

# Topvex ERVs Provide Fresh Air Solution for University and Community Center



Photo credit: Michele Joller

Designing HVAC systems for large, mixed-use facilities is never easy, but imagine if that design had to meet the diverse needs of both a university and a community center all within the same building.



**T**hat was the challenge faced by MCW Consultants Ltd. when the engineering firm was asked to design the HVAC systems for a satellite campus of Trinity Western University (TWU) and the new City Centre Community Centre in Richmond, British Columbia, Canada. The community center would occupy the first two floors of the four-story building and the University would occupy the two floors directly overhead. The rooftop would be visible from neighboring buildings, including upscale residential high-rises and commercial real estate, all situated in an area conceived to showcase urban lifestyle, culture, and sustainability. The decision to pursue LEED Gold certification for the community center ramped up the challenge even further.

A decentralized heat pump system was provided as part of the base building mechanical and would meet all of the facility's heating and cooling needs as well as the required individualized control. For ventilation, MCW searched for the most efficient, non-obtrusive solution they could find. Their search led them to Systemair's Topvex Energy Recovery Unit (ERV).

Determined to maintain a high aesthetic standard, the architects ruled out any rooftop equipment. Interior mechanical space was limited, especially given the 60 heat pumps installed throughout the building. Multiple ERVs had to be tucked away

in small places, above ceilings and in random pockets of spaces throughout the structure. Some of those spaces were in offices or next to classrooms, making noise a concern.

MCW was on the hunt for a slim-lined ERV that could fit within these nooks. They also wanted variable flow capability and ECM motors for more quiet operation, enhanced performance, and demand controlled ventilation. Such features don't ordinarily come in a small box, at least not with the CFM requirement of a high occupancy public space--but they do with the Topvex from Systemair.

"The Topvex offers a lot of features that we don't necessarily see with other manufacturers, like air flow options, variable flow, high efficiency energy wheel, easy access points, economizer options, sensor options, data points, etc. You don't typically see all that in a packaged unit like this," explained Raymond Cho P.Eng., project engineer for MCW.

### Small and Quiet

The community center and TWU each occupy about 28,000 square feet within a new living and cultural development in downtown Richmond. The community center features a large living room; multipurpose spaces; fitness center and change rooms; aerobic and dance studio; meeting rooms; lounge; kitchen; art studio and music rooms. Directly above are TWU classrooms, faculty offices, seminar rooms, a resource center, and other spaces typical of an academic facility. Thus, at any given time TWU students could be listening to a lecture, while a class of preschoolers might be practicing ballet in a room below.

"Because this was a decentralized system, we knew from the beginning that noise would be a concern. And we did not have the space to put equipment in any loud spaces like the fitness center. So [the ERVs] had to be put in hidden spaces, like in office closets," said Cho.

Fortunately, the largest ERV selected for the project occupied a space no larger than 97" x 70" x 36" inches. EC motors ensure quiet and efficient operation regardless of speed. Depending



Topvex FR Series hugs the wall and has easy access to components.

---

**The Topvex offers a lot of features that we don't necessarily see with other manufacturers, like air flow options, variable flow, high efficiency energy wheel, easy access points, economizer options, sensor options, data points, etc. You don't typically see all that in a packaged unit like this.**

**- Raymond Cho, P. Eng.**

---

on the location, some units were specified with factory installed silencers.

#### **Truly Compatible Onboard Controls**

Maintaining seamless communication between the ERVs and the Building Management System (BMS) was another hurdle for MCW. When Cho realized that the Topvex units came with "BACnet compatible" factory-installed controls, he was concerned about the actual level of compatibility between the packaged controls and the BMS.

"We've had a lot of issues with BACnet integration between base building DDCs and OEM control modules. Most of the time we have issues getting the two systems to talk to each other," said Cho.

Luckily, that wasn't the case at the TWU/Civic Centre facility. The control signals matched perfectly between the field installed control and the factory-installed Corrigo E controls on the ERVs, so the integration was much smoother than expected.

#### **Putting It All Together**

A total of eleven Topvex ERVs with capacities ranging from 1150 CFM to 3800 CFM were chosen for energy recovery and fresh air delivery to the University and community center spaces. The units supply 100% outdoor air while recovering up to 73% of energy from the air exhausted from bathrooms, showers, and other interior spaces.

Meanwhile, 60 water source heat pumps are the primary source for heating and cooling. A closed circuit cooler and condenser water loop serve as the heat rejection and absorption source for the heat pumps. The closed circuit cooler and several condensing boilers work together as needed to keep the condenser water loop within the heat pumps' operating range.

The Topvex ERVs minimize the load on the heat pumps year round and can operate in full economizing mode when outdoor temperatures allow.



Topvex TR Series was designed for tight spaces.

### Here's how it all works:

Fresh outdoor air passes through the ERV where it is pre-conditioned with building return air via the energy recovery wheel. After exiting the ERV, the fresh, pre-conditioned air enters the individual heat pumps where it is further heated or cooled depending on demand. Some ERVs are equipped with an electric pre-heat coil to heat outdoor air as needed to keep the internal heat wheel from freezing during extremely cold periods. Operating parameters (including CFM, temperature set points, etc.) are pre-programmed into the onboard Corrigio-E controls, which can be monitored and adjusted via the BMS.



Factory installed Corrigio-E controls in the Topvex TR.

### A Good Fit – From Installation to Service

It is a complex system with many moving parts, but one that provided the engineers with the flexibility and efficiency required for this unique project.

Duane Goderis, project manager for GML Mechanical, the installing contractor, credits the Topvex design and controls package, as well as Systemair support for streamlining the installation and start-up process.

“The units were very easy to hang. There are only six connection points with the brackets, which the

manufacturer includes. Sometimes we have to fabricate the brackets ourselves. Also, these units have good doors that swing open from the bottom, so changing filters is easy with no side access required.”

Most importantly, according to Goderis, the client was happy and GML was able to make their deadline, which was fairly tight given TWU's pending Fall 2015 semester. The project could have easily fallen short had the installation and control integration not gone as smoothly.

“The experience I had working with Systemair was great and you don't always get that with other manufacturers. Sometimes a BMS [controls team] can't help that much with integration but Systemair stepped in and helped a lot. It isn't always this easy.”

