



YASKAWA

Mice Provide Unique Challenge for Yaskawa Drive

Jackson Laboratory, an internationally-recognized research center and leading provider of genetically-defined laboratory mice, presented a unique design challenge of its environmental control systems.

Each year, The Jackson Laboratory, distributes nearly two million laboratory mice to universities, medical schools and research laboratories throughout the world. Twelve thousand research institutions in 56 countries, including the National Institute of Health, depend on Jackson Laboratory to provide more than 2,400 varieties of genetically-pure mice.

The non-profit Laboratory, founded in 1929, occupies nearly 50 buildings in a campus-like atmosphere. It employs more than 1,000 people and serves as the comprehensive information resource for mouse genetics and biology. The laboratory itself is one of only ten institutions designated by the National Cancer Institute as a Basic Cancer Center, dedicated to advancing the understanding of the genetic factors underlying the disease.

Rigorous quality controls are employed at Jackson to ensure the standardization, health and genetic definition of mice involved in scientific research.

Those controls include utilization of state-of-the-art heating, ventilation and air conditioning systems to provide the optimal environment to raise the mice, as well as control and maintain the working environment for Jackson staff and scientists.

Design of a system to maintain a proper environment for both laboratory animals and staff requires ingenuity. Breeding and raising healthy laboratory mice requires constant temperature and air flow 24 hours per day, seven days a week.

On the other hand, areas housing laboratories and offices for Jackson staff and scientists function most efficiently on an advanced variable air volume system - a system which can deliver optimum comfort during working hours and off-peak setbacks for energy savings during evenings and weekends.

The HVAC system, as designed, installed and maintained by John Fitzpatrick, P.E., Manager of Engineering and Technical Services for Jackson Laboratories, and Mark Levesque, Senior Engineer for AC Electric, Auburn, Maine, achieves control of these dissimilar environments through application of Yaskawa's variable frequency drives.

According to Fitzpatrick, the variable frequency drives provide control in the macro environment of 500,000 square feet in several laboratory campus buildings, and in the micro environment of the separate animal rearing cages.

In the critical environment where animals are housed and raised, ingeniously-designed supply and exhaust plenums actually serve as frames for the cages. Yaskawa's drives control fan speeds on both the supply and exhaust sides of air handlers feeding these plenums.



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Ensuring optimum rearing cage conditions on a 24 hour per day schedule revolves around maintaining constant discharge pressure, according to Fitzpatrick. One of the unusual elements that he must consider in accomplishing that is the heavy biofiltration designed into the system. Such filtration is necessary to provide a biologically clean supply of fresh air to the animal rearing cages.

This intense filtering requires that drives and motors be run hard, according to Fitzpatrick, and, as a result, have been derated about 15 percent to accommodate the additional filter load.

These same drive/motor installations that maintain constant discharge pressure in the cage areas also enable Jackson to achieve extraordinary energy savings in its administrative and laboratory spaces, which Fitzpatrick refers to as the Office Side.

Electrical energy savings of from 15 to 20 percent are easily realized in areas using Yaskawa drives to provide classic Variable Air Volume (VAV) heating and ventilation control.

We consider this an extraordinary result, since we provide a minimum of twelve air changes per hour instead of the normal six and use 100 %outside air instead of a conventional sequence, Fitzpatrick said.

Jackson Laboratory's savings result from the ability to program the drive to operate fan motors at optimum, reduced speeds instead of a constant 100 percent of capacity.

Jackson Laboratory installed its first Yaskawa drive in 1992 and presently has more than 50 drives in operation in various campus facilities.

Working with Fitzpatrick, AC Electric installed the Johnson Controls Metasys communications option on four P5 drives to demonstrate how drives and, therefore, control and monitoring of the building environment can be achieved from a central point.

The drives with Metasys cards and bypasses have been installed in Jackson's Annex Three production facility for more than a year. By linking the drives and related equipment - boilers, chillers, air handlers - to a PC or other monitoring device, the Metasys system is able to provide effective control from a single point.

As installed, the Metasys building management system provides a monitoring, alert and control system, while the variable frequency drives control fan speed and air volume to match flow requirements.

Advantages include reduced installation costs, since drives and controls are linked by simple, twisted-pair wiring. Additionally, the system provides improved maintenance capabilities, since a remote drive shut down by a fault condition can be brought back on line by commands from the central PC. System information fed back into the communication network also provides information to help maximize energy savings.



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Jackson and AC Electric are presently evaluating operation of the Metasys installation, with an eye toward converting the remainder of the campus to a communications-controlled drive architecture.

The exacting nature of the work performed at The Jackson Laboratory, along with its biological environment and location, four hours from any metropolitan center, create an exceptional need for dependable equipment and quality service.

Fitzpatrick's experience since installation of the first Yaskawa drive in 1992 has resulted in a defacto standardization on Yaskawa drives. "The drives have been very dependable - in fact, trouble free," Fitzpatrick said. The demands of our biological environment and the welfare of our employees and laboratory animals creates a requirement for excellent service on a continuing basis. AC Electric has been able to deliver that service.

AC Electric, founded 50 years ago in Auburn, Maine, has modern facilities in both Auburn and Bangor. The company provides both engineering and repair, with a focus on customer service, according to Levesque, head of AC's Engineering Group.

We consider ourselves a service organization, Levesque said. We provide drives and training in their use as part of our engineering and design service. Because of this corporate vision, our customers see us a single source for all their electrical apparatus requirements.

Jackson Laboratory's success with Yaskawa's AC variable frequency drives, their dependability and flexibility to meet varying demands in challenging applications, coupled with AC Electric's responsiveness to service and design requirements, continues to strengthen the relationship between customer and service provider.

In fact, Fitzpatrick and AC Electric are already evaluating drive and communication combinations which can be applied to a planned installation of a drive multiplexing system on Jackson's main chilled water plant.