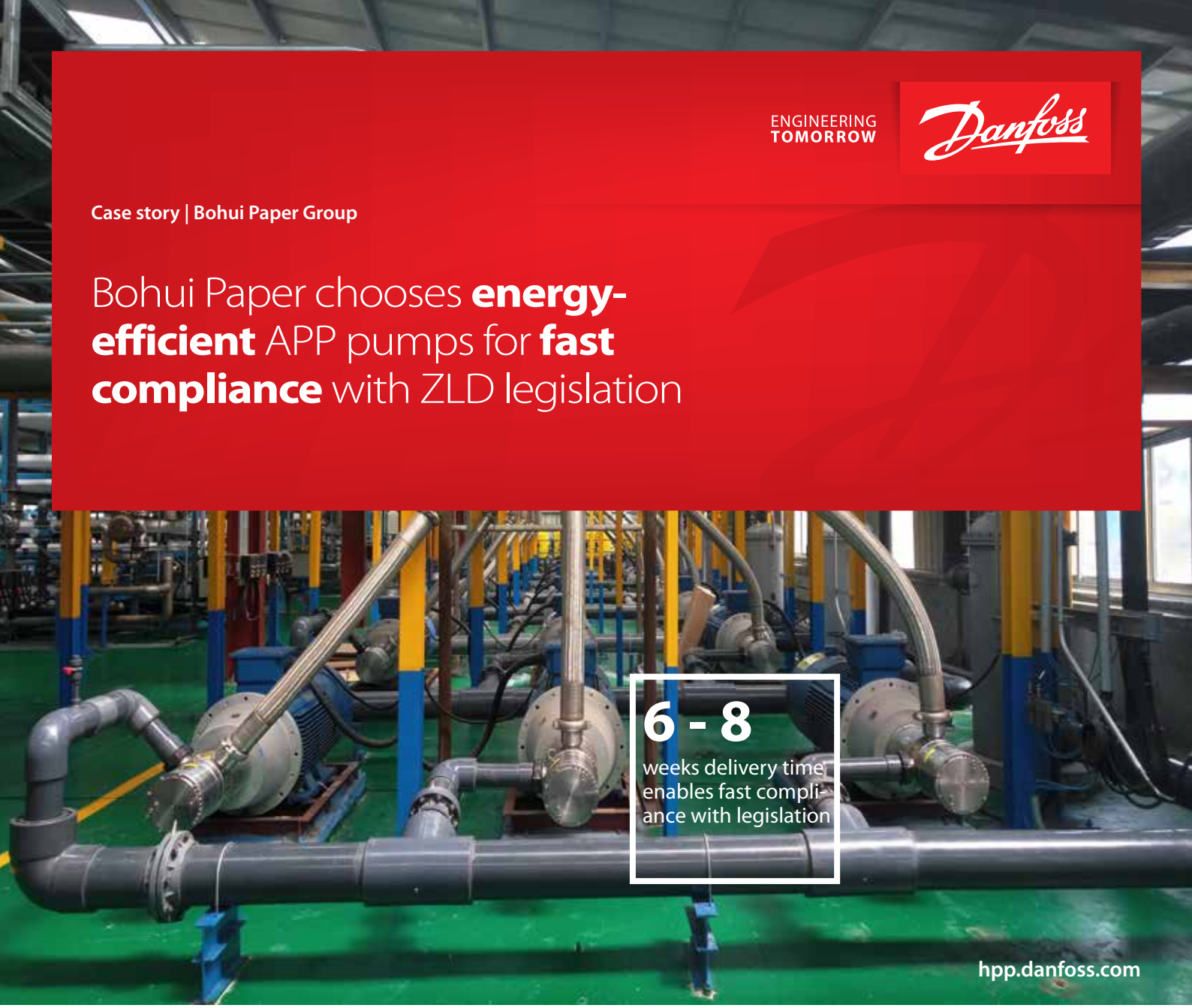
ENGINEERING TOMORROW

Case story | Bohui Paper Group

Bohui Paper chooses **energy-efficient** APP pumps for **fast compliance** with ZLD legislation



As China continues to sharpen its focus on environmentally sustainable industrial production, zero liquid discharge legislation is increasingly enforced in factories countrywide. To reduce the significant energy costs that result from wastewater being transformed from liquid to solids, companies are turning to RO treatment – and energy efficient Danfoss APP pumps are leading the way.

The challenge: Establish an energy-efficient plant to treat 30,000 m^3/d of chemical wastewater in a zero liquid discharge system – in just four months

Bohui Paper Group managers were faced with an acute deadline. In order to comply with China's strict zero liquid discharge (ZLD) legislation for one of the group's factories, they needed a new plant to treat 30,000 m^3 of wastewater per day as energy efficiently as possible. And they needed to do it in just four months.

ZLD demands are increasingly widespread in China to combat industrial pollution of groundwater, rivers and lakes. While effective in stopping industrial effluents from entering waterways and the water table, standard ZLD processes require huge amounts of energy to concentrate and crystalize brine prior to their proper disposal. But RO technology is changing the game.

The solution: A two-stage RO wastewater treatment facility driven by efficient Danfoss APP pumps to reduce the quantities of brine that need to be concentrated and crystalized

The key to making ZLD systems more energy-efficient is reducing the quantities of brine that need to undergo concentration and cystallization, both of which require substantial amounts of energy: 13-26 kWh/m^3 and 32-65 kWh/m^3, respectively.

To achieve this reduction, engineers proposed a two-stage RO plant that would effectively pre-concentrate the wastewater and reduce the ZLD system's overall energy consumption and costs.

The first stage consists of seven parallel trains (six in operation, one for backup), each of which uses three APP 78 pumps to provide design pressure of 50 bars. This first stage has the capacity to match the factory's daily wastewater output, 30,000 m^3/day, and provides the first step of brine concentration with a recovery rate of 60%.

The second stage further concentrates the remaining brine of 12,000 m^3/day with seven parallel trains (six in operation, one one for backup), each using four APP W 24 pumps to provide design pressure of 120 bars.

According to Obama Sun, general manager at Beijing C.I.I.T, there were three good reasons to choose Danfoss APP pumps for the project.

"The first and most important reason is energy efficiency, the biggest single OPEX category," he says, "Energy costs are the main driver for ZLD in general, and for the pressure needed in RO filtration specifically. The second reason is easy maintenance: since the end-user built and operates the RO system, long maintenance intervals, no lubrication, and onsite maintenance were all important. But third and not least was delivery time. Because of the tight deadline, we had only four months to design, source components, build, and install.

We had to move fast, so Danfoss's short lead time for these standard pumps was critical."

The results: Fast response, reduced energy costs, zero liquid discharge – and a satisfied end-user

"Actual build was completed in just one month, but teams were working 24/7," explains Sun. "Fortunately, delivery time for all Danfoss pumps was just 6-8 weeks. If we would have had to wait for traditional centrifugal pump lead times, we would never have been able to complete such an ambitious project so quickly."

The end user is also very satisfied with the results of the project. "Operating costs are in great focus for such a large build-and-operate zero liquid discharge project," says Rong Chao, factory manager at Bohui Paper Group. "The extremely high efficiency of Danfoss APP pumps fully meets our requirements; at the same time, their maintenance-free features greatly reduce our on-site workload."

Danfoss APP W 24 pumps operating in parallel

Danfoss APP 78 and APP W 24 high-pressure pumps

About Bohui Paper Group :

Founded in 1994, Bohui Paper Group is one of China's leading producers of folding box board, printing and writing paper, testliner board, gypsum board, and kraftliner board. The group also produces and sells pulp. With sales throughout China and exports worldwide, the group invests heavily in R&D and quality control. For more information, see www.en.bohui.com.

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