Next-generation efficiency
for water-intensive manufacturing

Green Blue Bubble System

WIPO GREEN Technology Forum 2026

Fine bubble retrofit solution for
water-intensive process manufacturing

Water Efficiency | Retrofit Ready | Sustainable Impact



Fine Bubbles support water and energy savings in process-water operations, reducing the use of scarce resources

As production volume increases, factories consume more process water and energy.
Fine bubble technology is increasingly used in water-related processes to improve process efficiency.



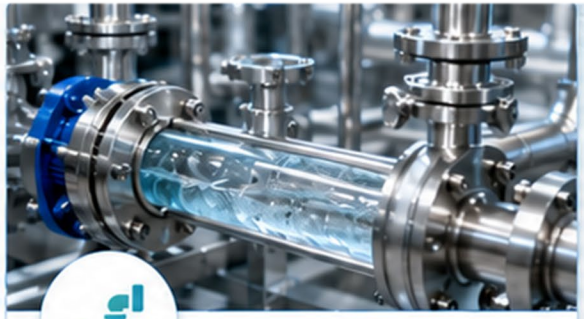
Water & hot-water costs

- Increased production raises the use of process water and hot water.
- Rising utility prices further increase cost pressure



Wastewater Treatment Load

- Fluctuations in BOD concentration and increasing wastewater volume raise treatment load, treatment cost, and environmental risk.



Excess sludge & Power Consumption

- Blower power consumption and excess sludge generation and handling increase equipment and operating costs.



Cleaning quality & operational stability

- Variation in CIP cleaning performance and equipment issues can affect quality, reduce productivity and cause resource losses.

GBB supports stable operations while helping reduce operating costs and environmental impact at water-intensive manufacturing sites.

Fine Bubble Solution

Application



CIP cleaning



Wastewater treatment

AIR UFB

O_2 UFB

GBB module (Fine Bubble generator)



Improved operation / Expected effects



Improved Cleaning efficiency

- ✓ Shorter cleaning time
- ✓ Reduced water use and thermal energy consumption
- ✓ Stabilized cleaning quality and improved reproducibility



Improved Oxygen Dissolution Efficiency

- ✓ Enhanced microbial activity
- ✓ Improved treatment capacity and stability
- ✓ Reduced treatment load
- ✓ Potential reduction in sludge generation and power load

Site assessment

Review the existing process and identify operational issues and improvement opportunities



Pilot testing

Verify the actual process using a demonstration system and confirm the feasibility of installation



System Design, Delivery & Installation

Design and implement the process based on the pilot test results



Operation optimization

Visualize operational data and support continuous improvement and stable operation



Why Fine Bubbles Work

Fine bubbles create multiple physical and biological effects that can improve process efficiency

1 Long Residence Time in Water



Fine bubbles remain suspended in water for a longer period, increasing contact opportunities with the liquid and target substances.

2 Cleaning support



Bubble attachment, detachment, and micro-scale agitation help remove contaminants from surfaces and support cleaning performance.

3 Improved Gas Dissolution



Fine bubbles promote efficient gas transfer into water and improve oxygen dissolution efficiency.

4 Aerobic microbial activity

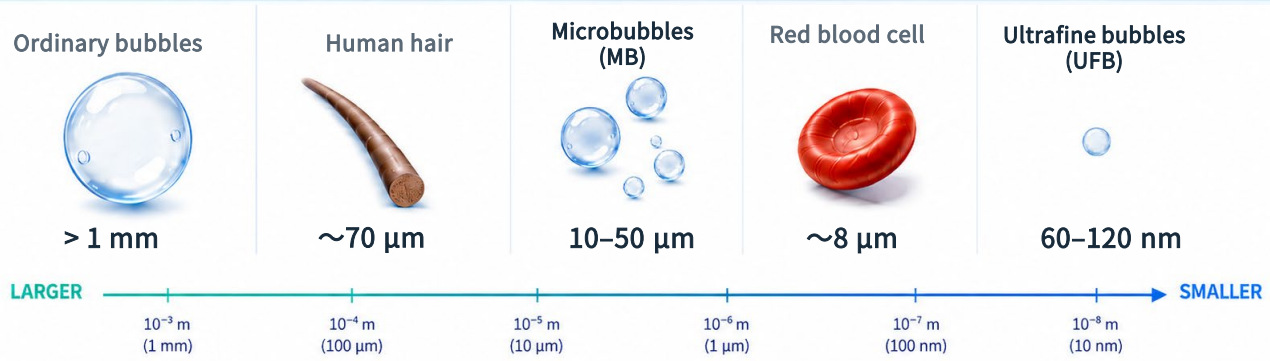


Stable oxygen supply supports aerobic microbial metabolism and can contribute to more effective biological treatment.

How small are they?

Fine bubbles include microbubbles (MB) and ultrafine bubbles (UFB).

The examples shown here use UFB of 60–120 nm and MB of 10–50 µm; ordinary bubbles are much larger.



Application-Specific Effects

The expected effects vary depending on the application and site conditions.



CIP cleaning

✓ Potential reduction in cleaning water and heat consumption: **approx. 50%**

✓ Approx. **10,000 m³**/year water savings



Wastewater treatment

- ✓ Potential BOD reduction: **approx. 30–50%**
- ✓ Potential reduction in excess sludge generation: **approx. 30-50%**
- ✓ Potential reduction in blower power load



Pipe cleaning

✓ Helps **suppress biofilm adhesion in piping and reduce cleaning frequency**.



Ultrasonic cleaning

- ✓ Supports ultrasonic cleaning performance
- ✓ Helps maintain cleaning effectiveness for longer
- ✓ Contributes to shorter cleaning time

Yearly Estimated Benefit Example

Approx. JPY 5–10 million

Estimated payback period (example)

Approx. 1.5 – 4.5 years

Figures are estimates based on assumptions from selected cases. Actual results vary depending on influent water quality and operating conditions.

Proven Applications Are the Starting Point. Potential Use Cases Continue to Expand.

Manufacturing

- Quality improvement
- Freshness, pH control
- Productivity improvement

Cleaning

- Water / energy / time saving
- Process cleaning
- Degreasing / CIP cleaning

Water & wastewater

- Energy saving, efficiency improvement, and industrial waste reduction
- Improved wastewater treatment performance and biodegradation support
- Filtration improvement and reclaimed water use

Exhaust gas treatment

- Energy saving and environmental protection
- Wet scrubbers and odor control
- Circulating water improvement and fouling prevention

Accelerating Global Expansion, Especially in ASEAN



- ✓ Demand is growing across a wide range of industries.
- ✓ Directly address water, energy and decarbonization challenges

Partnerships sought through WIPO

Overseas pilot sites
Performance verification and data collection under actual operating conditions

Local deployment partners
Sales, engineering, installation, maintenance and service collaboration

Joint demonstration & business development
Co-creation of problem-solving demonstration and new business opportunities

THANK YOU