

**Advanced Course on Hygienic Design  
Amsterdam, 23 - 26 April 2018**

**Program content**

**1. Introduction**

**2. Design Constraints and Requirements**

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

**3. Know Your Enemy™**

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

**4. Scientific background EHEDG documents**

- o EHEDG Test Methods, three tests, results on sheet

**5. Hygienic Design of Food Production Systems**

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

**6. Material of Construction**

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

**7. Welding Stainless Steel**

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

**8. Static Seals and Couplings**

- o Design principle static seals; examples

**9. Case Study: Spray Ball**

- o Application; define: product contact areas; redesign model

**10. Background: Rheology / Thermodynamics**

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

**11. Valves**

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

**12. Dynamics Seals (Pumps)**

- o 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

- o Cleaning & Disinfection: background, application
- o 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**

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

### **18. Building & Process Lay Out**

- o Design around process, equipment, logistics, etc.

### **19. Supporting Activities - Installation & Maintenance Procedures**

### **20. Integration of Hygienic Systems**

- o Risk management paramount - evidenced-based!
- o Starts with constraints: law, hygiene hazards, stakeholder requirements
- o All steps correct and present
- o Right sequence
- o Concurrency
- o 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. Plenary Discussion**

- o Presentation each group of results case study

### **23. Student Course Evaluation**