



AIRSIDE / APPLIED / CONTROLS / SERVICE / SPECIAL SOLUTION / TOTAL SYSTEM / UNITARY

## Case Study – ICAO Headquarters

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



### Carrier System IAQ Management Reduces Project Costs by Over \$1.3 Million

#### Project Objectives

When the Canadian government decided to provide the United Nations' International Civil Aviation Organization (ICAO) with a new world headquarters in Montreal, they presented tough specifications for creating state-of-the-art HVAC control, noise attenuation and fire/life safety systems. The systems would have to work together to deliver superior indoor air quality (IAQ), yet be efficient and cost-effective. There were outside air requirements and carbon dioxide level limitations. Each room required individual climate control, and the building system had to be extremely quiet, with DB levels of NC-25.

#### Solution

Carrier's system solution reduced installed equipment costs by more than \$1.3 million, while still meeting the challenges of stringent specifications and Montreal's cold climate. Carrier provided three chillers and 17 air handlers, with 1,068 direct digital control (DDC) variable air volume (VAV) boxes, all with factory-installed product integrated controls (PICs). Field installed devices (FIDs) provided additional points of control for auxiliary HVAC equipment and fire/life safety systems, for a total of more than 8,000 (DDC) points providing extremely precise monitoring and response. The resulting efficiency reduced predicted energy use by \$45,000 (5%) annually, while delivering exceptional performance.



*Carrier air handlers and air terminals exceeded engineers' expectations by cost effectively maintaining the required CO<sub>2</sub> levels. When suitable, the system brings in 100% fresh, outside air, to further enhance IAQ.*



## Case Study – ICAO Headquarters *continued*

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*“The system performs even better than expected. There is no wasted energy and our utility bills are much lower than we had anticipated.”*

Pierre Boudrias,  
building manager,  
Westcliff, Inc.  
(ICAO building  
management)

### Project Synopsis

The new United Nations ICAO world headquarters complex is a 17-story, 495,000 sq. ft. main building, connected to a five-story conference center by a glass-covered atrium, flying bridges and escalators. The challenging HVAC engineering requirements included individual climate control in each room; monitoring and limiting CO<sub>2</sub> to a maximum of 350 parts per million above outside levels; delivering 80% of heating with natural gas; and using 100% outside air for meeting rooms, conference rooms and translators' booths. The building system also needed to be exceedingly quiet to facilitate delegates' concentration. In fact, the resulting sound levels are rated at NC- (Noise Control) 25, with conference rooms at an even quieter NC-15, as compared to typical office ratings of NC-35 to NC-40. Carrier's solution to air quality management saved more than \$1.3 million in equipment and installation costs. And the building's state-of-the-art comfort system was a significant factor in winning the prestigious TOBY (The Office Building of the Year) Award in 1999 from the International Building Owners and Managers Association (BOMA).

The Carrier controls system monitors and manages the entire HVAC system, as well as the building's fire/life safety systems. Carrier provided three model 19XL chillers, 17 model 39 Series air handlers and 1,068 direct digital control (DDC) variable air volume (VAV) boxes, all with factory-installed product integrated controls (PICs). Each box has seven points of control, including room temperature, air flow, damper position and supply air temperature, to provide continuous monitoring and comfort tailored to the needs of each space. This ensures that cooling is not wasted, saving \$45,000 (5%) in annual energy costs over projected costs.

Carrier installed an additional 750 points of control on-site, using field installed devices (FIDs), to monitor and manage the cooling towers, pumps, air make-up units, boilers, main air handling systems, lighting and fire/life safety systems. In total, the system monitors and controls 8,097 DDC points, “an incredible number,” said Stan Segal, president of Kolostat, the design-build firm for the project. Off-site monitoring and adjustment capability provides additional flexibility for building management.

In the office tower, fresh air is heated with natural gas and injected into the mixing chambers of three large air handlers. “By doing this even in mid-winter and mid-summer, when we are on minimum outside air, we still have the full fresh air requirement,” Segal said. This allows the required CO<sub>2</sub> levels to be maintained. The Carrier air handlers further enhance IAQ. They bring in 100% fresh, outside air and feature cleanable insulation and sloped, stainless steel drain pans that prevent standing water and bacteria build-up.

The ICAO has been reaping the economic benefits of the building's operating efficiency. And equally important, the new HVAC system keeps their critical work going productively and comfortably.



The 1999 TOBY Award was presented to ICAO from the International Building Owners and Managers Association (BOMA).

### Project Summary

**Location:** Montreal, Canada

**Project Type:** New Construction

**Building Type/Size:** 17-story tower connected to five-story conference center, 495,000 sq. ft.

**Building Usage:** Offices, conference and meeting rooms, translation booths

**Objectives:** State-of-the-art comfort, control, indoor air quality, noise reduction

**Major Decision Drivers:** Performance; efficiency; control; IAQ benefits

**Design Considerations:** Individual climate control for each room; carbon dioxide limit; 80% heating with natural gas;

100% outside air for meeting and conference rooms

**Total Cooling (tons):** 1650

**HVAC Equipment:** Three model 19XL chillers; 1,068 DDC VAV boxes; 17 model 39NX air handlers

**Unique Features:** 8,097 DDC points; individual room climate control; 100% outside air

**Project Cost Range:** \$1 million to \$5 million

**Installation Date:** 1996

**Consulting Engineer:** Pageau, Morel & Associates

**Contractor:** Kolostat, Inc.

For more information, contact your nearest Carrier Representative, call 1.800.CARRIER or visit our web site at [www.carrier.com](http://www.carrier.com)