

“Hygienic design is our focus”



When it comes to monitoring hygienic processes, reliable, precise and robust measurement technology is required.

Expert talk with Gabriele Hengesbach on the challenges in process measurement technology

Process hygiene stands and falls with hygienic design, i.e. the design of components and systems with cleaning in mind. A topic that is therefore an important item on the agenda of measurement technology specialist Hengesbach from Erkrath. LT spoke to Managing Director Gabriele Hengesbach about the requirements for process instrumentation in the food industry. She clarifies: “Properly thought-out hygienic design minimizes the amount of cleaning required!”

LT: Ms. Hengesbach, the importance of hygiene and food safety has steadily increased in recent years. What does this mean for Hengesbach as a provider of process measurement technology?

Gabriele Hengesbach: Food safety and hygienic design are the brand essence of Hengesbach's high product quality. We therefore have a very strong technical background in relation to food safety. This means that with

Our program focuses on the stringent requirements that are typical of the food, beverage and dairy industries. We are talking about an industry that has to deal with stricter legal regulations to protect the end consumer, increasing labeling requirements and a growing number of interlinked process components - all in a global context.

In such hygiene-sensitive branches of production, this also means the highest demands in terms of safe and sustainable process management and quality.

What portfolio are you active in the market with?

We have a great deal of expertise thanks to our clear market and product specialization, as we have been developing and manufacturing innovative measurement technology for these industries for over 40 years. Our product portfolio includes pressure and level transmitters of various measuring principles, primarily for front-burner applications with media temperatures of up to 200 degrees Celsius. We also offer pressure transmitters, temperature sensors, level probes, magnetic-inductive flow meters, inductive conductivity meters and conductive conductivity meters for the smallest conductivities in steam or vapors, as well as turbidity meters - all designed for use in liquid and pumpable media.

From the producers' point of view, hygiene means one thing above all: everything that can come into contact with food must be easy to clean ...

The be-all and end-all is therefore to design machines and components for cleaning. This is the only way to reliably rule out contamination. The development and design of installation systems, which include inline process measuring technology, plays a central role in meeting all the requirements in terms of hygiene, health, economy, ease of operation and convenience. Particular attention must be paid to the process connections used, as the connection between the measuring device and the production system is a particularly sensitive point.

German law and European directives specify a large number of binding standards. What requirements does this impose on your products?

Our products must comply with the legal requirements defined in the various regulations. These include the new Machinery Regulation 2023/1230 and supplementary standards on hygiene requirements, such as DIN EN 1672-2 and DIN EN ISO 14159, as well as Regulation (EC) No. 1935/2004 inclu-



For over 40 years, Hengesbach has been developing innovative measurement technology with a clear focus on the food, beverage and dairy industries.

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sive of their individual measures, Regulation (EC) No. 2023/2006, the Consumer Goods Ordinance and the German Food and Feed Code. We confirm compliance with the requirements regarding the materials used and the structural design of our products by means of corresponding certificates and documents. In addition, the EHEDG guidelines and FDA regulations are also incorporated into our designs.

The European Hygienic Engineering & Design Group that you mentioned offers support in the implementation of hygienic designs. What significance does this have for Hengesbach?

The EHEDG develops guidelines and methods for the testing and certification of process technology equipment that reflect the latest state of research and technology. There are now over 50 of these guidelines. They relate to materials, surfaces and technical equipment such as valves and sensors. The guidelines therefore describe

The requirements for component certification must be met in great detail. When designing our measuring devices and process adaptations, we therefore implement these consistently, as they are ultimately the practical implementation of the legal requirements for the safety of foodstuffs and their production.

The EHEDG now has around 750 members. Hengesbach is one of them. What prompted you to join the expert network?

Hengesbach has been an active company member of the EHEDG for almost 25 years. We are convinced of the work of the EHEDG and support it out of a sense of responsibility towards our customers and end consumers - after all, the common concern of all members is the production of safe and sustainable food. Another important aspect for us is networking with experts from various fields within the EHEDG. We consider this transfer of knowledge and the opportunity to engage in interdisciplinary exchange beyond our own expertise to be very valuable. The EHEDG also invites you to participate in seminars and congresses as well as to work in the respective specialist groups.

What role do the EHEDG certificates play for you?

When it comes to implementation, hygienic design means analyzing the production process in its entirety.

from the individual components to the machines and the entire system, with the aim of creating a risk analysis if necessary. EHEDG certificates are useful and effective building blocks for the decision-making process of food producers. The EHEDG certification mark shows that our instruments comply with the guidelines and therefore the requirements of hygienic design.

What's in it for the food manufacturer? In this context, experts repeatedly emphasize: Hygienic design means efficiency ...

That's right, because systems that need to be cleaned less frequently have an efficiency advantage! Even though certification is a complex process for us as a process measurement technology provider, it is

“All our devices guarantee the highest level of process reliability.”

and cost-intensive process, we are convinced of its relevance for our customers and their products. Correct hygienic design minimizes the cleaning effort, prevents faulty production and thus also costly recalls and possible damage to the company's image. The “wrong” design, on the other hand, costs unnecessary money.



For the hygienic design of their systems, users can draw on a portfolio that covers all important parameters such as pressure/level, temperature, limit level, conductivity, turbidity and flow rate.

Let's talk specifically about one of your measuring devices, the PZM ...

With its modular process connection system, the pressure and level transmitter is one of our most successful innovations. Its flush process connection with O-ring seal and stainless steel diaphragm is EHEDG type EL-Aseptic-Class I certified and predestined for measurements with the highest hygienic requirements, something we are very proud of. With its wide range of different process adapters, the PZM can be used for both level measurements and demanding pressure measurements, even under difficult conditions up to 200 degrees Celsius. As a "universalist", it also offers the advantage that only one device needs to be provided for the various measuring tasks.

What are the typical application scenarios?

The devices are suitable for pressure and level measurements in pipes and tanks. They can be read out, configured and diagnosed via an on-site display for the 100/200 series or a display and service module for the 101/201 series. The PZM delivers extremely precise measurement results, as required for level measurements in pressurized tanks, for example in dairies or breweries, or in atmospheric tanks with expensive concentrates, for example. The modular connection system of the PZM also allows pressure measurements up to 100 bar using the corresponding weld-in sleeve.

How was the proof of easy cleanability provided?

The demanding EHEDG certification of type EL-Aseptic-Class I of the PZM was based on three sequential tests: the cleanability test, which checks whether the measuring device is CIP-cleanable, the sterilizability test, which confirms steam sterilizability, and the bacterial tightness test. It checks the

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pressure transmitter for bacteria-tightness, i.e. whether it is hermetically sealed from the outside. It is essential for successful certification that all three tests are passed.

How clean a system is after cleaning depends primarily on the condition of the surfaces that come into contact with the product. What needs to be considered here?

The aim of hygienic design is to avoid contamination by biological, chemical and physical factors in the form of microorganisms, cleaning residues and foreign bodies. For the materials used, this means first and foremost that they must be suitable for use with food and resistant to the prevailing process and cleaning conditions. Austenitic stainless steels,

as defined in Regulation (EC) No. 1935/2004, form the basic material. All surfaces should therefore be made of inert, corrosion-resistant materials such as chromium-nickel steels or special materials whose technical properties remain stable in food applications.

Does it always have to be stainless steel?

No, the EHEDG guidelines also mention other materials. Plastic components, for example, are suitable for applications where low weight, high wear resistance and chemical resistance are required. Of course, food-safe plastics are subject to strict legal requirements, such as those defined in the EU Plastics Regulation 10/2011. The background to this is that plastics can get into the food through the migration of tiny particles and lead to contamination. Migration tests offer an instrument for preventing this contamination. Documentation following successful testing certifies suitability for contact with food.

When all components installed and involved in the processes have to contribute to hygienic design: What does this mean for closed processes, which are typical for the beverage and dairy industry?

Only reliably tight and extremely durable design solutions can be used in such production facilities. Even today, connections and screw fittings, valves and measuring devices, pipelines, containers and heating units are still particularly susceptible to microbiological contamination. As a result, the development and design of hygienic installation systems is increasingly coming to the fore in order to eliminate or minimize the risk of contamination through deposits in dead spaces, drying of the product and adhesion to surfaces. Otherwise, this can lead to serious hygiene problems over a longer period of time.

The hygienic design is also about optimizing the measuring devices so that they are easy to clean without leaving any residue ...

We mainly use chrome-nickel steel as a material, the surfaces of which can be finished in various processing grades, such as electropolished. The maximum surface roughness is 0.8 micrometers. Important design criteria are smooth surfaces, rounded and aligned internal and external edges and the avoidance of microscopic and macroscopic geometries such as recesses,



EHEDG type EL-Aseptic Class 1 certified: The PZM is universally suitable for pressure and level measurements in pipes and tanks.

undercuts, dead spaces and radial misalignment of joined parts. Both the EHEDG recommendations and the DIN EN ISO 14159 and DIN EN 1672-2 standards provide various tips on the design of the geometries.

Can you explain this using an example?

The sealing area at the interface to the process plays an important role here. It is not uncommon for constructive adaptations to be found in order to make the measuring device or the component as a whole functional. In the case of sealing using elastomers, materials with strongly divergent expansion behavior come into contact with each other.

“Hygienic design extends covers all aspects of the life of the life cycle.”

have. In the worst-case scenario, the sealing situation is no longer given, so that this application must also be mastered by making design adjustments during development. Furthermore, the later application of the component in the process flows into the design considerations in order to rule out possible errors during installation in advance.

Once the measuring device has been selected, the next step is to integrate the components into the process. What do plant manufacturers and food producers need to pay attention to?

In addition to the metrological characteristics, the requirements profile of hygienic design, as we understand it at Hengesbach, includes the aspects of life cycle considerations. Hygienic assembly as well as

Dismantling of the devices over their entire life cycle, e.g. for maintenance and calibration purposes, is taken into account in our constructive design and documented accordingly for the customer.

What are typical installation error that lead to hygiene risks?

Examples of sources of error that can be encountered in the case of installed measurement technology are installations with uncleanable dead space, applications where self-drainage is not possible and maintenance at incorrectly measured intervals. The importance of “careful handling” during installation is also often underestimated. Even minor impact damage to areas in contact with the media can pose a hygiene risk. Dirt and/or product residues can accumulate there and lead to microbiological problems.

One of the major challenges for food manufacturers is to adapt their batch production lines to the CIP cleaning processes ...

The central task of a CIP system is to achieve the desired cleanliness without disassembling components. It must therefore be ensured that the parts can be cleaned safely in order to prevent any damage to the product caused by microorganisms, foreign bodies and cleaning residues. This can be caused by the aforementioned technical installation deficits.

What needs to be taken into account when designing the measuring devices?

The sensors must be designed in such a way that they can withstand conditions relating to chemical and temperature compatibility, both during cleaning and sterilization, and that the metrological properties remain guaranteed. This also applies to the housing designs, where high and resilient tightness plays an important role in protecting the electronics and sensors. These properties have to prove themselves time and time again, both during multi-layer production processes and when using various cleaning techniques - using foam, high-pressure jets or high-pressure steam at different temperatures, pressures, chemicals and exposure times on the surfaces.

Finally, what general trends do you currently see in process measurement technology?

Manufacturers, suppliers and operators of product-sensitive systems are faced with high

In the face of global dynamics, companies are required to constantly optimize and automate their processes to achieve even greater efficiency and safety throughout the entire value chain. The recording and processing of a wide range of physical measured variables along the processes is one of the key prerequisites for this. This implies holistic thinking and an understanding of process technology. The goal remains the same: to create early warning systems that ultimately prevent product contamination and thus millions of euros worth of recalls and damage to image.

Which brings you to process data analysis. This is not least about identifying patterns and trends, which can be used for optimization and troubleshooting ...

The integration of artificial intelligence into the sensors, which will enable them to make decisions independently, should therefore also be exciting. Sensor technology with IO-Link for flexible and effective connection to control systems or field bus systems, depending on market requirements, are also a strategic focus of our further developments and innovations at Hengesbach as part of digitalization, flanked by current developments in AI. **TW/MB ■**

The interview was conducted by Mareike Bähnisch, freelance journalist for process technology



The highest standards of hygienic design are a matter of course for Gabriele Hengesbach. “Because these concepts reduce the cleaning effort and production errors and increase system availability,” says the Managing Director, who is the second generation to run the company.