

SAY GOODBYE TO BIOFILM, WITH ENZYMES

The Belgium-based detergent company Realco has developed a unique enzyme-based solution for removing biofilm contaminations within the food & beverage industry.



Industrial food & beverage processing generates specific cleaning challenges where enzymes prove their worth by speeding up and improving cleaning performance and maximizing equipment utilization.

Biofilm is a collection of bacteria encased in extracellular polymeric substance (EPS), more commonly known as slime. This slime forms on surfaces and builds up over time, allowing pathogens to flourish and leading to contamination.

Many industrial companies struggle with biofilm. Buildup and subsequent contamination can occur on any type of surface, often including food production machinery, membrane filters, and pipes, to give just a few examples. The slime is a problematic and unpredictable source of contamination that is very hard, if not impossible, to remove with traditional cleaning chemicals.

Although various methods are used to attempt to control biofilm, they are not without limitations. Aggressive chemicals such as caustic soda and bleach are often used, but they do not provide very good performance and, at the same time, corrode materials and machinery, endanger users, and negatively impact the environment.

Fortunately, a more efficient, safe, and environmentally friendly option is available – enzymes.

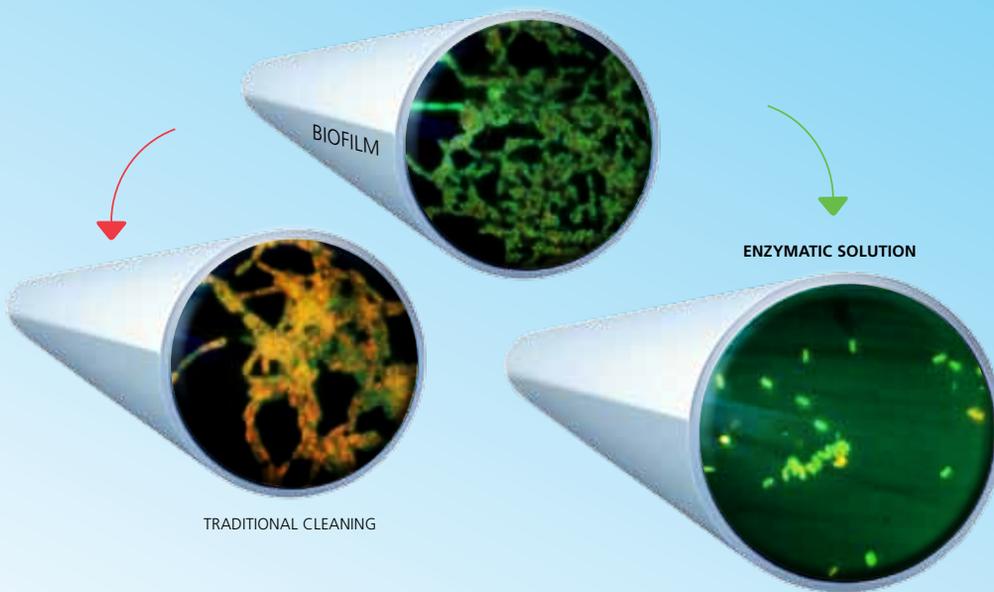
An immense problem

“The market for biofilm removal solutions is large; many industries are confronted with microbial

contaminations related to biofilm,” says Benoît Duculot, Enzymatic Process Sales Manager, Realco. “Wherever hygiene is considered important, there is a potential application.”

Cleaning in place (CIP) is a term denoting cleaning equipment such as pipes, tubes, and other processing equipment on the spot between production runs. CIP does not involve mechanical cleaning action, only reliance on the power of the cleaner. In this particular application, enzymatic cleaning is the only way to get complete biofilm removal.

“Biofilm can develop anywhere, but it’s most often found in locations that are tough to clean,”



TRADITIONAL CLEANING

ENZYMATIC SOLUTION

Traditional cleaning methods cannot remove biofilm but Realco's enzymatic solutions can.

Photos: INRA-UR638, Y. Lequette, C. Faille (NETZYM).

AWARD-WINNING INNOVATION

Realco's Biorem product line is the result of a European research project, NETZYM, initiated by EUREKA in partnership with two renowned European organizations – the Catholic University of Louvain (UCL) in Belgium, and the National Institute of Agronomic Research (INRA) in France. In 2009 Realco received an Innovation Award from CFIA (Carrefour des fournisseurs de l'industrie agroalimentaire – the Food Industry Suppliers' Annual Meeting) for its biofilm removal solution.

says Olivier Fain, Enzymatic Process Sales Executive, Realco. "For example, biofilm often thrives in membrane filtration units and heat exchangers in the food industry, where CIP is used."

Works on tough cases

Biofilms have very strong chemical resistance, making them a very tough cleaning challenge. Realco's multienzyme solution has been developed and tested to be effective against more than 60 different biofilms found in food processing plants, including the seven most difficult-to-remove biofilms, which do not respond to traditional cleaning.

Finding the right combination of multienzyme cocktail and detergent ingredients and then understanding how to integrate them into an efficient cleaning procedure took more than three years of work and is covered by a pending patent.

Realco's R&D effort has been rewarded. Realco has worked with several companies since the commercialization of its Biorem product in 2009: "In confirmed biofilm contamination cases the success rate is 100%," says Benoît Duculot.

A two-step, multienzyme method

Using an easy two-step cleaning procedure comprising a multienzyme mix based on enzymes from Novozymes followed by a biocide step, Realco has come up with an efficient way to rid surfaces of biofilm.

The Novozymes enzymes used in the Biorem product line act specifically on the EPS that forms the structure of the biofilm, degrading it and allowing the detergent to remove the biofilm. This enables the subsequent disinfectant step to reach all the way down to the exposed bacteria and kill them.

There are two ranges in the Biorem product line: one curative treatment and one preventative treatment to be applied every 4–8 weeks. However, Realco's solution is not only its products, but also test kits and consultancy support to identify the location of a contamination problem and recommend a cleaning protocol to eliminate it.

"Our customers need to use the curative treatment only once," says Benoît Duculot. "We teach them how to use our preventative product and how to integrate it into an effective cleaning procedure."

The Biorem products offer important advantages over traditional chemical cleaning solutions:

- Efficiently eliminate and prevent costly contaminations
- Gentle for operators to use
- Noncorrosive on materials
- Based on renewable raw materials and green technology

Two real-world cases

Realco has applied its solution successfully in several food & beverage plants.

Firstly, a well-known yogurt producer was having problems with nonconformant texture in some of its products due to the presence of too many microorganisms. Realco's solution got the production back on track.

"Although there was no real contamination problem in this situation, our solution was able to help this company uphold its global brand reputation as a producer of high-quality yogurt," says Benoît Duculot.

Secondly, a European butter production plant was having problems with batches that exceeded

a standard microbial count limit. This resulted in many batches needing to be destroyed. In this case, Realco was able to solve the problem with its curative treatment. Today the plant is using Realco's preventative treatment and is no longer experiencing contamination problems.

A complementary solution

"Some companies are afraid that switching to this enzymatic solution will mean that they need to completely change their cleaning regimen, but this is absolutely not the case," says Oliver Fain. "Actually, this solution is complementary to a company's current cleaning procedure; it only needs to be used periodically to keep the biofilm under control."

"Biofilm is notoriously difficult to deal with," says Christian Wieth, Senior Global Marketing Manager at Novozymes. "I'm impressed with the results that Realco has obtained so far. Finding the right cleaning protocol with enzymes and detergent for broad removal of common biofilms is not trivial. Novozymes is happy to spread the word in the industrial cleaning arena that a new alternative exists." ■

FOR MORE INFORMATION

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