



Chubu Electric Taketoyo Power Plant - Chubu EI, Japan

Power Industry

Case story

By the mid 80s, Chubu Electric's Taketoyo Power Plant had been in service for more than 30 years. Fueled by heavy crude, it had a history of reliable operation but it was having problems with its shell and tube heat exchangers.

The shell and tube's performance was declining rapidly just at a time when increased heat duty was needed. The company could continue making expensive repairs to the shell and tube or it could try what to them represented a new, unproven technology – the plate heat exchanger.

Task and description of the application

The Chubu Taketoyo plant, originally constructed by Toshiba, delivers 3 x 375 MW + 1 x 220 MW of electric power. To handle its cooling duties, it used two Alubrass shell and tube heat exchangers (S&T) – each with approximately 2000 tubes – more than seven meters long and a heat transfer area of 844 m² per unit.

The problem

After more than twenty years of service, the heat exchange capabilities of the S&T for central cooling was declining dramatically because of fouling and scaling. The tubes were plugged. It was impossible to completely remove more than twenty years of scaling and deposits.

More critically, the seawater flow rate could not be increased, regardless of increased heating duty needs. In short, the S&T was growing prohibitively inefficient. Worse, they simply could



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not expand the capacity of the tube cooler. This was unacceptable, especially during hot summer months when the plant could not be sufficiently cooled by seawater. Action needed to be taken to prevent further deterioration. The existing S&T had to be retrofitted.

The solution

Since plate heat exchangers (PHE) were an unknown technology at the plant, Alfa Laval offered to deliver a test unit of commercial size that was fully operational. For this particular application, the AX30-FM with 444 m² of heat transfer area was recommended.

Its performance would be closely monitored over a period of one year. During that period, one of the two S&Ts was held in standby while the other was allowed to operate parallel to the PHE. Since the PHE has 15% extra capacity relative to the S&T it was expected too meet the demand for extra capacity.

Customer reassurance

Both Alfa Laval and the client closely monitored the system. After one year, the only problem encountered with the PHE unit was slight clogging by sea mussels. The use of chlorine effectively prevented this problem from reoccurring. Minor scaling was cleaned by a high pressure water jet. Manpower productivity reports revealed that only few days of



PHE was an unknown technology at the power plant.

work were required to keep the system clean – including time needed to open and close the PHE.

In fact, eight years later the PHE proved so reliable that no gasket change had been needed to date and today 2 x AX30 and 1 x AX30B have been installed at Taketoyo Power Plant, all replacing S&Ts.

New orders – the best measure of customer loyalty

In the intervening years a non-Alfa Laval PHE had been installed at the plant. However, due to weak port support, corrugated strips had to be placed at diagonal corners and unfortunately the led to clogging and flow problems.

The Alfa Laval PHE delivered problem-free performance. As a result, the Chubu Taketoyo Power Plant placed a new order with Alfa Laval, who was asked to retrofit S&Ts with two PHEs – AX30-FM 444 m² and AX30- BFM 318 m². This time, no S&Ts would be left on stand-by.

Alfa Laval serves power plants around the globe

Alfa Laval has by today supplied more than 5,000 units in power plants for central cooling and many other steam and oil applications.

Alfa Laval – where it all started

Do more companies turn to Alfa Laval for PHE solutions because we invented most PHE innovations or because we offer superior solutions?

You be the judge.

Here is a short list of some of the advancements we have made in PHE technology:

- AlfaFlex
- Titanium plates
- Semi-welded for aggressive media applications
- AlfaRex for high pressure/high temperature applications
- Glue-free gaskets

Anything a shell and tube can do, a PHE can do better

A PHE is smaller, lighter and less expensive than a shell and tube.

Is it any wonder PHEs are quickly winning acceptance in more industries?

Specifications of AX30-FM	Cirkuculation Water	Seawater
Flow rate	844.35 m ³ /h / 37.718 GPM (US)	710 m ³ /h / 3.126 GPM (US)
Inlet temperature	39.8°C / 103.6°F	31.0°C / 87.8°F
Outlet temperature	34.3°C / 93.7°F	37.3°C / 99.1°F
Heat dissipation	4,610 Mcal/h / 18,302 kBtu/h	
Permitted pressure drop	40 kPa / 5.8 psi	40 kPa / 5.8 psi
Design pressure	700 kPa / 101.5 psi	700 kPa / 101.5 psi

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