International Association for Food Protection WEBINAR

Hygienic Design & Monitoring Strategies to Prevent In-Process Contamination in Food and Beverage Applications

Moderator: Anne Bigalke, QualiTru Sampling Systems

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This webinar is being recorded and will be available to IAFP members within one week.

International Association for Food Protection

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- It is important to note that all opinions and statements are those of the individual making the presentation and not necessarily the opinion or view of IAFP.
- All attendees are muted. Questions should be submitted to the presenters during the presentation via the Q&A section on your screen. Questions will be answered at the end of the presentations.
- This webinar is being recorded and will be available for access by IAFP members within one week.

Panelists

Chris Paradise

- Director of Business Development, QualiTru
- Dual background in science and business

Bob Ferguson

- President, Strategic Consulting, Inc.
- Author, Food Safety Insights Column, Food Safety Magazine

Alex O’Brien

- Dairy Safety & Quality Coordinator, University of Wisconsin Center for Dairy Research
- Long family ties to dairy industry and extensive experience in dairy quality across multiple companies

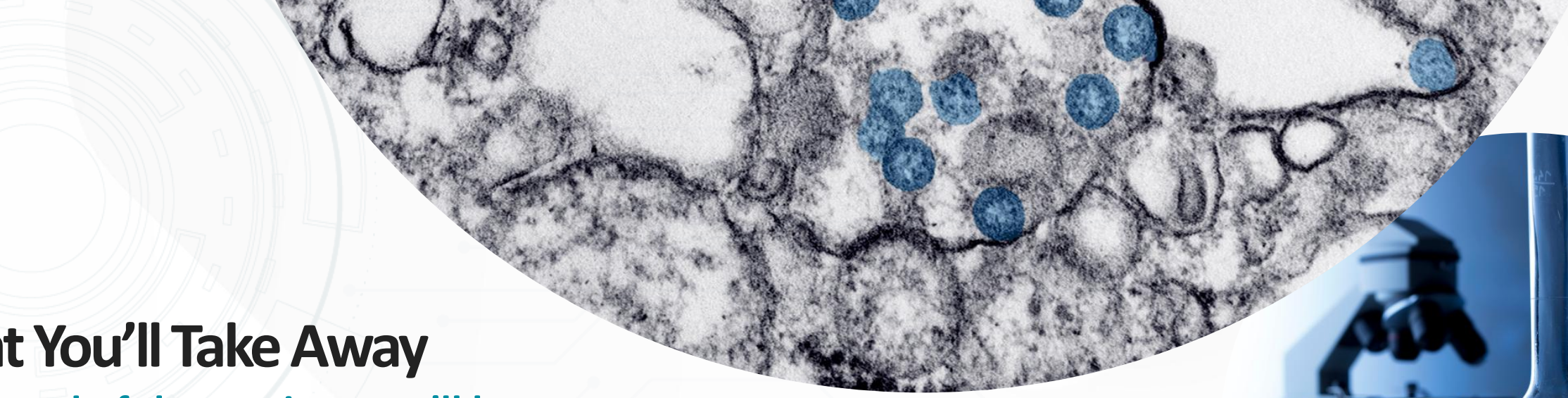
One major blind spot: Inside the system

Webinar Objectives

- Food is safer than ever--but in-process contamination still occurs
- Strong regulatory environment (FSMA, GFSI)
- Monitoring is essential: if you can’t monitor it, then you can’t manage it

TODAY’S GOAL

Learn how proactive monitoring helps detect, troubleshoot, and prevent contamination before it becomes a problem.



What You'll Take Away

By the end of the session, you'll be able to:

- Spot microbial risks hidden inside process systems
- Apply hygienic design principles that enable meaningful sampling
- Identify where and how to build sampling access into your process
- Use sampling data to support early detection, root cause analysis, & validation
- Align sampling strategies with EMP and preventive controls

Hygienic Design and Monitoring In Real Life

FoodSafety magazine

CIP/COP | FACILITIES | SANITATION

Hygienic Design: How are Processors Coping With This Essential Element of Food Safety?

Hygienic design of both equipment and processing facilities is important for the consistent production of safe food

By Bob Ferguson

- Survey and Interviews with 118 Food Processors about their Hygienic Design and Monitoring Programs

- Real Life Issues and Challenges

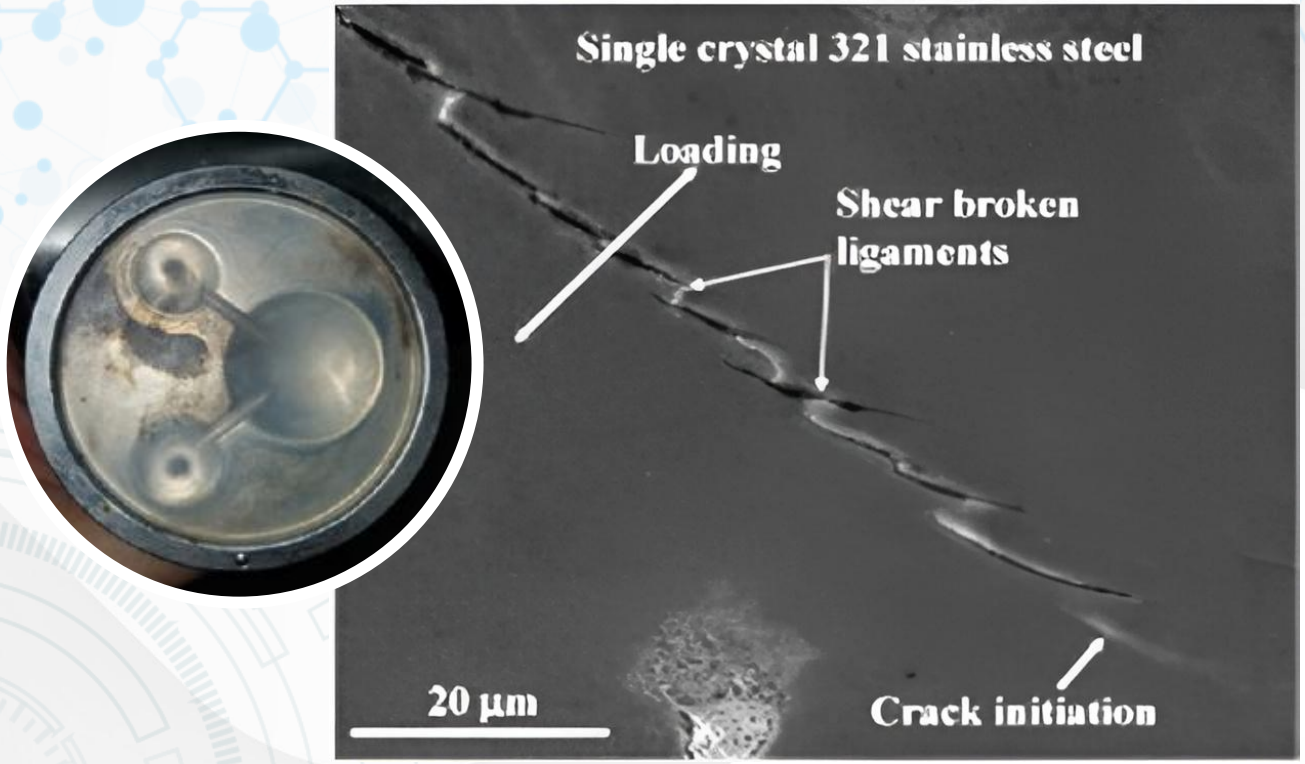
Practical Hygienic Design: Challenges

Issue	Quote
Equipment Design Inspector's View	*"Overall, much of the food processing equipment I see is very poorly designed. It is usually difficult to disassemble and reassemble, and contains dead ends and unsanitary threads. I wish food processing equipment had adopted the same design standards as dairy equipment… aseptic – no risk of introducing contamination"*
Older Buildings Old Designs, Renovations	*"Our building is almost 100 years old. It proves to make some things much more difficult."*
Replacement Equipment Opportunity for Upgrades	*" We have a policy when bringing in equipment from another plant. Often old equipment has dead ends and unsanitary threads. In acceptance we make upgrades, to same designs as dairy equipment when we can."*
Accessibility Key for employee compliance	*"When equipment is hard to access, assemble-dissemble, clean, sample, then employees just don't want to do the work"*
Liquid Sampling Access, aseptic sampling	*"Our plants do have nozzles coming off pipes. It's not the best option…but sampling is one of those things that in a production environment is really hard."*

Overlooked Blind Spots

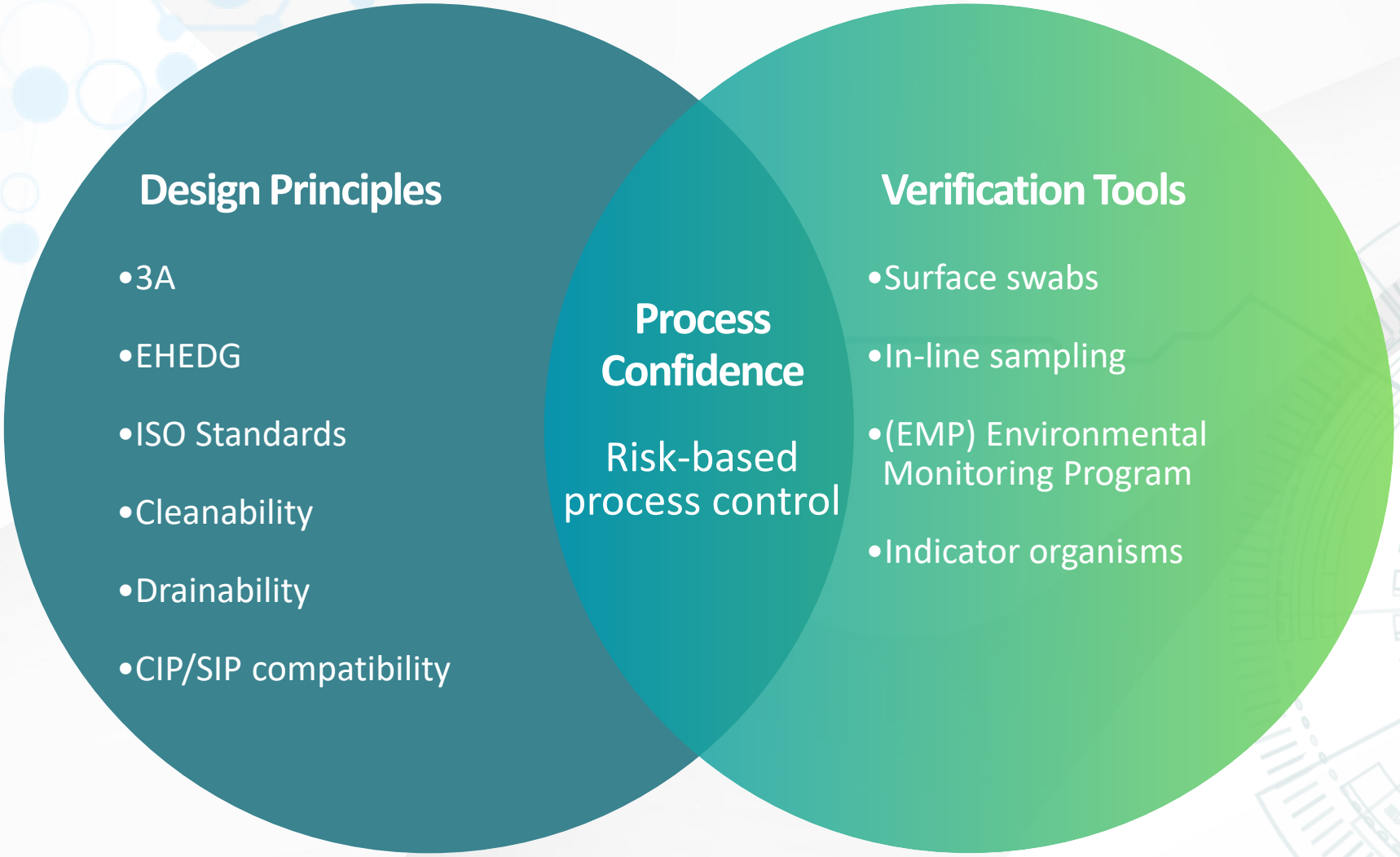
- Risk zones often exist inside the process not on exposed surfaces
- Common harborage points include:
    - Gaskets, bad welds, & valve seals
    - Dead legs & poorly drained lines
    - Pasteurizer plates, pump seals, & tank walls
- These areas may never be touched by swabs, but

If you don't sample here, you may never see the problem.



Food processes are dynamic – maintenance, upgrades, & equipment changes constantly shift the risk landscape.

Hygienic Design: Essential —But Not Enough



Designing Sampling into Process Systems

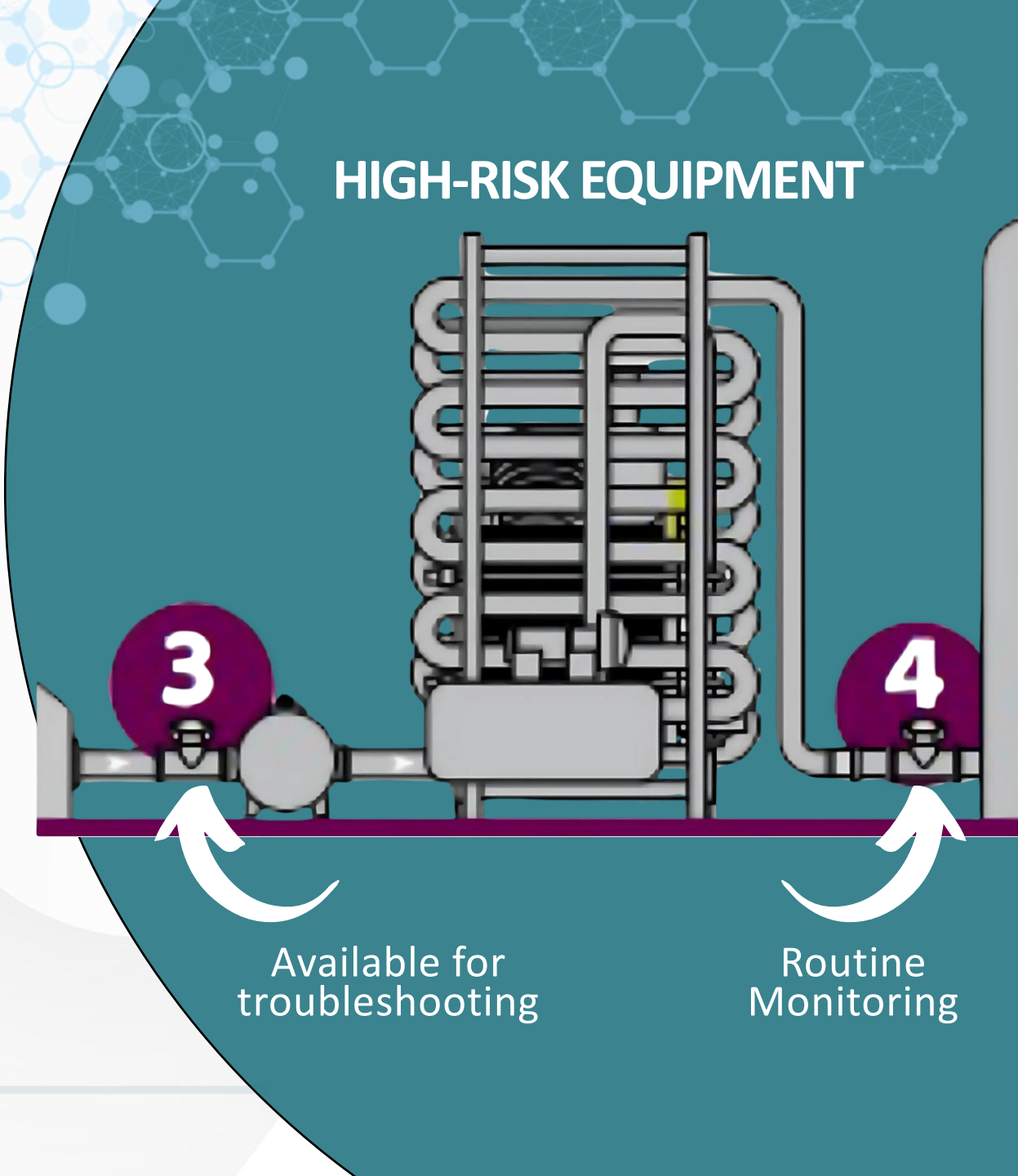
Sampling ports are proactive QA tools

Install them at:

- Routine points (e.g., after the pasteurizer, before the filler)
- High-risk zones and before/after critical equipment

Effective sampling ports should be:

- Aseptic – designed to prevent contamination
- Repeatable – enable consistent, validated collection
- Accessible – easy to reach & use during normal operation



Sampling Port Design: Key Requirements

Example Port 1

A well-designed sampling port should be:

- CIP/SIP compatible – fully cleanable in place
- Aseptic – no risk of introducing contamination
- Low dead volume – minimizes residual fluid retention
- Repeatability – enables consistent, validated collection
- Accessible – placed for ease of use during routine event-based monitoring

Sampling Ports: Key Requirements

Example Port 2

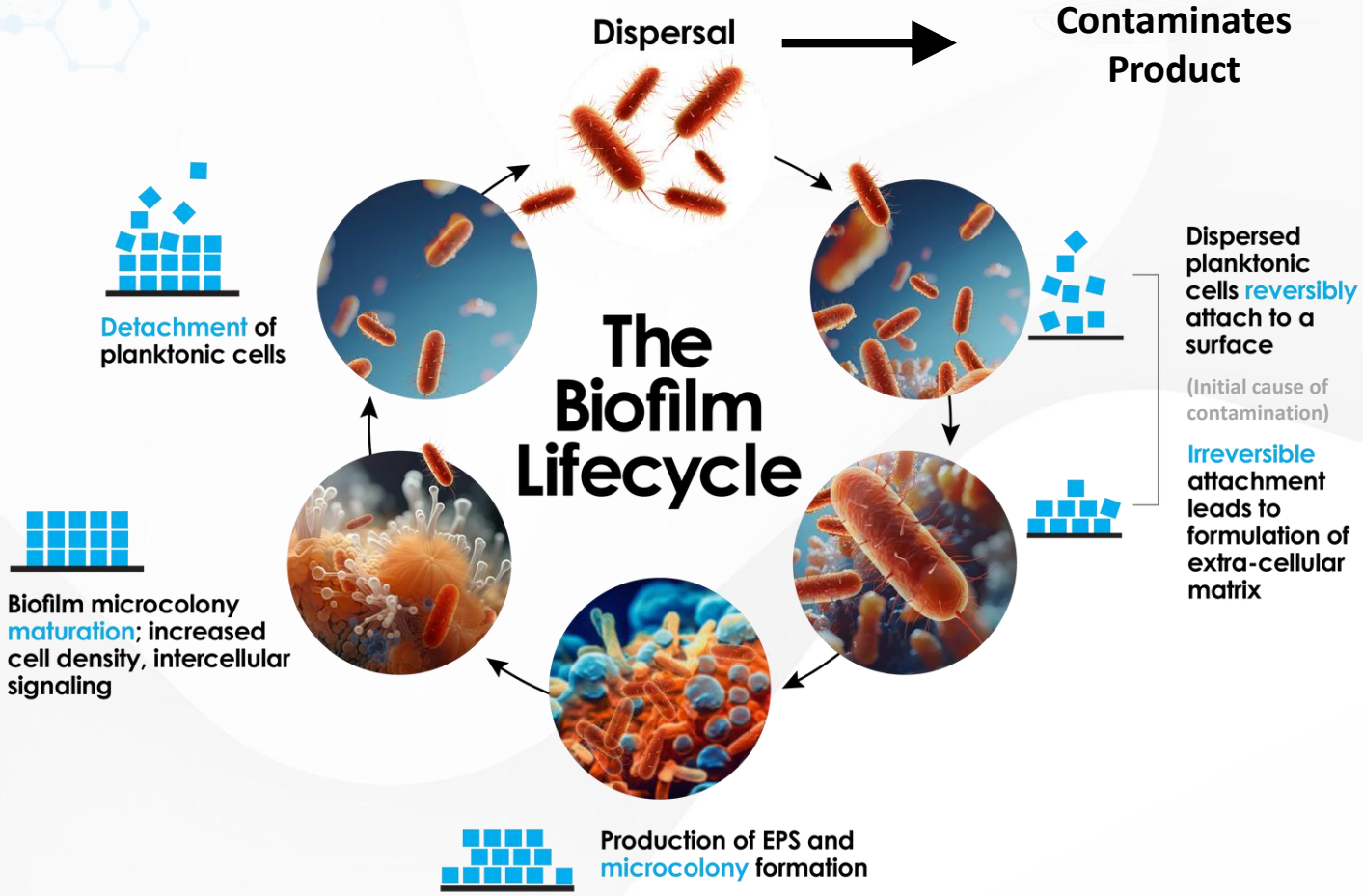
When installing sampling ports, consider:

- Weld-in or tri-clamp design – secure & sanitary
- Smooth internal surfaces – support cleanability and CIP
- Steam sterilization options – for aseptic collection
- Strategic placement – based on flow, risk points, & access needs

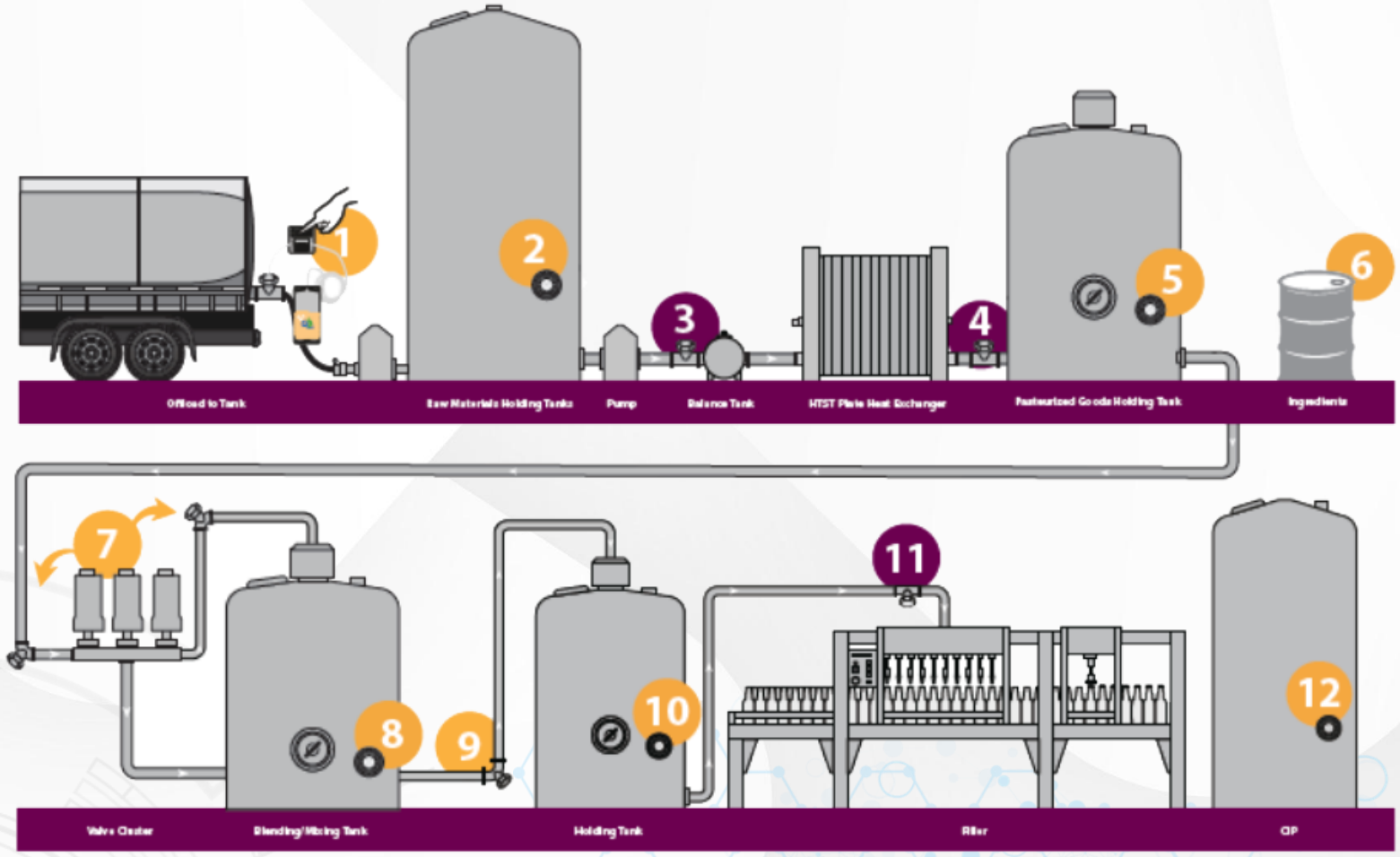
Biofilms: The Hidden Risk

Biofilms:

- **Defies Removal:** Shielded by a resilient extracellular matrix, biofilms resist standard cleaning methods.
- **Eludes Detection:** Intermittent contamination makes biofilms hard to identify, slipping through routine checks.
- **Endures as a Persistent Menace:** Deeply entrenched, biofilms linger as pervasive, insidious sources of contamination.
- **Lurks Everywhere:** Embedded throughout the production process, from equipment to pipelines, biofilms threaten product safety.



Example: Monitoring a Juice Process



Critical. Consistent monitoring.

Important. Vital for troubleshooting.

- Contamination detected at point 4 but absent at 3 & 11—suggesting the heat exchanger as the source.
- Upstream and downstream samples helped isolate the root cause.
- Early detection of contamination. Maintenance addresses

Key Targets for In-Process Monitoring

Monitoring should be tailored to your process and risks. These categories help align test targets with contamination scenarios.

Monitoring Target	Examples
• Pathogens	• Listeria monocytogenes, Salmonella
• Spoilage organisms	• Yeasts, pseudomonas, Alicyclobacillus (ACB)
• Indicator organisms	• Enterobacter, coliforms, phosphatase
• Hygiene indicators	• APC
• Other	• Allergens, adulterants, other (as appropriate)

Designing for Troubleshooting

Monitoring should be tailored to your process and risks. These categories help align test targets with contamination scenarios.

Without Sampling Ports

- Inaccessible Pipe Sections
- Lack of sampling locations in critical process locations
- Reliance on guesswork
- Reactive decision making

With Sampling Ports

- Predictive
- Isolate key equipment or operations
- Efficient, rapid diagnostics
- Proactive decision making

Sampling ports should be placed at logical decision points in the process

Pulling it all Together

THREE LEGS OF CONTROL

- Built-in access to process
- Eliminate harborage points
- Ensure cleanability
- EMP alignment
- Enables root cause isolation

Key Points
to Remember

1. Hygienic design alone isn’t enough.

- You need access to the right data.

2. Sampling is an early warning system.

- Lets you act before the problem hits the product.

3. Smart design, sampling & monitoring

- Effective control comes from integrating smart
- design, strategic sampling, and meaningful monitoring.

QUESTIONS?

QualiTru.com

Phone: 651-501-2337

Email: sales@qualitru.com

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