Enzymatic cleaning: 
the key to improve hygiene and safety in craft breweries?

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Agenda

1. Brief Introduction by Murphy & Son
2. Realco at a glance
3. The enzymatic technology
4. Enzymatic cleaning and the food & beverage industry
5. ENZYBREW 10: product, protocols and applications
6. References and “ENZYBREW 10 Ambassadors”
7. Contamination issues: biofilm
8. Q&A
We are excited to supply an enzymatic cleaning product specially designed for microbreweries

ENZYBREW10
2. Realco at a glance

- Over 40 years of experience in hygiene and food safety
- Globally-recognized technological achievements - 9 patents and 3 prizes
- At the forefront of scientific research – 15% of turnover invested each year in R&D
- A family owned company at the heart of Europe, Belgium
- International network: Europe, Japan, India, Canada, USA, etc.

Key figures:

- 2000 customers globally
- Turnover: 6.200.000 £ in 2015 (+10%)
- 47 employees
- Export: 40%
- Subsidiary in the U.S.A: Realzyme
- Subsidiary in medical sector: OneLIFE

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2. Realco at a glance

1. World Leader in the Enzymatic technology

10. Average annual percentage growth

25. Years of experience in enzymatic technology

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2. Realco at a glance

**Mission**: Providing hygiene solutions that ensure the well-being of human and the environment in the 4 following sectors:

- Food Service
- F&B sector
- Consumers
- Hospitals

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3. The enzymatic technology

✓ Enzymes are natural proteins (100% biodegradable) that transform organic residues into water-soluble compounds in an irreversible reaction.

✓ Enzymes transform organic substances irreversibly into water-soluble residue.
✓ Enzymes are powerful cleaning agents.
  => Guarantee of effective, in-depth cleaning
  => Improved hygiene, reduced use of disinfectant

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3. The enzymatic technology: sustainability

Enzymes are natural proteins which transform any organic material into smaller components which are directly soluble in water and more easily assimilable by bacteria (+++ reed bed systems)

Consequence:
enzymatic cleaning solutions accelerate and improve the WWT process
3. The enzymatic technology: benefits

1) **More effective cleaning**: in-depth cleaning

2) **Better Global Hygiene Level**: better cleaning => more efficient disinfection

3) **Safety for users**: neutral pH, non irritant, less injuries

4) **Safety for materials**: neutral pH => does not attack any materials

5) **Positive impact on sewage works and WWTP**: pre-purification

6) **Sustainability**: environmental implication: high biodegradability + biofilm treatment

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4. Enzymatic cleaning in the F&B industry

- Present for 25 years
- Meat and Seafood processing industry: products shelf life guarantee, contaminations monitoring,…
- Dairy processing industry: membrane filtration cleaning, membrane’s working life extension,…
- Biofilm monitoring and treatments (CIP and OPC)
- … in the brewery sector soon?
Realco’s enzymatic offer for breweries

Enzymatic technology

Implements cleaning efficiency

Realco’s ENZYBREW range

Micro-breweries

Reduces the risk of contamination

Realco’s BIOREM treatment

All breweries

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5. ENZYBREW 10: product, protocols and applications

- Designed for manual cleaning
- Daily cleaning
- All-in-one (enzymes + oxidizing effect)
- Strengthened in proteases, amylases and cellulases to get rid of all organic residues mainly present in brewing process (fibers, draff,...)
- Safe for users and equipment: non corrosive
- Applications: fermentation tanks, cartridge filters, ...
- Sustainable: pre-purifying + high biodegradability (98%)
- Phosphates free
- Suitable for organic beers production
- To be used at lower temperature (55°C): less beerstone
Applications: fermentation tanks, vessels, heat exchangers,…

Standard Cleaning procedure with ENZYBREW 10:

<table>
<thead>
<tr>
<th>Cleaning Steps</th>
<th>Product</th>
<th>Dosage</th>
<th>Contact Time</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rinsing</td>
<td>PW</td>
<td></td>
<td></td>
<td>Cold or warm rinse</td>
</tr>
<tr>
<td>Cleaning</td>
<td>ENZYBREW 10</td>
<td>1%</td>
<td>45 min</td>
<td>55°C</td>
</tr>
<tr>
<td>Rinsing</td>
<td>PW</td>
<td></td>
<td></td>
<td>Cold or warm rinse</td>
</tr>
<tr>
<td>Disinfection</td>
<td>PERACETIC ACID</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final rinsing</td>
<td>PW</td>
<td></td>
<td></td>
<td>Cold or warm rinsing</td>
</tr>
</tbody>
</table>
Applications: Cartridge filters

- Fouling elimination
- Restoration of the flow rates
- Extension of the working life of the filter

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### Applications: cartridge filters (Standard procedure)

<table>
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<th>Dosage</th>
<th>Contact Time</th>
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</thead>
<tbody>
<tr>
<td>Rinsing</td>
<td>PW</td>
<td></td>
<td></td>
<td>Cold or warm rinse</td>
</tr>
<tr>
<td>Circulation</td>
<td>ENZYBREW 10</td>
<td>1%</td>
<td>5 min.</td>
<td>55°C</td>
</tr>
<tr>
<td>Soaking</td>
<td>ENZYBREW 10</td>
<td>1%</td>
<td>4-6 hours</td>
<td>55°C</td>
</tr>
<tr>
<td>Circulation</td>
<td>ENZYBREW 10</td>
<td>1%</td>
<td>5 min.</td>
<td>55°C</td>
</tr>
<tr>
<td>Rinsing</td>
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<td></td>
<td>Cold or warm rinse</td>
</tr>
<tr>
<td>Disinfection</td>
<td>(See manufacturer Recommendations)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final rinsing</td>
<td>PW</td>
<td></td>
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<td>Cold or warm rinsing</td>
</tr>
</tbody>
</table>
6. ENZYBREW success story: our Ambassadors

BrewFist (IT): Since 2012

Birrificio Baladin (IT): Since 2013

Brasserie DeSutter (FR): Since 2015

Brasserie des Légendes (BE): Since 2015

Moor Beer (UK): Since 2015

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Realco’s enzymatic offer for breweries

- Enzymatic technology
  - Improves cleaning efficiency
  - Realco’s ENZYBREW range
    - Micro-breweries
  - Reduces the risk of contamination
    - Realco’s BIOREM treatment
      - All breweries

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7. Contamination issues: biofilm

Typical germs linked to contamination in breweries:

1. Lactobacillus
2. Pediococcus
3. Pectinatus
4. Pseudomonas

The main reason why germs remain (even after an intensive disinfection) is because they are locked into a biofilm.
What is a biofilm?

Biofilm development stages:

1. Organic cells adsorption/fixation on the surface
2. Bacterial development and EPS matrix growth
3. Mature biofilm and contamination

Common microorganisms linked to biofilm contamination:

- *Listeria monocytogenes*
- *Bacillus cereus & mycoïdes*
- *Salmonella spp*
- *Pseudomonas aeruginosa & fluorescens*
Biofilm: the enzymatic solution

Standard cleaning
Failure to eliminate biofilm → poor hygiene, high risk

Enzymatic cleaning
Biofilm removal → optimal hygiene, no contamination risk

① Biofilm before treatment
② Superficial action
③ Bacteria remain trapped in biofilm structure

Enzymatic solution breaks down biofilm matrix

① Biofilm before treatment
② In-depth action
③ Bacteria are free and accessible to disinfectants

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How to detect biofilm?

A complete audit of the production installation will enable to identify, locate and quantify contamination. The objective of this step is to determine a cleaning plan for biofilm removal.

REALCO has developed various techniques making it possible to reveal the presence of biofilm, where traditional methods (plate count, sample) can be ineffective.

**CIP: biofilm forming bacteria detection + ATP 2G**

Realco can offer an audit and a treatment to eliminate contamination and maintain the organoleptic quality of your beer.

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Thank you for your attention!

Q&A

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