

**Advanced Course on Hygienic Design
Amsterdam, 3 - 6 December 2019**

Program content

1. Introduction

2. Design Constraints and Requirements

- History, Standardisation & Legal Aspects
- Machinery Directive; NEN-EN 1672; ISO 14159; NSF 3-A, **EHEDG**;
- General Food Law

3. Know Your Enemy™

- Damage and losses caused
- Functional microbiology
- Contamination/invasion mechanisms
- Colonisation, biofilms, preservation and death

4. Scientific background EHEDG documents

- EHEDG Test Methods, three tests, results on sheet

5. Hygienic Design of Food Production Systems

- Uses Know Your Enemy™ to explain reasons behind design rules
- Introduction document 8 & 10
- Cleanability
- Bad examples and effective solutions™
- Wider coverage than just equipment

6. Material of Construction

- Stainless steel; corrosion; surface finish
- Polymer use; FDA, Limitations, Management, Desorption
- Background information integrity polymer surface (for seals)

7. Welding Stainless Steel

- Also set-up project; QA - QC incoming materials
- Permanent joint

8. Static Seals and Couplings

- Design principle static seals; examples

9. Case Study: Spray Ball

- Application; define: product contact areas; redesign model

10. Background: Rheology / Thermodynamics

- Newtonian / non-Newtonian fluids; yield value (needed to understand case pump)
- Flow rate; removal of micro-organism; falling film; results for closed equipment applicable to open equipment
- Fouling heat treatment; sterilisation time (needed for heat treatment and reaction time)

11. Valves

- Valve types
- Hygienic versus aseptic
- Double-seat valve
- Case study weir-type valve

12. Dynamics Seals (Pumps)

- Case Positive replacement pump with application; safety valve and yield value

13. Cleaning and Disinfection

Up to now focus on removing invisible micro-organisms, but firstly visual soil has to be removed

- Cleaning & Disinfection: background, application
- Fouling, cleaning agents, cleaning methods (Sinner circle), CIP, ATP

14. Continuous Thermal Treatment Processes

15. Open Equipment Design

16. Packaging

17. Supporting Activities - Lubrication Use

- FDA, Limitations, Management (following bearings; dynamic seals)

18. Building & Process Lay Out

- Design around process, equipment, logistics, etc.

19. Supporting Activities - Installation & Maintenance Procedures

20. Integration of Hygienic Systems

- Risk management paramount - evidenced-based!
- Starts with constraints: law, hygiene hazards, stakeholder requirements
- All steps correct and present
- Right sequenceConcurrence
- Prescriptive design versus risk assessment
- Buying and selling hygienic Equipment

21. Case Study (Pilot equipment and examples)

Small groups assessing various pilot equipment and examples of components

22. Student Exam

23. Student Course Evaluation