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The new Academic Health Science Building

A valuable teaching tool

Carleton University recently inaugurated its Academic Health Science building, which will house the Health Science and Neuroscience programs in an environment geared towards collaboration.

The seven-storey building includes offices, workspaces, a conference room and a mezzanine.

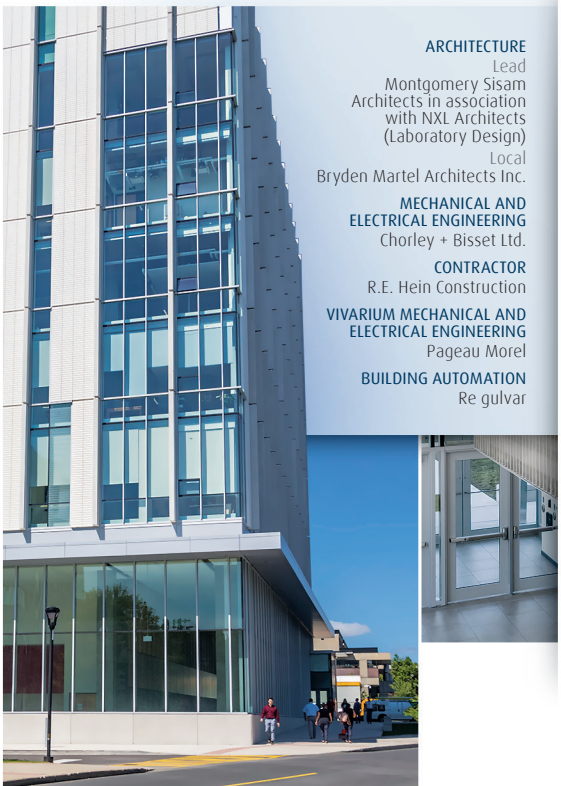
It also has this unique feature: almost half the total surface area of 120,000 square feet is occupied by open-plan teaching labs, research labs and a vivarium.

Given the energy-intensive nature of these areas, the university chose to invest research funds in developing methods to reduce energy consumption and is aiming for top marks in its Green Globe certification.

The success of this project can largely be attributed to the university's decision to replace the traditional "design-bid-build" approach with an integrated design strategy.

From the outset, the key players—architects, mechanical and electrical design firms, animal care specialists, user group representatives, the university's project management and implementation personnel, and Regulvar experts—were invited to work as a team.

Together, they proposed an innovative solution after analyzing all the needs and selecting the most appropriate ways to meet them.



ARCHITECTURE
Lead
Montgomery Sisam Architects in association with NXL Architects (Laboratory Design)
Local
Bryden Martel Architects Inc.

MECHANICAL AND ELECTRICAL ENGINEERING
Chorley + Bisset Ltd.

CONTRACTOR
R.E. Hein Construction

VIVARIUM MECHANICAL AND ELECTRICAL ENGINEERING
Pageau Morel

BUILDING AUTOMATION
Re gulvar

Carleton UNIVERSITY

A perfect challenge for Regulvar

As a partner of Carleton University for more than 20 years, Regulvar was delighted to once again lend its expertise. We were proud to contribute to the success of this initiative by providing specialized integration support, 40 years of experience in building automation, and 10 years of experience in the control of critical environments.

Our building automation system was designed to meet the university's energy efficiency objectives, ensure the comfort and safety of the building's occupants, and permit the smooth and efficient management of all activities.

To achieve these goals, the designers opted for an innovative solution, taking into account the many spaces involved and their respective requirements.

Based on a centralized approach in which all systems are seen as a whole, the solution groups all functions together on a single platform, thus avoiding the compromises involved in adapting to third-party systems.

It also includes regulation strategies that function according to applications rather than devices.

This approach allowed us to optimize equipment operation, limit interference among different pieces of equipment, reduce unnecessary duplication, ensure the system's stability, establish rapid communications, and reduce energy consumption.

TECHNOLOGY
The importance of choosing the right products

The building automation system designed by Regulvar is based on the latest generation of Delta Controls products, renowned for their reliability and versatility.

1

The designers first chose to limit the quantity and number of switch and sensor models required for the project in order to limit costs and simplify management.

To do so, they installed a single multifunction device (the eZNS-T100) in almost every room.

This versatile device acts as a switch and dimmer, as well as a multisensor (movement, temperature, humidity and light).

It is therefore the perfect tool to optimize available data in each room.

2

The team then selected a series of controllers according to the context of use, and opted for the all-new O3 Integrated Room Control system to meet specific needs within this complex project.

The O3 system was chosen for its three unique benefits:

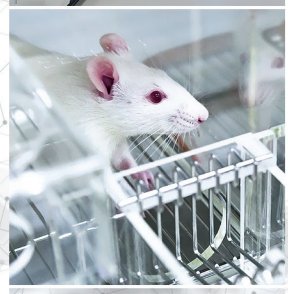
- its powerful processor handles highly complex control sequences;
- its modular design allows it to adapt the number of points to the number of inputs/outputs required by the HVAC and lighting control systems;
- and its protocol integration modules (Somfy, DALI and Mbus) allow for the integration of third-party devices that are not usually part of a building automation system.

3

Finally, all of the control devices were connected to enteliWEB software, which has a unique, user-friendly front-end interface that allows the operator to modify parameters and remotely control the equipment with ease.

enteliWEB®

The Academic Health Science building is among eight of the 45 buildings on campus that are currently connected to this software. Work is under way to connect the university's remaining building stock to the system within the next year.



HVAC in a lab environment
An added challenge

In any building, maintaining optimal ambient conditions for all occupants and spaces is a complex exercise, since it involves orchestrating the operation of all the components in the heating, ventilation and air-conditioning system.

In the Academic Health Science building, the challenge is even greater, since close to half the total surface area is occupied by labs and animal care areas—spaces that require a specific air management approach.

Specialized equipment such as exhaust hoods, which rapidly extract large quantities of air from the room, operate in an irregular and energy-intensive manner.

To compensate for this sudden energy demand and to avoid disturbing conditions elsewhere in the building, the regulation system must be programmed to respond rapidly and sufficiently.

With over ten years of experience in laboratory projects, the Regulvar team was fully equipped to meet this challenge head-on.

Our proven, high-performance solution respects the usual requirements in terms of comfort, hygiene and safety. It also regulates ventilation use in order to attain energy-efficiency goals.

Thanks to the advanced functions of Delta Controls devices, the HVAC solution provided by Regulvar clearly stands out from competitors' solutions on three fronts.

First, it provides higher quality feedback and frequent status updates to the main ventilation systems, thus limiting the frequency and scope of discrepancies from established parameters.

Second, this strategy is the only one on the market capable of managing the temperature and ventilation speed regardless of the type of HVAC equipment used, for example a VAV box, a fan coil unit, or an air valve.

Finally, thanks to real-time data from the eZNS-T100 multisensors, the controllers rapidly and precisely regulate the equipment to which they are connected.

LIGHTING
A highly versatile protocol

In terms of lighting control, the designers opted for a dual strategy.

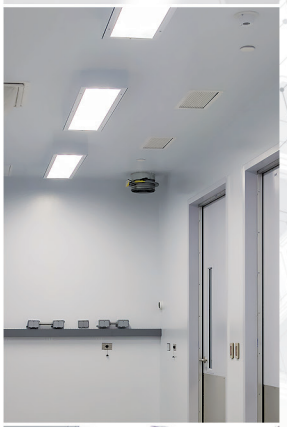
In most of the spaces—notably the offices, lecture theatre and labs—a local standard approach was perfectly adequate. We therefore installed eZNS-T100 multisensors/switches in all of the rooms. These are connected to local lighting relays.

The light can therefore be regulated manually by the occupant or automatically by the building automation system via an analog signal sent to the lighting drivers.

The vivarium required a more creative network approach. It had to allow the researchers to modify the lighting colour to simulate night conditions; to conduct high-pressure cleaning without damaging the equipment; and to limit actions that would disturb the animals—for example, employees having to replace parts.

Regulvar and Delta Controls recommended that the engineering firm Pageau-Morel use the DALI (Digital Addressable Lighting Interface) protocol. This is the only protocol that allows colours to be modulated, is supported by O3 controllers, permits the control of individual lights as well as lighting groups, and allows configuration data to be saved in the ballast.

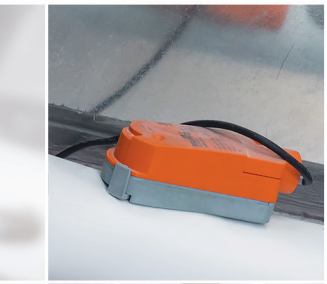
Another benefit: since control modules are integrated into the ballast of each light, relays and controllers are not required. This reduces the amount of repair work in the animal areas.



CONTROLLING BLINDS
To make full use of natural light

The building automation system designed by Regulvar allows automated blinds to be raised or lowered according to ambient light or room occupancy. The blind control system works in tandem with the lighting control system, allowing lights to be adjusted according to the amount of natural light entering the room. It is also activated by the HVAC control system to use or eliminate solar loads. In addition to allowing for energy savings, this strategy enhances occupant comfort.

MEASUREMENT
Tools to improve and learn



In order for the Academic Health and Science building to become a teaching laboratory as well as a high-performance building, Carleton University decided to install a variety of meters in the building.

In addition to the usual meters connected to cold water, domestic water, steam and electricity inlets, several submeters permit a more nuanced analysis of the how these systems behave and how much energy they consume.

- The main ventilation systems are equipped with Belimo energy valves that provide information on individual coil consumption as well as the necessary feedback for their optimal functioning.
- Each room has a Sontex heat meter to read and measure the energy provided via the heating coils.
- The electric panels, motor control centres (MCCs) and main pieces of equipment have several power meters to measure energy consumption.
- Sensors have been installed on the electrical outlets in the offices in order to measure how much power devices use.

The data obtained from these devices will be used by the university's technical personnel to optimize building operations. Teaching staff and students in the engineering and architecture programs will also use it to conduct research on building operations, human environments, and the application of new control sequences.

"In my 20 years of experience, the Academic Health Science Building is definitely one of the most complex regulation projects I've ever worked on. We had to bring several technologies and disciplines together to create a harmonized, high-performance centralized environment. The skills and creativity of the Regulvar team, combined with the power and versatility of Delta Controls products, allowed us to deliver a top-notch solution." — Stéphane Riffault, P.Eng.

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