



# DS21 DELIVERS SCALABLE WASTEWATER SOLUTIONS FOR MAJOR CHEMICAL PRODUCER'S COMPLEX EFFLUENTS AT ECO-FRIENDLY PROJECT

## OVERVIEW

Process reliability is critical for wastewater treatment facilities striving to minimize their environmental footprint. As part of its corporate sustainability goals and adherence to stringent environmental regulations, a leading global chemical manufacturer sought a comprehensive wastewater treatment solution that could ensure operational reliability while meeting regulatory and sustainability benchmarks.

DS21 was selected for its expertise in delivering turnkey, fully integrated wastewater treatment systems. For this project, DS21 engineered a modular solution designed to handle high variability in influent quality, maintain discharge compliance and optimize operational efficiency across multiple plant interfaces.

The project encompassed advanced material and chemical processing units, both of which generate complex and variable wastewater streams. The client required a scalable, modular system that integrated advanced treatment technologies, sludge handling, odor control and automated operation through a Distributed Control System (DCS). DS21 delivered on all fronts.

## THE CHALLENGE: MANAGING COMPLEX AND VARIABLE WASTEWATER

The industrial project presented a unique set of challenges due to the highly variable influent characteristics from the processing units. Located at a production site in Asia, these influent streams included oily wastewater, Reverse Osmosis (RO) reject water and Cooling Tower (CT) blowdown, resulting in significant fluctuations in organic and inorganic load profiles.

### KEY CHALLENGES INCLUDED:

- Elevated levels of COD, BOD and TSS, with periodic spikes in flow rate and contaminant concentrations.
- High-temperature effluent discharges that threatened biological treatment stability.
- Limited operational space at the site, necessitating a compact, modular design.
- The need for effective odor control and integration of multiple chemical dosing systems for pH, nutrient and polymer control.

Achieving high biological treatment efficiency under these demanding conditions was essential to maintaining regulatory compliance and stable operations.

## THE SOLUTION: A FULLY INTEGRATED MODULAR SYSTEM

To address these challenges, DS21 engineered and delivered a robust, modular wastewater treatment system tailored to the manufacturer's needs. The solution combined advanced physical, chemical and biological treatment technologies to ensure compliance, reliability and efficiency.

### KEY FEATURES OF THE SYSTEM

#### PRIMARY TREATMENT

Corrugated Plate Interceptor (CPI) Separators removed free oil and settleable solids, significantly reducing the organic load on downstream processes. Skimmed oil was directed to a dedicated sump, while sludge was discharged to an oily sludge pit.

#### ODOR CONTROL

A dedicated system with activated carbon beds and odor suction fans managed odors from CPI units, basins and sludge areas.

#### HYDRAULIC AND LOAD BALANCING

Dual Equalization Basins equipped with mixing blowers were installed to mitigate influent fluctuations. Additionally, Plate Heat Exchangers tempered high-temperature wastewater to protect microbial communities in the biological treatment stage.

#### ADVANCED TREATMENT

A Dissolved Air Flotation (DAF) system separated fine suspended solids and fats through air-assisted flotation, supported by pressurization tanks and circulation pumps. The biological treatment stage included anoxic basins for denitrification, aeration basins for BOD/COD removal and clarifiers for final solid-liquid separation.

#### AUTOMATION AND CONTROL

The entire system was integrated into a Distributed Control System (DCS) for remote and local control via HMI panels. Major equipment operated via VFDs or BLDC controls, while sensors and analyzers ensured optimized performance.

#### CHEMICAL DOSING AND SLUDGE MANAGEMENT

Chemical dosing systems for pH adjustment, flocculation and nutrient support were centrally controlled via the DCS. Sludge from CPI, DAF and biological processes was processed through thickening and dewatering units, with separate handling for oily and bio-sludge to maximize efficiency.





# RESULTS: ENVIRONMENTAL AND OPERATIONAL BENEFITS

DS21's wastewater treatment system delivered exceptional performance, meeting the manufacturer's stringent requirements and exceeding expectations.

## KEY OUTCOMES:

- **Regulatory Compliance:** Consistently achieved 80–90% removal of BOD and COD, with significant reductions in TSS and total nitrogen.
- **Odor Reduction:** Maintained effective odor control across biological and sludge processes.
- **Sludge Volume Reduction:** Minimized disposal costs through efficient dewatering.
- **Compact Design:** The modular system was optimized for limited space and future scalability.
- **Automation:** DCS and PID controls reduced operator workload and enhanced reliability.

The project not only ensured compliance with local effluent discharge standards but also enhanced the client's environmental performance, setting a benchmark for scalable, replicable wastewater treatment solutions.



# THE DS21 ADVANTAGE

DS21 demonstrated its engineering expertise by integrating mechanical, biological and automated systems into a customized solution. The modular design successfully addressed the challenges of variable influent characteristics, limited space and stringent regulatory requirements.

## HOW DS21 DELIVERED

1

A flexible, multi-barrier approach for reliable, long-term performance.

2

Advanced automation with PID-based controls for real-time adjustments.

3

A compact, scalable design for ease of installation and future expansion.

4

Proven ability to balance complexity with operational simplicity.

This project underscores DS21's commitment to delivering innovative, high-efficiency wastewater treatment systems that align with sustainability goals and regulatory demands.