

MAPPING OUT A REFRIGERTAION SYSTEM WITH BOHN AIR HANDLER TECHNOLOGY

Lennox offers flexibility while keeping cool

Whitehead Institute of Genome Research is the largest DNA sequencing center in the world, and is the single largest contributor to the Human Genome Project.

The Human Genome Project—arguably the most important scientific undertaking in human history—is a collaborative international research program that is constructing detailed genetic and physical maps of the human genome to determine the patterns, or sequences, that make up human and animal DNA, the building blocks of all life.

By itself, Whitehead Institute has sequenced roughly one-third of the human genome. Sequencing nearly one billion DNA bases annually requires a great deal of efficiency and coordination.

“Our library of code samples is growing by leaps and bounds every month,” says Whitehead’s Director of Physical Plant, John Shearns, “and we need to be able to store and retrieve samples with increased efficiency to keep up the pace.”

So, Whitehead decided to install a robotic retrieval and storage system inside a large custom-made freezer manufactured by American Insulated Panel Company. The freezer is centrally located right on the laboratory floor.

“In the past, our researchers had to retrieve and store sample plates by hand, cataloguing them into one of many small, portable freezer boxes on the production floor,” said Shearns. “They could only move so fast.”

From a production standpoint, it made much more sense to have a centrally-located storage area. However, this seemingly straightforward refrigeration specification had nearly as many twists as DNA’s double helix.

First, it had to be a completely reliable refrigeration system. Second, there was a lack of physical space on the production floor to locate the freezer box and its refrigeration equipment; the box is wedged between two pillars. Third, a low ceiling left very little room to mount refrigeration equipment. This was complicated by the fact that there was no room inside the freezer box for traditional refrigeration equipment.

“With the robot and shelves of samples inside the box, there was no room to install a fan coil,” says Bob Stone, Service Manager for Winchester Mechanical Service Company, Inc., which has been working with Whitehead Institute for 18 years. “We only had a half-inch of free space outside the box to work with in installing this equipment.”

Without the option of a traditional fan coil to cool the freezer, Stone and Dick Falardeau, Winchester Mechanical’s Vice President, needed solutions. With so little space to maneuver the ductwork and place the equipment, Winchester Mechanical needed a manufacturer who could offer options. They called Mark Potenza at ABCO Refrigeration Corporation.

“I told them that a Bohn air handler would be the best choice in this application because of Bohn’s reputation for quality and the variety of air distribution options it offers,” says Potenza.

Acting on Potenza’s advice, Falardeau and Stone collaborated with Bohn representative Jim Nicklin, Potenza and Bohn’s Larry Smith over the next five months to engineer a custom-built air-handling and duct system to cool the 8 x 23 x 12-foot freezer.

"What clinched it for us was the small size of the air handlers and the flexibility of air-discharge configuration that Bohn offers," says Stone.

Most air handlers discharge air from only one side of the machine, but Bohn manufactures air handlers that discharge air on whichever side is required.

"We had Larry Smith from Bohn's corporate facility come up to help us determine how he could best configure the air handler," says Falardeau. "Air handlers in freezer applications are novel," adds Stone, "so the extra input we got from Bohn was very much appreciated."

In terms of reliability, the Bohn system has to maintain a temperature of -5 degrees Fahrenheit, even though a 35 x 7-inch window automatically opens up to 900 times daily for a period of 30 seconds each time so the robot can pass one of 20,000 DNA samples in or out. Even more, the robot itself creates a heat load on the equipment. These factors influenced Winchester Mechanical to recommend installing two systems.

"One system was enough," says Stone, "but with the robot heating up the freezer, we decided to go with two systems to ensure reliability."

Winchester Mechanical was also impressed with Bohn's serviceability, especially its hinged access panel and motor-mounting options. These options allow a service technician to simply flip a latch in order to open a hinged panel and work on a motor mounted exactly where the service tech can most easily access it.

"The faster I can get in and out," says Stone, "the better it is for my clients and me."

Whitehead Institute is one of the first genome labs to install an automated cataloguing system, and Shearns feels proud to be on the leading edge of this trend.

He adds, "I also feel confident that we have a working solution to our climate control needs to help keep us on the cutting edge of gene sequencing."