

University of Cambridge Study: University of Cambridge Report, Press Release, and Articles

Report: University of Cambridge - Smart Building Envelopes 4th Year Project Report; Prepared by: M. Beevor; Submitted: June 2010
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Research Frontiers Inc. Press Release:

University of Cambridge Study Finds Energy Efficient SPD-Smart Windows Reduce Solar Heat Gain by up to 90%

Article: Study Finds Energy Efficient SPD-Smart Windows Reduce Solar Heat Gain by up to 90%

Article: Cambridge Study into the Energy Saving Potential of SPD Glass

Research Frontiers Inc. Press Release:

University of Cambridge Study Finds Energy Efficient SPD-Smart Windows Reduce Solar Heat Gain by up to 90%

Research Frontiers Inc. (Nasdaq: REFR) licensee SmartGlass International Ltd. announced today that a new study published by the Department of Engineering at the University of Cambridge concluded that SPD-Smart(TM) light-control windows are exceptionally energy efficient, reducing solar heat gain by as much as 90%. This new study follows a 2009 independent analysis performed by DSET Laboratories, a division of Atlas Material Testing Technology, which determined that SPD-Smart windows were similarly energy efficient.

Further information about this study entitled "Smart Building Envelopes" can be found on the SmartGlass International [website](#) and in their [press release](#).

The extraordinary reduction in solar heat gain using SPD-Smart windows contributed to a 65% reduction in annual cooling loads. The Cambridge study indicated that the real-world testing "confirms theoretical predictions that SPD glass holds great energy saving potential and is a technology that can really help to reduce energy wastage of glass facades."

In addition to SPD-Smart technology, the Cambridge study discussed alternative dynamic glazing technologies that could be used in windows (e.g. electrochromic), and reported that SPD-Smart technology did not have the disadvantages that limited the potential of these alternative technologies. For example, the study cited that an electrochromic window that is 2.4m² can take up to 30 minutes to change from clear to dark, or vice-versa.

The Cambridge study concluded that SPD-Smart technology is the most promising dynamic glazing technology, and summarized the performance of SPD-SmartGlass(TM) as an energy efficient building material as follows: "It can be concluded from both real-world and simulation results that SPD glass is able to maintain a comfortable room temperature, and prevent unwanted fluctuation linked with the change in external temperature. It can also be concluded that SPD glass holds great energy saving potential due to its ability to reduce high levels of solar heat energy into the room, therefore reducing in turn the energy required to cool the room to a comfortable or necessary temperature."

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To learn more about SPD technology, please visit www.SmartGlass.com or follow us on our [Twitter](#) and [Facebook](#) sites.

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Cambridge Study into the Energy Saving Potential of SPD Glass

January 25, 2011

The Department of Engineering at the University of Cambridge recently released a paper outlining the results of a study into the energy saving potential of suspended particle devices or Smart Glass.

FOR IMMEDIATE RELEASE
(Free-Press-Release.com) January 25, 2011 –

The study of building physics is becoming an ever more popular and necessary direction for engineering research and development worldwide. This includes in particular the energy conditions and efficiency surrounding the usage and maintenance of everyday buildings. For the majority of commercial and domestic buildings worldwide it is a desirable requirement to maintain a comfortable interior environment, and due to the extremes of external environmental conditions this requires energy.

Energy consumption and wastage is a worldwide concern with global warming caused by excessive greenhouse gases in the atmosphere as well as rapidly diminishing non-renewable resources. There are two important directions associated with tackling these problems; to convert energy generation to renewable 'non-carbon' resources and to reduce the amount of energy consumed by society.

The Department of Engineering at the University of Cambridge recently released a paper outlining the results of a study into the energy saving potential of suspended particle devices for chromogenic switchable glazing (also known as "smart glass") in comparison to regular clear glazing on glass.

This study focuses on such new 'smart' technologies that aim to reduce the high energy wastage in buildings. These 'smart glasses' have the ability to modulate optical and thermal properties, and therefore are able to adapt to prevent undesired energy flow through a glass façade.

While briefly looking at the various smart glass devices this project focused on the performance evaluation of electrochromic switchable technology, and more specifically, suspended particle device (SPD) glass. SPD glass is able to control its optical properties by the application of an electrical current to the glass, and holds great potential in being able to reject solar heat gain into an internal

environment. A reduction in solar heat gain during summer months and hotter climates could result in significant energy saving in terms of cooling and air conditioning.

Performance data was measured using SPD glass in an actual real-world environment and compared with measured data using clear float glazing. In addition to this, environmental modeling was carried out using computer software to analyze the energy performance of the SPD windows.

With such comparisons available, the performance conclusions between a real-world and virtual environment also allowed the research team to comment on the accuracy of such simulation modeling.

From the real-world performance data of the SPD windows it can be concluded that SPD glass is able to provide a much more uniform and comfortable internal room temperature than regular single float glazing. This was shown by data measurements detailing how the room temperature only fluctuated by 2°C with SPD windows, in comparison to 8°C in the reference office.

SPD windows were shown to be significantly more energy efficient than regular clear float glazing. The solar heat gain was reduced by 90% through SPD glass, which partially results in a 65% reduction in annual cooling loads.

This investigation into the performance of SPD glazing has shown that this switchable smart technology has important advantages over the use of regular clear float glazing. It was identified before experimental measurements that SPD glass had a lower visible light transmission, and similar solar heat transmission to other smart switchable glazing, such as thermotropic, gasotropic and electrochromic. All of which can be used to reduce energy consumption and wastage in buildings.