

# CASE STUDY:

## BAI LONG GANG WASTEWATER PLANT

SHANGHAI, CHINA | 2008



### BACKGROUND

The Bai Long Gang WWTP located in Shanghai, China is one of the largest municipal wastewater treatment facilities in Asia. It treats an average of 2.8 million m<sup>3</sup>/day (740 million USGPD), serving a population of 7.2 million, and accounts for roughly 40% of Shanghai's total treatment capacity. A retrofit in 2018 will upgrade the plant to treat 3.5 million m<sup>3</sup>/d (925 million USGPD) while meeting more stringent effluent quality targets.

### THE CHALLENGES

The Bai Long Gang WWTP, operated by the Shanghai SMI Water (Group) Co., is a shining example of China's commitment to manage the demands of economic growth while reducing pollution. The original plant, built in 1999, was challenged to achieve discharge permit levels consistently. The plant was upgraded in 2007-2008 to an anaerobic-anoxic-oxic (AAO) process for nitrogen and phosphorus removal. The oxic component demanded robust and effective aeration capabilities to ensure the process met treatment targets.

### CHOOSING THE BEST VALUE SOLUTION

Shanghai Water (the Client) was concerned about the impact such a large treatment facility would have on local communities. Minimizing the plant's footprint while achieving the best-value treatment were of paramount interest.

Client representatives visited EDI's American manufacturing facilities to evaluate EDI's aeration technologies closely.

The client ultimately selected EDI to supply the aeration components for this high-profile application despite heavy competition from local and foreign-based companies.

### INTERNATIONAL SUCCESS

This extensive aeration project demanded robust, well-proven, high-efficiency diffusion technologies coupled with intelligent control protocols to accomplish desired results.

EDI, with decades of experience and a strong reputation for delivering quality on every project, achieved another successful outcome:

- 10% greater oxygen transfer efficiency
- Reduced maintenance costs
- Additional 20% operating energy savings through PAL™ Aeration Control, resulting in \$500,000/year savings.



Environmental Dynamics International

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The client's decision was influenced by several key factors:

- EDI's unique technologies and proven performance
- The comprehensive warranty EDI offered
- EDI's reputation for excellence and responsive after-sales service

Environmental Dynamics International (EDI) partners with Shanghai WINda Environmental Co. Ltd. (WINda) in China. WINda's strong local expertise coupled with EDI's assessed ability to fulfil on future expansion plans for the process also played a key role in the client's final decision.

## TAKING CARE OF BUSINESS

EDI designed the aeration system concept during the 2007-2008 upgrade of Bai Long Gang WWTP; and shipped 22,000 FlexAir™ Magnum™ duplex fine bubble flexible membrane tube diffusers to WINda. With dedicated EDI support, WINda supplied and installed the aeration components to the project. EDI's Magnum tube diffusers with 91mm dia. x 1000mm length (3.6" x 39.4") were used in this installation.

EDI's Magnum diffusers offered several benefits to the Client:

- They are best suited for fine-bubble aeration upgrades
- Their configuration works best for high-density floor coverage
- Diffuser construction maximizes chemical, temperature, and UV resistance
- Premium-quality membrane materials reduce fouling and maintenance requirements.

The client's confidence in choosing EDI was especially noteworthy considering the Magnum product enjoyed no reference installations in China at the time. Their confidence was well-rewarded—the system performed as promised.

## AERATION SYSTEM IMPROVES EFFICIENCY, LOWERS OPERATING COSTS

The aeration system upgrade delivered 10% improvement in oxygen transfer efficiency, made possible using EDI's high-performance diffusers. Further, the aeration design with robust diffuser construction and stable operational performance has minimized the need to drain the aeration tanks for frequent maintenance, resulting in additional cost-savings.

## ADVANCED AERATION CONTROL SYSTEM OPTIMIZES PERFORMANCE

The massive and complex operations at the Bai Long Gang WWTP also exemplifies the unparalleled efficiency and performance achieved through the control systems under EDI's Symphony® Operations Management System. As part of the plant upgrade in 2008, PAL™ (Predictive Aeration Logic) – Aeration Control System was installed. PAL™ uses process-based calculations to combine the control of the aeration blowers and the control valves in the tanks to achieve precise levels of dissolved oxygen (DO).

Under manual control at Bai Long Gang, DO varied in response to influent loading changes by as much as 3.9 mg/L. In contrast, DO was within  $\pm 0.3$  mg/L of the setpoint under the advanced aeration control system 93.07% of the time; and within  $\pm 0.5$  mg/L of the setpoint 99.09% of the time. This tight DO control capability enabling high-efficiency treatment and lower energy consumption by the blower system resulted in a 20% reduction in aeration energy requirements. That is equal to a savings of \$500,000/year in operating cost for Bai Long Gang WWTP; providing a 20-month payback period for the control system. This energy reduction is on top of the 10% improvement in oxygen transfer efficiency due to the aeration system upgrade.