

SMARTD Case Study - RED-Rochester



PROJECT ROLL-OUT

PHASE 1 Startup date: 2/5/2019

Solution: 2000 TR Smartd V-class oil-free centrifugal chiller (WB600.5UG12.F2CDQB.F2CRQB.TSO)

PHASE 2 Startup date: Winter 2020

Solution: 3200 TR Smartd V-class oil-free centrifugal chiller (WB900.8UG12.F1BSOB.F1CEOB.TSO)

ABOUT THE CLIENT

Eastman Business Park (EBP), located in Rochester, New York is a 1,200-acre R&D and manufacturing campus with over 16 million square feet of multi-scale manufacturing, distribution, lab and office space. There are currently almost 110 companies onsite employing over 6,000 people, many of them responsible for the development of next-generation technologies in the areas of Energy Storage, Chemical Manufacturing, Roll-to-Roll Manufacturing and Photonics. The Park's immense manufacturing infrastructure—including the private utilities and onsite water and wastewater management system—is a competitive advantage for its high-use tenants.

RED-Rochester, LLC owns and operates EBP's utility infrastructure and offers a suite of 16 different utility services. RED's competitively priced utility services originate from harnessing the efficient tri-generation of electricity, steam and refrigeration from the combustion of a single source of fossil fuel in their new natural gas-fired boilers.

RED's utility offerings include: electricity, four different pressures of steam, chilled water, nitrogen, compressed air, potable water, industrial process water, demineralized water, high purity water, fire protection water, natural gas, and industrial wastewater treatment with precious metals recovery through a Title V/RCRA permitted multiple hearth incinerator.

Client: RED-Rochester, LLC — Eastman Business Park

Location: Rochester, NY, USA

Application: District cooling network

Smartd Sales Rep: H&V Sales Group, NY

THE CHALLENGE AND REASON FOR SELECTING SMARTD

RED evaluated and considered several chiller technologies and manufacturers for this project. A magnetic bearing centrifugal chiller was desired for energy efficiency and reduced maintenance. Ultimately the decision was made based upon the total package of capacity and turndown, efficiency, reliability and redundancy.

Smartd is the only manufacturer capable of constructing a single 2000 TR oil-free type machine. All others were limited to about 1000 TR at the time. As such, the specified design was converted from two chillers to a single chiller with five compressors. At RED, the load is quite dynamic, and turndown is very important. Being able to operate this unit over a wide load range provided the flexibility of staging and running the entire system more efficiently, including the old steam chillers. Smartd's energy efficiency was above and beyond other magnetic bearing chillers over the entire operating range.

The V-class oil-free centrifugal chiller can operate at extremely low condenser water temperatures to achieve world-class kW/TR values during wintertime operating conditions. Other manufacturers would have required costly additional features, tube enhancements, controls upgrades, etc. to approach the efficiencies offered by Smartd.

THE SCOPE OF WORK AND SOLUTION EFFICIENCY

The original scope of work was to install two 1000 TR magnetic bearing centrifugal chillers to replace a single 2400 TR steam turbine-driven centrifugal chiller. The new chillers would join two other existing 2300 TR steam turbine-driven centrifugal chillers for a total plant capacity of 6600 TR. However, the ability of Smardt to provide all 2000 TR cooling capacity within a single chiller dramatically reduced overall installation costs while still offering similar redundancy and turndown of having multiple machines. Selecting a single chiller reduced overall floor space, piping, insulation, electrical and controls. It also eliminated the second set of chiller equipment including the chilled water pump, condenser water pump and flow meter. The final solution was a single 2000 TR Smardt chiller with five Danfoss Turbocor® compressors. The chiller utilizes dedicated variable speed chilled water and condenser water pumps. The overall system is fully variable and operates 24/7/365, providing 43 °F chilled water to the business park customers.

PERFORMANCE RESULTS FROM OWNER

- Avg load: 1222 tons
- Max load: 2312 tons
- Avg condenser water temp: 63 °F
- Min condenser water temp: 45 °F (now 47 °F)
- Avg chiller efficiency: 0.346 kW/TR
- Best chiller efficiency: 0.141 kW/TR
- Avg COP: 10.2
- Best COP: 25.0
- CHW Supply temp deviation: ± 0.8 °F

"Smardt has a reputation for building robust and reliable machines. Our project team was able to visit with another customer in Grand Island, NY and view their installation.

Being able to see the quality of the machine and speak with this customer was very beneficial towards making our decision. Also, the Danfoss Turbocor compressors are leading-edge technology and have a long history of performance and reliability. Finally, the redundancy offered by five independent compressors was very attractive to our site.

The ability to continue operating the unit at a reduced capacity when a compressor may be out of service is extremely valuable to our operations and maintaining continuous chilled water supply to our customers."

- Craig A. Avalone, P.E., CEM, LEED AP
Energy Manager
RED-Rochester, LLC

PHASE 2

RED has been very pleased with the operation of the chiller in Phase 1 and has since sent a purchase order for a 3200 TR Smardt V-class chiller. The attractive ROI made it simple for RED to approve funds for the additional chiller upgrade.



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