

CASE STUDY

Ensuring code-compliant, accurate air change rates in operating rooms

Surgery Center - McLaren Macomb

Background

In 2005, the 151,000 sq. ft. [Surgery Center at McLaren Macomb](#) opened its doors to serve the community of Mount Clemens, Michigan. The Surgery Center is equipped with eight spacious surgical suites with expansion capacity to 10 operating rooms (ORs). It also features world-class technology, such as the da Vinci advanced robotic surgical system.



To ensure these cutting-edge ORs are fully compliant with healthcare specifications, the Surgery Center's facilities team sought to replace vintage variable air volume (VAV) boxes with an easier to control, more consistent airflow management system.

The Situation

As Keith Miller, Corporate Director of Facilities & Energy, [McLaren Macomb](#), explains, "We were having issues with pressurization and air change rate within the ORs in the Surgery Center." Hospital regulatory standards dictate that the air change rate be 20 air changes per hour during surgery mode to properly dispel bacteria and germs away from the patient. However, McLaren Macomb's data analytics provider, Resolute Building Intelligence, found that due to the current VAV boxes' fluctuation and drifting, the presumptions were 40 to 50 air changes per hour.

"If the air changes are too high, the airflow becomes turbulent, churning bacteria. This can increase the risk of infection," explains Thomas Oziem, P.E, Manager, Energy Engineering and Integration Services at [Resolute Building Intelligence](#). "We needed to replace VAV boxes with a solution that would provide tighter airflow control and pressurization for the space."

The Solution

Having worked with [Phoenix Controls venturi valves](#) in past laboratory applications, Oziem and the rest of the Resolute Building Intelligence team selected the company's valves for the air supply and the exhaust.

The Phoenix Controls venturi valves "meter flow, which doesn't allow for drift or uncertainty," says Ken Dillingham, Senior Sales Engineer at [Quality Air Service, Inc.](#) "They ensure specific flows (CFM), which help to maintain exact surgery air change rates." Unlike the single blade VAV box that constantly hunts for a fixed offset, the Phoenix Controls solution uses a mechanical pressure independence via the operable cone assembly inside the air valve. This feature delivers plus or minus five percent accuracy. And, "with a proven air change rate that you can maintain, the environment becomes cleaner," Miller adds.

Contractor teams also installed Phoenix Controls APM 2 monitors inside ORs so nurses and technicians can understand the room's performance. Outside the room, a View touch screen (as illustrated) provides indicators for temperature, humidity, occupancy and air change rates. Staff can adjust the temperature setpoint, change the room mode to "surgery" or "unoccupied" state ("unoccupied" drops the air change rate down to 10 to avoid excessive energy costs), as well as view room pressurization to ensure the room stays within compliance.

The Result

Originally estimated to take five weeks, Resolute Building Intelligence and contractor crews were able to compress the project schedule into just two weeks during the 2020 pandemic shutdown. The involved teams reported the Phoenix Controls components were easy to work with from the controls to the installation of the valves themselves, which contributed to the project’s successful completion before the ORs came back into full use.

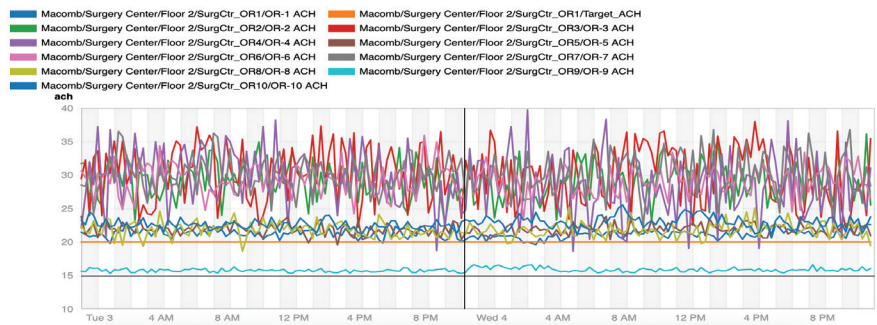
With the system fully operational, staff has already seen results. In the words of Miller, “They’ve noticed the consistency of the air change rate and have been able to see the current temperature. They really didn’t have a good understanding of those regulatory compliance items visually before. Now, they have an opportunity to see key performance indicators in front of them, whether inside or outside of the ORs.” Not only is this observable and reportable consistency beneficial from a joint commission standpoint, but

McLaren Macomb can also be confident that the surgical suites are cleaner and safer for better patient healing outcomes.

The Phoenix Controls solution is further part of a total control package. It allows Resolute Building Intelligence to see consistent data trends and relay how current airflow compares with past airflow. “We already see measurable differences in the ability to maintain target air change rates, as the air no longer has to condition 16,000 CFM plus. We’ve also seen a reduction in energy supply and return—it’s literally night and day for that building,” Oziem says.

With the ability to go from 20 to 10 air changes when not in surgery mode, airflow decreases by half for significant energy savings. According to Resolute Building Intelligence’s rough estimate, the Surgery Center stands to save approximately a quarter-million dollars a year in operation costs. This will translate to more funding for projects, programs and technology, advancing health and wellness in Macomb County.

Before: with VAV boxes



After: with Phoenix Controls venturi valves