

Data Center



Avid R&D Center *Case Study*



Creative Energy: Avid Cools R&D Center on New Campus with Innovative Packaged Chiller Plant

Avid Technology, Inc., is all about creativity: providing the tools to help audio and visual professionals complete projects efficiently and cost-effectively. Avid Technology production software is used in demanding, high-end projects such as the soundtrack editing for *Avatar*, the visual effects editing for the movie *Star Trek* and the on-tour production needs for Grammy Award-winning band Maroon 5.

Avid's Real Estate department officials applied a similar creative approach when they sought a new HVAC system to cool the company's data center and R&D labs. They found their solution in an efficient, cost-effective Mammoth high-efficiency packaged chiller plant. The custom-engineered, factory commissioned package—combining a magnetic-bearing centrifugal chiller, evaporative condenser, waterside economizer and controls into one unit—reduces design and installation costs as well as ongoing operating costs for Avid's labs and data center air conditioning.

Aesthetic chiller plant on a high-profile campus

Needing a more state-of-the-art facility, Avid recently moved into a three-building campus totaling over 200,000 square feet in Northwest Park, a high-profile complex of offices, stores and residences along Route 128 in Burlington, Massachusetts, a Boston suburb. Avid's new space features a combination of private offices, customer presentation areas, data center and R&D labs designed to create an open and collaborative work environment.

At a Glance

- New R&D center in leased building space requires added chilled water capacity to serve R&D labs and data center.
- Innovative, high efficiency packaged chiller plant combines magnetic-bearing centrifugal chiller, evaporative condenser, waterside economizers and controls.
- Chiller plant meets desire for a totally self-contained system, precommissioned plug-and-play operation, lower electrical demand, sole source responsibility and portability if the facility is vacated.
- System provides added benefits of a shorter construction cycle, reduced installation costs and an attractive, low profile package.



The Mammoth chiller plant installed at Avid provides a totally self-contained system, precommissioned for plug-and-play operation, sole source responsibility, portability if the facility is vacated, and it meets aesthetic requirements of the building owner.

A central HVAC system serves the offices and is operated by Nordblom, the building owner. However, the 15,000 square feet of data center and high-use engineering lab required its own cooling system. The engineering area uses about 11 watts per square foot, while a number of individual smaller computer rooms use 150 watts per square foot.

“We needed a totally engineered, self-contained system all in one box,” said Neal Foley, senior manager for real estate, Avid. “That’s partly because, if and when we vacate, we have to remove it. More important, however, we wanted something that was covered by one manufacturer’s warranty. I didn’t want to have to deal with warranties for all the components of the system. Plus, our landlord is protective of the aesthetics of the campus, so it had to look good. And, because the project was on a very tight timeline, it had to be available quickly.”

Design engineers quickly excluded the option of a traditional central chiller

plant with cooling tower because there was no room in the building other than rentable space, which was too costly for a mechanical room; plus, a cooling tower would have detracted from the low-profile campus. After researching a variety of options, including air-cooled and water-cooled chillers, engineers recommended a 500-ton energy-saving magnetic-bearing centrifugal compressor chiller with an evaporative-cooled condenser system from Mammoth.

“The low-profile box that Mammoth presented, with its evaporative-cooled option, was the best aesthetic solution,” said Vinny Bettano, mechanical engineer with RDK Engineers, Boston. The firm specializes in mechanical, electrical, plumbing and fire protection engineering services as well as total building solutions, from systems design to commissioning to facilities management. “Two other deciding factors were Mammoth’s ability to test the entire package at its plant and the excellent support from the local representative, APA.” Alfieri Proctor Associates (APA), Boston, provides airflow and HVAC systems for commercial and institutional facilities.

High efficiency in a plug-and-play package

Known for its packaged, custom-engineered systems, Mammoth pioneered and developed the evaporative-cooled condenser system more than 50 years ago. Centrifugal chillers, evaporative condensers and waterside economizers are all components that can be engineered in a chiller system. It is not common, however, to find them packaged together as a plug-and-play system that includes primary and secondary pumps and drives, assembled, pre-piped and pre-wired with controls.

For Avid, that translates to a high-efficiency system with a shorter construction cycle and an attractive, low-profile package.

Magnetic-bearing compressors

Key to the system’s operating efficiency are two flooded chiller barrels, each with two Turbocor magnetic-bearing centrifugal compressors per barrel.

“The magnetic-bearing compressors allowed us to present the best possible efficiency at low-load conditions,” said Bettano. “The data center equipment will be phased in over time, so the space won’t require full-load cooling from day one. The system will be operating between 30 to 40 percent of load, and that’s the sweet spot for magnetic-bearing compressors.”

The compressor’s low IPLV exceeds ASHRAE 90.1 and California Title 24 energy-efficiency requirements. In addition to efficiency, the compressors are oil-free, which means no oil management hardware, controls or downtime costs, no lubrication and no metal-to-metal contact of rotating components. Because the compressors don’t vibrate, operation is about 70dBA, or the same sound level as normal conversation. The compressor’s footprint is about 50 percent smaller and 25 percent lighter than that of conventional compressors, making it ideal for the packaged system.



"My energy requirements are different than other people's," said Foley. "True, I want to reduce energy costs and be a good corporate citizen. My bigger concern was getting my electricity usage down. This park is serviced by a utility that has only a certain amount of capacity that would squeeze through the pipe. We were restricted by primary electrical feed sizing. Because of our business, we consume a significant amount of electricity. The packaged chiller plant was a key factor in helping us meet our reduced-load requirement."

Evaporative condenser

The Mammoth evaporative condenser accomplishes the same purpose as a cooling tower—it rejects heat to the atmosphere—but does so more efficiently by using evaporation to reduce the workload on the condenser. Its small footprint allows it to be housed with the centrifugal chiller. The compressor uses up to 40 percent less compressor energy to operate compared to an air-cooled condenser. "To prevent freezing in the winter, a glycol loop preheats outside air before it enters the evaporative section, providing up to 30 degrees temperature difference across the coil," said Bob Rieckelman, sales representative, APA. "In extremely cold weather, the unit can run dry and still provide the required operating capacity." The footprint of the condenser is smaller and quieter because it requires less coil surface area and moves less air.

Waterside economizers

Waterside economizers, equipped with plate heat exchangers and pumping, take advantage of Boston's climate by providing "free" cooling during mild temperatures. When the outside air is dry- and wet-bulb temperatures are low enough, the economizers—essentially supplemental heat exchangers—use chilled water from the condenser, which eliminates the need for cooling via the compressor. "This free cooling gives the data center a maximum capacity of 150 tons of cooling on a zero-degree day," said



The innovative, high efficiency packaged chiller plant combines a 500-ton magnetic-bearing centrifugal chiller, evaporative condenser, waterside economizers and controls to provide the highest efficiency and low electrical demand, in addition to quiet operation and reduced maintenance and service.

Rieckelman. "With computers running 24/7, that's a significant advantage."

Controls

A Mammoth EPiC™ System controls the building pumps, chiller pumps, compressors, refrigerant level control, evaporative condensers and economizer cooling coils. The entire chiller plant's operation is fully integrated leaving the factory, providing the customer single source responsibility.

The Mammoth EPiC System combines a software and hardware approach that can also work over a wide range of control protocols, often without additional hardware. The flexibility it provides allows all components in this complex, custom-designed system to be factory commissioned, dramatically reducing start-up timelines and field commissioning costs. The EPiC System for Avid communicates information to the building management system via BACnet® MSTP. Other common interconnection protocols include other forms of BACnet (IP, Ethernet, ARCnet & PTP), LonTalk, Modbus, and N2. The entire package was custom-

engineered to Avid's specs and deadline. "We couldn't change our move-in date," said Foley. "Our lease at the previous building had expired, so we were locked into our moving day. The good thing about a packaged plant is that Mammoth technicians did the full assembly out at the Mammoth factory. They put a load on the system and did all the commissioning at their site. It made final commissioning here that much easier and helped us meet our deadline."

Payback time

Combining all the components usually associated with a large and expansive chiller system into one pre-assembled plant gives Avid an estimated five-year payback period over the base case air-cooled system, according to Bettano. "It underscores our goal of giving the client the best, most efficient system we could." Reducing design and installation costs, simplifying maintenance and increasing energy efficiency in one technologically advanced package—it's a perfect match for Avid's own creative energy.

Mammoth Custom Packaged Chiller Plants

Mammoth is one of the original manufacturers of packaged chiller plants and is backed by more than 40 years experience in their application, design, manufacturing and control. Mammoth custom packaged chiller plants are installed in a variety of applications including schools, hospitals, shopping malls, offices, data centers, manufacturing facilities and more.

Mammoth custom packaged chiller plants offer virtually unlimited options in a single, centralized system that is:

- Designed to meet your specific performance and service requirements
- Fabricated, tested and commissioned (optional) at our factory
- Delivered to your jobsite in shipping sections that can be lifted into place using a crane
- Assembled in place at your jobsite and connected to electrical, plumbing or other utility service
- Ready for commissioning and start-up

Benefits of using a Mammoth packaged chiller plant include:

- Sole source responsibility for the chiller plant system – not just the chiller component(s) – dramatically reduces the timeline and cost for design, coordination of trades and installation versus a field-built system
- Close proximity of components can reduce piping and electrical costs
- Factory designed, manufactured and commissioned (optional) system promotes reliable start-up and operation
- Outdoor design provides significant savings of valuable, revenue-generating indoor space
- Centralized location of HVAC components simplifies maintenance and reduces costs



Available With Oil-free Magnetic Bearing Compressors From Turbocor

- **Efficient:** Exceptionally low IPLV exceeds ASHRAE 90.1 and California Title 24 energy-efficiency requirements
- **Low Maintenance and Reliable:** Oil-free operation means no oil management hardware, controls or downtime costs, no lubrication and no metal-to-metal contact of rotating components
- **Quiet:** Operating sound is about 70dBA, or the same level as normal conversation
- **Compact and Lightweight:** The compressor's footprint is about 50 percent smaller and 25 percent lighter than that of conventional compressors, making it ideal for packaged systems



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