



3D TRASAR™ Solid Pasteurizer Technology Helps a Renowned Brewery in China Reduce Total Operation Cost by US\$62,239 and Increase Productivity by US\$12.15 million



BACKGROUND





A world-renowned brewery group with over 50 plants in China committed to improving its sustainability performance by setting the following goals:

- Lower water consumption: meet the industry-leading water consumption goal of 3.2hl/hl
- Lower energy consumption: Decrease energy consumption for each hectolitre of product by 10% over 2012.
- Lower greenhouse gas emissions: Reduce the greenhouse gas emissions for each hectolitre of product by 10%; reduction goal in China is 15%

Decreasing energy and water consumption and reducing total operating costs are the focus of the company's global action plan. Product quality and food safety risk are also key performance indicators.

CHALLENGES

Located in eastern China, this plant has a capacity of 4,000,000 hl/year and is one of the group's biggest plants in China. The bottle breakage rate in the packaging workshop of the plant's four pasteurization machines is around 0.1%. which contributes to nutrient substance in the cycling water. Under the

CUSTOMER IMPROVEMENT	eROI SM	ECONOMIC BENEFITS
26,400 m ³ water saved each year	 WATER	Annually cost savings of US\$21,285
18,000 kWh of electric energy and 1,417 tons of heat energy are saved each year.	 ENERGY	Annual cost savings of US\$40,957
12,000kg of cleaning chemical is saved each year.	 WASTE	Annually savings of US\$1,808
Reduced cleaning time from 4 hours a day to once every 10 days	 PRODUCTIVITY	Increased production capacity by US\$12,152,448 in peak seasons annually

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

proper environmental temperature of 20-40°C, massive microorganisms will occur. This occurrence had multiple impacts:

- The biological film generated from massive microorganism blocked the filter screen and sieve plate, impacting the spraying system and resulting in uneven water distribution. The dynamic water balance of the whole pasteurizer was affected, and the resultant high water level overflowed into some water tanks, while the others had to be resupplied due to the low water level. The water consumption of the whole pasteurizer was dramatically increased.
- Due to the heavy blockage in the filter barrels and screen, dedicated personnel had to be assigned to clean the biological slime on the screen to prevent blockage and ensure the equipment was running properly. Normally it takes over 4 hours each day to replace water and clean the pasteurizer before it can return to normal production.
- The pasteurizer had to be shutdown for cleaning during peak production season, especially in summer. Production was interrupted, impacting overall productivity.
 - The pasteurizer water spray was uneven, resulting in the beer being heated unevenly in the system. The beer's taste and quality will be affected.
 - The extension of time during which the beer bottles remained in the high-temperature zone of the pasteurizer caused corrosion in the bottle crown, deteriorating the product package.
 - A dedicated operator needed to feed water every day. Moreover, sodium hypochlorite gave off a strong pungent smell, negatively impacting people's health and safety.

SOLUTION

After an in-depth, on-site survey and data analysis, Nalco Water suggested 3D TRASAR Solid Pasteurizer Technology to solve the microbial fouling and improve operational reliability and efficiency of the pasteurizer.

3D TRASAR Solid Pasteurizer Technology can effectively control microbial fouling and ensure the dynamic balance for the whole water system. Other benefits include greater control of the corrosion tendency for metal packaging and significant improvements in operational reliability. These all contribute to significantly lower operating cost.

This technology includes:

- Real-time, online monitoring technology for oxidation-reduction potential in the water channel at the low-temperature zone, which is used to adjust and optimize the dosage of oxidizing biocide automatically to better

control the microbial fouling in pasteurizers.

- Nalco Water's patented 3D TRASAR technology is applied to control the dosing of oxidizing biocide at the high-temperature zone to ensure accurate and optimized chemical dosage. The technology is able to prevent the product from remaining too long in the high-temperature zone, and thus avoid product packaging corrosion.
- The solid chemical technology was applied to reduce the manual feeding frequency for chemical. Solid chemistry can avoid the potential risk of chemical volatilization which can harm the human body. It also aligns with small storage space compliance with the GMP requirement for food processing factories.

RESULTS

With the real-time online automation technology, the microbial fouling issue was controlled at the low-temperature zone in the pasteurizer. As shown in Figure 1, with online ORP monitoring, 3D TRASAR pasteurizer technology could control the FRC within the range of 0.5 to 1.5 ppm, so that the screen and barrel of the water tank in the system were never polluted by the microbial film. The whole water system had a good dynamic balance, water was circulated well and a stable water temperature was maintained.

Most importantly, the corrosion of the product's metal packaging was much reduced. The company brand was protected with this improvement in the quality of product packaging.

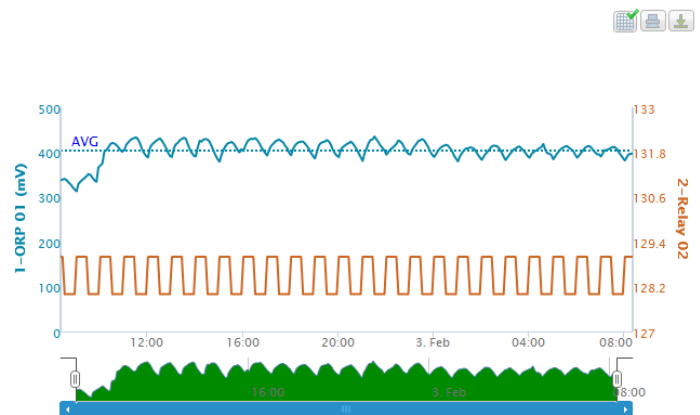
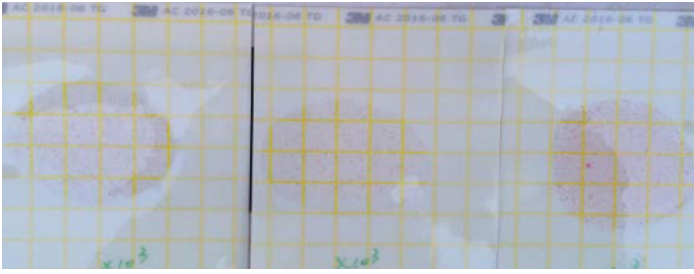


Figure 1, 3D TRASAR Solid Pasteurizer Technology controlled the system ORP within the range of 350 - 400MV



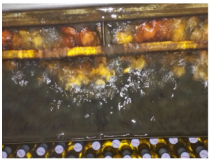
BL3 1 temperature zone for the treatment of previous chemical solutions BL3 2 temperature zone for the previous chemical solutions BL3 3 temperature zone for the previous chemical solutions

Before processing >10⁶cfu/ml



BL3 1 temperature zone after Nalco Water treatment BL3 2 temperature zone after Nalco Water treatment BL3 3 temperature zone after Nalco Water treatment

After processing <100cfu/ml



Treatment with previous chemical solution



1 week after Nalco Water treatment



2 weeks after Nalco Water treatment

Figure 2 the pictures before and after Nalco Water treatment at low-temperature zone



Mesh is blocked by microbial slime, and nozzle is partially blocked, Uneven water flow due to blockage of the nozzle part



Mesh and nozzle are all unblocked resulting in uniform water flow distribution

Figure 3: Microbial control progress before and after Nalco Water treatment



Figure 4: Spray system comparison between before and after Nalco Water treatment



Figure 5, Comparison between the traditional liquid solution and the new 3D TRASAR solid solution

Here are the unique benefits that solid solution brings to the customer.

INCREASED SAFETY

- Protects the operators from the harmful gas generated from bleach water.
- Eliminates the metal corrosion caused by the volatile bleach water.
- Reduces safety risks caused by chemical leaks and sprinkling during the liquid chemical dosing.

EASY HANDLING

- Reduces the labor hours to handle the chemicals.
- Chemical types was reduced from three to two.

IMPROVED PERFORMANCE

- Compared with the bleach program impacted by temperature, the solid chemicals are more stable.
- The corrosion inhibitor provides better protection of the metal packaging.
- Improved performance and stability of microbial control in the pasteurizer water system

SUSTAINABLE

- Significantly less chemical stocked, meeting the compliance of the GMP standards in the F&B industry.
- Reduced chemical types and auxiliary equipment such as pumps and chemical barrels, increasing available site space

CUSTOMER IMPROVEMENT BENEFITS

After Nalco Water started treating the pasteurizer, the cleaning interval of the packaging workshop was significantly prolonged. The pasteurizer didn't require cleaning the lye transpiration equipment before production.

Based on the brewery's annual output of 2 million hectolitre of beer, the customer improvement benefits can be estimated as follows:

WATER SAVING

By controlling the microbial fouling in the pasteurizer water system, cleaning and water replacement cycles were extended from daily to once every 10 days.

26,400m³ water is saved per year, equivalent to US\$21,285.

ENERGY SAVING

The equipment operation cycle was extended to reduce the transpiration cleaning frequency from once a month to zero.

Electric energy: 18,000 kWh saved, equivalent to US\$2,306

Thermal energy: 3,912,480 MJ; i.e., 1,417 tons per year of steam, equivalent to US\$38,651

The total energy cost saved was US\$40,957 per year.

CHEMICAL SAVING

The alkali cleaning frequency was reduced from once a month to once a year by controlling the microorganisms in the pasteurization water system.

The reduced alkali cleaning frequency contributed to cleaning chemical cost reduction by US\$1,808 per year, equaling a 50% reduction and lowering the annual operating cost by US\$59,721.

INCREASED PRODUCTIVITY

Due to the prolonged water replacement frequency, production time was increased by 400 hours in the peak season.

Increased capacity: 40,320,000 bottles, equivalent to US\$12,152,448

CONCLUSION

3D TRASAR Pasteurizer Technology helped this brewery customer successfully solve the microbial fouling issue, eliminate food safety risks, improve operational efficiency, save water and energy, and reduce total cost. Moreover, it controlled corrosion leading to improvements in product packaging and protecting the brand and the company's image. Lastly, better water balance optimized product quality with elevated beer taste.

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