaps. Instead of an O-ring, it has a radial moulded seal above the connection thread, a sealing ring below the domed cap nut and a specially formed conduit sealing ring on the cable. It has smooth surfaces and no edges, meaning that the remaining food cannot settle there and can easily be washed off. The cable gland, as well as the SILVYN® FG NM protective conduit, or the ÖLFLEX® ROBUST cables also fulfil the ECOLAB® requirements for durability against widely used cleaning agents.

In terms of product development, there is no need to keep reinventing the wheel. A pragmatic approach makes sense. This means that often it is not necessary to develop expensive special products, instead existing products from mechanical and plant engineering can often be used in the food industry as well. One example of this is the classic 'ÖLFLEX® Robust',

a series of cables that resist both machine oil in industrial production and cleaning agents in food production. This also applies for a wide selection of accessories and other cables with sheaths made from PVC, TPE, or PUR, some of which have undergone ECOLAB® testing. It is especially important for the end user to know the exact requirements of the application in question and select adequate solutions. Good, comprehensive counselling by experts who know the industry is extremely valuable here.

Materials suitable for contact

When installing cables in the product and spray zones, one alternative to using rigid and expensive stainless steel pipes is using SILVYN® FG NM, a flexible and dimensionally stable protective conduit made from soft PVC with an internal spiral, along with the accompanying conduit gland SILVYN® HYGIENIC. Both are suitable for contact with foodstuff and, thus, for use in the hygienic design zone, and are easy to clean. The conduit, for instance, has no grooves in which residue can settle, unlike conduits used in mechanical engineering. It is blue, as the sector requires it to be. If a piece of plastic were to somehow fall into the food, it would be easier to detect it this way because, in nature, there are no materials with such an intense blue colour.

This is also the case for the cable ties, which Lapp provides especially for the food industry. They are blue as well and also contain an admixture of metal. This means that a missing cable tie can be retrieved very easily using a metal detector or an X-ray unit. □

Courtesy: Lapp Group