Plate evaporation system for industrial fermentation = quality and savings

Zhejiang Shenghua Biok Biology Co., Ltd, P.R. China **Case story**

Founded in 1993, Zhejiang Shenghua Biok Biology Co., Ltd is one of China's leading manufacturers and exporters of bio-agrochemicals and medicaments for animal nutrition and health. In 2010, they started working on a state-of-the-art plant to produce amino acids used for animal feed. For the new plant, the company wanted a modern alternative to the energy-hungry shell-and-tube (S&T) evaporators used in their older plants. Alfa Laval's AlfaVap plate evaporators and AlfaCond condensers proved a perfect solution.

Two AlfaVap 500 evaporators and an AlfaCond 400 condenser installed at the Biok plant.

"This is the first time we have used plate-type evaporators to concentrate fermentation products," says Mr Liu, vice general manager at the plant. "Alfa Laval is 'famous' in the field, so naturally we chose them. We are very pleased with the performance of the new evaporation system."

2-effect plate evaporation system – for energy savings

A 2-effect evaporation system consisting of two AlfaVap 500s, a thermal vapour re-compressor (TVR) and an AlfaCond 400 were installed at the Biok plant. Commissioned in 2011, the AlfaVap evaporators use a minimal amount of steam: 300 kg per 1000 kg of water as compared to 500-600 kg for the previous installation with S&T evaporators.

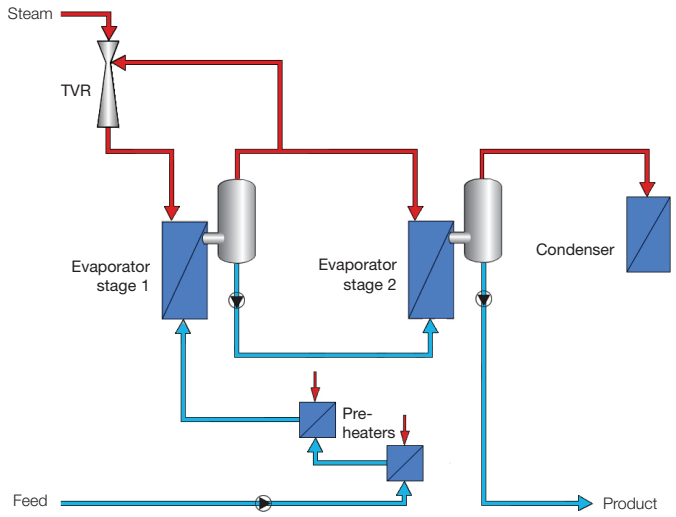
In addition, the low steam consumption means that the vacuum pump needed for this system is much smaller than the vacuum pump used in the old S&T system. Which in turn means that much less electricity is consumed.

"At first, we almost didn't believe that the vacuum pump was big enough or that the steam consumption could be so low," says Mr Liu. "But now that the system is in operation, everyone is satisfied."

Perfect for heat-sensitive amino acids

Low boiling temperatures and short residence time of the amino acids in the evaporation effects contribute to high-quality products. Mr Liu explains: "Exposure to a high-temperature environment for a long period would destroy our product. We get a better product now – thanks to the AlfaVap evaporators and Alfa Laval's deep knowledge of evaporation system design."

The low hold-up volume of the AlfaVap ensures a very short residence time inside the evaporation unit. It's ideal for heat-sensitive products like Biok's because their product solution passes through the system extremely quickly. Close temperature approaches mean that the boiling temperature in an



2-effect plate evaporation system for fermentation products.

AlfaVap evaporator can be low. At Biok the boiling temperature in the first effect is 75 °C. In the second effect, it reaches no more than 50 °C. The end result is less product loss, less degradation and a much better product quality.

Easy cleaning with less cleaning fluid
The installed AlfaVap system is compact – approximately 50% of the space of a comparable S&T system. Biok also appreciated the AlfaVap system for another reason:

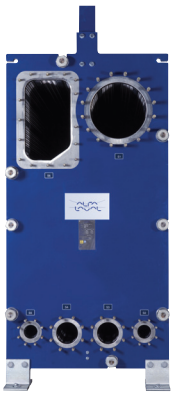
"Space wasn't really an issue for us, but we do save on CIP cleaning solution. The internal volume of the evaporators is so much smaller. Cleaning is also much easier compared to the old S&T system," says Mr Liu.

The AlfaVap evaporators´ low hold up volume mean less CIP liquid is used after each batch run when the system is cleaned. The fact that cleaning is faster and easier is due to the small volume inside the evaporators as well as the corrugated plates which create high turbulence and reduce fouling.

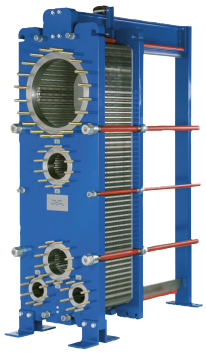
Less manpower
When asked if there was anything else he was particularly pleased with, Mr Liu was quick to reply: "Alfa Laval's process control system," he said. "Now we only need one operator to supervise the entire evaporation system. We're able to pay more attention to other important areas of the factory."

The fully automatic system is controlled fully – and completely reliably – by its PLC. In addition, important data can be stored in the system's database.

Expert support
Biok is also very happy with the support they've received from Alfa Laval. "The Alfa Laval engineers are experts – we learned a lot about evaporation from them during commissioning. Now we get a better product, while consuming less energy," concludes Mr Liu.



AlfaVap 500 — Features and benefits
- Gives a higher quality of sensitive products.
- Low hold-up volume gives a short residence time, which makes it ideal for heat-sensitive substances.
- Compact size and low weight gives a leaner installation.
- Corrugated plates ensure high turbulence and high heat transfer coefficients.
- Low fouling due to high turbulence
- Easy to adapt to changing capacity demands by adding or removing plates.



AlfaCond 400 — Features and benefits
- Specially designed for condensation of low pressure steam.
- Designed to minimise gas flow to vacuum pump.
- Condensate and cooling water never mix, eliminating a source of pollution.
- Minimized scaling on cooling water side.

Fast facts

Company challenge
Biok Biology Co., Ltd. wanted a modern evaporation system for their new plant in Huzhou City in the Zhejiang province. Among other things, they sought to save energy and minimize product degradation.

The benefits of Alfa Laval´s evaporation system
- Higher product quality thanks to low boiling temperatures and short residence time
- Close to half the steam consumption
- Easier cleaning
- Large savings on CIP cleaning liquid

The solution

AlfaVap evaporator
The AlfaVap is tailor-made for evaporation applications. Also efficient at high concentrations and high viscosities, it can work with temperature differences down to 3-4 °C. The AlfaVap allows a boiling temperature as low as 35 °C in the last effect.

AlfaCond condenser
The AlfaCond is the first plate condenser in the world specifically designed for low pressure vapour condensation. It is used in all types of industries.

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com.