HEATEX

Synchronous Condenser Cooling

Industry

Electric power transmission is the movement of electrical energy from a generating site to an electrical substation. With more renewable and intermittent power, synchronous condensers help stabilize the electrical grid.

Company

Founded in 1958, DEC has been engaged in the electric power industry for more than 60 years, providing about one-third of China's energy equipment is one of the largest energy equipment manufacturers worldwide.

Application

A synchronous condenser is used to stabilize the electrical grid. It requires cooling to operate effectively. Different cooling solutions are used where Heatex provides an efficient method for air cooling (TEAAC).

CASE STUDY

with Dongfang Electric, China

"Heatex supported us with technical design expertise throughout the complete project phase."
XuLei, Application Engineer at DEC.

Introduction

Among many other application areas, DEC keeps optimizing traditional power generation control services, primarily focusing on modern control technologies by providing equipment manufacturing and system solutions.

Together, Heatex and DEC have a long track record of successful projects within the field of wind turbine cooling. Many DEC wind turbines feature custom-made Heatex nacelle or generator cooling systems.

DEC wanted us to develop an air-cooling solution for this project for their 50MVAr Synchronous Condenser. Limited in space and footprint, Heatex delivered a complete cooling solution with less footprint, lower weight, and better cooling performance than traditional tube designs.

Following the successful implementation and operation, Heatex has continued to develop and deliver smaller systems for 20MVAr and 30MVAr modifiers.

This case study is a summary of the 50MVAr cooling system.

Challenges

With large cooling demands and high ambient temperatures, the demands on the cooling system of the synchronous condensers are challenging to meet.

- Limited space availability
  (The complete system has to fit on top of the condenser.)
- Low power consumption
  (Especially the fans are energy-intensive)
- Noise requirements
- No coooling water available

Solution

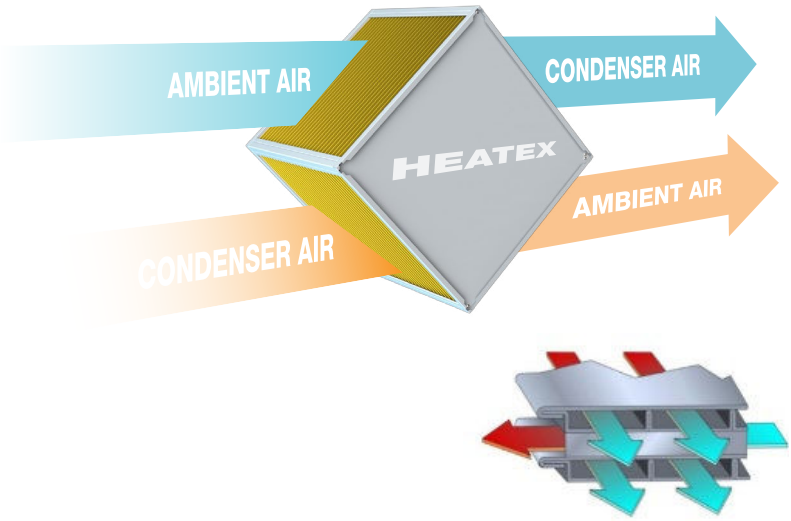
The complete cooling system is built of multiple modules of heat exchangers with fans and a surrounding casing.

The internal hot air in the synchronous condenser is directed through the heat exchanger and back. The ambient air is used to cool down the internal air coming from the condenser.

The system has variable frequency drives to control the fans and allow for optimal power consumption. Pressure drop monitoring and temperature sensors are installed to facilitate intelligent operation.

The system's heart consists of Heatex cross-flow heat exchangers with a corrugated plate pattern. This allows for a compact and efficient solution, which was needed to meet the size and power consumption requirement. It also provides maintenance-free operation despite the risk of having ambient air mixed with sand.

The cooling system was tested and validated in the Heatex Shanghai facility and has been in the field since 2022.



In summary, Heatex cooling systems provide:

- Liquid-free cooling
- High performance air-to-air cooling
- Modular design for flexibility
- Low maintenance for less downtime

Heatex's skilled and experienced application engineers support you throughout the development process, finding the right solution for your unique needs.

Ask an Expert

Results

Location, China.

Rating

50 MVAr

Synchronous condenser rating.

Cooling Power

573 kW

Exceeded the the 540kW required by DEC.

External Air Volume Capabilities

64 808 $m^{3/h}$

At 40°C ambient temperature.

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