

**Advanced Course on Hygienic Design  
Amsterdam, 22 - 25 October 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**