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Literature : JET17-801

Modular Water-Cooled Chillers for Industrial Plant Application

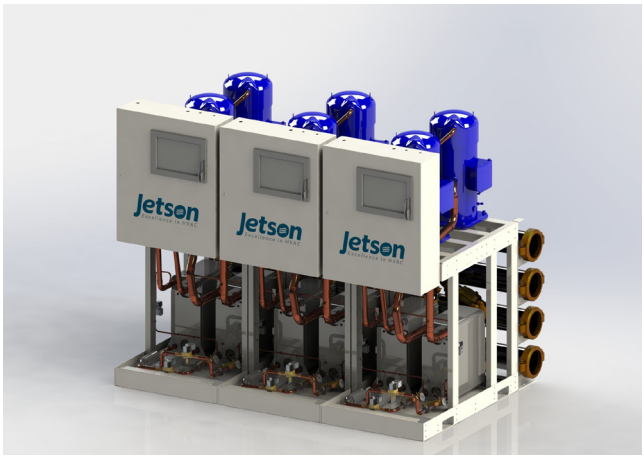
THE CHALLENGE

An industrial plant in Tennessee faced a significant challenge in maintaining efficiency and sustainability within their critical paint process due to a surge in demand. The existing cooling system no longer had sufficient capacity to meet this increased demand, and a more effective solution was urgently required.

Mechanical Resource Group (MRG), the Jetson by Modine representative for the state of Tennessee, partnered with the industrial customer to find a solution: a system that could provide the necessary cooling capacity for the critical paint process while also being energy-efficient and sustainable, reducing electricity usage and CO2 emissions generated by their gas-fired boiler used for hot water production.

THE SOLUTION

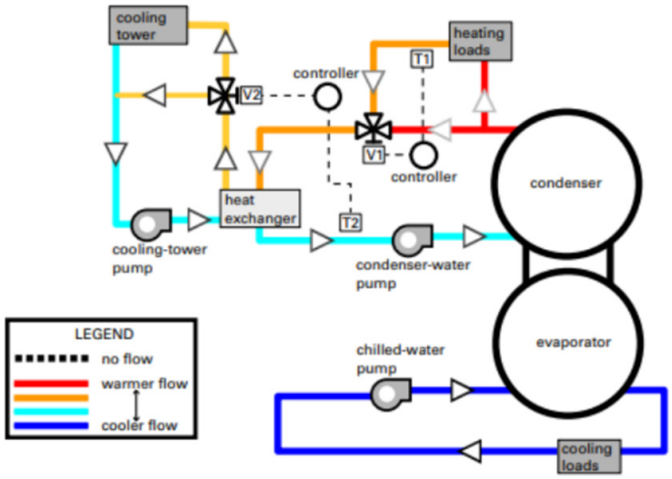
Two Jetson 85-ton modular water-cooled chillers (FWCD) with heat recovery capability were selected to be installed as an array, providing a total nominal cooling capacity of 170 tons. These chillers were selected to provide 44°F chilled water for the critical paint process while simultaneously recovering and rejecting free heat from the water-cooled condensers at 135°F for the hot water washer process.



At a time when energy costs are high and continue to rise, reducing energy usage has become increasingly important. By using Jetson FWCD modular water-cooled chillers with heat recovery option, utilization of energy can be improved by using heat from the condenser that would otherwise be wasted. This greatly reduces or eliminates the reliance on other fossil fuel based water heating systems. The use of heat recovery should be considered in any building with simultaneous heating and cooling requirements or in facilities where heat can be stored and used at a later time. Buildings with high year-round internal cooling loads, are excellent opportunities for heat recovery.

Heat recovery is designed to capture a portion of the heat that is normally rejected to the cooling tower and put it to beneficial use. With the addition of a heat recovery cycle, heat removed from the building cooling load can be transferred to any heating application. The heat recovery cycle is only possible if a cooling load exists, where the heat of rejection can act as a heat source.

Such systems are particularly beneficial in industrial settings where there is a simultaneous demand for cooling and heating, making them an effective strategy for reducing carbon footprints and operational costs.



In addition to the chillers, Mechanical Resource Group collaborated with the industrial customer to provide a complete solution by adding and replacing heat exchangers and installing new pumps with variable frequency drives (VFDs). The customer also utilized free cooling from the cooling tower during lower outside air temperature conditions, further enhancing energy savings.

THE RESULT

The two Jetson 85-ton FWCD Heat Recovery Chillers provided a reliable chilled water solution to meet the increased process demand, enhancing both the efficiency and reliability of the production processes. The FWCD chiller array has an IPLV of 0.527 kw/Ton in cooling mode and a COP of 2.57 in Heat Recovery mode, with over 2200MBH heat rejection capability.

The implementation of the Heat Recovery led to significant benefits. By utilizing the heat rejection capabilities of the Jetson chillers instead of gas-fired boilers, MRG estimates that the client will save over $40,000 per year in natural gas costs and eliminate over 26 tons of CO2 emissions, thus reducing the plant's carbon footprint and achieving an attractive return on investment. The industrial customer also benefited from an energy savings incentive program from TVA EnergyRight.

Overall, the project led by MRG utilizing Jetson FWCD-085 Heat Recovery Chillers proved to be a successful solution for the industrial client in Tennessee. It maximized energy efficiency and cost savings, significantly reduced natural gas usage, and contributed to sustainability efforts. This innovative approach not only provided substantial environmental benefits but also positively impacted the plant's operations.

IPLV (Cooling)	COP (Heat Recovery)	Estimated Energy Savings:
0.527 kw/ton	2.57	$40,000 and 26 metric tons of CO2 per year

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