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Redundancy and improved efficiency for server room air conditioning

A large data center facility in the Chicago, IL area was struggling to meet peak demand of their cooling system with their existing dry coolers. Güntner's GFD 'V' shape style unit was able to exceed the performance of the existing coolers while meeting the physical space limitations of the site with low fan power consumption.

High level of redundancy and improved efficiency

The data center turned to Güntner to design and supply reliable efficient cooling. As a replacement project, the challenge was to exceed the original design load by 25% without increasing the footprint of the existing dry coolers; all the while with an eye on energy efficiency. Güntner's GFD 'V' shape style unit, which utilizes two coil assemblies with a common set of fans, was able to exceed the performance of the existing coolers while meeting the physical space limitations of the site with low fan power consumption.

Overview

Business line:	HVAC
Application:	Data Center
Location:	Chicago, Illinois, USA
Refrigerant:	Propylene glycol solution
Product:	GFD V-Shape Vario



Being a mission critical application, the data center required a high level of redundancy. To this end, Güntner was able to apply the Adiabatic Cooling System to account for upset conditions such as extreme high ambient temperatures or unforeseen higher thermal loads. During these upset conditions, with the Adiabatic Cooling System, air entering the finned heat exchanger is pre-cooled by wetted cooling pads to a temperature approaching the wet bulb temperature, without aerosol formation and without applying water to the finned surface. The coolers were selected to operate completely dry (i.e. no water for the pre-cooling of air) when ambient temperatures were 95°F (35°C) and below. The adiabatic functionality could be employed above this temperature to account for ambient temperatures as high as 125°F (51.7°C) and still maintain design thermal performance.

In addition to the redundancy aspects of the Güntner solution, the data center gained a 30% increase in capacity AND decreased the total power requirement by 15%. The data center experienced a drop in PUE from 1.92 to 1.62 during summer operation. The electronically commutated (EC) motors paired with the Güntner Motor Management (GMM) provides precise capacity control and excellent part load efficiency further enhancing the overall system efficiency.

The intelligent controls of the Güntner unit added to the user's peace of mind to ensure reliable system functionality. The EC motors and GMM offers inherent redundancy with a bypass function that initiates fan motors to operate at 100% fan speed should a communication error with the controller occur. A cleaning function which allows fan motors to run in reverse to aid with dirt and debris removal adds to the efficient operation. All with communication capabilities via Modbus to alert to upset conditions and the tracking of critical parameters such as power consumption, hours runtime and water use.

Technical Data

Cooler type:	GFD Dry cooler
Quantity:	16
Total heat rejection capacity:	34,880,000 Btu/Hr (10,223 kW)
Fluid:	30% Propylene Glycol
Design fluid temperatures:	123°F entering / 110°F leaving (50.6°C / 43.3°C)
Design ambient:	125°F (51.7°C) dry bulb / 82°F (26.7°C) wet bulb
Adiabatic switch point:	95°F (35°C) ambient temperature