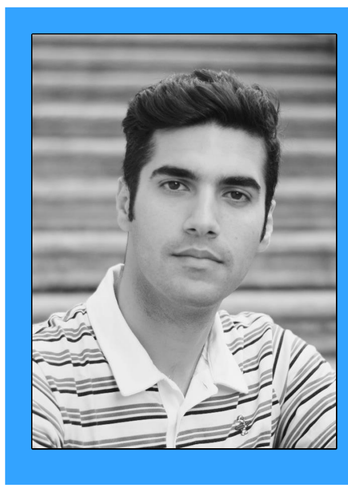

Implementation And Sensitivity Analysis of ISO 52016-3 For Adaptive Facades: A Case Study of Office Buildings

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ABSTRACT

The study is defined the most effective control strategies and assessed the new standard (ISO 52016-3) and presents recommendations for the future regards. In this paper we used most common control strategies for dynamic shadings and compared their result with control strategies whish proposed by the new ISO. Also, we studied the most influential control strategies on overall building energy performance by conducting global sensitivity analysis.

KEYWORDS

Control strategy; Dynamic shadings; Energy performance; Energy modeling; Temperate climate; Belgium

PROBLEM

There is no standardized way for assessment of control strategies regarding to the adaptive façade elements specially for dynamic shadings.

OBJECTIVE/ HYPOTHESIS

Comparison of heating and cooling loads related to dynamic solar shading and electrochromic glazing façades based on ISO 52016-3 for an office building in Belgium.

Comparison the most common control strategies for dynamic shadings with the control strategies proposed by the new ISO.

Find the most influential control strategy on heating and cooling loads by means of global sensitivity analysis.

Preparing recommendations for improvement of ISO 52016-3.

AUDIENCE

Building engineers, architects, facade engineers, urban designers, and researchers, chromogenic glass manufacturers, solar shading organizations, national building code developers, and building owners and occupants.

RESEARCH QUESTION

What are the most common control strategies for dynamic shadings?

What distinguished ISO 52016-3 when it compared to other control strategies?

ORIGINALITY

1. Evaluation and comparison of heating and cooling loads in an office building with the façade employing dynamic shading technology in accordance with ISO 52016-3.

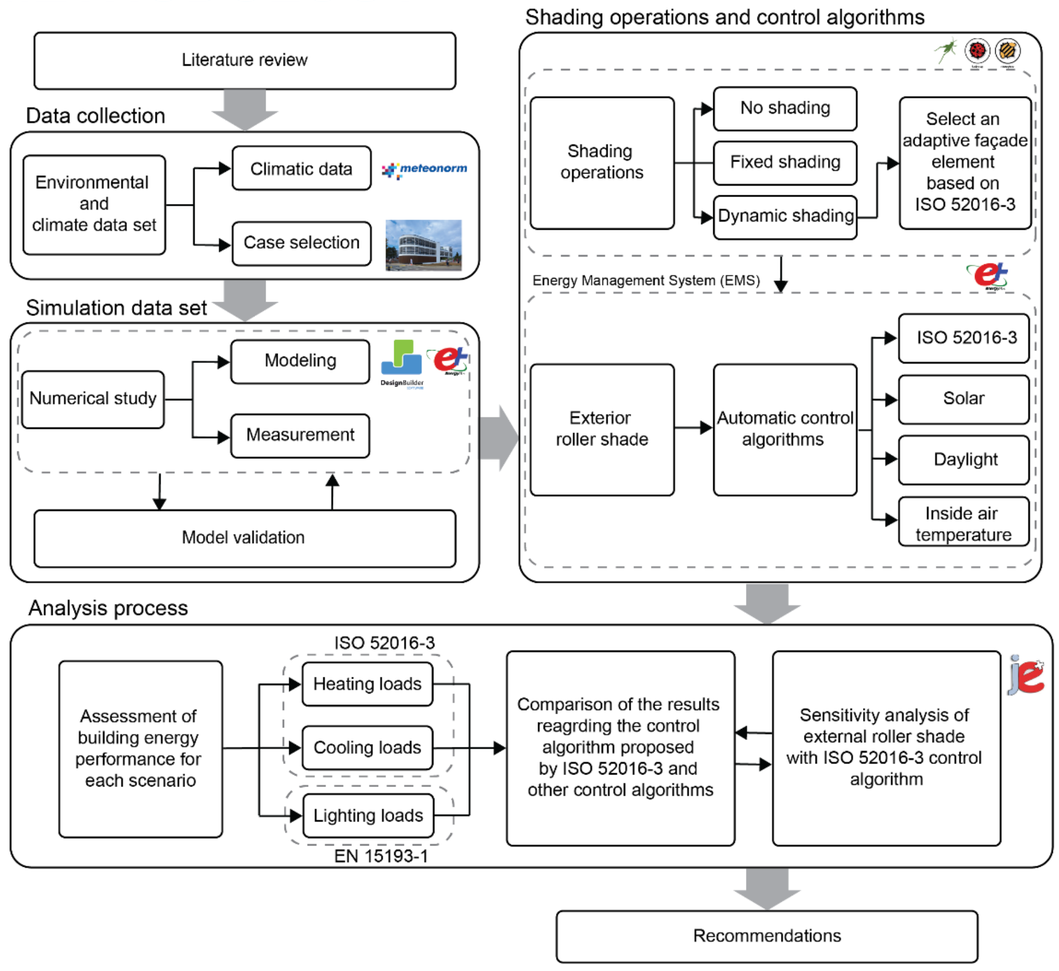
2. There are few studies have been done with ISO 52016-3.

3. Analyzing the effectiveness of ISO 52016-3 towards reduction of residential buildings heating and cooling loads.

3. Testifying the control strategies suggested by ISO and evaluating their impacts.

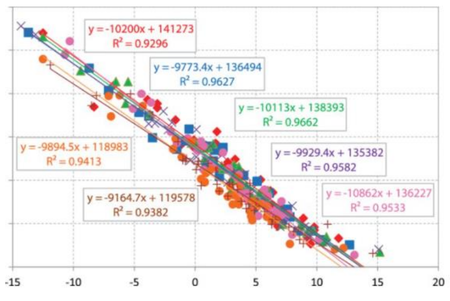
4. Comparing the most common control strategy with ISO.

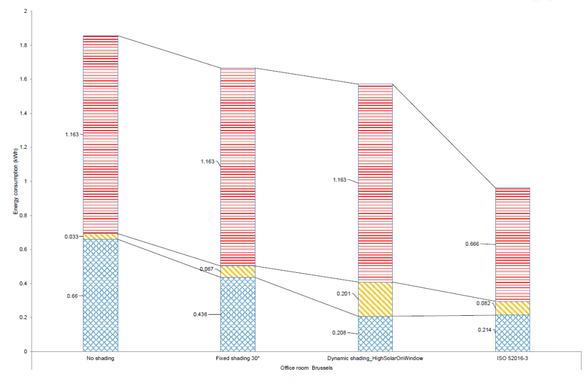
METHODOLOGY



RESULTS

Analyzing the results shows that by using the control strategy recommended by ISO the heating and cooling loads decreased x% compared to the other strategies. Also the results of sensitivity analysis show that the most influential control strategy is x.





CONCLUSION

The main contribution of this paper is implementation of the new ISO 52016-3 for calculation of the building energy performance in an office building with adaptive façade elements. Among adaptive façade technologies which covered by the new ISO the dynamic shading is selected based on the achieved results. Dynamic simulations have been done based on the control strategies provided by ISO and most common control strategies for dynamic shadings. To explore the most influential control strategy on building energy performance of the building, the global sensitivity analysis have been done.

Results show that by means of using control strategy x the overall building performance is decreased for x% and the control strategy Y is the most influential on building energy performance.

Resources

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