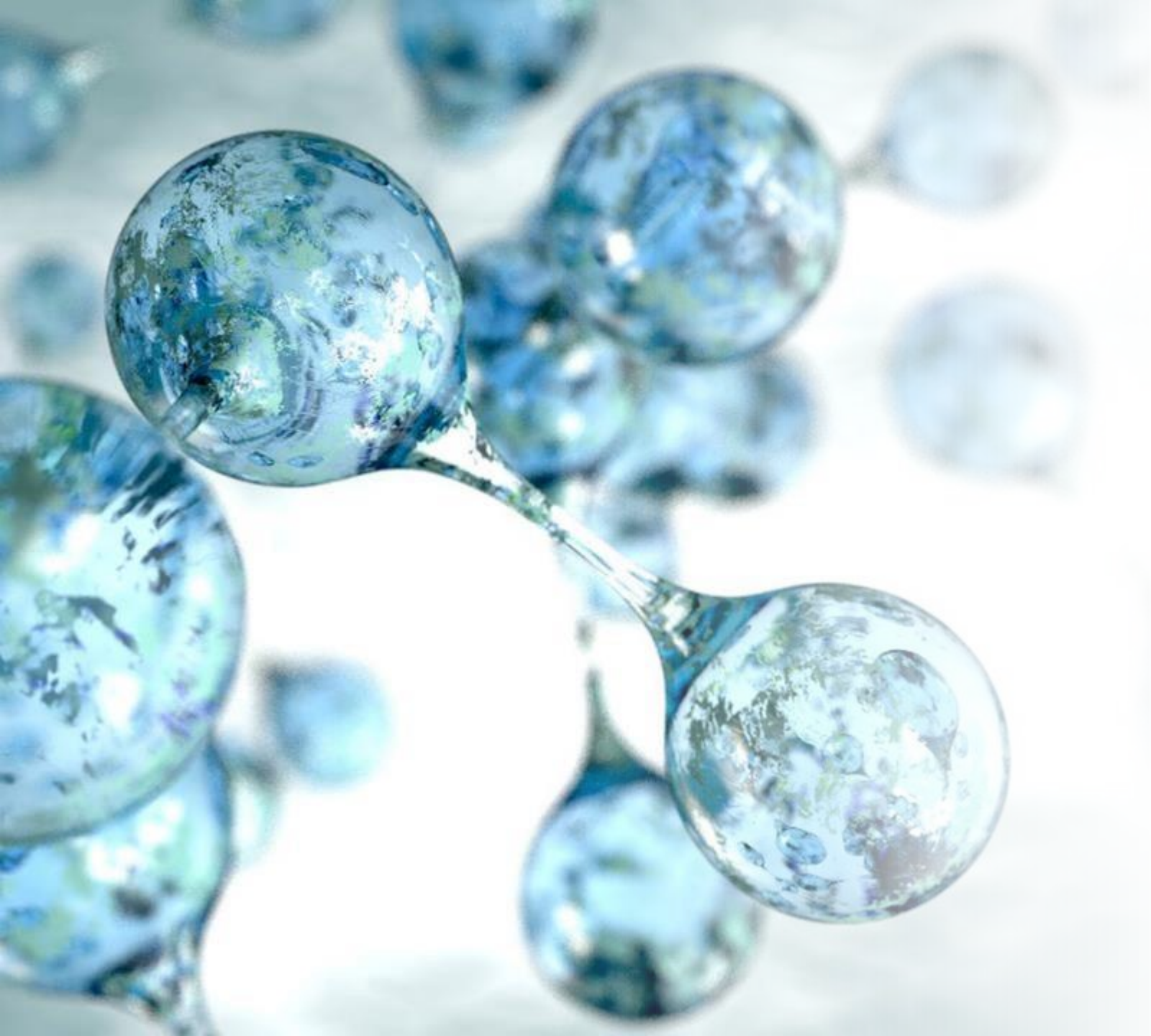
VINK CHEMICALS

**Industrial Hygiene**

# Cleaning and sanitization: 2 keys for the optimization of your production and of the protection of your products

**Hungarocoat 2022 – November 29-30**



# ABOUT US

# WE ARE…

Vink Chemicals GmbH & Co. KG is a family owned medium-sized company founded in 2011 and based in Kakenstorf in Lower Saxony.

Vink Chemicals is involved in the production of biocide formulations for a variety of industries.

By specialising in tailor-made services in this field, we are closing an important gap in the international biocide market. We also offer a selection of speciality chemicals.

Vink Chemicals is active worldwide!

# WE ARE…

*“A Team with our Customers”*

- **Tailor-made developments / customized recommendations**
- Several types of packaging
- Tailor-made product packaging available on request
- Private labeling
- 250+ biocidal formulations and specialty chemicals


- **Worldwide presence**
- International sales and distribution network
- Excellent connections to raw material suppliers
- Strategic procurement of raw materials in a global network

- Specialists with 30+ years experience
- Anticipation to regulations
- **Own microbiological and analytical labs**
- More than 30 global registered patents

# OUR MARKETS | OUR PORTFOLIO

OILFIELD & FUEL TREATMENT

PAINT & COATING INDUSTRY

CONSTRUCTION INDUSTRY

LAUNDRY & CLEANING AGENTS

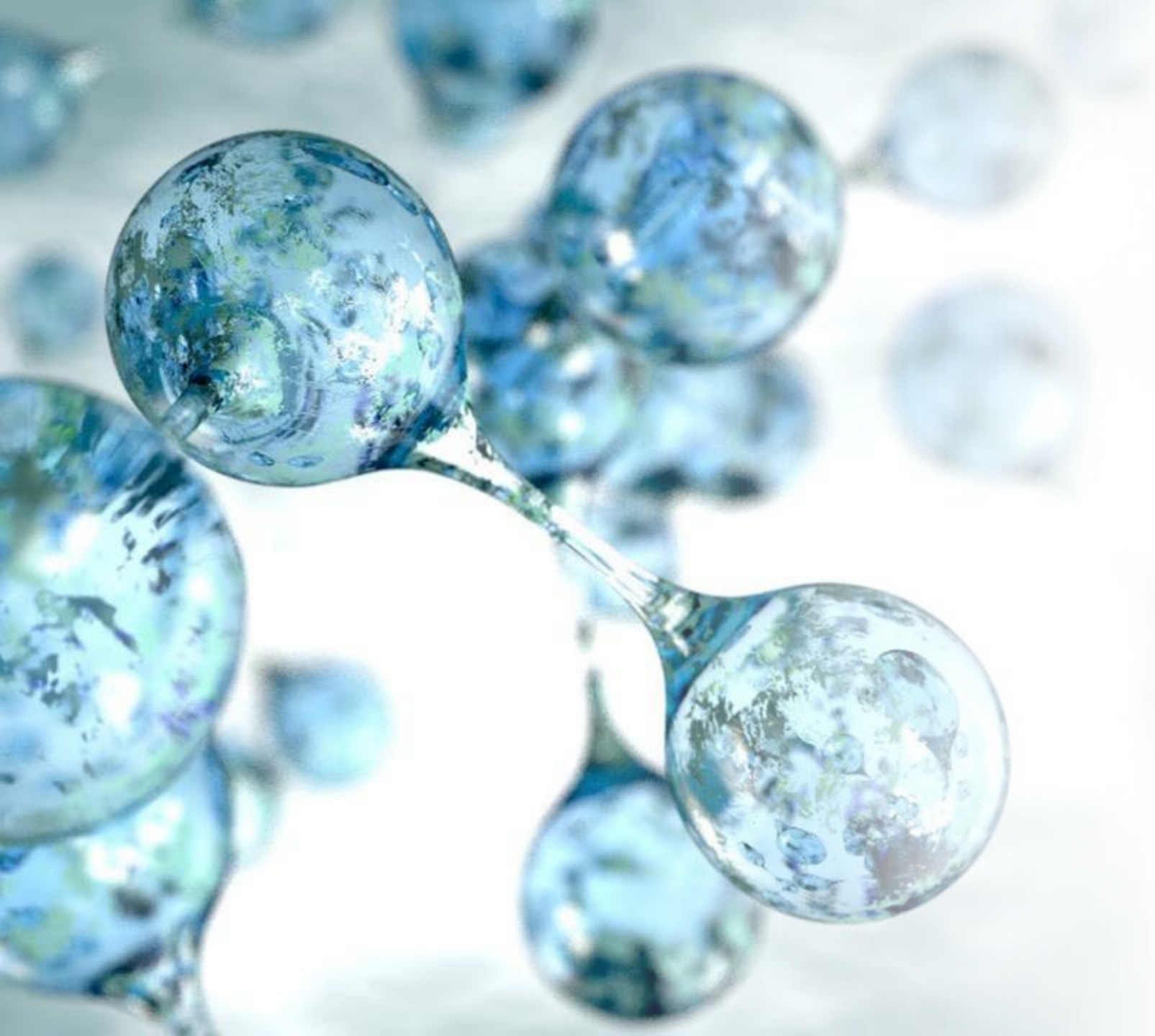
LUBRICANTS

TECHNICAL BIOCIDES

OILFIELD & FUEL TREATMENT

SPECIALITY CHEMICALS

SYSTEM CLEANERS



# TODAYS CHALLENGES

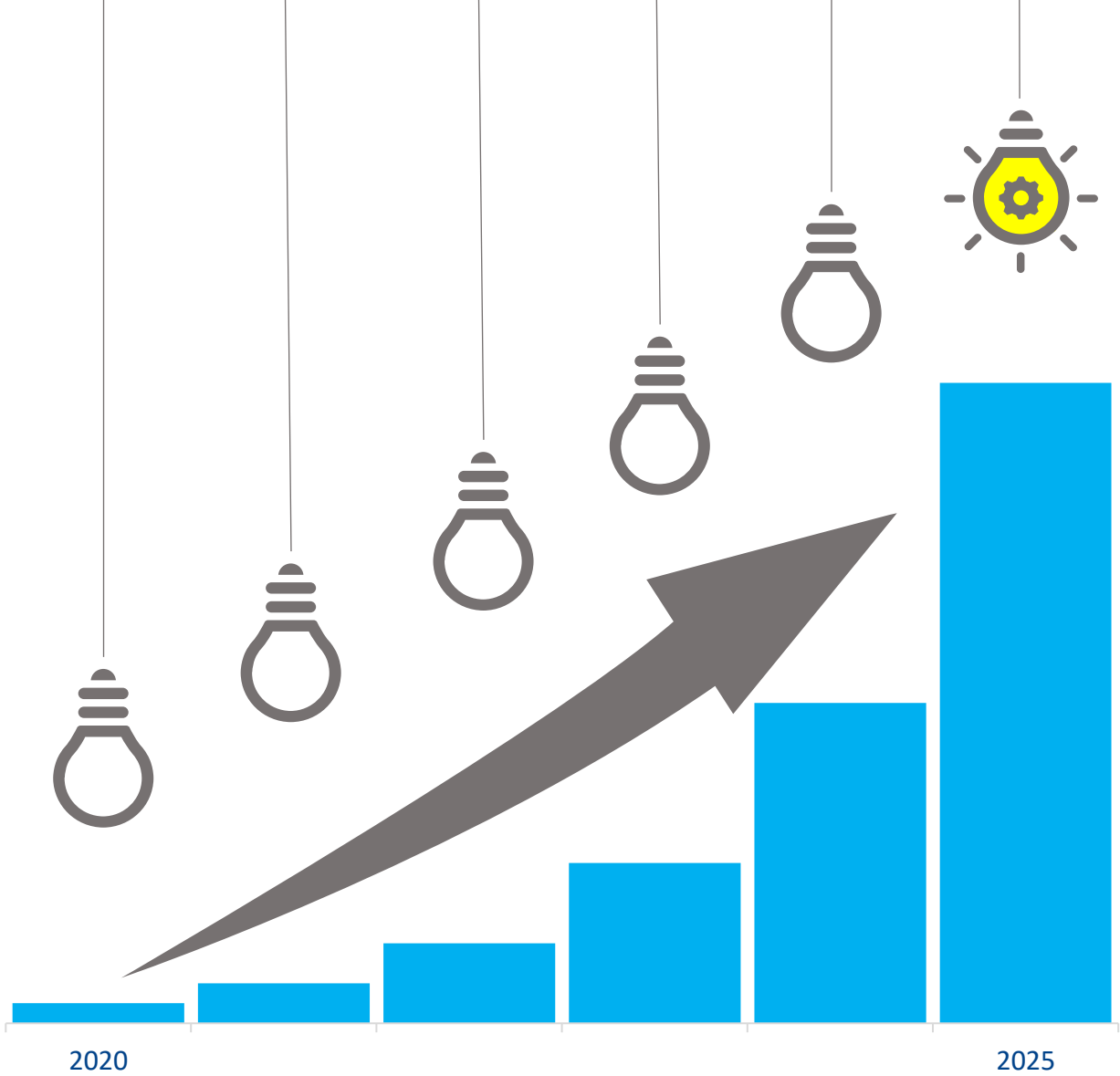
# FOREWORD

- With the constantly changing restrictions on the use of biocides, improving the overall hygienic conditions is a must.
- Challenge tests are suited tools to determine the optimal dose level of biocide to be used
- Production hygiene audits are important tools for the protection optimization
- Sanitization is more and more recommended to reduce possible contaminations hiding in production equipment
- Aren’t we missing an important step?

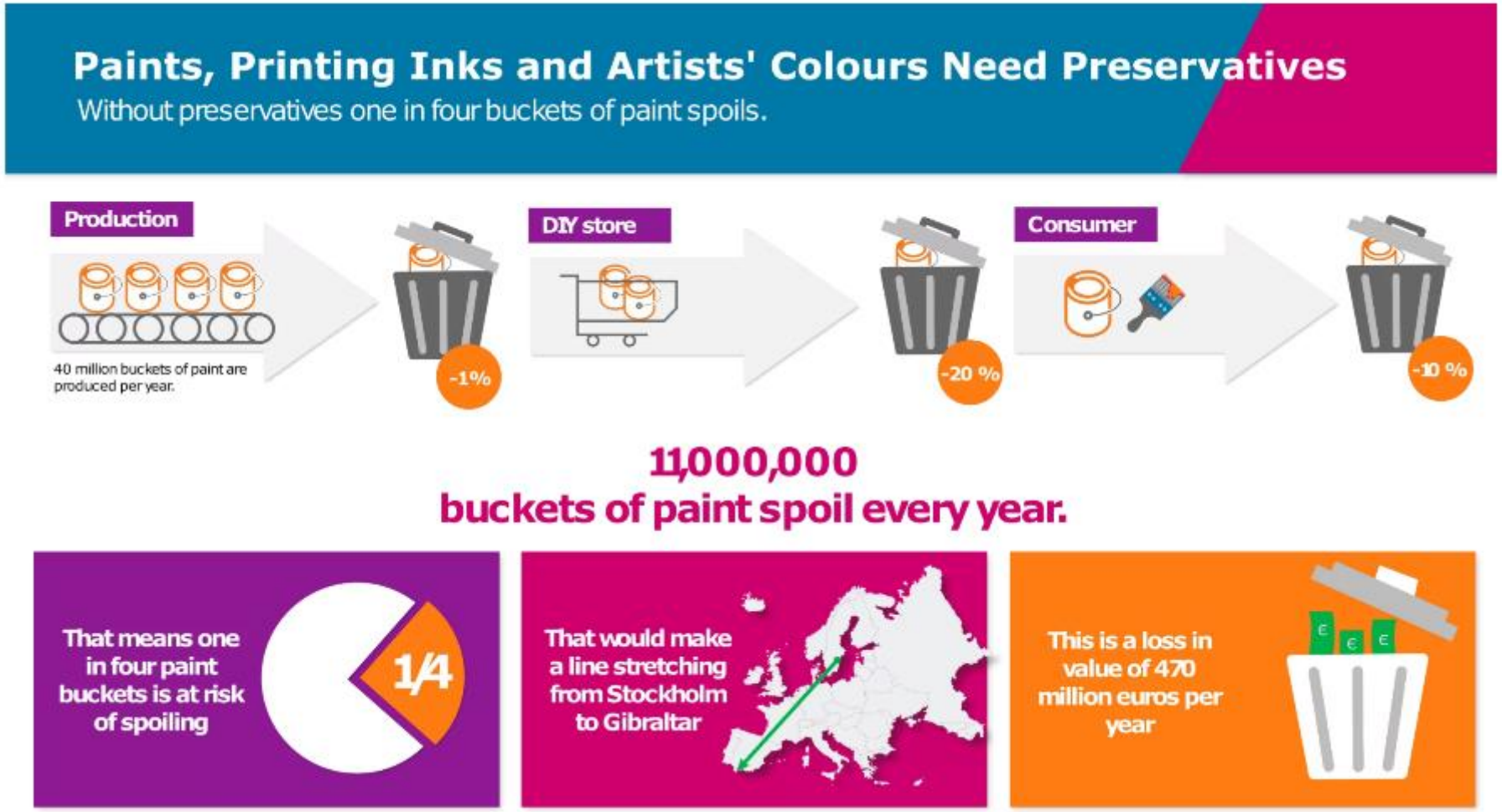
# TRENDS & TRIGGER

- “Green Chemistry”
- Low risk potential → Soft preservation
- Cost savings/ treatment
- Increasingly regulated markets
- Sustainable supply chain
- Low water consumption
- Waste management

- **Innovative plant hygiene**



# CONTAMINATION RISK




The European Council of the Paint, Printing Ink, and Artist's Colours Industry (CEPE)

Campaign: Coatings need preservatives - CEPE

# CONTAMINATIONS: THE PRICE TO PAY

- Recent contamination issues met in the food industry are relevant of the price to pay to restore confidence for customers

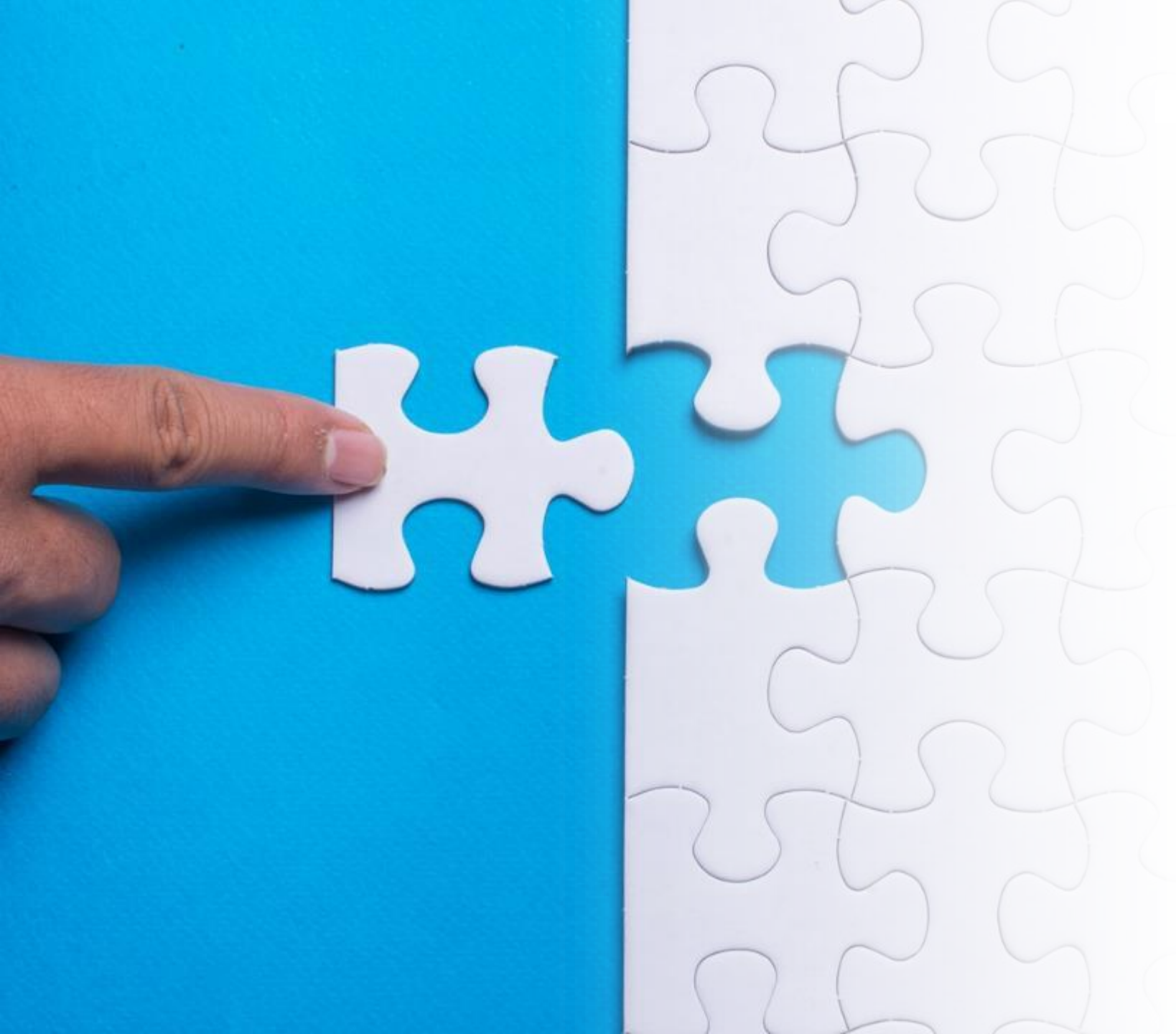
→ Stocks to be collected and destroyed

→ Emergency procedures to be set to cure the production units

→ Bad image on the market

→ Huge efforts needed to restore customers' confidence in the brand

→ Court cases



# The pillars to optimize your wet-state protection

# CHALLENGE TESTS: ADVANTAGES

Challenge tests in laboratories are good discrimination tools to:

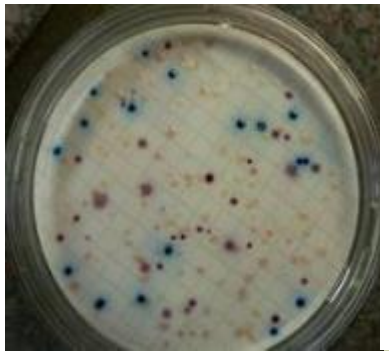
→ Rank various tested protections

→ Eliminate weak systems

→ Determine the optimal dose levels

→ Check the stability of active substances in the tested matrix

→ Detect incompatibilities



# CHALLENGE TESTS: DRAWBACKS

- Challenge tests have some limitation:

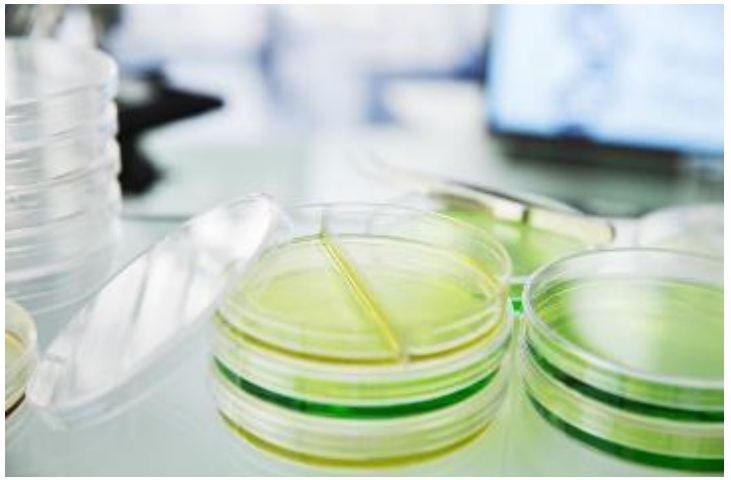
→ They reflect the behavior of the tested material under optimized conditions and against the microorganisms that grow in the laboratory.

→ They don’t allow seeing the benefits of having flash curing systems

→ They sometimes neglect the competition between species

→ They hardly consider the constraints of the manufacturing process

→ Biofilms are hardly considered in tests



# BIOFILM?

- Biofilms are dynamic heterogenous microbial communities of bacteria and fungi **surrounded by a protective slime matrix**. Microorganisms can attach to surfaces and produce an extracellular polymeric matrix (EPM) to enable a strong attachment and protection from external attack. The biofilm will grow and mature as the organisms grow, divide and metabolize.

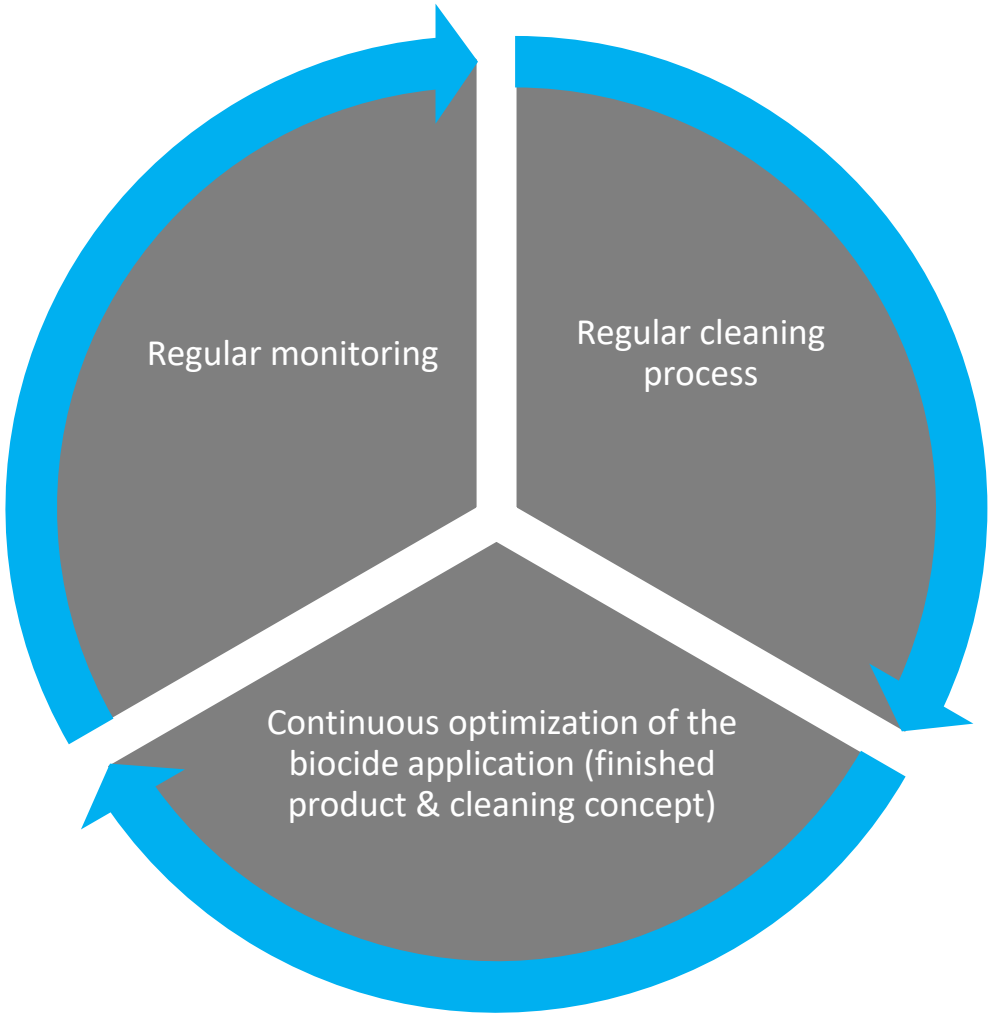
- Biofilms can have detrimental effects in the human environment when occurring in the wrong place and/or wrong time. Biofilms can be involved in the destruction of the materials they colonize; these processes are described as **biocorrosion** or biodeterioration. Biofilms are involved in all kinds of biofouling, for example in cooling water systems they cause **increase in resistance to heat energy transfer**, increase in fluid frictional resistance, or acceleration of metallic corrosion

- Biofilms are known to exert **enhanced resistance** to biocides; they are **10 to 1 000 times less susceptible** towards a wide variety of different antimicrobial agents than are the corresponding planktonic cells.

- Biofilm detachment can cause pollution of a few buckets, a full batch, or even colonize a whole facility.

# PRODUCTION HYGIENE AUDITS: GOALS

- Monitoring of the hygienic conditions of the audited plant
- Creation of a hygiene plan – CCP (critical control points)
  Identification of the materials / devices of concern in the production
- Establishment of quality standards for raw material suppliers
- Identification of working methods in need of optimization
- Determination of the optimal (production) steps for biocide addition
- Limit the risks of claims



# PRODUCTION HYGIENE AUDITS: LIMITS

- Production Hygiene Audits only give overviews of the sanitary conditions at the day of the inspections

→ Monitoring only reflect what customers allow to be seen

→ Samples can only be collected from accessible areas

→ Reports are only valuable if recommendations are realistic and are followed by the customer

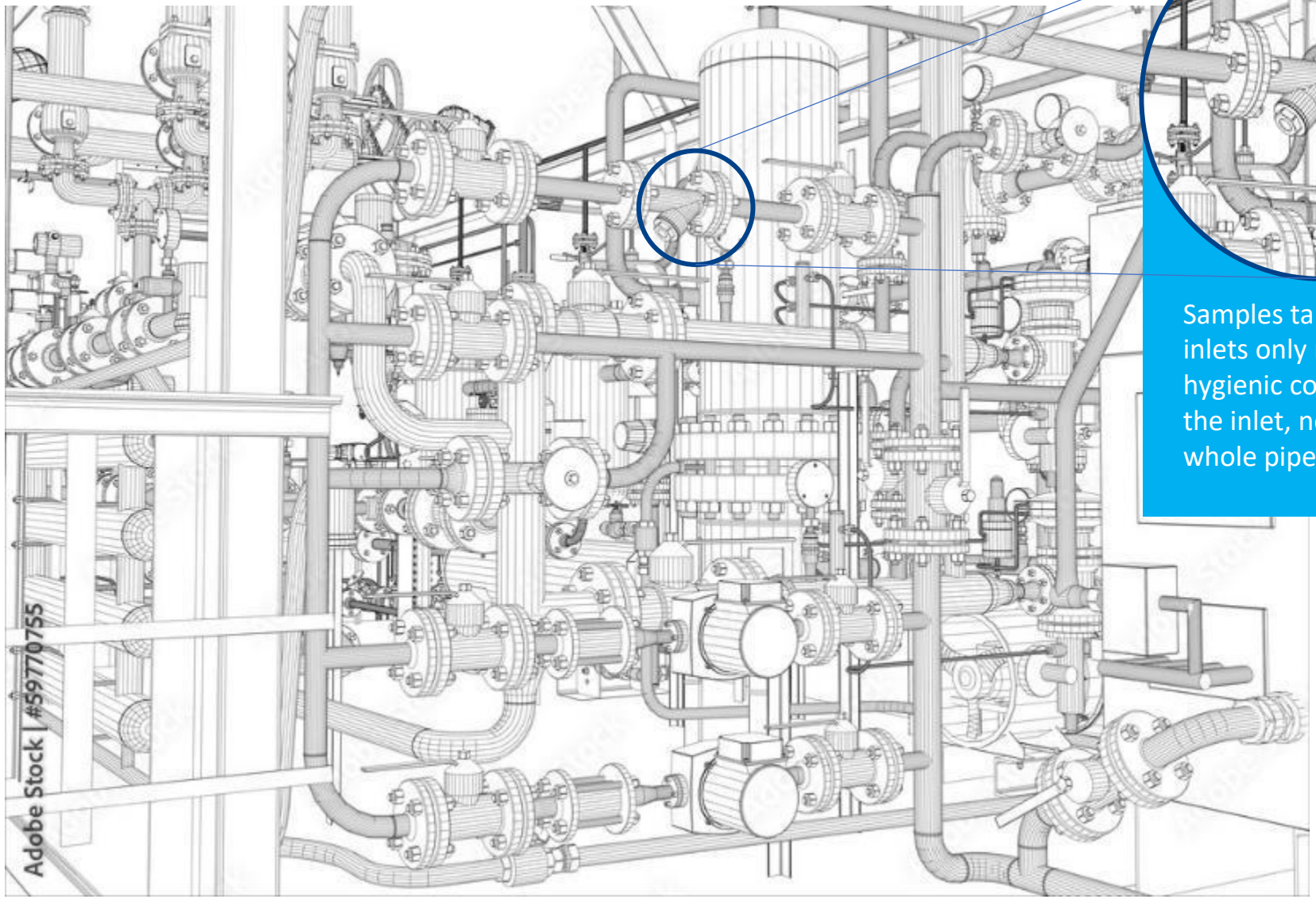
→ Routine kills – picking samples always at the same place skew the results

→ Weak points can hardly be found without customers' support

→ The analytical interpretation of the results can differentiate from one supplier to another – a global understanding of the process is needed

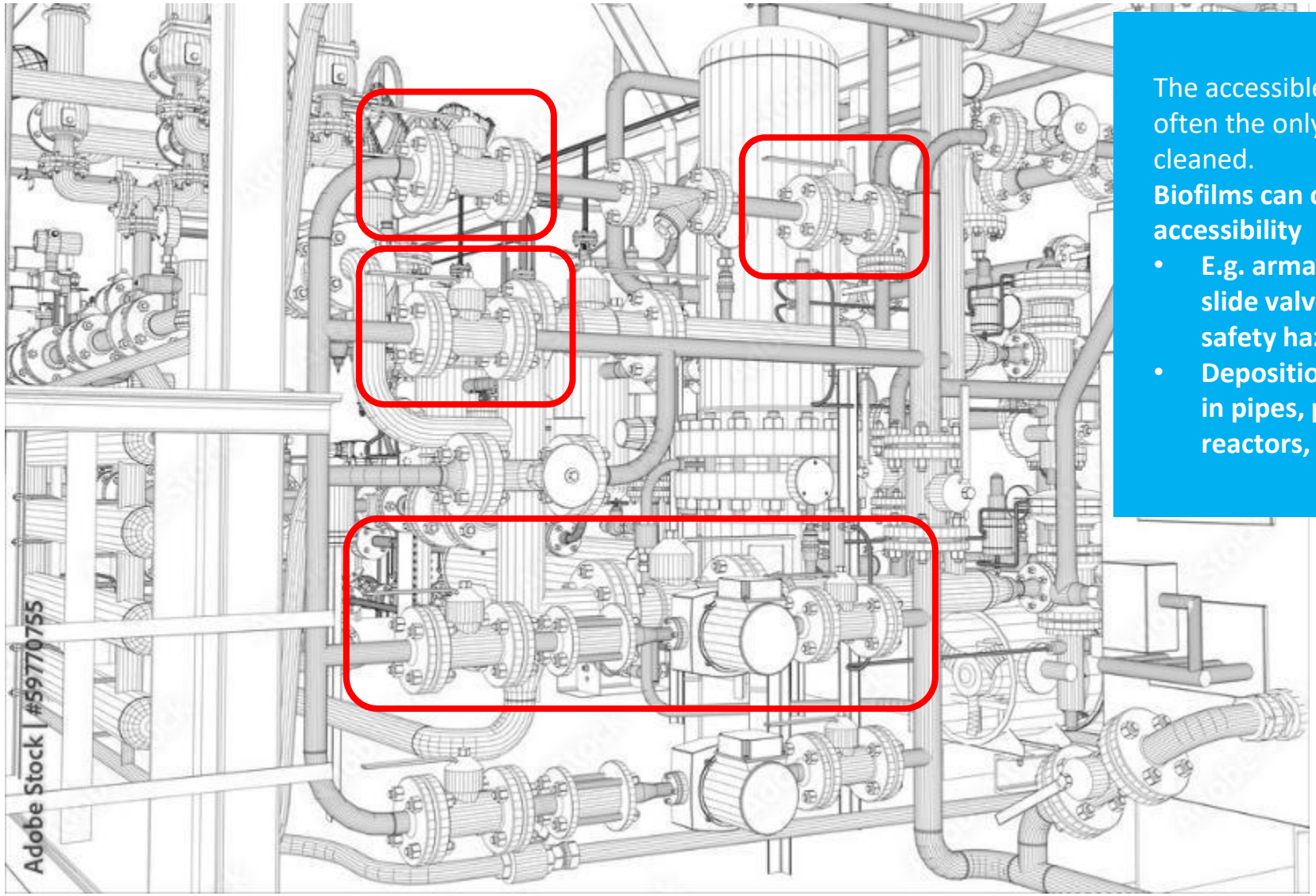
→ Random inspections only lead in partial view

# SAMPLES AND REAL CONDITIONS




Samples taken from the inlets only reflect the hygienic conditions of the inlet, not of the whole pipe.

# SAMPLES AND REAL CONDITIONS




The accessible part of the dome is often the only part that get cleaned.

**Biofilms can often stay due to poor accessibility**

- **E.g. armatures (ball valves, slide valves, etc.) are often a safety hazard.**
- **Deposition of product residues in pipes, pipe systems, vessels, reactors, etc.**

# SANITIZATION: ADVANTAGES

- Various options are suited for the fast sanitization of paints, varnishes, inks, adhesives and glues production equipment.

- The fast-acting substances allow sanitization of the treated surfaces within a short time frame at minimal use levels

- Some of them degrade rapidly with non-detectable residues and therefore don’t have to be rinsed or disposed off in a production process.

- Alternative chemistries are used at high dose levels for the sanitization of the pipes and flexible hoses with a prolonged contact time.

# SANITIZATION: DRAWBACKS

- Some of the fast-acting biocides may lead in other active substances degradation when not properly handled.
- Some of the standard solutions are highly corrosive to metal, including stainless steel.
- Some are not compatible with the product to be manufactured therefore, require rinsing.
- High-dose levels of biocides require specific waste management and may expose workers to unwanted risks.
- Most of the standardly used sanitization systems are not able to penetrate biofilms and will only act as surface sanitizers.

# SO, HOW TO IMPROVE HYGIENE ?

A **2-step approach** for optimal performances:

- **Sanitization** is an important step to reduce the risks of contamination in clean environments:

- Sanitization is not meaningful in dirty environments (eg. biofilms)

- Flooding pipes and equipment or spraying surfaces with a **system cleaner** may help in improving the overall hygienic conditions (shedding of mature biofilms, detachment and destabilization of mature biofilms)

- A mechanical action is sometimes necessary to detach biofilms:
  - Recirculation and turbulences are key factors to succeed

- The use of further sanitizing solutions might be required.

**Regular cleaning / sanitization and monitoring are the keys to success !**

# CLEANING vs SANITIZATION

## WHAT IS THE GOAL?

| Goal | | Solution | | |
|---|---|---|---|---|
| Visible ? | >>> | Clean | >>> | Complete removal of residues such as dirt, dust and grease from all surfaces using surfactants under recommended conditions. |
| Invisible (Microorganisms) | >>> | Sanitize | >>> | Reduction of microbiological infestation to accepted values. |

**Reminder!**
Sanitization is the beginning, not the end, of a production cycle and a major topic in various industries.

# SYSTEM CLEANERS

## - Production hygiene -

## REQUIREMENTS & COMPOSITION FOR SYSTEM CLEANER

### Requirements

- Good cleaning properties
- Good wetting properties
- Good material compatibility
- Cracking of existing biofilms

### Composition of a system cleaner

- Biocides / Biocide-free
- Wetting agents
- Dispersants
- Emulsifiers
- Alkali / Acids

# SYSTEM CLEANERS | WITH OR WITHOUT BIOCIDE ?

- **System cleaners with biocides** are to be preferred where a good recirculation can be ensured and where the production process can hardly be stopped (eg. MWF, flow coating, continuous processes).
  They have to be added during the manufacturing process.
  In this case, the biocide contribution must be considered for the labelling of the end products.

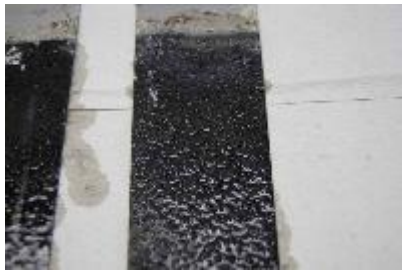
- **System cleaners without biocide** are to be preferred where biocide contributions matter.
  They must be used during the down-time of the facility.
  A sufficient contact time and recirculation must be insured to favour the detachment of biofilms through wetting and mechanical actions.
  Additionally, they can be combined with fast acting biocides to kill the microorganisms within the detached biofilm as well as of residuals of them on the surfaces.

# SYSTEM CLEANERS | VINKOCLEAN SR range

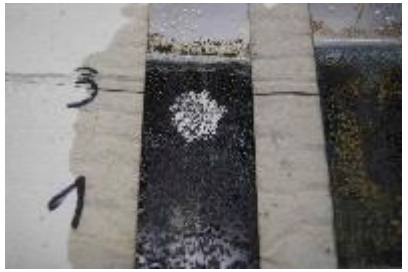
- Vinkoclean SR products are highly effective system cleaners with excellent cleaning properties. Mud, bacterial slime, clumps of fungi and yeast colonies are detached, container and pipelines are cleaned even in inaccessible places.
- Vinkoclean system cleaners effectively remove biofilms from surfaces and prevent new contamination of the system caused by shedding from mature biofilms. Existing biofilms are infiltrated, which leads to the detachment of the destabilized films. This can reduce the regular use of in-can biocides.
- Vinkoclean system cleaners contain surfactants as cleaning and reinforcing components. Other ingredients are acid (Vinkoclean SR 3) or alkali (Vinkoclean SR 1). The cleaners also contain bio dispersants to detach and bind biofilms and remove them from the system. This prevents a recontamination from deposition of the abraded biofilms. Booster substances intensify the efficiency as biofilm remover.
- Additionally, they can be combined with fast acting biocides to kill the microorganisms within the detached biofilm as well as of residuals of them on the surfaces

# EFFICIENCY TESTS | VINKOCLEAN SR range

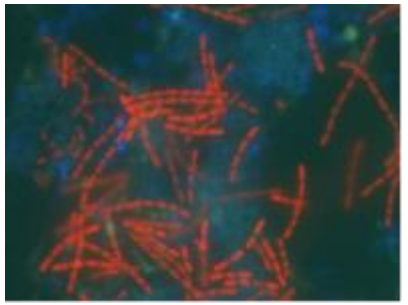
- Based on the standards of DIN/EN, ASTM and EHEDG a 3-step test was designed, including static and dynamic phases as well as field tests.



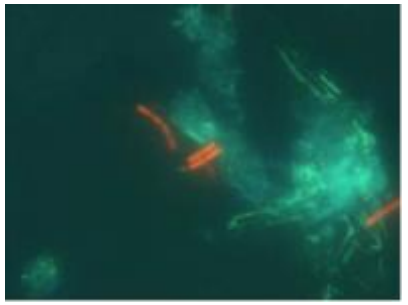
- Vinkoclean SR 3 showed a convincing biofilm removal on steel in a static test according to ASTM E2799 and EHEDG Doc.15.



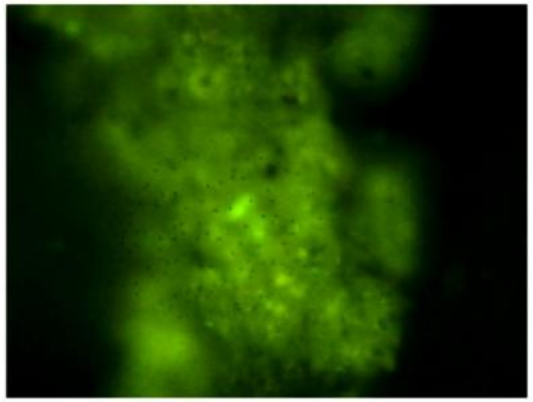

- Both 20% dilutions of Vinkoclean SR 1 and of Vinkoclean SR 3 are able to detach more biomass than a pure 20% DBNPA solution in a dynamic test according to EHEDG Doc. 2.



- With DPNBA alone the lower layers of the biofilms are not killed, DBNPA does not penetrate the biofilm.



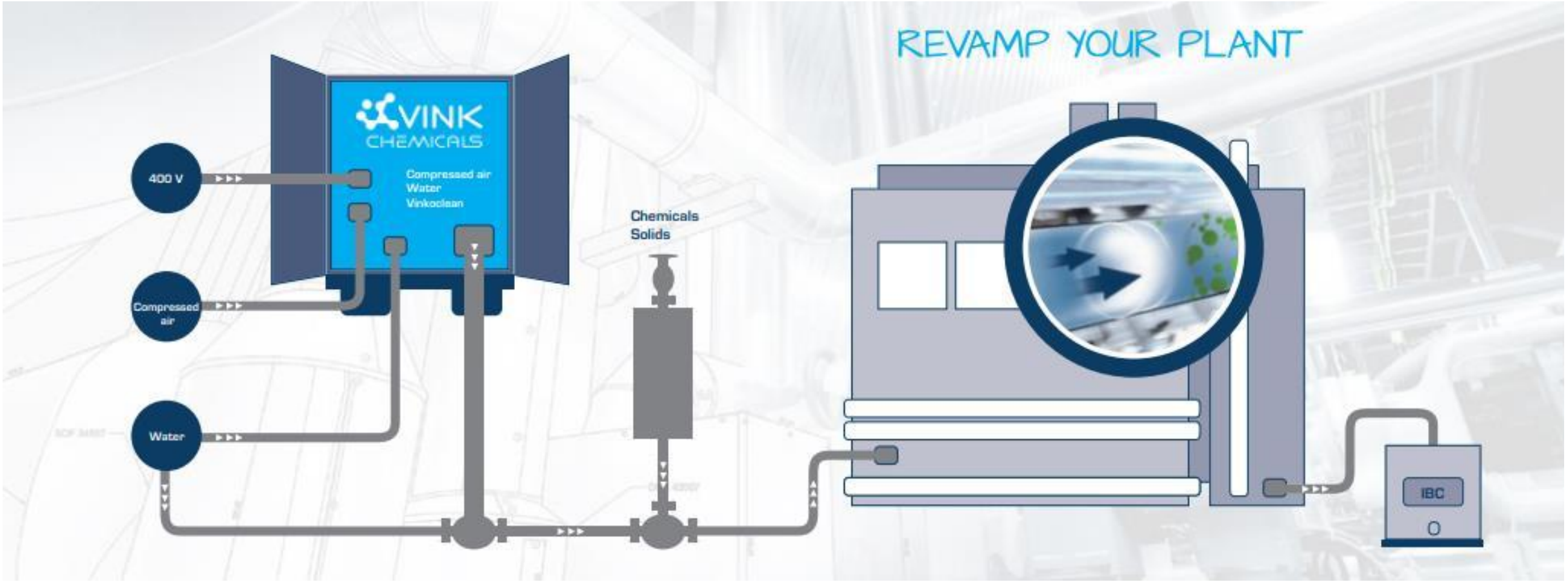
# EFFICIENCY TESTS | VINKOCLEAN SR range



- In a field test, various surfaces were swabbed before and after cleaning.
- The cleaned surfaces showed a clear reduction of bacterial counts on the surface after cleaning with a 20% Vinkoclean SR 3 solution.
- The use of the system cleaner Vinkoclean SR 3 resulted in an obvious reduction of the biofilm, which could be flushed out of the system.
- Compared to flushing with water only, the use of Vinkoclean SR 3 did not just remove the biofilm, but also reduced the microbial count to below of the detection limit.

| No: | | Sampling point | Microbial count | | |
|---|---|---|---|---|---|
| | | | *Bacteria* | *Yeast* | *Mould* |
| **Sampling before 24-hour circulation with Vinkoclean™ SR 3 (1:5)** | | | | | |
| 1. | S | Container hose, docked to IBC | 3 | 2 | 0 |
| 2. | S | Wall outlet, pump side | 4 | 0 | 0 |
| 3. | S | Hose, connects to wall opening and then goes into pump | 3 | 0 | 0 |
| 4. | S | Like no. 3, only after rinsing with water | 2 | 0 | 0 |
| 5. | S | Sieve in the pump | 0 | 0 | 0 |
| 6. | S | Hose pressure side to the IBC - centre piece (hose no. 2) | 4 | 0 | 0 |
| 7. | S | Hose on the pressure side to the pump (hose no. 1) | 4 | 0 | 0 |
| 8. | S | Hose extension between hose 1 and 2 | 4 | 3 | 0 |
| 9. | S | Filter inside without sieve | 0 | 0 | 0 |
| **Sampling after 24 hours circulation with Vinkoclean™ SR 3 (1:5) and rinsing with water circulation** | | | | | |
| 13. | S | To sample no. 1 | 0 | 0 | 0 |
| 14. | S | To sample no. 2 (opposite side) | 0 | 0 | 1K |
| 15. | S | To sample no. 3 (opposite side) | 0 | 0 | 0 |
| 16. | S | To sample no. 5 | 0 | 0 | 0 |
| 17. | S | To sample no. 6 | 0 | 0 | 0 |
| 18. | S | To sample no. 7 | 0 | 0 | 0 |
| 19. | S | To sample no. 8 | 0 | 0 | 0 |
| 20. | S | To sample no. 9 | 0 | 0 | 0 |

# VC PRODUCTION HYGIENE | EXTREME SOLUTION

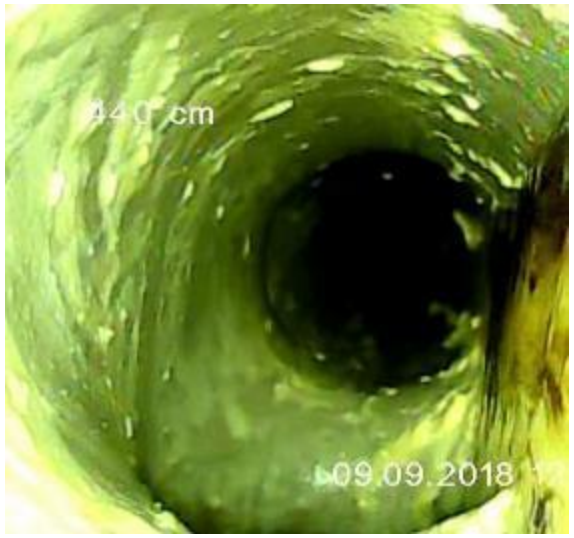


# DESINFECTING vs CLEANING OF “DEAD-ENDS”

Water always chose the easiest path to flow – flushing water through pipes

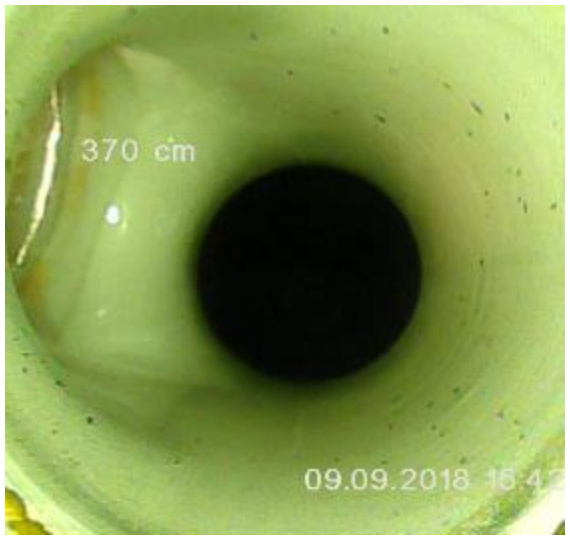
Sanitizing an equipment contaminated by a biofilm is not enough. It only sanitizes the surface of the biofilm without removing it.

Contaminated pipe (binder) before procedure

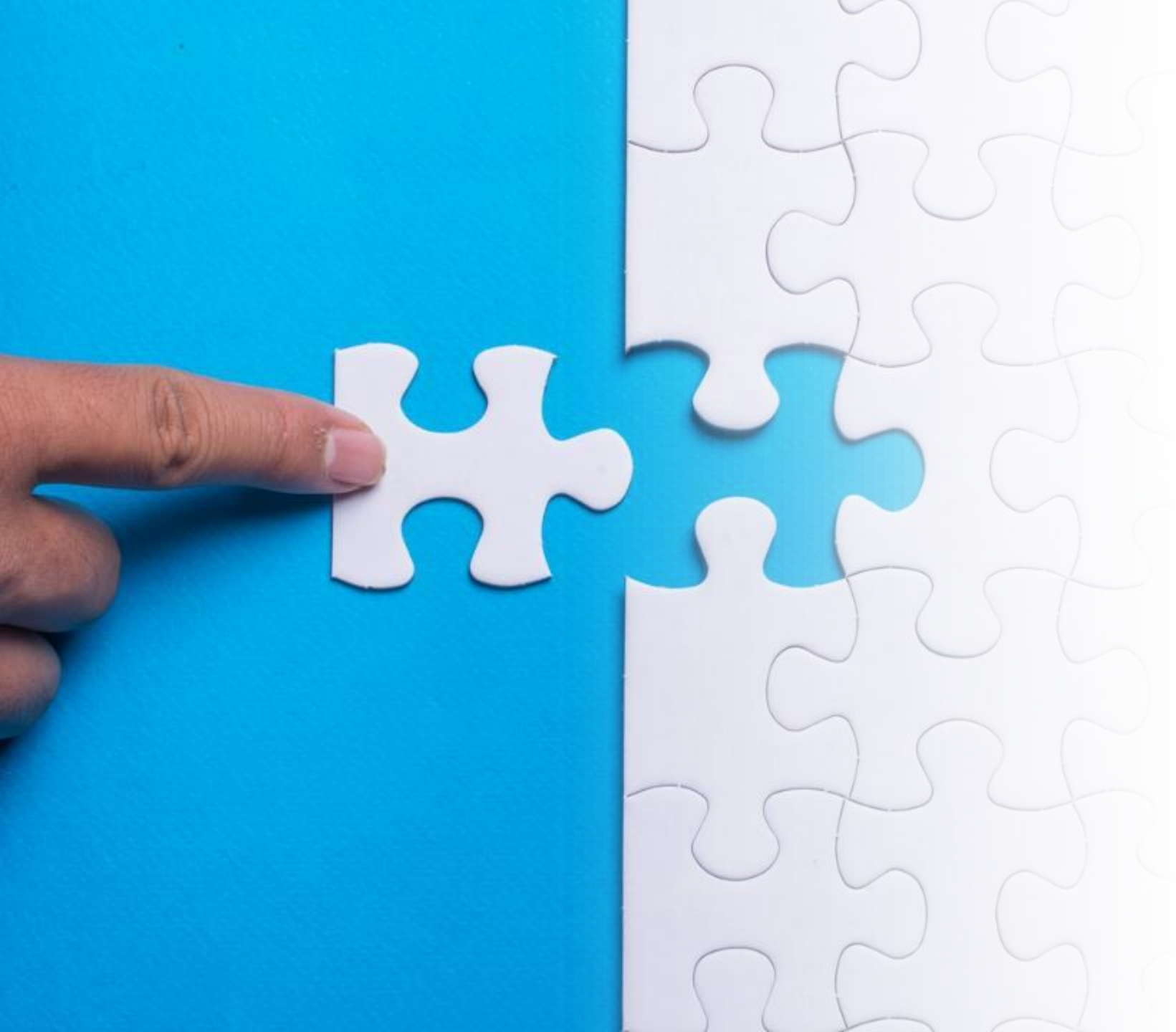



Contaminated pipe after flushing with disinfactant solution


Contaminated pipe after cleaning with system cleaner solution (Vinkoclean SR1)




Contaminated pipe after using pipe purification concept



# Take Home Message

## - Plant hygiene -

# TAKE HOME MESSAGE

- Suited biocide solutions can only be efficient under good production and handling conditions
- Sanitization is an important step to lower direct biocide consumptions for the end-products
- Cleaning is a necessary preventive step to minimize the use of dangerous chemicals
- System Cleaners are the next solution for optimal hygiene
- Vinkoclean SR 1 and Vinkoclean SR 3 are optimized biocide-free solutions to eradicate hiding biofilms

# YOUR TEAM

| | |
|---|---|
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