



# Atlantium

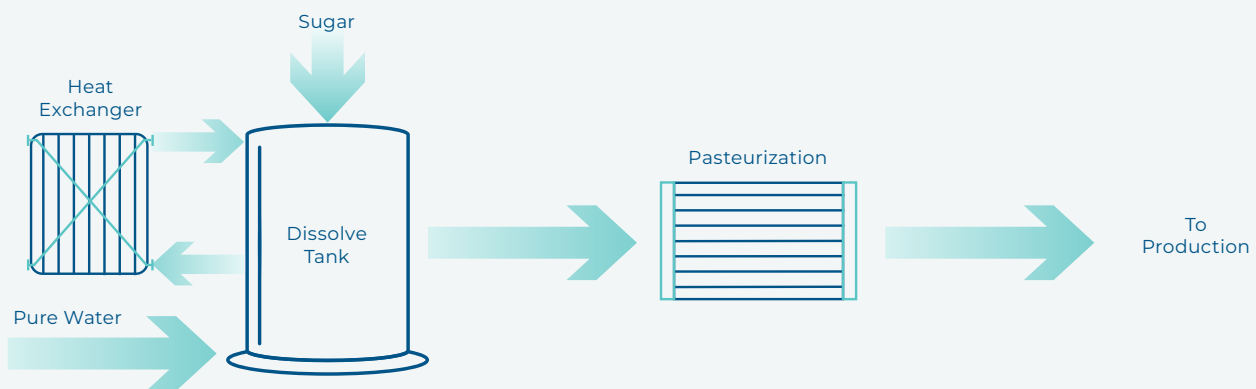
## Simple Syrup Case Study

### Background

SCH Group, an Atlantium partner in Taiwan, effectively replaced the heat pasteurization process with a UV disinfection process for the sucrose syrup line at one of Taiwan's largest food and beverage companies. With over 55 years of experience in the industry, this company offers a wide range of products,

including food, edible oil, and various soft drinks. After switching 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.

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



## The Challenge

### Performance Concerns using pasteurization:

1. Contamination of *Bacillus subtilis* - a gram-positive, rod-shaped bacterium that forms heat-resistant dormant spores.
2. TAB - *Alicyclobacillus* spp., also known as Thermophilic Acidophilic Bacteria (TAB), is a spoilage organism in the fruit juice industry. It can generate strong off flavors and odors due to guaiacol or bromophenol production and are resistant to pasteurization.
3. Risk of caramelization and reactions that alter the colors, taste & aromas of the liquid sugar.

### OPEX:

1. High energy usage. A pasteurization heater can heat the liquid up to 135°C with a flow rate of up to 25CMH. (HTST process).
2. Operational complexity - time to heat. The pasteurization protocol can differ from product to product. Even sucrose itself requires complex fine-tuning.

### CAPEX:

Large footprint requirement. The typical size of a pasteurization heater would be 4.5 meters by 3 meters, a height of 1.5 meters.

# The Solution

## Stage A: Lab Tests

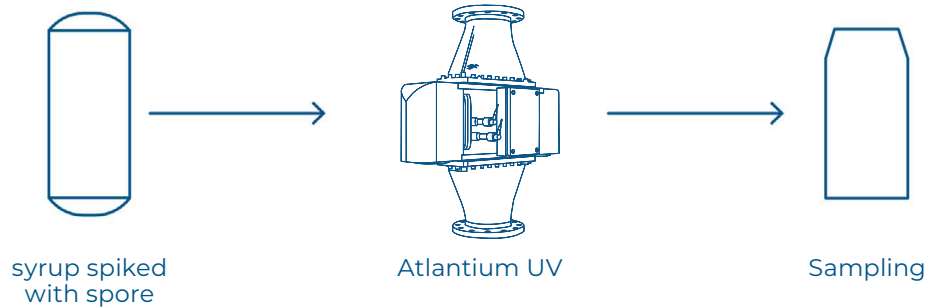
Special MP (Medium Pressure) UV lamps were selected and tested to validate that no by-products could be created: "No other component appeared in the chromatograms except trace amounts of mono-sugars." (External Organoleptic Lab Report)

## Stage B: Third-party verified superior performance (higher LRV)

### Set up:

65brix syrup

Spores' final concentration of 105 cfu/L



## Stage B Results:

Item	Untreated spore conc.	Treated spore conc.	Rating	LRV	Flow rate
1	2.0x10 <sup>6</sup> cfu/L	<1 cfu/L	99.9999%	Log 6	12CMH
2	2.4x10 <sup>6</sup> cfu/L	<1 cfu/L	99.9999%	Log 6	12CMH
3*	2.4x10 <sup>6</sup> cfu/L	3.5x10 <sup>2</sup> cfu/L	99.985%	Log 3.84	13CMH
	(-----)				

Conclusion: UV system may give a disinfection of  $\geq 5$  LRV. **Complies** the acceptance terms of a LRV >4 disinfection ability.

[\*] Item 3 is affected by sudden flow speed change (12CMH→15CMH→ stable 13CMH). This may affect some UV system outcomes. Despite of unexpected flow change, Atlantium UV system always give a result better than F&B market standard of LRV=3. There will not be sudden change in actual operation at the factory site. This influence is neglectable.



## Stage C: Outstanding Operational Feedback from End User (June 2022- March 2023):

### Maintenance

There was no caramelization during yearly operation.

Atlantium HOD™ UV cleaning during 9 months was minimal. It was limited to hot water only once every 2-3 weeks and never with Caustic Soda or nitric acid.

### Performance

All microbial tests during the 9 months of operation were successful.

The facility witnessed improvements in CAPEX due to the significantly smaller footprint of the UV system compared to the traditional pasteurization heater (3-4 times smaller), making it a more space-efficient solution. In terms of OPEX, the UV disinfection process offered lower energy usage and streamlined operational complexity, resulting in cost savings and enhanced productivity.



## Conclusion

The study demonstrated the effectiveness of Atlantium's solution in a syrup processing environment without creating unwanted by-products. The third-party verification and higher LRV reinforced the system's superior performance in reducing microbial contamination.

*Furthermore, the positive end-user feedback over nine months of operation highlighted the system's efficiency, low maintenance requirements, and reduced operational costs.*

*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.*