



## Hygienic design, EHEDG and Hygienic Design Center at DTU

**Wirtanen, Gun Linnea**

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# Hygienic Design, EHEDG & DTU HDC

## Gun Wirtanen, DTU National Food Institute

### SP Seminar in Gothenburg on 15<sup>th</sup> of September 2015

#### Hygienic Design, EHEDG & Hygienic Design Center at DTU

Gun Wirtanen, Associate Professor

Technical University of Denmark

Division: Production and Microbiology

Research Group: Microbial Food Safety and Quality

[guwi@food.dtu.dk](mailto:guwi@food.dtu.dk)

DTU Food  
National Food Institute

$$\int_0^{\infty} \frac{1}{x} \left( \sum_{k=0}^{\infty} \frac{(-1)^k}{k!} \right) dx = \frac{1}{2} \ln 2$$

#### Agenda

- Introduction of the speaker
- Background to Hygienic Design
- European Hygienic Engineering & Design Group (EHEDG)
- Hygienic Design Center (HDC) at DTU and its activities

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#### Gun Wirtanen – Curriculum Vitae

##### Associate Professor at DTU National Food Institute

- Lecturing in course 23521 (main lecturer) and similar level courses
- Lecturing in Hygienic Design Courses for industrial representatives (equipment manufacturers, food and biotech producers & food plant builders) at DTU Centre for Hygienic Design
- Lecturing in the EHEDG Advanced Course in Hygienic Design arranged e.g. at DTU Centre for Hygienic Design
- Research projects in process hygiene
- Tutoring of student theses at BSc, MSc and PhD levels

##### External Lecturer in Process Hygiene at University of Helsinki, Finland

- Biofilm formation, Surface Microbiology and Cleaning & Disinfection
- Hygienic Design

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#### Gun Wirtanen – Curriculum Vitae cont.

##### Main jobs

- 2014- Associate Professor in Hygienic Design and Cleaning Operations at DTU National Food Institute
- 2010-2013 Senior Expert in Process Microbiology and Hygiene at VTT Expert Services Ltd.
- 1997-2009 Senior Research Scientist in Process Microbiology and Hygiene at VTT Biotechnology and Food Research, VTT Biotechnology and VTT
- 1988-1997 Research Scientist in Microbiology at VTT Food Research Laboratory and VTT Biotechnology and Food Research
- 1986-1988 Research Trainee in Microbiology at VTT Food Research Laboratory

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#### Gun Wirtanen – Process Hygiene Activities

- Project coordinator of the Specific Support Action project SAFOODNET (FP6-022808) 2006-2009, which focused on knowledge sharing of new methods, tools and applications in improved hygiene management in the new EU.
- Involved in coordinating Nordic projects P93156 "Sanitation of dairies" 1994-96, P96049 "Evaluation of cleaning agents and disinfectants for use in dairies: methods and mechanisms" 1997-2000 & P00027 "DairyNet: Hygiene Control in dairies" 2001-04.
- Published more than 350 publications on quality control of foods, food processing hygiene and cleanroom technology as peer-reviewed articles, invited book chapters, articles based on oral and poster presentations and articles in technical journals.

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Introduction – Consequences of poor design and hygiene

#### Why we are here ?

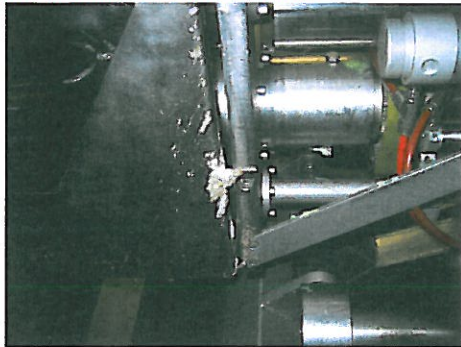
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# Hygienic Design, EHEDG & DTU HDC

## Gun Wirtanen, DTU National Food Institute

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#### Example: Poor hygienic design



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#### Example: Poor hygienic design



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## Overall consequences of poor hygiene

### Reduced lifetime of process equipment

- Increased cleaning & disinfection efforts
- Costly repairs
- Prolonged downtime of the process line

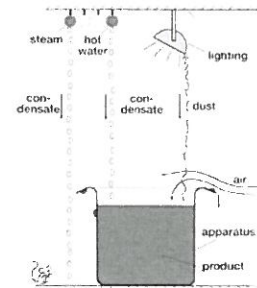
### Product contamination

- Bad reputation for brands or retailers
- Single cases influence the whole food industry
- Closing of factories
- Law suits against leading staff

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## Five main routes of contamination

- People
- Surfaces and tools
- Air
- Water
- Pests



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Introduction - Good design does not guarantee good hygiene... but it helps

## What we can do ?

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## We need to know...

- How to construct
- What to avoid
- What to buy
- How to clean & disinfect
- How to evaluate

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# Hygienic Design, EHEDG & DTU HDC

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## Good Hygienic Practise



Hygiene must be included in all planning and production steps

- **Design** of premises and equipment
  - Location, roads, layout, design
- **Maintenance** and **cleaning** in processing facilities
  - Procedures and monitoring
- **Control** of the production process
  - Raw materials, packaging, process water, air, intermediates, tools, pests, products

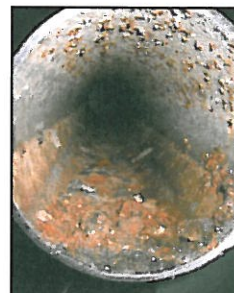
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## How to construct ?



Materials must be...

- Inert to
  - Product
  - Detergents
  - Disinfectants
- Non-toxic
- Smooth and crevice free



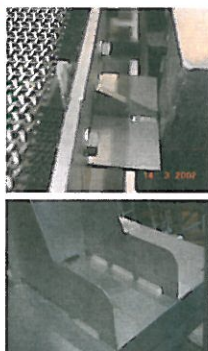
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## How to construct ?



Design – accessible, cleanable & drainable

- Smooth surfaces
- No steps/misalignment
- No metal-to-metal contact
- Crevice free
- Use rounded corners
- Accessible
- Cleanable
- Drainable



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## What to avoid?



Contaminants can be of

microbiological sources

- Bacteria, fungi, viruses, parasites, insects ...

chemical sources

- Detergent, disinfectants, toxins, pesticides

physical sources

- Metal, rubber, plastic, glass ...
- Dirt, stones
- Personal objects, jewellery, nails



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## How to clean?



Priorities to ensure high quality and safe products:

1. Remove soil (fat, protein, carbohydrates, salts & minerals)
2. Remove/kill microorganisms (cleaning/disinfection)
3. Avoid recontamination (rinsing/drying)

By combining proper design and effective cleaning & disinfection we should be able to obtain low microbial loads during processing

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Hayes, 1985

Introduction – Focus areas in hygienic design

## Who and what is important?



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#### Focus areas – demands on equipment



##### Authorities' demands

- Cleanable and possible to disinfect to a certain (acceptable) level
- Contamination of food must be reduced
- Installations allowing cleaning of equipment and facilities

##### Producer's demands

- Long processing time, good cleanability → fewer stops

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#### Focus areas - expertise



##### Material science

- Which steel, plastic and rubber types can be used
- Demands for surface characteristics
- Demands on process additives e.g. lubricants

##### Construction and design of equipment

- What is possible to construct
- Working environment

##### Fluid mechanics (closed equipment)

- Flow conditions in pipe systems and components

##### Water pressure (open equipment)

- Flow conditions in pipe systems and components

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#### Focus areas - expertise



##### Microbiology

- Attachment and detachment
- Which microbes are present and which are critical

##### Chemical engineering

- Detergents and disinfection
- Interaction between cleaning agent, soil and equipment

##### Food engineering

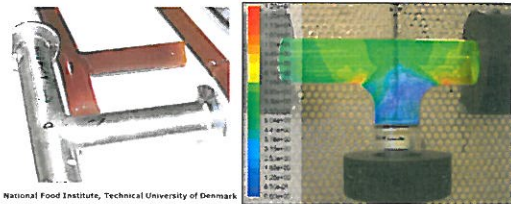
- Knowledge of the whole process (primary use)
- Equipment specification

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#### How to evaluate?

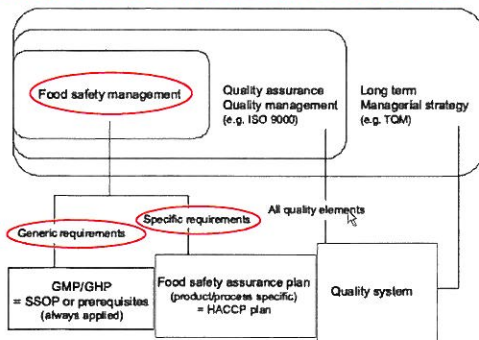


- Visual and physical inspections
- Microbial culturing
- In-use testing
- Soiling test – e.g.  $\beta$ -carotene, buttermilk with indicator organisms, uranine
- Modeling tools (e.g. Computational Fluid Dynamics = CFD)



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#### Safety and quality assurance systems



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#### Relevant Harmonised Standards



DS/EN ISO 14159 2008 Safety of machinery – Hygiene requirements for the design of machinery

- General hygiene demands for machinery
- Risk evaluation
- Design features for reduction of risks

**Machinery in general**

EN 1672 2 + A1 2009 Food processing machinery – Basic concepts - Part 2 Hygiene requirements

- General hygiene requirements for food processing equipment
- Design features for reduction of risks

**Food processing machinery specifically**

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# Hygienic Design, EHEDG & DTU HDC

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## European Hygienic Engineering & Design Group (EHEDG)



- A private consortium founded in 1989
- [www.ehedg.org](http://www.ehedg.org)
- Promotes safe food by improving hygienic engineering and design in all aspects of food manufacturing
- The members can represent or be
  - Companies for the manufacturing of food and food equipment, pharmaceutical and cosmetic production
  - Companies supplying engineering services
  - Scientific and research organisations
  - Health authorities and associations and
  - Individual members
- Activities: produce guidelines & training, provide expertise, carry out certification and networks
- Supports European legislative work and cooperates with other organisations e.g. 3-A

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## The Guidelines are prepared in Working Groups and launched by EHEDG ExCo



Working Groups	EHEDG Working Groups				
Product Portfolio Sub-Committee Equipment & Components Design/Use Processing, Services and Logistics Training & Education	Within EHEDG, a number of several hundred international experts are gathered in the Working Groups. These expert teams are responsible for the development of the EHEDG Guidelines. Each Working Group is responsible for an area of expertise, and within each area certain specific scopes are defined. The table below shows the various Working Groups and their expertise. Working Groups with the same focus are pooled together in clusters which are governed by the Product Portfolio Sub-Committee.				
	<table border="1"> <thead> <tr> <th>Working Group cluster</th><th>Working Groups</th></tr> </thead> <tbody> <tr> <td> <b>Equipment &amp; Components</b> Contact: Jacques Kesteven                             </td><td> <ul style="list-style-type: none"> <li>Bakery Equipment</li> <li>Conveyor Systems</li> <li>Food Refrigeration</li> <li>Mechanical Seals</li> <li>Pumps</li> <li>Seals</li> <li>Sensors</li> <li>Separators</li> <li>Tank Cleaning</li> <li>Valves</li> </ul> </td></tr> </tbody> </table>	Working Group cluster	Working Groups	<b>Equipment &amp; Components</b> Contact: Jacques Kesteven	<ul style="list-style-type: none"> <li>Bakery Equipment</li> <li>Conveyor Systems</li> <li>Food Refrigeration</li> <li>Mechanical Seals</li> <li>Pumps</li> <li>Seals</li> <li>Sensors</li> <li>Separators</li> <li>Tank Cleaning</li> <li>Valves</li> </ul>
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## The Guidelines are prepared in Working Groups and launched by EHEDG ExCo



Product Portfolio Sub-Committee	Working Groups				
Contact: Dr. Jørgen Rasmussen	<ul style="list-style-type: none"> <li>Building Design</li> <li>Design Principles</li> <li>Dry Materials Handling</li> <li>Hygienic Systems Integration</li> <li>Materials of Construction</li> <li>Testing and Certification</li> <li>Welding</li> </ul>				
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## List of the 43 EHEDG Guidelines (2015)



- Microbiologically safe continuous pasteurization of liquid food (1992)
- A method for assessing the in-place cleanliness of food processing equipment (2002)
- Microbiologically safe aseptic packing of food products (1993)
- A method for the assessment of in-line pasteurization of food processing equipment (1993)
- A method for the assessment of in-line sterilisation of food processing equipment (2004)
- The microbiologically safe continuous flow thermal sterilisation of liquid foods (1993)
- A method for the assessment of bacterial tightness of food processing equipment (2004)
- Hygienic equipment design criteria (2004)
- Welding stainless steel to meet hygienic requirements (1993)
- Hygienic design of closed equipment for the processing of liquid food (2002)
- Hygienic packing of food products (1993)
- The continuous or semi-continuous flow thermal treatment of particulate foods (1994)
- Hygienic design of equipment for open processing (2004)
- Hygienic design of valves for food processing (2004)
- A method for the assessment of in-place cleanliness of moderately sized food processing equipment (1993)

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## List of the 43 EHEDG Guidelines (2015)



- Hygienic pipe couplings (1997)
- Hygienic design of pumps, homogenizers and dewatering devices (2013)
- Chemical Treatment of Stainless Steel Surfaces (2014)
- A method for assessing the bacterial impermeability of hydrophobic membrane filters (2012)
- Hygienic design and safe use of double-seat mixproof valves (2000)
- Challenge tests for the evaluation of the hygienic characteristics of packing machines for liquid and semi-liquid products (2000)
- General hygienic design criteria for the safe processing of dry particulate materials (2014)
- Production and use of food grade lubricants, Part 1 and 2 (2009)
- The prevention and control of Legionella spp. (and legionnaires disease) in food factories (2002)
- Design of mechanical seals for hygienic and aseptic applications (2002)
- Hygienic engineering of plants for the processing of dry particulate materials (2003)
- Safe storage and distribution of water in food factories (2004)
- Safe and hygienic water treatment in food factories (2004)
- Hygienic design of packing systems for solid foodstuffs (2004)
- Guidelines on air handling in the food industry (2005)

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### SP Seminar in Gothenburg on 15<sup>th</sup> of September 2015

#### List of the 43 EHEDG Guidelines (2015)

- 31 Hygienic engineering of fluid bed and spray dryer plants (2005)
- 32 Materials of construction for equipment in contact with food (2005)
- 33 Hygienic engineering of discharging systems for dry particulate materials (2005)
- 34 Integration of hygienic and aseptic systems (2006)
- 35 Hygienic welding of stainless steel tubing in the food processing industry (2006)
- 36 Hygienic Engineering of Transfer Systems for Dry Particulate Materials (2007)
- 37 Hygienic Design and Application of Sensors (2007)
- 38 Hygienic Engineering of Rotary Valves in Process Lines for Dry Particulate Materials (2007)
- 39 Design Principles for Equipment and Process Areas for Aseptic Food Manufacturing (2009)
- 40 Hygienic Engineering of Valves in Process Lines for Dry Particulate Materials (2010)
- 41 Hygienic Engineering of Diverter Valves in Process Lines for Dry Particulate Materials (2011)
- 42 Disc Stack Centrifuges - Design and Cleanability (2013)
- 43 Hygienic Design of Belt Conveyors for the Food Industry (will be published soon)
- 44 Hygienic Design Principles for Food Factories (2014)

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#### EHEDG Doc. 8: Hygienic equipment design criteria, 2004

- Guideline No. 8 describes the criteria for the hygienic design of equipment intended for the processing of foods.
- Its fundamental objective is the prevention of the microbial contamination of food products. It is intended to appraise qualified engineers who are designing equipment for food processing with the **additional demands of hygienic engineering in order to ensure the microbiological safety of the end product.**
- Upgrading an existing design to meet hygiene requirements can be expensive and may be unsuccessful.

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#### EHEDG Doc. 8: Hygienic equipment design criteria, 2004

- Hygienic design is most effectively incorporated into the **initial stage**. The long term benefits of doing so are not only product safety but also the **potential to increase life expectancy of equipment, reduce maintenance and lower operating costs.**
- This document was first published in 1993 with the intention to describe in more detail the hygienic requirements of the **Machinery Directive.**
- Parts of The Machinery Directive were subsequently incorporated in the **standards EN1672-2 and EN ISO 14159**. (16 pages)

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#### HYGIENIC DESIGN OF CLOSED PROCESS EQUIPMENT AND SYSTEMS

In Guideline 10 drawings on: **1) how to avoid crevices, shadow zones and stagnant product areas, 2) how to connect and position equipment in a process line to ensure unhampered draining and cleaning-in-place etc. & 3) how to prevent leakages in processes and thus also product contamination:**

- pipe joints (Fig. 1)
- metal-to-metal seal (Fig. 2),
- O-ring seals (Figs 3-4)
- flange connection (Fig. 5)
- heating of sealing (Fig. 6)
- dynamic seal (Fig. 7)
- double shaft-seal (Fig. 8)
- pipe transitions (Fig. 9)
- centrifugal and lobe pumps (Fig. 11)
- pump by-pass arrangements (Fig. 17)
- swept tee (Fig. 10)
- flow diversion (Fig. 16)
- poor probe mounting (Fig. 12)
- temperature probes (Fig. 15)
- screw connections (Fig. 20)
- vessel lid mounting (Fig. 19)
- metal plate welding (Fig. 18)
- vessel insulation (Fig. 21)
- dead legs (Figs 13-14)

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#### HYGIENIC DESIGN OF OPEN PROCESS EQUIPMENT AND SYSTEMS

In Guideline 13 factors affecting operation hygiene and cleanability are dealt with using the following pictures:

- corners (Fig. 2),
- screw joints (Figs 4 & 5)
- welded joints (Fig. 1)
- dismountable joints (Fig. 3)
- equipment rims (Figs. 8-9)
- drainability (Fig. 6)
- equipment covers (Fig. 10)
- shaft arrangements (Fig. 11)
- stirrer blade attachment (Fig. 13)
- equipment accessibility (Fig. 26)
- equipment fixed to floor/walls (Figs 24-25)
- product protection (Fig. 12)
- flange couplings (Fig. 14)
- foot bearings (Fig. 15)
- belt reinforcement (Fig. 16)
- conveyor belts (Figs 17-19)
- framework structures (Fig. 22)
- horizontal framework (Fig. 23)
- framework cladding (Fig. 21)
- walkway design (Fig. 27)

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#### General Information about EHEDG Certification

##### Certification

EHEDG offers two main types of equipment certification:

- **Type EL** for Equipment cleaned with Liquids
- **Type ED** for Equipment Dry cleaned only

The criteria for certification include: a design review according to the EHEDG guidelines and testing according to [EHEDG test methods](#) (where appropriate).

##### Overview of Equipment Certification Options

Each of the certification TYPES have subcategories (Classes) as shown below:

##### TYPE EL: (Equipment cleaned with Liquids)

- EL Class I Closed equipment, wet cleaned-in-place (CIP) without dismantling
- EL Class I AUX Open equipment, wet cleaned without dismantling
- EL Class II Closed or open equipment dismantled for wet cleaning
- EL Aseptic Class I Closed equipment, wet cleaned-in-place (CIP) without dismantling, steam sterilisable, and bacteria tight
- EL Aseptic Class II Closed equipment, dismantled for wet cleaning, steam sterilisable, and bacteria tight after reassembly

##### TYPE ED: (Equipment Dry cleaned only)

- ED Class I Closed equipment dry cleaned only without dismantling
- ED Class II Closed or open equipment dismantled for dry cleaning only

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# Hygienic Design, EHEDG & DTU HDC

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#### Testing performed at DTU HDC



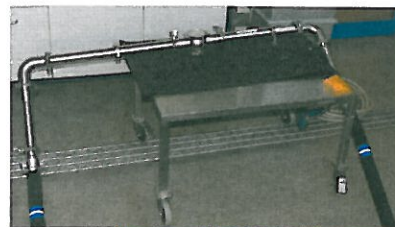
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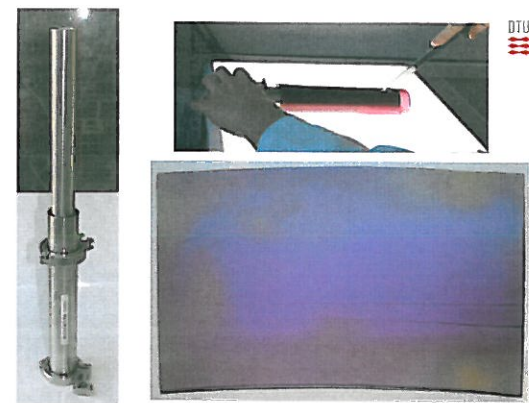
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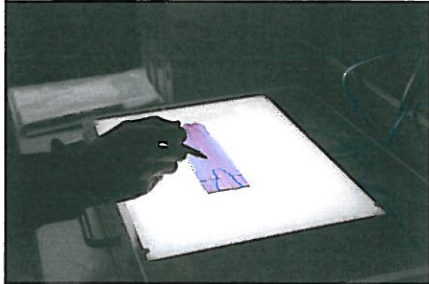


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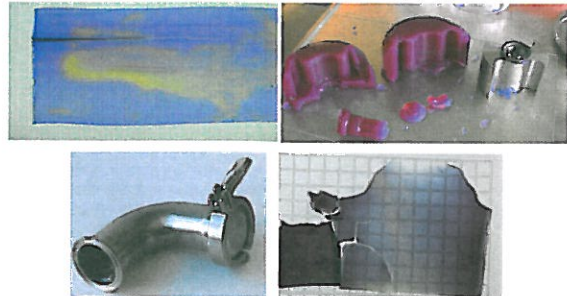
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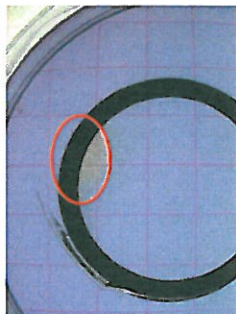
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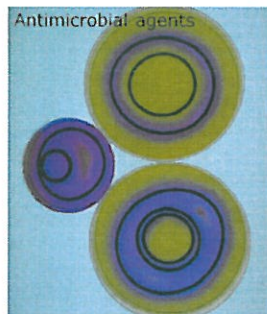
Changes in colour in the reference pipe Agar from a pump rotor



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## Activities at DTU HDC



- Testing based on EHEDG GL Doc 2 of closed processes, which is a part of the certification procedure
- Certification of process equipment
- Evaluation of hygienic design in food and biotech processes from autumn 2016
- Consulting equipment manufacturers and food producers
- Training and education in hygienic design
- Development of test method(s) for certification of open process equipment

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## Courses in Hygienic Design at DTU HDC



- 2 d basic course in hygienic design (HD) on equipment once a year at DTU in Danish/Swedish/English September 22-23, 2015:
  - Basic Hygienic Design Course - Equipment Manufacturer
- The basic course can be tailored (1 d or 2 d) for food producers and food building designers in Danish/Swedish/English and held in the premises of the client:
  - Basic Hygienic Design Course - Food Manufacturer
  - Basic Hygienic Design Course - Designing Buildings & Cleanrooms
- 2 d course "Inspection Procedures in Food/Biotech Process Design" held at DTU by Dr. Roland Cocker in English March 8-9, 2016
- 4 d Advanced course in hygienic design (with exam) is held at DTU once a year in English November 23-26, 2015
- More information at the home page: [www.hdc.food.dtu.dk](http://www.hdc.food.dtu.dk)

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DTU Center for Hygienic Design  
High Level International  
Advanced Course

**Hygienic Engineering and  
Contamination Control**

- for the food and pharmaceutical industry as well  
as equipment manufacturers



Registration form

**Course on Hygienic Engineering  
and Contamination Control**

23-26 November 2015  
Register no later than 1 November

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address / E.O. Box \_\_\_\_\_  
Zip code, city/town & country \_\_\_\_\_  
Phone direct/USM \_\_\_\_\_  
E-mail \_\_\_\_\_  
EHEDG Member: ☐ Yes ☐ No  
Favorable address (if different from above given address) \_\_\_\_\_

Please fill in the form and send to: [gun.wirtanen@food.dtu.dk](mailto:gun.wirtanen@food.dtu.dk) or [gun.wirtanen@ehedg.org](mailto:gun.wirtanen@ehedg.org)  
Alternatively send to: [gun.wirtanen@ehedg.org](mailto:gun.wirtanen@ehedg.org)

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# Hygienic Design, EHEDG & DTU HDC

## Gun Wirtanen, DTU National Food Institute

### SP Seminar in Gothenburg on 15<sup>th</sup> of September 2015

Day 1	Monday 23/11	Tuesday 24/11	Day 2
08.00 – 08.30	Registration and collection	08.15 – 08.30	Registration and collection
09.30 – 11.45	Introduction and participant presentation	09.30 – 09.45	Certification procedure including EHEDG test procedure for closed equipment
11.45 – 12.00	Legal requirements	09.45 – 10.00	Food microbiology
12.00 – 13.15	Lunch break	10.00 – 10.30	Coffee/tea break
13.15 – 14.00	Scientific background to EHEDG documents	10.30 – 11.15	Interface and an microbiology
14.00 – 14.45	Hygienic design of open process equipment	11.15 – 12.00	Equipment material – stainless steel and polymers
14.45 – 15.30	Hygienic design of closed process equipment	12.00 – 13.15	Lunch break
15.30 – 16.00	Coffee/tea break	13.15 – 14.00	Welding stainless steel
16.00 – 16.45	Summary of the day and participant expectations	14.00 – 15.30	Common demonstration on hygienic design
19.30 –	Dinner	15.30 – 16.00	Coffee/tea break
		16.00 – 17.30	Group work 1 – 3: Hygienic design of various process lines, surface hygiene and EHEDG test procedure for closed equipment
		19.30 –	Dinner

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Day 3	Wednesday 25/11	Thursday 26/11	Day 4
08.15 – 08.30	Registration and collection	08.15 – 08.30	Registration and collection
08.30 – 09.15	State seals and couplings	08.30 – 09.15	Cleaning & Disinfection – Cleaning Procedures in Open and Closed Processes
09.15 – 10.00	Fluid dynamics	09.15 – 10.00	Cleaning and disinfection – Cleaning agents & distribution
10.00 – 10.30	Coffee/tea break	10.00 – 10.30	Coffee/tea break
10.30 – 11.15	Valves	10.30 – 11.15	Product safety hazards
11.15 – 12.00	Pumps (dynamic seals) and care study on pumps	11.15 – 12.00	Exam (note allowed)
12.00 – 13.15	Lunch break	12.00 – 13.15	Lunch break
13.15 – 14.00	Heat treatment (heat transfer)	13.15 – 14.00	Integration, installation and maintenance
14.00 – 15.30	Group work 2 – 3: Hygienic design of various process lines, surface hygiene and EHEDG test procedure for closed equipment	14.00 – 14.45	Building and process layout
15.30 – 16.00	Coffee/tea break	14.45 – 15.30	Concluding remarks, course certificates and course evaluation by participants
16.00 – 17.30	Group work 3 – 3: Hygienic design of various process lines, surface hygiene and EHEDG test procedure for closed equipment	15.30 – 16.00	Coffee/tea break with sandwiches
19.30 –	Dinner	16.00 – 16.45	Bus to Copenhagen and thereafter to the hotel for those who are staying until Friday

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**Registration form**

**Course in Inspection of Food and Biotech Processes**

For information time and date please visit [www.hdc.food.dtu.dk](http://www.hdc.food.dtu.dk)

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Zip code, city/town & country: \_\_\_\_\_

Please date & time: \_\_\_\_\_

I would like to attend: \_\_\_\_\_

Some background information (please always give address): \_\_\_\_\_

Notes: \_\_\_\_\_

We will call you in the 2<sup>nd</sup> week September 2015

DTU Center for Hygienic Design  
c/o National Food Institute  
Technical University of Denmark

National Food Institute, Technical University of Denmark

**DTU Center for Hygienic Design**


**Invitation to a Course in Inspection of Food and Biotech Processes**

**Place:** DTU, Hygienic Design Centre, Copenhagen University of Denmark, National Food Institute, DK-2800 Lyngby

**Time:** Visit [www.hdc.food.dtu.dk](http://www.hdc.food.dtu.dk)

Day 1	
08.00 – 08.30	Registration and Coffee / Tea
09.30 – 10.00	Aims of the Course and Presentation of Participants
10.00 – 10.45	Knowledge Requirements for Inspection & Approval
10.45 – 11.30	Legal Aspects & Client Documentation
11.30 – 12.30	Lunch break
12.30 – 13.15	Documentation of Inspection
13.15 – 14.00	Prerequisites Needed in the Inspection
14.00 – 14.30	Coffee / Tea break
14.30 – 15.15	Prep guides continuing
15.15–16.00	Dinner
16.00 – 22.00	Dinner in Lyngby

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## Day 2

08.00 – 08.30	Registration and Coffee / Tea
08.30 – 09.15	Criteria on Buildings
09.15 – 10.00	Criteria on Air and Equipment in the Production Facilities
10.00 – 10.30	Coffee / Tea break
10.30 – 11.15	Process Line Criteria I
11.15 – 12.00	Process Line Criteria II
12.00 – 13.00	Lunch break
13.00 – 13.45	How to Inspect Activities
13.45 – 14.30	How to Inspect Services
14.30 – 15.00	Coffee / Tea break
15.00 – 16.00	Discussion & Concluding Remarks

**European Hygienic Engineering & Design Group**

**ANNOUNCEMENT**

**EHEDG World Congress on Hygienic Engineering and Design 2016 – Denmark**

**2 to 3 November 2016 in Herning / Denmark on occasion of FoodTuch**

The Congress will be held at the exhibition center of MCH Herning, located in the heart of the Danish food industry area on occasion of FoodTuch [www.foodtuch.dk](http://www.foodtuch.dk) from 2 to 3 November 2016.

The Congress is co-organized by EHEDG International and MCH Herning.

**MCH**

For tickets and registration please visit [www.ehedg-congress.org](http://www.ehedg-congress.org)

**Topics**

In its 1<sup>st</sup> edition, the Congress will be a unique event in hygienic design highlighting the following topics:

- Hygienic product design – National and international
- Case studies of hygienic design
- Safety related in hygienic food production
- Designing equipment for hygienic food production
- Designing process lines and hygienic design
- Hygienic systems integration

**Programme**

- 2 days intensive Congress
- Current opening opportunities and exhibition area for companies
- Visit for visiting to people in area
- One to One business meetings and networking
- Official congress dinner
- Guided technical tour
- Hygienic design during Congress

**Venue**

The Congress will be held at the exhibition center of MCH Herning, located in the heart of the Danish food industry area on occasion of FoodTuch [www.foodtuch.dk](http://www.foodtuch.dk) from 2 to 3 November 2016.

Use group discounts and enjoy free parking in the exhibition area.

**DTU**

QR code

**Gun Linnea Wirtanen**

**Associate Professor**

**Hygienic Design Director**

**National Food Institute**

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