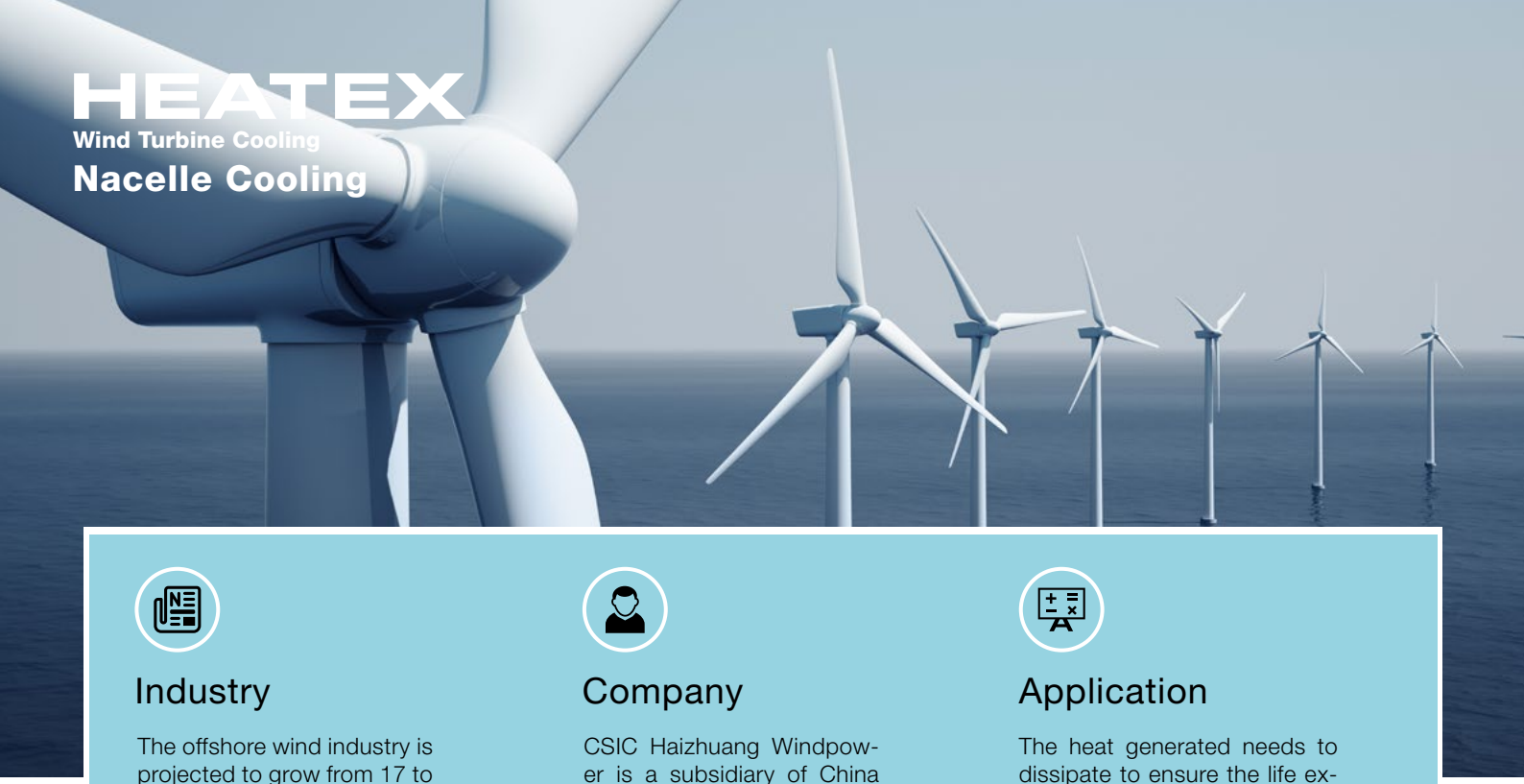
HEATEX
Wind Turbine Cooling

Nacelle Cooling



Industry

The offshore wind industry is projected to grow from 17 to 90 GW in the next decade, and offshore wind power is expected to account for 15 percent of the global wind industry going forward.

Company

CSIC Haizhuang Windpower is a subsidiary of China Shipbuilding Industry Corporation. It develops and manages wind turbines and on/offshore wind power projects all across China.

Application

The heat generated needs to dissipate to ensure the life expectancy of the components inside the nacelle. Heatex develops customized cooling systems for both onshore and offshore Wind Turbines.

CASE STUDY

with CSIC Haizhuang Windpower

Introduction

CSIC Haizhuang Windpower (CSIC HZwindpower) was set up in 2004 as a subsidiary of China Shipbuilding Industry Corporation (CSIC), a large state-owned industrial group.

CSIC HZ windpower's 10MW H210-10.0 turbine was first released in 2019 and features a 210-metre rotor, offering a low 289W/m2 specific power rating specifically aimed at favourable Chinese offshore locations with mean wind speeds above 8.5m/s (IEC class I).

It is now in full serial production and operating outside the coast of the Shandong province in China.

CSIC was looking for a partner capable of supplying cooling systems for offshore applications (C5M environment according to ISO 12944-2) that met the demanding requirements regarding heat dissipation, quality, production, and cost.

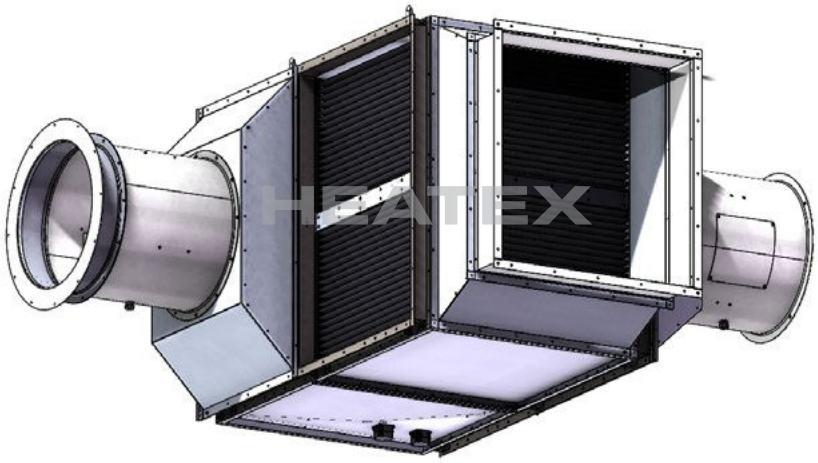
Heatex leveraged its air-to-air heat exchangers to develop a customized system solution to fulfill CSIC's specific needs.

Challenges

The nacelle inside air continuously absorbs the heat from electrical equipment. This heat needs to be removed, and the temperature needs to be controlled to ensure an optimal working environment for all equipment inside the nacelle.

The challenges for CSIC in terms of cooling were mainly:

- Maintaining sufficient circulation of cooled air to the nacelle.
- Making sure the corrosive ocean air doesn't get inside the nacelle
- Optimizing the system according to the specific cooling needs
- Keeping to the size limits provided inside the nacelle



Solution

The cooling system was designed around Heatex's high-efficiency aluminum cross-flow heat exchanger Model H2 for superior heat transfer efficiency and low pressure drop. Due to the closed-loop design of the system, the ocean air never gets inside the nacelle.

Thanks to the open plate design, dirt will pass through the exchanger without clogging it. In addition, epoxy-coated aluminum plates provide high resistance to the offshore environment.

The heat exchanger framework and system structure were powder coated with several layers and assembled using stainless steel rivets. The corrosion-resistant fans were optimized to reduce total power consumption and weight.

To facilitate easy installation, the system was designed for suspension on a roof or wall or fixed to a platform. In addition, flexible ducts were used to allow for a perfect match with the nacelle interfaced.

In summary it results in a system with:

High Cooling Capacity
Heat exchangers, fans, and ducts were designed and tested as a complete system to avoid losses and secure high capacity.

Closed Loop Cooling
The corrosive ocean environment never comes in contact with the electronics inside the nacelle.

Low Maintenance Costs
Self-cleaning heat exchangers require minimal maintenance.

Moderate Power Consumption
Fans were designed and optimized based on actual operating conditions of the complete cooling system.

Ask an Expert

Results

Cooling Power

36 kW

Continous cooling power at 35°C ambient temperature.

Offshore Compliant

100%

The system is protected against the ocean environment.

Systems Delivered

185 sets

Since 2020

Need Consultation?

Heatex has over 10 years of experience in both On- and Offshore applications. Over 2000 Heatex cooling systems are successfully operating worldwide.

Ask an expert for a free consultation.

HEATEX