

Simple Syrup  
Disinfection

Food &  
Beverage

Taiwan

# Simple Syrup Disinfection at Taiwanese Food & Beverage Factory

## Challenges of Using Heat Pasteurization During Syrup Production

One of Taiwan's largest food and beverage companies, a manufacturer of foods, edible oils, and soft drinks, was using a heat pasteurization process in its sucrose syrup production line.

Using pasteurization heaters failed to eliminate bacillus subtilis, a gram-positive, rod-shaped bacterium that forms heat-resistant dormant spores. In addition, Thermophilic Acidophilic Bacteria (TAB), a pasteurization-resistant spoilage organism generates strong off-flavors and odors due to guaiacol or bromophenol production. The pasteurization process also carries the risk of caramelization and reactions that alter the color, taste, and aroma of the liquid sugar.

In addition to the impact on product quality, the pasteurization process impacted the company's OPEX. The operational complexity results from differing pasteurization protocols from product to product; even sucrose itself requires complex fine-tuning.

Additionally, time to heat differs according to the end product, which impacts energy usage. Pasteurization heaters heat liquids up to 135°C / 275°F with a flow rate of up to 25 CMH/110 US GPM (HTST process). Additionally, pasteurization processes impact CAPEX, as the typical size of a pasteurization heater is 4.5m x 3m x 1.5m (14.7ft x 9.8ft x 4.9ft).

### The production process prior to Atlantium's simple syrup solution



## The Solution

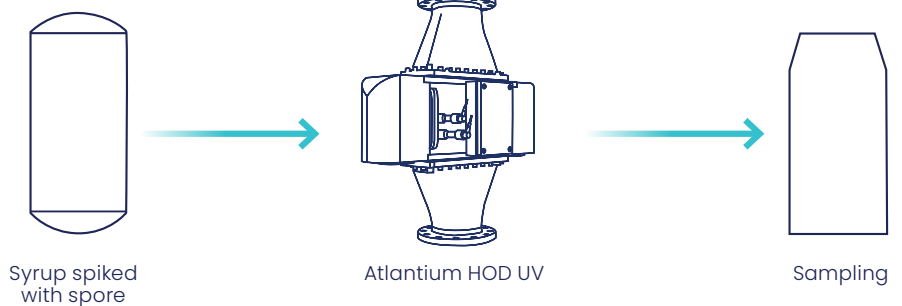
Atlantium's HOD™ (Hydro-Optic Disinfection) UV disinfection system, fitted with special medium-pressure UV lamps, was selected and tested to validate that no by-products could be created.

Atlantium HOD UV systems effectively inactivate bacteria and pathogens. This is achieved by combining ultraviolet water disinfection technology with hydraulic and optic principles. The HOD UV system ensures homogeneous UV dose distribution, provides superior power (kW) efficiency compared to traditional UV, and achieves unprecedented micro-organism inactivation, without the risk of caramelization.



### Set up

65brix Syrup  
Spores' final concentration  
of 105 cfu/L



According to an external organoleptic lab report:  
**"No other component appeared in the chromatograms except trace amounts of mono-sugars."**

Results showed that the system may provide a result of >5 LRV, adding that despite unexpected flow changes, Atlantium's HOD UV system always provides better results than the F&B market standard of LRV=3 and complies with LRV<4 disinfection standards.

Fluctuations in flow will not result in sudden changes in actual operation at the factory site; its influence is negligible. The third-party assessor verified that the system delivered superior LRV performance.

Item	Untreated spore conc.	Treated spore conc.	Rating	LRV	Flow rate
1	$2.0 \times 10^6$ cfu/L	<1 cfu/L	99.9999%	Log 6	12CMH
2	$2.4 \times 10^6$ cfu/L	<1 cfu/L	99.9999%	Log 6	12CMH
3*	$2.4 \times 10^6$ cfu/L (-----)	$3.5 \times 10^2$ cfu/L	99.985%	Log 3.84	13CMH

### Conclusion:

The HOD UV system may give disinfection of >5 LRV. Complies with the acceptance terms of an LRV >4 disinfection capability.

[\*] Item 3 is affected by sudden flow speed change (12CMH 15CMH stable 13CMH).

This may affect some UV system outcomes. Despite unexpected flow changes, Atlantium's HOD UV system always gives a result better than the F&B market standard of LRV=3. There will not be a sudden change in actual operation at the factory site.

This influence is negligible.



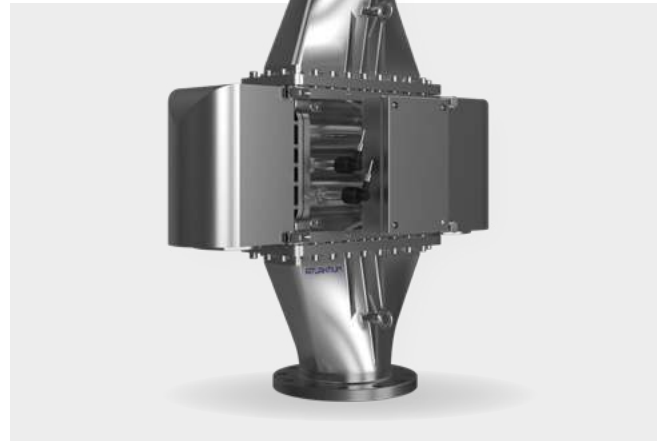
## Results

Following installation, Atlantium's HOD UV system received outstanding operational feedback, highlighting the system's efficiency, low maintenance requirements, and reduced operational costs.

The study demonstrated the effectiveness of Atlantium's solution in a syrup processing environment without creating unwanted by-products. There was no caramelization during yearly operation.

Additionally, the third-party verification and higher LRV reinforced the system's superior performance in reducing microbial contamination. In terms of OPEX, cleaning during a 9-month period (June 2022 to March 2023) was minimal, limited to hot water once every 2-3 weeks without use of caustic soda or nitric acid.

After making the switch from pasteurization to HOD UV, the facility experienced significant improvements, leading to better product quality and operational efficiency, contributing to the facility's sustainability efforts. These results indicate that the implementation of Atlantium HOD UV technology offers a dependable, sustainable, and user-friendly solution for microbial control in syrup production processes.



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## About us

For more than two decades, Atlantium Technologies has helped to ensure water safety with its innovative HOD™ (Hydro-Optic Disinfection) UV technology and novel approach to performance, monitoring, and control. Atlantium's superior, environmentally friendly water treatment solutions ensure stable, efficient, and dependable production.

With thousands of full-scale installations for leading brands in various industries globally, we're committed to consistently meeting our customers' water quality needs, ensuring pure results.

