Know-how in shortened form

Open Plant Cleaning OPC - Disinfection

The food market requires a high level of consistency in product quality, safety and taste. The manufacturing environment presents significant challenges to hygiene. An acceptable level of hygiene must be ensured.

This can be done by following general hygiene requirements for all food production sites:

Directive 852/2004. This mean every place where food is produced, processed, prepared, stored and sold. If necessary, company specific hygiene management systems define what exactly is meant by the "general hygiene requirements". HACCP as part of Directive 825/2004.

After production, manufacturing and food contact surfaces all need to be cleaned and sanitized prior to restarting production. This cleaning processes are commonly known in the industry as Open Plant Cleaning (OPC).

In this whitepaper, the tasks of open plant cleaning will be explained and solutions are described to raise the hygiene level even further.

Task

International chemical vendors and professional cleaning companies, specialized in open plant cleaning, had the problem of contamination with microorganism after professional cleaning. After cleaning impurities, germs, fungi, microorganism were observed.

ProMinent was called in to improve the hygienic standard of the water system and in doing that we improved the overall hygiene in the production halls as water comes in contact with everything.

Specific challenges of cleaning had been recognized after detailed analysis. The synergistic combination of specialty chemicals ensure a proper cleaning. But, dependent on the application, especially in hygienic critical food production, cross contamination could be possible. Fungal or bacterial infections are possible after proper cleaning.

OPC **O**pen Plant **C**leaning

Cleaning and disinfection

Cleaning

Almost all processes and areas can be cleaned by wet cleaning methods. Most common is cleaning with potable water with washing active substances to remove unwanted substances such as grease, food residues, dirt and microorganisms and keeps it dissolved or dispersed.

„Standard“ cleaning is done in several steps. For example:

Pre-rinse to remove remaining product →**Scrub** →**Foaming** to ensure all surfaces are cleaned → **Rinse**

Challenge

A good cleaning and final rinse will have an cleaning effect, but will be not 100% effective. During the rinsing and cleaning processes, washing water flows everywhere. So do pathogens with final rinsing water. The residual moist could lead to cross-contamination because it could contain a wide variety of pathogens and become a breeding ground after cleaning the production site.

Wiping dry the entire factory to remove any remaining moist is of course impossible. The challenge is to keep also unseen and unreachable places clean and germfree.

Solution: Cleaning and disinfection

An extra disinfection step into the final rinse after cleaning will lead to the desired end result. Hereby avoiding the favorable conditions for pathogens to thrive in the remaining moisture.

„Improved“ open plant cleaning is recommended in following steps. For example:

Pre-rinse to remove remaining product →**Scrub** →**Foaming** to ensure all surfaces are cleaned → **Rinse** → **Disinfection step** (not required by law) → **Rinse.**

Different disinfectants

- **Chlorine** based disinfectants are widely use because of price and availability
- **Chlorine dioxide** based disinfectants generated in-situ
- **Foam cleaning products** come in all different varieties (alkaline, acid, chlorine etc.) depending on the application
- **Hydrogen peroxide** based disinfectants In the food industry mostly used in aseptic filling plants for the sterilization of e.g. PET bottles in higher conentrations appr. > 30%
- **PAA** not widely used due to smell and health hazards for workers

Know-how in **shortened** form

OPC disinfection | Case Study 1: Chicken processing company

General Task

The following case study describes the challenge in a meat and poultry processing company.

The company was suffering from bacterial infection after cleaning. The reason for this: During the rinsing and cleaning processes, washing water flows everywhere. The residual moist of the final rinsing water contain a wide variety of microorganism and become a breeding ground after cleaning the production site.

Both cleaning company and chemical vendor where asked to advise but no safe and effective solution allowed by law could be found within the product package of the chemical vendor.

Solutions

Through years of collaboration between the chem vendor and ProMinent a plan was formed to dose 0,4 ppm chlorine dioxide (legally allowed maximum for drinking water applications).

Of course the client was skeptical so a testing period was agreed to prove the ProMinent solution. Testing started by metering 0,4 ppm chlorine dioxide into the cleaning water The results were so overwhelming that the cleaning company quickly made arrangements with the food processing company to implement a test.

1. Cleaning satellite station and cleaning water line

In the production site the water of the cleaning satellite station and also the cleaning water line were treated with 0,4 ppm chlorine dioxide.
The results met the expectations and even exceeded them.

Tom Homan Free, ProMinent Sales Engineer specialized in food & beverage industry, reports:
„The results are overwhelming. The agar plate test changed from average 4/20 positive to 0/20. No pathogens at all!“

We were asked if to implement our solution at two other critical processes on the production floor:

2. Chicken Plucker

A very critical production site was the chicken plucker. During the plucking process the chicken are continously sprayed with water. Due to this cross contamination was one of the issues here. Beside cross contamination from chicken to chicken pathogens also nestled in the rubber seals of plucking fingers and conveyor belts. These places can’t be cleaned without disassembling every last bit of the machine.

We provided two solutions: First **continuous metering of 0,4 ppm** (residual) chlorine dioxide into the rinsing water and second **30 minutes shock dosing of 2 ppm** each morning before production. This ensured a clean machine before production starts. It also prevents building up pathogenes during the day.

3. Chicken Cooler

To prevent cross contamination a further chlorine dioxide generator was installed to treate the chicken cooler with a concentration of 0,4 ppm residual chlorine dioxide.

Know-how in shortened form

OPC disinfection | Case Study 2 : Salad producer

Task

Case study 2 describes the challenge in the production plant of one of the largest salad and spread producer. The company produces since nearly 50 years delicious, chilled fresh salads.

This customer had continues slight Lysteria concentrations originating from several locations on the production floor. Every time they thought they located the source a new source popped up. **The recognized infections always had been within the required limits but the company wanted to raise the standard even higher.**

The cleaning company, specialised in hygiene and disinfection in the food processing industry, and an international chemical vendor, had been asked to master this challenge. But no safe and effective solution allowed by law could be found within the product package of the chemical vendor.

The solution

ProMinent suggested to add chlorine dioxide to the rinsing water for the final cleaning step. With the addition of 0,4 ppm residual chlorine dioxide to the water in the final rinsing step (maximum allowed concentration in drinking water by law) an situation was created where water with disinfection capabilities could be used without the need to rinse again with drinking water. After all Bello Zon chlorine dioxide in this concentration is allowed to be in drinking water.

After promising first results the cleaning company permanently installed the chlorine dioxide system Bello Zon® at the client site.

After installation the line water quality has never been better, the lysteria problem is gone and bacteria counts are all time low. Due to the very good results a plan to shock dose the water lines with chlorine to keep Legionella at bay was considered unnecessary saving yearly costs and chemical use.

Tom Homan Free, ProMinent Sales Engineer specialized in food & beverage industry, sums up the results: “Notably, the bacteria counts in the water are less than a hundred, **the mould count is zero and the water is Legionella-free**.” and added: “**Our customer is considering to scrap the Legionella management plan because it’s no longer necessary.”**

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OPC Solution | Disinfection: Water Treatment with Chlorine Dioxide

Solution

Chlorine dioxide

Chlorine dioxide has various advantages over chlorine, which is the most popular choice to disinfect water. Unlike chlorine, its disinfectant effect does not diminish as pH increases. Chlorine dioxide remains stable in piping systems over long periods and provides from many hours up to days of microbiological water protection.

Stable, safe, clean

Ammonium, which causes considerable chlorine loss, is not attacked by chlorine dioxide so the dosed chlorine dioxide remains fully available for disinfection purposes.

Chlorophenols, strongly smelling compounds which can result from the chlorination of water, are not formed with chlorine dioxide. Chlorine dioxide also does not produce trihalomethanes (THMs) and other carcinogenic chlorinated hydrocarbons.

Biofilms form in all water-carrying pipes and provide an ideal breeding ground for dangerous bacteria such as Legionella. Unlike chlorine, chlorine dioxide not only kills off biofi lms but actively removes them. This eliminates the conditions that Legionella bacteria need to survive and offers long-term protection against repeat contamination.

Bello Zon® CDLb

Bello Zon® CDLb uses the chlorite/acid process. A chlorine-free chlorine dioxide is generated from a sodium chlorite solution using hydrochloric acid in a batch process.
The mixing ratio is 1:1.
Depending on the type of system, up to 120 g of chlorine dioxide is produced an hour and put into intermediate storage in a concentration of 1,000 or 2,000 mg/l. The outstanding stability of the chlorine dioxide solution generated allows the system to remain switched off for several days without any noticeable loss of activity.

Know-how in shortened form

OPC | Disinfection: Tipps for being successful

- Always consult with the cleaning experts on problem area’s and personal safety
- No reactive disinfectant is without limitations consult with experts on your target application
- Good disinfection will never be effective without good cleaning. Chlorine dioxide will not replace your cleaners
- Always consult with all involved parties before implementing new technology and take in all necessary safety precautions
- Follo exact the operator instructions
- Accurately detect and document the contamination to find problem area's and treat them
- Accurately document the process parameters. A wide variety of process parameters can influence the effectiveness of chlorine dioxide. Please always consult with your expert
- Accurately document the dosage concentration used. Always check what you are doing, continues measurement of any disinfectant that is dosed is recommend