CASE STUDY

SOLAR CONTROL SOLUTIONS, MOTORIZED LOUVERS

HIDDEN SOLUTION TO A GLARING PROBLEM

Views of Canadian Parliament interior and exterior.

Long-term renovation projects will always produce a certain amount of issues, and the ongoing refurbishment of the Canadian Parliament Building in Ottawa is no exception. One of the most glaring problems required a creative custom solution that, for all its ingenuity, remains mostly hidden from view.

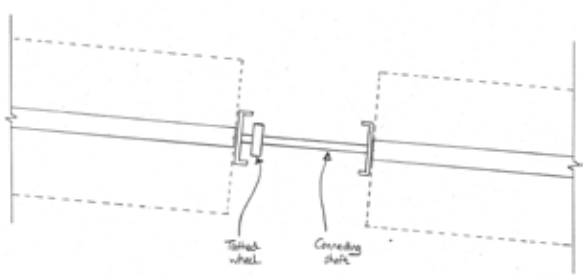
During renovations in the main Center Block of the complex, a new home for parliament's debating chamber was required. The West Block courtyard was converted into a legislative chamber to be used while the Center Block is out of commission.

To convert the exterior courtyard to an indoor space, architects AFGM designed a multilayer roof structure comprising a supporting steel structure, outer glazing, an access catwalk, and an inner laylight. This plan would create an impressive space that would be full of natural light.

IMPRESSIVE BUT PROBLEMATIC.

The proceedings of the House of Commons are televised, which means that the control of light through the roof structure is critical. Draper's task was to provide a solution to maximize the diffuse daylight in the space, without permitting direct sunlight to strike any part of the debating chamber at any time during the day.

Given the complex geometry of the roof and the need to block direct sunlight, it wasn't possible to use an "off the shelf" solution. As a result, Draper worked closely with facade engineers Front, climate engineers Transsolar, and skylight contractor seele to develop a custom motorized louver system.



THERE WERE THREE BIG CHALLENGES TO ADDRESS:

- Motorized louvers rarely rotate more than 90 degrees. But this project required a drive mechanism that could rotate the louvers through 180°, allowing them to continuously track the sun throughout the day.
- The louver system needed to cope with the irregular shaped skylight elements.
- The system needed to allow adjustment to run on a number of different slopes.

EXPERIENCE GOES TO WORK

Draper's experienced team of engineers, drafting technicians, and project managers got to work. The final design comprises a drive bar with sections of rack mounted at each louver location. These racks engage toothed wheels mounted on the louver shafts. Consequently, as the actuator drives forward and back, the louvers are rotated. The louvers slowly rotate 180 degrees every day during daylight hours, then retract to their original position overnight. Adjusting the actuator stroke allows the amount of louver rotation to be increased or decreased as required.

PROTOTYPES AND TESTING

Using 3-D printers, prototypes of components were produced to check their integration with the structure.

Due to the precision required, two mock-up systems were built and reviewed by the design team and modifications made to address issues found during testing. Noise measurements resulted in the original actuator being replaced by one which achieved significantly quieter operation. The mock-up also allowed consideration of maintenance issues, including louver or actuator replacement and, in an emergency, the ability to close a bank of louvers if an actuator failed.

In addition to the prototyping and approval process, each segment of the louver system was completely built and tested in the factory before shipment to Ottawa.

In the end, the custom louver system, while critical to the successful operation of the debating chamber, is almost invisible both from the interior and the exterior because of its position in the middle of the multi-layer roof structure.

To learn more about Draper's custom solar control solutions, click here. (*draperinc.com/customsolutions*)

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