

Application of multi-objective optimization for resolving conflicts when selecting windows

Citation for published version (APA):

Jalilzadehazhari, E., Pardalis, G., Johansson, J., & Johansson, P. (2019). *Application of multi-objective optimization for resolving conflicts when selecting windows*. Abstract from The 9th International Conference on Sustainable Development in the Building and Environment (SuDBE2019) & the International Forum of Green and Healthy Buildings, Cambridge, United Kingdom.

Document status and date:

Published: 24/09/2019

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.



<http://www.diva-portal.org>

This is the published version of a paper presented at *The 9th International Conference on Sustainable Development in the Building and Environment#SuDBE2019#& the International Forum of Green and Healthy Buildings. Reading and Cambridge, UK. 22nd to 28th July 2019.*

Citation for the original published paper:

Jalilzadehazhari, E., Pardalis, G., Johansson, J., Johansson, P. (2019)

Application of multi-objective optimization for resolving conflicts when selecting windows

In: *The 9th International Conference on Sustainable Development in the Building and Environment#SuDBE2019#& the International Forum of Green and Healthy Buildings*. Reading and Cambridge, UK

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:lnu:diva-86972>

Application of a multi-objective optimization for resolving conflicts when selecting windows

Elaheh Jalilzadehazhari¹, Georgios Pardalis², Jimmy Johansson³, Peter Johansson⁴

1,3. Department of Forestry and Wood Technology, Linnaeus University, Växjö 35195, Sweden

2. Department of Built Environment and Energy Technology, Linnaeus University, Växjö 35195, Sweden

4. Department of Construction Engineering and Lighting Science, Jönköping 551 11, Sweden

Abstract: Sweden passed legislation to achieve a target of net zero greenhouse gas emissions by the end of 2045. The Energy Performance of Building Directive further obliged European countries to ensure zero-energy building codes and improve the quality of indoor environments when buildings are renovated, as approximately 40% of total greenhouse gas emissions in Sweden are produced while heating buildings. Windows currently play a significant role in improving the quality of indoor environments and cutting total energy consumption, thereby reducing greenhouse gas emissions and mitigating environmental impact. Selecting a suitable window design is a complicated task compounded by two main difficulties: i) the availability of multiple window designs, each with a different glazing system, size, form and position; and ii) conflict between visual comfort, thermal comfort and energy consumption. Previous studies have primarily analysed a limited selection of window designs; however, analysing a wide variety of glazing systems, sizes, forms and positions will help resolve the abovementioned difficulties, thereby ensuring zero-energy building codes while improving the quality of an indoor environment. A multi-objective optimization was therefore completed to analyse the performance of a wide variety of window design variables and select suitable designs for an office room in Sweden. The results show the potential of multi-objective optimisation to resolve the difficulties of selecting suitable window designs.

Keywords: multi-objective optimization, visual comfort, thermal comfort, energy consumption