



Afsin A. Power Plant - Afsin, Turkey

Power Industry

Case story

Near the small Turkish village Afsin, on the high plateau of Elbistan in the south east of Turkey, we find the 1360 MW coal fired thermal power plant Afsin A. The plant was built in 1980 in the vicinity of a big coal mine and the spring wells of the river Ceyhan.

Task and description of the application

Afsin A is the biggest thermal power plant in Turkey with 4 x 340 MW ABB steam turbines. The cooling system is based on cooling towers using natural circulation, with make up water from the river. Each turbine and cooling tower circulates 40,000 m³/h cooling water. Make up river water is 400 m³/h.

The main share of the cooling water is used in the big steam condensing units and remaining cooling water is supplied to central coolers, feed water pump lube oil coolers and steam turbine lube oil coolers. From the beginning the plant was equipped exclusively with shell & tube (S&T) type of coolers.

The problem

After a few years of operation the plant experienced problems in reaching full capacity. Cooling temperatures to vital equipment such as feed water pumps and turbine main bearings could not be kept within limits and consequently the plant had to reduce its power output. The reason was to be found in the cooling system where many of the S&T unit were severely corroded and subsequently tubes had been plugged in order to avoid leakages.

Moreover, the S&T coolers were designed for a temperature of 28°C whereas the temperature of the cooling water summertime climbed up to 35°C. Clearly the S&T cooling system could not cope.



PHEs are smaller, lighter and less expensive than shell and tubes.



Afsin A Power Plant, the biggest thermal power plant in Turkey, replaced their shell & tubes with Alfa Laval's plate heat exchangers.

The situation deteriorated due to reduced maintenance to a point where available power production was only 60% of the nominal capacity of the plant resulting in a power loss of more than 500 MW.

The solution

A comprehensive maintenance programme was planned to eradicate the cooling program. At first a complete overhaul of the S&T coolers was anticipated.

After contacts with Alfa Laval it was agreed to try one of Alfa Laval M3 Plate Heat Exchangers (PHE) for a test.

The test was soon concluded a success and further 3 M3 units followed by another 5 M3 units were ordered. So, when the tender for the big retubing programme was opened, the plant management accepted Alfa Laval's offer to replace the S&T coolers with Alfa Laval PHE coolers instead of retubing.

The first target was the central coolers to one of the turbines. The Alfa Laval solution incorporated 3 x M20-FM plate heat exchangers, providing a 3 x 50% installation.

The order was placed with Alfa Laval. Replacement work was executed while the plant remained in operation with PHE in a bypass circuit.

Total downtime was limited to two days for welding the bypass pipe. This can be compared to an estimated downtime of three months for retubing of the S&T coolers.

Experience

The result of the PHE installation was that the plant could resume full capacity in summer time as the coolers now were able to use the warm cooling water of 35°C and still keep bearing and feed water lube oil temperatures within their limits.

Stimulated by the successful replenishment of the central coolers, plant management now decided replacement of the S&T turbine lube oil coolers.

The result was so positive that within a year all lube oil coolers were replaced with Alfa Laval M15-FG PHE type coolers. Thanks to the increased cooling capacity it was now possible to run the turbines at their rated load.

Plant Manager Mr Tayfun Buyuk comments: "We looked for a solution which would restore our power production capacity and ensure long term operation at full output with minimum maintenance costs. The Alfa Laval solution has proven to comply with these demands. The PHE's will certainly be my recommendation for the sister plant Afsin B which is now under construction."

Maintenance Manager of turbines Mr Ali Eren fills in: "We are very satisfied with the cooperation with Alfa Laval and their local representative SEGA."



Maintenance Manager Mr Ali Eren: "The complete PHE installation was made without any interruption in our daily production."

Total scope of supply

For each of the four turbines the following coolers were installed:

- 2 x M15 – BFG, 310 plates, stainless steel, turbine lube oil cooling, 2 x 100%
- 3 x M20 – MFM, 185 plates, titanium, central cooling, 3 x 50%
- 2 x M10 – BFM, 194 plates, stainless steel, feed water pump coupling oil
- 2 x M10 – BFM, 88 plates, stainless steel, feed water pump lube oil

As extra support to the power plant:

- 25 x M6 – FGL for heating of buildings
- 9 x M3 – FGL for lube oil cooling of coal grinders

Alfa Laval 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?

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