

## INDUSTRIAL MACHINERY

# Marel Water Treatment

Improving wastewater processing by analyzing fluid flow with fully CAD-embedded CFD software

### Product

Simcenter

### Business challenges

Improve performance of flotation units used in water treatment

Accurately assess flow behavior in physical flotation units

Mitigate risk of time and cost spent on ineffective designs

### Keys to success

Validate capability of simulation to model complex physics with existing designs

Use Simcenter FLOEFD to optimize existing designs and explore a wider variety of new designs

### Results

Developed new concrete DAF with 25 percent increased throughput

Reduced optimization of existing designs from several months to one month

Ensured that designs could be quickly iterated and knowledge retained by conducting simulations in house

### Marel Water Treatment uses Simcenter FLOEFD to optimize existing designs and increase throughput by 25 percent

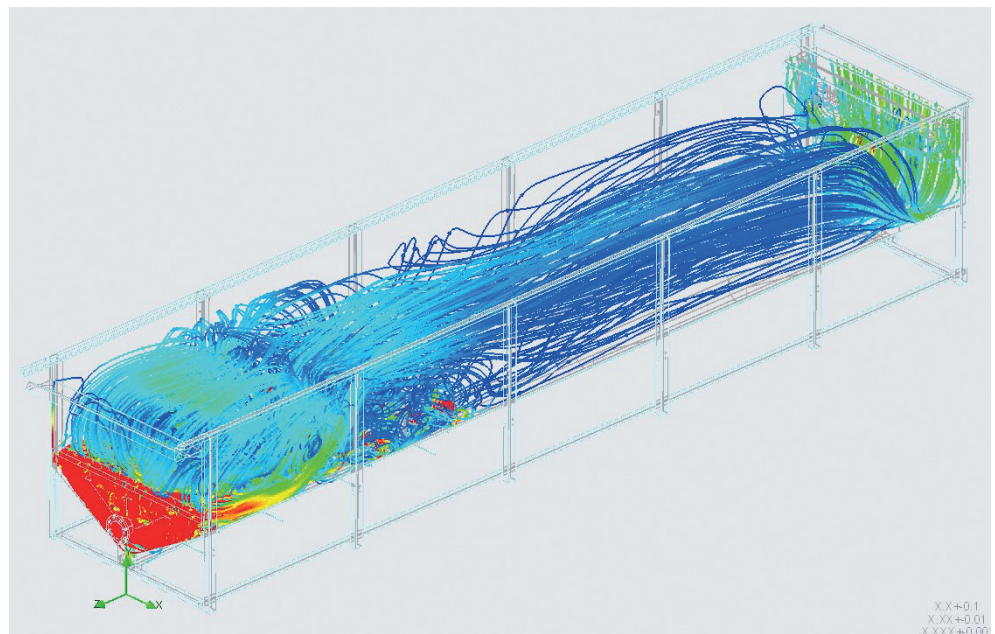
#### Every drop of water counts

The treatment of wastewater is crucial for protecting people and the environment. It removes pathogens and contaminants, prevents the pollution of rivers and oceans, and conserves resources through water reuse.

Marel Water Treatment, part of JBT Marel, reduces water stress on the local environ-

ment by providing solutions for all types of food processing wastewater. This helps processors minimize wastewater, enhance efficiency and increase sustainability.

Dissolved air flotation (DAF) units play a critical role in pretreatment of wastewater. Marel Water Treatment wanted to design a larger version of its existing concrete DAF unit that would allow for 25 percent more throughput. At the same time, the company wanted to optimize the performance of its entire range of both stainless steel and concrete DAF units.



**“Despite the tight commercial schedule, we were able to validate our proposed alternative designs and adapt the units accordingly. As a result, going forward, we have full confidence in the accuracy of Simcenter FLOEFD to use it in the design of new units and model variants.”**

Bernold Leferink  
Process Engineer  
Marel Further Processing



Building prototypes to test new designs comes with significant risk due to the cost and time involved. So the team turned to simulation to validate designs before prototyping. Marel Water Treatment used fully computer-aided design (CAD) embedded computational fluid dynamics (CFD) software Simcenter™ FLOEFD™ software, part of the Siemens Xcelerator business platform of software, hardware and services, to evaluate fluid flow earlier and speed up development.

#### **Analyzing flow behavior**

A DAF unit is part of the primary water treatment process that removes sediment, suspended solids and fat, oil and grease. Water is saturated with compressed air and

then released through nozzles where the pressure is atmospheric. The released air forms tiny microbubbles that adhere to larger suspended particles or flocs. The attached bubbles increase the buoyancy of the particle–bubble aggregates, allowing them to rise to the surface. This is moved by a skimming device to a sludge compartment or chute, and the cleaned water is discharged from the DAF via an overflow weir.

Bas Ubbink, engineering manager at Marel Water Treatment, explains that concrete DAFs allow for larger flows and can also be produced onsite, avoiding significant transport costs. “Stainless-steel DAFs are available in different sizes,” he says. “But



**Simcenter FLOEFD allowed us to cut costs and time by eliminating local testing and running simulations overnight.”**

Bas Ubbink  
Engineering Manager  
Marel Water Treatment



**“Our flotation units perform more efficiently and by keeping the process in house, we retained valuable knowledge for making rapid future improvements.”**

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scaling up of the concrete unit required careful assessment of performance to mitigate risk due to the cost of building and testing onsite.

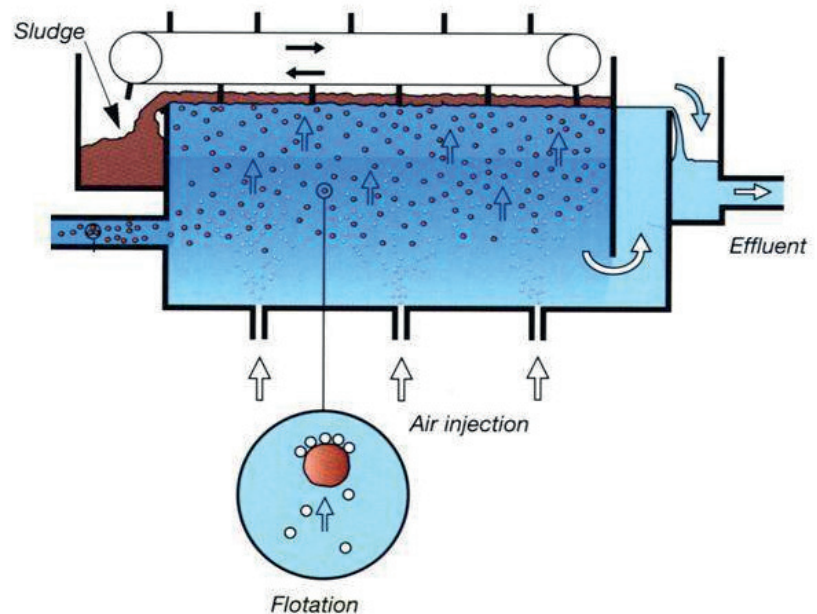
“There is also no visibility of flow behavior in a physical flotation unit, making it difficult to accurately assess performance. So we decided to set up simulations based on CAD models to reduce prototyping and see exactly how the flow behaved within the unit before finalizing designs.”

This allowed for a much wider variety of designs to be investigated and much better confidence in the final design before building any prototypes.

### Validating simulation

It was vital for JBT Marel to verify that simulation could accurately model the complex physics of a DAF unit, so they first validated it by simulating existing units. “This enabled us to conduct a testing phase of an existing unit in the timeframe between manufacturing and delivery to the customer,” says Bernold Leferink, process engineer at Marel Further Processing. “We then compared our measurement results with the simulations to verify the accuracy.

“We also included the most promising design alternatives from the simulation exploration in the measurement plan, performing velocity measurements in the DAF unit based on the results from Simcenter FLOEFD. Despite the tight commercial schedule, we were able to validate our proposed alternative designs and adapt the units accordingly. As a result, going forward, we have full confidence in the accuracy of Simcenter FLOEFD to use it in the design of new units and model variants.”

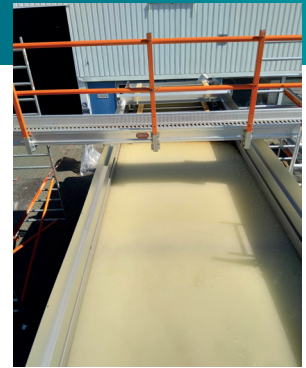


By using Simcenter FLOEFD, the team was able to simulate the main fluid flow patterns and residence behavior within the unit. They did this by adding particle trajectories as proxies for bubble transport and flow of residence behaviors, such as optimizing the inlet structure to ensure efficient use of the unit's length.

Simcenter FLOEFD proved invaluable for calculating fluid flow, enabling engineers to see where improvements could be made. For example, it allowed them to significantly improve inlet structures to achieve a more even flow distribution.

"We used flow trajectories as a prime aid to visualize and communicate the results," says Leferink. "To assess design alternatives in more detail, we used metrics like the uniformity index and performed analyses on particle studies of the microbubbles."

Group discussions, including multidisciplinary feedback from mechanical engineering, customer support engineering and water technology, helped refine the



designs based on simulation results. Improvements were first realized for the stainless steel unit, and comparable improvements were applied to the concrete units as well.

#### **Improved performance and reduced timescales**

The new larger concrete flotation unit, developed using Simcenter FLOEFD, has been successfully deployed in several projects, demonstrating the required performance increase of 25 percent throughput. The stainless steel units also underwent significant improvements, benefiting from the insights gained during the simulation process to achieve better separation of solids from wastewater.



Instead of taking several months of testing, we can now use Simcenter FLOEFD to validate our designs in just one month, which helps keep us ahead of the competition."

Bas Ubbink  
Engineering Manager  
Marel Water Treatment



### Solutions/Services

Simcenter FLOEFD  
[siemens.com/simcenter-floefd](https://www.siemens.com/simcenter-floefd)

### Customer's primary business

JBT Marel is a leading global provider of integrated technology, equipment, software and services to the food and beverage industry. JBT Marel was formed when JBT Corporation completed its acquisition of Marel in early 2025.

<https://welcome.jbtmarel.com/jbt-marel/home>

### Customer location

Lichtenvoorde,  
the Netherlands



Marel Water Treatment's adoption of simulation has transformed their approach to designing flotation units. By simulating and validating designs before implementation, the company has achieved significant cost savings, improved unit performance and retained critical knowledge within the organization.

"Simcenter FLOEFD allowed us to cut costs and time by eliminating local testing and

running simulations overnight," says Ubbink. "Our flotation units perform more efficiently and by keeping the process in house, we retained valuable knowledge for making rapid future improvements. Instead of taking several months of testing, we can now use Simcenter FLOEFD to validate our designs in just one month, which helps keep us ahead of the competition."

### Siemens Digital Industries Software

[siemens.com/software](https://www.siemens.com/software)

Americas (USA)  
1-800-498-5351

EMEA (United Kingdom)  
0800-279-0464

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For additional numbers, click [here](#).