

EHEDG CONNECTS

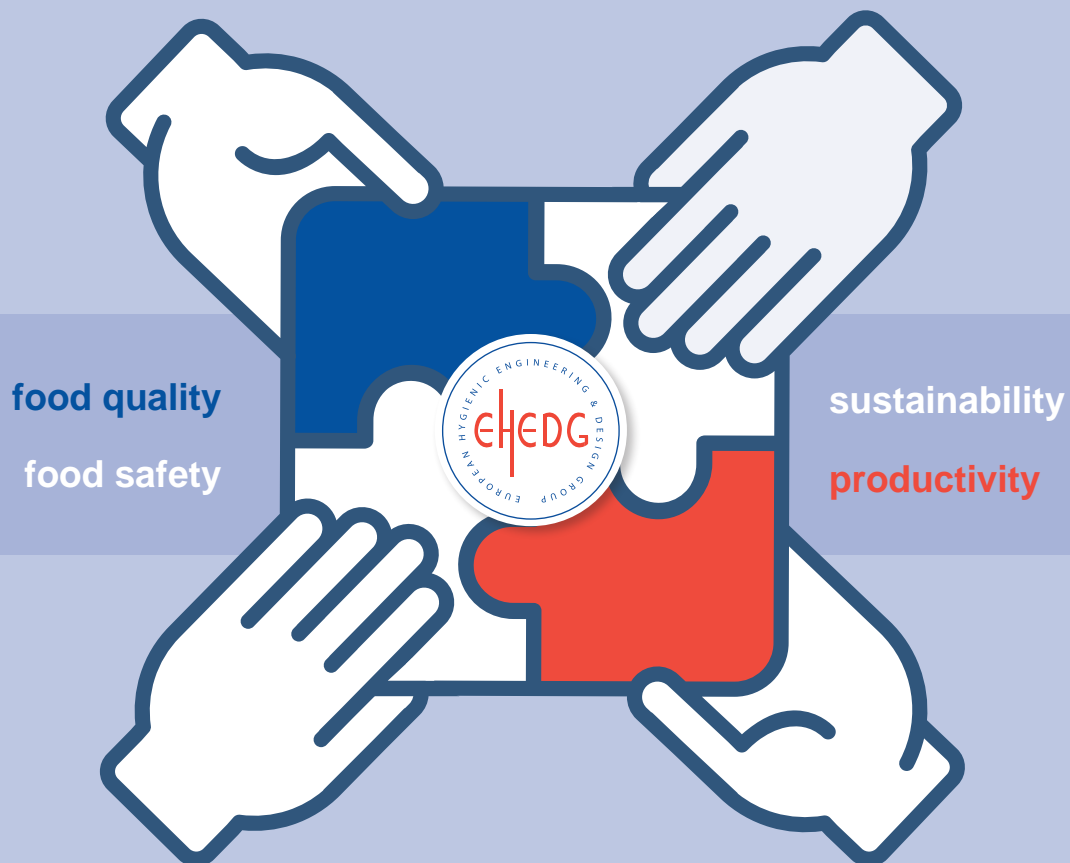
CERTIFICATION
GUIDELINES
EXPERTISE
NETWORK
TRAINING

edition 4

Official Magazine of the European
Hygienic Engineering & Design Group

Hygienic Design Strategy

where technology meets food industry needs



About EHEDG

new membership offerings
new guideline documents

Hygienic Design Strategies

industry best practices
prerequisite benchmarking

Ask an Expert

tips and insights
experts opinions

Facts, Figures & Views

interviews & infographics
applicable research data



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EHEDG PRESIDENT LUDVIG JOSEFSBERG
A smart investment in sustainable success
4



EHEDG TREASURER MATILDA FREUND
Update on finances and new projects
6



SUB-COMMITTEE PRODUCT PORTFOLIO
Raising the EHEDG Membership Value
Chair: Hein Timmerman
8



WORKING GROUP CERTIFICATION
New plans and developments
Chair: Andy Timperley
10



NEW ADVISORY BOARD MEMBER
Anne-Claire Carrère [Nestlé]:
'EHEDG leading source of expertise'
14



NEW ADVISORY BOARD MEMBER
Dr. James Hartley [Mondelēz]:
'Clearly convey your needs'
16



NEW ADVISORY BOARD MEMBER
Dr. Georg Kalss [Bühler]:
'Innovation and sustainability'
20



EHEDG GLOBAL PERSPECTIVE
EHEDG in: France, Italy, Portugal,
Mexico, New Zealand
22



EHEDG MEMBERSHIP INFO
Latest facts and figures
34



GFSI HD BENCHMARKING SUPPORT
Dr. Patrick Wouters:
'Breakthrough or still a long way to go?'
36



GFSI HD BENCHMARKING
Dr. Peter Overbosch:
'JI & JII in place. What's next?'
40



GFSI JI & JII
Dr. John Holah:
'What they mean and how to prepare'
42



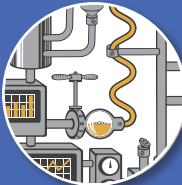
NEW EHEDG TEST METHOD
Max Hesse [Fraunhofer IVV]
48



NEW EHEDG GUIDELINE DOCUMENTS
Sensors | System Integration
Cleaning & Disinfection | Validation
50



EHEDG CONNECTS WEBINARS
Presented by: Vikan | AINIA
Hindustan Coca-Cola Beverages
Commercial Food Sanition
60



INDUSTRY STORIES
Hygienic design applications
72



HYGIENIC WELDING
By EHEDG member Polysoude
74



ENGINEERING SOLUTIONS
By EHEDG member Angst + Pfister
78



HYGIENIC DESIGN STRATEGY
By EHEDG member Bühler
80



PRACTICAL ASPECTS FOR DRAINAGE SYSTEMS
By EHEDG member ATT
84



MISSING SAFETY LINK IN FOOD SUPPLY CHAIN
Awareness for HD in transportation sector
88



HYGIENIC STUDY AWARD
Learn about the winners and their research
90



A KNIGHT'S TALE
Honouring Piet Steenaard
96



EHEDG HEAD OFFICE
Who is who and how to contact them
98



EHEDG President Ludvig Josefsberg:

‘A safe and smart investment in sustainable success’

‘We are living in times of great change’. This message was expressed in various keynote speeches during our latest EHEDG Online Event. After an era of globalization, and now recently a global pandemic, many industries find themselves confronted with new demands for safer, more sustainable, and less wasteful processes. Consumers and investors demand full accountability for the environmental impact of industrial activities, and new legislative rules raise the bar for sustainable success and create new level playing fields in various sectors. The food industry, being one of the biggest sectors in the world, is called to lead by example. That’s why we continue to advance towards rising standards in food safety, food quality, productivity, and sustainability, while minimizing food waste, energy consumption, and the daily usage of water and cleaning chemicals.

EHEDG Membership Value

EHEDG plays a pivotal role in these challenging times, because educating yourself and investing in hygienic engineering and design offers many opportunities to optimise food production. With almost 1000 EHEDG Members (individuals: 368, companies: 564, institutes: 67), representing leading food processing companies, machine producers and academic institutes around the world, I feel that EHEDG has a special obligation to support its members in the most practical ways, and with the capacity to do so. That is why I am convinced that EHEDG needs to continue to invest in developing its products and services offerings to further increase the value of your EHEDG Membership.

EHEDG Certification

Food processing companies invest in EHEDG certified components because they don’t want to worry about the cleanability of their food processing lines, and we notice a growing demand for certified systems and complete production lines. The EHEDG Testing Laboratories are currently very well equipped to physically test and certify components, but we need to expand our joint activities in this area quickly. The recently developed new testing method, that is applied in the testing of the external cleanability of open process equipment, is a good

step in the right direction. The newly established GFSI benchmarking requirements will also force the industry to further adapt and secure the primary goal of food safety management systems: food safety. That is why for EHEDG, food safety will always be the main priority, and why we must make sure that every single EHEDG certification scheme is always firmly grounded in relevant EHEDG Guideline Documents.

EHEDG Guideline Document Development

With the need for more flexible, scalable, and productive food processes comes the need for more process oriented EHEDG Guidelines. That is why the expert volunteers of the EHEDG Working Groups started developing guidelines dedicated to specific food process categories. The first results can be downloaded from the EHEDG Website. EHEDG will continue to develop hygienic engineering and design guidelines that meet the evolving practical needs of the food industry.

EHEDG Guideline Documents contain the current expert consensus on hygienic design directives. Following increasing industry demands to optimize not only food safety and quality, but also productivity and sustainability, we will need to broaden the scope of the EHEDG Guideline Documents. This cannot be done overnight, as there are many EHEDG Guideline Documents in place, but future EHEDG Working Group requirements will have to reflect this transition.

EHEDG Training & Education

The pandemic reminded us that we need to rapidly expand our online training offerings. Since online training doesn’t require participants to travel, and is therefore also more affordable for all concerned, it will allow even more food industry workers around the globe to increase their knowledge about hygienic engineering and design, and level up their performances within their own working environments.

The challenges that EHEDG faces are not only related to setting up a technical education platform, but also to certain limitations of online training and education. Being able to physically touch and handle components is an

important benefit of real-life courses. That is why we are looking into options to set up a hybrid training and education course environment that combines online training with a hands-on training experience.

EHEDG Networking

EHEDG Certification, EHEDG Guidelines and EHEDG Training & Education have always been considered the major membership offerings of an EHEDG Membership. I would like to add that EHEDG Networking should be considered as another valuable EHEDG Membership benefit. More and more food and food equipment industry professionals and scientists have joined online EHEDG Working Group meetings and were able to connect with each other via our social media channels. Currently almost 9000 food industry related professionals can be contacted directly via our LinkedIn-page: www.linkedin.com/company/ehedg

Networking, connecting and sharing knowledge is all about engagement. EHEDG wants to offer its members more opportunities to connect, so we currently evaluate a communication platform that will help you to quickly find trustworthy answers to practical hygienic design related questions. Of course, this initiative can only be successful with your support and engagement. I therefore invite you to share your best industry practices with all of us, so that we can all learn from each other’s experiences. Drop us a message at office@ehedg.org and our communication team will be happy to convey your experiences in stories that inspire others and highlight your company as a leading member that is driving positive change and innovation.

EHEDG Hygienic Design Strategy

EHEDG unites experts from all areas and levels of the food industry and academia, and they all share a universal sense of obligation to further advance food safety, quality, productivity, and sustainability. EHEDG has been doing that for 30 years, but we are now living in times of extraordinary change. The new GFSI Hygienic Design Benchmarking Requirements, published in the GFSI Documents JI & JII, have the potential to result in new legislative enforcement that will drive companies on all levels of the food supply chain to adopt and apply hygienic design.

Simultaneously, tougher demands by food consumers and food industry investors will accelerate the need for sustainable processing, and hygienic design is a key element of being able to comply with those demands. I invite you to look into this EU document about Best Available Technologies for Pollution Prevention &

Control (Sustainability), particularly page 119 and reference 113, based on the EU Best LIFE Environmental Projects Award winning research of EHEDG company member and EHEDG Testing Laboratory AINIA: <https://eippcb.jrc.ec.europa.eu/reference/food-drink-and-milk-industries>.

Let there be no doubt about it: the research results, gathered under real life industry conditions, prove that investing in hygienic design leads to major savings in cleaning time, water and chemical use and generates equally significant productivity gains. In other words: investing in hygienic engineering and design is the most effective investment strategy for sustainable success. I wish you a great reading experience while journeying through the illustrative articles in this EHEDG Connects Magazine edition. Meanwhile, you can rest assured that EHEDG will continue to support you and your companies along your own explorations in this golden era of hygienic engineering and design.

With best regards,

EHEDG President Ludvig Josefsberg





Meet the new EHEDG Treasurer & Secretary Matilda Freund

“Healthy finances plus new projects equals added membership value”

After decades of voluntary service, Piet Steenaard recently handed over his EHEDG Treasurer & Secretary position to Matilda Freund (Vice-President Global Food Safety Mondelēz International), who is also an EHEDG Foundation Board Member and a former EHEDG President. EHEDG Connects Magazine asked Matilda to sketch the current financial position of EHEDG, and to share her views on the post-pandemic financial future of the EHEDG Foundation.

Hi Matilda. How do you do?

Matilda: ‘Very well. Importantly, my family and friends have managed to remain safe throughout this difficult year. I hope the same for all of our EHEDG colleagues and their families. Somehow through this pandemic, EHEDG has remained a constant. It is nice to work with such dedicated people who have the same interests and it is a welcome distraction for me during this time.’

What challenges did you encounter when you became the new EHEDG Treasurer?

‘The main challenge was that everything was in a state of change. While the EHEDG Central Office team did an excellent job in managing the transition, it was and still is a bit difficult to familiarise myself with the new systems and processes, as everything was changing and I could not travel to the office to meet people and learn more about how we were structuring things.’

How do the travel restrictions affect the financial position of EHEDG?

‘You can imagine that our members’ ability to travel has been greatly reduced due to the pandemic. This has led to slight budget underspending in areas where face to face meetings were anticipated. The good news is that our members stayed active, and found new virtual ways to conduct the business of EHEDG. Our membership numbers stayed strong, so that’s good news too. We also identified a few areas that need extra investment, like our infrastructure, especially in the area of IT, in order to ensure that we are fit for the future. Our financial capacity enables us to take on new projects, and to bring in some resources for additional support. Going into 2022, we are already factoring in lower travel spending for the first half of the year, because it looks like the Covid situation will continue for at least that long.’

Can you provide us with a general financial overview of the EHEDG activities?

‘While we don’t have the end of year summary yet, I can say that EHEDG is financially healthy. Our membership continues to grow, which means that we have been able to maintain our income and, as I mentioned earlier, some of the planned spending was unable to be realized. As most people know, our budget is spent in a number of areas. We have the office and EHEDG Central Office staff expenses, and we fund the activities of the EHEDG Regional Sections and EHEDG Sub-Committees. In addition, we hosted an extra online conference, which was a good way for us to stay connected with the wider

membership and provide a forum to exchange technical information. Hopefully, we will be able to maintain some of these new ways of working even after the end of the pandemic, because in the future we might be able to reach even more people by making good use of online technologies. Within my company for example, various colleagues were able to attend the online event, whereas only one of them would have attended in person.’

A few words on the financial impact of the EHEDG Central Office transfer and new staffing please?

‘The EHEDG Central Office transfer has gone very well. It is bittersweet as we also miss our previous staff and are sorry that we had to say goodbye. We would have loved to give them a proper farewell with all the members joining in, but circumstances did not allow it. That being said, we have a great new staff with a broad experience, and I think our members will value the extra support that this team can provide. I was finally able to meet them face-to-face in Amsterdam recently, and was even more impressed. As we are all able to start traveling, I hope more of our members will have the opportunity to meet them in person. As far as the transfer, we were actually able to conduct the move under our anticipated budget. Today we are a “standalone” organization and, as a result, we have some additional financial control requirements. Therefore, we have decided to have an independent, third party conduct an annual audit of our finances to ensure we meet all legal obligations appropriately.’

Your personal vision on how EHEDG could utilise its financial resources more effectively: what can EHEDG do better?

‘As an organisation, we carefully create and submit budgets and formally approve them. We developed a strategy for EHEDG and we ensure the spending aligns with our overall strategy. One area where we could improve is around tracking the actual spending versus the submitted budget proposals. We will be able to do that in future with the new finance IT system that we have. The system allows us to provide more transparency to our members regarding the actual versus the planned spendings. Looking ahead, given the healthy financial position of EHEDG and new projects in the pipeline, I feel confident to state that EHEDG members can expect to see a further increase in their membership value.’

Also check out the ‘Knight’s Tale’ in honour of former EHEDG Treasurer & Secretary Piet Steenaard on the last page of this EHEDG Connects Magazine.

Introducing the new chair of the EHEDG Sub-Committee Product Portfolio:

Hein Timmerman: ‘Next steps in raising the EHEDG Membership Value’

After many years of voluntarily supporting EHEDG, Dr. Peter Golz, Deputy Managing Director at VDMA, handed over his chair position of the EHEDG Sub-Committee Product Portfolio to his successor Hein Timmerman, Global Sector Specialist at Diversey. EHEDG Connects Magazine asked Hein, who also has been closely affiliated with EHEDG for many years by contributing to various EHEDG Working Groups and to the EHEDG Advisory Board, what's happening and what's coming.

What is the role of the EHEDG Sub-Committee Product Portfolio?

Hein Timmerman: ‘About seven years ago, EHEDG reorganised its organisational structure, and established three EHEDG Sub-Committees, one for regional development, one for communication and one for its product portfolio services. This Sub-Committee Product Portfolio supervises the EHEDG Working Groups Guideline Development, Certification, and Training and Education. These develop their respective EHEDG membership services, which are referred to as the main EHEDG ‘products’, hence the name EHEDG Sub-Committee Product Portfolio. The EHEDG Sub-Committee Product Portfolio reports to the EHEDG Executive Committee and the EHEDG Foundation Board. Under the excellent guidance of the former chair Dr. Peter Golz, this EHEDG Sub-Committee Product Portfolio was established with a clear set of roles and responsibilities. Now that I am granted the honour to step in his footsteps, I am looking forward to continuing building on the firm foundation that Peter has established.’

How do the services, represented by the EHEDG Sub-Committee Product Portfolio, relate to each other? Let’s start with EHEDG Guideline Development.

‘Let’s start from the viewpoint that the food industry needs effective hygienic design to optimise food safety, quality, productivity and sustainability, we first need well-trained people. And if we want to train people, we first need to agree on what it is exactly that they have to learn about hygienic design. That knowledge is gathered, discussed and compiled



by the EHEDG Working Group members. They agree on the contents of the EHEDG Guideline Documents. There are as many EHEDG Working Groups as there are EHEDG Guideline Documents, but there is only one team which coordinates all of that work, and which represents the first pillar of our EHEDG Sub-Committee Product Portfolio.

So, the groundwork at EHEDG is done by developing guidelines. How does EHEDG Training and Education and EHEDG Certification fit in?

‘The guidelines represent a common ground, a widely shared consensus of what hygienic design actually is. They also define the needs for training and education. The EHEDG Working Group Training and Education uses the key learning points from each guideline to then develop training modules for the hygienic design training courses that are conducted by the EHEDG Authorized Trainers. This ensures that all advanced hygienic design courses in the world are harmonised. The link to certification is that the guidelines describe how equipment should be designed, and offer enough data, or enough baseline information to validate and certify components. The EHEDG Authorised Testing Laboratories conduct well defined ISO certified testing procedures to obtain a certificate for end users. So these activities are really interconnected, which is why we decided to unite them in one EHEDG Sub-Committee Product Portfolio.’

Who defines the strategies that align all of these activities?

‘The strategies are defined in the EHEDG Executive Committee meeting where all the chairs and the co-chairs of the three sub-committees gather with the EHEDG Foundation Board, the EHEDG President, the EHEDG Vice-President and the EHEDG Advisory Board. That way, the mission, goals, strategies, and the action points for follow up by the Sub-Committees are discussed and agreed upon in a democratic way. In general you could say that future plans are developed by the executive committee, while the implementation is executed by the Sub-Committees.’

What new developments does your Sub-Committee have in store for us?

‘Point one is guideline development. Currently, EHEDG members have access to as many as 56 distinct EHEDG Guideline Documents that have been written over the past 30 years. So you can imagine that the approach to develop these different guidelines has changed over the years, resulting in a variety of formats, even though all of them together are intended to help food and food equipment producers to provide a comprehensive guidance on how to develop, integrate and apply effective hygienic engineering and design practices. That is why we aim to harmonise these guidelines. We have to make clear distinctions between what is a guideline and a specification or a standard. And we have to clearly state the differences between components and systems. Since we now have a policy to revise every guideline at least once every five years, we focus on a consistent harmonisation process focused on aligning every new guideline update to a newly defined guideline format. We help working groups to perform these tasks by offering them professional editorial support and project management software that helps them to map out their activities and speed up the development process. Another new development is that besides food safety and food quality, the scope of the guidelines is now extending to the two additional benefits of hygienic design productivity and sustainability.’

Thank you, and what’s new for point two: EHEDG Certification?

‘One of the new requirements is that every working group has to include a set of key learning points in their new guideline updates. These KLPs link the guidelines to the EHEDG Certification schemes. Many certificates are currently focused on components, but we just set up a strategic group that looks into new possibilities to deal with integrated systems, with bigger and more complex types of equipment, up to complete food processing lines. So yes, we are taking the next step in certification into consideration. An even higher priority is to further develop the external cleaning tests. Three EHEDG Testing Laboratories are already equipped with new testing robots that enable this new test method, and they’re aligning the test procedure, so we can roll this out soon. So the future of certification looks promising and exciting.’

Is there anything exciting happening in training and education?

‘Since the completely unexpected start of the pandemic, EHEDG Training and Education has been confronted with major challenges. EHEDG Hygienic Design Training Courses have always been very hands-on oriented, conducted in a classroom with a trainer who brings a suitcase filled with equipment, to show the engineers the materials and to help them understand the differences between hygienic and unhygienic design. That was simply not possible in the past two years, and now that the whole world is quickly adapting to get used to working in virtual environments, we have to rethink our way of bringing the EHEDG Training and Certification offerings to the working floors of the food and food equipment industries. This demands for a completely different way of working, and the EHEDG Working Group Training and Education is looking into new options to develop small and interactive online training modules. Simultaneously, we started using our LinkedIn channel to deliver short webinar presentations by experts. Our ultimate goal is to make the wealth of EHEDG hygienic design knowledge available in various online formats that are accessible 24/7 from any part of the world.’



EHEDG Working Group Certification

Chair Andy Timperley: 'New milestones and plans for EHEDG Certification'



Despite traveling restrictions imposed by the COVID pandemic, EHEDG Working Group Certification has managed to hold more online meetings than ever before, and progressed a number of new milestones. Working Group Chair Andy Timperley shares his views on the ongoing activities in certification, and deliberates on future plans for further advancements in EHEDG certification services.

What milestone do you consider to be most significant?

Andy Timperley: 'They're all equally significant, but let me highlight a few of them here. We've expanded our pool of EHEDG Authorized Testing Laboratories (ATLs) by assessing the Japanese Food Research Laboratory (JFRL) in Japan. They built themselves a very well designed cleanability test rig, and completed internal trials in accordance with the EHEDG requirements. The ATL final on-site assessment of the laboratory is planned for the second or third quarter of 2022, COVID restrictions

permitting, in order to bring JFRL on stream as a fully operational

With Force Technology, EHEDG also managed to maintain the ATL representation in Denmark. I personally supervised the methodology assessment with Alan Friis, a well known expert in hygienic design and computational fluid dynamics, and his excellent team of technicians. I witnessed a complete test procedure, which was conducted with testing hardware transferred from the former ATL DTU (Technical University of Denmark). It was a really well-conducted test that yielded the expected test results, so there were no concerns authorizing Force Technology as the new ATL in Denmark. A great addition to the group.

Another milestone is that the standard operating procedure (SOP) for an open plant cleaning (OPC) test is in the final stages of development. Fraunhofer IVV has been leading the development of this new OPC method, and trials within two other ATLs will now commence to validate the reproducibility of this method, which introduces the utilisation of a robotic cleaning arm. These inter-laboratory trials are also necessary to obtain an ISO 17025 accreditation for the method.

What other next steps will be taken now?

'The next step is to finalise the SOP and incorporate all of this into a new EHEDG Guideline Document, which would support certification of open process equipment. A dedicated 'Task Force' has recently been formed to drive this initiative to completion. This new method is particularly important because EHEDG has always recognized that any open process is vulnerable to anything that's happening within the surrounding environment which could affect food safety, so wherever food is exposed, the whole factory environment becomes a potential source of contamination.'

How are you going to address the complexity of that?

'It is indeed a complex challenge, and that's why we are pleased to have a very experienced expert, Dr. John Holah, involved with updating the existing factory design guideline. He is also involved in the GFSI initiative that looks into food quality systems and how to manage food safety assessments within food processing. So the open plant cleaning (OPC) test method will support open processing equipment developers in their hygienic design efforts and also take into account the accessibility of the processing installations. After all, you can only clean equipment when you can gain access to it.

The whole idea is to offer companies the possibility to test the individual features of a larger machine that couldn't be tested as a complete unit. And then when we look at the system integration document, and at others like document 13 on the hygienic design of equipment for open processing, evaluation officers can assess the hygienic design of the complete machine based on results of the OPC test for the features that are then put together as an entity.

Another initiative being driven by EHEDG is the consideration of 'end-to-end' testing for more complex integrated systems, buildings, and utilities. A Project Charter Team made up of EHEDG Company Members and WGC representatives will define the roadmap and milestones in order to develop guidelines and methodologies for testing and certification.'

So it's a modular approach to certify larger components?

'Yes, and it is possible, because when we look at this modular approach to certifying things like conveyors, we've got the guidelines pretty well structured for that. And that's another development that our EHEDG Working Group Certification is

driving now: we participate in a lot of the groups that are producing updates to hygienic design principles, to make sure the guidelines will actually contain specific guidelines on the dimensions, roughness, materials, and construction techniques that we can then apply within our assessment processes to certify equipment.

Another development that supports further progress of the entire certification scheme is the recent publication of a new supplementary certification requirements (SCR) document. This document is being published in the public domain and is free to download for all equipment developers to review specific design aspects or assessment criteria that have not yet been included in a guideline document.'

What's the future going to bring?

'In the future, we will continue to focus more and more on hygienic engineering as a mindset, and on training all stakeholders. After all, that's why EHEDG changed its name from the Hygienic Equipment Design Group to the Hygienic Engineering and Design Group. Because we've scoped out our portfolio to also cover factories, cleaning and disinfection, etc. EHEDG now has guidelines on topics like air handling, tank cleaning and cleaning validation, which aren't pure design guidelines anymore. It is all linked to the global approach to hygienic engineering and food safety. We will continue to develop the EHEDG Certification scheme to support this holistic approach.'

Welcome on Board

EHEDG welcomes new EHEDG Advisory Board Members

EHEDG is the global community in hygienic engineering and design for and by food industry professionals. This is reflected by the strong engagement by these professionals in the EHEDG Working Groups that develop EHEDG Guideline Documents, EHEDG Certification, and EHEDG Training and Education offerings, and the EHEDG Sub-Committees Product Portfolio, Communications and Regional Development.

EHEDG Advisory Board

The close relationship between EHEDG and the food industry is also illustrated by the members of the EHEDG Advisory Board. This board ensures that all EHEDG activities are tightly aligned with the changing needs of the food industry. Within the

EHEDG Advisory Board, each member brings in the wants and needs of his/her respective company. The board provides outlines for future EHEDG activities that are followed up by the EHEDG Executive Committee and implemented by the EHEDG Sub-Committees.

New EHEDG Advisory Board Members

To safeguard the continuity and diversity of the EHEDG Advisory Board, new members are elected into this board once every two years. On the following pages, EHEDG Connects Magazine introduces the new members that recently joined the EHEDG Advisory Board.



Anne-Claire Carrère
Represents EHEDG Company Member: Nestlé



Dr. James Hartley
Represents EHEDG Company Member: Mondelez



Dr. Georg Kalss
Represents EHEDG Company Member: Bühler





New EHEDG Advisory Board Member

Anne-Claire Carrère

Represents EHEDG Company Member: **Nestlé**

Anne-Claire Carrère is responsible, on a global level, for hygienic engineering at Nestlé. She is trained as a food processing engineer at AgroParisTech, and has built up more than 15 years of working experience in different roles within Nestlé. Anne-Claire worked for the Nestlé food and dairy businesses, and led a Capex project in the area of aseptic processing for Nestlé Science. She recently joined the Nestlé Technical Competence Unit in the Nestlé Headquarters in Vevey (Switzerland).

How did you feel about joining a new team within Nestlé?

Anne-Claire Carrère: 'I was quite excited when my colleagues at the technical competence unit asked me to join their team. That was a big opportunity for me. During the previous years, I had supported Nestlé projects all over the world in the area of cleaning-in-place, which involved a lot of traveling. I am now stationed in Vevey, focusing on corporate manufacturing excellence, and supporting hygienic

engineering for the whole group. We have put together a very ambitious roadmap. We want each engineer at Nestlé to be passionate about hygienic engineering and design, and about effectively maintaining all of our assets.'

On your LinkedIn profile you characterise yourself as an 'out-of-the-box' platform manager. How does out-of-the-box thinking in hygienic engineering help Nestlé to play a leading role in the space of hygienic engineering and design?

'At Nestlé, we put the consumers at the centre of everything we do, and we make sure that our engineers do that as well. While we always need to innovate, we also need to keep an eye on the project costs. We strive to design solutions that are sustainable for years to come, so that our operator can work with this machine for decades and be happy about it.'

What's new at Nestlé? What new activities have you deployed to make sure that the equipment you use continues to comply with your own standards and with the EHEDG Guideline Documents?

'Nestlé is utilising new initiatives in our project management. For example, we are building 3D models of our factories, so we can zoom in on each single item or piece of equipment in order to determine if there is a gap, or to gain certainty that the design is correct. We are also using 3D goggles during commissioning, so that an expert can follow the operator on site and see exactly what the operator sees. Recently, I've taken part in online workshops in a virtual conference centre, interacting

What are you looking for?

'We want to install machines that are safe for our operators, easy to maintain, and easy to clean. We want to have a positive impact on the environment, and we want the operator to love to work with the machine. It depends on the machine and the food product it processes, but if operators need to spend hours on cleaning their machines, then that's not ideal. So, while deciding which machines to buy, we look at the machines from many different angles. We pay attention to the level of hygienic design and machine safety obviously, but we also take the environmental impact into account, and the productivity and the maintainability of the machine as well.'

Anne-Claire Carrère (Manufacturing Excellence Hygienic Engineering at Nestlé):

'EHEDG is recognised as the leading source of expertise in hygienic engineering.'

with the chief engineers, and all participants had their own virtual reality goggles. After entering the virtual world, all workshop participants participated in a brainstorming session. You feel like you're really in the same room with the people. It was a very nice experience.'

Can you describe the relationship between Nestlé and EHEDG?

'Nestlé has had a longstanding relationship with EHEDG. We share the same objective. We work hard to earn the trust of our consumers, also by producing safe food, because as we say at Nestlé: if it's not safe, it's not food. For EHEDG, it's very important to have the food producers on board, because we are the end user of the machines. When food producers buy a machine, they invest a lot of money in it, and they need to live with the machine for the next 20 years or 30 years or even longer. Therefore, their feedback on the design is very important.'

What is your view on the role of EHEDG within the food industry and the food equipment supply chain?

'EHEDG is recognised as the leading source of expertise in hygienic engineering. And EHEDG continues to support the harmonisation and standardisation of hygienic design requirements, which is great. Meanwhile, it's also important to close the remaining gaps in areas where EHEDG has not yet developed any industry guidance. I would also like EHEDG to create a complete package of user-friendly documents and digitise them, so that engineers and operators can access information wherever and whenever they need it. I think this is an area where there's still quite some work left to do.'



James Hartley (Global Sanitation Director Mondelēz International):
'As a customer, you need to be able to clearly convey your needs'

New EHEDG Advisory Board Member

Dr. James Hartley

Represents EHEDG Company Member: **Mondelēz International**

James 'Jim' Hartley is a newly elected member of the Advisory Board and Global Sanitation Director of Mondelēz International. His work involves leading a global team of hygienic design and sanitation specialists, supporting the manufacturing and research and development base of Mondelēz, responsible for setting policy on sanitation program design, good manufacturing practice, pest control, and of course: hygienic design.

What does your daily work entail?

Jim Hartley: 'We provide expert guidance to facilities on the implementation of policies, and a major part of my role is working with quality, R&D, engineering, manufacturing, food safety, and many other areas across the world to ensure that our current requirements are well-understood and well-implemented. I also work with colleagues to create future development plans, both on hygienic design compliance and on performance.'

Do you consider it to be your social responsibility to be part of this community?

'Mondelez International has had a very long standing and constructive relationship with EHEDG. Matilda Freund, our VP Global Food Safety, is a past president of EHEDG, and there are many other members of Mondelēz International who have significantly contributed to EHEDG Working Groups and EHEDG Guidelines over the years.'

So for us, food safety is a top priority and the hygienic design of equipment and facilities is a prerequisite of this. I think it's important that a big size company like Mondelēz International, being a customer of equipment manufacturers, provides input and expertise into EHEDG. This is our contribution to represent an industry that wants to produce safe food and beverage products.'

Mondelēz International is indeed a large, multinational food processing company that has its own standards. Do you still apply the guidelines that EHEDG develops in your own practice?

'Absolutely. We have over 100 manufacturing sites spread out across the world. As a company we use the insights and guidelines of EHEDG to develop our own global standards. While developing our policy requirements, we also have to consider the different requirements across the world, and the EHEDG documents provide very useful input for this policy development process.'

You're a busy man, I presume. Why did you become an EHEDG Advisory Board member?

'EHEDG is an important organization to help drive the continuous improvements of food safety standards through hygienic design, and that's fundamentally what my role is about. As a major food manufacturer, and a manufacturer that has a long history of supporting EHEDG, I felt it was important coming into this role to continue that involvement and also to demonstrate that Mondelēz International remains committed to developing industry best practices in hygienic design.'

We are a food processing manufacturer, so we are the customer to the food equipment industry, and as a customer, you need to be able to make clear what you want - otherwise, it's very difficult for suppliers to truly understand your needs. Being part of the EHEDG organization gives us the opportunity to express our end user requirements in a crystal clear way.'



Do you have a technical background yourself?

‘I am a chemist by training, and I obtained a degree and PhD in chemistry before I started in the food manufacturing industry, so my background is more on the chemical side of processes. However, I am very fortunate to work in a team where we have many experienced engineers, and in particular, our global hygienic engineering design lead Dimitri Tavernarakis who also contributes to some of the EHEDG working groups, and is a very experienced engineer. I am surrounded by talented people, and that’s always helpful.’

What ideas are you planning to bring into the organization?

‘One of the things I am particularly passionate about is raising awareness and understanding of the importance of hygienic design, and getting people enthusiastic about designing equipment in the right way, so I’m getting involved in that here. Sustainability is also a very important topic, for us as an industry, and for me as an individual, and so we’re working on developing the EHEDG strategy around sustainability.’

Do you have any general tips for equipment providers when it comes to approaching big food processing companies like yours?

‘One of the advantages of being within the EHEDG community is the documented guidelines. Major industry players use those guidelines as the basis of their own policies. Compliance to these guidelines is what the food manufacturers are going to be expecting from you as an equipment supplier. They can give you the inside track into what big companies are looking for.

In very simple terms: start looking at the EHEDG guidelines, and take those to heart by applying them in your processes and equipment. That’s the best way to achieve a straightforward job when aligning your equipment to the requirements of a food manufacturing company. So if you haven’t done so: start studying the EHEDG Guideline Documents - it is worth the effort.’

New EHEDG Advisory Board Member

Dr. Georg Kalss

Represents EHEDG Company Member: **Bühler**

Dr. Georg Kalss is the Food Safety Officer in the Wafer business unit of global food technology company Bühler. His background is in technical chemistry, with a special focus on material sciences, especially metallic materials, surface technology, and non-stick properties of food contact surfaces.

Your new role at EHEDG is to offer your perspective and views on what is needed, and on how EHEDG can align itself to those needs. Do you already have some ideas?

Dr. Georg Kalss: 'I think we primarily need to step up our efforts in the field of certification, and not only regarding components, where we already have quite a nice system established with the testing laboratories, but also concerning the certification of complete machines and technologies. Many food processing companies would like to see that happening. They are eager to start installing certified machines instead of combining certified components, because it will give them more control over the food safety, quality, productivity, and sustainability of their processes on site.'

At Bühler you have a lot of experience with hygienic engineering and hygienic design. What do you still get out of EHEDG? Does your company still make use of the guidelines, certificates, and training courses?

'Yes, we apply the EHEDG Guideline Documents, and of course we offer a wide range of EHEDG certified components. We also defined a training goal for the whole company. We want all of our engineers to complete a EHEDG hygienic design basic training, so that every single Bühler engineer knows how to look at machine designs from a hygiene perspective.'

in a more general setting. That enables us to develop a broad perspective on hygienic engineering and design.'

Traditionally, the costs and benefits of hygienic design equipment has always been solely related to food safety. Nowadays, major food processing companies acknowledge the additional product lifecycle benefits of hygienic design: the productivity and sustainability benefits are better understood now. How does Bühler deal with the different aspects of hygienic design?

Dr. Georg Kalss (Food Safety Officer Wafer Business Unit at Bühler):

'Most innovation in the food industry will be centred around the topic of sustainability'

Can you give us an insight in how food safety management is structured on an organizational level at Bühler?

'We combine the EHEDG Guideline Documents with the input we receive from our customers, and with practical experiences of our own as well as of other EHEDG company members. From this broad knowledge base, we develop solutions that enable our customers to produce safe food.'

Does EHEDG also help you to promote your hygienic design equipment in a more effective way?

'Definitely. This is something we appreciate about EHEDG: being part of this expert community also enables us to link up, apart from a specific project, with customers and suppliers, for example in EHEDG Working Groups and in the EHEDG Advisory Board. Within EHEDG, we exchange and discuss topics with experts, customers, and suppliers

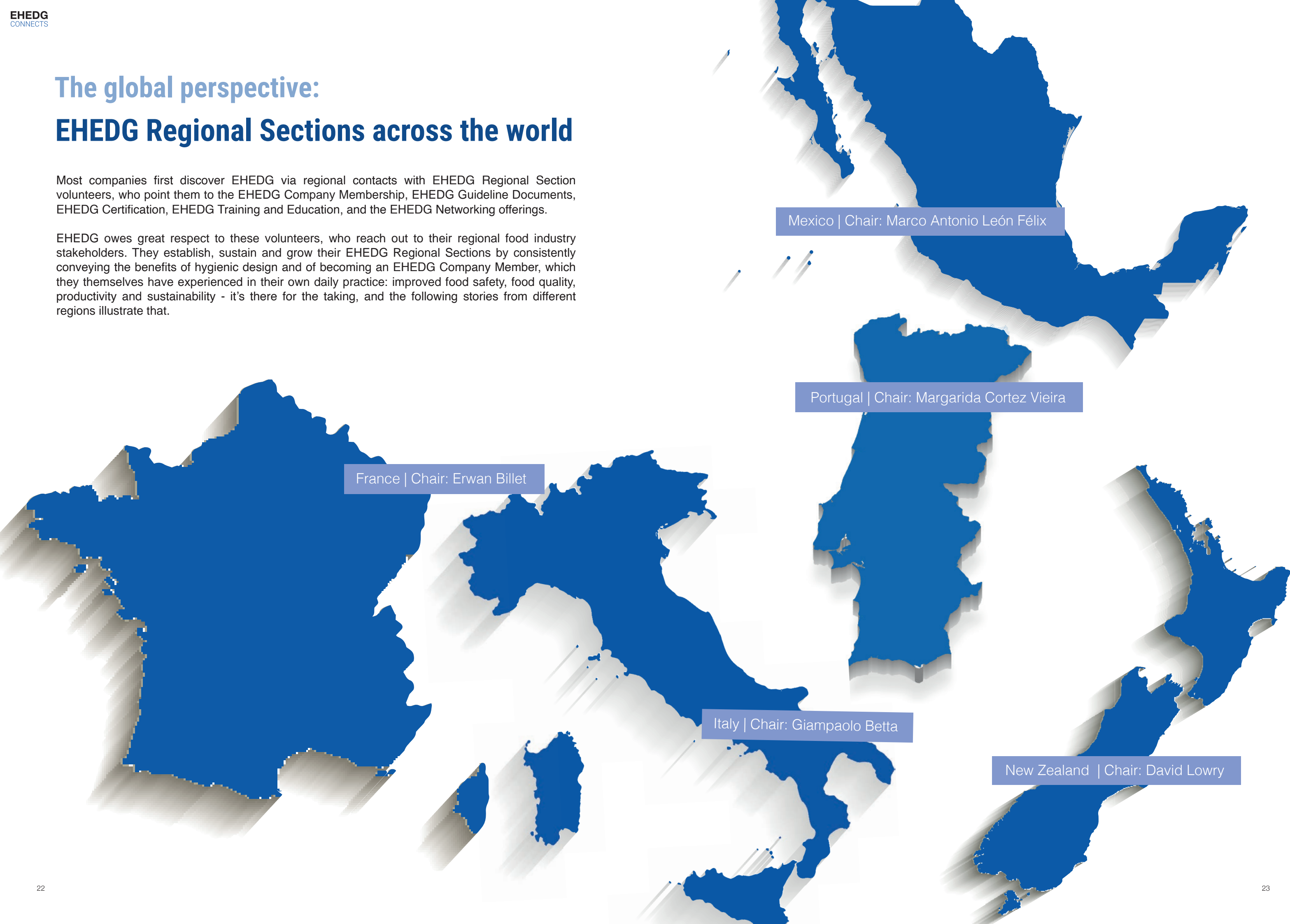
'The most important fields for innovation in the food industry in the next 20 years will be centered around sustainability. When looking at the carbon footprint of foodstuff, there are quite a lot of possibilities to get this footprint down by introducing new, or optimising existing, processes. One sustainability aspect that is often overlooked is food waste. From my point of view, this is a very strong argument for hygienic design, because the primary goal of hygienic design is to avoid contamination incidents, which lead to food loss during the production process, and, in a worst-case scenario, to recalls. Hygienic design helps to prevent recalls by enabling safe cleaning processes, which also minimises the loss of raw food materials in the process. I think that we should all strive to further advance hygienic engineering and design to make industrial processing more sustainable. At Bühler, we really focus on that.'



The global perspective: EHEDG Regional Sections across the world

Most companies first discover EHEDG via regional contacts with EHEDG Regional Section volunteers, who point them to the EHEDG Company Membership, EHEDG Guideline Documents, EHEDG Certification, EHEDG Training and Education, and the EHEDG Networking offerings.

EHEDG owes great respect to these volunteers, who reach out to their regional food industry stakeholders. They establish, sustain and grow their EHEDG Regional Sections by consistently conveying the benefits of hygienic design and of becoming an EHEDG Company Member, which they themselves have experienced in their own daily practice: improved food safety, food quality, productivity and sustainability - it's there for the taking, and the following stories from different regions illustrate that.



EHEDG Regional Section Italy

Chair: Giampaolo Betta



Dr. Giampaolo Betta holds a Masters degree in mechanical engineering and a PhD in food science and technology. He owns his own consultancy firm and is also the director of the EHEDG Testing Laboratory in Parma, Italy. He is also Chairman of the EHEDG Working Group Open Equipment and a member of the EHEDG Working Groups Training and Education and Test Methods, as well as the Chairman of the EHEDG Regional Section Italy.

Giampaolo, how important are certificates in the adoption of hygienic design by the Italian food processing and food equipment industry?

Dr. Giampaolo Betta: 'In the EHEDG Testing Laboratory, at present, we test only closed equipment, which is a well developed product area for the Italian food equipment industry. Most of the time, when we receive inquiries from Italian companies, the equipment already turns out to comply with the current hygienic design requirements, and certification is used as a means of confirmation of their ability to design and manufacture hygienic equipment. In other cases, the company has the objective of having a EHEDG certified machinery in their catalogue, and certification is the main driver for them to innovate and develop a completely new product. In addition, we do see innovation in the field of open process machinery, mostly because there is a lack of hygienic design components in that area. Many companies are now trying to launch new, hygienically designed components for open process machinery, as various companies strive to create a competitive advantage by being the first and the best.'

When was the Italian Regional Section of EHEDG established and how has it evolved over the years?

'Our Regional Section was established in 2007. Back then, we only had a few company members. Some companies were already EHEDG members before the foundation of the EHEDG Regional Section Italy, so they were the main players at that time to create this new section, together with some of my colleagues from the University of Parma. Since then, the number of members has increased and continues to increase to the point that I think we are now one of the biggest sections within EHEDG. This is, of course, related to the fact that Italy has a very active and strong food manufacturing industry sector.'

What are the specific challenges in your region?

'I think everyone knows that the Italian food industry has a very strong tradition, based on traditional Italian recipes and processes. Italian cuisine is very popular all over the world, so our food industry companies are quite experienced

in exporting food products to various countries. As a result, Italian food processing companies are used to adapting their processes in compliance with different national regulations. I would say that the Italian food industry is quite traditional, but also flexible and innovative when needed.'

Being a consultant yourself, how do you help your clients find the right level of hygienic design for each application, that sweet spot that enables them to guarantee their food safety without compromising on their profitability?

'That is a very good question, and a difficult one to answer as well. When you have very old traditions, it is sometimes difficult to start

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 foremost needs to continue publishing very high quality guidelines, and then we can give very high level training and offer relevant certification schemes.

Certification quickly ensures you are doing something that is compliant with the current hygienic design criteria, and training activities also offer opportunities to network, because

Giampaolo Betta (Owner and Director Societa Italiana per L'Innovazione nell'Industria Alimentare):

'Italy has a strong, flexible and innovative food processing machinery industry'

up improvement projects. And when it comes to hygienic design, it's not sufficient to just replace one single component or to just place one single certified component in your plant. Every new machine that you add to your line should be hygienically designed, and when building a new facility or a new line, a comprehensive approach is always the most effective way to go forward.

EHEDG certified equipment is highly recognized here, so companies know that if they select a piece of EHEDG certified equipment, the risk of running into problems later will decrease. Unfortunately, currently the availability of certified equipment is limited to certain types of components. If you look for a complex and large machine, you will not find a certified machine, so you need to dive deep into the design and the construction and judge for yourself whether the machine is suitable or not, or what parts must be improved. It's a very complex issue that still demands for the support of consultants.'

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.'

Chair: Prof. Dr. Margarida Cortez Vieira



Margarida Cortez Vieira is a professor at the Departamento de Engenharia Alimentar (DEA), Universidade do Algarve. Her background is in chemical engineering, with a later specialization in food by doing a Masters and PhD in food engineering. Dr. Vieira has taught food engineering for more than 30 years at the University of Algarve, and is currently teaching a course on hygienic design in food plants. EHEDG Connects Magazine interviewed her in her role as Chair of the EHEDG Regional Section Portugal.

How would you describe the structure of the Portuguese food industry?

Margarida Cortez Vieira: 'Portugal produces typical Mediterranean products like olive oil, wine, milk, bread and pastries, just like other countries in this region, but Portugal holds a particularly strong position in the space of bread and pastry production. Many small-sized companies make products like the famous custard pastry 'Pastel de Nata'. These small companies need help to achieve the hygienic standards that are demanded by the rules established by the EU.

We also have a strong fish industry in Portugal. We have the highest fish consumption per capita within the EU, and Portugal exports codfish, dried or frozen desalted to Brazil, Angola, France and Italy. After the second world war, many canneries disappeared, but they came back later, mainly for tourists (canned sardines and tuna fish). Lately, the frozen fish and seafood production is becoming more significant. I should also mention the salted codfish, bacalhau, which was fished for centuries from the North Atlantic fisheries of the Grand Banks of Newfoundland and Georges Bank (bacalhau da Terra Nova), and was salted and dried in Newfoundland and Nova Scotia, or smaller quantities in Iceland and Norway. Nowadays, bacalhau is frozen right after being fished in high seas, and then it is salted and dried in Portuguese plants. It is known as our "faithful friend", as every Portuguese home consumes it at least once a week, and we have a thousand ways to cook it. It is one of the few species of fish that is not consumed fresh in our country.'

So there's still room for food safety improvement in your region. Is that the reason why you decided to establish a new Regional Section in Portugal?

'The food industry in Portugal has evolved a lot in recent years. With all the rules by the EU in place, the food industry in Portugal has modernized itself considerably, with more food industry companies buying more hygienic design equipment. However, we see this happening mainly within middle to big-sized companies. Very small to small sized companies can't afford to buy this equipment, considering they'd also have to pay for the expertise that is necessary to achieve the levels of hygienic design and the hygiene in their products that are needed.

The pastry industry requires a very severe control in order for it to consistently produce high food safety level products. I'm not saying that it's not safe to eat these products. Pastries are cooked at high temperatures, so the product is safe, but other

products come with higher food safety risks. Some people struggle to achieve what's demanded, and sometimes they turn to the universities for help. They require our assistance with exporting their

supply and retail channels all over Europe. They require that expertise, and that is missing. Those channels come within reach through the EHEDG network, and that is very important to them.'

Margarida Cortez Vieira (Department of Engineering, Universidade de Algarve):

'Many small food companies in Portugal need help to comply with the rules established by the EU'

products or extending the shelf life of the foods. These can be highly improved by having better hygienic design procedures.'

What part of the EHEDG membership offerings are most valuable to the smaller food processing companies in Portugal?

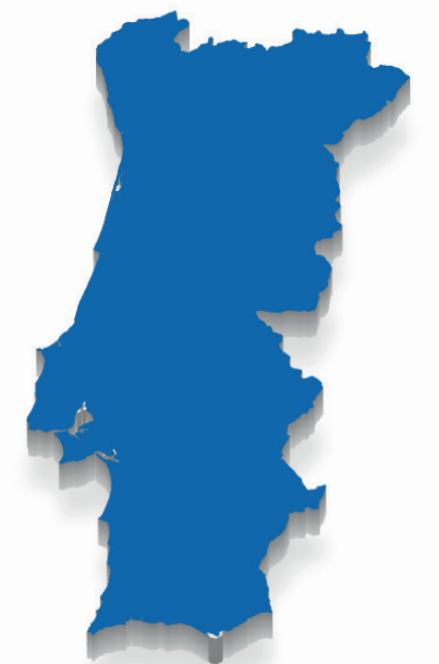
'I think all of them will be very useful. Training mainly for the food industry, certification more for the equipment manufacturers for the food industry, and the guidelines come along with training. If you don't know much about it, the guidelines won't be useful. I think it has to be half and half. The companies have to be trained to use the guidelines. Our universities already offer training in Food Engineering, we teach some parts about hygienic design and cover all of this, but this training is for those who can hire a food engineer. But even food engineers need to be trained on a regular basis, because there's so much to learn about hygienic engineering and design, that all of it can never be taught within the course of one semester.'

Many of your delicious Portuguese pastries are not yet available in Northern European supermarkets. Does the EHEDG network offer your regional food processing companies new opportunities to enter new markets in Europe?

'Oh yes! The networking is very important. Many companies are trying, especially young entrepreneurs, to sell their food products beyond the Portuguese borders. Many come to ask us about packaging and extending shelf life, because they want to export and sell their products via the food

Just like any other EHEDG Regional Section, your options to reach out to the industry and to propagate hygienic design in your region have been limited, but what are your plans for Portugal?

'We plan to go to Lisbon and Porto, and maybe pose some of the questions that you ask me now to some of the main associations of the food manufacturers. We want to fully understand their needs, and introduce ourselves and let them know that EHEDG is here. We were supposed to be present at a food fair in Lisbon earlier, but that fair was postponed due to the pandemic. Everything is postponed, but I am hoping to attend the meetings in Lisbon and Porto to make new connections there. Because ultimately, food lovers outside of Portugal also deserve to enjoy the delicious food and beverages that are produced in Portugal.'





EHEDG Regional Section France

Chair: Erwan Billet

Erwan Billet is active in the field of hygiene, cleaning, and environmental control, in his training and consulting organization Hydiac, and as a professor at the School of Environmental Trades of Rennes. Last but not least, he is the longstanding chair of EHEDG Regional Section France. In this interview, Erwan talks about the special status of this regional section within the global EHEDG organisation, the unique characteristics of the French food and food processing equipment industry, the European ban on harmful but useful cleaning chemicals, and the French Hygienic Design Award.

What differentiates the French food and food equipment industry from those in other countries?

'Well, first of all: we love food, and we take pride in our local cuisine. That's why we have many small food companies in this country. 76% of all the French food industry companies have less than 10 employees, and only 2% have more than 250 employees. However, the large companies account for 58% of the turnover. So we have a rich group of small and very large food factories here.

Our organization is a separate EHEDG Association in France. This special status allows us to be recognized at the national level by the French

authorities and ministries. In fact, our association in France is a regional section that is organized much like the global EHEDG organization. We have an Executive Committee and a Board, and most importantly: we have more than 120 engaged EHEDG member companies here. Together we drive progress in the adoption of hygienic engineering and design in the French food and food equipment industry.'

To generate interest for EHEDG, you first have to generate interest for hygienic design?

'Yes. Hygienic design is the most important step towards effective cleaning, and therefore should be considered a priority by the entire food industry. If your equipment designs don't comply with the design guidelines of EHEDG, you will sooner or later run into cross-contamination issues, and your equipment will be very difficult to clean, which makes it difficult to produce good food.'

What French food industry sectors in particular could benefit from EHEDG guidance?

'Some French bakeries have had problems with yeast contamination, and with mold and listeria. They are expected to use less and less nitrate

salt, so the woodwork becomes more risky. It's a European problem. EU-legislation bans the use of more and more types of cleaning chemicals. So we have more risky types of foods and at the same time, we have less effective cleaning solutions. Hygienic design then becomes the

innovations in this field. We do this because we want to drive progress and stimulate the development and usage of hygienic design equipment. For EHEDG Regional Section France, this award is yet another solution to communicate about hygienic design in France.'

Erwan Billet (Directeur, HYDIAC):

'Hygienic design is the most important step towards effective cleaning, and therefore should be considered a priority by the entire food industry.'

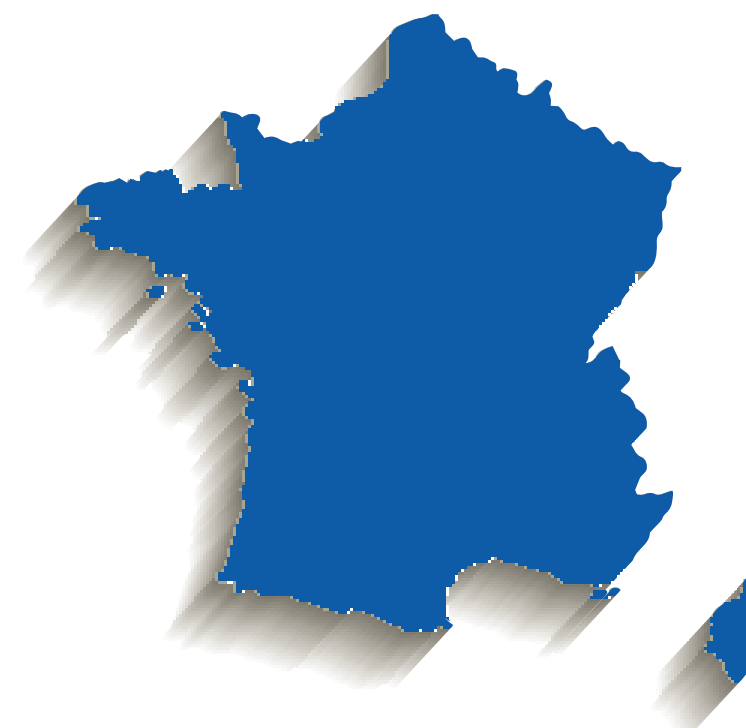
most important factor to stop contamination. And there's still a lot of ground to cover in that sector, because traditionally, the food safety risks in the bakery sector were considered to be low, so that sector has not developed a vision on hygienic design. After a series of contamination incidents, this sector decided to progress in hygienic design, so they reached out to EHEDG to find answers on the million euro question: how can we have less problems with our food production?'

What kind of services can you offer to the members in your region?

'Normally we organise two conferences per year in France, the first in March and the second in October or November. Every member is welcome to participate in these events, even the food factories who are not in the association are invited to attend. It is very important to communicate about hygienic design in France, and these conferences offer very good opportunities to do that. Five years ago, we created a hygienic design award, the PCH. It's a prize to reward food equipment companies for their

You haven't been able to organize any events in the past year. How do you keep in touch with your members and with the industry?

'Despite the Covid-19 situation, we managed to offer two hygienic design training sessions in 2021. The first in April and the second in the autumn. We have also decided to have an online conference with our regional section members. We are planning to have many webinars in the coming year and we also hope, of course, that it will be safe to go out and present EHEDG to the food processing industry again.'



EHEDG Regional Section Mexico

Chair: Marco Antonio León Félix

Marco Antonio León Félix is a trainer, consultant and auditor on food safety and quality issues at LEFIX y Asociados in Coyoacán, Mexico. He is also a Professor in the Faculty of Chemistry on technology issues of food and food safety since 1983 at the Universidad Nacional Autónoma de México. In his voluntary work as chair of the EHEDG Regional Section Mexico, he strives to increase the awareness for the benefits of hygienic engineering and design and for the value of EHEDG in his region.

How would you characterize the Mexican food industry in general?

Marco Antonio León Félix : ‘The Mexican food industry has a very unique structure. In this diverse country, you’ll find a complex mix of food processing facilities of all sizes, from very small to very large. One of the world’s largest processing sites for tuna products is located in Northwest Mexico, and we have a huge facility for the production of soft drinks and beer, and of course many facilities for canning chillies and vegetables.’

EHEDG Regional Section Mexico is growing. Do you have tips for other EHEDG regions?

‘Firstly, let me emphasize that in the very early days of our Mexican section, we didn’t have any idea how to start out. We first established close relationships with other EHEDG Regional Sections, and participated in the EHEDG World Congress and EHEDG Plenary Meetings. We learned a lot from other regional sections, especially from Spain, of course, and from Macedonia, Taiwan, Italy, and others.

After we returned to Mexico, we decided to start with creating hygienic design courses. Back then, few people here knew about EHEDG, so we also started to organize conferences throughout the country, and not only in Mexico City and Monterrey, in order to inform people about EHEDG. Those were our initial steps.



Later on, we realized that Mexico demands for a unique approach, since, as I said, we have a very unique mix of industries here. So we started working with small companies, working to support them with implementation of hygienic design. That has been one of our greatest successes. Because of that, some government officers came to us and they are now in talks with us to develop a conference together.’

What are the first results of your EHEG Mexico activities in the region? Can you see a better implementation of hygienic design in local food processing companies?

‘Yes, especially after people started attending our hygienic design training courses, we could see amazing improvements, especially among food machinery suppliers. Good machinery supply is very important. It enables the end-users of those machines to improve their processes. And the training courses enabled them to describe their needs to the food machinery suppliers by making use of the design criteria.



They save a lot of time and money by doing this. In the past, we have also seen companies here building installations that were not hygienically designed, and consequently, they had to make time consuming and expensive changes later.’

standards. Considering the new GFSI Hygienic Design Benchmarking Requirements JI and JII, the need to accomplish this becomes even more obvious.

Marco Antonio León Félix (Owner LEFIX y Asociados)

‘Mexican food exporters adopt hygienic design to ensure access to their export markets’

What will the future bring? How do you envision the role of hygienic design in your region in the coming years?

‘Many people know that we have signed an agreement with Canada and the United States. That is a very big market, so that agreement is very important for us in order to continue our growth in food exports. However, the FDA and Canadian Food Safety Agency require the use of hygienic design equipment in the food processes. So it’s extremely important for a food exporting country like Mexico to comply with all international

So, we don’t only do this to comply with our own governmental rules, but also to ensure our access to the international markets. Mexico also exports food to Central and South America, including Venezuela, Columbia, and Peru, and we have a huge market in Brazil, Argentina, and Chile. I think that hygienic design will be a key issue for Mexican exporters to consider and accomplish. They will have to be creative in their techniques in order to raise the level of hygienic design.’



EHEDG Regional Section New Zealand
Chair: David Lowry

During his long career, David Lowry has propagated the use of hygienic design in different companies all around the globe. He now runs his own consulting firm and is the chair of the EHEDG Regional Section New Zealand. David is a microbiologist by training, and started his career in a research institute focusing on pathogen issues. He then moved to the commercial sector by becoming the technical lead for Ecolab in New Zealand, and worked in a global regional capacity for 25 years, including assignments in the Ecolab headquarters in the US and China, before setting up the food safety section in New Zealand.

You've worked all around the globe. How would you describe the differences between the food and food equipment industry in New Zealand compared to other regions?

David Lowry: 'Considering the fact that for a long time New Zealand and Australia have been quite isolated from their mother countries, and that it took a long time for material to arrive from other parts of the world, we have become very independent in the way that we approach design challenges. Compared to industries in other countries, here in New Zealand we can be somewhat stubbornly patriotic at times, and we are used to tackling technical challenges ourselves, but the food industry

is now very much a global community and we need the support that the EHEDG community offers. With our EHEDG Regional Section New Zealand, we want to establish new connections, and support the advancements in hygienic engineering and design in this part of the world.'

How is the regulatory environment in New Zealand with regard to hygienic engineering and design?

'The regulatory environment here does not specify in detail requirements for hygienic design yet, except if they are absolutely needed for export approval. They do, however, state desired outcomes, and it is up to the innovation or expertise of the individual companies to come up with the standards. That can be a good thing or a bad thing, depending on the execution. We have a saying in New Zealand. We call it "The number eight wire approach". Number eight wire is the standard fencing wire that has been used in the farming industry for years. Over the years, mainly due to a lack of supply, all sorts of on-farm constructions were realized with number eight wire. Applying this term to the food industry, there have been many unique engineering solutions developed, some of which are hugely innovative from a process standpoint, but troublesome from a hygienic design standpoint, so that is something

we have to address. We have to overcome, to some extent, the prevailing industry attitude that we can do it ourselves, and we don't need help in the process.'

What feedback do you get from companies in New Zealand? What about the certification offerings in your region?

'Companies that are not members of EHEDG, and that have equipment to promote or to export

Despite the COVID-19 restrictions, EHEDG Regional Section New Zealand managed to be present at a physical event this year. How did that go?

'The New Zealand Institute of Food Science Technology organized a conference in June, and a representative of a company that supplies instrumentation and sensors to the food industry approached me. In 2019, he had attended one of our EHEDG Advanced Hygienic Design training

David Lowry (Microbiology, Food Safety, Hygiene and Sanitation Consultant):

'We are used to tackling challenges ourselves here, but we also need the support that EHEDG offers.'

internationally often ask us about how they can get their products certified. In this part of the world, obtaining an EHEDG Certificate can still be quite a challenge, because the closest testing laboratories are currently in Taiwan and Japan. Many companies also don't yet realize what certification exactly means, and what is involved. We would like to be able to assist companies more actively in obtaining a certification and enable suppliers in this part of the world to market their products on a global scale.'

What is the current scope of equipment suppliers in New Zealand?

'Most equipment manufacturers in New Zealand and Australia are mainly focused on the dairy, meat, and poultry industries, and on some produce plants. The core processing machinery components frequently come from international suppliers, so the equipment often is not built or designed locally. However, integration systems, such as conveyors, pipework, and tanks, are almost always provided regionally here in New Zealand. There is some very innovative and successful engineering development and manufacturing here, but many companies focus only on the integration systems between transformation pieces of equipment, e.g. pasteurizers and homogenizers in the dairy industry.'

courses, and he asked us if I would be prepared to share a stand with them. I was delighted to do so. It shows that the initial contacts with EHEDG are often established after meeting each other in training sessions, so we will continue to focus on providing more and more EHEDG hygienic design training courses in the coming years.'

You even deployed a dedicated training and education program for New Zealand. How is that coming along?

'I feel that we really have some momentum going on here now. Recently, EHEDG Authorized Trainer Andy Timperley provided a trainer certification assessment for Shane Mason and myself, delivering the 3-day Advanced Hygienic Design Course flagship training from the UK via an online video-connection. It must have been very tiring for him to do that over the course of three days in a row from behind his computer screen, but he delivered and did a sterling job. Shane and I have recently received our notification that we are now EHEDG Authorized Trainers as well, which will help us to continue promoting EHEDG and the benefits of hygienic design in New Zealand.'

Organisational Fact Sheet | 2021



EHEDG VISION

To be recognized as the leading source of hygienic engineering expertise and its application, focused on solutions for enhancing food safety and quality across the food industry

Individuals
368

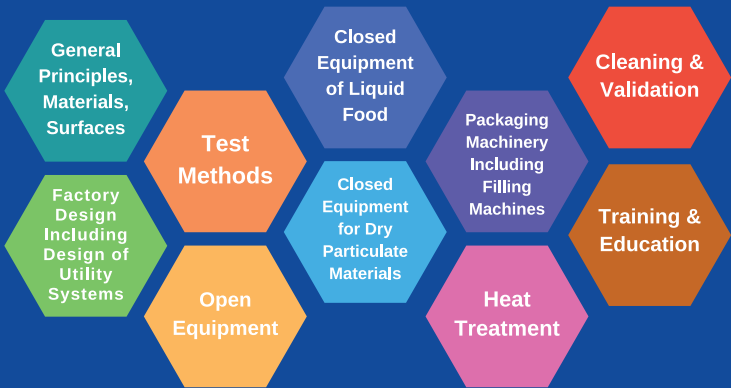
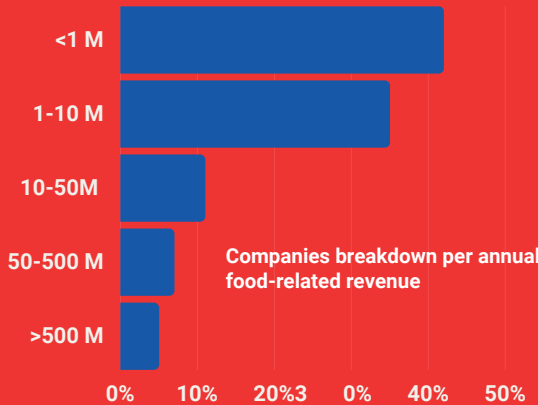


Companies
564

Institutes
67



EHEDG MEMBERS

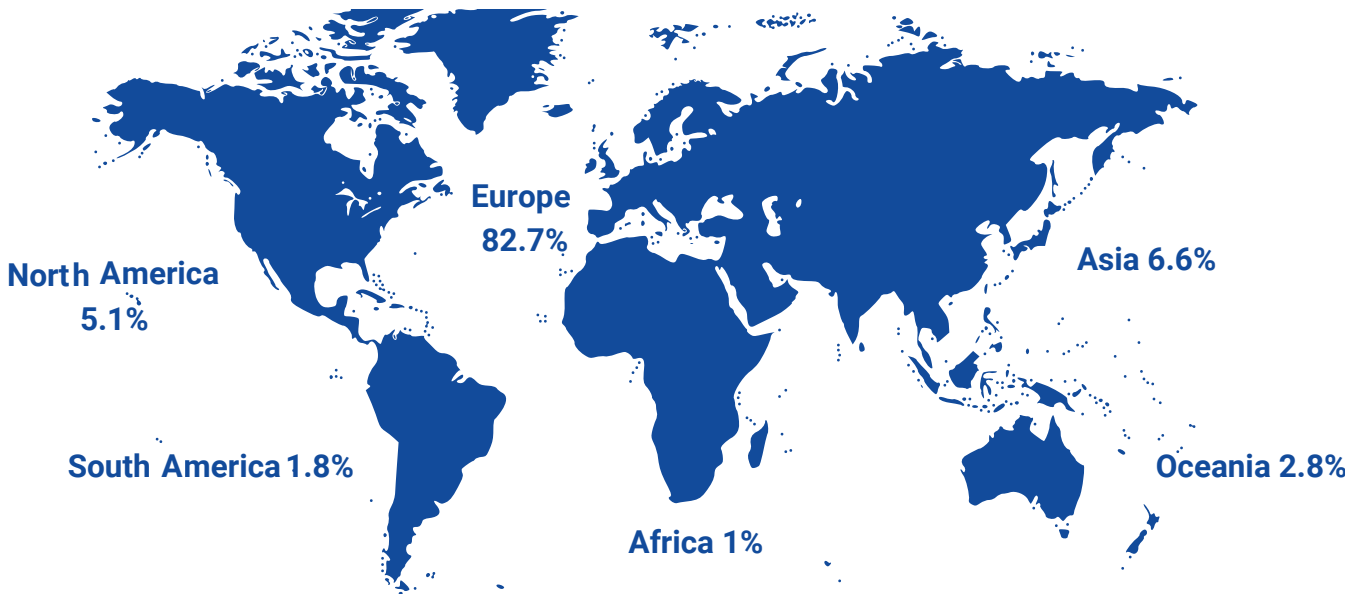


PRODUCT PORTFOLIO

- 10 Focus Areas
- 29 Working Groups
- 50+ Guidelines
- 50+ Authorised Trainers

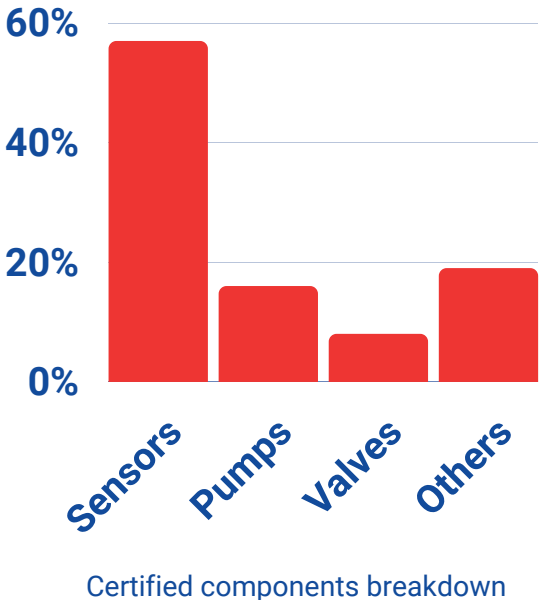


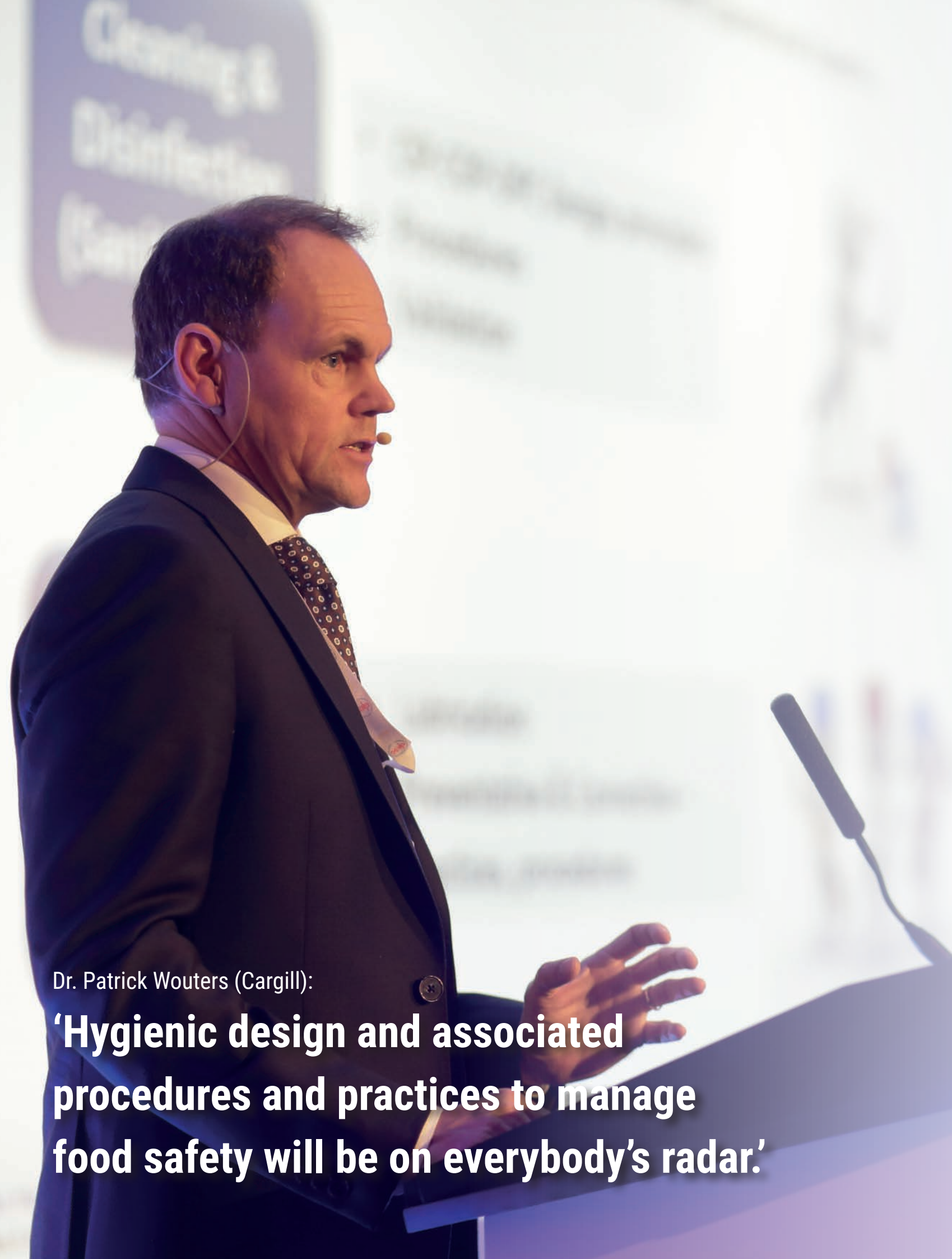
GEOGRAPHICAL PRESENCE



CERTIFICATION PROGRAMME

- 400 Certified equipment components
- 12 Authorised Evaluation Officers
- 8 Authorised Testing Laboratories





Dr. Patrick Wouters (Cargill):

‘Hygienic design and associated procedures and practices to manage food safety will be on everybody’s radar.’

Hygienic Design Benchmarking Requirements

Breakthrough for hygienic design or still a long way to go?

When the Global Food Safety Initiative (GFSI) published its Hygienic Design Benchmarking Requirements, it was the first time that GFSI related its food safety management requirements directly to hygienic design. What does this mean for food processing companies, food processing equipment manufacturers, and other providers? EHEDG Vice President Dr. Patrick Wouters, who is the Global Hygienic Design Lead at Cargill, provides insights into the relevance of that publication, and updates us on the ongoing EHEDG activities to develop a support structure for the industry.

What is benchmarking, and why are GFSI benchmarking requirements relevant to us?

Dr. Patrick Wouters: ‘Benchmarking means that the GFSI established requirements that so-called certification program owners (CPOs) need to - or may have to - include in their auditing standards. I say ‘may’ because the new benchmarking requirements JI and JII are voluntary requirements, so it is up to the CPOs to adopt or not to adopt them.’

These hygienic design benchmarking requirements of the GFSI are published in two documents and are referred to as JI and JII. Why this distinction?

‘The JI document is written for equipment suppliers or building contractors in food manufacturing. The JII document was written for food producers. These requirements are organised in a similar fashion as the other benchmarking requirements for the different scopes of the end-to-end supply chain, which means that the benchmarking requirements

contain three sections. The first section is about HACCP requirements and the related hygienic design requirements. The second section is about food safety management and system requirements. Finally, the third section is about good manufacturing practice requirements.’

How is EHEDG involved and what does it mean for equipment and building design providers and food producers?

‘EHEDG has been indirectly contributing, through its members, to establish these benchmarking requirements. As for food producers: at Cargill for example, we are interested to show our compliance to these requirements and we are especially eager to see that certain equipment manufacturers or building contractors can be audited in the future. This will determine how they will be able to integrate the hygienic design benchmarking requirements within their current systems. Seeing how they apply hygienic design will be a way for us to develop more trust in their organisations. It is important to realise that the whole scope of the benchmarking requirements spans the complete food supply chain, from farm to fork, so what we really want to emphasise is that the level of hygienic design depends on the hazards that must be managed. It is important to understand that hygienic design requirements can differ throughout the process from farm to fork, depending on one’s position in the supply chain.’

Food processing companies will basically need to ascertain to which extent they comply with these new requirements; they will have to do some sort of risk assessment.

Does EHEDG have a plan to offer its members support in these matters?

'EHEDG has started to write a new guideline document on how to effectively perform a hygienic design risk assessment, and to provide guidance on how to do this for food production processes. Coming to an agreement on how to do this will be beneficial to the whole industry. EHEDG is in the perfect position to provide that knowledge, based on our experience in hygienic design. It is in full accordance with our vision and mission, so this is what we stand for.'

Once these GFSI benchmarking requirements are adopted by CPOs around the world and by the global food industry, we are talking about a global movement. EHEDG is a global community, but do you plan to operate alone, or are you collaborating with other organisations that deal with hygienic design?

'As part of this effort, we are also working in close collaboration with other organisations that are active in hygienic design and standards development, like the US based organisation 3-A SSI. Together with 3-A SSI, we are currently aligning our efforts regarding this initiative. So, it is not EHEDG alone that is active in the development of knowledge to provide a good understanding on how to comply with these hygienic design benchmarking requirements.'

What does this mean for the adoption of hygienic design in the future?

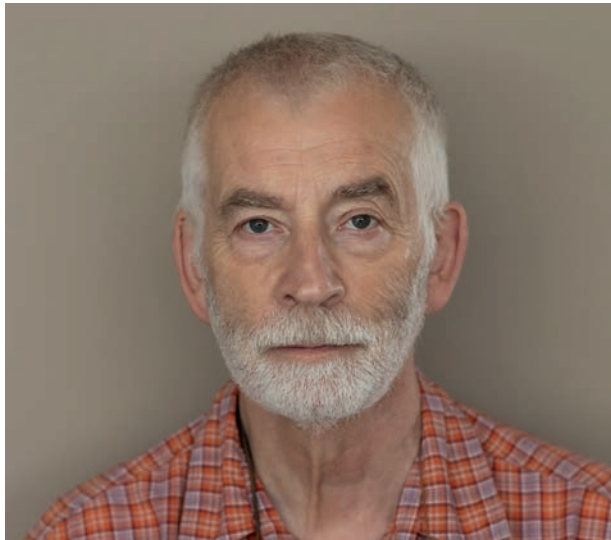
'The value and benefits of hygienic design will be even better acknowledged when we develop and learn how to define the appropriate hygienic design to manage food safety effectively within each step in the food supply chain. Hygienic design and associated procedures and practices to manage food safety will be on everybody's radar.'

Dr. Patrick Wouters [Global Hygienic Design Leader at Cargill & EHEDG Vice-President]:

'EHEDG has contributed, through its members, to establish these benchmarking requirements'



Dr. Peter Overbosch: GFSI Hygienic Design Benchmarking Requirements in place: what's next?



The new GFSI Hygienic Design Benchmarking Requirements documents JI and JII could provide a significant boost for hygienic design, on a global scale. To support the Certification Process Owners (CPOs), Auditors, and Industry with implementing and complying to the new GFSI Hygienic Design Benchmarking Requirements, EHEDG established the Hygienic Design Benchmarking Support Group (HDBS). EHEDG Connects Magazine visited one of the initiators of this group to learn more about the past, the present and the future of this initiative.

After a long international career in Quality Assurance for companies including Unilever, Kraft Foods, and Metro AG, Dr. Peter Overbosch now contributes to the EHEDG Hygienic Design Benchmarking Support Group.

You are one of the first EHEDG HDBS members. Please tell us a little more about the start and development of this group.

Peter Overbosch: 'Promoting the understanding and implementation of hygienic design (HD) is at the heart of EHEDG's mission, and we felt that integration of HD into the GFSI portfolio of benchmarking requirements might be the best way to bring HD to the center of attention in the Foods world. 'A GFSI certification is often seen as a license

to do business in the food industry. However, those recognized GFSI standards do not currently include an explicit hygienic design component and that is a gap that EHEDG intends to fill with this initiative.' We started our discussions and planning in 2016 and saw the HD-related GFSI benchmarking requirements JI (for builders and equipment manufacturers) and JII (for food producers) published in 2020. That is very important to us, but we are not finished yet.

What is the main goal of this EHEDG Hygienic Design Benchmarking Support Group?

Ultimately we want to see equipment manufacturers and builders seeking certification in accordance with JI – and their customers asking for it. For food manufacturers, we hope and expect to see the requirements of JII integrated in existing CPO standards. In that way, HD is an integral part of the whole food production chain, understood, implemented, and expected everywhere. The EHEDG HDBS Group works to support that development every step of the way. At this moment we are developing a guideline that will explain the GFSI benchmarking requirements in more detail, and a separate guideline for HD risk assessment. As HD is still relatively new to many stakeholders, we feel that providing more explanation and background information will help lower the barrier to implementation.

Who are the primary target groups of these new GFSI benchmarking requirements, and which industry stakeholders should start looking into these GFSI hygienic design benchmarking requirements right away?

'The benchmarking requirements as issued by GFSI are high level documents and their target audience is the Certification Process Owners (CPOs), for them to base certifiable standards upon. It all depends on whether and when the CPO's will adopt the new GFSI requirements. They are the first and foremost stakeholders who should look into these documents, and then decide how

they are going to implement the new requirements in their certification processes.'

How should food processing companies and food equipment companies approach and understand these new GFSI benchmarking requirements?

'You could see this as a kind of pyramid. At the top, there are the GFSI benchmarking requirements and below that are the CPO standards. Those are the standards that people can base their certificates on, like FSSC 22000, BSC, or IFS, and a number of others. Then, of course, there are the actual end users. The end users are in this case not only the food processing companies, but also the equipment manufacturers. Benchmarking requirement JI is for the equipment manufacturers and JII is for food manufacturers. There is a lot of interest in getting these certificates implemented, in creating the opportunity to be certified, but then

there need to be CPO standards first, which will only be developed if there is enough interest from the end users. And the end users will probably only express interest and start moving once there are CPO standards.'

What is needed to get this flywheel in motion?

'We are having ongoing discussions with the CPOs and the people who work with them. Simultaneously, we are also communicating with food industry representatives to get this flywheel in motion. EHEDG will definitely support that process through the development of new guidelines. I am confident this will significantly contribute to the further advancement of hygienic design.'

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Dr. John Holah, Principal Corporate Scientist, Kersia Group

New GFSI Benchmarking Requirements Documents JI & JII:

What they mean, where they lead us, and how to prepare for them

The new hygienic design benchmarking requirements of the Global Food Safety Initiative (GFSI) set the food safety benchmarks for food manufacturers, retailers, and food processing equipment suppliers across the farm to fork food supply chain. What do these new documents entail? Will they become a major driving force for the further adoption of hygienic design by the global food and food equipment industry. How will that process unfold, and how long will it take? Dr. John Holah, member of the GFSI Technical Working Group that developed Documents JI and JII, explains.

What do these new documents entail?

Dr. John Holah: 'Two specific scopes were created: JI and JII. JI is entirely new. It is a scope for the hygienic design of food buildings and processing equipment constructors, and really that's the first new scope that has appeared since the scope for packaging manufacturers. In the early days of GFSI, everything was primarily focused on food manufacturing. Then packaging came along. JI now offers the opportunity for equipment manufacturers and food building designers to also become accredited according to a GFSI scope. Part II updates what is already present in existing certification program owners (CPOs) standards. They're both voluntary, so that, as yet, they are not compulsory. The CPOs are not obliged to add them to their schemes at the moment, primarily because the documents are relatively new, and they would require some time to be put in place.'

How will that process unfold? And how long will it take?

'GFSI benchmarking requirements are adopted by CPOs and built into their own CPO standards, such as the BRC or the IFS, etc.. Audit bodies then audit food manufacturers, feed manufacturers, retailers, etc. against those CPO standards. Now, traditionally, hygienic design has always been very poorly represented in standards. The standards should require that equipment is suitably designed for the intended purpose, and should be used and stored so as to minimise food safety risks. GFSI has always looked at the intended purpose for a piece of equipment.'

What about BRC and IFS?

'When we look at CPOs, like BRC, we see that they've interpreted this intended purpose based on these two clauses. Given the importance of hygienic design, and how a lack of it has proven to be a crucial omission in many of the global food contamination cases, the situation that food manufacturers are only audited against two tiny clauses is peculiar. The GFSI recognised this, and set out to form a technical working group (TWG) that was asked to look at hygienic design requirements across the board, from farm to fork. EHEDG members were very well represented in this group. The TWG was tasked to think about hygienic design assessment and to come up with a set of new benchmarks, which it did in 2020. It resulted in two new hygienic design benchmarking requirement documents, JI and JII. They are standalone benchmarks, so hygienic design is a standalone benchmark now. It is not currently incorporated into the farming and the food processing ones.'



What new thinking did the GFSI Technical Working Group bring to the table?

‘It’s a frame of mind that introduces what we call a hygienic cycle, which starts off with the intended use. So if you’re creating a piece of equipment or a building, you first have to describe what the intended use of that building or equipment is. You then undertake a risk assessment of the hazards within that equipment or that building pertinent to its intended use. Wherever possible, you then mitigate the risks of those hazards using hygienic design. There may be some additional hazards that require mitigation in the factory, but the basic rule is that you do whatever you can do to mitigate as many hazard risks as possible. You then construct your equipment or your building without adding any additional hazards.’

What about the stages that follow on the above?

‘We then move into the responsibilities of the food processor, who mitigate any hazards that are still remaining after the design and construction stages, usually via cleaning and maintenance programmes. We undertake a legacy risk assessment, maybe annually or once every five years, depending on the level and rate at which a factory is being transformed, to see whether the equipment or building is still applicable for its intended use. Now this comes with its own implications. This is genuinely new and needs some thought and perhaps some guidance. Hygienic design risk assessments for food safety hazards of new facilities and equipment is a requirement. That in itself brings up an important point to consider. One is hygienic risk. This hygienic design risk assessment approach is applicable from farm to fork, so we have to apply it to farm equipment at one end, as much as to an aseptic filling machine at the other end of the chain. It’s not only intended for equipment or buildings in high hygienic use environments, it is intended to be used across the entire food supply chain.’

Are you saying that stakeholders will have to collaborate more prominently?

‘Yes. Food and beverage, as well as feed manufacturers will be asked to assess their current facilities and equipment, which is new. This demands for a multi-disciplinary team approach, in which all stakeholders in the use of that equipment

and building have their say on the hygienic design. Clearly, training will be paramount to put all of that into place, and ultimately, we hope that new audit standards for building and equipment constructors will emerge.’

What are the implications for EHEDG?

‘Sometimes EHEDG is accused of being rather black and white in its approach, since traditionally we may have perceived particular equipment as either hygienic or unhygienic. EHEDG now recognises the differences in requirements for dry or wet cleaned equipment, for equipment that needs to be dismantled or not, and so on. Another gap is that EHEDG has not addressed hygienic design from a farm to fork perspective yet. We’ve mainly focused on the manufacturing end, and haven’t really looked elsewhere for the guidance that we’ve developed. So maybe we don’t need to think in black and white, but rather in shades of gray, and start thinking along the lines of basic hygiene, low hygiene, medium hygiene, and high hygiene, based on the ‘fit for purpose’ approach. I believe that we should start moving away from the traditional black and white approach and start thinking more in terms of fitness for specific purposes of hygienic design.’

Can you explain the meaning of ‘intended use’ in more detail?

‘There’s guidance out there, particularly through European and ISO standards, but the fundamental principles are that we must understand what is the intended use of each building and every piece of equipment. What raw materials will it process and what are their characteristics - what is the final product? Is it to be cooked? Is it ready to eat? Is it an ingredient? Will it require wet or dry cleaning? Who’s going to consume it? Is it made for the general public or for specific groups of people, like babies or the elderly, or the immunocompromised who might have to face additional hazards? How are we going to zone and segregate in both the internal and external parts of machines or buildings? Where are we going to position these pieces of equipment, and what requirements apply for dismantling and maintenance? So, this requires a lot of information up front before we can undertake a risk assessment to understand the hazards for that particular intended use, and how we would then mitigate them.’

How should the stakeholders communicate about hygienic design in that process?

‘We have the GFSI language, the EHEDG language, the 3A language, and on top of that we have jargon seeping in from European and international standards. Our first task is to compare and contrast risk assessment techniques like HACCP and FMA. How do we then talk to each other in this type of format? Then we have to support experts with different specialties and backgrounds. Engineers and production workers, quality assessment people and microbiologists - they all use slightly different languages.’

What stakeholders should EHEDG aim to offer support to first?

‘There are three main players: the building and equipment constructors, the building and equipment users, and the GFSI auditors. All of them are essentially auditing hygienic design. I think we should focus on establishing multi-disciplinary teams that include not only food safety experts and engineers. There needs to be a good balance between architects, civil, mechanical,

and chemical engineers, food safety and quality management, and sanitation professionals. One of the most effective steps to optimize your processes is to ensure that all stakeholders’ opinions on hygienic design are being heard. It’s not difficult to understand that the input of the sanitation crew can help others to ensure that equipment and buildings are effectively cleanable.’

What can EHEDG do to offer support?

‘Those multidisciplinary teams can only be successful if they operate on a shared basic knowledge base. Everyone in the team needs to understand the hygienic design principles, the process, the current user and legal requirements for equipment and buildings, and the industry standards. We also need the basis of understanding of HACCP analysis and risk assessment approach. Maybe we can ask ourselves this question within the EHEDG: do we reach that full audience? Do we appeal to all of those stakeholders? If not, how are we going to appeal to them, and how do we plan to educate all those different stakeholders? EHEDG has a lot to offer here. We only need to find effective ways to adapt the EHEDG Certification, EHEDG

Guideline Development, and EHEDG Training and Education offerings to the evolving circumstances.'

What about the hygienic design risk assessment itself?

'We recognise that we're looking at it for each hazard individually, and that there are a number of risk assessment concepts out there, like the very basic HACCP approach that looks at the likelihood and severity of hazards. We also need to think of the dynamics of the hazards during the use of the building or equipment including ingress, accumulation, and growth. The outcome of the risk assessment must then be turned into a language that is understandable by both building and equipment manufacturers and users, for the purpose of e.g. user purchase specifications or equipment manufacturers sales benefits. To an extent, we already have this for buildings, where the risk assessment outcome results in the need for basic, medium, or high hygiene manufacturing zones. We may be able to devise something similar for equipment, describing it to be manufactured in relation to basic, medium, or high hazard risk mitigation.'

Are there any documents out there that can help you to develop an effective EHEDG Hygienic Design Risk Assessment Guideline?

'Other risk assessments do exist, like the requirements in EN 1672-2 and ISO 14159, and these are now getting quite sophisticated. Their main concern though is that they are absolutely limited to equipment manufacturers and specific machines. So you define the machine and then you undertake this risk assessment. It will look at hazards; it will ask the question how you mitigated them through design; it will ask the question if you have, by mitigating through the design, created another hazard either to hygienic concepts or to operative safety; and it will also identify any residual hazards that need to be controlled by the machine user. But there's nothing like this for buildings and for legacy equipment. So we really are starting from new grounds here. The group has been looking at putting together some decision trees and again, trying to come up with a concept of a three-stage approach, based on a concept of three position outputs: low, medium, and high.'



Where are we going with the hygienic design research risk outputs?

'We've got the different risk analysis; and we've got the interested stakeholder parties. So let's take existing plant legacy equipment. That's going to be undertaken by food manufacturers, who are going to consider whether there's a need for immediate action. Does it need mitigation? Does it need improvement? However, equipment manufacturers should also be thinking about this. They need to think about their own equipment, and review the performance of their equipment over time. They should start talking to their customers about this, and maybe even become proactive, for example by looking at the availability of hygienic upgrades so that the food manufacturer can purchase those systems.'

What is your own conclusion on where the industry stands now, and on what's needed?

'This group has addressed some important questions: how do we undertake hygienic design risk assessments? What languages do we use? How do we mitigate that through hygienic design? If we advance onto the next stages, the hygienic construction of equipment or of buildings or installation of equipment and buildings, then we first have to acknowledge that EHEDG currently offers no guidance, so there is an opportunity to develop new guidance in those areas. EHEDG is pretty strong in cleaning mitigation.

We've just published Guideline Documents 45 and 52 on cleaning and validation, and there are the new CIP documents as well. However, we currently don't offer any guidance in the area of hygienic maintenance, so again there is an opportunity to bring together some of our experts and work on that together.'

So that's what's needed. And what can EHEDG members expect to get?

'Legacy risk assessment is taken on board with what we're doing. We're trying to come up with some tools that might help equipment manufacturers, building constructors, food manufacturers, etc., by walking them through this hygienic design risk assessment process, but it is a new concept and it is complex. The languages are particularly difficult, but we still strive to put something together in the coming months. We understand that there are questions and concerns within the industry,

questions like: 'will we have to develop a legacy risk assessment procedure as soon as possible? Do we need to replace all our equipment? Why do we need more audits, and why do they need to become more complicated?', but I believe that we've got to overcome those initial reactions, allay the fears of users, and acknowledge that it's time for a fundamental change. Hygienic design is now being recognized as a real means to control hazards and prevent food poisoning and other food safety issues. So we need to make ourselves heard; we need to convince CPOs to adopt JI and JII. We need to proclaim that the GFSI JI and JII are great opportunities to push hygienic design into the farm to fork food chain. As a secondary aspect, there's plenty of scope for EHEDG to develop additional guidance that will help us to interpret these JI and JII standards.'



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New EHEDG test method for external cleanability of food processing equipment

Max Hesse studied mechanical engineering with a specialisation in processing and packaging machinery and cleaning technologies. At Fraunhofer IVV in Dresden, he works as the Group Leader for Machinery and Process Development. Fraunhofer IVV conducts research in the areas of hygienic processing, adaptive cleaning, industrial cleaning technologies and hygienic design. Fraunhofer works closely together with EHEDG. The deputy director of the Fraunhofer IVV's Division Processing Technology, Dr. Marc Mauermann, chairs the EHEDG Working Group Training and Education.



The EHEDG Working Group Certification developed a new test method to determine the external cleanability of (open) food processing equipment. With this test method, EHEDG, in collaboration with the Fraunhofer Institute IVV in Dresden, delivers on requests by its members to take a first step towards the certification of open food processing equipment. Max Hesse, Group Leader Machinery and Process Development at Fraunhofer IVV, explains how this test method was developed.

Why the need for a new EHEDG testing method?

Max Hesse: 'When looking at the testing options available to EHEDG, we primarily refer to EHEDG Guideline Document 2, which addresses the in-place cleanability of closed process equipment, like pumps and pipes and valves and so on. This document relates to several other EHEDG Guideline Documents, like Document 8 and 13 and others. So, we have one actual test method, as well as guidelines that offer guidance to machinery component developers. External cleaning of surfaces, like for example the outer parts of gearboxes or cable glands, are mentioned in EHEDG Guidelines, but there were no predefined

test methods for that as yet. So we've had guidance on how to construct them, but no actual method to test the effectiveness of products in terms of an easy cleanability.'

Why didn't EHEDG develop such a method much earlier?

'Developing a test method that yields consistent results when testing the external cleanability of components is a very complex matter. There are many aspects involved, like all the fluid dynamics that are going on, and the sheer variety of external surface designs. You really need to test everything to see how all the factors interact with each other, like reflections between features of a certain spray pattern and such. EHEDG has wanted to close this gap for a long time, but we had to make sure that we'd do it in the right way, and we finally did.'

What challenges did you encounter when developing this new method?

'The main challenges were definitely dealing with a very high degree of freedom. Most EHEDG tests consist of three stages: a smudging stage, a cleaning stage, and a cleaning validation stage.

We had to approach these stages in a completely new way, from an external perspective. I don't want to downplay all the work that went into developing EHEDG Guideline Document 2, but if you design a test method for closed systems, the system boundaries actually define themselves just by the shape of the components that are being tested. So, when testing a pump for example, you basically 'just' apply pressure and volume flow to it, and of course you have to figure out the temperature, volume flow, and the type of soiling - but with regard to external cleaning you have to consider so much more, like: what kind of nozzle do I use? What spray angle? How many nozzles do I use? And how should the spray pattern move around the test object? Or do we move the test object through the spray pattern? We eventually managed to overcome all challenges by using an industrial robot to perform a reproducible test method.'

Yes, the robot, an idea originally pitched by former EHEDG President Knuth Lorenzen. What were the functional requirements for the robot?

'We had to create something that we in Germany traditionally refer to as an "Eierlegende Wollmilchsau", which means "a pig that lays eggs and produces wool and milk", so a method that would do everything at the same time. There's just such a wide variety of components out there, from really small ones, like cable glands, to medium sized equipment, like gearboxes, up to components of a considerable size. One can imagine how tricky it is to develop a test method that can examine a fly as correctly as an elephant.'

So, how did Fraunhofer tackle this complexity challenge?

'We started out with a limited scope and array of test objects. Many EHEDG Company Members graciously contributed various test objects. We tried to deliver an initial scope of objects, with certain features that are very commonly used in machinery equipment. We had an array of features at our disposal, hygienic and non-hygienic design, which we could then use to tune the test method in a way that we obtained a suitable distinction between hygienic design and non-hygienic design features. We then started with only the single features and then increased the complexity of the test development in steps to actually use assemblies of single features to larger assembly



groups. In the evaluation phase, which runs in parallel to the accreditation process, and is joined by all the other EHEDG Authorised Testing Laboratories throughout Europe, we now perform final ring trials.'

How can food processing equipment developers benefit from this new test method to improve on their hygienic designs?

'To verify their hygienic design, component manufacturers used to conduct cleaning and/or cleanability tests at the end of their development process. If they failed the test, it often was too late to adapt their designs. They may have already invested in costly tools for mass production. These manufacturers can now use this new test method to figure out which design actually works in an earlier stage of their development and design process. This method can also help companies that have to choose between different design options. They can identify the best design options for optimal cleanability early on in their development and construction process, and then proceed effectively.'

Are EHEDG and Fraunhofer already applying this new test method?

'We now have three industrial robots ready to perform tests on different scales. And we are working closely with all of the other EHEDG Authorised Testing Laboratories in Spain and France to set up their test setups as quickly as possible. By 2022, they will also be able to offer these tests. If you are already eager to test something, just contact us. We'll be happy to help you out right now.'

Find a comprehensive list of all EHEDG Authorised Testing Laboratories here:
www.ehedg.org/testing-certification/authorised-testing-laboratories/

Announcing new EHEDG Guideline Documents

Every year, EHEDG Working Groups finalise and publish new EHEDG Guideline Documents. On the right, please find short summaries of upcoming new guidelines that are currently in the peer-review phase, or that are awaiting the final release approval by EHEDG.

On the following pages, EHEDG Connects Magazine interviews the chairs of EHEDG Working Groups that have recently published new EHEDG Guideline Documents.

EHEDG Connects Magazine invites you to subscribe to the EHEDG newsletter [www.ehedg.org/news-events/newsletter-sign-up/] and to follow the EHEDG company page on LinkedIn [www.linkedin.com/company/ehedg] so you will be notified as soon as a new EHEDG Guideline Document is ready to download from the EHEDG website.

You can also visit the EHEDG website to find an up-to-date overview of all EHEDG Guideline Documents that are freely available to all registered EHEDG members: www.ehedg.org/guidelines

Upcoming new EHEDG Guideline Documents:

EHEDG Guideline Document 48: Design of Elastomeric Seals

Chair: Angelika Ruhm [Freudenberg Process Seals GmbH & Co. KG, Germany]

The Guideline “Design of Elastomeric Seals” addresses hygienic aspects of elastomeric seals in food processing and packaging components. It discusses those attributes of elastomers which are important to seal effectiveness and it shows basic design principles at the interfaces between seals and product contact surfaces. A practical guide to failure analysis and to seal handling completes the document.

EHEDG Guideline Document 51:

Hygienic design aspects for tank and vessel cleaning in the food industry

Chair: Bo Boye Busk Jensen [Alfa Laval Tank Equipment A/S, Denmark]

This guideline provides a basic understanding of the cleaning and hygienic design of tank cleaning devices and the tank they intend to clean. Along with a tool for making the initial selection of tank cleaning device technology, background information is provided on tank cleaning principles, total cost of ownership and tank cleaning devices sizing, installation, working principles, special considerations, and design issues. Finally, also the tank design itself is considered, as this has a great impact on the success of the tank cleaning device.

EHEDG Guideline Document 53:

Hygienic engineering of bulk pack-off systems in process lines for dry particulate materials.

Chair: Gabrie Meesters [TU Delft, The Netherlands]

Bulk pack-off systems are widely used in the food processing industry for the packing of dry particulate materials (dry products) in bags, containers etc. As product handling invariably involves product flow in possible contact with the environment, potential hygiene risks are involved. Therefore, packing procedures must meet hygienic processing standards, and all components in contact with the product have to be of approved hygienic design. This document describes the design and operational features of bulk pack-off systems handling food and food related to dry products.

EHEDG Guideline Document 37

Hygienic Design of Sensors

Led by its Chair Holger Schmidt, the EHEDG Working Group Sensors released EHEDG Guideline Document 37 in July 2021. To assess the real significance of this guideline update and of the sensor technology innovation, EHEDG Connects Magazine kicks off the interview with a bold statement.

Sensor technology will become the most important driving innovation in optimizing food safety. Do you agree?

Holger Schmidt: 'Definitely! There's a trend towards more automation, and the automation is requiring information out of the process. That way the sensors are gaining more importance over the last decades. On the other hand, we need to ensure that when we install something into a process, it can also be easily cleaned and won't compromise the hygiene conditions of a process. Our Working Group wanted to support the automation technology, in a way that the process itself does not suffer, and that users can utilize the equipment in the best possible way.'

How can sensor technology contribute to improved inline food processes?

'Besides reliable quality, sustainability is one of the main points on everybody's agenda, and sustainability needs process control, based on real time processing data. If they are correctly installed, sensors can supply the necessary data for that. The food industry is rapidly adopting new automation technologies, as we also see development of the sensors in the accuracy and improvement of the signal strength. We see steps forward in standard process controls, like temperature, pressure, flow, or level signals being reliably converted into automation data, but as well in the usage of signals that are more sophisticated like pH, oxygen, colour, or turbidity. This offers the user new opportunities for inline quality controls, adjusting the process right in time to ensure that it always stays within the defined parameters.'

The first set of comprehensive guidelines on this topic were published this year. How did this development come about and what can we expect from it?

'This guideline has been in development over the years. We are not only on the forefront of the development within the technology, but also within

the development of guidelines within EHEDG. We had a very strong focus on a customer-centric and user-centric setup of the guideline, so the user can more easily deal with the different technologies in process automation sensors. The document became quite big, 115 pages, and we changed the way of displaying things in the document, from simple pictures of real life sensors to 3D drawings that show the critical or interesting hotspots in sensor design.'

Why is it important to closely work together and to exchange expertise in a working group like yours? Why is that important for the end users of these sensors?

'Development is always aimed at a mix of interests. The end users, e.g. the food producers know exactly what they would like to measure and produce next year. The sensor suppliers know what is on the sleeve, and which new technology developments are emerging. The plant and machine builders know how they would like to optimize their machines, and what signals they would need to improve the machines. A team approach provides the best

results joining all this information. Therefore, the EHEDG Working Group Sensors offers its support not only to the sensor suppliers, but also enables the end users to gain insights in what is coming and to ensure that new developments match their requirements.'

What would you say to anyone who is curious about working in an EHEDG working group? What is enjoyable about joining your EHEDG Working Group Sensors? What can you offer them?

'We offer the opportunity to design new guidelines in a way that EHEDG has not done before. The first part of Guideline 37 is aimed towards the users, and now the second part should come up with the guidelines for the designer and developer, as well as for the engineers within the plant and machine builders. Together with the knowhow of the three groups we will have the opportunity to make a great document that supplies the best usability and that offers practical support to the industry. New members have the opportunity to influence the next generation of hygienic sensors.'







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EHEDG Guideline Document 45

Cleaning Validation

EHEDG Working Group Chair Hui Zhang works as a quality expert in the Unilever Global Quality group. Her focus area is hygienic design, cleaning, and disinfection of process lines in manufacturing. Before she started her job at Unilever, she obtained her master’s degree in molecular plant science at Leiden University. As the chair of the multidisciplinary EHEDG Working Group Cleaning Validation, her main responsibility is to provide leadership and facilitate the process of the guideline development, helping to move the guideline from draft towards completion. She also serves as a first point of contact for people who want to provide feedback, have technical questions or comments about the content of the guideline. The members of this EHEDG Working Group represent different areas of the food industry, from manufacturers of foods and raw food materials to manufacturers of cleaning and

What basic criteria should food processing companies apply to determine the correct degree of cleaning validation?

Hui Zhang: ‘The primary criterion of cleaning validation is visual cleanliness and the presence e.g. absence of odors and films. In addition, acceptance criteria should be set up based on food safety requirements, like pathogens, allergens etc; or based on product quality requirements, like spoilage organisms, colour or other appearance attributes of the finished product. From an operational point view, when people take a sample on the product contact surface after cleaning and disinfection, the acceptance criteria may be expressed as maximum limits for the amount of residual on the surface, for example in mg/cm² for organic matter, or CFU (colony forming units / cm²) for target microorganisms. When taking samples from the rinse medium after cleaning, the criteria may also be expressed as the maximum limits of residual in the ‘rinsing fluid’, for example in µg/mL for organic matter or allergens, or in CFU/ml for microorganisms.’

What are the differences between validation, monitoring and verification, and how do they relate to each other?

‘These three activities are closely related with each other. Cleaning validation is a process of obtaining evidence that the cleaning program is effective and delivers consistent results when predefined cleaning processes are conducted. Typically, it answers the question: does my cleaning procedure work?’

Monitoring is performed during every cleaning procedure. It includes a planned sequence of observations, measurements, records of control parameters, to assess if the cleaning procedure is performing within the specifications. Monitoring activities are typically “real-time” measurements during cleaning.

Verification determines if the control parameters have been implemented as intended. Verification occurs during or after the cleaning procedure through a variety of activities, including observation of monitoring activities and review of records. Typically, it answers the question: did it work?’



What are currently the main challenges regarding cleaning validation?

‘While everyone in the food industry agrees that cleaning validation is critical to guarantee the consumer safety and product quality, there is still a knowledge gap about how to conduct cleaning validation correctly and effectively. Substandard cleaning validation may put the safety of consumers at risk, but on the other hand, taking an extremely conservative approach is also unnecessary, because it is time consuming and creates impractical demands on resources.’

What is the scope of this guideline, what’s new and what is not included?

‘This guideline provides the overall concept, a master plan of cleaning validation. The master plan is a structured approach with step-by-step guidance to complete the cleaning validation. I would particularly like to mention that this guideline provides templates of validation protocols of diverse cleaning technologies, which is a new element in this EHEDG Guideline. We give clear instructions

on how to use the templates and what should be filled in. We expect that users can easily follow the protocol to establish their own validation, monitoring and verification programs. This guideline provides general advice and does not cover specific validation programs for a specific product.’

Is this guideline also valuable for big companies, like Unilever, that have their cleaning validation practices firmly in place?

‘EHEDG is a great platform for companies to exchange knowledge and experiences with each other. All member companies can benefit from the extensive professional network of EHEDG, regardless of their business size. During the development stage of this guideline, we shared our practical experiences with each other. After publication of the guideline, EHEDG will develop a training module for Cleaning Validation and include it in its EHEDG Training and Education program. Through training courses, EHEDG will help companies in the FMCG industry to enhance their capability of cleaning validation.’

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EHEDG Guideline Document 52

Basic Principles of Cleaning and Disinfection in Food Manufacturing

EHEDG Working Group Cleaning and Disinfection, led by chair Dirk Nikoleiski, Regional Manager EMEA at Commercial Food Sanitation L.C.C., developed EHEDG Guideline Document 52, which was published in July 2021.

On a general note: how does cleaning and disinfection relate to hygienic design?

Dirk Nikoleiski: 'It is not always sufficiently understood that cleaning and disinfection performance is strongly linked to hygienic design, while in fact they are two sides of the same coin. When companies are confronted with food quality or contamination issues, they tend to immediately point to cleaning practices, while the core of the problem often turns out to be related to the initial equipment design.'

Cleaning crews are often unjustly blamed for problems that are actually caused by engineers who integrated non-hygienic design components in machines. Whether you have hygienic design in place or not will greatly determine the options you have for cleaning, and vice-versa. When setting up a cleaning protocol to achieve acceptable cleaning results, the required cleaning regime will also determine the design of the equipment.'

How about the general industry knowledge of cleaning and disinfection?

'It's surprising to see that many food processing professionals still don't seem to fully understand the basic principles of cleaning and disinfection. Companies may rely on what they've done for many years, maybe because they haven't encountered many problems, or they simply rely on other people's advice or experience, but often this does not address the actual fundamentals of cleaning and disinfection.'

With this guideline, we want to close this knowledge gap. Over the years EHEDG has published many technical guideline documents, but we didn't

develop a guideline that addresses the basic principles that play a role in effective cleaning and disinfection. We also wanted to place this topic in the context of hygienic design, because it goes hand in hand with cleaning and disinfection.'

How do the contents of this new EHEDG guideline document relate to the cleaning and disinfection requirements of the prerequisite programs that food processing companies have to deal with?

'Actually, cleaning and disinfection are prerequisites as such, so they are always included in all recognized GFSI food safety standards; however, in those standards you'll typically only find 'what' you have to do. Food manufacturers must develop cleaning and disinfection protocols detailing 'how' to do it. This is what our new guideline is for. This guideline doesn't contain recipes for each individual application, but it should help the industry to make the right decisions when setting up cleaning protocols. It helps to build up a sound understanding of the basic principles to comply with prerequisite programs.'

What is the scope of the guideline and who is it for?

'This guideline is of interest for all stakeholders involved in the food industry because it addresses the basic principles. We have tried to explain different methodologies, like the differences between wet and dry cleaning. The guideline also contains some fundamentals on soil and soil characteristics, contaminants, and cleaning programs. We have provided a holistic overview on cleaning and disinfection, and have tried to explain this in a broader scope, without going into too much

detail, as it's all about the basic principles.'

Another EHEDG guideline was published this year on Cleaning and Validation. Last year EHEDG published a guideline on Cleaning-in-Place (CIP). These guidelines all deal with cleaning. How do they relate to each other?

'They all belong to the same EHEDG Cleaning and Disinfection Guideline Cluster, which contains all the basic principles of cleaning validation. EHEDG also plans to publish a new guideline on tank cleaning, which belongs to this cluster as well. Interestingly, the starting point of the EHEDG Guideline Document Basic Principles of Cleaning and Disinfection was the validation guide that EHEDG issued some years ago. At that time we realized that when we're talking about cleaning validation we should also address cleaning and disinfection as such. So, yes, these are complementary documents that relate to each other. Besides the validation of the cleaning performance, the cleaning validation guideline document also includes new aspects like monitoring. It's a very nice and comprehensive package.'

In EHEDG Guideline Document 52, you give a nice overview of the determining factors of effective cleaning and disinfection, along with some illustrations. Can you elaborate?

'We included many illustrations, in order to help the readers to digest the information quickly. We've used some illustrations and publications from other sources, for example the Sinner Circle, which explains in a very easy to understand way the four parameters: chemical impact, mechanical impact, time, and temperature. These four parameters are interacting with each other, and to a certain extent can also compensate for each other.'

For example: when you lower the chemical concentration, you can balance this out by increasing the temperature, time, and mechanical action. This illustration helps you to understand the influence of these parameters on the cleaning efficacy. Other illustrations also include soil characteristics, hygienic design, and environmental impact, which may vary depending on the applied type of cleaning methodology.'



Who contributed to this EHEDG Guideline Document 52?

'All stakeholders were represented. We've received valuable input from suppliers, producers of cleaning chemicals, and various cleaning services and cleaning solutions. Equipment manufacturers, food processors, researchers, and even retailers contributed to this guideline. And that is why I can confidently state that this guideline is not only valuable for food manufacturers. I had the honour to work with a team that was extremely engaged, that contributed actively to our discussions, which were sometimes controversial, but always productive. The result is substantial and we publish it with pride.'



EHEDG Certification & Guideline System Integration

An interview with Alan Friis (Hygienic Design Consultant, Force Technology)

Dr. Alan Friis is a hygienic design specialist at FORCE Technology, as well as an EHEDG Accredited Evaluation Officer (AEO), and a member of the EHEDG Working Group System Integration, which recently published a new update to EHEDG Guideline Document 34. Alan is a mechanical engineer by training, and experienced in the area of food processing. He specialised in heat transfer equipment, and then moved into designing hygienic food processes with a holistic approach, including proper integration of hygienic design in the design process.

What are the biggest hurdles for food processing companies to integrate hygienic design equipment in their process designs?

Friis: 'The importance of hygienic design for consistent food safety and food quality are well understood, so every company that sets up a new, or refurbishes an existing processing line, should make hygienic design its top priority. However, the benefits of investing in hygienic design for optimal productivity and sustainability performances are less well-known. Initial investments are often drawn from a different company budget than the operational costs that emerge after the equipment is installed. The challenge for these companies is to take all financial aspects into account from a total cost of ownership perspective. Investment decision makers should take into account that initially, hygienic design may very well be more expensive to acquire, but is much cheaper to operate and maintain. So, what I'm saying is that investing in hygienic design pays off, because the returns on higher investments are reduced costs during the lifetime of the process.'

Can you be more specific about the actual returns on investments?

'It is still difficult to quantify, but we are developing tools that can offer better insights into the total costs of ownership effects of applying hygienic design. Making total cost of ownership calculations is not easy, and it's especially difficult to say what the worst case scenario would have been without hygienic design. It is similar to quantifying food safety: we cannot say how many people would have become sick if we did not have HACCP and proper food safety in place. Similarly, when you invest in hygienic design, later on you cannot quantify what problems you may have run into if you had not done that. There's a real need for data, not only for scientific research data, but also for real industry results to fully prove the benefits of hygienic design.'

Ultimately, it's up to the investing companies to decide, but how to approach them?

'I think it's not enough only to educate mechanical engineers about hygienic engineering and design as EHEDG defines it, that is: at the highest level like the requirements which qualify for certification. We need to be flexible and adapt to their reality and what is possible for them and their companies. Because when the engineers return to their companies to discuss this with their colleagues, many will just conclude that they don't need that high level of hygienic design. I think we need to have different levels of hygienic design, related to the use of the equipment in the food processing industry, with the top level design for aseptic applications, via several levels down to a basic hygienic design standard for lower risk processes. When we had meetings in the EHEDG Working Group System Integration to develop our

new guideline update, we clearly saw in the review comments that this is a matter of concern for some in the peer review group. It's a complex challenge, and a difficult topic to discuss within EHEDG, but I think that we should not shy away from it. I think we should at least be able to discuss the options that we have.'

Do you think it's better to optimize food safety by focusing on the weakest link in the food processing chain, or is it better to approach it with a holistic view?

'It is a bit of both. I think that if you don't have the holistic approach, you're missing the interfaces to the action plan. If you build up from the bottom, of course, you will do well in hygienic design, but you'll always need to have an iterative process.

critical areas. When it comes to the machines, you can choose for EHEDG certified equipment, or for non-certified but still suitable equipment with components that were made according to the EHEDG Guideline Documents. Those components are in themselves hygienic. We start creating risks however, if we integrate them incorrectly within an installation. So understand the interface and the requirements of the surrounding up and downstream processes. It is very important to keep all that in mind when selecting and integrating a new refurbished part of your process.'

Your testing laboratory helps food equipment producers in Denmark to certify their equipment. What about all the other stakeholders that are involved?

Dr. Alan Friis (Hygienic Design Consultant, FORCE Technology):

'We need adapted levels of hygienic design, based on risk assessment which is related to the actual application of the process'tres'

We have to approach hygienic design like all other design aspects of a food plant: you need to set your specifications. You need to find possible solutions, and then you need to validate whether your specifications have been met or not. It's the same with food safety and food quality. It's an iterative design process. If you forget to include hygienic design as part of your design process, then it can all become quite difficult. Some companies first look for what they consider to be the best machine or installation before they think about making it hygienic. That's the wrong way to approach it, and that can then turn out to become a very hard thing to do.'

There are only so many greenfield projects that offer opportunities to build up a hygienically designed system from the bottom up. What about the brownfield projects that make up the major part of your work?

'When adapting an existing plant, focus on the interfaces first, because with regards to food safety and quality, the interfaces are always the most

'Here in Denmark, many food manufacturers and equipment manufacturers are engaged with hygienic engineering and design, and I think that it's quite the same in the rest of Europe. Everywhere you look, there are a lot of local companies involved, not necessarily only in making the design, but also in building it, both on the equipment and on the food production side. I often notice that people need to be reminded to establish better communication practices between the stakeholders.

It's all a matter of speaking your mind and feeling comfortable to ask questions. Ultimately, the biggest risk for food safety, quality, productivity and sustainability is that everyone is just relying on their counterparts. Good communication between all the stakeholders in a mechanical engineering, system integration or process optimization project is key. No optimization without communication and effective system integration, and that's why our EHEDG Working Group System Integration was working so hard on completing our new guideline publication.'

EHEDG Connects Webinars

Invest an hour and learn something new

In 2021, EHEDG started offering the first online EHEDG Connects Webinars to connect EHEDG hygienic design experts with the food and food equipment industry. The experts provide freely accessible presentations that illustrate the practical benefits of hygienic engineering and design. The webinars are primarily intended to propagate the importance and benefits of hygienic engineering and design, and they are not affiliated with the EHEDG Hygienic Design Courses that are developed by the EHEDG Working Group Training & Education.

The contents of the webinars reflect the expertise, vision and opinions of the webinar presenters. However, all EHEDG Connects Webinar presentations are scrutinized by the EHEDG Working Group Training and Education to make sure that the contents are not in contradiction with the contents of the EHEDG Guideline Documents.

Each EHEDG Connects Webinar includes a 30 minute expert presentation, followed up by a 30 minute question and answer session. Did you miss them? The recordings of these webinars are available at: www.ehedg.org/connects and on the EHEDG LinkedIn Company page: www.linkedin.org/company/ehedg.

Conducted by EHEDG experts, free for all

The first EHEDG Connects Webinars were conducted by food safety and hygienic design experts from various parts of the industry. EHEDG thanks all webinar presenters and attendees for contributing to raising the awareness of the importance of hygienic design for food safety and food quality, and for propagating the benefits of hygienic design for the productivity and sustainability performances of food processing. The following topics were covered:



CIP Time Variation Reduction Project

Expert: A. Subramani

EHEDG Company Member: Hindustan Coca-Cola Beverages



Hygienic design of conveyor belt systems

Expert: Roger Scheffler

EHEDG Company Member: Commercial Food Sanitation (CFS)



Hygienic design of cleaning tools

Expert: Debra Smith

EHEDG Company Member: Vikan



Sustainability and productivity benefits of hygienic design

Expert: Rafael Soro

EHEDG Company Member: AINIA Technology & Innovation Centre

EHEDG Connects Webinar

CIP Time Variation Reduction Project

Mr. A. Subramani (Former Corporate QA Manager Hindustan Coca-Cola Beverages Ltd.)

At the time of this EHEDG Connects Webinar presentation, Mr. Subramani worked as a Quality Assurance Manager at Hindustan Coca-Cola Beverages, driving food safety, quality, and sustainability in 10 manufacturing factories in India, dealing with all the green-field projects, as well as existing expansion projects. In his webinar, he presented the social, environmental, and economic sustainability benefits resulting from a cleaning-in-place (CIP) time variation reduction project by strengthening hygienic design and improving CIP PLC program logics.



Mr. A. Subramani (Former Corporate QA Manager Hindustan Coca-Cola Beverages Ltd.)

‘We optimised our three-step CIP time from about 55 minutes close to 30 minutes, and water consumption from 4500 - 5000 to 1500 - 2000 litre’

What can we learn from your EHEDG Connects Webinar presentation?

Subramani: ‘In this webinar, I shall be speaking about how to achieve effective CIP processes at optimal costs while complying with all the food safety requirements, which we derived from various international standards and EHEDG Guideline Documents.’

What were the quantifiable results of your CIP time variation reduction project?

‘Through the knowledge of hygienic design and adopting the best of best automation practices, we have optimised the three-step CIP time from 55 minutes to 30 minutes, and the water consumption

from 5000 litres to 2000 litres, keeping all the food safety requirements duly complied. This particular project also helped to improve productivity of our juice lines by two to six percent. It has also helped improve the water usage ratio in the factories. After the initial success, this project was replicated in seven bottling plants across India.’

To what extent are the webinar attendees able to replicate the results that you realized?

‘This particular project is replicable in all the dairy, fruit pulp manufacturing, nutrition food manufacturing, as well as beverage plants. There are lessons to be learned from this project regarding the optimised usage of natural resources, as well as the improved system line efficiency.

These learnings shall help food companies that engage in heat treatment and CIP activities.’

What questions did you receive in the webinar Q&A session?

‘Some of the questions that I received inquired about the specific challenges we come across in this project, hand-holding of the project between plant teams and equipment suppliers, and how we are sustaining the project. In one of the plants we have digitized the CIP and pasteurisation related data concerning the consumption of water, CIP Time, and the operational aspects, so there were also some follow up questions on real time monitoring of outcomes and advanced digitisation options.’

Is it correct that your project has won some sustainability awards?

‘Yes. Our project won the first prize of the Aditya Sustainability Award, as well as the Coca-Cola South Asia supply chain award for implementation of CIP Time Variation reduction project. We are thankful for the support of our equipment suppliers like Tetra Pak, GEA, and Krones, and system integrators like ICPRO Solutions, for helping us to drive continuous improvements in cleaning-in-place optimization.’

Find recordings of EHEDG Connects Webinars on www.ehedg.org/connects



EHEDG Connects Webinar:

Hygienic Design: Conveyor Systems

Roger Scheffler (Food Safety Expert, Commercial Food Sanitation)

Roger Scheffler is trained as a mechanical engineer who worked in project engineering in the space of robot systems, with a specialization in linear actuator systems. In the food industry, he worked in different roles in the meat, seafood, bakery, and snack industry, where he developed a deep understanding of conveyor systems.

What are the benefits of hygienic design in relation to conveyor systems and why should we pay attention to this?

Roger Scheffler: 'The benefits of good hygienic design cover a huge area. There are benefits with regard to technical aspects, like reduction of cleaning time or reduction of water usage during cleaning, and hygienic design also results in better cleaning results in terms of micro or allergen cleaning. Something to consider very important is that, once you have invested in hygienic design, you obtain repeating benefits every single time you clean the equipment. So, good hygienic design decisions result in long-lasting benefits.'

What are the biggest food safety challenges of using conveyor belt systems in direct food contact processes?

'I see the biggest challenges in accessibility for cleaning. Food processors always work under time pressure, so the cleaning time needs to be short. The biggest challenges are to clean the whole installation, with all the equipment effectively and efficiently. Sanitation professionals cannot always easily gain access to all parts of the conveyor systems, and if you look at conveyor systems in a meat deboning process, for instance, you will see conveyor systems everywhere, up and down, left and right, with real challenges to gain access to all parts of those systems.'

EHEDG published EHEDG Guideline Document 43 on the hygienic design of belt conveyor systems for the food industry. How does your webinar relate to it?

'One aspect is the design of the conveyor system itself. Hygienic design conveyor systems for example have round profiles instead of square ones, and comply with many more basic hygienic design principles. However, it is equally important to integrate these conveyor systems into food processing lines in a correct way. In daily practice, we often see a lack of overview in this area. You need somebody who really identifies the challenges in the installation phase, to ensure the accessibility of systems that are integrated in a packed hall. There is still a lot of potential improvement to be made there.'

What can we learn from your EHEDG Connects Webinar?

'The webinar first addresses the importance of conveyor systems. Think about conveyor systems as the circulatory body systems. The veins and arteries transport the blood and oxygen through the

organs, and likewise, conveyor systems in the food processing plant connect the processing machines within that environment. Because of the different industries we're working in, and the fact that the levels of hygienic design are always variable, I demonstrate some examples of good hygienic design applications including some variations, because every application is different and there is no universal solution for every one of those conveyor systems.'

You seem to believe in the effectiveness of a holistic approach. What role do the people that work on and clean these conveyor lines play in this?

'People are the foundation for good food processing. And safe food processing is only obtainable with effective sanitation. We need to have professional people in processing and sanitation, so a solid training program that is regularly repeated is fundamental for consistent good food processing.

In this context, it is always needed to stress the importance of working and cleaning food processing installations correctly, to remind people that the food that is running on the conveyors is for us, for our families, our neighbours, and our friends. We have the responsibility to serve the food industry with knowledge, training, and good components, and that's why it is so important to look at that regularly. This webinar provides insights on how to improve belt cleaning effectiveness, and how to gain greater access to systems and conveyor systems, as well as on how to optimize the cleaning of conveyor systems.'

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EHEDG Connects Webinar:

Hygienic Design: Raising the bar

Hygienic design of cleaning tools and utensils - beyond the GFSI Requirements

Debra Smith, Global Hygiene Specialist at EHEDG company member Vikan, talks about the new GFSI benchmark requirements for hygienic design and highlights the existing ones regarding cleaning tools and utensils, an area that she is particularly knowledgeable and passionate about. Earlier, Smith also provided a free EHEDG Connects Webinar on this topic.

Debra is a microbiologist by training, with over 35 years of experience in the food industry. She started her working life in the microbiology laboratory of a poultry factory, after which she joined the Food Safety Division of the UK Government where she worked in contamination control of food. She later became the research manager in the hygiene department of Campden BRI, where she looked into new ways to offer contamination control support to the food industry.

She's been a member of EHEDG for 15 years, and has taken part in many EHEDG activities,

including helping to organise the EHEDG 2018 World Congress in the UK. Debra has also written many papers and guidelines that have hygienic design at the core of food contamination control strategies.

How do you expect the new GFSI requirements to affect your field of work?

Smith: 'Most of the guidance and information that's available so far is focused on the food production equipment, but the new GFSI benchmark seeks to expand this to other equipment and to the facilities in which the food is produced. Consequently, it refers to the buildings, the utilities, and then the equipment that's used to either produce it or to maintain it in a safe way. So, I think they will definitely help to raise awareness but it will take a while for these to be adopted fully by the CPOs like BRCGS and FSSC 22000. That will give the industry time to adapt to the new benchmark requirements and to put them into place.'

Now about your webinar: EHEDG hasn't published a guideline on the hygienic design of cleaning tools yet. Why is that?

'We have known about hygienic design for a long time now, but traditionally, most of the guidance and information on hygienic design has been focused on the food production equipment, but now we understand that there are many other things within the food production environment that can contribute to contamination of the food product. So, it's all about applying the hygienic design principles that we've established to many other things within the food production environment, including cleaning tools and utensils. An EHEDG guideline on this would be very useful, and has already been suggested, so watch this space.'

What was the goal of your webinar, and how did you approach your topic?

'I wanted to start out with an overview of the current legal requirements and the guidance that is available now. I then dug into areas which tend to be missed. You see, we all know about hygienic design and we've applied it for many years in the factories and the food production equipment, but there are so many other sources of contamination in a food factory that we really need to focus on as well. The new GFSI benchmark requirements go a long way to covering many of these, but there are still others that we should also be focusing on.'

How should we focus on the design of cleaning equipment and utensils?

'A number of studies have shown that cleaning tools and utensils can easily become both a source and a vector of contamination. One particular study by Campden BRI, undertaken on behalf of the UK government, examined a number of chilled, ready to eat product factories. After having taken various samples within the food production environment, 47% of the cleaning equipment tested was positive for the pathogen *Listeria monocytogenes*. I get to see a load of food factories, and encounter all kinds of stuff there that I take pictures of, like equipment of poor hygienic design, that's been put together on site, and tools that haven't been maintained or cleaned properly. We've used some of those pictures in the webinar, just to give people a feel for what we encounter, and maybe they recognise something that they see in their own factory too. The first step of solving any problem is to make people aware of its existence.'

What kind of questions do you answer in your webinar?

'Questions like: how do we find hygienically designed tools? What are the things we should look for? How do we look after those tools? How do we clean them? How often do we clean them? Which kind of chemicals should we use for it? You would think it wouldn't be difficult to clean a piece of cleaning equipment, but it really does depend on so many things. We're also looking at materials of construction and compatibility with cleaning chemicals and disinfectants that are used within the industry. It's important to me to show the broad range of products that's out there. Hygienic design is really important, and if you can start by applying its basic principles within your food production environment, not just to the food processing equipment, it will really help you to improve on everything you do.'

Watch the full recording of this EHEDG Connects Webinar on: www.ehedg.org/connects



Debra Smith (Global Hygiene Specialist, Vikan):

'Cleaning tools can easily become both a source and a vector of contamination'





EHEDG Connects Webinar:

Sustainability and productivity benefits of hygienic design

Expert: Rafael Soro Martorell
Hygienic Engineering Lead AINIA

In this article, hygienic engineering expert and EHEDG Sub-Committee Training and Education co-chair Rafael Soro discusses the importance of developing scientific proof for the productivity and sustainability benefits of hygienic design. The scientific research data that he refers to are derived from a comprehensive study, by Spain's leading fish producer Grupo Pescanova, the Spanish association of equipment manufacturers Amec, as well as Calidad Pascual, one of the main dairy producers in Spain, and research and innovation centre AINIA, which is also active as one of Europe's EHEDG Testing Laboratories.

What is the main goal of the food industry?

Rafael Soro: 'When we read contemporary food slogans, we might think that the primary goal of food companies is to offer us not only delicious food, but more so food that fits our lifestyle, food that contributes to a good life, a better, healthier life, food that makes us smile, or that even gives us wings. The slogans convey that this industry wants to make us happier and healthier, but the primary goal of food producers, just as any other industry, is to make a profit. I think it's a good thing to state clearly here that the food companies' main concern is about the profitability of their activities, and that hygienic engineering and design can actually help them to optimize that.'

What factors determine this profitability?

'When addressing profitability, we basically talk about the balance between income and expenses. Income in the food industry is closely related to the brand image and to the consumer perception of these brands, which are related to the quality, taste, nutrition value, safety, and price of the food products.

Lately, this also relates to how consumers perceive a food company's environmental and social ethics. When looking at the expenses, we can distinguish many different costs related to food production, like the costs for raw materials, packaging, equipment and facilities. There's personnel involved, cleaning and disinfection services, and increasing costs related to the environmental impact of the food processing activities.'

So what has hygienic design to do with these variables?

'We all agree that hygienic design is useful to enable the production of safe food, so we already have a direct link with one of the income determining factors. But hygienic design can also help us to save time and thus boost the productivity of food processing environments, because good hygienic design minimizes cleaning and disinfection efforts. Another benefit of hygienic design is that it helps us to lower environmental related costs, and to move forward towards more sustainable production processes. Consequently, we can state that: hygienic design can help the industry to increase its profitability.'

How exactly?

'Let's have a look at the environmental impact of hygiene related activities. It is mandatory that the food that is produced is safe for consumers. This is mandatory by law, but it's also foremost an ongoing commitment of any food industry company to protect its brand image. To achieve this, the industry invests many resources in ensuring food safety. If we then focus on cleaning and disinfection, which is a key activity to ensure food safety in the food and beverage industry, we see the industry using

significant amounts of water. This generates waste water that needs to be treated in water treatment plants, and is often taxed by governments. On top of that, cleaning and disinfection requires time, energy, and the use of cleaning chemicals.'

What volumes are we talking about, compared to other industries?

'Let's first look at water consumption. The European food sector is the largest manufacturing industry in Europe, meaning that almost 15% of the manufacturing sector turnover comes from the food industry and almost 15% of the employment in the EU comes from the food industry, and 12% of the total water consumption is consumed by the food industry. The food industry uses water for different purposes, but the main water consuming operation in most of the sectors is cleaning and disinfection.'

Does this differ between different types of food and beverage products?

'We all have a real opportunity to reduce water consumption, and consequently save costs by scaling up hygienic design. But let me give you some specific data per sector: the dairy industry produces a great variety of products, but their water consumption varies from less than one litre per kilo to up to 12 litres of water per kilo for milk and dairy production. Approximately 25 to 50% of this water is related to cleaning and disinfection of equipment. The water consumption in the fish industry is also variable: from 3 to 30 litres per kilo of product produced, and again, around 10 to 50% of this consumed water is related with equipment sanitation. In fruit juices, around 6 litres per kilo, frozen vegetables from 5 to 10, and meat processing around 3 litres per kilo. So yes, there is a huge amount of water consumed across the board, but within each sector, the actual amounts vary greatly. As you can imagine, the main part of all this water that's used for cleaning purposes ends up as wastewater.'

How difficult is it to clean this wastewater?

'We have many pollutants, depending on the products that we are manufacturing, but most of the total amount of wastewater coming from the food

industry contains heavy loads of organic matter, oils and fats, and, depending on the products, suspended solids, nitrates, chlorides, and so on. As an example, if we are producing market milk, there is an average of 2 litres of wastewater generated per litre of raw milk material processed, notwithstanding the energy consumption and Co2 emissions involved in these hygiene activities.'

How can research on the effects of hygienic design help the industry to do better?

'Hygienic design reduces soil accumulation and improves cleanability. Consequently, it contributes to an environmental impact reduction. Within the EHEDG community, we basically all agree on this, but the problem is that there's still a lack of experimental data that proves these statements, that quantifies this correlation - only a very small number of studies have been conducted in this field. So that's why we launched a research project ourselves, and we submitted it to the EU Life Programme. The project title was 'Demonstration of hygienic eco-design of food processing equipment as Best Available Technique', for which we created a consortium of four companies: Grupo Pescanova, which is one of the main fish industries in Spain, Amec, the association of equipment manufacturers in Spain, Calidad Pascual, one of the main dairy producers in Spain, and our research and innovation centre AINIA.'

How did you approach this study?

'The aim of this project was to demonstrate that hygienic design of equipment and facilities is an economically viable technique to reduce the environmental impact of cleaning and disinfection activities in the food industry, while always maintaining the hygienic standards, since this is a must. So we had to maintain the hygiene levels required per product. We could not alter any cleaning or disinfection protocol, make it shorter or apply less water or chemicals if the hygiene levels would be compromised by that. We worked with two different food sectors, dairy and fish processing, and the first phase of the project was to develop a test method. We wanted to be able to compare the cleanability of hygienically designed equipment and the cleanability of conventionally

designed equipment. The first step was to design a soiling methodology. We designed a soiling agent, a mix of milk and flour and fluorescent dye as an indicator. Then we designed a soiling procedure, and a cleaning procedure. We used different types of equipment, and both open and closed cleaning procedures were studied. We then designed a method for assessing the remaining soil after cleaning. This assessment was a combination of visual assessment aided by the fluorescent dye indicator, and a closer inspection of those areas where soil had remained, plus a quantification of this indicator by spectrophotometry.'

How did you select the types of food processing equipment that you examined?

'We used a fixed set of criteria to select the equipment. One of them was the level of relevancy per sector, another was the resources needed for cleaning such equipment, so we focused on equipment that required greater effort for cleaning. So for example, for the fish industry, we focused on the batter tank mixer, the viscosity measuring and the batter mix pumping system. For the dairy industry, we chose an aseptic tank, a conveyor belt, and tested different cleaning devices for tanks, like a static spray ball versus a rotary spray head. We also worked with some packaging equipment, and in our facilities at AINIA, we tested some small equipment types, like pressure sensors, T-connections, valves, centrifugal pumps, and load cells.'

Can you share some meaningful results with us?

'When we compared the cleanability of the aseptic tank lid, the conventional one versus the hygienically designed proof, we found that there was a saving of 40% in time, and also 40% in water savings. When applying this method to a 7000 litre tank, we first cleaned with a static spray ball and then repeated the cleaning cycle after repeated soiling under exactly the same experimental conditions by using a rotary spray head. It took eight minutes less to clean it, and yielded water savings of 42%.

The equipment for packaging disposal, we assessed it independently inside and outside, and on the inside, the reduction was up to 75%, on the outside it was not that much, it was just a 9% saving. Finally, we tested a conventional conveyor belt. Then this conveyor belt was refurbished by replacing the motors by drum motors, changing the belt, framework and other parts. The original conveyor system needed almost half an hour to be cleaned and after this improvement, it took just 17 minutes, representing a saving of 37%.'

What was your overall conclusion, and how did the EU respond to your findings?

'After testing all these types of equipment, it resulted in an average saving of 38% when cleaning hygienically designed equipment compared to non-hygienic design. We submitted these results

to the European Integrated Pollution Prevention and Control Bureau (IPPC), which took this study as a basis to include hygienic design as a "best available technique". Shortly after that, hygienic design became one of the officially EU-recognized best available techniques (BAT) for the food industry. It was incorporated into the EU document "Best Available Techniques (BAT) Reference Document for the Food, Drink and Milk Industries", which can be seen as an official recognition by the EU that hygienic design can contribute to more sustainable food processes by cutting down on water and chemical usage, waste water and energy. It was a great experience when the EU awarded this project as the Best of the Best LIFE projects 2016-2017', including an award ceremony in Brussels, but for me, the most important value of this research project is that it provided us with

strong arguments that hygienic engineering and design indeed offers real life industry opportunities to reduce the environmental impact of industry activities. Let's just hope that many food industry equipment decision makers may read this and act accordingly.'

For more info, please contact AINIA and/or EHEDG Regional Section Spain.

Watch the full recording of this EHEDG Connects Webinar on: www.ehedg.org/connects

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Hygienic engineering and design in the food and food equipment industry

Practical applications of EHEDG Membership offerings

All over the world, food and food equipment companies apply the expertise and insights that EHEDG Guideline Documents, EHEDG Certification and EHEDG Training and Education services offer to them in their daily industry practices. On the following pages, you can read about and learn from their various hygienic engineering and design projects.

If you want to receive updates on new hygienic engineering and design projects of EHEDG Company Members, please join the EHEDG online community on the EHEDG LinkedIn company page (click on the link and then on the follow button): www.linkedin.com/company/ehedg

Industry story 1

The Winning Assembly in Hygienic Pipe Couplings

- by EHEDG Member Polysoude

Industry story 2

The Engineering solutions for special requirements

- by EHEDG Member Angst + Pfister

Industry story 3

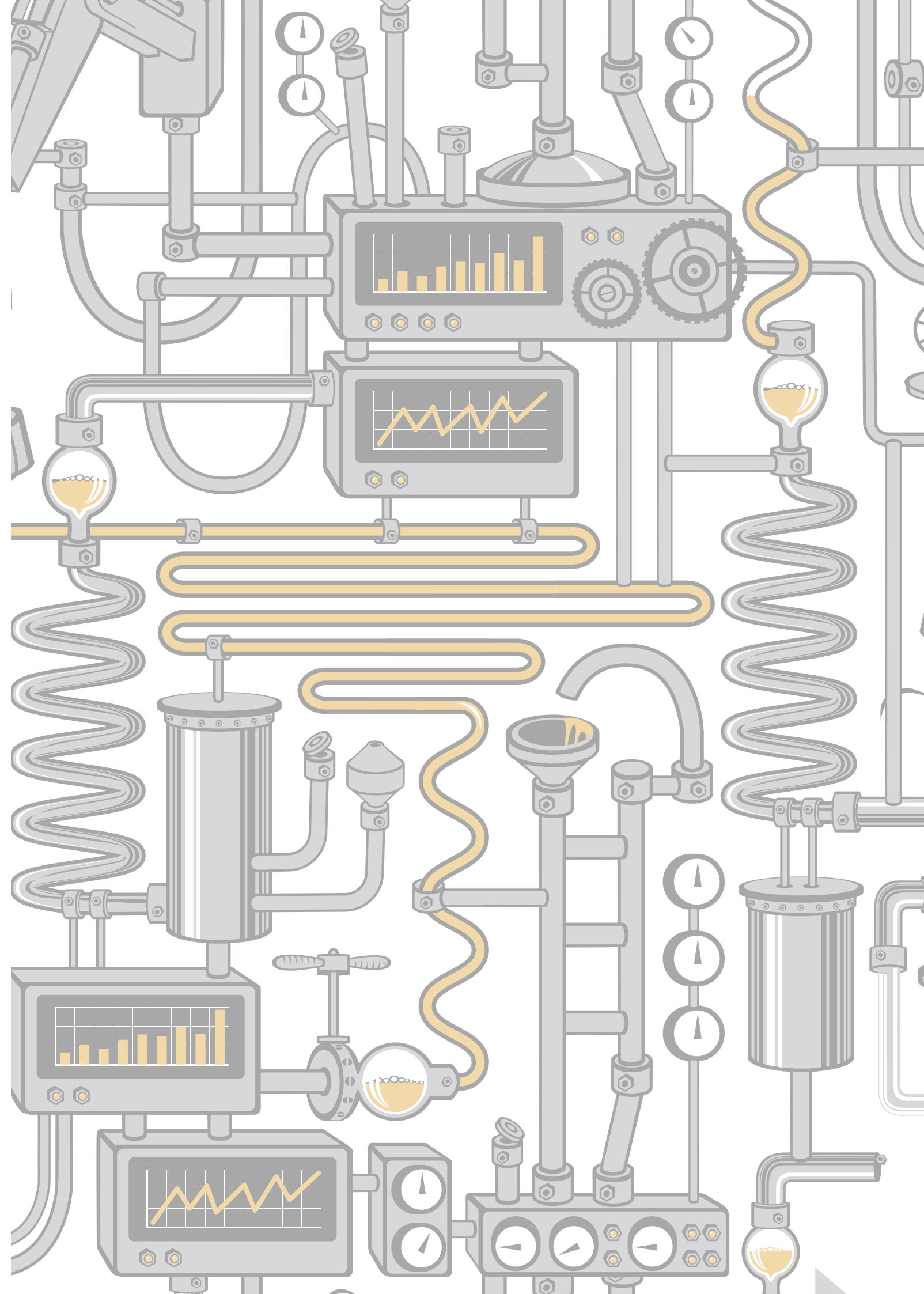
The Hygienic Design Strategy

- by EHEDG Member Bühler

Industry story 4

The practical aspects for investing in drainage systems

- by EHEDG Member ATT





POLYSOUDE

Hygienic welding

Winning assembly in hygienic pipe couplings

EHEDG Guideline Document 8 at work

In food-processing, pharmaceutical and cosmetics industry process environments, piping is used for many purposes, from gas and fluid distribution to cleaning/steaming in place, filtration or heat exchange. All these networks require the execution of numerous manifolds, among which many T-joints. These manifolds are usually manufactured from stainless steel, following the recommendations of EHEDG Guideline Document 8.

STATEMENT EHEDG DOC. 8: "The construction materials must also be corrosion-resistant, non-toxic, mechanically stable, and their surface finish must not be adversely affected under the conditions of intended use".

Another leading guideline is the ASME BPE standard, which advocates the use of 300 series stainless steel, and more specifically 316L. Indeed, for hygienic applications, 316L stainless steel is cleanable, cold-formable and contains 2 to 3% of molybdenum, which significantly increases its resistance to corrosion.

For the execution of branches, there are three principal methods:

- The installation of pipes on holes drilled in the manifold (Fig. 1 and 2)
- The installation of T-joints on lengths of pipe (Fig. 3)
- The forming of the branch connections directly from the run pipe (T-DRILL method) (Fig. 4)

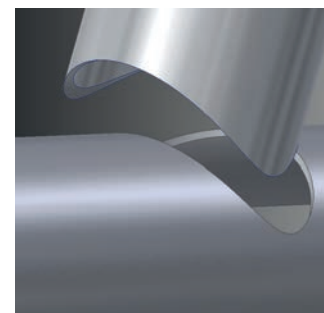


Fig. 1: Drilled holes



Fig. 2: Fish-mouth connection



Fig. 3: Welded T-Joints

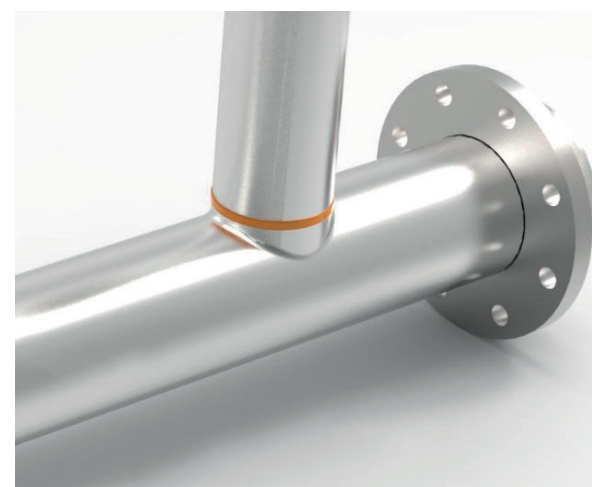


Fig. 4: Extruded collar (Source: T-Drill)



For pipes of a thickness of even up to 12,7 mm, the best and most effective method of manufacture of these manifolds consists of mechanically (T-DRILL) forming the branch connections directly on the run piping. This minimises the need for welding, which also minimises the possible locations of leaks or locations susceptible to trapping contaminants. If an additional polishing of the pipes at the welded points is required, it is more effective with mechanically formed branch connection, since there is minimum amount of butt welded and perfectly perpendicular connections.

In the field of the installation of pipes over hole, there are so-called "fish mouth" connections (Fig. 2). Although the "fish mouth" connection has been the most widely used method for a very long time, it is nowadays the one which presents the greatest risks with regard to hygiene. Indeed, the shape is complex when it comes to welding and, for reasons of productivity, manual welding is widely employed. This method, even with the best manual welder, cannot guarantee a smooth, clean weld bead at the most tortuous areas. Moreover, this shape presents areas where cleaning becomes uncertain.

Where possible, one of the most effective methods consists of elliptical hole milling, mechanically extruding or shaping (collaring) the branch connection and trimming the face of the extruded portion, all without having to move the pipe. After many years, it is accepted that automatic orbital welding is the most recommendable solution for assembly due to the quality of the result, the gains in production, and the fact that it meets all the requirements of High Purity.



Fig. 6: Equipment for mechanical extruding and collaring of tubes

Another common aspect of these industries is that their systems are manufactured from polished austenitic stainless-steel pipe, generally assembled by autogenous butt welding or by fusion. When executed correctly, and when the sulphur content of the elements is very similar, this type of weld produces a highly solid join, with no cracks or porosity which might trap elements susceptible to subsequently contaminating the product. It might be necessary, in the field of Ultra-High Purity, to carry out an electropolish in order to optimise the flow.

To ensure correct assembly, a number of characteristics inherent to the execution of these manifolds with extruded holes must also be taken into consideration. Mechanically forming the

branch connection systematically involves a very slight ovalisation which must always be included in the normalised values of the orbital welding.

Extrusion also involves some reduction in the thickness of the mechanically formed branch outlet; this is perfectly known and under control, depending directly on the ratio between the diameter of the branch and the diameter of the manifold. Knowing that the more similar the run and branch tube diameters are, the more important the thinning of the wall is, a ratio close to 2 is generally used to optimise the result of the assembly.

The height of the collars thus formed is determined by the material used, its elongation and the dimensions/ratio of the run and branch pipes. Typically, the collar height varies between 2 and 20 mm between the small and large pipe dimensions. This height is of course altered by the operation of trimming the face to guarantee an optimal contact surface with the branch pipe. It has been experienced that with the height of the mechanically formed collar it is perfectly possible to carry out the assembly via orbital TIG welding.

Of course, the height of the collars implies that in certain cases the welding head should feature specific equipment. It must have a system which tilts or skews the electrode to position it in the area to be welded, ensuring an effective gas shield in order to prevent any oxidation. According to the type of heads used, the gas shield will be either in a closed space (Fig. 7) or by diffusion (Fig. 8).

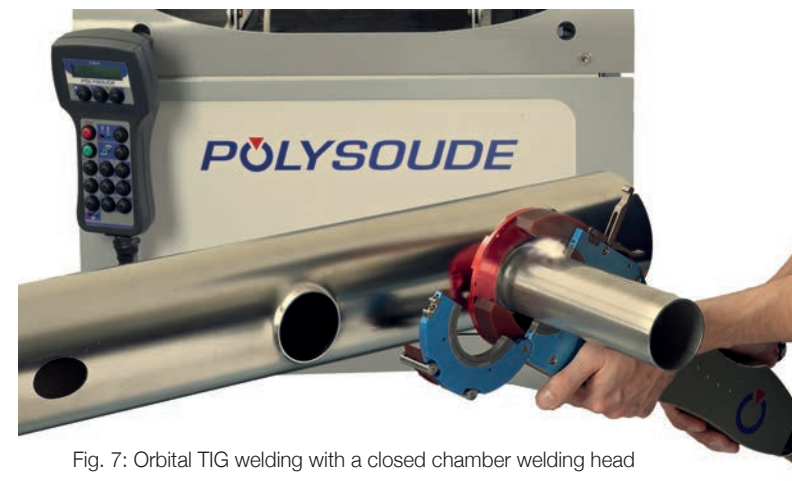
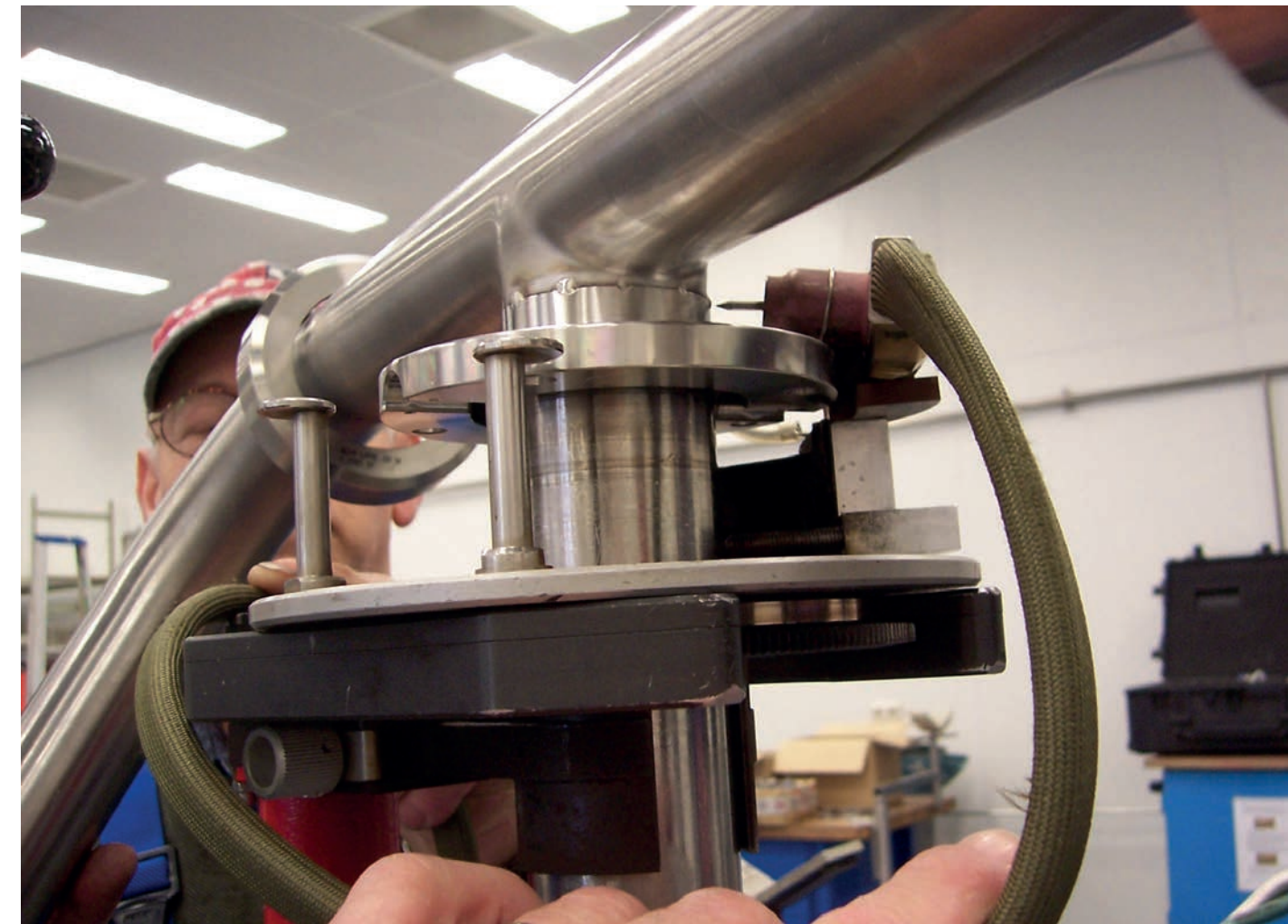


Fig. 7: Orbital TIG welding with a closed chamber welding head

Fig. 8: Orbital TIG welding with an open type welding head with shield gas diffuser



Evidently, an additional precaution, whichever type of head is used, will be to implement a gas system on the other side to prevent any oxidation of the internal weld bead as well. Nowadays, welding generators are equipped with dialogue systems which enable the selection of the best operating method according to various parameters such as the diameters implemented, the materials, etc. Assisted programming favours weld quality. Division into welding areas facilitates mastery of the weld pool in every respect, and more specifically, its position, its thickness and its shape within the joint.

In conclusion, technical breakthroughs and technological innovations in the mastery of welding materials and procedures currently guarantee the quality of products and installations while improving productivity. Mechanically shaping the collars on the manifolds minimises the number of secondary welds and operations, reduces the quantity of T-joints purchased and is perfectly compatible with an orbital TIG-welding equipment, ensuring weld repeatability in complete safety.

Engineering solutions for special requirements

Sometimes the best and most cost-effective solution is not the one initially anticipated. The engineers at Angst+Pfister aim to find design approaches in dialogue with their customers that tackle multiple issues at once – and whenever possible produce a lower price solution. For example, a new silicone cover for Coperion’s vibratory feeders simultaneously resulted in a more efficient cleaning cycle for their customers that minimises potentially serious hygiene risks.



The white silicone cover on the feeder protects the electronics – without interfering with the vibrations conveying the dry bulk.

The German company Coperion operates worldwide and has a manufacturing base in Switzerland. Coperion makes extruders for the plastics and food-processing industries and provides end-to-end material handling solutions. Its subsidiary, Coperion K-Tron, in turn, specialises in process feeding and pneumatic conveying. In addition to the plastics and food-processing industries these systems have applications in pharmaceutical companies. The product range includes vibratory feeders, “These feeders are designed for high-precision dosing of free-flowing dry bulk - for example, for extruders,” explains Coperion engineer Urs Helfenstein.

New solutions found together

Coperion came to Angst+Pfister for a moulding to cover a feeder drive – and already had a clear concept of what the part should look like, and provided a sketch for the part. It had to be silicone and attached on the underside by means of a metal plate to provide a tight seal. The walls of the silicone cover needed to be transparent or at least semi-transparent – and therefore thin. The serial number and construction year plate had to be easy to read through the silicone so that during servicing the cover would not have to be removed and replaced in a time-intensive procedure. In general, the thicker

the silicone the milkier it becomes. In other words, the walls could not exceed about two millimetres in thickness. A further function of the integrated metal plate was to stop the thin protective cover from slipping off, or shaking like jelly, when the dry bulk is moved forwards by means of vibration. The design for the silicone part involved two of Angst+Pfister’s specialities: sealing technology and antivibration technology.

This was a hard nut to crack for Angst+Pfister’s engineers: the complex structure, a length over fifty centimetres, the specification for transparency and the United States Food and Drug Administration special approval requirement. “The thing that really caused us a headache during the feasibility study was the integrated metal plate and the rubber-metal connection,” says Marcello Gisler, Product Application Engineer for Angst+Pfister’s Sealing Technology department. He knew solutions could be found for all the other issues. In fact, it is virtually impossible to find a manufacturer for such a large and complex silicone moulding. It requires massive tools and the right sort of machinery. “But we found what we were looking for in our vast network of first-class contacts,” continues Marcello Gisler. The moulding not only had to be large but also of exceptional quality. Firstly, it could not have any tiny air bubbles

that might diminish transparency. Secondly, the surface had to fulfil strict hygiene specifications. The cover also needed to protect from dirt and spills so the equipment could be cleaned correctly.

“From our point of view, the challenge was to design a vibrating machine with as little damping as possible that prevented a build-up of dirt and could be cleaned easily,” recalls Urs Helfenstein.

Alternatives that pay-off

“Our idea was to lose the metal plate – for reasons of cost and ease of manufacture. Instead, the cover could be fixed to the metal sheet underneath by means of silicone plugs. At the same time we proposed a silicone that is so transparent that the plate underneath could still be read regardless of the thick walls,” says Tugba Bilgic Tune, Engineer Sealing Technology at Angst+Pfister. In turn, the customer carried out a vibration simulation on this design and positioned the silicone plugs – with good results and the metal insert component really could be omitted.

The engineers chose a translucent silicone rubber (VMQ) for this design with a Shore A Hardness of 50. It has FDA approval in accordance with Title 21 CFR (Code of Federal Regulations) 177.266 a) to f) for elastomer articles. This means it is included on a positive list and has passed migration testing. This material with its superior transparency ena-

bled Marcello Gisler and Tugba Bilgic Tune to increase the silicone wall thickness and dispense with the metal plate.

Coperion tested the design first with a prototype produced using the vacuum casting process. The customer gave the go-ahead for the idea – without the metal plate, the cover could be made at a significant cost reduction. “We are very happy with the outcome,” says Urs Helfenstein. The dialogue-based approach produced good, workable solutions.

Design and hygiene regulations

Tugba Bilgic Tune und Marcello Gisler even came up with a convincing solution for the hygiene and cleaning issue in the design. “The cover was pressed onto the feeder under tension so that the internal electronics remained hermetically sealed,” reveals Tugba Bilgic Tune. As a result, a closed system was created. The silicone cover prevents ingress of dirt to the grooves. This keeps cleaning to a minimum. Coperion verified with tests

that no liquids entered the equipment and, as such, that it complies with the strict hygiene design stipulations of the food and pharmaceutical industry. “The cover envelopes the whole drive mechanism without gaps or cracks,” observes Urs Helfenstein. For customers, this means a more efficient cleaning cycle and the hygiene risk, which can have serious consequences, is minimised. “Coperion and Angst+Pfister are both members of EHEDG and have the required expertise for hygiene applications,” says Marcello Gisler. EHEDG is a European trade association that promotes hygiene in the food processing industry.”

Ultimately, Angst+Pfister was able to supply the three-dimensional silicone cover between 30 and 54 centimetres in size. “We are delighted by the good and cost-efficient solution to the challenge we faced.” – concludes Urs Helfenstein.



When new thinking is needed:
Adapt design and material together to meet the highest demands of international markets – and reduce costs in the process.



How Angst+Pfister understands hygiene standards as an opportunity: For Coperion K-Tron’s vibratory weighfeeders, we developed silicone covers that now allow more efficient cleaning cycles, reducing serious hygiene risks. The silicone hermetically and seamlessly encloses the electronics. At the same time, we combined our design and material expertise to significantly reduce the production costs of the cover – without compromising on international approvals. With smart engineering, we not only exceed the highest hygiene standards.



Beatrice Conde-Petit

Edyta Margas

The Hygienic Design Strategy of Bühler:

Holistic approach to achieve an effective hygienic design mindset

Even if you've never heard of Bühler before, chances are that you've used one or more products made with Bühler technology today. Whether it's breakfast cereals, pet food, roasted coffee, beauty products or even batteries, Bühler processing equipment is used by many industries all over the world. One of the reasons for that is the consistent commitment of Bühler to its hygienic design strategy, which adds value to its products with regard to food safety, food quality, productivity and sustainability. EHEDG Connects Magazine interviewed Global Head of Food Safety Edyta Margas, and Food Science Officer Beatrice Conde-Petit.

What is Bühler's strategic approach to hygienic engineering and design?

Edyta Margas: 'We always look at the entire value chain. We set very strong sustainability targets. We aim to halve the energy and water consumption and the waste product volume in our customers' value chains by 2025. We allocate resources for innovation to really make a difference, also given the big challenges that by 2050, this industry needs to be able to feed 10 billion people on this planet. Hygienic engineering and design play a pivotal role in achieving these ambitions. In our food safety strategy, we focus on four main pillars: training and education of our own staff, compliance, and hygienic design of equipment, as well as developing new food safety technologies and services. We are consistently building up knowledge and credibility in this field. For each of these goals we establish key partnerships and collaborations.'

How does food safety relate to sustainability regarding hygienic design at Bühler?

'Food safety is part of our sustainability agenda, which focuses very much on security, minimising losses and waste, and developing solutions to produce affordable and nutritious foods, while always preventing contamination. We are taking the 'one health approach', so it's the health of the planet, health of humans, and health of animals that we consider at all times. If you think of livestock for example, this is part of our animal food chain and if a lot of antibiotics are used upstream in feed processing to feed livestock, then we have an issue with antimicrobial bacteria later for humans. It's also about combating fraud and providing solutions for the integrity and transparency of the value chains.'

Let's focus on food safety: can you first give us a global perspective?

Beatrice Conde-Petit: 'On a global scale, we still have huge food safety challenges to overcome. Worldwide, one in ten people fall ill after eating

contaminated food. That means 600 million people fall ill, resulting in over 400,000 food contamination deaths every year. Bacteria and viruses are still the main organisms responsible for food borne health issues, mainly Salmonella, but also E.coli and other microorganisms like Norovirus, Campylobacter, and Listeria. And then there are chemicals, for instance contaminants, like aflatoxin, a toxin produced by mould found on crops that create serious food borne health burdens across the globe. Fortunately, we now understand food safety hazards much better than 20 years ago, which enables the food industry to better anticipate and take preventive measures, also by improving the hygienic design of the food processing equipment.'

How do changing food consumption patterns affect food safety?

'We snack more frequently in between meals and we eat less at home, and we cook less from scratch. As a result, we are delegating food safety from the household to the caterers, to the food industry that provides this ready-to-eat food. So if something goes wrong, it's not just one family that is hit. On the other hand, we have clear and stricter standards and regulations, and we have social media, so if something goes wrong, everyone will know it quickly, because as we all know, bad news travels fast on social media. So there are a lot of challenges, but it all comes down to understanding and preventing the main hazards.'

What hazards in particular?

Edyta: 'In recent years, we've seen that Salmonella represents one of the major hazards for the dry food industry, because it can survive in dry conditions for years. Salmonella in low water activity environments are more resistant to heat than other bacteria, so we have to design our thermal inactivation processes focusing on this most resistant organism. We also know that a few cells can already cause illnesses, especially if these Salmonella are protected by a fat mass, such as in chocolate. Fortunately, we've seen a paradigm change, from just producing food and testing it at the end to see if it's okay, towards prevention. Anticipating by taking the right measures, with good manufacturing practices, hazard assessment and control concepts, and the hygienic design guidelines that can be applied to prevent food safety incidents are key.'

What practical steps do you take to move forward?

'When we started the journey here at Bühler, we felt the strong need to create awareness, education, and training. Together with Campden BRI, we established the Food Safety Training Academy. Later on, we developed a training focusing strongly on our needs as technology providers, and trained over 64,000 people at Bühler. We also extended this training to customers. We see huge needs for training and education in many parts of the world. So we put together cross-functional teams, not only with food technologists, but also with commercial people, automation staff members, sales, and R&D, to enable them to work together. We took a look at the entire value chain, for example the value chain of rice, we looked at the grain handling up to the rice served on a plate, with all the processing steps in between. It helped us to overcome attitudes like: 'I am just responsible for that part of the value chain where I sell my technology.' People understood that you need to have the full picture to also understand the full impact of your solution, and to decide which machines will be important or less important. It also showed that to ensure safe food, we need to take actions focused on each step of the value chain.'

How do your training efforts contribute to improved food safety at your clients' sites?

Beatrice: 'Let me give you an example. During a microbiology training course for our engineers, we noticed that the topic of cleaning was perceived as 'not significant' by our engineers, while in fact this the most important part of the course. Since we don't operate food processing lines ourselves, we had less experience with what happens while using our product. This resulted in a new directive within Bühler. Engineers who want to design a new machine or redesign an existing machine first have to truly understand cleaning, sometimes even by going out and doing the cleaning themselves.

This has also helped to shape this holistic view of food safety and how to control and prevent hazards. So, when we think of the microorganisms, it's all about preventing the microorganisms entering the factories in the first place. Secondly, the microorganisms that still manage to get in need to be stopped to spread throughout the factory. The next layer of defense is avoiding growth and eventually having a technology for microbial inactivation. We

start with the whole factory layout and building design, which is one element of hygienic design, but also personal hygiene and how to store raw materials. For avoiding the growth of potential microorganisms hygienic design of equipment is key. It avoids niches and circumstances that allow microorganisms to grow. Once people have developed a good understanding of the big “why”, of the relevance of the machine in the whole context of food safety, we then send them into a deep dive, by letting them follow an EHEDG Hygienic Design Training for instance, and by analyzing the EHEDG Guidelines in much more detail.’

How important is hygienic design during inactivation steps?

‘Extremely important, whether it’s in heat treatment or an alternative technology. Hygienic design even plays a role in the control and monitoring functions of critical processes, where installing appropriate sensors is important, diverting out-of-spec product, as well as in the maintenance of the whole infrastructure. You see again and again; hygienic design pops up everywhere within the entire cycle of prevention to reduce the risk of food safety incidents.’

Can you share an example that illustrates your colleagues’ hygienic design mindset?

Edyta: ‘Let me share some examples that illustrate how our teams have really embraced the topic of food safety. We were able to take food safety out of the ‘boring corner’ of compliance, and through a series of workshops we stimulate the creativity of our staff, so that engineers are now actually happy to design solutions to overcome challenges. One team did a brilliant job for example by building the Sortex F, which is now one of our flagship technologies

for sorting foods. We already had sorters that were rather closed systems, and were looking for a better way to build a sorter for far more sensitive foods, such as frozen vegetables and fruit. Our team came up with an extremely open design. We were amazed by the success of this machine. We initially designed it for food and vegetables, and today it is also in the space of nuts, pet food, and in many other fields where you have ready-to-eat foods that need to be sorted.’

Do you also have one to share with us Beatrice?

Beatrice: ‘One team had to build a cooler for wafer blocks. When you prepare wafers, you first have to deal with the wafers, which are baked first before the cream is spread on top of them. This cream needs to cool down before you can cut it. The cooler is a big box in which the cream covered wafers travel in a spiral path through the cooled box. Everything is condensed in there and if something goes wrong you have lots of waste product, and it’s also quite tedious then to clean this because of the spiral cooler, that consists of a huge surface that needs to be cleaned. This is one of the first cases where the engineers not only designed the system itself, but also developed an optimal way to clean it by designing a dedicated cleaning device for this machine that enables an effective cleaning operation that minimises downtime.’

New concept for hygienic design

At Habasit, we understand the importance of maintaining food-safe processing conditions. Designing the new Habasit Super HyCLEAN belt range, we looked at the best available market standards for plastic modular belts and removed their weak spots.

From reducing spaces where product residue and soiling can collect to making the belt easier to clean – we are confident you will see your benefits with a naked eye. But even under the microscope, results show up to 4,1 x less soiling and 20 x fewer colony forming units compared to other hygienic plastic modular belts.



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After

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Consider this before investing in drainage systems

By: Krzysztof Kaczmarczyk, Technology Manager & Marcin Rebalski, Export Sales Director ATT

Regardless of whether we engage in a greenfield construction project or the modernisation of existing food production environments - the importance of selecting suitable floors and drainage systems to ensure effective cleaning and safe food production processes should never be underestimated.

In this article, Krzysztof Kaczmarczyk, Technology Manager ATT and Marcin Rebalski, Export Sales Director ATT, provide their views on the technical and financial aspects of choosing drainage systems that won't compromise the safety, consistency, productivity and sustainability of your food processing activities.

A small step for investors, a giant leap for food safety

Drainage systems generally represent a relatively small part of the total investment budget, but investment mistakes in this area can play a major role in generating future hygiene risks. From a production perspective, it's generally very bad news when floor layers and drainage systems need to be replaced, because it generally involves costly production stops. Hence investment decision makers should make sure to gain sufficient awareness of the functional parameters that determine the suitability of floor and drainage systems.

When choosing for a specific drainage system, the following aspects should be considered:

1. quality of production process – materials and hygiene of drains' production environment;
2. types of elements and coherence with floor technology;
3. features of hygienic design;
4. flow rates of liquids discharged to canalisation;
5. load class of a system.

Now let's look into the parameters of key functionalities and methods in more detail.

I. Material and drains production environment.

The preferred choice of material for drainage construction is stainless steel. This material is widely acknowledged to offer the best properties for safe food production. However, there's less consensus on what exactly should be considered to be the best type of stainless steel. The most popular grades are 304, 316L, 316Ti. The choice depends on the production environment, the product itself and the production and cleaning chemicals that can interact with the floor materials and the drainage and sewage system. Click here <https://att.eu/en/tocrm/> for a study indicating the resistance of the two most popular types of stainless steel types: 304 and 316L to widely used chemical substances.



The processes of pickling and passivation of processed steel are important factors here, because they can influence the safety and hygiene of goods. Both methods are used to rebuild and consolidate the oxide layer, known as the passive layer, so that the steel does not rust. The passive layer is restored after each water cleaning. The quality of materials that are suitable for the food industry depends on the raw materials that are used, the environment

in which the materials are processed, and the preparation of the products for transportation.

The selection of the appropriate stainless steel supplier involves an in-depth screening of: raw material certification, storage quality (e.g. fiber-protected racks with a neutral effect on stainless steel), proper surface protection (protecting foil), and means of transport that should prevent contamination and damage to sheets. The above aspects should provide protection of steel from dirt and from reacting with undesirable substances (such as black steel or others that may cause corrosion or affect the quality in the process).

Sample storage of steel raw material.

A production plant, addressing its products to the F&B sector, should ensure sterility of stainless steel processing. By this it is meant:

- safety of steel surface against damage at every stage of production;
- total isolation of the process from harmful materials, such as black steel;

- not using fasteners, supporting elements or tools made of black steel.

As mentioned in the study, finished products should undergo a surface cleaning process. High-quality effects are achieved by pickling and passivation of the entire structure, which increases hygiene quality.

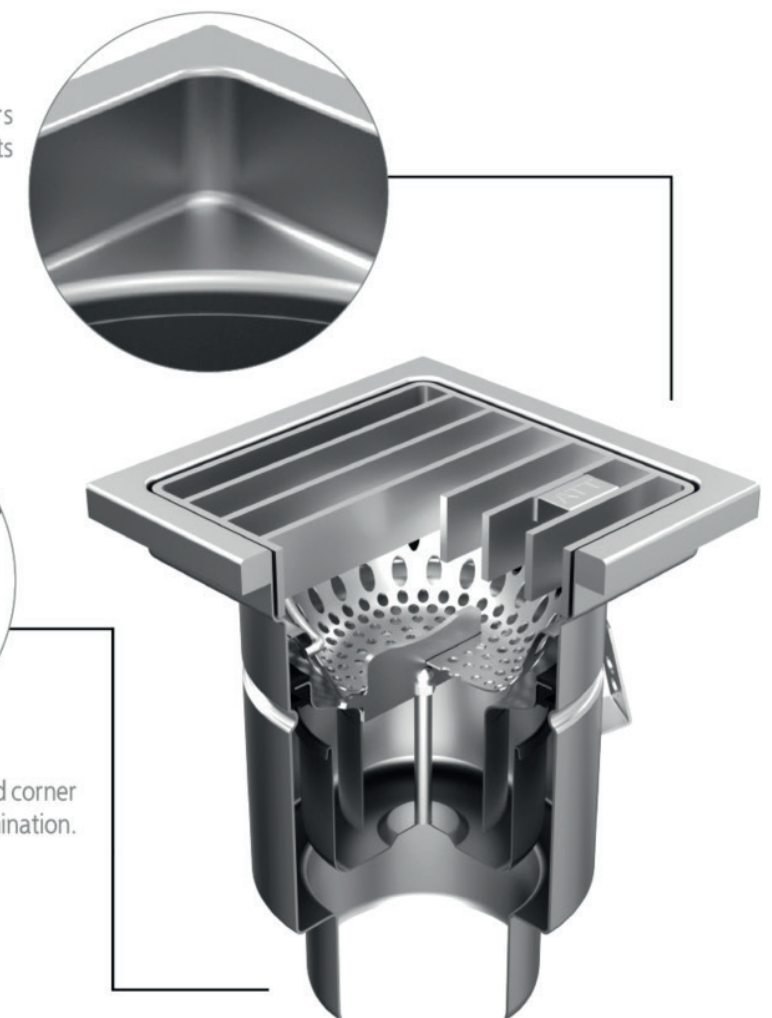
Logistic preparation of the product should enable its safe transport by protecting against contact with undesirable materials and substances, as well as against mechanical damage.

II. Types of elements and coherence with floor technology.

The type of drainage used in a defined area is related to the functional elements described in paragraphs IV and V. The most common items installed in plants are:

- 1) floor drains (point drainage) – one and two parts. Two parts are frequently used in the upper floor sections of buildings;
- 2) channels with flat, V-shaped and U-shaped bottom profile – the selection is related to the installation space in the floor and the hygienic requirements of the channel. Channels with a

Pressed upper part with no sharp corners facilitates removal of contamination and prevents growth of bacteria.



Pressed body, with no sharp edges or welded corner joints prevents the accumulation of contamination.

round bottom (U) allow to significantly reduce the number of places in the drainage section where possible dirt and bacteria accumulate, further facilitating the cleaning of the element; 3) slot channels - as a rule, these are used in places where the amount of medium discharged into the sewage system is small without large amounts of unit discharges.

Adapting drainage to the type of floor is a very important technical issue at the interface between manufacturers of drainage systems and industrial floor applicators. The selection of an edge finish of products that enables an application of a given type of floor is critical.

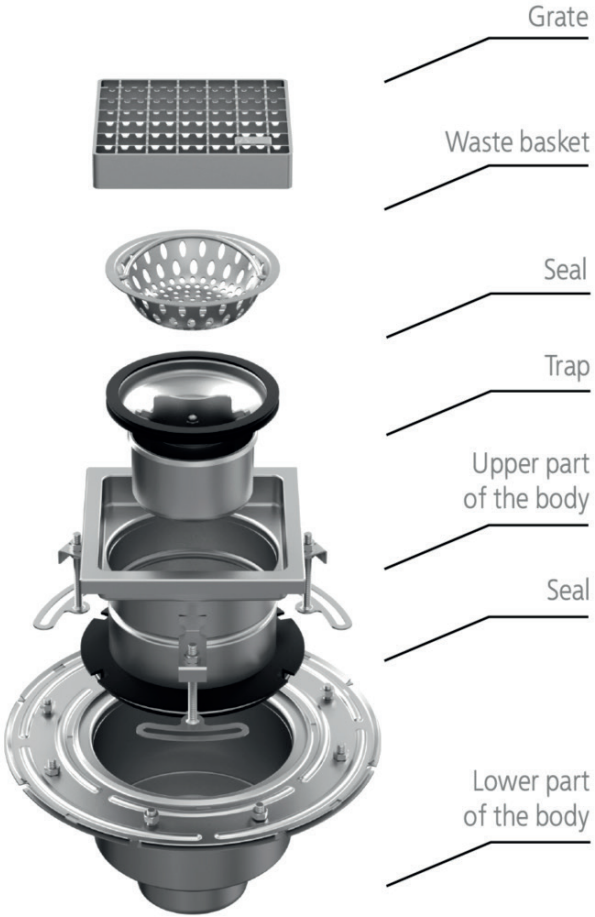
Incorrect adjustment of drains to the type and technology of the floor, may lead to cracks/ leaks, which significantly reduces the hygiene of production, leading to surface contamination and accumulation of bacteria in cracks. There are two basic types of industrial floors - epoxy and alternatives, and industrial tiles. Below there are examples of types of edge finishing profiles used in industrial plants.

III. Features of hygienic design.

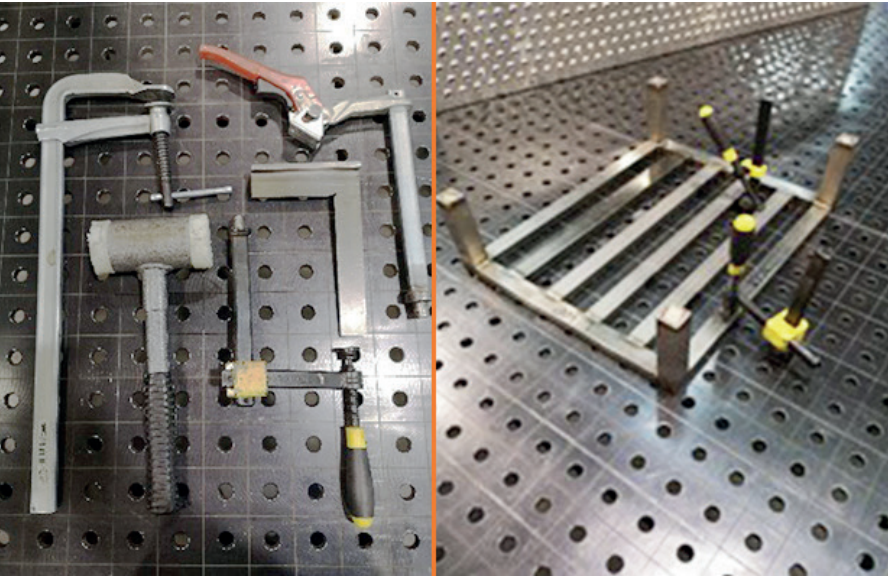
Drainage system design is a very broad topic, which we partially described in the EHEDG Yearbook 2017/2018. Hygiene is the main priority in the production of high-quality drainage systems for food processing plants, with the design and product finishing aiming at minimizing spaces suitable for bacteria accumulation, and maximizing the cleanability. To minimize the required amount of welds, drains should be constructed with the use of deep pressed elements, which also eliminate sharp corners. If welds are necessary, only well cleaned butt welds are suitable. Tight continuous joints are of high importance. To verify the quality of welding works, certificates of external institutes such as TUV Rheinland are issued (according to EN 1090-2 and DIN EN ISO 3834-2 standards). It is also worth looking into the edge grading of elements that come into contact with staff members.

IV. Flow rates of liquids discharged to canalisation.

This is one of the basic functional parameters that

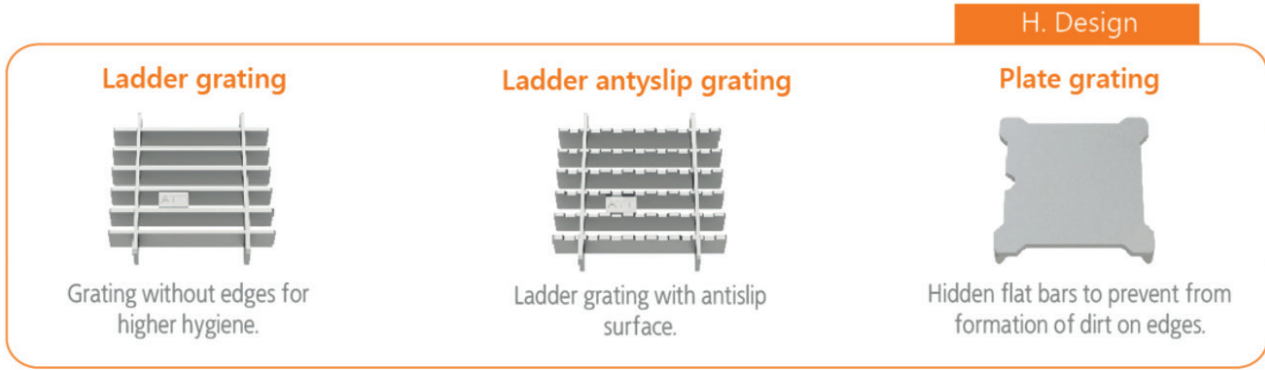


allows to determine the effectiveness of planned drainage systems in predefined production environments. During implementation of the investment project, managers compare the required flow rate (measured in litres per second) with the parameters of specific products. It is often forgotten, but nevertheless very important to also relate these flow rates to those of your drains and drainage channels. The flow rate in a point drainage is determined by the diameter of the pipe discharging the substances to the sewage system and the capacity of the trap designed in a product.



The size of the body determines a buffer. The buffer indicates an amount of medium that the body can absorb before it is discharged into the sewage. The type of the sediment basket and the type of the grating impact the point drainage flow efficiency parameter. In an operating environment, the floor drain with a mesh grating will have much greater capacity than the corresponding one covered with a plate.

It is extremely important to precisely define the type of traffic that will take place in the area of drains. Usually we consider pedestrian traffic, pallet trucks, forklifts, heavy load traffic. The edge - which is a point of contact between a floor and a drainage - is the very sensitive element responsible for maintaining the appropriate load class of the channel or gully.



A similar correlation appears when we look at drainage channels. Their efficiency of flow rates is determined by the DN of drain pipes, the types of traps and the number of outlets per linear meter of the channel. By increasing the width and depth of the linear drain, its ability to absorb discharges of large amounts of fluids increases – identically as in case of the buffer mentioned above. It is important that the buffer is well correlated with the capacity of the traps in the drains.

To sum up, when analysing the I/s parameter, it is worth to learn:

- 1. product testing conditions / locations: external testing centre;
- 2. do the indicated parameters take into account the presence and diversity of: traps and sediment baskets;
- 3. the hight of the water column in tested unit - according to the standards, it is assumed that the column should be 20mm above the drainage edge (PN-EN 1253-1)

V. Type and load class of a system.

To select proper grating, three main parameters must be taken into consideration:

- 1. functionality;
- 2. load class;
- 3. hygiene requirements.

The table illustrating types of load classes corresponding to the PN-EN 1253 and PN-EN 1433 standards can be found <https://att.eu/en/load-class/>. It is worth paying attention to the method of filling. Concrete filling during the assembly is the most error-prone solution (the space may not be completely filled in), which significantly increases the risk of distortions caused by vehicular traffic. Therefore, one should consider filling with epoxy resin or in the case of high-class loads with a stainless steel flat bar, which ensures the highest load resistance and durability of products.

In conclusion

The above study indicates the core elements of the decision process related to the selection of an appropriate drainage system in an industrial plant. The described issues point decision makers to a path that can be taken when selecting the appropriate drainage parameters. Each of these points is a subject for technologists' analyses aimed at maximizing the hygiene and effectiveness of products.



Missing safety link in food supply chain

ENFIT Guideline creates awareness for food safety related transportation risks

EHEDG Connects Magazine interviewed Hans-Dieter Philipowski, President of the International Association Supply Chain Safety, ENFIT, to discuss a new guideline that strives to improve the safety of food and food products in the transportation sector.

Philipowski states that - while most current guidelines, including the laws in the EU and member states, focus on the safety in food production environments - there's quite some ambiguity and misunderstanding amongst many in the transport industry regarding the cleanliness of transportation containers and their suitability for a cross-contamination-free transport of food. Philipowski: 'Outside of the production scope, many food producers are under the impression that requirements similar to their own apply to logistics companies. However, this is not at all the case.'

(EC) No. 178/2002

Philipowski points to what he considers to be one of the main reasons for this ambiguity and misunderstanding: 'There's a gap in the European Parliament and Council Regulation (EC) No. 178/2002, wherein there is no mention of transportation companies. Many logistics companies think that their only responsibility is to move the product from point A to point B, without having any responsibility for the effects of the transportation activities on the food quality. This raises great concern, because how can we trust a sector to adhere to food safety rules if that same transport sector does not consider itself to play an important role in the food and safety chain?'

So, if we understand you correctly, you are saying that the law is not specific enough to be effective. But the portrayal of the law, the goal, must be food safety, so what does the law say specifically about that?

Philipowski: 'The law states that every supply chain partner is responsible for its own part in



the food supply chain. The transport company is responsible for the conditions and cleanliness of their transport units. This means that the food producer, transporter, and receiver should share a three-angle responsibility in which every party is equally responsible. At the end of the day, however, it's the raw food material supplier that must ensure that the product is without any cross contamination, salmonella, or microbiological contaminants when it is delivered on the doorstep of the buyer. That is the law, but the daily practice is different.'

How is it different and for whom did you develop this guideline? For the transportation sector? Or for the food producers?

'This guideline was developed for the transportation companies, but we were also aware that another main target group would be the food producers. They should know where the gaps are, also with regard to transportation. They are directly responsible for their products, and as such take on the risk and responsibility of the supply chain as well.'

Food processing companies invest a significant amount of money in the hygienic design process, basically to optimize the cleanability of their own food processing environments. Are you saying they could yield a higher return on investment if they would be willing to pay a little more for their transportation services, so that their logistics partners could invest in hygienic design and good cleaning practices as well?

'Yes, that's exactly what I am saying. Many food processing companies underestimate the food safety risks of price-driven transportation choices.

One must realize that, in the end, money will be saved by investing in a logistics company who regularly provides a good and proper clean to their transportation equipment, lowering the risk of a recall due to contamination.'

Will this guideline help different stakeholders within the food supply chain come to a better understanding, have better communication, resulting in better decision making when it comes to how to approach this important topic of food safety?

'That was the reason we developed this guideline; to show the entire supply chain how things were working in practical reality, to identify the gaps, and to provide all the stakeholders with a way to discuss these matters. The producers, logistic companies, and cleaning stations were all using different terminology, which results in misunderstandings.

The target of this guideline is to unite everyone in a shared understanding of what we are talking about, so they can exchange views and strive for common goals. We looked at all transportation aspects, not just on the cleaning or the transport container. We wanted to ensure that quality management can discuss these matters with their logistics companies, in their own factories, and outside with the transport companies and with cleaning stations. We first need to pinpoint where the gaps are, what the responsibilities are, and what it all means at the end of the day.'

More information: www.enfit.eu





Hygienic Study Award

Meet the winners and their new and exciting research

The Hygienic Study award was established in 2009 in collaboration with Fraunhofer IVV in Dresden, EHEDG, and the German Mechanical Engineering Federation VDMA. With the Hygienic Study Award, these organisations strive to motivate academics all over the world to take on research topics related to hygienic design.

Dr. Marc Mauermann is the Chair of the EHEDG Working Group Training and Education and the Deputy Director and Head of Department at Fraunhofer IVV. He states that the general awareness of the correlation between food processing equipment component design and food safety has been growing over the past years.

Mauermann: 'The academic community within EHEDG has been very important, since young scientists discover new possibilities to treat materials, design, and do fundamental research that can affect and drive innovation in the food industry and food equipment industry. The role of hygienic design as a prerequisite for safe food production is

now widely acknowledged, and there's no doubt that universities, technical colleges and their students are of great importance to develop a knowledge-based design of production processes in the food industry.'

The Hygienic Study Award also aims to promote science and research in the field of hygienic processing, and to connect students with the industry. Since 2009, the Hygienic Study Award has recognized 24 researchers for their outstanding and innovative work in hygienic processing. Their research has created added value for safe food production and for the promotion of hygienic engineering and design. This time, after an international call for papers was made, students from Austria, Denmark, Germany, the UK, and Croatia submitted their applications.

EHEDG hopes that this award also offers scientists and researchers a chance to gain new insights into the needs of the industry and into potential applications of their work.



#1

Dr. Hannes Köhler

Technical University of Dresden, Germany

Thesis title:

'Method for analysers modeling optimization of cleaning processes with impinging coherent liquid jet'



#2

Dr. Georgina Cuckston

University of Cambridge, United Kingdom

Thesis title:

'Methods for detailed study of detergent action in cleaning of food soils'



#3

Dr. Felix Schottroff

University of Natural Resources and Life Sciences / Vienna, Austria

Thesis title:

'Tailoring electrotechnologies for microbial inactivation of food and bioprocess engineering.'

Method for the analysis, modeling, and optimization of cleaning processes with impinging coherent liquid jet



Dr. Hannes Köhler
Technical University of Dresden, Germany

This year's first place winner of the Hygienic Study Award is Dr. Hannes Köhler of the Technical University of Dresden, Germany, for his thesis on Method for the analysis, modeling, and optimization of cleaning processes with an impinging coherent liquid jet.

Dr. Köhler started working on his PhD in 2010, studying the rotary jet head as an effective cleaning device with a goal to understand the cleaning process in detail, and to find ways to model and discover possibilities to improve this device or the cleaning process. He enhanced the detection method for using the fluorescent intensity of soilings in order to measure the cleaning progress in a non-invasive way with spatial and time resolution. Cleaning experiments were conducted in a laboratory setting with different nozzle diameters, pressures, and nozzle-to-plate distances, for either stationary or moving jets.

Dr. Köhler then described with empirical models how the parameters affected the cleaned radius and the cleaning width, which were useful insofar as they identified the most relevant parameters, and thus provided a good starting point for his self-developed, semi-empirical models. The models then reproduced the observed nonlinear influences just as well as a physical model, which had been developed in parallel by the University of Cambridge.

Using all of these results and models, Dr. Köhler was then able to show how these parameters impacted cleaning performance for example in terms of time and fluid consumption based cleaning performance indicators. Regardless of

these models, a simultaneous increase of the performance indicators could only be achieved by increasing the jet moving speed; however, it was not possible to maximize them at the same time. The results showed that it is possible to find an optimal jet moving speed with this method, but the increase in performance on the one hand, and the lower process stability on the other, will need to be considered, leaving room for very interesting further research.

Dr. Köhler: 'I think that I've contributed to reducing the experimental effort to improve machines and equipment through a better understanding of the jet cleaning processes and the use of cleaning models. My thesis so far is about the adhesive detachment, which is one of the four cleaning mechanisms I found during my literature research. This model concept of the cleaning mechanism has helped to divide general cleaning problems into easy to handle sub-problems. Along with my research group in Dresden, I'd love to develop cleaning models for the other cleaning mechanisms in a similar approach, and hopefully provide new ways to optimize industrial cleaning processes for specific industrial applications in the future.'

More info: hannes.koehler@tu-dresden.de

Methods for detailed study of detergent action in cleaning food soils

Dr. Georgina Cuckston: 'The concept of the topic is actually very simple. Our question was: "What is the best way to clean burnt macaroni cheese off dishware? Initially, each aspect of a simple substrate soil solution model pertinent to the cleaning mode of action was analysed.

On the microscale, what was studied was the penetration of the solution at the interface between the soil upon contact with water or the cleaning solution to better understand its hydration characteristics, as well as its swelling profile as it interacted with the cleaning solution. On the macroscale, the forces required to remove the soil from the substrate over time as a function of its cohesive and adhesive strength of the soil substrate matrix was measured. Finally, a solution analysis, both chemically through the organic carbon concentration within the solution over time, and visually through droplet analysis (as droplets were being formed and moved into the solution) was conducted.

Tests in each body were conducted in a range of cleaning solutions, varying one aspect at a time, such as the ph, surfactant type or levels, and temperature of the standard variables during cleaning. The data

was then normalized and combined to showcase which aspects of the cleaning mechanism were altered by changes made in the cleaning solutions. This body of tests can be used during formulation of novel cleaning solutions and testing of new surfactants or combinations, in order to determine the right set of additives to use together to enhance problem modes or areas or soils in particular. For example, moving from just a simple water solution of PH7 and 50 degrees Celcius to PH9 at 50 degrees increased the soil swelling and decreased the oil droplet size during cleaning. This change also decreased the weakening of the adhesion of the soil to the substrate, meaning it was adhered for longer and therefore less likely to clean, similar to something like a dishwasher during a set time interval. The next step would be to enhance the formulation and find the right additive to work in conjunction with the hydroxide ions to aid in detachment of the soil.'

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Tel.: +447455240980*



Dr. Georgina Cuckston
University of Cambridge, United Kingdom

Tailoring Electrotechnologies for Microbial Inactivation of Food and Bioprocess Engineering.



Dr. Felix Schottroff

*University of Natural Resources and
Life Sciences / Vienna, Austria*

Dr. Felix Schottroff: 'Processes employing a direct application of electric fields (so-called electrotechnologies), such as pulsed electric fields (PEF) or ohmic heating, are used in food and bioprocessing for the inactivation of microorganisms. The framework of the thesis included investigations on inactivation mechanisms, application studies, as well as design and optimization of treatment chambers for electrotechnologies.

PEF treatment uses short high voltage pulses, enabling the inactivation of microorganisms by electroporation at reduced process temperatures, compared to traditional thermal pasteurization. Ohmic heating, on the other hand, is a process deploying alternating electric current of a lower voltage to rapidly and uniformly heat up products.

While the effects of PEF treatment on vegetative microorganisms are well understood already, the possible occurrence of additional, non-thermal effects caused by the electric field during ohmic heating is still under discussion and was investigated in the thesis. The effects of conventional and ohmic heating on six different microorganisms were compared, using specifically designed equipment.

Predominantly thermal effects were found. Moreover, effects of electric fields on bacterial endospores were studied and a possible inactivation mechanism was derived. Results indicated that core proteins are the main target of

the electric field. This enables the development and further optimization of electric field assisted thermal sterilization processes.

Moreover, the preservation of heat-sensitive protein formulations by PEF was studied and ideal process windows as well as product parameters were evaluated, allowing an efficient reduction of viable microorganisms, while preserving product quality. Low pH levels and lower protein concentrations facilitated inactivation of *L. innocua*. In a second study, the challenges and limitations of PEF decontamination of high solids protein formulations were outlined.

Based on the outcomes of these studies, a novel treatment chamber design was proposed for electrotechnologies, increasing the treatment homogeneity of continuous processes. For this, the inlet was changed in such a way that a vorticity was generated. This approach proved to be especially beneficial for the decontamination of formulations at neutral pH, which is usually the most difficult matrix to decontaminate.'

More info: felix.schottroff@boku.ac.at

Hygienic Study Award 2022/2023: Are you shaping the future of hygienic design?

The Hygienic Study Award distinguishes diploma, bachelor, master and PhD papers in the following areas:

- Hygienic design of machinery and equipment;
- Materials and material surfaces optimisation under hygienic aspects;
- Cleaning of food-associated materials optimisation (including research of the fundamentals of soiling and cleaning processes).

Every other year, three awards are being granted and announced during the EHEDG (online) Congress: a unique occasion to liaise with the international EHEDG network of food producers and food equipment manufacturers, gaining insight into the practical relevance of the research work, potential applications and needs of the industry. The winners also receive a monetary prize, kindly offered by VDMA.

Are you shaping the future of hygienic design? Apply now!

1. The deadline to submit your work is 28 February 2023.
2. The submitted papers should not be older than two years.
3. A selection panel comprised of representatives from various universities and research institutes will review and assess the entries.
4. All participants will be notified by the Fraunhofer IVV office at the beginning of June 2023.

More information:

www.ivv.fraunhofer.de/en/processing-machinery/hygienic-production/hygienic_study_award.html

A Knight's Tale

More than 70 delegates representing the EHEDG Foundation Board, Advisory Board, Executive Committee, Sub-Committees, Regional Sections and Head Office attended the 14th Plenary Meeting in October 2021, which was delivered in a hybrid in-person and virtual model, due to ongoing worldwide Covid-19 restrictions.

The main purpose of this meeting was to present the organisational strategic direction, share the latest projects, developments, achievements but also portfolio gaps and challenges, introduce and welcome new EHEDG colleagues, and bid farewell to old ones too.

The participants had in fact the opportunity to say goodbye to Piet Steenaard, who 'retired' from his role as EHEDG Treasurer – a position that he has diligently and passionately covered for almost three decades. Piet has played a key role and demonstrated an unwavering commitment in driving EHEDG's growth worldwide, from a few dozen companies in the 1990s to more than 900 members at present, ensuring at the same time that a volunteer-based organisation remained a close-knit community.

For those who are not familiar with Piet's full curriculum, his unsalaried work and professional career go beyond hygienic design and engineering. It spans from saving lives with the Royal Netherlands Sea Rescue Institution to saving a local football club from relegation, from disembarking a steamboat in his Sinterklaas (Saint Nicholas) outfit and parading through the streets of Weesp on his white horse, to successfully managing the national volleyball team that won the Olympic gold in Atlanta.

Regardless whether Piet had to deal with lubricants, coach benches or Dutch traditions - connecting and supporting people has always been at the very heart of his activities, as well as daring and pioneering rather than taking easy, predictable roads. The EHEDG members weren't the only ones to be impressed by Piet's longstanding and meritorious service to our foundation and the community, and by his free spirits and guts.

In a surprise ceremony facilitated by the EHEDG Head Office and EHEDG Board Members, Piet was awarded an honorary knighthood of the Dutch order of chivalry of Orange-Nassau, which dates back to 1892. The prestigious title, which ranks among the highest distinctions that the Netherlands can bestow upon its citizens, was conferred by the mayor of Almere Franc Weerwind, on behalf of the Dutch King. Among others, Piet was surrounded by his wife Ada, his daughter Mirjam, his grandchildren Quint and Romy, his great-grandson George, as well as long-time friends and colleagues from the different associations he has been volunteering for the last 50 years.

A true knight's tale.



Who is who at EHEDG?

Introducing the EHEDG Head Office Staff

Introduction

Last year, the EHEDG Head Office focused on laying foundations: building up a new team in Naarden (The Netherlands), setting up a structure and implementing systems and tools. Next year will be the year of new projects, such as improving the online position and website user experience. Having a substantial digital presence won't only increase awareness, but also help strengthen the EHEDG brand by building up its credibility. The EHEDG website and social media channels are the places to educate stakeholders about EHEDG, and to let them resonate with the EHEDG mission to be the leading source of hygienic engineering expertise, and enhance food safety and quality across the whole industry.

As the new EHEDG Head Office staff is determined to facilitate networking, dialogue and access to information on these topics, they are also working on the development of an e-learning platform. This will enable a rapid deployment of content and dissemination of hygienic design principles - with resources and knowledge available 24/7 for a global and remote audience. These projects will be carried in parallel to the daily duties and responsibilities: providing support to EHEDG members, the EHEDG Foundation Board, EHEDG Executive Committee, EHEDG Sub-Committees, EHEDG Working Groups and EHEDG Regional Sections across the world.



Adwy van den Berg
EHEDG Operations Director

Adwy: 'I would describe myself as a creative and experienced marketing professional. My jobs varied from developing new commercial B2B strategies to setting up online products, to managing and coaching key account managers. I like to get things done and work with people, the local team and international colleagues. You can contact me any time about budgets, (financial) reporting and audits, if you need any support within the Foundation Board, Advisory Board, Executive Committee, Sub-Committees Product Portfolio and Regional Development. And if you are looking for insights on our events, the EHEDG World Congress and potential partnerships.'



Brad DeSouza
EHEDG Project Manager

Brad: 'I joined EHEDG on July 1, 2021. I started my professional life as a financial accountant in Montreal and Toronto, then transitioned to working on systems implementations, software support and ERP systems management, roles which have taken me to Copenhagen, Rome and Amsterdam. My role at EHEDG is to manage projects by mapping our requirements, transforming them into specifications and coordinating with colleagues and technical partners to ensure we get solutions which meet our needs.'



Cristina Annoni
EHEDG Communication & Web Services Officer

Cristina: 'During the last 10 years I have lived in Milan, Paris and Amsterdam, working in marketing and communication within the travel, beauty, e-commerce and education industries. I enjoy how creativity and new insights thrive in international environments, where people have different ideas and perspectives. That's why I'm excited to contribute to EHEDG. Within the Head Office, I'm the first point of contact for the EHEDG Sub-Committee Communication, third parties and press. I'm also managing the website content, and as of next year, I'll be implementing an SEO strategy to boost our online ranking, and drive more traffic and attention towards EHEDG.'



Joby Huang

EHEDG Membership & Information Management Officer

Joby: 'My passion is to explore solutions for a smooth and efficient workflow at the workplace. With extensive experience in communication and program management in both commercial and non-profit organisations, I focus on implementing and planning the strategy, ensuring quality deliverables, as well as managing expectations to bring customer satisfaction. I particularly enjoy working with people from diverse backgrounds and am always up for new challenges. As the first point of contact for the Sub-Committee Product Portfolio and the members, I will help optimise the process for different projects at EHEDG.'



Karlijn Faber

Certification Officer

Karlijn: 'In the past I worked for the Dutch Tourist Board, publishers, stores, and the National Health Services in project management, marketing services, labor market analysis and logistics. I enjoy being service-oriented in my work.'

Karlijn's role and responsibilities within EHEDG

- Certification Officer.
- Certification admin, finance and correspondence.
- FPC certification holders, labs and evaluation officers.
- Part of workgroup meetings.
- Safeguard compliance.

EHEDG Financial Admin Officer

As mentioned in the introduction, the Head Office team is now nearly complete. It turns out that financial people are in popular demand in the Netherlands. The unemployment rate is at its lowest in over fifty years. So we are still looking for someone that can take on these tasks and responsibilities:

- Supporting financial administration.
- Invoicing and addressing debtors.
- Checking invoices from creditors and paying them.
- Keeping the general ledger accurately up to date.
- Addressing financial-administrative questions and problems.

The EHEDG Membership Value:



- 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 IS A SAFE AND SMART INVESTMENT IN SUSTAINABLE SUCCESS’

Ludvig Josefsberg [President European Hygienic Engineering and Design Group]

‘EHEDG IS RECOGNISED AS THE LEADING SOURCE OF EXPERTISE IN HYGIENIC ENGINEERING.’

Anne-Claire Carrère [Manufacturing Excellence Hygienic Engineering at Nestlé]:

‘AS CUSTOMERS OF THE EQUIPMENT INDUSTRY, WE NEED TO CLEARLY STATE WHAT WE WANT’

James Hartley [Global Sanitation Director Mondelez International]:

‘MOST INNOVATION IN THE FOOD INDUSTRY WILL BE FOCUSED ON SUSTAINABILITY’

Dr. Georg Kalss (Food Safety Officer in Wafer Business Unit at Bühler):

THE NEW GFSI JI AND JII DOCUMENTS CREATE A PUSH OF HYGIENIC DESIGN INTO THE FARM TO FORK FOOD CHAIN.

Dr. John Holah [Principal Corporate Scientist, Kersia Group]

