EHEDG CONNECTS

CERTIFICATION
GUIDELINES
EXPERTISE
NETWORK
TRAINING

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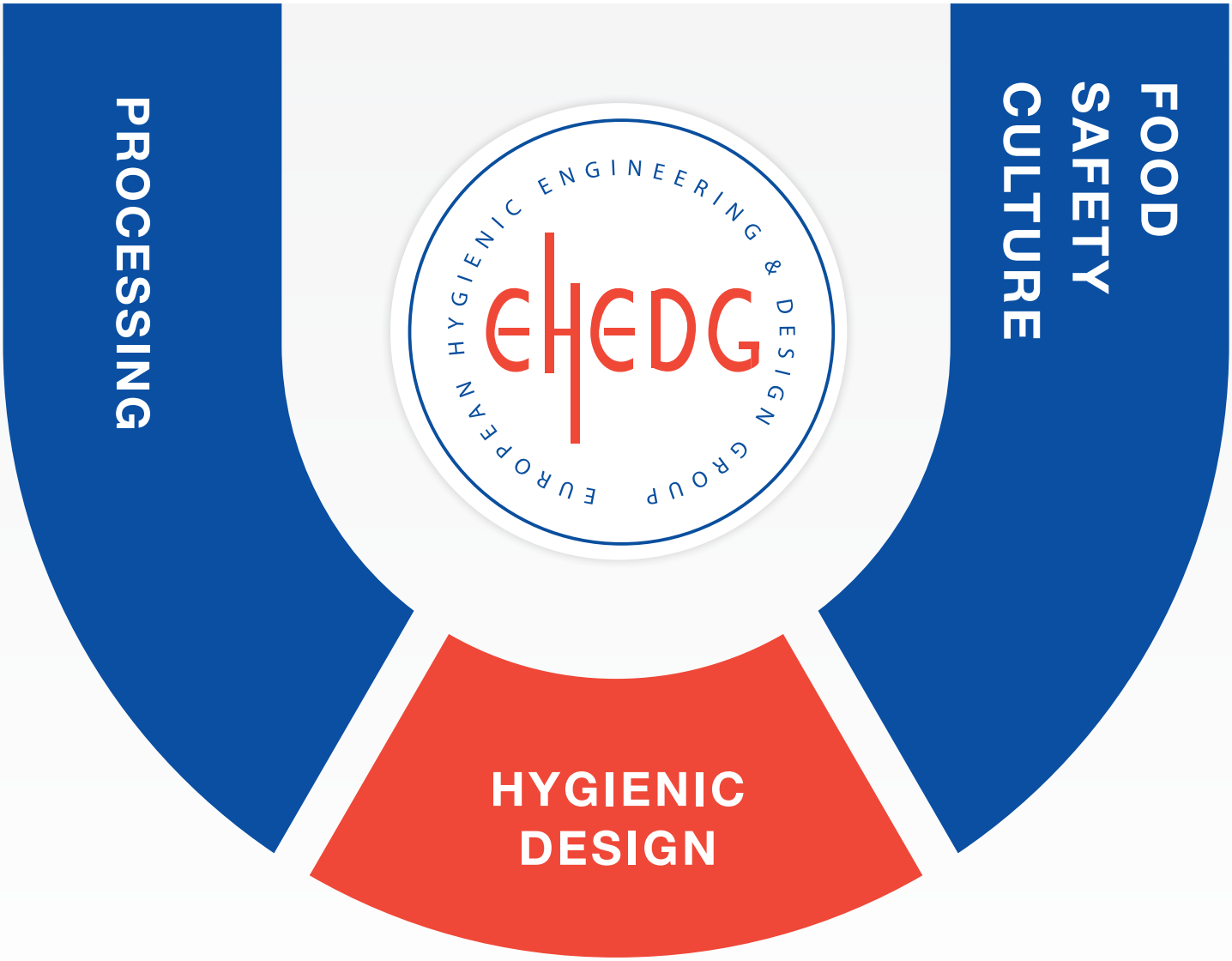
Official Magazine of the European
Hygienic Engineering & Design Group



HYGIENIC DESIGN DYNAMICS

Benchmarking | Auditing | Risk assessment

HYGIENIC DESIGN: FROM FARM TO FORK

HD auditing is coming: co-innovation with EHEDG

HYGIENIC DESIGN STRATEGIES

Hygienic design & Business development

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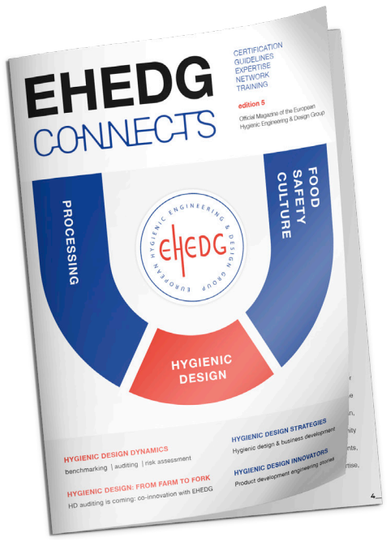
Product development engineering stories



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EHEDG CONNECTS CONTENT OVERVIEW

Hygienic design in food processing and food safety culture

Engaging with EHEDG: a great way to connect and succeed

Each new consumer trend places additional demands on food processors, as does new food safety and sustainability legislation. Now all food industry stakeholders will have to comply with new hygienic design standards and food safety culture expectations, but it is only together that we can learn how to do so effectively. That's where EHEDG comes in. This global expert community offers a platform for connecting with subject matter peers, exchanging practical insights and experiences, and developing hygienic design guidance in EHEDG Guideline Documents. Your input also helps EHEDG to educate professionals through its EHEDG Training and Education courses, and to safeguard the validity of hygienic design in the marketspace with its EHEDG Certificates. We invite you to benefit from this community, for example by joining one of the EHEDG Working Groups, so that you can enrich the guidelines with your own expertise and professional input.

Last year's publication of GFSI Document JII introduced hygienic design benchmarking requirements into the scope of international certification programs. In August 2022, these new hygienic design requirements were adopted by BRC, and included into their newest BRC Global Standard. BRCGS will start auditing using this standard as a benchmark in 2023, and other Certification Program Owners are expected to follow suit soon after. This means that, for the first time since EHEDG was established in 1989, hygienic design is being incorporated to food safety management programs, thus becoming an integral prerequisite for food processing, for retaining market access and for doing business in the global food industry.

In other words: regardless of whether your activities are geared towards food processing or selling food processing technology - in order to stay competitive in the global food industry, a clear understanding of hygienic engineering and design, of its food safety, food quality, productivity and sustainability benefits, and of its product and business development opportunities has now become pivotal to your success. We hope that this new issue of EHEDG Connects Magazine will encourage you to further broaden your understanding and perspective of hygienic engineering and design, and the role it plays in your specific working environment.

Seen here (from left to right): Karl-Heinz Bahr (former SubCom Chair), Kees van de Watering, Bengt Eliasson, Lammert Baas, Claudia Baenen, Rob Groot, Michael Evers (Co-Chair).

For more than three decades now, EHEDG has been providing practical guidance on matters related to hygienic engineering and design. Over the years, this community of food and food equipment industry professionals, scientists, auditors and legislators have created a large body of useful reference work. This helps EHEDG member companies around the globe to make wiser investment choices, develop better design solutions, introduce smarter processes, but also realise, operate and maintain safer, more productive and more flexible processing installations. In doing so, EHEDG also helps its members to successfully capitalise on emerging food trends. Hygienic design links the technology needed for industrial food processing to the current food safety culture. The global EHEDG community connects these important domains and enables us all to meet our responsibilities for food consumer health.

In this EHEDG Connects Magazine, you will find articles on a wide array of hygienic design related topics. The stories offer an insight into your fellow industry stakeholders' approaches and dealings with hygienic food processing and hygienic design equipment. They illustrate that, in this rapidly changing world, the entire food processing and food equipment industry is looking for ways to comply with the new requirements and expectations - it's just that, as an EHEDG Member, you are better equipped to do so.

Even while you are reading through this EHEDG Connects Magazine, the exchange of subject matter expertise and industry practices in hygienic engineering and design is continuing, both within the EHEDG Working Groups, Sub-Committees and Leadership Teams, as well as in the public domain, on the EHEDG website, and on the EHEDG LinkedIn social media platform. Our growing community teaches us that following the guidance of EHEDG, as available in its EHEDG Guideline Documents, EHEDG Certification and EHEDG Training and Education services, and exchanging expertise, views and industry practices is a great way to connect and succeed.

At your service,
Your EHEDG Sub-Committee Communications Team

Visit the EHEDG website: www.ehedg.org
Follow EHEDG on LinkedIn: www.linkedin.com/company/ehedg
Contact us for editorial inquiries, interview requests and publication suggestions: editorial@ehedg.org

Introducing

EHEDG President Hein Timmerman

Hein Timmerman is a food technologist with 35+ years of international work experience in various food-equipment-related industries. During his career, he has gained skills in engineering, technical management, sales and business development, and become an expert opinion in dairy, processed food technology, automated cleaning systems and CIP techniques. As the new EHEDG President, he aims to apply his strategic, creative and social skills, while leveraging his commitment to EHEDG and his pragmatic, solution-focused management style.

When and how did you become involved with EHEDG?
'Hygienic design has intrigued me right from the start of my first job at Alfa-Laval in 1986. After its founding in 1989, EHEDG quickly became the leading resource for expertise in hygienic engineering and design, and I wanted to be part of this community. Over the years, my drive to contribute to EHEDG has growing even stronger, not least because of the many friends I have made while collaborating in our EHEDG community. My active engagement with EHEDG has also helped me to gain many new insights, and a clear understanding of food safety needs within the food and beverage industry.'

Your predecessor started reshaping the EHEDG organisation. What's next?
'EHEDG is growing steadily and sees the need to adapt its organisational structure accordingly, in order to achieve faster, more harmonised guideline development, to develop new certification schemes and excellent membership support processes. Establishing a new EHEDG Head Office team was part of this adaptation process aimed at effectively supporting EHEDG Company Members, EHEDG Sub-Committees and EHEDG Working Groups.'

Considering your previous longstanding chairmanship of the EHEDG Sub-Committee Product Portfolio, how do you envision the further development of the EHEDG Guideline Development, EHEDG Certification and EHEDG Training and Education offerings?
'In 2022, under the leadership of EHEDG President Ludvig Josefsberg, EHEDG defined focus points for the further improvement of its membership offerings related to guideline development, certification and training and education. Now it's time to fill in these gaps and to start developing the content that is required to do so. In line with our ambition to upscale our certification offerings, EHEDG has already introduced a new EHEDG Open Process Certification scheme, and new processes to support working groups in developing more process-oriented guidelines in a more standardised format. These steps are also necessary to increase the accessibility, user-friendliness and applicability of the EHEDG membership services, and to further increase the value of EHEDG Membership.'

What is your strategic view on the future development of EHEDG?
'I believe that EHEDG should, in the first place, continue to focus on the value of EHEDG membership offerings, and to do this, we need to listen carefully to the practical needs of our members and then offer support accordingly. It is then up to the EHEDG leadership teams, EHEDG Sub-Committees and EHEDG Working Groups to align their activities with these practical needs. The basis of EHEDG membership value is created in an active exchange of expertise, perspectives and best industry practices amongst our members and subject matter experts in the working groups and committees.

In light of all the new developments that are taking place in the field of hygienic engineering and design, we need to acknowledge that EHEDG cannot do all of this itself. We need to establish new partnerships, based on our current position of offering fundamental guidance, a framework based on which our partners can roll out more services at a practical industry level. I particularly see opportunities for new collaboration across the farm-to-fork supply chain related to developments such as the adoption of the GFSI Hygienic Design Benchmarking Requirements by Certification Program Owners.'

How do you envision the further global expansion of EHEDG?
'With the support of EHEDG members across the world, the EHEDG Sub-Committee Regional Development has managed to establish a global structure of EHEDG Regional Sections. These introduce EHEDG in their

respective regions, for example, by organising EHEDG Training sessions, and by representing EHEDG at regional events. During the first few years after a new EHEDG Regional Section is established, the global EHEDG organisation offers financial support, with the intention of enabling the regions to become financially self-sufficient.'

How do you plan to manage that?
'The levels of activity differ significantly between the various EHEDG Regional Sections, so EHEDG has introduced a regional financial support system that is directly linked to the regional activities. In this way, we can apply KPI's and direct funds more effectively. For a societal foundation like EHEDG, it is important to demonstrate full accountability for all costs and outgoings, as well as to make clear leadership choices, for example, on whether we should primarily focus on growing the EHEDG membership base, or on reaching out to and engaging more professionals within existing EHEDG member companies. These are topics of an ongoing discussion within EHEDG that need to be agreed upon.'

How do you define your leadership goals?
'At EHEDG, we jointly define what our goals are, and how to advance these goals effectively; for example, by developing new guidance that enables companies to optimise their food safety, food quality, productivity and sustainability results. The EHEDG guidance framework results from enabling our expert community to reach a consensus on what good and effective hygienic engineering and design actually is. That's why it is also important to include food processors in our working groups, so that they bring in their end-user perspective. We can only define what good hygienic design is if our guidance is strongly rooted in daily real-life industry practice. And by developing relevant guidance, we also raise the awareness of the importance and benefits of hygienic design throughout the food and food equipment industry.'

How would you describe your leadership style?
'EHEDG is a foundation that thrives thanks to the unpaid contributions of the many volunteers who have a passion for hygienic engineering and design and a believe in the good cause EHEDG stands for. This demands a leadership style that is geared towards motivating people to reach consensus based on our common understanding of how technology works out in real industry settings. In my former career and my current daily work at Diversey, I learned that effective problem solving and troubleshooting can only be achieved when you start out with an open dialogue between experts. Sharing knowledge and practical experiences introduces a clarity and a way forward that will overcome even the most complex challenges, and I consider myself a leader who likes to listen first, then create an organisation that allows everyone to contribute opinions, and then find a common ground to make decisions and move forward together, as a community, for the benefit of all.'

Thank you, and congratulations
'I thank all EHEDG members for their trust, and I thank Diversey for its continual support that has allowed me to contribute to EHEDG in the past, and take on this new challenge. I am proud to be part of this EHEDG Community, and honoured to be asked to contribute to this wonderful global expert community in hygienic engineering and design.'

Working Experience

Diversey
2011-current : Global Sector Specialist Dairy & Processed Food
2010-2008 : Global Sector Specialist Processed Foods
2008-2006 : Sector Specialist & Business Development Director F&B EMA
2004-2005 : International Application Expert – Global R&D
2003-2001 : Technical Director Belgium
1993-2000 : Sales manager Dairy & Beverages Belgium

Alfa-Laval
1990-1992: Project manager
1989-1988: Commissioning engineer
1986-1988: Project engineer

Royal FrieslandCampina
1985: Scholarship for master thesis

The EHEDG Constitution and Internal Rules stipulate a Foundation Board (consisting of the President, the Vice-President and the Treasurer/Secretary) and an Advisory Board (consisting of six members, plus the President). Their task is to provide informed guidance and recommendations on the EHEDG long-term strategies. In accordance with the statutes, EHEDG applies a rotation system in the election of these two bodies to guarantee continuity, by creating an overlap in the boards in between election periods. Therefore only some of the positions are vacant every two years. The most recent elections took place in November 2022, and resulted in the appointment of a new President, Treasurer/Secretary and four new Advisory Board members, who will serve from January 2023 until December 2026.

EHEDG Presidency 2016-2022

Ludvig Josefsberg hands over his presidency and leadership legacy

When Ludvig Josefsberg announced the completion of his presidency at the EHEDG World Congress in Munich, he mentioned the irony of having introduced the selfsame re-election rules that now demand him to step down. His drive, energy and good health (Ludvig is a daily jogger) would have allowed him to extend his presidency for another term, but Ludvig is too much of a stickler for the rules to break his own rules, so as of 2023, after a reign of two consecutive terms, Ludvig officially hands over his presidency to his newly elected successor Hein Timmerman.

Shortly after Ludvig finished his opening speech in Munich, the congress stage was taken over by younger speakers, highly enthusiastic about the important role of hygienic design in a future driven by new legislation, emerging farm-to-fork collaborations and exciting innovations. Their message went down well with those EHEDG members who like to focus on technological progress, and on the opportunities that hygienic design offers for mitigating rising energy prices and shrinking profit margins. Only the future will tell how this will play out in practice, but one thing is certain: in the history of EHEDG, the end of every presidential era is always marked by new beginnings. And while Ludvigis now taking a step back from the floodlights, his legacy has equipped EHEDG to move forward effectively into a golden age of hygienic design.

Under his leadership, the European-based EHEDG Foundation became a truly global community, with EHEDG Regional Sections in six continents, serving more than 650 EHEDG Company and Institute Members. This growth has been enabled by a series of fundamental adaptations of the EHEDG strategy and organisational structure. Ludvig led the reshaping of the EHEDG governance system, by introducing transparent electoral processes, clear checks and balances, and 5-year renewal programs for all EHEDG Hygienic Design Certificates and Guideline Documents. Thanks to his strong advocacy for making EHEDG future-proof, its members can continue to rely on a strong EHEDG membership portfolio, and a high EHEDG membership worth that continues to include practical industry support in all matters related to hygienic engineering and design.

The man and his mission

Ludvig Josefsberg knows how to grow the bottom line. After he completed his MSc training in Chemical Engineering in 1973, Ludvig's first employer Alfa Laval recognised his ability to successfully manage teams, organisations and businesses. Consequently, he was appointed to various managerial positions, serving in both the food industry and marketing companies during his global segment presidencies - roles that he fulfilled for almost 20 years, before Alfa Laval merged with Tetra Pak in 1993, after which Ludvig continued in roles involving leadership responsibility, including the global responsibility for the processing systems division.

After his official retirement, Ludvig assumed the role of Senior Director, with his main task being to represent Tetra Pak within EHEDG. For half a century now, Ludvig has demonstrated his leadership skills which is evident from an impressive track record. When asked about the secret of his consistent success, he replies that he always focused on what was needed to maximise the value for clients and end-users.

Ludvig's leadership experience and clear vision of the need to restructure the EHEDG organisation made him an interesting candidate for the EHEDG Presidency in 2015. Nevertheless, Ludvig chose to start his first year in 'transition mode', gradually taking over the position from the then longstanding EHEDG President Knuth Lorenzen. It was a characteristic move: instead of jumping to conclusions, Ludvig first wanted to learn as much as he could about EHEDG, and gain a comprehensive overview of the situation, in just the same way as one might expect an experienced strategist to approach a challenging chess game.

Even before Ludvig became the formal EHEDG President in 2016, he had already initiated a review of the leadership structure. Together with his fellow EHEDG Foundation Board members of the time, Piet Steenaard and Patrick Wouters, he introduced a new EHEDG Advisory Board, consisting of elected EHEDG Company Members who would represent the membership base from the food industry. This strategic step allowed EHEDG to gain clear insights into the actual membership needs, while simultaneously creating a support base for reshaping the organisation even further.

In a final step towards a new EHEDG organisation, three EHEDG Sub-Committees were established. These became responsible for the strategy and further development of the EHEDG Product Portfolio offerings (e.g. EHEDG Guidelines, EHEDG Testing & Certification, and EHEDG Training & Education), for EHEDG Regional Development and for EHEDG Communications. With these committees, the EHEDG leadership managed to steer this growing community, with its diverse and voluntary Working Groups, through a series of technological and market-related developments, as well as a global pandemic.

Under Ludvig´s leadership, EHEDG managed to untangle the former EHEDG Secretariat in Germany from its hosting entity VDMA (a step that was necessary to comply with new legal requirements), and transfer EHEDG's centre for daily operations to a newly staffed EHEDG Head Office in The Netherlands. This included recruiting an entirely new staff, and setting up a new administrative support structure, whilst maintaining a high-quality service standard to the members. Part of this process was the introduction of a new EHEDG Operations Director position.

Within the scope of the 2020 election, Ludvig was also instrumental in introducing a new leadership term principle stating that participation in the Advisory and Foundation boards would be limited to four years, with appointments to the board being made in a staggered manner in order to secure continuity. In this election Ludvig was elected for two years, together with the new board members, whose terms were completed in 2022.

Following the election in 2020, the EHEDG Foundation Board started to focus on pinpointing opportunities to further develop the current EHEDG membership offerings. A member survey showed that the members expected EHEDG to introduce a broader scope of services. One example was certification of the cleanability of open process equipment, which is now available at the first three EHEDG Testing Laboratories in Europe. The member input thus resulted in a series of projects, aimed at developing a new EHEDG Product Portfolio based on a more holistic farm-to-fork approach.

During this period, EHEDG-affiliated subject matter experts also contributed to the development of the GFSI Hygienic Design Benchmarking Requirements. In 2022, EHEDG published a white paper on hygienic design risk assessment, and started developing a new EHEDG Guideline Document on this topic. This development is expected to be of great value and interest for the EHEDG members.

Golden age of hygienic design

Ludvig Josefsberg is handing over his presidency during exciting times, in which the following important developments are merging: the consistent innovation of hygienic design solutions by equipment engineers, the active contributions of industry subject matter experts and scientists to new EHEDG Guideline Documents, and the practical support of EHEDG Authorised Trainers and Evaluation Officers in hygienic design education and equipment certification. Their support illustrates that adopting hygienic design is a crucial necessity for any company that needs to upgrade its food safety, food quality, productivity, and sustainability results its food safety, food quality, productivity, and sustainability results.

In spite of their broad scope, all of the above developments are essential tools for establishing an effective food safety culture. The food industry is entering a golden age of hygienic engineering and design, and Ludvig Josefsberg was the person who made sure that EHEDG is well prepared for it. That is an impressive achievement, for which EHEDG owes Ludvig a debt of gratitude. He has laid a strong foundation for the new EHEDG President Hein Timmerman, who can now continue to build a great future for EHEDG and its members. So, on behalf of the entire EHEDG community, we say farewell for now, with a big:

"Thank You Ludvig!"

EHEDG VALUE WHEEL

1 EHEDG offers these products and services

2 for the benefit of these stakeholders

3 for these development stages of hygienic food processing facilities

Hygienic design auditing is coming - are you prepared?

First CPO adopts GFSI Hygienic Design Benchmarking Requirements

On August 1, 2022, the first Certification Program Owner (CPO) adopted the majority of the GFSI Hygienic Design Benchmarking Requirements Document JII into its new standard and will start auditing against this standard in 2023. What does this mean for food processing companies, for their food equipment suppliers and for EHEDG?

Dr. Holah is the Principal Corporate Scientist Food Safety & Public Health at Kersia, and Honorary Professor of Food Safety and Hygienic Design at Cardiff Metropolitan University. In this article, he shares his thoughts as an initiating member of the EHEDG Hygienic Design Benchmarking Support Group, which was founded to offer practical guidance to the food industry on effective implementation of hygienic design risk assessment.

What is the current status in this development?
'The GFSI published its Hygienic Design Benchmarking Requirements in two separate documents, commonly referred to as document JI and JII. Document JI contains the hygienic design benchmarking requirements for building constructors and for food processing equipment manufacturers, while document JII focuses on the hygienic design benchmarking requirements for existing scopes (feed, farming, conversion, food processing, catering/retail). Implementation of both documents is currently voluntary. In August 2022, BRC was the first CPO to adopt JII in their new Global Standard Food Safety Issue 9. This means that in 2023, food processing companies that use BRCGS as their GFSI approved scheme will start to be asked questions about hygienic design.'

Now that BRC is introducing this, do you expect other CPOs to do likewise?
'I think they will all fall in line eventually. I don't see how you can argue against improving food safety, and hygienic design is fundamental to food safety. So I think once one CPO has adopted it and reaps the benefits, if you like, in terms of making the food industry adopt better practices, then I think all CPOs will have to seriously look at it. I think there'll also be a recognition from users, starting with the food manufacturers, that this is a good standard. It really is challenging us, it's making us better because it is making our food safer. Therefore, whilst this standard may be difficult to meet initially, we really do want it, because it's challenging us and it will help us all to improve food safety. Once we reach that stage, other CPOs will have to work on the basis of that, and will start adopting at least Document JII.'

How will equipment purchasers of food processing companies be affected by this new auditing standard?
'CPOs that adopt GFSI Documents in their standards will start asking questions like: "How did you, as a food manufacturer, choose that building or that piece of equipment?" To provide satisfying answers to these questions, food manufacturers have to set up teams that include all stakeholders involved in the design and use of a certain building or piece of equipment. These teams should include people from the production division (who will use it), the purchasing unit (who will buy it), the engineering department (who need to specify, install and conduct maintenance services on it), and the hygiene staff (who will have to clean it) - all those professionals need to be consulted when creating specifications for the equipment manufacturers or builders. This should fundamentally improve internal communication and give all stakeholders a chance to share their views on the use, maintenance and cleaning aspects of the building or equipment.'

Will this help suppliers to supply more suitable solutions?
'Thanks to this, equipment manufacturers gain a much better understanding of what the equipment is to be used for, and what the hazards might be that are associated with such a use. As a result, they can build equipment or commission a building that largely mitigates the hazards that their customers bring forward. They will be better able to apply and sell hygienic design

solutions that meet the hazard reduction requirements of their customers - requirements that can straightaway be included in the purchase specification documents. So all parties benefit: equipment manufacturers and building constructors will have a better understanding of what they are trying to achieve, and can apply their hygienic design principles to it. The food manufacturer will better understands what the equipment is intended for, and the hazards associated with it, and obtains a better piece of equipment or better building, which then ultimately means that their food is going to be manufactured in a safer facility.'

How is EHEDG going to integrate these new standards into their EHEDG Guideline and Certification and Training offerings?
'Historically, EHEDG has focused more on high-end equipment, particularly liquid handling equipment, whereas JI and JII are aimed at the entire food supply chain, from how to design a plough or a combine harvester, through the design of food manufacturing equipment, to food service and even retail display equipment. The new standards will ask questions like: what is the intended use? What are the hazards and resultant risks associated with that use? These are relevant questions to ask when creating a piece of equipment or a building that must be fit for the purpose of managing food safety hazards. This farm-to-fork approach helps all stakeholders apply suitable types

Issue 9 of the BRC Global Standard was launched on 01 August 2022: https://www.brcgs.com

of equipment or buildings across the entire food supply chain, including at the lower end of the chain. A plough or a combine harvester at the farm level is designed very differently to equipment used more upstream in the food processing chain. However, both types of equipment are hygienically designed - they are both fit for purpose. This changes the way that EHEDG has to think, because EHEDG now needs to put the onus on risk assessment and hazard analysis.'

Can you tell us about the new documents that EHEDG is developing to support the industry in this development?
'It's been a challenge for EHEDG to get up to speed on this because hygienic design risk management is a new development. We do, however, have a working committee that is compiling a series of helpful guidance documents on how to undertake the process, including how to define the intended use of the equipment or the building, how to assess what hazards and resultant risks might be appropriate to its intended use, and then to mitigate the risks of those hazards through hygienic design. It should be noted that the hygienic design principles needed to mitigate the hazard risks are already included in current EHEDG guidelines, as are the principles of cleaning, disinfection and maintenance to mitigate any residual risks. It is the hygienic design risk assessment that is the novel part of the hygienic design risk management process.'

EHEDG recently published a white paper and is also developing a new EHEDG Guideline Document focused on hygienic design risk assessment. What's next?
'We follow two principles: one is that the guidance EHEDG offers must be useful and easily applicable, and the other is that we need to align the guidance with HACCP principles, which is a legal requirement in Europe and other parts of the world. In other words: we look at this the same way that the food industry looks at all of their hazards in its efforts to manage them. We can't invent an entirely new food safety system, but we have to adopt what we have at the moment in such a way that we leave the risk assessment of the product related to the consumer up to HACCP, and complement that with hazard management associated with buildings or equipment to ensure that hazards are not added to the foodstuffs from such buildings and equipment during their use.'

How significant is this step for EHEDG members?
'This is a fundamental step forward towards the full adoption of hygienic design by the global food industry and its suppliers. Hygienic design has been around for approximately 100 years, but this is definitely the biggest change in this area that I have witnessed in my lifetime. Now, there is still a lot to learn and to discover, and we are doing our best to support the industry in doing what needs to be done. I believe that EHEDG plays an important supporting role to ensure that the GFSI Hygienic Design Benchmarking Requirements can be incorporated in an effective way to improve food safety on a farm-to-fork basis.'

'Hygienic design auditing is coming: BRC adopts GFSI Hygienic Design Benchmarking Requirements (JII) into its auditing standard. Other CPOs will follow'

Dr. John Holah [EHEDG Hygienic Design Benchmarking Support Group].

Priscila Hernandez
Global Accounts Manager
EHEDG Company Member: Stonhard Mexico

'Suppliers to the food industry, including resinous flooring manufacturers, can submit products to HACCP International to acquire a certification as food safe under HACCP international guidelines. Non-toxic materials are preferred, as well as materials that prohibit proliferation of harmful pathogens and food contaminants.'

David Lowry
Hygienic design expert / Chair EHEDG Regional Section New Zealand
EHEDG Company Member: Lowry Food Consulting Ltd.

'When undertaking a hygienic design risk assessment or troubleshooting, there are really only two very simple questions to ask. Number one: are there any areas that are inaccessible or unable to be inspected for cleaning? And two: are there any areas where there are hold-ups for product that may support microbial growth, or retain process liquids or wash water? If the answer to either of these questions is yes, you have a potential hygienic design risk.'

Bengt Eliasson
Manager Center of Expertise Dairy Ambient
EHEDG Company Member: Tetra Pak

Parameters under control
Many of the food safety issues in the liquid food industry are related to poor cleaning results. So my best tip is to have your cleaning-in-place parameters well under control - so: concentration, temperature, flow, and time. By doing this, you will avoid a lot of issues.

New open process cleaning test method opens up new perspectives

EHEDG launches certification scheme for open process equipment

After years of preparations, with considerable research and development efforts, and testing and recalibration procedures, the first EHEDG Authorised Testing Laboratories have now started testing and certifying components according to a new open process cleaning (OPC) testing and certification method. This creates new opportunities for food equipment suppliers that want to certify equipment used in open food processing environments.

Tracy Schonrock explains why this new EHEDG Certification scheme is a significant step forward. 'This will help food processors and their suppliers to discern which components can be fully and effectively cleaned externally to suit specific open food processes and cleaning regimes.'
What value does OPC testing and certification add for food processors and equipment developers?

'Food processors are increasingly concerned about how their processing equipment and the interconnectivity of individual pieces of equipment may adversely impact the wholesomeness of the foods processed. This is particularly important whenever there are intervals during which product is exposed during processing. Therefore, is becoming increasingly important to ensure that the exterior surfaces of equipment in OPC applications do not contribute to potential contamination risks within processing environments. The OPC testing and certification provided by EHEDG assists equipment developers and the food processing companies to meet their risk assessment criteria for open food processing.'

What OPC certification scheme offerings are currently available?
'EHEDG is currently developing the procedures that will be published as EHEDG Guideline Document 57 'A method for assessing the cleanability of food processing equipment intended for use in open processing (see exhibit 1: flow chart).'

What does the new EHEDG OPC Certificate look like (show example)?
'See Exhibit 2: Sample Certificate,'

What current limitations (size restrictions, type of components range) do we have to take into consideration?
'All current EHEDG Testing Programs are limited to items that can be placed within the dimensions of the current test rigs. This has limited all EHEDG certification to smaller components that can be fitted on a table-top sized area. EHEDG is currently investigating how it can expand to include certification of larger sizes of equipment and processing lines at an affordable price.'

How is EHEDG planning to scale up its OPC certification offerings?
'This is a topic to be discussed within the EHEDG Executive Board. Testing is currently available at three locations: Fraunhofer in Germany, Actalia in France, and AINIA in Spain. The EHEDG Sub-Committee Communications and the EHEDG Working Group Certification will be actively involved in the industry roll out.'

What is expected from the ATL's and the AEO's?
'The EHEDG Authorised Testing Laboratories are awaiting the finalisation of EHEDG Guideline Document 57, which they will use as their guidance for the test procedures. The EHEDG Authorised Evaluation Officers do not need any special additional training for the evaluation of equipment for OPC certification. EHEDG policy defines the external surfaces of the equipment used in OPC to be the equivalent of product contact surfaces, due to their potential to contaminate the processing environment, so the existing criteria apply and are adequate.'

Where and how can companies submit their components for OPC Certification?
'The initial contact for an interested company is to establish a relationship with an AEO. The AEO will, as they do now, help by guiding the company through the certification policies and evaluations, and advise them on how and where to submit their items for testing. So the AEO's are the key starting points for any certification process.'

EHEDG Certification:

Open Process Cleaning (OPC) test method Good news for open process equipment developers

The standard operating procedure for an open plant cleaning (OPC) test, based on a test method applying a robotic cleaning arm, has been successfully implemented at three European EHEDG Authorised Testing Laboratories: Fraunhofer Institut in Germany, ACTALIA in France and AINIA in Spain. EHEDG Certification Chair Andy Timperley explains why this is such good news for open process equipment developers.

Why did EHEDG develop a test method for open processing equipment?
'EHEDG has always recognised that any open process is vulnerable to anything that's happening within the surrounding environment. So, wherever food is exposed, the whole factory environment becomes a potential source of contamination.'

How is this new open processing equipment certification going to help companies to actually improve their hygienic designs?
'The OPC method will support companies that are designing equipment for open processing, from both a hygienic design and an accessibility point of view. The basic principle is that you can clean anything if you can access it, but this may be very complex and costly if you must dismantle every single part. The whole idea of the OPC test is to give a company the ability to test relatively small items of equipment as an entity or the individual design features on a larger machine that couldn't be tested as a complete unit.'

How are the hygiene risks of open process equipment assessed?
'Wherever food is exposed, the whole factory environment becomes a potential source of contamination, including the building structure, floors, walls, kerbs, etcetera. All of these factors need to be taken into consideration. It is why we have Dr. John Holah, a very experienced expert, looking at updating the existing factory design guideline. He's also heavily involved in the GFSI initiative looking at food quality systems and how to manage assessments of safety within food processing. We are sitting on a lot of the committees that are producing updates to design principles. The new guidelines contain specific dimensions, radii, surface roughness, materials, construction techniques, etc. that we can use within our assessments to certify equipment.'

What role do these newly implemented supplementary certification requirements play in this?
'Where we found omissions in the guideline documents, such as certain subjects that were not discussed, we've put together a position statement with the whole group and all the Authorised Evaluation Officers (AEO) involved, and created this list of supplementary certification requirements. This has led to there beingsome misconceptions about how applicable this new test method is from the perspective of the equipment developer.'

Can you give us an example?
'Sometimes, developers think that they can just certify an individual part of a piece of equipment, and then sell it to several different companies that manufacture the same type of equipment. That's not possible, because it must be integrated into the module to test its open process cleanability. Additionally, the EHEDG AEOs need to know the intended functionality for a component and how it is to be integrated before they can certify a specific piece of equipment.'

Where can developers of open process equipment find more information on this topic?
'If you are a developer, designer, engineer of open food processing equipment and want to know more about this new test method, please just have a look at the EHEDG website, a list of the EHEDG Authorised Testing Laboratories. Contact one of them for more information on how you can start up your certification process.'

Thomas Tyborski

Technical Excellence Manager Dairy F&B Europe

EHEDG Company Member: Ecolab

Know your hygiene weak points
'Hygienic design in all its detail is a basic prerequisite for successful cleaning. Know your hygiene weak points, evaluate them and find ways to master them.
Hygienic design is a key element for remaining safe and compliant in your cleaning operations.'

Dr. Edyta Margas

Global Head Food Safety

EHEDG Company Member: Bühler Group

Send designers to factories
'Before designing new machines and new equipment, send all design crew members to the factory, make them clean the existing machine themselves, let them crawl into all those difficult-to-access spaces, do a hands-on exercise, and then, and only then, allow them to start designing the new machine, based on their personal hands-on understanding of the main challenges of cleaning and disinfection.'

Marco Antonio León Félix

Chair EHEDG Regional Section Mexico

EHEDG Company Member: LEFIX y Asociados

Be careful with purchasing and human resources
'The EHEDG Regional Section Mexico members stress the importance of being very careful with purchasing processes, of taking hygienic design into account at every single step, from initial negotiations with your supplier, through to visits to the supplier facility, up to finaldelivery. In this way, you can make sure that what you are asking for is what your supplier will actually deliver. Also be very aware of the importance of conduct in your facility. Monitor if people are actually putting into practice what they have learned in the EHEDG Hygienic Design courses.'

The Hygienic Design Strategy of EHEDG Company Members:

Hygienic design: a growing business

Hygienic design as a business development strategy

The following articles feature decision makers at EHEDG member companies who chose to include hygienic design product development in their business development strategy.

These companies focus on further developing their hygienic design offerings to help their clients tackle food safety, quality, productivity and sustainability challenges (and by doing so, are establishing a strong market position in the field of hygienic design).

Their commitment is reflected by their companies' structural investments in hygienic design product research, development projects, and hygienic design training programs that enable their employees to apply the EHEDG hygienic design guidelines in their engineering and product development activities.

Each of them plays a leading role in driving hygienic design innovation within their companies, which may well deliver a competitive advantage for the respective company's product portfolio. Nevertheless, they were still happy to share the considerations that led to their choice to include hygienic design product development in their business development strategy. We can only salute them for that. Let's hope they inspire others to follow their example.

The Hygienic Design Strategy of EHEDG Company Members:

Krones
Dr. Sven Fischer, Head of Corporate Research and Development

Krones AG is a German packaging and bottling machine manufacturer. It produces production lines for filling beverages in plastic and glass bottles or beverage cans.The company manufactures stretch blow-moulding machines for producing polyethylene terephthalate (PET) bottles, plus fillers, labellers, bottle washers, pasteurisers, inspectors, packers and palletisers. This product portfolio is complemented by material flow systems and process technology for use in the production of beverages for breweries, dairies and soft-drink companies.

Endress+Hauser
Tim Schrodt, Regional Industry Manager Europe Food and Beverage

Endress+Hauser is a Swiss-based globally active process and laboratory instrumentation and automation supplier. The company manufactures electronic instruments for process automation including level, flow, pressure and temperature measurement; instruments for liquid, solids and gas analysis; data acquisition and system integration. Its commercial customers mainly operate in the food and beverage, chemical, life sciences, oil and gas, water and wastewater, power and energy, raw material and metals industries. In the laboratory business the group also serves customers from healthcare and academia.

Tetra Pak
Jimmy Moons, Global Commercial Product Manager Heat Exchangers at Tetra Pak.

Jimmy explains how Tetra Pak incorporates hygienic engineering and design into its Product Development and Product Sales Strategy. Tetra Pak is a Swedish-Swiss multinational food packaging and processing company with head offices in Lund, Sweden, and Pully, Switzerland. The company offers packaging, filling machines and processing for dairy, beverages, cheese, ice cream and prepared food, including distribution tools such as accumulators, cap applicators, conveyors, crate packers, film wrappers, line controllers and straw applicators.

The Hygienic Design Strategy of Krones

Dr. Sven Fischer, Head of Corporate Research and Development

When and how did you embark on the journey into hygienic design, and how far have you progressed in thedevelopment process?
Dr. Sven Fischer: ‘Our first ventures in aseptic food processing took place 20 years ago, and that’s where we first learned to deal with the specific requirements of hygienic processing. We enrolled our staff in lots of classroom teaching, and engaged in many discussions about what exactly was needed for hygienic design, what was available, and how we could improve on existing systems. During these two decades, we have communicated regularly with EHEDG - it is an Important partner for us’.

Your company supplies some of the biggest bottling companies in the world. How does hygienic design contribute to their processes, and what are you aiming for?
‘We always try to reduce the time taken for cleaning, sterilisation, dismantling, changeover and so on, and that’s where hygienic design comes into play. It is very important for our customers to reduce the time and effort required for cleaning and sterilisation. After so many years, we have become truly proficient in this area. However, this working field is also constantly evolving, which means we can continue improving our products to further reduce the cleaning and sterilisation times of our equipment, and thus contribute to minimising the overall changeover times for our customers’.

Which hygienic design trends do you see emerging in aseptic processing ?
‘There is a trend to really open everything up, to improve access and transparency, to increase the cleanability in all areas. This is a valid approach, because wherever you have good access, you can see what is happening, which is less risky than dealing with partly enclosed areas where you never quite know what exactly is going on. In contrast there are the aseptic chambers that need to be cleaned and sterilised completely, and where every single area is checked via microorganism count reduction tests and so on. Instead of making these chambers bigger to make them more accessible, we now strive to keep these specific areas as small as possible to minimise contamination risks’.

What benefits can a hygienic design product development strategy bring?
‘When you look at aseptic systems, we have reduced from four and a half hours, cleaning and sterilisation to two and a half hours, or even one and a half hours. And still, with improved hygienic design, we can reduce this even further. This shows that hygienic design helps food processing companies to increase their productivity. In other words: having a hygienic design product development strategy is worthwhile’.

Would you mind sharing an example with us?
‘Sure. We always try, for example, to position the caustic tanks as close to the machines as possible. This means we don’t need to pump a lot of water around, and then have to wait until the whole system is heated up. By using a good heat exchanger, the necessary temperature is reached straightaway. This saves time, energy and flush water. We have also managed to dispense with some of the additives or special chemicals, and to effectively clean our components on an almost pure caustic basis. These little steps can make a huge difference’.

What new developments allow cleaning in a purely caustic manner?
‘We can now lean internally (CIP) and externally (COP) simultaneously. Previously, this was impossible because we used foam cleaning agents that required a cold surface, and the pipes and the system are both often hot at the same time. So when we started to use caustic for COP as well, we could do things in parallel, and that saves a lot of time. And then sterilisation went from wet to dry sterilisation. For dry sterilisation, you need to dry out the machine with hot air. This is very energy intensive, and it also takes a long time. If you have correctly designed slanted surfaces, drying takes just five minutes. For the critical areas, such as flat and plastic areas and crevices, it can take up to forty-five minutes to sufficiently dry everything out to be able to conduct effective sterilisation. Nowadays, we attack this time window using hygienic design’.

Does hygienic design give you a competitive advantage?
‘Yes, it does. Imagine a customer who runs for example a bottle filling line: we can help him to shorten the cleaning cycles through hygienic design, and thus increase the bottle filling capacity of his process line. So the output increases and this give both him, and therefore us, a competitive edge. Hygienic design helps to create unique selling points and to set our products apart from the competition’.

What is your take on the new GFSI hygienic design benchmarking requirements?
‘I think it is a positive development that different stakeholders should try to homogenise the various requirements in order to make it simpler to come up with a solution that is suitable for more than just one customer. We need to standardise requirements because there are plenty of situations in which hygiene needs to be improved. The important question is: can we agree on a certain standard that is widely accepted, preferably on a global scale, or do we need to reinvent the wheel for each individual customer? This is important because the latter option may be possible, but it’s expensive, and it doesn’t make sense, not for the customer and nor for us. This is why I’m looking forward to these new developments. It is our belief at Krones, that in the near future hygienic design will become even more important than it is now, and that these new requirements will generate another boost for hygienic design’.

Thank you.

> Does your company have its own hygienic design strategy? Share your story with us! Contact EHEDG Connects at: editorial@ehedg.org

The Hygienic Design Strategy of Endress+Hauser

Tim Schrodt: Regional Industry Manager Europe Food and Beverage

What is your view on the relevance of sensor technology related to food safety, food quality, productivity and sustainability in food processing?
Tim Schrodt: 'I think the importance will increase because you can improve processes only when you have information. Without information, you're forced to drive a process on sight or based on estimations. I think if you are able to get reliable process information quicly, then you can really control your processes. Better control leads to improved quality assurance.'

Does sensor technology contribute to the ongoing automation of processes?
'Definitely yes. Sensor technology is one of the main driving forces for our industry.And the degree of automation is very important, because the cost pressure in the food industry is really high. So, every process which can be automated saves money and time, and also makes products safer'.

How is hygienic design addressed as a working field within Endress+Hauser?
'Our product portfolio is not only focused on Europe, it's focused on the global industry. Seeing, for example, that China has recently established new standards for food contact materials, we are helping our customers to comply with new standards. It is part of my and my colleagues' responsibility, because food contact materials and hygienic design go hand in hand'.

When did Endress+Hauser embark on this journey into hygienic design?
'It started when we decided to develop an industry-focused product portfolio for the food and beverage industry. That was in the nineties, when some of our staff members were individual EHEDG members, but before Endress+Hauser became a full EHEDG Company Member. I started here as a product manager, and it was when I took on the role of industry manager three years later, that I thought, now is the time for Endress+Hauser to become an EHEDG Company Member because the topic of hygienic design is not just important for a handful of colleagues who work here. We have a lot of engineers creating instruments for the food industry, and they all have to adopt a hygienic design mindset; they need to have an in-depth understanding of the principles of hygienic design, and for that they all need to have access to all the know-how and services that EHEDG provides.'

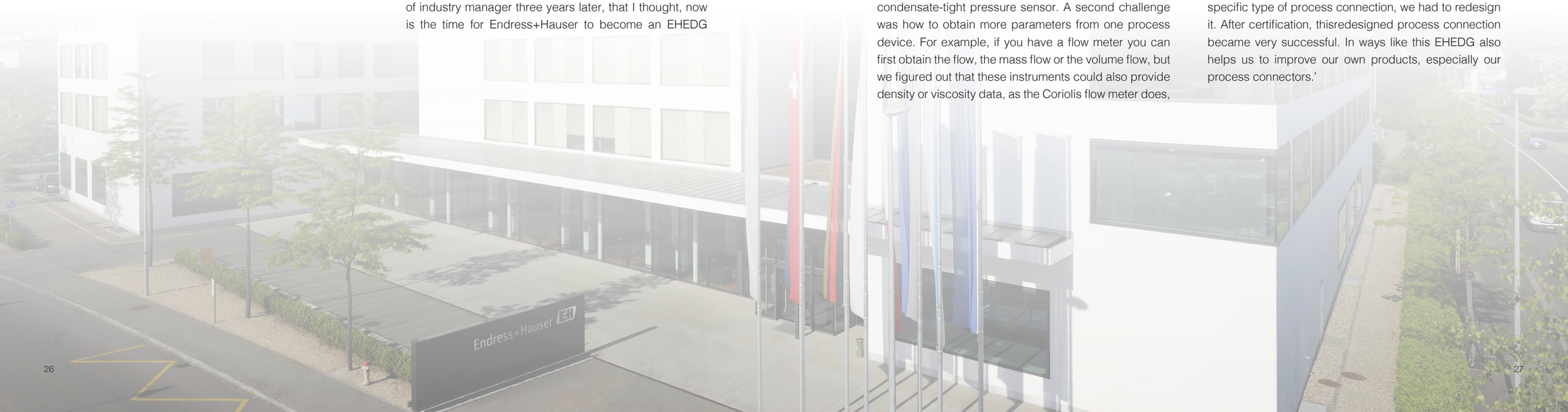
Let's zoom in on some early products that you developed. For example, the Memosens pH sensor. What was the idea behind this new type of sensor products?
'The underlying idea here was that inline pH-measurement was a nightmare for all users, because they had to calibrate the pH-probes onsite within the process. We developed a digital pH-probe that stores the calibration data inside the probe, so that calibration can be carried out by qualified staff in the laboratory. And if a worker has to replace the pH-probe during the process, he just replaces the probe with a pre-calibrated probe from stock. This helped and continues to help our customers to save time and prevent mistakes.'

What were the initial hygienic design challenges that you encountered after you joined EHEDG and learned more about this topic?
'When we started out, one challenge relating to pressure sensors was to ensure they were condensation-tight, because condensation is a huge problem in the food industry. You have chilled products, such as beer and milk, and our components, which are installed on pipes and on tanks, must be able to handle these environmental conditions. So we developed the condensate-tight pressure sensor. A second challenge was how to obtain more parameters from one process device. For example, if you have a flow meter you can first obtain the flow, the mass flow or the volume flow, but we figured out that these instruments could also provide density or viscosity data, as the Coriolis flow meter does, or in the case of magnetic inductive flow meters, it is also possible to measure conductivity.Thus, this can be used for phase detection or to detect residues of cleaning agents, for example.'

What are your clients' latest requests concerning the functionality of sensor technology?
'They are trying to use more specific cleaning agents for their processes. Here, one trend is to improve the cleaning processes, but I think they also want to get more information about the process, so that you are not forced to run the cleaning cycles based solely on predetermined time intervals, but rather based on the conditions in-situ.'

What is your company's response to those requests?
'At the moment we are developing fouling monitoring sensors that will help our customers retrieve crucial information about the status of their processes. Based on these sensor data, they can make an educated choice on when to start the cleaning cycle. They can determine whether they can postpone cleaning or not, based on real time fouling data. We call this monitoring and verification technology heartbeat technology.'

And how does hygienic design come into play in this?
'Here the process connection plays an important role. We provide our own process connections with our instruments, and, a while back, for example, we had to update our previously EHEDG-certified process connections because EHEDG decided to change its certification procedure. Therefore, all process devices had to be recertified. To obtain the new certificate for one specific type of process connection, we had to redesign it. After certification, thisredesigned process connection became very successful. In ways like this EHEDG also helps us to improve our own products, especially our process connectors.'



Tetra Pak Packaging Solutions

The Hygienic Design Strategy of Tetra Pak

Jimmy Moons, Global Commercial Product Manager Plate and Tubular Heat Exchangers at Tetra Pak, explains how Tetra Pak incorporates hygienic engineering and design into its Product Development and Product Sales Strategy.

When did Tetra Pak start developing heat exchangers and how important is this product line for your company?
Jimmy Moons: 'Heat exchangers have an extremely important position within the product portfolio of Tetra Pak. They form a key part of our end-to-end solution for entire processing lines. Heat exchangers can be built as standalone units to heat up or cool down product or as the heart of our Tetra Pak processing modules, such as in pasteurisers for example. Tetra Pak has been a supplier of heat exchangers since the 1980's, when we developed our first tubular heat exchangers. Besides these tubular heat exchangers, we also offer a full scope of plate heat exchangers, scraped surface heat exchangers, and coiled heat exchangers.'

What is Tetra Pak's vision on hygienic design in relationto its business development strategy?
'Tetra Pak's vision is to protect what's good. We are committed to making food safe and available everywhere. We do this by ensuring that our customers can produce food in a safe way. It also means that our hygienic design strategy continues to drive forward our heat exchanger innovations. With hygienic design components, we help our customers to comply with their food safety requirements, and also to reduce their energy costs.'

What are your customer needs, and how have these needs evolved over the years?
'Twenty years ago, our customers chose Tetra Pak because our pasteurisers offered a certain level of energy regeneration. They were already re-using energy that was put into the product for pasteurisation or as part of UHT-treatment, but it was not always easy to convince customers to invest in energy-efficient equipment. Now, with rising costs and the desire to make environmentally conscious choices, the benefits of hygienic design are clearer to customers. The higher energy regeneration ratio of hygienic design components results in much shorter payback times. These components generate consistent savings on a daily basis, so it's no wonder that today hygienic design is more popular than ever within our product portfolio.'

When did Tetra Pak start submitting its products for EHEDG Certification?
'Our journey began many years ago, back when I was a sales manager at Tetra Pak. I visited a customer in the Netherlands who used many Tetra Pak heat exchangers. They were clear that hygienic design was increasingly something they considered in the buying process, and that offering EHEDG-certified equipment was important. We took this on board and started looking into what needed to be done in the area of EHEDG Certification.'

Can you use the certificates as a unique selling point?
'Yes, it's an additional unique selling point to be able to say to our customers: you don't have to believe us. You can take the EHEDG Certification as proof that the unit is cleanable.'

You recently developed a new EHEDG-certified hygienic design tubular heat exchanger. How did you experience the product development process and what would you like EHEDG to start offering in the future?
'It has been an intense and very constructive journey and collaboration with the EHEDG Authorised Testing Laboratory and the EHEDG Authorised Evaluation Officer to get our tubular heat exchanger modules EHEDG certified.

Looking to the future, we would like to see EHEDG expand its certification offerings to other products, for example to hygienic design plate heat exchangers. It would be great if we could find some way forward by exploring the possibilities for EHEDG to establish an EHEDG certification scheme for those types of equipment as well.'

Why do you think your company sends its staff members to EHEDG to contribute to new EHEDG guideline developments and to share knowledge?
'We see this as an important collaborative contribution to food safety. EHEDG comprises experts that are part of a greater community, and we believe that working together to develop solutions and develop knowledge is the best recipe for moving forward in this area of hygienic engineering and design.'

Dear reader:
Is your company also an EHEDG Company Member? And do you also have an inspiring hygienic design related story to share? Send your interview request to editorial@ehedg.org and share your story with the entire EHEDG community and the global food industry!

The Hygienic Design Innovators

Developers optimise equipment through co-innovation

What is the value of an EHEDG certification process? Apart from the certificate being a validation for excellent hygienic design (and a sheer necessity for competitiveness in the hygiene-demanding food equipment market space), does it also offer benefits for the equipment developers themselves?

EHEDG Connects asked three different EHEDG Authorised Evaluation Officers from different parts of Europe to provide us with a handful of newly EHEDG-certified products that they consider to be particularly innovative for the food industry.

The following examples of best practice illustrate how equipment developers benefit from their interaction with EHEDG Authorised Testing Laboratories and their EHEDG Authorised Evaluation Officers to become more innovative and develop more successful hygienic design solutions.

More testimonials from product development engineers can be found on EHEDG Connects Online on the EHEDG website: www.ehedg.org/connects as well as on the EHEDG company page on LinkedIn: www.linkedin.com/company/ehedg

Product development by co-innovation

Learn from EHEDG Company Members that optimised their equipment through a process of co-innovation with EHEDG Authorised Testing Laboratories. The following hygienic design innovators share the lessons learned during their product research and development journey that led up to an EHEDG Certificate accreditation.

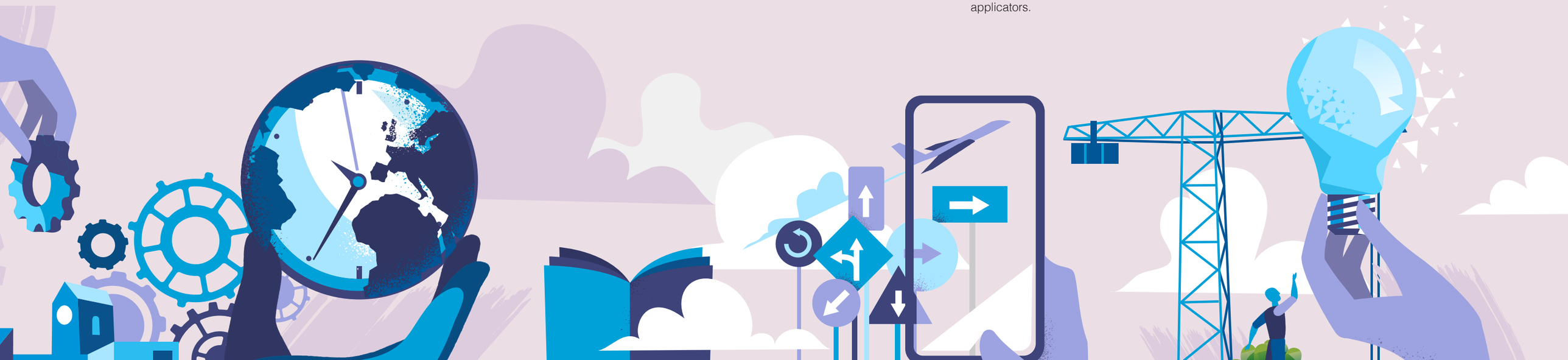
KxS Technologies
Based in Finland, KxS Technologies is an engineering company that quickly became a frontrunner in the design of inline refractometer sensors. By designing and manufacturing inline optical liquid concentration monitors based on refractive index, KxS Technologies contributes to securing their clients' most critical processes.

Endress+Hauser
Endress+Hauser has a leading position among manufacturers of industrial sensors that monitor liquid, gas and steam flows. More than 2200 employees worldwide work on innovative solutions that help food processing companies to optimise the food safety, quality, productivity and sustainability of their food production processes.

Ammeraal Beltech
Ammeraal Beltech, founded in 1950, designs, manufactures, fabricates and services high-performance process and conveyor belts. The company runs 10 manufacturing sites, and has over 80 sales and fabrication centres worldwide. It has also developed various new conveying concepts. Ammeraal Beltech is part of the AMMEGA Group.

Rittal
Rittal is a global supplier of industrial enclosure systems, power distribution and climate control systems, IT infrastructure and software services. Rittal offers product solutions and services in electrical engineering and automation, renewable energies, information technology, infrastructure, mechanical engineering and transport technology.

Tetra Pak
Tetra Pak is a Swedish-Swiss multinational food packaging and processing company with head offices in Lund, Sweden, and Pully, Switzerland. The company offers packaging, filling machines and processing for dairy, beverages, cheese, ice cream and prepared food, including distribution tools such as accumulators, cap applicators, conveyors, crate packers, film wrappers, line controllers and straw applicators.



The Hygienic Design Innovators: KxS Technologies

Sharing design experience on avoiding dead spaces

You don't need to work in a large company to be successful in the field of hygienic engineering and design, particularly if you have an innovative mindset, and if you make good use of the EHEDG membership offerings.

One example here is KxS Technologies, an experienced industrial liquid instrumentation company that is based in Finland, and is a specialist in inline optical sensor technology. This new EHEDG Company Member managed to develop, engineer and prototype a new hygienic design enclosure for their sensor technology, and turned it into an inline optical Brix monitor that has been awarded a Red Dot Design Award and an EHEDG Certificate.

Instrumentation Technologist Marcus Kavaljer and Head of Design Harri Salo share the challenges they faced during their product design process, so that we can all learn from their lessons learned.

What does your new product do?
'The DCM-20 inline optical Brix monitor drives critical whey protein membrane filtration systems in Ultrafiltration (UF) and Reverse Osmosis (RO) applications. Among optical inline Brix instrumentation, the DCM-20 is unique in providing a hygienic instrument design for a scalable integration setup in high pressure membrane filtration systems.'

And how does it work?
'The inline Brix monitor itself, i.e. the refractometer, measures the concentration of liquid using light. We have an optical window that interacts with the liquid and the light source. The reflected light is then analysed by a camera to measure the concentration of the liquid.'

How did you start this project?
'We started the design process by applying the EHEDG hygienic design guidelines. Too often, developers first engineer a sensor and then adapt their designs to make them hygienic. It's a mistake that we too have made. Previously, we first designed the optics and the mechanics of the sensor, and then tried to make it as hygienic as possible, but this always results in compromises, because in the later design stages, its no longer possible to make significant changes to the optics or the mechanics. So this time we started with the EHEDG Hygienic Design Guideline Documents and applied all the design rules, while designing the optics to be as small as possible, so that we could fit the sensor in to a small industry standard process connection.'

Did the certification process help in further optimising your product?
'It did! We received valuable suggestions from our EHEDG Accredited Evaluation Officer Alan Friis at the EHEDG Certification Laboratory Force Technology in Denmark. His approach was really hands-on. He reminded us that, from a hygienic design viewpoint, the process connection part is as important as the sensor itself, since the end-users combine the two components to integrate it into their process installation. Consequently, we also designed the connection part while applying the EHEDG guidelines. So yes, we were very happy to have EHEDG and Alan on board.'

What technical insights emerged from this EHEDG certification process?
'To accommodate small pipe sizes, the sensor needed to be small too, because when the sensor is larger than the process pipe size, you need to engineer an extension part, which creates dead spaces, and dead spaces are tend to lead to hygiene problems. A second requirement that came out of this certification process was that we decided to eliminate the need for any welds in the sensor housing, integrating to process pipes, because weldings tend to introduce unwanted hygiene and structural risks. That is why our product is manufactured from one solid steel piece with smooth surfaces. We started by designing a T-piece flow cell, with a welded neck. At first this didn't work because of hygienic reasons. While introducing the design improvements, we managed to resolve the problem by pushing the sensor deeper into the liquid in the process pipe. This resulted in another improvement: by pushing the sensor deeper into the liquid, the sensor measurement becomes even more accurate because the sensor head is now positioned in the centre part of the flow.'

How can you share this experience while at the same time still protecting your intellectual property?
'Our intellectual property lies within the optical instrumentation design - that's something that we keep to ourselves. We know that this is something unique. However, where the integration employing the sensor housing equipment is concerned: that's something we're very keen to communicate. We want to help people to eliminate dead spaces. That should be a common goal for us all. We want everybody to join our quest to remove dead space.'

What's your advice to other hygienic design innovators?
'First, contact your EHEDG Evaluation Officer, to get ideas on how to make your instrument more hygienic. There's a lot of information available from EHEDG, so don't hesitate to ask questions. And then, of course, there are the design rules, so you have to get familiar with those also. If you only consider the design in-house, you might end up struggling to pass a cleanability test, so instead: maintain a human-centred design thinking process, and find out aboutthe process environment, and really apply the EHEDG Guidelines as the leading design trait when starting a new product development.'

The Hygienic Design Innovators of Endress+Hauser Flow

Engineers of EHEDG certified components discuss the hygienic design challenges that they had to overcome to obtain an EHEDG Certificate. Each product has been singled out and selected by one of the EHEDG Authorised Certification Officers as being particularly innovative for the food industry. EHEDG Connects interviewed Michael Burger, Development Engineer at Endress+Hauser Flow about the design process of a new inline measurement product called Teqwave H.

How does this new product of yours fit into the existing product line of Endress+Hauser?
Michael Burger: 'Teqwave H is an addition to our already substantial portfolio of inline measurement solutions, and the operating principle behind this sensor is based on the speed of sound. So, with our hygienic design product line, we can offer great benefits to our customers, including enabling inline measurements of food and beverage quality parameters without creating additional food safety risks.'

What challenges do your clients have to meet on a daily basis?
'Food and beverage face a highly complex challenge in balancing food safety, quality and sustainability. They have to make sense of many KPIs, and need to manage a continuously growing variety of different food and beverage products. And as this trend is developing dynamically, it requires reliable, safe, fast, and adaptable measurement technology.'

How did you start this development process?
'We started by considering the EHEDG guidelines at an early stage in the development process. Of course, the new product also had to meet the requirements of the industries we serve. Therefore, we discussed the design in our established company-internal review panel, which meant we could exchange knowledge across our company divisions and benefit from earlier experience.'

In 2022, a lot of new inline sensors entered the market. What makes your new product stand out?
'Teqwave H extends our application coverage in this area, and is used, for example, for applications measuring the sugar and alcohol concentration in liquors simultaneously. It also measures the concentration of cleaning or disinfecting agents such as hydrogen peroxide. And it's EHEDG-certified, which gives it a unique combination of reliability and versatility.'

Endress+Hauser has been an EHEDG Company Member for many years. Were you able to reuse insight acquired in earlier certification processes?
'In designing Teqwave H, we leveraged the experience we gained from developing our flowmeter product range. Over the years, we have gathered significant experience which allowed us to optimise the hygienic designs for this product range. This gave us a toolbox to design and adapt Teqwave H to meet its requirements. And of course it is the first EHEDG-certified ultrasonic device from Endress+Hauser Flow.'

What was the most challenging aspect of this design process?
'To match the sensor body and the flanges to the gasket shape over the entire specified temperature range, which is quite considerable. The tolerances for the permissible gap sizes are very small in this case. Since the metal is, of course, in a working environment we needed to incorporate some space to contain it and to allow it to retract especially when dealing with high temperatures. At the same time, we needed to ensure that everything remains leak-tight. To ensure leak-tight gaskets and seals was really the most challenging part of the project. We developed several prototypes and versions to get this aspect right. With all the experts and the reviews, and the expertise of our EHEDG Authorised Evaluation Officer, Alan Friis, we finally succeeded.'

Did the collaboration with the EHEDG Authorised Testing Laboratory help you to advance this development process more effectively?
'Yes, for sure. The early exchange in the development process with the EHEDG Certification Officer really helped us to elevate the product quality to a high standard. It also helped us to shorten the time to market and the time prior to accreditation with an official EHEDG Certificate. We also benefited from our fully-automated state-of-the-art hygienic rig, which we operate in cooperation with the University of Applied Sciences in Muttenz, near Basel. Using this rig, we can simulate multiple conditions and challenges, and relate them to the official EHEDG cleanability test. By making good use of EHEDG support at a very early stage in the development process, we managed the certification process as efficiently as possible for both sides.'

New guideline, new technologies

New EHEDG Guideline Documents include new technologies

The members of the EHEDG Working Groups update their guidelines once every five years. A lot of technological innovation can occur over such a long period, so EHEDG Working Groups have to decide on a regular basis what new technologies should be incorporated in the various hygienic design guideline updates.

Over the past years, the EHEDG Working Group Conveyor Systems has witnessed a range of new approaches from conveyor system developers aimed at improving the hygienic features of their systems. The way in which EHEDG Working Groups incorporate new technologies into their guidelines is illustrated by this interview with Giuseppe Allais, who is the Global Food Manager at EHEDG Company Member Ammeraal Beltech, and who has also contributed to two existing guidelines that address the hygienic design aspects of conveyor belts and of foreign body detection and prevention.

What types of foreign bodies are most frequently found in food processing environments?
'We know that at the top of the list we have insects and hairs. Many food processors are less aware of the food safety risks that are introduced by plastic particles as opposed to those posed by metal parts. That's why we are focusing more and more on plastic fragments.'

Where are these plastic particles coming from exactly? And how is this related to the design and the usage of conveyor belts?
'If you have a belt running in friction drive mode, then it's impossible to achieve a 100% constantly aligned tracking. There's always some slip, and each time the belt rubs against the conveyor frame, tiny plastic fragments are generated and enter the environment. In addition to the belt, accessories like tracking ropes can also generate foreign bodies. In the newest EHEDG Guideline Document 43 on conveyor systems, we include guidance on design features that can mitigate the risks of introducing foreign bodies.'

We all know about metal detection. What about the detection of plastic particles?
'We have seen a real leap in progress here. For example, my company offers test cards containing a small plastic particle to test the effectiveness of plastic detection systems. Apart from proving the effectiveness of the detection system, these test cards are also used to identify the minimum particle size that can be detected.'

Your company has contributed significantly to the development of this new technology. How long did it take you to do that?
'We started our own R&D project in 2011, so that's a long time ago. The main challenges related to the construction and material of the belt itself, and on how to combine different layers of materials to match the standard performance with regards to the flexibility, durability, and, last but not least, the food safety characteristics. We worked on collaborations with Mettler Toledo, and did lots of lab analysis rounds, so it was a very long process, but we finally succeeded and introduced the new Dectyl belt in 2021/22.'

The EHEDG experts in the Working Groups always like to say: 'less is more'. How does this relate to the actual risks of plastic contamination in food processing environments?
'With detectable belts, it is possible to incorporate a filter in the conveyor system, but it is also necessary to minimise the risk of generating plastic particles in the first place, so that's why we focussed on the root cause of the issue. This led to the development of non-fray belts, based on knitted fabric, that eliminate the risk of losing an entire warp of weaved fabric. The most effective way to minimise foreign body risks is to combine a less-is-more approach with new detection technologies.'

Out of the box hygienic design

How Rittal developed its HD enclosures line driven by customer needs

EHEDG has now been developing hygienic design guidelines for more than three decades. Nevertheless, some product designs have yet to be addressed in the guidelines, such as the design of electrical cabinets. That didn't stop EHEDG Company Member Rittal from developing its own product line of hygienic design electrical enclosures. Rittal Product Manager Theo Gerritzen explains how and why his company continues to do so in order to meet the practical needs of customers in the food and beverage industry.

Why do we see more and more small-sized electrical cabinets close to food production processes?
'One of the reasons is that more and more food processing data is collected directly at the product line. Each and every process step is being translated into data.
The data not only provides new real time insights into the processes, but also into the performance and maintenance state of machines. This provides new opportunities to optimise the productivity of food plants, while also creating the need for more small enclosures containing data routing equipment that needs to be installed close to the product lines.'

Rittal decided to start developing hygienic design cabinets more than 15 years ago. What were the initial reasons for doing so?
'Rittal is an international supplier of electrical enclosures, and we also supply the food and beverage industry, mostly in partnerships with OEM suppliers that develop food processing machines. Functionality related to cleanability has always been a concern. Water and electrical enclosures are generally not considered to be a good combination, but the Rittal HD product line of enclosures has been proven to protect sensitive electronics in harsh cleaning environments, while also minimising contamination risks.'

What are the most significant components of an electrical enclosure that need to be optimised to improve its cleanability?
'Various parts of an enclosure can cause trouble, particularly the design of the door. The locking system also needs to be well-designed. The next most vulnerable part is the cable-entry area, and, depending on what kind of enclosure you use, the method of mounting it on or near a machine also significantly affects the cleanability.'

How do we measure the 'performance' of an enclosure in a food processing environment?
'Well-designed enclosures offer both food safety and electrical safety. That is particularly important when applying enclosures in high risk areas. The design of our hygienic designed enclosures differs significantly from standard electrical cabinets. There are no hidden areas, no holes, no crevices, nothing of that type at all. Standard cabinets contain a polyurethane foam to seal the door, but this doesn't suffice in a hygienic design enclosure because it needs to be able to withstand aggressive cleaning chemicals. No seal parts can be allowed to loosen in order to eliminate the risk of sealing material ending up in food products. That's why the seals of our hygienic design enclosures are made from blue silicon.'

What about the locking system?
'A standard locking system contains a double-bit system with holes all around, but hygienic designed enclosures have a locking system that makes use of a sealed outer part with a blue silicone sealing ring behind it. This means there are no holes in the locking system and the door itself.

Sounds like a challenge for OEM's and other food equipment providers.
'It is. Enclosures are often a part of an assembled machine. We still see many machines with non-hygienic design electrical cabinets attached to them. This needs to be improved by improving the communication between the end-user and the equipment suppliers. As soon as food processing companies learn that there are more hygienic solutions available, they can ask their machine suppliers to use these instead of standard enclosures.'

Tetra Pak Packaging Solutions

Applying hygienic design to minimise food spoilage

EHEDG Company Member Tetra Pak protects what's good, and also applies this motto to its packaging and handling solutions which of course comply with the latest EHEDG Guideline Documents. Tetra Pak commits to making food safe and available everywhere, and in the company's efforts to pursue that mission, it uses the latest technological innovations to continuously improve its processes and performances, both for their installed equipment base, and for their new equipment solutions. Fredrik Hansen, a Senior Technology Specialist in Aseptic Technology & Performance at Tetra Pak, shares his perspective on these ambitions, and on the role of hygienic engineering and design in future progress.

First, please can you tell us where your company's commendable focus on reducing food spoilage comes from?
'During the last decade, global economic growth meant that more than 100,000 people every day moved out of extreme poverty. Thanks to the COVID 19 global pandemic, energy crises, extreme weather and armed conflict, the predictions are now that the number of people in extreme poverty will increase, and fewer people will have enough to eat. This situation calls for all of us in the food industry to focus even more on reducing food waste, and hygienic design can play an important role in that.'

How can your company contribute to reducing food spoilage?
'The food industry has always had to deal with a certain percentage of spoiled packages, and it still does. This spoilage is sometimes related to ineffective cleaning, or to other parts of the operations, including the handling of the final product packaging. Based on new insights in hygienic engineering and design, as published in the EHEDG Hygienic Design Guideline Documents, and with increasing technological capabilities to better help the operator, or even remove operator dependency entirely, we can reduce the number of wasted packages due to microbiological contamination.'

What is the current average spoilage rate in the industry related to non-hygienic packaging?
'In the industry today, the common spoilage rate for aseptic packaging is around 1 package per 10,000 packages, sometimes better, sometimes worse. I think there is an opportunity to reduce that by an order of magnitude. So, we can increase performance a lot.'

What exactly do you mean by the term hygienic performance, and how can packaging systems contribute to that performance?
'We speak of hygienic performance as a measure of the ratio of the volume of the spoiled packages to the respective volume of produced packages. That ratio depends on many factors related to food production. There are challenges and increasing complexity in liquid food packaging, for example, related to the increasing varieties of plant-based dairy alternatives that is resulting in the introduction of many new product formulations. We also see a growing demand for higher packaging production capacities, without compromising on flexibility in package formats. So this is an increasingly complex environment.

So we need more data? Can the digitalisation of food processes help us out?
'The industry needs better equipment design and increasing levels of automatic control to avoid operator mistakes. Digitalisation is one of the new developments that offers the tools for that. Our investment in improving performance for our customers is now starting to yield significant measurable results.'

OUR FACTS & FIGURES 2022

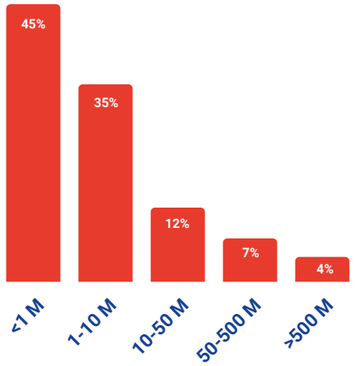
OUR MEMBERS

141
Individuals

67
Institutes

610
Companies

Companies breakdown



Food-related revenue per annum

OUR GEOGRAPHICAL PRESENCE

OUR WORLD CONGRESS

Munich, Germany
12 & 13 October 2022

300+
Participants

38
Break out sessions

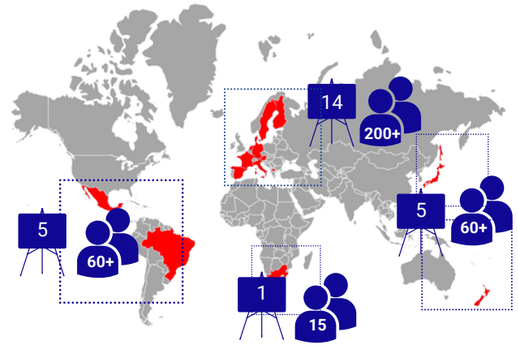
16
Speakers

33
Sponsors

3 Congress themes
- Food Factory of the Future
- Hygienic Design meets Digitalisation
- Intelligent Food Production

10
Posters

OUR COURSES AND TRAINEES



54
Authorised Trainers

600+
hours delivered

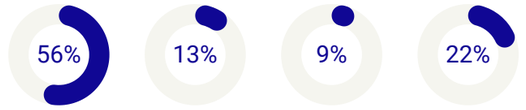
335+
trainees

OUR CERTIFICATION PROGRAMME

8
Testing Labs Worldwide

12
Evaluation Officers

270
Active Certificates



Sensors | Pumps | Valves | Others

OUR PRODUCT PORTFOLIO

10
Focus Areas

30
Active Working Groups

450+
Volunteers

55+
Guidelines

1 General Principles
- Design Principles
- Hygienic Integration Systems
- Lubricants
- Maintenance
- Materials of Construction
- Seals
- Welding

2 Factory Design
- Air Handling
- Building Design
- Food Refrigeration
- Water Management

3 Closed Equipment for Liquid Food
- Mechanical Seals
- Pumps, Homogenizers
- Sensors
- Separators
- Valves

4 Closed Equipment for Dry Particulate Materials
- Dry Material Handling

5 Open Equipment
- Bakery Equipment
- Conveyor Systems
- Fish Processing
- Meat Processing

6 Packaging Machinery Incl. Filling Machinery
- Packaging Machines

7 Heat Treatment
- Heat Treatment

8 Cleaning & Validation
- Cleaning & Disinfection
- Cleaning in Place
- Cleaning Validation
- Foreign Bodies
- Tank Cleaning

9 Test Methods
- Testing & Certification

10 Training Material
- Training & Education

Meet your new fellow EHEDG Company Member

Invert Robotics: remote visual inspection for safe food processes

Utilising hygienic design equipment - preferably EHEDG certified - is one of the best ways to prevent food safety and food quality issues. But what do you do when such an issue arises, and the cause is unknown? New EHEDG Company Member Invert Robotics is specialised in non-destructive inspection technologies. Gilles Gauderlot, Invert Robotics Regional Sales Manager Southern Europe, explains how it works.

What added value do your clients get from hiring your company to inspect their systems?
'Our robot can inspect even the most confined spaces, and generate visual data that can be analysed to assess the mechanical, as well as the hygienic integrity of assets. The probes and pictures are analysed by our inspectors and shared with our clients. The data also helps in analysing the effectiveness of cleaning processes because the camera offers a precision of 65 microns at ten metres. With its 30 times zoom, it is more powerful than the human eye.'

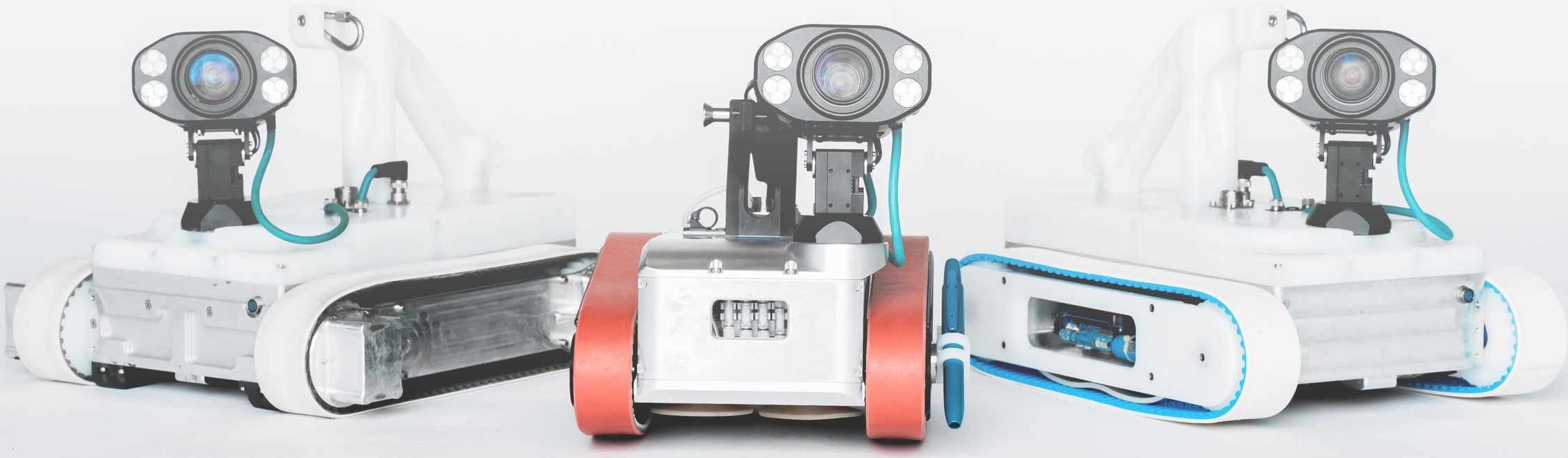
How do your clients use these high-res images?
'Although initially designed to primarily detect mechanical flaws, more and more food processors started calling us to help in finding the causes of their bacteriological issues. Tank inspections are particularly in demand. We share the captured data with maintenance and production workers. This helps to get them actively involved in analysing defects within their process lines. Additionally, we provide an inspection report, which can point food processing companies towards what needs to be repaired to improve food safety, quality, productivity and sustainability.'

Your clients are not professional data analysts. Are they able to correctly interpret these images?
'Our non-destructive testing inspectors are certified to do that for them. They come from industries with strict requirements, such as the aviation, and the chemical and nuclear industries, so they have a deep understanding of structural design flaws. Once an inspection report is issued, it becomes the property of the customer. In our daily routine, we see our clients utilise the data in various ways. For example, one of our most renowned customers asked us to share our findings with one of their equipment suppliers so that they could improve the design of their system. It is not our aim to replace manufacturing companies, but we can explain to them what we have seen, and help manufacturers to optimise their equipment based on real life industry assessments.'

How did you become aware of the existence of EHEDG, and why did you decide to become an EHEDG Company Member this year?
'Some of your most prominent food processing members made us aware of EHEDG, and suggested we join so that we could contribute to this community and share our findings for the benefit of all. By joining EHEDG, we believe we can help others to improve their designs and hygienic practices.'

Which existing EHEDG guidelines are most relevant to you?
'I've looked into it, and we are currently conducting some cross-checking with our development team. They have been instructed to monitor the EHEDG Working Groups and their guideline publications. Members of the development team are the staff with the technical knowledge to carry this out. And then we shall humbly request to participate in these groups, which will also help us to further optimise our technology.'

INVERT ROBOTICS



Meet your fellow new EHEDG Company Member:

HAUS Centrifugal Technologies

CEO and third generation company owner Hakkı Gözlüklü:

‘We joined EHEDG to learn and to contribute, because we care’

Among the 100 new companies that have recently joined EHEDG did so because their business has ventured into the food industry and they had acknowledged their need to learn more about hygienic design to be competitive in that market space. HAUS Centrifugal Technologies, a successful equipment producer based in Turkey, is an example of this. EHEDG Connects Magazine talks to the owner of this company Hakkı Gözlüklü, who shares the reasons why he decided that his company should become a full fledged EHEDG Company Member.

How did your family company reach its current size?
Hakkı Gözlüklü: ‘Our company is now 68 years old. It’s a 100 percent family owned business, based in Aydin, Turkey, where our headquarters are also located. Of course, at the end of the day, we are an international company. We have several sister companies all around the world, but the main production is in Turkey, and also we have a new production facility in Italy.’

You are a producer of high performance centrifuges. How is performance related to hygienic design?
‘The performance results of our machines are very critical, and so is their reliability. The centrifuges are at the heart of main processes in the dairy and beverages industries. Our machines play a central role within those processes; they are at the heart of the process lines, for example clarifying and debacterising the milk, so yes, hygienic design is very important for us in this market space. Our family business has been around for almost 70 years now, and EHEDG has been around for 30 years, but it is only in recent years that HAUS has become more and more involved in the food and beverage sector. We decided to join EHEDG to support our new food and beverage clients, and now we are looking deeper into the hygienic design and engineering aspects of our products.’

How do you plan to optimise the hygienic design of your type of equipment?
‘It’s not too difficult for us to adapt our equipment to the latest EHEDG hygienic design requirements. Due to the high speed rotation, the machines are already suitable for CIP applications. But there are some design features that we can still improve upon, particularly related to the cleanability and drainability of our equipment. I have made it clear that it is our engineers’ duty to realise these improvements.’

Which EHEDG Membership offerings are most important to your company right now?
‘Our R&D department staff is actively working on applying the EHEDG Guideline Documents. They are using the guidelines as their primary reference documents, especially EHEDG Guideline Document 8, which covers the basic hygienic design principles. Use of the guidelines is currently directing and shaping our product design in trespect of hygiene criteria.’

Will this eventually result in you certifying one of your products?
‘Our R&D team got in touch with EHEDG in Italy, with the EHEDG Authorised Testing Laboratory led by Dr. Giampaolo Betta. Together, we are currently investigating our options for obtaining EHEDG Certificates for our first products.’

Your engineers have decades of experience in centrifugal technologies. Are you willing to send them off to EHEDG Working Groups so that they can contribute to the development of new EHEDG Guideline Documents?
‘Yes, definitely, this is our goal: we would like to contribute to EHEDG by participating in the EHEDG Working Groups.’

Food safety culture in Mexico, Central America and The Caribbean

EHEDG Regional Section Mexico reaches out beyond borders

EHEDG Regional Sections come in many shapes and sizes, and serve the food and food equipment industries in regions that can differ substantially in size, culture and their adoption of hygienic design. The impact that any EHEDG Regional Section factually has on a region very much depends on the engagement and commitment of individual regional section members.

Since the establishment of EHEDG Regional Section Mexico, an active group of regional volunteers, working in food processing, food equipment and food safety consultancy businesses, has managed to promote EHEDG to a growing number of new companies in Mexico and beyond. Despite the restrictions related to the global pandemic, EHEDG Regional Section Mexico has managed to attract the attention of food processing companies all over Central America, from Mexico to Guatemala, Costa Rica, Cuba, and the Dominican Republic.

By effectively offering online meeting opportunities, webinars, hygienic design courses, and a strong business network in their region, EHEDG Regional Section Mexico has become one of the most active regional sections within the global EHEDG community. EHEDG Regional Section Chair Marco Antonio León Félix explains how (and why) his team did this, so that others may be inspired and do likewise.

Many food processing companies run food processing facilities in Mexico to supply the Mexican and Latin American, US and Canadian food markets. Why are you also propagating hygienic design in other countries in your region?
'That is because we are really passionate about hygienic design. It all started when we realised that there was no EHEDG Regional Section in Costa Rica, which is a very important country in Central America, the same for Guatemala. So, we just started working with them. Looking at the Caribbean: we have also been in Cuba, and we are planning to establish new connections in the Dominican Republic as well. We share the goal of EHEDG to spread the message that hygienic design is one of the most important aspects to consider in optimising food safety, quality, productivity and sustainability in food processing.'

What are the cultural differences in your region, and how do these differences affect the way you approach the companies?
'Our approach very much depends on the country. Costa Rica, for example, has a very well developed food industry, because they supply Panama. Companies owned by Costa Ricans can be found in almost every single country in Central America. They have facilities in Guatemala, Costa Rica, Dominican Republic and Panama. So Costa Rica is quite different. This is really a developed country for the food industry and some of these companies have recently attended EHEDG Advanced Hygienic Design Courses here in Mexico.'

What about Guatemala?
'Guatemala is similar to Costa Rica, but as a Mexican neighbour, it has a huge potential to increase exports to Mexico, and on the other hand, many Mexican companies are also based in Guatemala. The food industry in Guatemala is very well connected to Mexico, both in terms of commerce, and also in relation to food production and food safety. So yes, we are happy to be able to say that we have generated an interest in hygienic design among companies in Guatemala as well.'

How important is hygienic design for companies in your region that want to export their food to countries with different food safety regulations?
'Very important! It is a key commercial driver for companies to look into hygienic design. Mexico, for example, exports lots of food to the United States and Canada, so we have to comply with the requirements of American and Canadian resellers. And besides that, there is also an international focus on hygienic design, expressed by the Global Food Safety Initiative (GFSI) in the GFSI J1 and J2 documents.'

What was your role in that development?
'Mexico is closely related to Central America, yet is not part of it, belonging as it does to North America. That's why there is a huge opportunity for hygienic design in the focus on food exports to the United States and Canada, which must comply with FDA and USDA regulations in the US, and the Canadian Food Inspection Agency regulations, plus the private schemes, mostly SQF, FSSC 22000 and BRC. Of course Mexico also exports a lot to Central America, but the main market is North America within the scope of the 2020 renewed Trade Agreement between Mexico, USA and Canada.

About two years ago, a delegation of our EHEDG Regional Section Mexico was present in Toronto, at the global launch event of the GFSI J2 document which focuses on hygienic benchmarking requirements for building designs. We realised that this was a major opportunity for us to approach more Mexican companies. To begin with, this was quite difficult because many companies were still hesitant. They stated that they didn't know how this was going to work out and wanted to focus primarily on establishing a food safety culture.'

Have you seen any changes in their perception of hygienic design since then?
'Yes, no least because governments urged the industry to modernise the general hygiene principles in this region, according to the Codex Alimentarius 2020 Hygiene General Principles of Food Hygiene. While they are still focused on the importance of developing a strong food safety culture, we remind companies that hygienic design is an essential part of any good food safety culture. We motivate companies to follow up on this food safety culture approach, and then investigate deeper what this means to them. We address the fact that consistent food safety is impossible to obtain if companies don't have the correct equipment, or the correct facility, as we've seen this year with so many devastating food recalls. So yes, food safety culture is key, but it is rooted in correct integration and use of hygienic design.'

Does it help that the new GFSI Hygienic Design Benchmarking Requirements are now being adopted across the world by various certification program owners?
'It does. We are already seeing a trickling down effect taking place. Years ago, the FDA included a chapter dedicated to good manufacturing practices in their Preventive Control for Human Foods document. These good manufacturing practices also refer to hygienic design, and now that the CPOs are engaging

with the GFSI documents, everything finally seems to be coming together. With the further adoption and integration of hygienic design, all pieces of the puzzle are finally falling into place, since this will enable companies to approach food safety from a holistic farm-to-fork perspective, and with the additional food quality, productivity and sustainability benefits that hygienic design offers on top of food safety, we are now seeing an acceleration in hygienic design across the food and food equipment industry.'

Do you see this development reflected in the number of food industry professionals attending your regional EHEDG Hygienic Design courses?

'We sure do. This year, for example, a big delegation from Tetra Pak in Mexico attended our course, and we also welcomed companies from Chile, Argentina, Costa Rica, Colombia and Peru. I think that we are living in a very interesting times for the implementation of hygienic design, and I celebrate the fact that BRC and IFS have started adopting the first GFSI hygienic design benchmarking requirements into their new food safety standards. These developments tend to take time, but we are definitely heading in the right direction.'

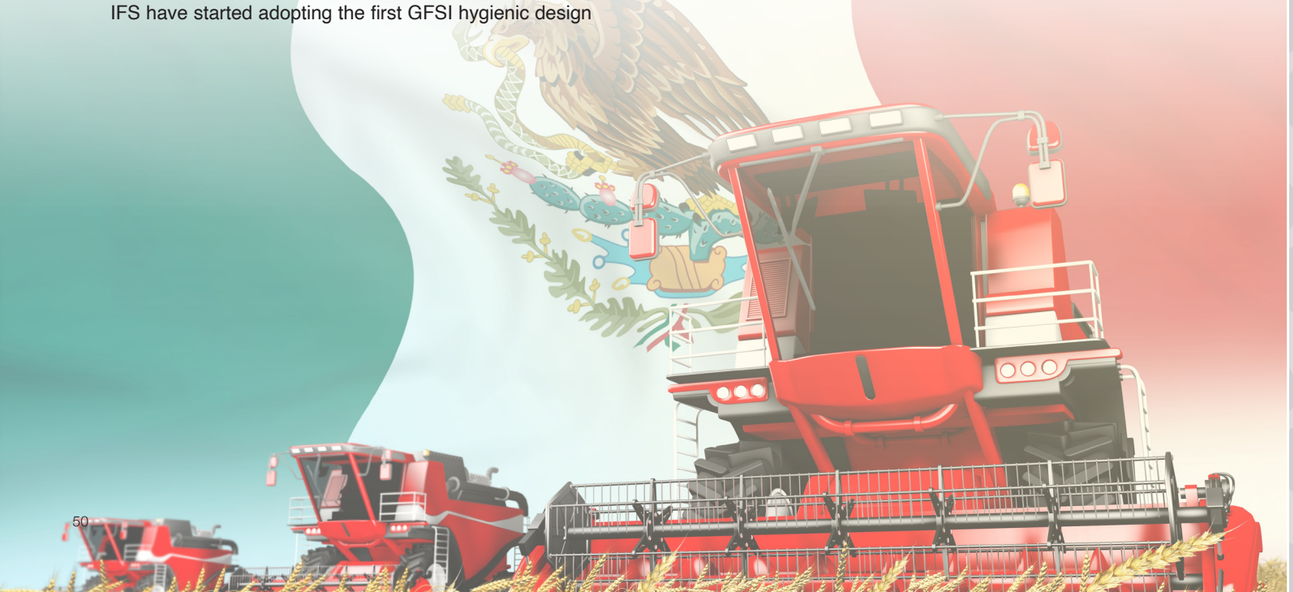
Apart from the EHEDG Certification offerings, how are the guidelines, training and education valued in your region?

'I think the best way to reach the companies is through a combined approach via certification on the one hand, and through training and education on the other, both of which are based on the contents of the EHEDG Guideline Documents. So, EHEDG first and foremost needs to continue publishing very high quality guidelines, and then we can give very high level training and offer relevant certification schemes.

Certification is a means of quickly ensuring you are doing something that is compliant with the current hygienic design criteria, and training activities also offer opportunities to network, because at the training you find people with the same problems that you are facing, and you can really discuss and dig into the practical stuff and benefit from the knowledge of both the trainers and the other attendees.'

That brings us to the fourth product portfolio offering that is not often explicitly mentioned, and that is networking. While we haven't had many events recently, how have you been able to network with your members during this past year?

`We reached out to contact new companies, because I think that our biggest challenge is to reach those companies who haven't heard of hygienic design and EHEDG yet. We have published videos on YouTube and shared the basics of hygienic design and the benefits of EHEDG to make people more aware of what is available. We will certainly continue to do that in the coming year.''



Effective tank and vessel cleaning in the food industry

New EHEDG Guideline Document 51:

Tank design guideline enables optimal cleaning, productivity, and sustainability

What is the best way to clean food processing tanks most effectively and efficiently? To answer this question, we first need to examine how tanks are designed and constructed, because it's the design of a tank that affects its cleaning potential, and consequently its effectiveness as a trustworthy part of a productive, safe, and sustainable food processing line.

It was this fundamental understanding of the interdependence between the hygienic design and cleaning aspects of tanks and vessels that made the members of the EHEDG Working Group Tank Cleaning decide to include both the design and the cleaning aspects of tanks and vessels into one comprehensive guideline document.

Hygienic Design Guideline Cluster

EHEDG Guideline Document 51 is part of a series of new EHEDG Guideline Documents that focus on this correlation between design characteristics and the achievable cleaning results, among recently published guidelines such as EHEDG Guideline Document 50 on the Hygienic Design Requirements for Cleaning-In-Place (CIP) Installations, and EHEDG Guideline 45 on Cleaning Validation, Monitoring and Verification. This newest EHEDG Guideline Document 51 on the Hygienic Design Aspects for Tank and Vessel Cleaning in the food industry completes this guideline cluster, and is now available for download from the EHEDG website (free for EHEDG members): www.ehedg.org/guidelines

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One guideline, various perspectives

EHEDG Guideline Document 51 has been developed by experts who work in different areas of the food and food equipment industry, from hygienic design consultants and auditors to end-users of tanks who process different types of food products. The working group was also advised by scientists who have performed extensive scientific research on the effectiveness of different types of tank cleaning. Finally, the working group also incorporates some of the largest tank cleaning machine vendors in Europe.

What differentiates tank cleaning from conventional CIP cleaning of pipe systems?

Bo Boye Busk Jensen, chair of the EHEDG Working Group Tank Cleaning, and R&D Engineer at Alfa Laval Cleaning and Mixing: 'This new EHEDG Guideline Document addresses one particular part of the the CIP process: the tanks that are used throughout the industry for various types of food processing. Compared to CIP cleaning of pipe systems, the CIP cleaning of tanks is more challenging, because it's much more difficult to obtain a consistent mechanical force on the inner surfaces of tanks and vessels than on the inner walls of pipes, where it often suffices to pressurise the cleaning fluids to obtain effective cleaning results.'

So you need different cleaning actions and different cleaning mechanisms inside tanks?

'Yes. You could do it with static spray devices, where you pour water into the tanks and then it runs down the tank surfaces. You can also use more advanced tank cleaning technologies, and all this is also included in the guideline that we have made. Besides this, the soiling itself is more severe in the tank, often because you have dry and semi dry conditions. Conversely, a pipe system will probably always be fully flooded with product so you don't get these interfaces between product and air that promote worse soiling, and where the soil layer can dry onto the surfaces making it much more difficult to remove.'

You focus both on the design of the tank itself and on the design and cleaning of the tank cleaning devices inside the tanks. Why did you decide to combine those two into one guideline?

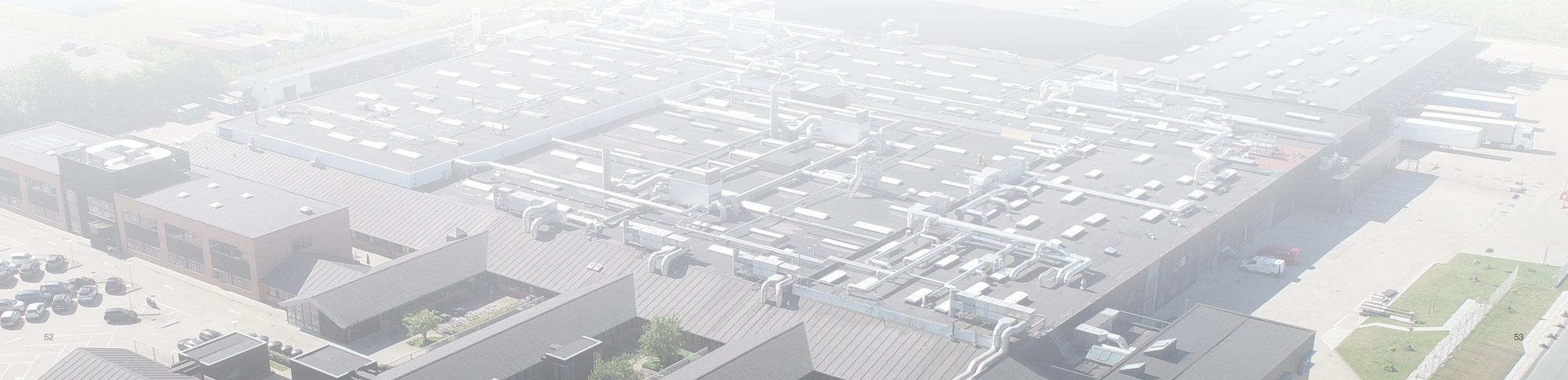
'The idea has always been not just to focus on tank design and not just on tank cleaning but to combine them in one guideline, because there is a big interaction between the tank cleaning machine and the design of the tank itself, and you can't really consider one without the other. So that's the main reason why we have retained tank design in the guidelines for now. There's been some discussion about whether we should have taken it out and created a parallel guideline for tanks, but we decided to keep it in for now because then everything is in one place. It has been a benefit in our discussions to keep everything in one place because it meant we could go back and forth and change some recommendations for the tank cleaning device, depending on our recommendations for the tank design, for example.'

Many different types of tanks are used in many different areas of the food industry. How did you handle the complexity of this topic?

'We included a matrix that provides an overview of the different types of soils and soiling characteristics that we encounter, which references to the relevant sections in the guideline document. The reader then determines the most suitable tank cleaning technology for cleaning a particular tank with a particular purpose based on volume flow, time or total cost of ownership. The guideline covers six different methods for tank cleaning, ranging from simple fill-and-dump-cleaning to more sophisticated types of cleaning, such as burst cleaning.'

What are the advantages of more sophisticated types of cleaning relative to more simple ones such as fill-and-dump? Are you also addressing that in your guideline?

'Yes, we do. Comparing fill-and-dump to burst cleaning reveals the wide scope of this guideline, and how combining different types of cleaning technologies can offer major productivity and sustainability benefits. To



save on cleaning liquid for example, you can conduct burst cleaning using any of the current tank cleaning device technologies that we have today: static devices or single-access devices or multi-access devices. First a burst is applied using a limited amount of cleaning liquid, and then you let it rest there for two to five minutes to let the chemistry interact with the soil. The chemicals partly dissolve the soil and partly separate it from the surfaces. Then you add another burst, which adds the effect of mechanical action on the soil as the liquid run down the surfaces. The new burst also applies more chemistry to the newly exposed layer of soil, and the reaction between the chemicals and soil restarts. This process is repeated several times.'

Do you also address specific cleaning issues, related to agitators, for example?
'Yes, this guideline also addresses the cleaning of agitators, because if you have an agitator, you often also have to deal with shadow zones, on the agitator itself, and on the surface areas in the tank that are difficult to reach due to the agitator. We address different strategies for cleaning the agitator itself, like letting it rotate slowly when you have a spray device that is spraying liquid onto it, or you can add spray devices beneath the agitator impellers, so that you can also clean the agitator from below.'

Besides focusing on food safety and food quality, various new EHEDG Guideline Documents also point to the additional benefits of hygienic design, such as productivity and sustainability aspects. Does your guideline include those as well?
'Yes, very much so. Optimising the effectiveness and efficiency of tank cleaning processes is the best and easiest way to significantly reduce water, energy and chemicals consumption. The potential savings are particularly high here because food processors can choose from a wide range of different tank cleaning technologies, each of which offers specialised ways for cleaning different types of tanks that are used for specific purposes. For example, many lightly soiled tanks can be cleaned quickly and effectively with just a static spray device, but the effectiveness of cleaning more heavily soiled tanks can really be boosted by use of more advanced tank cleaning devices that apply a combination of chemicals and mechanical force.'

What are currently the potential savings of optimising tank cleaning?
The potential savings are significant, and that's supported by best industry practises throughout the industry that provide evidence of water savings of up to 70 to 75 percent and cleaning time reductions of up to 50 percent. This often results in productivity increases because there is such a reduction in cleaning time, and in reductions in investment as well, since it is no longer necessary to establish a parallel process line next to the existing one in order to increase production..

So, this guideline helps to improve on cleaning, as well as productivity and sustainability results?
'Yes, it does.'

To download this guideline, please visit www.ehedg.org/guidelines.

Claudia Baenen

Business Development Analyst & Marketeer

EHEDG Company Member: Commercial Food Sanitation (CFS)

Cross-functional teams
'Successful designs are not reached in isolation. My tip for the food industry is to bring together a cross-functional team very early on in your projects. Then really focus on understanding the needs and desires of different users, while bringing in various technical and professional viewpoints. Through collaborations and partnerships you can establish the hygienic designs that meet all processing criteria.'

Stefan Akesson

Company Specialist, Food Safety

EHEDG Company Member: Tetra Pak Processing Systems

Intended use
'Don't forget about the intended use when you're selecting components or material. The intended product could be like milk or could be very viscous or contain fibres or seeds. Such aspects can influence the hygienic design. Other parameters, such as fat content and pH, might also impact on the selection of materials, and on the detergents to be used. You can read more about that in the EHEDG Hygienic Design Guidelines, all written by experts in the field.'

Eric Partington

Consultant Metallurgist

EHEDG Company Member: Nickel Institute

The enemy is small
'My Hygienic Design Top Tip is to remember that the enemy is small. The microorganisms which we need to control are very small and this demands precise and clever engineering. How do we achieve this? Well, there's a lot of information in the EHEDG guidelines, which were written by experts in the industry who have faced and dealt with exactly these problems.'

Integrating Hygienic Design Entities: EHEDG Guideline Document 34

Dr. Roland Cocker: ‘This update reveals new insights, challenges and solutions’

Dr. Roland Cocker is a biotechnology expert with practical international management and consulting experience in research and development, technology transfer, toll manufacture, laws, standards, licensing and marketing. He has led the implementation and accreditation of risk, quality, safety and environmental management systems, covering ISO 9001, ISO 14001, FMEA, HACCP, HazOp, TQM, biotechnological, food and pharmaceutical GXP. He is an expert in highly advanced automated biotechnological systems, aseptic and hygienic design, equipment and processing. In his role as Chair of the EHEDG Working Group System Integration, he provides valuable insights in how to effectively apply the new EHEDG Guideline Document on Integrating Hygienic Entities.

How does the guideline define the term ‘integration’ and what is its scope?
Dr. Roland Cocker: ‘This guideline was produced by two successive EHEDG Working Groups, with the support of several reviewers. First of all, we recognised that defining what questions to ask over the course of a project is at least as important as detailing answers. In the guideline, the process of integrating hygienic design entities is presented in flowcharts, dependent on the processing phases, their interdependencies, and their sequencing. It’s not just the physical entities that need to be integrated. Aspects such as verification-steps and information-routing are also an intrinsic part of the hygienic design. The guideline covers the whole life cycle of entities, and how to apply the existing guidelines during their entire lifetime. The definition of integration we use is: “the process of combining or arranging two or more entities to work together whilst eliminating or minimising hygiene-risks”. In practice we see that entities are often combined in ways that create hazards and hygiene-risks.’

How exactly do you define hygiene-risks?
‘There’s a lot of talk about hygienic design and food-safety, but a hygiene-risk refers to a risk that does not just concern food safety - it’s a risk to any of the potential benefits of hygienic design: food safety, quality, productivity, and sustainability. When considering the relative roles of HACCP and hygienic design in food safety on its own, one can state that, up to a point, the critical control points (CCPs) of HACCP act as backstops for food-safety hazards resulting from previous hygienic-design flaws.

At a minimum, hygienic design is a prerequisite for the safe operation of CCPs and of any processing steps that occur after a CCP, for example the slicing and packing of cooked food. However, hygienic design is essential prior to CCPs to satisfy the contemporary demands for milder processing, reduced salt, sugar and fat, elimination of preservatives and longer shelf-lives without compromising on food-safety. To provide a useful working language and concepts, our working group borrowed some terms from medical-device standards, for example where the risk can be controlled ‘as low as reasonably practicable (ALARP)’, which brings into focus concepts such as practicality and costs, which you may have to consider especially when dealing with legacy systems.’

Sounds interesting, have you got any other examples?
‘Another term concerns critical systems, where the risk must be controlled as far as possible (AFAP) and thus we also have convenient shorthand-terms for discussion around risk in hygienic design. For the flowchart-overview of the process, we’ve applied an adapted version of the well-known V-model. Instead of presenting processes in a linear way, this V-diagram arranges the processing steps into separate design qualification stages, and places the qualification steps opposite to the corresponding specifications.’

What about change-management?
‘Change management, as mentioned on the left-hand side of the diagram, is quite easy to implement. It’s very cheap. However if you forget something on the right-hand side, or if you decide to change one of the parameters in a later stage, it often becomes very expensive. It can also cause serious time delays because, ideally, you would thenreally need to go back down through the risk-assessment stages for these and for any consequential changes. Time and cost-pressures tend to discourage this, resulting in imperfect solutions. So, in the guideline we’ve built in the concept of getting the design-specification correct first time, and then freezing it. This is called design-freeze.’

But this process is not linear, it’s cyclical…
‘Exactly, and because of that, people often tend to forget to capture learning experiences from preceding projects, and to exploit them in the user-requirements specification. These should be diligently elicited, recorded, and applied. Each of these phases is then expanded into a detailed flowchart. To help people find their way, each detailed flowchart is accompanied by a thumbnail of the master V-model with the phase in question highlighted. Anything you use in a particular step comes in from the left, and anything you produce, such as a plan or a record comes out from the right. A consistent feature is the repeating pattern of three steps: do-check-decide (and if it’s not right, go back and do it again). For unassigned entities (phase 4b), there are far fewer definitions of requirements, which makes it appear simpler than for assigned entities (4a). In the guideline, we discuss how to bridge the gap between unassigned and assigned entities, via “prospective HACCP”.’

How does this apply to installation-qualification?
‘This differs between people who apply it from the perspective of an OEM supplying to the open market, and teams concerned with entities that have already been assigned to a specific location, use of raw materials, processes, products, operations, staffing and so on.’

Can you share a new insight that the new version of the guideline offers?
‘Sure, the guideline shows, for example, how to deal with legacy-systems, and provides insights into the cost-ratios between renovating and building new. Another clear insight is that the most common mistake that people make is to fail to capture the feedback-knowledge and incorporate it into the user-requirements specifications. The result is that there is a threat that the process will be directed by ‘opinion-engineering’, tradition or dogma, where people jump through the design-stages and say: ‘this is how we do it.’

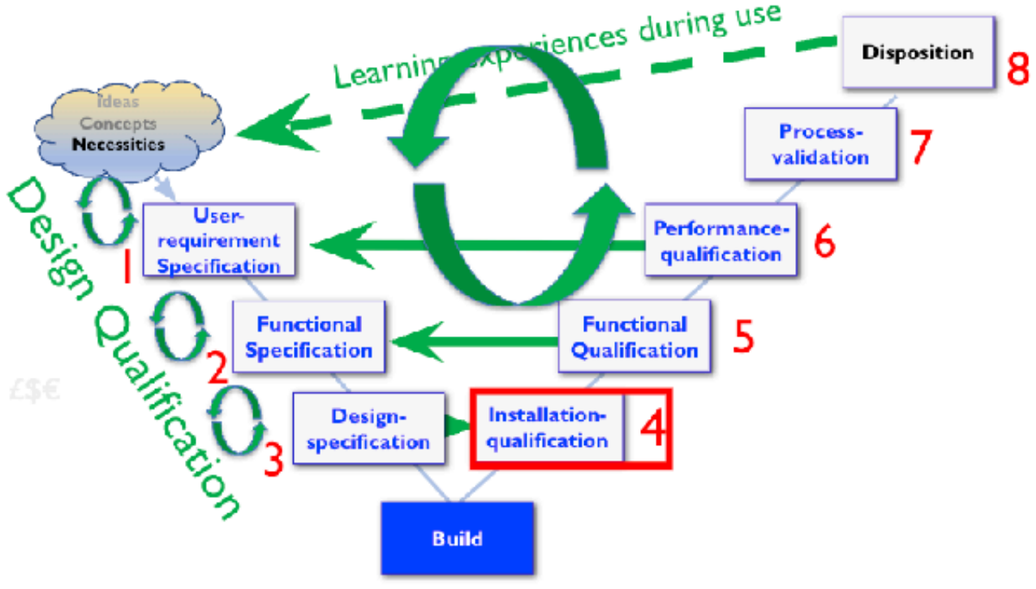
So what is the correct way to do it?
‘Step one: always start with the user stakeholder requirements specification. When you see the orientation map, one of the issues to pay attention to is potentially missing or hidden knowledge, and this will spawn a whole area of expertise on customers, hidden needs, users’ hidden needs. This is the foundation of what you are going to build, so this foundation must be strong. If you don’t have that, then you simply won’t get a good build. So, when looking at missing information at this stage, a key thing that we discuss in the guideline is the omission of stakeholders’ viewpoints.

The term ‘user-specification’ can lead people to consult only those who operate the process-line, but in practice, it should include all that have a stake in the design-specification. Who are the stakeholders? It’s going to include installers, maintenance personnel, cleaners, operators, quality-control people, purchasers, safety-people, validators, and so on. If you leave those people out, you can have big problems, because once you get onto the right-hand side of the V-diagram and you’ve installed the equipment, then it’s too late.’

But people are known to make mistakes, to forget things, aren’t they?
‘Indeed. When we give instructions to a computer, we’re quite used to the rigidity that comes with that, since the engineering-software will tell us very quickly if we’ve missed something, or if we put something together in the wrong order or made some other mistake. In the user-requirements specification-phase, it is important to stress to the users that they must really think hard to ensure that their requirements are comprehensive, accurate and clear.

With text-based instructions to people, we often expect people to fill in the blanks, or we assume that they will understand something, that they will know it already, but often they don’t. So, people who use instructions are

The V Model



often used to compensating for these deficiencies. And this is what I call 'real-time repairs', where people find out empirically what's wrong with the process and then correct it, often instinctively and subconsciously. This can be the difference between excellent performance and not. It is "gold dust", that needs to be captured in the user-requirements specification of future projects. ISO 9000 tells us to "say what you do, do what you say and keep records to prove it" or in other words, to keep records of everything you do so you will be able to prove it later. Auditors are trained to check if these things match up or not, but it follows that hidden know-how or practices may pass undetected.'

What about foreseeable changes?

'Predictability is a tricky business. Let's say a (possibly confidential) business-plan is already in place: "We're going to double production in two years" time. Is the management expecting equipment that's currently designed and assigned for dry processing, to be suitable for making some wet-processing products later-on? The team needs to be informed. Then there are pending regulatory changes, and (harder to predict) technological changes. We try to hold the mirror up to ourselves within EHEDG, with respect to our guideline development steps. We know how hard it can be to avoid the ambiguity that can result from a myriad of details, from bad punctuation, from using incorrect words or complex, verbose text. Misdirection can also create problems. This is the case, for instance, when people include design solutions in the user-requirements specification. It's better to say what the goal of a system is: its performance-requirements. That is not to say that some design-solutions cannot be included, but only if they have already been qualified or validated, including corporate standards and specifications.'

Can you give us one practical recommendation here as a takeaway?

'Well, I recommend the use of product-data management-software. We discussed this briefly in the document. This is software that has been used traditionally by aerospace companies such as Airbus and Boeing. We now see that pharmaceutical companies like GSK and food companies like Unilever are also beginning to use it. The software keeps track of the project, stores it in the cloud, and can facilitate worldwide transdisciplinary collaboration and feedback. It also maintains a current virtual twin or digital twin of the design specification and keeps, as a backup, a real time dossier on the history of design changes. Most importantly, it also stores the underlying reasons and evidence, including recordings of any modelling-processes. It also facilitates communication, for example, beyond the project-team. All stakeholders monitor their own perspective on how the design is developing and provide their own input accordingly. I truly believe that this form of interactive management can also significantly contribute to achieving goals in hygienic design processes for the food industry as well. But first of all download and read this new EHEDG Guideline Document 34 on integrating hygienic design entities, because this new document update reveals many new insights, challenges, and solutions.'

EHEDG Working Group Conveyor Systems

Keeping up with innovations and connecting expertise

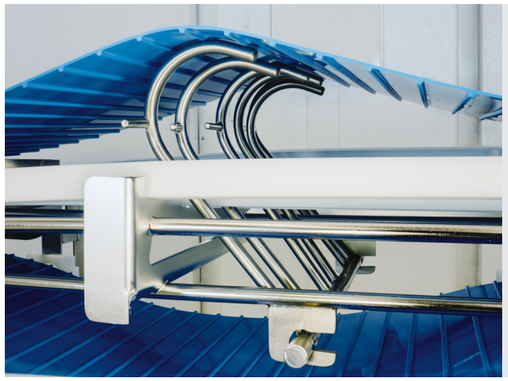
To ensure that EHEDG Guideline Documents stay relevant and up to date, each document is updated at least once every five years, and each update needs to be aligned with both the latest needs of food processing companies, and new developments in food equipment innovation.

Most of the guideline development work is done by the EHEDG Working Groups. Their members represent a wide range of expertise on various subject matters, and ideally they reflect both the perspective of component developers and end-users. However, now and then these groups also reach out, to gather additional input on specific subtopics, and to establish consensus on fiercely discussed guideline details.

To further improve the practical value of the EHEDG Guideline Document Conveyor Systems, EHEDG Working Group Chair Roger Scheffler invites all EHEDG Connects Magazine readers, and particularly those working at food processing companies, to share their daily practical user conveyor system experiences with his working group.

When your working group developed the first edition of this guideline, it took quite some time to do so. Why was that?
'We had very complex discussions about what was important to put into the guideline, and what was less important. Everybody had their own reasons for including certain items of information in the guideline, and we had to structure all this information into one comprehensive document that would make sense to a broad audience of EHEDG members. That's why it took such a long time before we finally published our (excellent, by the way) initial guideline in 2016.'

What is it that makes developing food safe conveyor systems such a complex challenge?
'Conveyor systems contain a lot of parts, and their design can vary tremendously depending on the type of food that needs to be transported through a production environment in which the hygienic requirements are high. Different aspects are, for example, the required transfer diameter, the transfer size, which sometimes demands, for example, tiny nose bars to transport small products such as little cookies from conveyor A to conveyor B. This then requires specific belt technologies etcetera.'



What about differences in cleaning methods?
'We see a similar level of complexity in cleaning methods. If you have a line that needs to be allergen-cleaned in between batches, you need a very easy-to-clean conveyor system, a design that allows for easy access to all components. And this requires, for instance, low-tension or zero-tension belting, so that you can easily lift the belting and gain access to all parts of the conveyors effectively. All aspects related to the design, installation and integration, daily use and cleaning of conveyor belts, are parts of the same puzzle.'

Recently, various suppliers have started bringing innovative conveyor systems to the market, systems that promise shorter cleaning interval times. Have you also noticed this?
'Yes I have, and that reflects the movement towards a more integrated approach to conveyor system development, where developers and designers now incorporate cleaning systems into their conveyor system designs. I personally think that any company striving to develop conveyor systems that offer both high performance and easy cleanability first needs to engage in a fundamental engineering investigation phase. What does it make most sense to incorporate? Just putting in a spray bar system or an Assisting Cleaning System (ACS) is not enough.'

What's the current level of understanding? Are the design principles that you cover in the guideline commonly understood?
'Many companies still need to develop a correct understanding on how to embed cleaning systems into food processing lines and their respective cleaning approach. This depends on technology as much as on cleaning practices. Concerning the type of cleaning: do you apply periodic cleaning? And why and when exactly? These are questions we need to pose, and this is what we communicate in the guideline: the importance of developing a comprehensive understanding of all aspects that affect the contamination risks, from the early design stage up to the daily use of conveyor systems in food processing environments.'

So, there's still room for improvement for the automation of cleaning?
'Yes, there's plenty of room for that. In my daily work alone, I have seen so many spray bar installations at conveyor systems in Europe that are not in use anymore. The food processors think they are ineffective. I can see why: the engineers designing these systems, even if it's a simple spray bar with nozzles, didn't have the right focus. So I encourage everybody to anticipate the near future, and I think the conveyor guideline is a good starting point. It's going to become even more user-friendly, and it will enable end users and design engineers to look at conveyor systems from a risk assessment perspective. That will greatly simplify choosing the best beltings, lifters, motors and so on.'

You mention risk assessment. Is that related to the new GFSI hygienic design benchmarking requirements?
'Yes, exactly. The basis of our thought process is the GFSI hygienic design benchmarking process. We have an end user in the group. That helps us to better understand what the specific requirements are right now. All our working group experts agree that this is the better way of looking into conveyor guidelines. This approach also aligns with new EHEDG activities that are looking more actively into GFSI aspects.'

The input of food processors is key in representingthe perspective of the end users, so why are food processing companies still underrepresented in many EHEDG Working Groups?
'To be honest, I don't really know why that is. I just want to encourage end-users to really look into it. We have one end user in our group now, while we are developing this conveyor guideline mainly for the end users, and for designers that are closely related to food processing. So yes, I would love to have more end users involved because it adds so much value, and because the contribution that end users make can also be leveraged across other working groups. Practical input from food processors can provided highly valuable insight to other members within the EHEDG organisation. It really helps to give direction to the EHEDG guideline, certification and training activities.'

Please invite the readers to participate in EHEDG Working Groups.
'Dear food processor, please consider joining one of our working groups, the conveyor group in particular would value your input. Hygienic design equals better food safety and better food safety starts with hygienic design, so your expertise would be more than welcome in making EHEDG Guideline Documents even better and more valuable than they already are.'

Hygienic design is a prerequisite for effective cleaning validation

Thomas Tyborski [Ecolab & member EHEDG Working Group Cleaning Validation, Monitoring and Verification]

The importance of effective cleaning-in-place validation cannot be overstated, says Thomas Tyborski, and he should know, because he is the Technical Excellence Manager at EHEDG Company Member Ecolab, and he also personally contributed to a new EHEDG Guideline Document update on Cleaning Validation.

Why is the topic of CIP validation so relevant in this time and age?
'CIP validation is an essential element for achieving food safety, food quality, productivity and also sustainability goals. The term 'valid' comes from the Latin and it means strong, effective, healthy - attributes that are highly applicable to a safe food production. A successful implementation of a cleaning validation means that cleaning cycles always and at any time deliver consistent predefined results. And in times of increasing attention to food safety and food quality, this is a goal that every food producer is striving to achieve. Therefore, cleaning validation is a fundamental part of every food production process.'

What about the productivity aspects of the food processes?
'Cleaning validation is always also a prerequisite for cleaning optimisation. Most sustainability improvements also yield monetary benefits, and these can be achieved with reliable cleaning. In many cases, validated cleaning also enables savings in energy, water, and chemicals, as well as reductions cleaning times without compromising food safety.'

How did the industry react to the launch of the EHEDG Guideline Document 45?
'Our EHEDG Guideline Document 45 was published last September, and we received a lot of feedback from food processors who are very pleased with this guideline because of its applicability to practical environments. Apart from the guidance with regard to cleaning validation, the document also contains an appendix with proposals for validation protocols, that is very useful in a practical environment.'

What were the takeaways of your EHEDG World Congress presentation on this topic?
'One aspect is that cleaning validation is a topic that affects many disciplines in the food and beverage enterprise, not just those responsible for production. It also includes Quality Management and Research and Development, but also those people responsible for maintenance. These areas should always be involved in the cleaning validation approach. It also makes sense to involve machine manufacturers or experienced experts in cleaning agents to have specific external expertise available for cleaning validation.'

Are there any systems available that can help to optimise CIP Validation?
'A key learning point is the understanding that cleaning validation never ends. The change control process on CIP must be carried out continuously. For this there is a state-of-the-art solution called 3D Trasar for CIP. This software uses signals and identifies errors in the cleaning process, enabling timely corrections and an increase in the conformity of cleaning. This information can then be used to optimise cleaning operations. The monetary benefits resulting from this are enormous and are all derived from valid cleaning. Moreover, this means that the safety and quality of the food produced is not compromised by incorrect cleaning.'"

What role does communication play in the effectiveness of CIP validation?
'Communication is key to a successful cleaning validation practice. For example, if a maintenance professional is asked to repair a defective system, then he should be aware of possible hygienic design related issues. If this is not the case, then although the correct function of the system may be re-established after repair, the same repair activity may also have introduced a hygienic design weak point, so that after the repair, cleanability is compromised, and then the cleaning results will no longer be valid. Therefore, everyone who has an impact on cleaning should be involved in the CIP validation process.'

Another key learning point on cleaning validation is the need for a systematic, integrated approach. It is important to establish a system that helps people to evaluate relevant aspects and to find the right answers. EHEDG Guideline Document 45 can help in this respect. Something that many people are not aware of is that the cleaning validation process never ends, which means that change control processes must be carried out on a regular basis, and remote systems, such as 3D Trasar for CIP, should be used to monitor cleaning conformity. Ultimately, CIP Validation is all about gaining and retaining control.'

Would you advise companies to outsource their cleaning validation tasks?
'It always makes sense to involve external expertise for in cleaning validation because not all the expertise may be available in the food processing company itself. Nevertheless, cleaning validation cannot be completely delegated to third parties. Internal expertise is always needed for cleaning validation. Only the food and beverage manufacturer knows all the details about the origins of products, the contents, and the product risks. Also, the food producer is always responsible for the acceptance criteria relating to cleaning results. So, involving external expertise makes sense, but never outsource it completely.'

How important is it that companies share the EHEDG guidance across their workforce?
'Very important. Everybody who is involved in anything that can impact the cleaning results should be involved, so not only food processing and cleaning staff on site, but also maintenance engineers and OEMs. These elements can also be part of a planning phase when you set up a new system or new machinery. Hygienic design aspects should always be considered by everyone involved.'

Can an OEM who is aware of these principles create unique selling points related to the servicing of equipment?
Absolutely, and incorporating hygienic design makes cleaning easier and safer. In addition to food safety, the time and resources required for cleaning can be reduced, so there is a high monetary value in this cleaning validation. Taking care of the prerequisites, and hygienic design is a prerequisite, is essential for any effective cleaning validation.'

EHEDG Connects

Webinars

EHEDG Connects Webinars have become one of the most popular online EHEDG online offerings, and there are good reasons for that: these webinars allow anyone in the world with an internet connection to learn about specific hygienic engineering and design related topics, they are easy to digest and only take up one hour of the attendees' time.

EHEDG Connects Webinars consist of a 30-minute expert presentation, followed up by a 30-minute questions and answers session. After the live webinar broadcast has ended, all webinar attendees have the opportunity to send in additional questions. Last but not least: EHEDG Connects Webinars are completely free of charge.

To stay in the loop about upcoming EHEDG Connects Webinars, please subscribe to the quarterly EHEDG Newsletter on the EHEDG website [www.ehedg.org] and follow EHEDG on LinkedIn [www.linkedin.com/company/ehedg], where you can also find recorded EHEDG Connects Webinar Q&A sessions.

EHEDG Connects Webinar Cleaning Validation: Questions & Answers

The most effective way to learn is to first listen to the experts, and then communicate with them about your specific processing challenges. That is why EHEDG Connects Webinars consist of both a hygienic design expert presentation, and a questions and answers session. Attendees can pose questions that are answered either instantly within the live webinar setting, or later via email.

The most effective way to learn is to first listen to the experts, and then communicate with them about your specific processing challenges. That is why EHEDG Connects Webinars consist of both a hygienic design expert presentation, and a questions and answers session. Attendees can pose questions that are answered either instantly within the live webinar setting, or later via email.
Here are just a few of the questions and answers from the EHEDG Connects Webinar Cleaning Validation by Hui Zhang, hygienic processing Expert at Group Quality in the Unilever Supply Chain. Hui is also a longstanding contributor to EHEDG as Chair of the EHEDG Working Group Cleaning Validation.

? *Webinar attendee question 1:*
How are worst case scenarios determined during cleaning validation?

Hui Zhang: 'Worst cases can happen in different scenarios. It can happen where cleaning conditions are less optimal, like in sections of the process line where the temperatures might be a bit low, or where the velocity drops, or where the concentration of the cleaning chemicals is lower. So, look for worst cases in areas that are less optimal than your mainstream. It can also occur in the production process section, where more soil can be formed, like in PHE (Plate Heat Exchanger), where the temperature is often much higher than in the rest of the process line, and the higher temperature will result in a formation of stubborn soil, which should also be considered as a worst-case scenario.'

? *Webinar attendee question 2:*
Regarding the selection of the worst-cases: must all the points be used, or can we have one or more points only to choose a worst-case condition?

'In principle, all of this must be considered, but probably some of these points are not applicable for you. All applicable points need to be validated, like unhygienically designed parts, worst case product and processing, worst case cleaning, etcetera.'

? *Webinar attendee question 3:*
Does EHEDG offer a recognised cleaning validation training for SME's, which can then be offered as a service by the SME's attending the course?

'At this moment we are still finalising the cleaning validation module, but we are planning to offer this module in our standard EHEDG Training and Education offerings, as part of the EHEDG Hygienic Design Advanced Course. So, the answer is not yet, but it's coming soon.'

? *Webinar attendee question 4:*
Kindly clarify the EHEDG recommendation on rinse water temperature for micro validation.

'It really depends on the process. In most cases, it can be just ambient water. Most important is that the micro quality of your rinse water must at least meet the potable water quality. So yes, if you have enough rinse water to rinse an aseptic production, and after that you don't have any plans to sterilise your aseptic equipment, in that case, you may consider using the aseptic water to rinse your equipment. Generally speaking, rinse water temperature is not really a key factor within cleaning validation processes. However, disinfection parameters play key roles in the disinfection process, by reducing the microorganism count to an acceptable level.'

? *Webinar attendee question 5:*
Are there any guidelines that you could point this attendee to?

'Yes, if you want to learn more about effective cleaning, please read EHEDG Guideline Document 52 'Basic Principles of Cleaning and Disinfection'. For more information on cleaning validation, please read EHEDG Guideline Document 45 'Cleaning Validation, Monitoring and Verification', on which the presentation of this Webinar is based.'

? *Webinar attendee question 6:*
Does the guideline on cleaning validation list legislative documents that specify cleaning validation requirements?

'Cleaning and disinfection are prerequisites for hazard control. Cleaning validation is to ensure that the cleaning and disinfection is effective. Cleaning validation is mandatory for most food companies because it is essential for consumer safety and product quality. In our guideline, we don't list regulatory documents about cleaning validation. Instead, we provide the principles and methodologies. Thus, instead of focusing on legal requirements, we provide general principles on how to define an effective cleaning validation process.'

? *Webinar attendee question 7*:
During cleaning validation, we use ATP analysis for our swab sample. Is this an effective method for analysing it?

'It really depends on your components because ATP is based on the metabolism of living cells. It is not an effective method for detecting general soiling. It is a rapid method, but it's not effective in detecting soiling, and not sensitive enough to find low levels of micro contaminations - if the method yields a negative result, then you probably still need to do a TVC.'

? *Webinar attendee question 8:*
Can you provide a template for a master validation plan?

'It is on our website. Visit www.ehedg.org and then go to the guidelines section, where you will find the list. This template is just one part of our cleaning validation guideline. On the EHEDG website, you'll also find a collection of documents. So, you can get the guideline itself, and you also get three separate Word-format documents that can be used as cleaning validation templates for CIP, OPC, and COP, so that you can edit them and work with them in your environment.'

? *Webinar attendee question 9:*
We have multiple contaminants as our target contaminant. Is it necessary to have separate validations for each contaminant, such as allergens, microorganisms, product residues, or can you kind of catch them all in one?

'You can combine them. When conducting cleaning validation studies, samples can be taken from multiple locations to perform different analyses that are targeted for multiple contaminants, e.g. to inspect the strainer for foreign matter, rinse water from dead-ends for chemical residue and allergens, to take surface swabs for product residue and microorganisms, etcetera. After that, you can combine them in one comprehensive study of the cleaning validation results.'

EHEDG Connects Webinar ‘Hygienic Design and Integration of Sensors’

Presenter: Holger Schmidt - Chair EHEDG Working Group Sensors.
Works for EHEDG Company Member: Mettler Toledo

In his career, while working for various suppliers of food and beverage processing equipment, Holger Schmidt has gained a deep understanding of automation components, specifically of process sensors that help in automating the food and beverage processing industry.

What are the current most common misunderstandings with regard to the hygienic design, integration and application of sensors in the food industry?
‘Generally speaking, when I was selling machines, I assumed that sensors never lie, that they always give you the best reading possible, regardless of how we use them. Looking back, after working with sensors for many years now, I now understand that this has never been true. Sensors need a specific environment. Firstly, they need to be integrated in a specific way first to work properly, and secondly, the sensors themselves need to be hygienic, so that they don’t introduce additional contamination risks. This is the mindset that our working group members applied when developing our EHEDG Guideline Document.’

Do you also address specific requirements with regard to the design, integration, and application of hygienic design sensors in food processes, and, if so, how do these differ from the requirements of other types of food processing equipment?
‘First and foremost, we have the internal system (which includes pumps, valves, heat exchangers, separators, filters, tanks, whatever it is that is in contact with the product) that needs to be designed so that it is easy to clean. This also applies to the design of process sensors. They are playing in the same league in that they are used in the wet part, but when designing and integrating sensors, additional requirements have to be met to make them effective, so yes, those requirements are addressed in the webinar, and more in detail in the guideline.’

What kind of questions are being answered in your webinar?
To list just a few: “What are the hygiene risks of sensors? What are the consequences of being aware of those risks? What sacrifices do we need to make with regard to either the accuracy of the sensor or the hygienic purpose of the equipment? What can he expect? What do we need to consider?“ Questions like that. I also show how to find relevant information in the EHEDG Document 37, illustrated by examples and some of the 3D graphics from the guideline. Ultimately, it all comes down to adopting the right mindset when choosing, integrating and using sensors in real industry settings.’

After having published part 1 of EHEDG Guideline Document 37, your working group is now developing a second part. Are you still looking for additional experts to contribute, and if so, what kind of expertise are you looking for?
‘Part 2 of this guideline will be aimed at engineers who try to design better sensors. We are interested in hearing from experts working in the areas of plant and machine building, and particularly food processing professionals that can help us by sharing their daily experiences, so that we can maximise the practical application value of the document.’

What is the most important key learning point of your webinar?
‘Many engineers still seem to believe that designing hygienic equipment is a matter of black and white: you either design something that is very hygienic and fancy and expensive, or not. I hope to convey that instead there are many shades of grey that engineers need to be able to navigate, and that everything should always be aligned with the actual use, the type of food and beverage products processed, the actual processing conditions etcetera. The webinar shows you how to find the information that you need to design, integrate, and apply components that are suitable for your process.’

EHEDG Connects Online Webinar ‘Decontamination by Design’

Webinar presenter: Peter Littleton

Technical Director Christeyns Food Hygiene Limited. Peter Littleton is globally active in the food and beverages industry and in the retail sector.

What type of situations do you encounter in your daily practice that have helped you to develop this webinar?
‘I’ve been working in a variety of food production and technical management roles within the UK industry for more than 35 years. I’ve also served as a food safety enforcement officer, and during those years I’ve seen quite a development in the design of equipment, both with regards to food handling and its cleanability. So, in this webinar, I talk about the techniques that can be used to effectively design, clean and decontaminate such types of equipment.’

What practical tips are you offering in your webinar?
‘I share practical tips that I’ve learnt during my career as a hygiene manager and as a technical manager. I illustrate these tips with real industry examples in practical factory hygiene. Some of these are related to a short shelf life salad operation for which I was both the producer and the hygiene operator. These illustrations are particularly insightful because I was working at both ends of the spectrum.’

Do most production and quality assurance departments still operate separately?
‘I think those worlds are slowly coming together, because more and more equipment needs to be cleaned between product runs. This will normally fall to the production staff and the production teams themselves, particularly where you’re dealing with a change of allergen profile between products. So the cleaning cycles are becoming more frequent and have to be carried out more stringently to achieve better results. That’s where hygienic design can really come into its own, because a good piece of equipment that has been designed with hygienic principles in mind is easier and more importantly quicker to clean and to decontaminate. Shorter cleaning cycles mean that processing lines can be back in production more quickly, which means that productivity in the factory goes up.

EHEDG Connects Online Webinars consist of a presentation followed by a 30 minute Q&A session. What types of questions do you typically get?
‘Typical questions are: “How do we modify ourequipment? What types of tricks can we apply? What types of adaptations can be made to make equipment easier and quicker to clean? How can we use less resources, be that water, time, energy or operating materials?” Nowadays, all resources are scarce, or at least finite, so I expect the majority of the questions to be on how we can modify existing pieces of kit, on how we can improve.

Interested? Please find this webinar on www.ehedg.org/connects

Hygienic Design Simple Truths

Easy to remember, just count with your fingers

How to improve food safety in 5 steps:

Identify and understand the hazards
The first step in designing a hygienic system is to identify and understand the potential hazards that may be present in the system. This includes identifying sources of contamination, such as food, water, or other substances, as well as identifying the potential for physical injuries or other hazards.

Design for ease of cleaning and maintenance
Hygienic design should focus on creating a system that is easy to clean and maintain. This includes designing smooth, continuous surfaces that are free of crevices and corners where contaminants could accumulate, as well as designing for easy access to all parts of the system for cleaning and maintenance.

Use materials that are resistant to contamination
To help prevent contamination, it is important to use materials that are resistant to the buildup of bacteria and other contaminants. This includes using materials that are nonporous, smooth, and easy to clean, as well as materials that are resistant to corrosion or other types of damage.

Minimise the risk of cross-contamination
To minimise the risk of cross-contamination, it is important to design systems that separate different types of products or processes. This can include using separate equipment or areas for different types of products or processes, as well as using barriers or other methods to prevent the spread of contamination between different areas or products.

Implement effective cleaning and sanitation procedures
To ensure that the system remains hygienic, it is important to implement effective cleaning and sanitation procedures. This includes developing and following detailed cleaning and sanitation protocols, as well as regularly inspecting and testing the system to ensure that it is free of contaminants.

EHEDG Connects Online Webinar

‘Food safety short stories - a collection of real life experiences’

- based on the book with the same title

Book authors:

Dr. Peter Overbosch: Previous Vice President of Corporate Quality Assurance, Metro Cash & Carry, and Senior Director Quality Kraft Foods Europe, Middle East & Africa, Senior Director Quality Kraft Foods Latin America, VP of Quality at Nabisco Inc., and Head of Quality for Unilever Foods worldwide. Peter was one of the initiators of the BSI PAS 220:2008 Standard for prerequisite programs of food safety for food manufacturing, now being used in the GFSI recognized FSSC 22000 scheme.

Dr. Yasmine Motarjemi: Previous Assistant Vice President at Nestlé in charge of Food Safety at global level. She has broad expertise in food safety management, both from a public health and regulatory perspective as well as from the food industry. She is the author of numerous books and peer-reviewed articles. Her latest works include the first edition of the Encyclopedia of Food Safety and the award-winning book Food Safety Management: A Practical Guide for the Food Industry. Since 2006, she has been blowing the whistle at Nestlé.

Prof. Dr. h.c. H.L.M. (Huub) Lelieveld: President of the Global Harmonization Initiative and Fellow of the International Academy of Food Science and Technology, and was formerly at Unilever in Vlaardingen, The Netherlands. He is the editor and co-editor of numerous books, including several on hygiene and food safety management, novel food processing technologies and harmonisation of food safety regulations. He has written chapters for many books and encyclopaedia, hundreds of scientific articles and articles for magazines and presented hundreds of papers globally. He was awarded doctor honoris causa by the National University of Food Technologies in Kiev, Ukraine.

All EHEDG members benefit from the EHEDG Guideline Documents, the EHEDG Training, and the EHEDG Certification offerings, but wouldn’t it be great if we could also learn from each other’s mistakes? This EHEDG Connects Online Webinar, conducted by Dr. Peter Overbosch is doing just that.

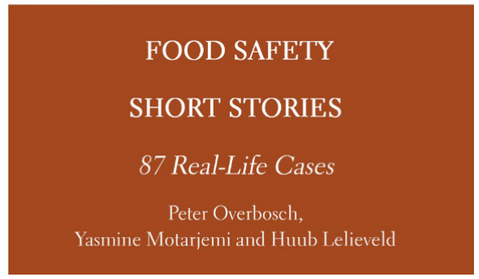
What kind of short stories are in the book?
Peter Overbosch: ‘Most of the stories in this book depict failures in food safety management. These failures partly resulted from technical and/or procedural problems, but also from miscommunication and a lack of food safety culture. All the stories happened in real life, but of course we have anonymised them, so the book doesn’t contain any links between the story and the original source of the story. There are no brand names, and no company names, but every detail in each story actually happened. The most important aspect of these stories is that everyone who reads them can draw lessons from them.’

Why did you create this book?
‘Traditional books on food safety management tell us what needs to be done for food safety, but they don’t contain stories about what happens when things are not all that well organised and simply go wrong. We felt that this was an important book to write, for learning and for teaching purposes.’

Since you and your co-writers didn’t write all these stories yourselves, how can you be sure that they really happened?
‘Yasmine, Huub and I have written many of the stories ourselves, and some stories were submitted by others. In the early book development phase, we reached out to potential auditors within our own professional network, inviting them to share their most telling stories. Of course, with regard to these particular stories, we haven’t witnessed the situations on site ourselves, but we have good reason to trust their authenticity. These fellow auditors are just like us, merely sharing their stories to help others to avoid negative outcomes.’

You refer to some of these stories in your webinar, but can you also give us an example here?
‘One story refers to a situation where a piece of equipment needs to be opened up in a factory for inspection, and it doesn’t work and can’t be opened by the factory manager. The auditor then stated: “Well, if it can’t be opened, the conclusion is simply that people have never looked in there, and that nobody ever cleaned in there.’ After that, the factory manager again furiously tried to open it, saying: ‘Well, it wasn’t that hard to open yesterday’, thereby suggesting that yesterday it was opened. But I think in this case the auditor rightfully concluded that it didn’t come apart at all yesterday, nor the day before, and probably not six months before.’

There are seven chapters in your book, one of them is about food safety and whistleblowing. Why did you include that chapter in your book?
‘Because in some of these cases nothing worked in terms of trying to address issues within the company, and then things ended up being communicated through a whistleblower. The book also contains a chapter on communication, education, information, and misinformation. There are stories about incident investigations and management challenges, about hazard and risk assessment, about hygienic design and cleaning, auditing, pest control and contamination, food frauds and counterfeiting, and the last chapter is about dangerous products. The bottom line message is that we should stop feeling so ashamed about our failures and start sharing them and start learning from each other’s mistakes.’



EHEDG Zooms in

Guideline sections explained by EHEDG Working Group Members

The voluntary work of EHEDG Working Group Members is the foundation for all EHEDG guidance on hygienic engineering and design, from the EHEDG Guideline Documents via the EHEDG Certification to the EHEDG Training and Education services. The newly introduced 5-year guideline renewal programme will ensure that EHEDG Guideline Documents, and consequently the EHEDG Certificates and EHEDG Training modules that are based on them, remain up-to-date and well-aligned with the current needs of EHEDG members.

Throughout the year, EHEDG Working Groups Members meet on a regular basis to discuss a wide array of engineering and design challenges related to the new guideline updates. They discuss, listen and explain, assess each other's views, share practical experience and exchange their subject matter expertise, with one common goal in mind: to reach consensus on the contents of their working group's output and deliver the best, most applicable and user-friendly EHEDG Hygienic Design Guideline Documents possible.

Sections highlight information value

On the following pages, various EHEDG Working Group Members zoom in on specific sections of their guidelines. Each section represents just a tiny fraction of the comprehensive guidance that can be found in each EHEDG Guideline Document, however, in doing so, they illustrate the level of technical details that EHEDG Guideline Document users can apply to make wise choices while engineering, designing, integrating, applying, cleaning and maintaining hygienic design equipment.

EHEDG Zooms in on the following EHEDG Guideline Document Sections:

EHEDG Guideline Document 25: Mechanical Seals
Zoom In Section 4.5: Seal Covers, Springs and Threads
EHEDG Working Group Member: Harald Tobies

EHEDG Guideline Document 28: Water Treatment
Zoom In Section 9.4: Steam Treatment
EHEDG Working Group Member: Francisco Pedrosa

Are you an expert but not yet an EHEDG Working Group Member? Join an EHEDG Working Group today, where your expertise will truly be valued and your input appreciated.

Are you an EHEDG Working Group Member and willing to share your guideline contribution with the global food and food equipment industry?
Then send an email to editorial@ehedg.org (subject line: 'EHEDG Zooms in') with your credentials and be featured in one of the upcoming editions of EHEDG Zooms in.

EHEDG Guideline Document 25:
Mechanical Seals for Hygienic and Aseptic Applications

In EHEDG Zooms In, we zoom in on one particular section of an EHEDG Guideline Document, together with one of the EHEDG Working Group members who contributed to this guideline. In this edition, we zoom in on EHEDG Guideline Document 25 with Harald Tobies (Co-Founder Metax Kupplungs- und Dichtungstechnik GmbH, Germany).

What practical value does this EHEDG Guideline Document offer?
Harald Tobies: 'Many companies have young staff members in many areas who need to learn about the subject of hygienic design. This particular subject is extensive and complex. When drawing up the guideline, we therefore made sure we included as many concrete tips as possible. This allows the reader to become familiar with the subject on a self-study basis or by using the document as a reference when addressing specific important details.'

Let's zoom in on 2 illustrations on guideline page 26. What do they illustrate?
'Figure 4.34 shows a detail of the design of a sealing cover. Here, the transition of the cylindrical recess to the flat surface was designed with sharp edges. This sharp-edged transition favours deposits in the corner that cannot be reliably removed even by the cleaning process. Deposits can promote the formation of germs and must therefore be avoided or completely removed at regular intervals. The critical area is marked by an arrow with a warning symbol.'

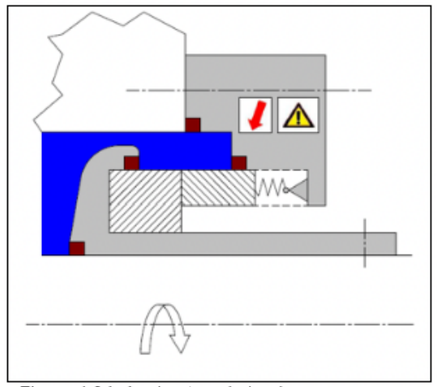


Figure 4.34: Angle at seal gland

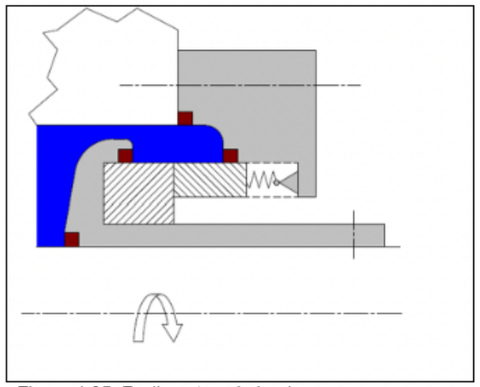


Figure 4.35: Radius at seal gland

'Figure 4.35 shows the improved design with a large radius in the critical corner for comparison. Additionally, the text contains the hint that such radii should be designed with a dimension of 3 mm or larger. The illustration is deliberately kept very simple to clearly show the important detail.'

What about elements that are difficult to clean, such as springs. Does this guideline also contain guidance on how to design these types of components?
'That's a good point. We only have to turn one page for that.'

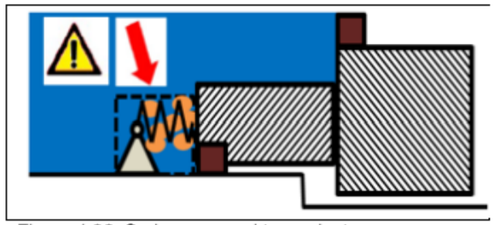


Figure 4.36: Spring exposed to product

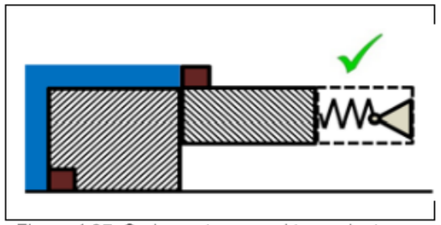


Figure 4.37: Spring not exposed to product

'In Figure 4.36, the critical area is again indicated by an arrow with a warning symbol. Here, the spring is located in the blue area of the medium to be sealed. In Fig. 4.37 directly next to it, the spring has been relocated to the housing area. This is a possible arrangement concept for implementing the requirement. Of course, in addition to the pictures, there are also corresponding text passages that describe this.'

What is that detail directly below about?
'This refers to problems with threads and small structures such as those found in screws with a hexagon socket. Similarly to the first example, product components can be deposited. Reliable removal by cleaning is difficult, and the deposited components can potentially lead to germ formation. So we have to exclude threads in the product contact areas, and screw heads need to be operated from the outside, for example with a hexagon or square head. Also all surfaces should be rounded off relative to each other, which can only be achieved by applying special designs.'

Thank you for zooming in with us
'My pleasure'

> Free for EHEDG Members:
Download EHEDG Guideline Document 25 here:
www.ehedg.org/guidelines

Guideline Document 28: Water Treatment

Detail chapter 9.4: Steam Treatment

Expert: Francisco Pedrosa
Francisco Pedrosa works for Spirax Sarco, an EHEDG member company specialised in steam treatment, and contributes to the EHEDG Working Group Water Treatment. He zooms in on Section 9.4 of EHEDG Guideline Document 28, that addresses hygienic steam treatment.

What was the goal of the guideline concerning this specific subtopic?
Francisco Pedrosa: 'What we tried to do was explain the importance of steam when it's in contact with food in a process. And the guideline gives you all the directions and ideas that should be considered when designing a clean steam system.'

Is the food industry currently sufficiently aware of the importance of steam treatment?
'No. A lot of industries out there are quite unaware, and even naive and confused with regard to the correlation between steam and food quality. There is a general lack of awareness as to what is meant by 'clean steam'. The guidance in this guideline section clearly indicates the purpose and the reason for clean as opposed to to any other steam in your process.'

How can Section 9.4 in this guideline help the readers to optimise their steam treatment?
'Section 9.4 clearly validates the use of best practices in steam treatment, ensuring the safety and the security of the process. Ultimately, we try to achieve the best results in reducing costs, waste and downtime, while avoiding unnecessary carbon emissions that can result from over-using the boiler. This is all explained in the guideline, but it also talks about the dryness and the importance of achieving saturated steam for both the industrial plant steam, as well as for the process steam.This is widely neglected within the industry. This guideline helps to generate awareness of the importance of dryness to both the plant and the process.'

Can you take us through the elements of this diagram please?
'It shows a basic configuration of a steam system within a typical food and beverage application. It starts at the boiler house on the left side of the diagram, and it shows that the hot well in the boiler is chemically treated. It contains various chemicals because this is required within the system. Now, the chemicals are applied within the boiler house, where steam is generated in the boiler. So if there are excess chemicals in the feed tank, those obviously end up in the boiler. When the boiler is generating steam, any excess chemicals will be transferred with the steam.

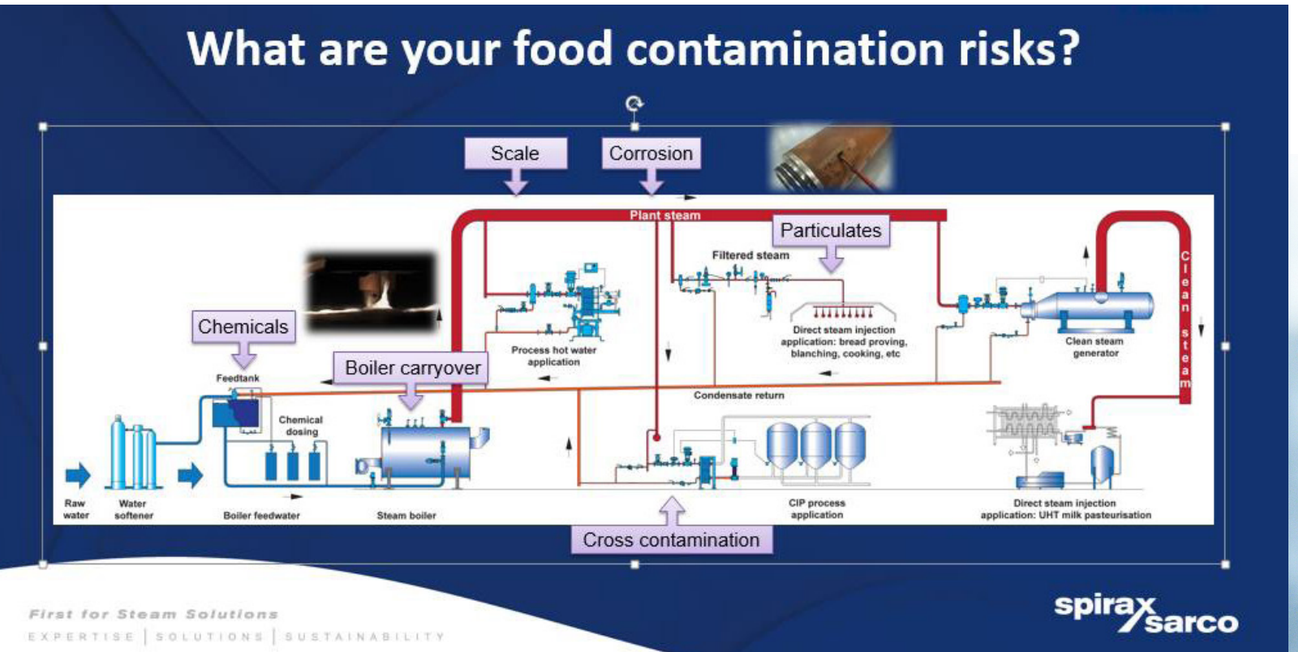
Now the boiler is very difficult to control. The chemicals carry over into the boiler room because the boiler has to react to certain demands of the factory or the process. So if the boiler is generating 5 tonnes an hour, then the boiler has to accommodate those 5 tonnes an hour at a specific required pressure. The chemical dosage normally varies, and a certain amount of chemicals has to be added to chemically treat the boiler for that loading. But we know that the loading within the boiler varies from 50 kilograms an hour up to 5000 kilograms an hour. So it is very difficult to manage the chemical dosage concentration correctly.

That's how you get chemical carryover?
Yes, further to the right you see the pipework, where you get carryover from the deposited limescale. That's why many factories include clean steam filters to remove the particulates. But they do not remove any carryover or odours or taints. Those contaminants can still end up in the process. So let's have a look at the condensate return. As you can see in this diagram, there is a clear risk of getting contamination from the condensate return. On the far right hand side of this diagram, it clearly shows that using a clean steam generator eliminates all those problems. It takes away all of the issues, including particulates and chemical carryover. So the diagram illustrates that using clean steam is the only way to ensure best practices.'

What about the initial quality of the water that is used to produce the steam?
'We know that the water quality is the most important variable for the quality of generated steam. Wherever the water quality is controlled, we also see more consistent steam quality. This guideline explains what water quality is required to generate clean steam. It also addresses the boiler carryover, and the harmful effects of carrying over chemicals in the process. We have introduced these guidelines to make sure that people can prevent these contaminants from carrying over from the boiler into the process.'

This section of the guideline also mentions the mechanical correctness of the clean steam system design. Why is this important?
'This guideline clearly addresses the importance of mechanical correctness. Mechanical correctness is first defined, knowing that people almost always compromise on cost to ensure that the desired system is installed within budget. But people often don't think about the timeframe for removing the condensate. - it's often too slow. They forget about crevices or dead legs in the system. These define the level of mechanical correctness. The guideline shows you that applying hygienic design principles to a steam distribution site system enables both better steam quality and improved steam purity. By ensuring the mechanical correctness of the plant and using the right hygienic design principles, we can significantly optimise steam system performance.'

Resources
This was just a very small section of this very comprehensive and valuable guideline. If you want to know more about water and steam treatment, download the guideline from the website (free for EHEDG Members): www.ehedg.org/guidelines



EHEDG & ACADEMIA

Scientists offer new insights for innovation

As soon as a company becomes an EHEDG Company Member, it gains access to 50+ guidelines and white papers that describe in detail how to engineer, integrate, apply and use hygienic engineering and design equipment for safe, effective, productive and sustainable food processing.

Some of the most valuable contributions to these guidelines are from academia - scientists who conduct fundamental research in science laboratories and pilot plant installations. These EHEDG members from universities and science institutes constitute just a small part of the total EHEDG membership base, but they provide valuable input for the further development of hygienic design products and future EHEDG Guideline, Certification, and Training offerings. They help the industry to move forward, to further optimise their solutions for improved food safety, food quality, productivity and sustainability.

EHEDG & ACADEMIA

University of Natural Resources and Life Sciences (BOKU), Vienna

Dr. Felix Schottroff of the BOKU University in Vienna, shares his views on the value for Universities in general, and pilot plants in particular, of collaborating with EHEDG.

What does your daily work as a scientist/researcher entail? What kind of research are you conducting?
'I'm conducting research in the field of food preservation using thermal and non-thermal technologies, focusing on a holistic approach, extending all the way from mechanistic studies, so how the different technologies affect microbial cells, for example, how the mechanism of action is taking place; through to application studies, where we do feasibility trials and see what the influences on the product and on the matrix are; and the optimisation and design of equipment.'

What facilities does BOKU have to test those different types of equipment?
'BOKU has its own food technology pilot plant, which is part of the BOKU Core Facility Food and Bio Processing. Our pilot plant has infrastructure covering over 300m², and offers most unit operations relevant for food applications. We can consequently mimic food processing technologies on a semi-industrial scale. This includes formulation and drying, such as spray drying and freeze drying, as well as extrusion. We also focus on preservation, and the inactivation of microorganisms, by applying different thermal and non-thermal technologies that are available on a pilot scale. Another important element is our laboratory infrastructure, where we can evaluate quality, texture, sensorial attributes, and the microbial status of different food products.

Who are your customers?
'Our Core Facility serves both BOKU internal and external clients. For internal clients, we do more basic research studies, related for example to the mechanisms of action of certain technologies and how they influence the product. For external customers, which are mostly industry clients, we focus more on application studies, on feasibility studies, where we can produce foods right through from the raw material to the final packaged and preserved product.'

As such, your facility is available to stakeholders within the food industry who want to maybe innovate, right?
'We aim to provide our infrastructure and our knowledge, especially covering all the equipment on the pilot scale, to internal but also to external clients. Everyone is welcome to conduct experiments with us, and we of course are more than happy to share our expertise and our experience in the field of food processing.'

What is the average estimated time to market for your research activities?
'This depends a little on the type of research. Especially more basic and mechanistic information takes a longer time before it's implemented in industry. However, such insights are also crucial in order to better understand technologies and their effects on the products. On the other hand, we also conduct a lot of applied research, where different companies are involved in a pre-competitive way. Here the focus is more on the actual problems and the actual issues that arise during typical use cases in the food industry. And since in this case the studies are directly designed to solve such issues, the results are usually taken up by industry quite quickly and quite without quibble. Our findings also contribute to providing a database for future EHEDG guidance on hygienic processing.'

What is your view on the correlation between hygienic design and food safety, food quality, productivity and sustainability?
'Everything is connected. When you can produce safely according to the standards of hygienic design and hygienic production, you have the fundamentals and the basis to also improve the product quality, and not just from the microbiological side, but if you master your process, you can also optimise the processing conditions, and therefore also the product quality. The same thinking applies to sustainability: if you master and optimise your processes, they will automatically become more sustainable, considering for example energy use, cleaning times and the usage of chemical agents for cleaning. All of these factors act together to improve the overall performance of food processes.'

What were your main considerations in becoming an EHEDG Member, and actively contributing to this community?
'I have been an EHEDG Member for several years now, and I am also active in the EHEDG Regional Section Austria. In this period, I have had a lot of very positive experiences. We scientists work in our pilot facilities, in our laboratories, and for us, it's interesting and crucial to gain insights into the actual challenges that the food industry has to deal with. These insights help us to select further research topics. So, communication with industry partners is crucial, and for this EHEDG provides a nice platform. EHEDG also allows me to share best industry practices in hygienic processing and hygienic design with my students. It is important to educate the next generation of food technologists, to spread the word, and equip them with the right knowledge to take this information out into the food industry.'

BOKU

Food & Bio Processing
BOKU Core Facilities

LOEHRKE innovates to support sustainability efforts

Sustainable processing and CIP, supported by new types of sensors

Cleaning in place (CIP) is a necessary, complex and costly process, employed all throughout the food industry. This means that for many food processing companies, CIP is the cleaning technique that offers the biggest opportunities for optimisation. Process optimisation used to solely focus on increasing productivity results. Rising energy prices and new sustainability legislation makes that process optimisation efforts are just as much aimed at reducing energy and cleaning chemical consumption.

Therefore, any company that wants to significantly level up its sustainability results, should look attentively into emerging innovations that contribute to improved CIP efficiency. It is also the reason why EHEDG invited Dr. Thilo Berg, Project Manager at EHEDG Company Member Jürgen Löhrke GmbH, to speak at the EHEDG World Congress in Munich. Dr. Berg holds a Postdoc in Dairy Engineering and contributed to a series of scientific publications on topics ranging from 'Spectroscopy to monitor and optimise cleaning-in-place (CIP) of whey filtration plants' to 'Reuse of process water in dairy ingredient production'.

In his EHEDG World Congress presentation, titled 'Sustainable with optimised cleaning processes', Dr. Berg related typical food plant cleaning requirements to hygiene risks, potential time and resource savings and actual cleaning demands. He also mentioned that LOEHRKE is currently developing a new type of sensor that can help food processors to detect biofilms before they can compromise food safety. As it turns out, this new technology also opens up new possibilities to optimise CIP processes as well as food processing productivity results.

What potential industry applications do you see for biofilm sensors?
Dr. Thilo Berg: 'Our biofilm sensor is still in an early stage of development, but the LOEHRKE sensor development team, headed by Monika Hutzler, can clearly envision the potential benefit for various applications like systems with recirculating water, such as cooling towers and ice water systems. Jacketed tanks for heating and cooling in the chocolate industry could benefit from this new type of sensor. Other possible applications are air conditioning systems and filling systems for soft drinks, beer, and flavoured water, where biofilm sensors could yield useful additional information to help determine the maximum filling time. Also, the production in other upstream processing steps, like pipes and tanks could be monitored with the help of biofilm sensors.'

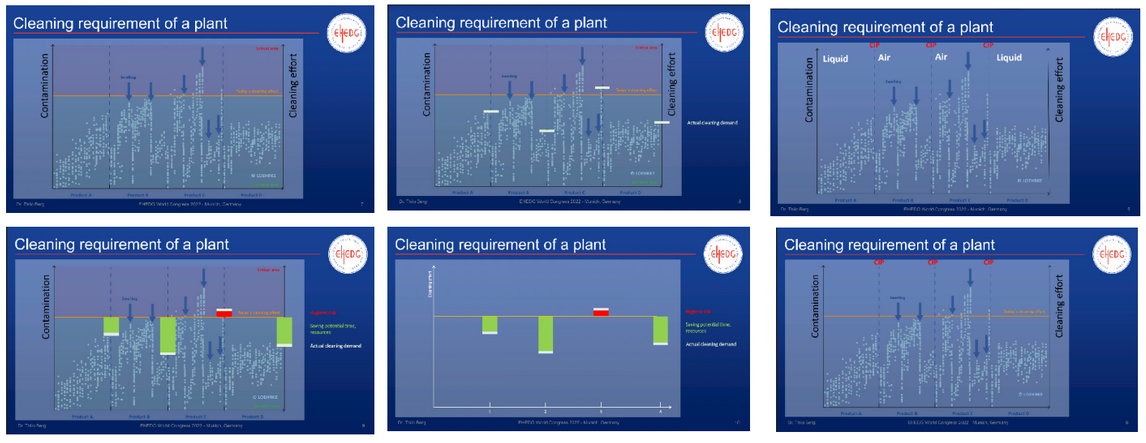
How should food processors mitigate their hygiene risks in an optimisation process? 'Effective optimisation means moving forward step by step in a controlled way. It is an iterative process, and in some cases, there might not even be a risk involved, for example when there is a phase changeover from cleaning media to water. In this example, the system may switch to the draining phase just a little too early, thus wasting cleaning media by not recollecting enough of it. Another example is that your analysis shows that you could run your filler for twenty more hours. In that case, it is probably a good idea to start with five more hours, and accompany that by microbiological tests of the final products and the filling equipment, and also by paying special attention to the subsequent CIP process.'

What role can biofilm & contamination sensors play in this?
'Existing process analysis can be enriched with sensor data from biofilm sensors. This sensor data can for example confirm that specific processes are safe to run longer than expected. So, sensor technology can help to identify process optimisation opportunities. Additionally, the CIP process itself can be optimised by gathering real-time biofilm sensor data. Of course, the results always have to be validated for any given system. Afterwards, when the optimisation is completed and validated, the sensor data can help to realise and maintain a validated status quo within the system.'

How can condition-based cleaning help companies to optimise their processes?
'First of all, it is important to realise that any optimisation process cannot be done without a certain commitment to put some extra effort into it. Just like for any other project, time and resources have to be allocated. You start out with an analysis of potential savings. By using new sensor technology, you open the black box of what is happening in your systems. You can then start learning a lot about the actual hygiene performance of your production process, thus revealing potential optimisation opportunities. Benefits are usually highest when bottlenecks that hinder a larger production capacity can be optimised. This bottle neck is quite often the filling machine. Then the potential risks have to be analysed. Risks, costs and benefits have to be balanced in order to prioritise follow up steps. Sensor technology can not only help to identify potential, but also to reduce risks in the process.'

About LOEHRKE:
LOEHRKE offers solutions for improved cleaning and automated processes. In addition to the production and supply of systems, LOEHRKE handles the complete engineering until entry into service and offers a wide range of after sales services. LOEHRKE project teams comprise specialists from different expertise areas, such as mechanical engineering, electrical engineering, process engineering, systems technology, chemical technology and food technology. They work closely together throughout all product phases in order to take account of all aspects of the customers projects.

If you are interested:
Contact the LOEHRKE Team: Monika Hutzler (monika.hutzler@loehrke.com) or Dr. Thilo Berg (thilo.berg@loehrke.com)



Hygienic Design & Digitalisation:

the SIEMENS way

Digital twins in food and beverage processes

SIEMENS Digitalisation and Innovation Manager Amy Hong works on simulation and machine learning projects, with a focus on food and beverage processes. In this article, she explains how a structural approach to digitalisation can help food processing companies to step up from experience-based to data-driven decision making.

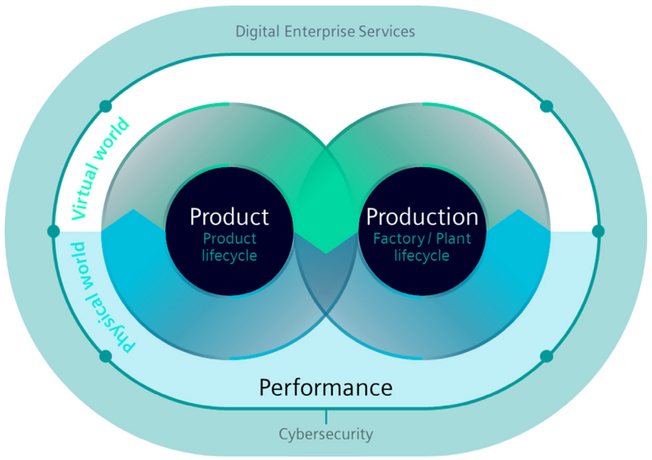
How do companies start out with a digitisation project? Amy Hong: ''That really depends on your goals. First think about why your company would need to digitalise its processes. These goals themselves can be directly or indirectly related to aspects such as market and societal trends. At Siemens, we use the answers to these fundamental questions as a starting point in defining the strategic priorities and selecting the appropriate technologies accordingly.'

What are common reasons for companies to embark on this digitalisation journey?

'There are many reasons, such as striving for more sustainable processes, with an ultimate goal of achieving a net zero emission result, which is a very good reason in light of environmental responsibilities and rising energy prices. Other drivers for investigating the opportunities of digitalisation are changing consumer preferences. Brand loyalty among consumers can no longer be taken for granted - it's conditional. Contemporary consumers want to know more about product ingredients for example. Where do these ingredients come from, are they plant or animal based, and what materials are used for packaging? They want to know more about the entire supply chain. from farm to fork, where ingredients come from, up to how food products are processed and packaged.

What about changing consumer preferences?

'Food trends are changing faster than ever. This also drives companies to increase the flexibility of their processing and packaging solutions, and to provide better insights into their products and food supply chains. Transparency and secure supply chains are crucial since these are demanded by consumers and governments alike. If a recall occurs, companies need to be agile, and equipped to trace contaminants back to their source. Digitalisation helps to effectively gather and log this information and digitalisation also helps food processing companies to step up from experience-based to data- driven decision making'



How will this affect the food processing equipment business?

'Data-driven decision making allows companies to explore new business models. Equipment suppliers can move forward from just selling machines to selling real industry performance guarantees, as long as they are able to monitor the performance and usage of their machines.'

Are you referring to life cycle management here?

Yes, in a sense I am. However, it's important to understand that companies typically deal with two different life cycle types. The first is the product life cycle, which focuses on the product itself, and covers aspects like type of end product and ingredients, ways of processing and packaging and the choice of materials; so aspects that exclusively deal with the product-related aspects of food and beverage production. Then there is the life cycle of the production facilities: the plant, the production lines, the machines, the assets you need to achieve specific production goals for these two life cycles don't necessarily run at the same speed, but they overlap, because once you develop a recipe for a new product, you also need to assess if your existing assets are capable of producing the new product, and if not, develop new processes to do so. The two life cycles correlate with each other, but occur in different phases, starting with the engineering and design phase and extending up to the realisation and optimisation phase.'

What are the next important stages in this digitalisation process?

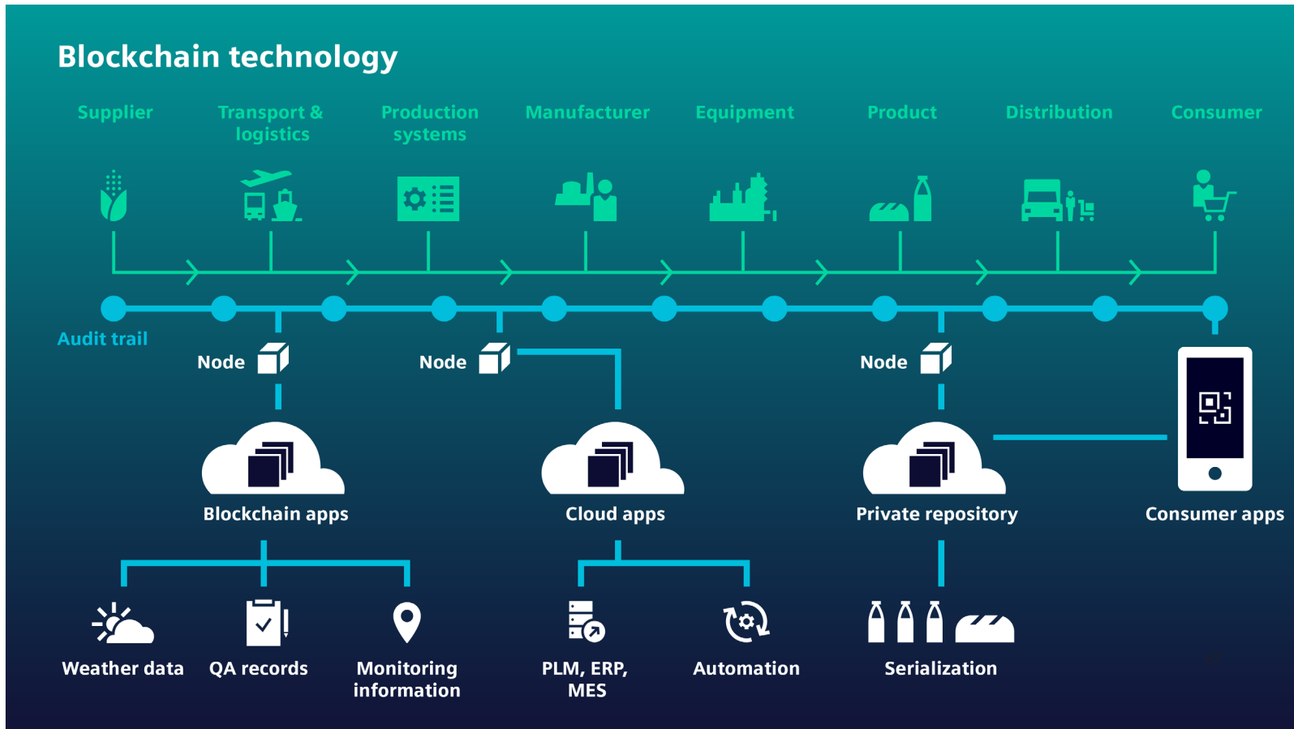
'After production design, you start looking into the machines that should be used, and move on from the manufacturing-related design aspects to product quality, production analyses, defining KPIs, and productivity maximisation. Even after you have established a system that enables data collection, this stage will need to be continually repeated, to further optimise your process and to adapt your process to changing production needs.'

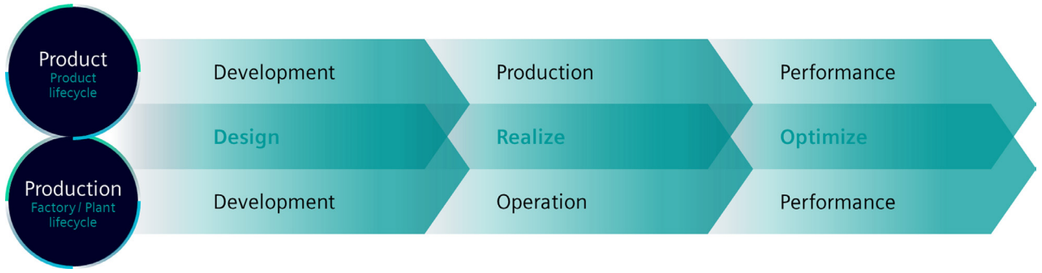
Can you illustrate that with an example please?

'Say you want to bring a new product to market, for example a new type of canned food. You know that in this case, sterilisation is a very important process step you have to integrate. When designing a new process like this, you want to find that sweet spot where investment costs are minimised without compromising on the sterilisation process results.'

So it's a fine line?

'Yes, because you have to find the optimum parameters while you're developing these processes. In this example, in an early process development stage, CFD simulations can help to gain insights the impact of the viscosity, the rotary speed,the transfer of the system and so forth. Simulations really help to spot dead areas in equipment designs, while also making sure that the construction is suitable for the targeted processes. Other aspects are the material selection, related to the type of food that is





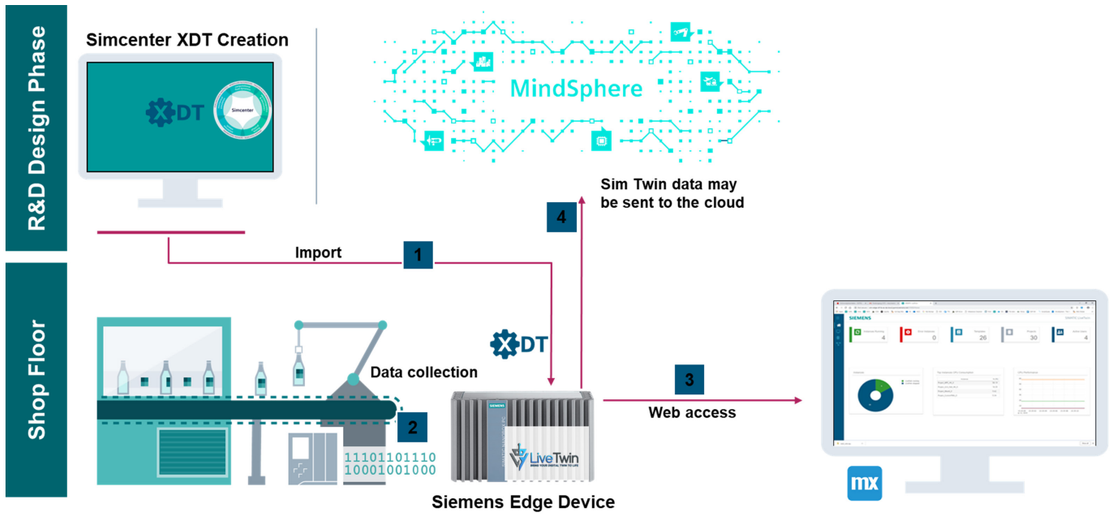
being processed, and the temperature handling and the speed of operation. You can carry out a lot of insightful analyses to make sure that every piece of equipment will optimally contribute to the overall performance of a food processing installation. It might take months to figure that out, but once you have this simulation in order, the process of finding the optimum process parameters will be greatly accelerated and account for a shorter time to the market. This approach also creates clarity for planning the construction, piping, and welding work.'

How does SIEMENS apply this approach in its own instrumentation development?

'A few years ago, we decided to adapt a certain kind of motors to the specific needs of the food and beverage industry. The goal was to make it suitable for a wide range of food processing applications. The first basic step was to adapt the design so it would meet the latest food safety standards. Then we looked at the performance requirements, made sure the motor performed effectively and would be robust enough to offer a long service life. For that, we needed to conduct different analyses, like vibro-acoustic analysis, to ensure its stability, temperature handling, etcetera. At SIEMENS we know that all of these aspects affect each other, and that we needed to run several simulations to optimise the designs and meet all requirements.'

Why do you propagate the development of digital product twins?

'Because the benefits far outweigh the extra initial efforts. When you already have digital twin designs of your equipment in an archive, then you can also deploy these in new production line designs, where you pair the digital twin design with real production data, in real time and on premise. Concerning the process: at some point, it is advisable to start working with what we call executable digital twins that cannot be edited anymore. You can then start using these executable twins to predict the performance of your process, and later to provide feedback as a reference setpoint to a PLC, so that the process can be adjusted automatically to ensure the optimal operating condition in real time.'



About EHEDG

Our vision

The aspirational goal that drives our foundation is to be the leading source of hygienic design and engineering expertise, and enhance food safety and quality across the whole industry. This is the shared ambition that shapes our role in the outside world.

Our mission

The outline around our logo captures the mission we're relentlessly committed to: to raise awareness of hygienic design and engineering, develop guidance and solutions, provide a platform to promote our expertise and facilitate networking across the world.

Our history

Since 1989 we have been connecting food producers, food processing companies, equipment manufacturers, universities, research institutes and public health authorities with the aim of supporting and shaping the future of food safety and quality.

From a handful of European-based organisations like Unilever and GEA Group, we can now proudly count more than 750 members in all continents.

From the first guidelines for pipe couplings and valves, today we have an inventory of over 50 documents addressing 10 focus areas, to better serve the food and hygienic design market in a time of rapid industrial and technological change. From old school lectures, we can today provide educational offerings and networking opportunities with different modes of delivery.

From a simple certification programme, we now offer a sophisticated scheme, comprising different equipment types and classes, supported by 12 Authorised Evaluation Officers and 8 Authorised Testing Laboratories.

None of these achievements would be possible without the participation of our expert volunteers. We are not done yet though: there are more challenges in store for EHEDG and the food industry in the coming years.

What we offer

Membership: an extensive network where your organisation can support the EHEDG vision and mission, influence trends, get access to our guidelines, earn international exposure and build strong relationships.
Guidelines: 50+ published documents covering anything from General Principles, Materials, Surfaces to Open Equipment, Closed Equipment for Dry Particulate Materials and Liquid Food and much more.
Training and Education: high-quality and practically-oriented courses based on the EHEDG guidelines, for both industry and academia, online or in-person in various locations.
Certification: methods for testing and certifying equipment in accordance with the latest research and state-of-the-art technologies, to help you operate in accordance with strict food industry safety standards.

Worldwide

Despite being called the 'European Hygienic & Design Group', we are engaged in 40+ countries all over the world, with Regional Sections ready to locally support you and your organisation.

Digitalisation, Sensors & Hygienic Design

Endress+Hauser is eager, but needs your support

At the most recent EHEDG World Congress, Endress+Hauser Corporate Director Marketing Paul Borggreve presented his company's view on digitalisation relating to food and beverage process performance. He ended his presentation by inviting his listeners to share their insights and processing data for the greater benefit of the entire industry. In this article, he extends his invitation to all fellow EHEDG Company Members.

Why should we look into digitalisation in the first place?
'Because digitalisation offers tremendous opportunities for process optimisation, with regard to food safety, quality, productivity and sustainability - provided of course, it is combined with proper hygienic design. Just to give you an idea: currently, up to 50% of the carbon footprint generated by food and beverage companies results from energy, water and chemical consumption related to cleaning activities. Additionally, companies on average lose 25% of their operation time due to inefficient cleaning procedures. Digitalisation can help us all to significantly reduce energy, water and chemical use, while simultaneously increasing productivity. It's a win-win opportunity, a no-brainer, something we should seriously look into together.'

What is the current state of development, and what's most needed to move forward?
'We see developments at different levels of the food and food equipment supply chain. The new guidance that EHEDG offers on hygienic design risk assessment relates directly to the new GFSI hygienic design benchmarking requirements, and the adoption of these requirements in new food safety standards. This top-down legal development was preceded by a bottom-up industry push by innovative equipment suppliers like Endress+Hauser, where smart engineers develop new components that help food processors detect fouling, and gain better insights into the effectiveness and efficiency of their cleaning cycles, and thus reduce their energy and chemicals use while also saving time.'

What is the best starting point to look into digitalisation opportunities?
'Data. Correctly interpreting process data is the key for all current and future technological advancements, particularly in the innovation space of sensor technology. As a manufacturer

of these components, we cannot do it alone. The occurrence and development of fouling, for example, depends very much on the type of process, on the entirety of components that are in use in a particular process line. It is one thing to start collecting and logging lots of process data, it is another to make sense out of it. The better we become in correctly interpreting data, the more relevant these data will become for the food processor, and the more robust, more reproducible and more predictable solutions we will be able to develop. That's why we strive for an active dialogue with end users and stakeholders, a dialogue focused on a clear objective: 'let's predict when exactly we need to start cleaning, and when to stop.'

Can you please illustrate that with an example?
'Let us consider a regular electromagnetic flowmeter, widely used to measure the flow rates within closed processes. For decades already, this technology has been well-established in the food and beverage industry. It's a pretty robust technology, and the measuring signal is very predictable. We can predict whether it will work or not, and we know the limitations. Now, 15 to 20 years into the digital revolution, we understand that these flowmeters are capable of measuring more than just flow rates. We now also use them to measure the conductivity of what's inside of the pipe, simply by integrating two electrodes that generate an electromagnetic field. We know what field-deformations to expect based on the changing electrical behaviour. We also have a firm grip on how the electronics perform, and we know how to process this information by developing software algorithms to analyse the data. Nevertheless, we haven't really used it much. Most of the applications I know of just measure the flow rate, while ignoring the rest of the data. Currently, in the food and beverage industry, on average 95% of the available digital data is not used.'

How can you motivate clients to start using the extra available data from flowmeters?
'We all know that data does not necessarily equal valuable information, but over the years we built algorithms and circuits for these flowmeters that offer a wealth of additional parameters, some of which are related to the build up of fouling. Our next step was to extend our attention beyond the electronics and the hardware aspects: we started looking into the actual pipework and vessels, to examine what is really going on in each process. This step actually represents the hardest part of the development process, because unlike electronic failures (which can be erratic, but are always diagnosable) it is often difficult to assess if malfunctions in actual process installations are systematic or not. It really depends on the application itself. That's why we need this dialogue with industry partners, to figure out how digital sensor technology behaves in various types of fluids, with various conductivity properties, levels of organic content, etcetera. We are, you might say, on an explorative yet worthwhile journey that will help everyone to dramatically optimise their processes.'

Endress+Hauser
People for Process Automation

Stainless steel platforms and structures in food & beverage processing plants

Applying hygienic design guidelines in the context of structural safety

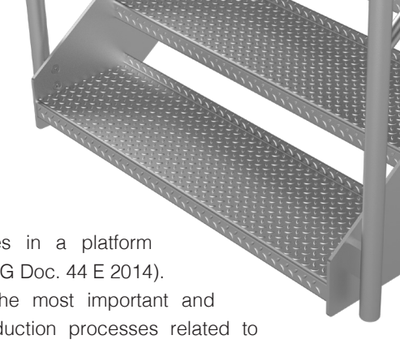
Author: Krzysztof Kaczmarczyk, Technology Manager, ATT

Production infrastructure often requires work to be carried out at heights. These processes are classified as highly hazardous and should therefore be performed to the highest safety standards. Platforms and process walkways are part of that manufacturing environment. Due to production lines equipped with the above-mentioned engineering structures, an employee can work in a stable and safe manner.

Key standards and guidelines related to platforms design and construction.

Platform structures shall be designed and manufactured in accordance with the applicable standards listed below.

1. Machinery - Safety - Permanent means of access to machinery
   Part 1: Selection of permanent means of access between two levels - EN ISO 14122-1:2016-08
2. Safety of machinery - Permanent means of access to machinery
   Part 2: Working platforms and walkways - EN ISO 14122-2:2016-08
3. Safety of machinery - Permanent means of access to machinery
   Part 3: Stairs, ladder-stairs, and railings - EN ISO 14122-3:2016-08
4. Safety of machinery - Permanent means of access to machinery
   Part 4: Fixed ladders - EN ISO 14122-4:2016-08
5. EN 1090-1:2012 Part 1: Principles for conformity assessment of structural components*
6. EN 1090-2:2012 Part 2: Techn
ical requirements for steel structures*
7. EN 1090-3 2012 Part 3: Technical requirements for aluminium structures*



*Regulation 305/2011 of the European Parliament and of the Council (CPR) obliges manufacturers of steel structures to issue a Declaration of Performance and to mark the product with the CE mark, thus, to implement a Factory Production Control system according to EN 1090 in their organisations.

Smart increase of efficiency - finite element analysis - advantages

A very important element of any engineering structure (for example platforms or technical walkways) is a static calculation, which assures the end user of the load-bearing capacity of the construction. Each structure supplied to the F&B industry should be accompanied by a static design documentation. Ideally, the static calculation is to be carried out at the basic design stage. However, the task is time-consuming and costly. Estimates, however, introduce the risk of under- or overestimating structural assumptions.

Finite Element Analysis

Due to the very accurate algorithms applied, this is a great tool for structural design and construction engineers. Using the method at a very early stage of the design process, we can analyse the mechanical features of a structure and optimise the product in terms of engineering requirements. Savings of up to 30% in relation to the original input data can be achieved by optimising designs with the help of FEA.

Hygienic aspects of platforms and steel structures

Hygienic design is the highest priority for all constructions supplied to F&B processing plants. The EHEDG guidelines specify features to be taken into consideration to ensure that the design of the platform is as hygienic as possible.

The fundamental factor affecting the quality of hygiene in production zones in the F&B sector is that the material that must be chemically inert (does not penetrate food) and resistant to chemicals used in cleaning processes in F&B production zones. One material meeting these requirements is stainless steel grade: 1.4301 or 1.4404.

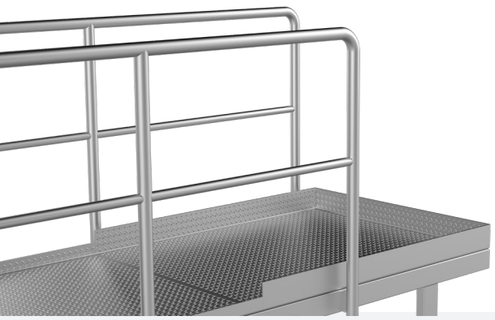
A key challenge for any structural fabricator is to meet customer functional expectations while also adhering to the highest hygiene requirements. Some food manufacturers prefer to use solutions based on open profiles (angles, channels, T-sections), while others promote closed profiles (square and round tubes). The following illustration shows the hygienically correct positioning of profiles in a platform design (source: EHEDG Doc. 44 E 2014).

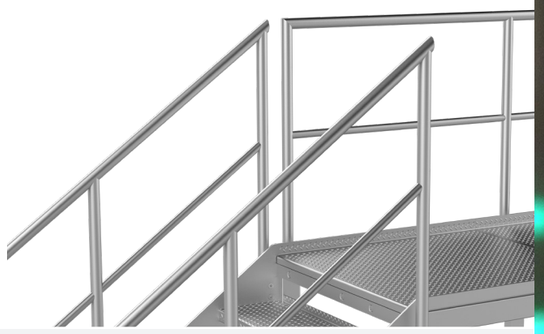
Welding is one of the most important and most vulnerable production processes related to platforms. The design technology in accordance with hygienic guidelines should avoid, if possible, location of welds in any spots where dirt can accumulate and bacteria multiply, for example corner welds. Another crucial element in hygienic welded elements is the quality of the weld finish. The best results are achieved with the 141 (TIG) method, which guarantees welds of a high purity class. TIG welding avoids the creation of weld slag. Slag mixed with the weld material makes the welding joint weaker and less resistant to external factors.

It is essential for hygiene quality that all welds are pickled. The corrosion resistance of stainless steel depends on the ability to form a thin, very durable chromium-rich oxide layer on its surface. Such a layer can be damaged during processes associated with the manufacturing of stainless-steel elements. The main reason for interruption of the passive layer is an exposure to high temperatures during material processing (bending, punching and welding).

Etching is a chemical process that removes the top layer of a material along with harmful oxides and iron inclusions. It uses strong oxidizing acids, such as nitric acid or hydrofluoric acid. The process is carried out with the help of pickling baths or with the help of pastes and gels. Bath pickling methods provide highly effective removal of the negative production and welding effects due to the fact it is carried out with very high precision and efficiency. A very beneficial process that should be carried out after the pickling process is passivation. The procedure also removes impurities and, more importantly, strengthens the passivation layer on the steel surface. It is carried out in the same way as pickling - by immersion or by spraying with a passivator.

Another widely used welding technology is method 135 (MIG/MAG). This method is faster, but the quality of welds is significantly lower and it should not be applied to structures installed directly in F&B processing environments. If the technical conditions do not allow for the use of the TIG method, any MAG welds should be properly processed to improve their hygienic properties, for example by applying a grinding procedure.





Walking surfaces

Walking surfaces represent another hygienically important aspect of the platform construction. The most frequently used solutions are listed below, sorted from the highest to the lowest hygienic value:

- checker plate - easy to clean, good anti-slip features;
- upturned steel perforation (USP) platform - easy to clean, very good anti-slip features;
- mash-grating - poor hygienic quality, very good anti-slip features.

The checker plate and the USP type of platforms are considered as hygienic applications in food production areas. We find USP design to be the optimum solution with an optimal combination of hygienic and safety requirements. Mash grating platforms are the least hygienic and should be avoided in F&B production zones.

Protective railings are highly important safety elements in working areas of the construction. Round tubes are considered the most hygienic choice. The welding joints on the handrails should be ground smooth to ensure safe usage. The end of the handrail lines should be blanked or made as a bent element.

Below there are illustrations of hygienically inappropriate designs of railings.

- sharp and hazardous ending of the handrail line / poor quality of welding joint
- poor quality of welding join / the joint should be tight to prevent the multiplication of bacteria

Summary

Nowadays, producers of platforms and construction elements face three fundamental challenges:

- efficiency of the structure (rising production costs)
- safety of operators, and
- highest hygiene level dedicated to the F & B sector.

Unstable and rapidly increasing prices of materials and utilities (electricity, gas) generate cost-cutting pressures on manufacturers, and possibly unpredictable product price increases for end users. Algorithms used in finite element analysis methodology support producers with cost optimisation processes provided that the safety of steel structures is not jeopardised.

The global social experience of the COVID-19 pandemic has raised customers' awareness of the importance of hygiene in every aspect of life. Platforms, technical walkway steel structures, as the key infrastructure in F&B production halls, must meet the highest hygienic design standards, as mentioned in the above article as well as in EHEDG Guideline Document 44.

Ultimately, all measures increasing the safety and hygiene of F&B production processes bring invaluable benefits to producers. Through smart optimisation, production costs are reduced and manufacturing safety is improved. On the other hand, by introducing hygienic design, the cleaning and maintenance costs of factories can be significantly reduced while the production security can simultaneously be upgraded.