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RESEARCH VIEWPOINTS BY IRC

Project to improve understanding of daylight-linked lighting systems

By **ANCA D. GALASIU** and **MORAD R. ATIF**

A research project still in its early stages is collecting the data necessary for a better understanding of the real-life performance of automatic daylight-linked lighting systems. This three-year project will determine how different types of control systems (both on/off and continuous dimming systems) and different types and positions of blinds (both automatically and manually adjusted) affect the energy consumption and the lighting in selected private offices.

The research is being done at the Institute for Research in Construction's (IRC's) Indoor Environment Program.

Lighting systems linked to available daylight have very seldom, if ever, met the expected savings predicted by previous research. This research has indicated that such systems—which automatically adjust the electric lighting in response to the amount of daylight entering the space—could reduce the electrical energy consumption in buildings by as much as half.

Although theoretically these systems seem capable of producing significant savings in lighting energy in any sunny climate, there really isn't much information at present about how they really perform and where their use might be most appropriate. In the few buildings where such systems were installed in Canada, building managers frequently expressed dissatisfaction with the way they perform and, as a consequence, most often the systems were disabled in order to avoid complaints from the occupants. Such radical measures prevented the realization of the energy savings that these systems were installed for in the first place, and never justified their rather high initial installation costs.

Commissioning procedures that are supposed to ensure that these systems work properly, provide adequate lighting, and achieve maximum energy savings are neither complete nor very accurate. As well, the impact of shading devices—and the way people use them—on energy consumption and illumination is also not reflected in these procedures.

The IRC project will take about three years to complete, with the first two phases taking about a year. The objectives of these two initial phases are:

- To evaluate the electrical lighting savings from daylighting in four individual daylight office spaces equipped with two types of commercial daylight-linked lighting systems: automatic on/off and continuous dimming;
- To evaluate the impact of manually operated venetian blinds on the performance of the two daylight-linked electrical lighting systems and their associated energy savings; and,

- To evaluate the impact of automated motorized venetian blinds on the performance of the two daylight-linked electrical lighting systems and their associated energy savings.

The spaces being used for the tests form a row of adjacent, south-facing offices in the IRC headquarters building in Ottawa.

Data from the project will provide the basis for guidelines for proper installation, calibration and operation of automatic daylight-linked lighting systems. It will also provide information on the field performance of existing daylighting technologies, which will enable designers and engineers to select daylighting strategies and products for optimum energy savings.

And (important for the controls industry) it will provide information to help Canadian manufacturers of lighting systems and blinds to improve the performance and marketability of their products.

These two initial phases of the project should be viewed as short-term experiments designed to help clarify the peculiarities of these systems and to identify potential limitations and problems associated with the daylighting technology used.

It will also provide an initial overview of the magnitude of the impact that blinds might have on the performance of photo-controlled lighting systems—impact that later on will be compared to larger scale installations of the same kind.

Anca D. Galasiu is a member of the research staff of IRC's Indoor Environment Program, while Morad R. Atif is director of the same program. For further information about this project contact 613.933.9629; fax 613.954.3733; anca.galasiu@nrc.ca or morad.atif@nrc.ca