

## Healthcare



## The Anatomy of a World Class Medical Center *Case Study*



A medical, surgical and teaching facility to rival the best in the world! That vision was the impetus for a major Medical Center's \$300 million expansion and renovation project. What was once an ambitious goal beset by practical challenges is now a reality. Today, the Long Island, NY hospital ranks among the gold standard medical institutions in North America.

The greatly enlarged and renovated facility offers more than a visually attractive environment. It is designed to be easy to navigate for patients, visitors and staff. Open plan architecture with abundant natural light reflects the bright, positive attitude of caregivers. Surgeons now work in high-tech operating rooms that facilitate best-practices in modern medicine.

### At a Glance

- A major healthcare educator and provider in Stony Brook, NY needed an air handling unit (AHU) retrofit solution that avoided major disruptions to surgery patients and staff.
- Critical design needs included a highly reliable airflow supply, an AHU design that could be broken apart and moved into an interior room, and an AHU construction that prevented thermal bridging.
- Ventrol Air Handling Systems, Inc. custom engineered a knock-down AHU design with a FANWALL array of 9 fans— 3 as backup and 6 active fans, delivering a total 31,800 cfm. When all 9 fans are activated it delivers 38,000 cfm against 12-inches wc. A thermal break construction using hybrid foam insulation prevents surface condensation.

# Hospital Improves System Reliability and Performance

## The Challenge of Change

The medical center currently has a total of 22 Surgery Suites. Ten were added as part of the renovation project, and the original 12 operating rooms were brought up to the highest standards of modern day efficiency.

The airside upgrade in the older OR suites is a compelling study in overcoming myriad challenges, ranging from a nearly impossible timeframe to a mechanical room with limited space. It's the story of a retrofit job that delivered a top caliber alternative to a traditional air handling system that would have required extensive new ductwork and considerable demolition. Above all, it is a study of how a hospital got the upgrade it needed without subjecting patients and staff to lengthy disruptions in their daily routine.

By 2006, the aging fan system was causing recurring maintenance problems, even though the motor had been changed more than once. Furthermore, with no redundancy in the system, a major breakdown was becoming a real concern. In an area of a hospital dedicated specifically to surgery, a fan failure could have been a recipe for chaos. Surgical procedures might well have been interrupted for months.

On the other hand, installing a brand new single fan unit or a rooftop system would have entailed a huge investment and also caused prolonged disturbance in the Surgery Center. Relocating vulnerable patients or delaying surgeries during the lengthy installation process were unacceptable options.

The challenge was formidable – First, find the most technologically advanced air handling solution available in the marketplace, one with plenty of redundancy, and built to require minimal maintenance over the years. Second, get it installed and operational within a record-breaking timeframe.

## Ventrol Knock-down Air Handler with FANWALL Solution

The solution came from Long Island-based Gil-Bar Industries. The firm recommended the installation of a Ventrol® knock-down air handler with a FANWALL® array. Ventrol Air Handling Systems, Inc. is a member of the CES Group™ along with HUNTAIR, Inc., the innovator of FANWALL TECHNOLOGY®.

A FANWALL system is an array of smaller and highly efficient aluminum air foil bladed fans driven with a variable speed drive. It delivers the required airflow in an air handler or built-up fan system. A fan array enables engineers to optimize the motor horsepower for any particular application, while reducing the overall unit length. In addition, FANWALL arrays have significantly lower operating sound power ratings versus comparable fans, which can often eliminate the need for attenuators that can increase static pressure losses and reduce efficiency.

The built-in redundancy in a FANWALL array is one of its most important features. If one fan fails, only that portion of the airflow is lost, unlike single fan systems where the entire air handler goes offline. Moreover, the loss of airflow from one fan can be offset by increasing the speed of the remaining fans.

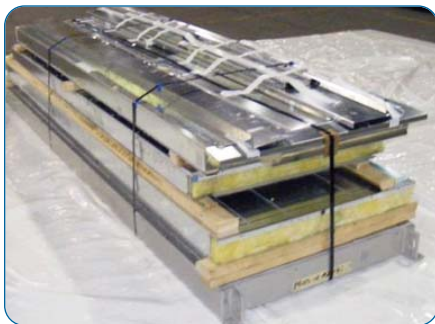
According to Gil-Bar's Alan Stefanac, "The knock-down air handler with a FANWALL array can be connected to existing ductwork, making it a cost efficient retrofit. The auxiliary components are easy to install and, once assembled, the air handler delivers maximum energy efficiency and low noise performance".

Gil-Bar's complete proposal included motors, pre and final filters, heating coils, primary and auxiliary cooling coils, humidifiers and re-heat dehumidification coils.

Once the medical center gave the "thumbs up" to the knock-down air handler with a FANWALL array solution,



**38,000 cfm Ventrol knock-down AHU is fully assembled, tested, and inspected at the factory.**



**How the Ventrol knock-down air handler breaks down for shipment. The unit breaks down onto pallets for shipping and maneuvering into the equipment room.**



**FANWALL cells ship on pallets so they can be individually moved into the building avoiding costly demolition. The motors are pre-wired at the factory for quick installation.**

Gil-Bar turned to Ventrol, a Montreal-based designer and manufacturer with a product offering that encompasses a comprehensive range of air handling equipment built according to the latest industry standards.

### **FANWALL Redundancy is Key**

The knock-down air handler was built to meet requirements specific to the hospital. For example, the ideal temperature in an operating room is considerably lower than normal control temperatures. So, the system featured two sets of coils, one for the base building system and a second set for the auxiliary chiller. This guaranteed redundancy in the chilled water system at all times.

The air handler that Ventrol custom engineered weighed 33,000 pounds, with a total of 9 fans in the FANWALL array. The system was designed to operate under normal conditions with 6 active fans delivering a total 31,800 cfm., or 38,000 cfm with all 9 fans activated.

Any build-up of surface condensation caused by a variance between ambient air and conditioned air can produce HVAC problems. Ventrol eliminated the possibility of such problems by building the air handler with hybrid foam thermal break technology consisting of fiberglass and foam with a R-18 value.



**Assembled 38,000 cfm Ventrol AHU that was brought into a tight quartered equipment room through a 60-inch square opening.**

### **Tight Timeframe Installation**

It would not have been unreasonable to allocate a couple of months to complete the multitude of the tasks involved in the changeover from the old fan system to the new knock-down air handler. The old fan with its motor had to be dismantled and removed from the premises; the mechanical room had to be prepared for the new installation; then the unit had to be moved into the hospital and assembled. Lastly, the new system had to be connected to existing ductwork and to the electrical controls. Once all that was accomplished, the air handler had to be put online and brought up to full operational performance.

But, the installation absolutely had to be completed in a mere 3 weeks. That was all the time that the hospital could accept for disruptions in the Surgery Center. To further limit any inconvenience, the installation would be done over the 2008 Christmas holiday period when the surgery schedule was lighter than usual.

Making sure that everything went according to plan, and with no glitches whatsoever, key members of the project team travelled to Montreal to view the finished unit. Joining Alan Stefanac, who spearheaded the FANWALL project, were: Jerome Bobak from Cannon Design, Consulting Engineers, John Swanson, Ventrol's representative at Cannon Design and Brian Svedberg from Best Climate Control, the mechanical contracting firm responsible for the installation of the AHU. Once inspected, the unit was knocked down and readied for shipment.

When it arrived at the hospital, the mechanical room was ready. Getting the components of the unit inside the building and into the mechanical room was no problem. Each individual fan cell and unit casing was designed to fit through the field opening measuring 60 inches high by 60 inches wide. Assembly proceeded quickly.

In just under the 3-week deadline, the



**Ventrol's thermal break design with hybrid foam insulation ensures metal that is exposed to the cold side of the panel is separated from the warm equipment room side preventing condensation.**



**Intake side of a 3x3 FANWALL array showing the backdraft dampers to isolate the fans when turned off.**



**Fan speed is controlled by a variable frequency drive. A bypass option serves as a backup control option. Control panel comes pre-wired from the factory for unit or remote mounting.**

medical center had a new air handling system that met and continues to meet, every expectation of performance.

### Maintenance-Free Performance

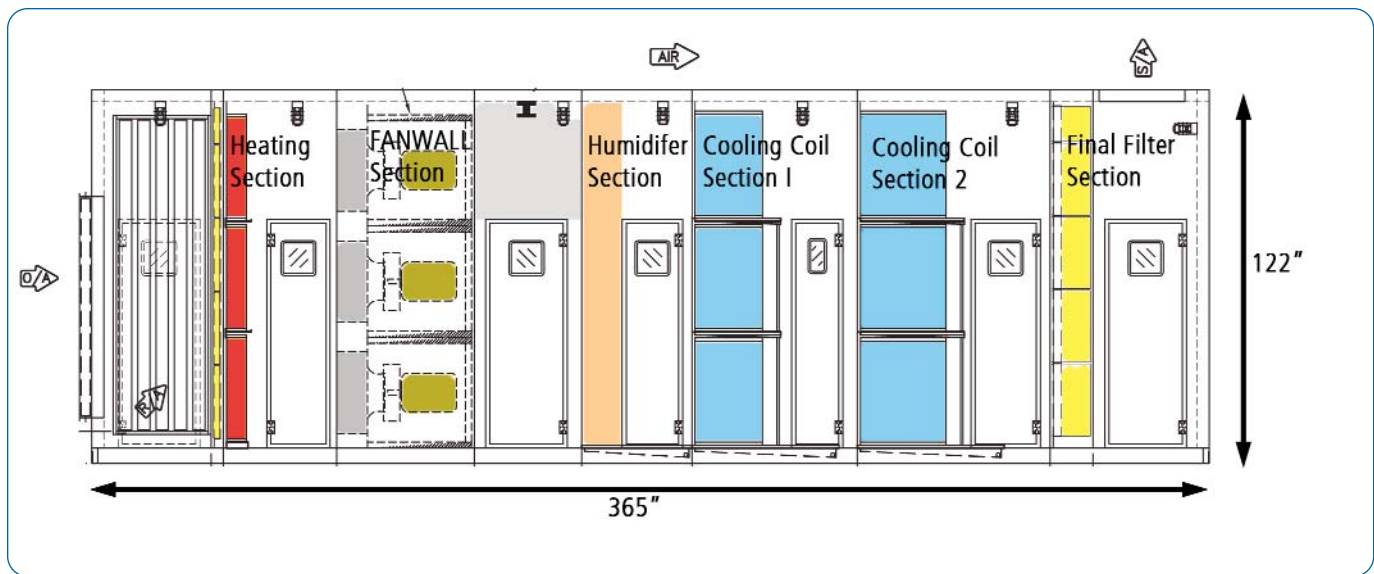
With hospital budgets always under scrutiny, maintenance costs are an on-going concern. But maintenance is not an issue with the new air handler from Ventrol because the fans are direct-drive arrangements. There are no bearings to grease or belts to replace, and each fan is small enough to change without the need for costly rigging. Once a FANWALL® array is installed, it runs with no special maintenance requirements.

### Energy Saved is Money Gained

A FANWALL array uses smaller horsepower motors than large single- or dual-fan systems. This helps the designer more closely match connected horsepower to the design horsepower. Their size also makes them more manageable to handle if service is required. Moreover, unlike large, single motor AHUs, FANWALL motors run closer to their peak efficiency at part-load conditions. Another energy saving characteristic is that one or more fans can be shut off in the array during part-load operation.

### A Happy Ending

The air handlers have been up and running for more than a year to the satisfaction of hospital officials. Moreover, by opting for the knock-down air handler with a FANWALL array rather than a single- or dual-fan type air handler or rooftop system, the hospital saved both time and construction costs. And, what was a critical concern for the hospital and a genuine challenge for the team turned into a success story. The entire project was completed on time and on budget.



**Elevation view of Ventrol knock-down air handler with a 9-fan FANWALL array for hospital retrofit. Designed to deliver 38,000 CFM @ 12-inches total static pressure.**



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