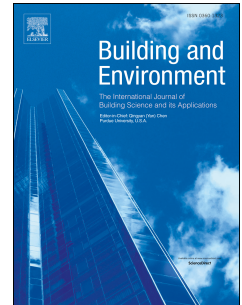


Accepted Manuscript

An Indoor Environmental Quality (IEQ) assessment of a partially-retrofitted university building

Sheikh Zuhaib, Richard Manton, Corey Griffin, Magdalena Hajdukiewicz, Marcus M. Keane, Jamie Goggins



PII: S0360-1323(18)30261-0

DOI: [10.1016/j.buildenv.2018.05.001](https://doi.org/10.1016/j.buildenv.2018.05.001)

Reference: BAE 5439

To appear in: *Building and Environment*

Received Date: 7 March 2018

Revised Date: 1 May 2018

Accepted Date: 2 May 2018

Please cite this article as: Zuhaib S, Manton R, Griffin C, Hajdukiewicz M, Keane MM, Goggins J, An Indoor Environmental Quality (IEQ) assessment of a partially-retrofitted university building, *Building and Environment* (2018), doi: 10.1016/j.buildenv.2018.05.001.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

An Indoor Environmental Quality (IEQ) assessment of a partially-retrofitted university building

Sheikh Zuhaib^{1,2}, Richard Manton^{1,2}, Corey Griffin³, Magdalena Hajdukiewicz^{1,2},
 Marcus M. Keane^{1,2}, Jamie Goggins^{1,2,*}

¹Informatics Research Unit for Sustainable Engineering (IRUSE), Civil Engineering, College of Engineering & Informatics, National University of Ireland, Galway, Ireland

²Centre for Marine and Renewable Energy (MaREI), Ryan Institute, National University of Ireland Galway, Ireland

³Portland State University, Portland, Oregon, USA

*Corresponding Author. Tel.: +353 (91) 492609, Email address: jamie.goggins@nuigalway.ie (Jamie Goggins), Address: College of Engineering and Informatics, National University of Ireland, Galway, Ireland

Abstract:

Achieving standards-based Indoor Environmental Quality (IEQ) in existing buildings is growing steadily due to the strong demand for deep retrofits in Europe. Existing non-domestic buildings pose challenges mainly due to occupancy patterns, lack of personal control over comfort and outdated building structures. Renovations of many post-war non-domestic buildings (>35 years old) have faced technical and financial challenges. Consequently, these buildings are often only partially retrofitted, which are often ad-hoc in nature. This paper describes the evaluation process of indoor environmental conditions in a partially-retrofitted university building in Galway (Ireland) originally built during the 1970s and partially retrofit in 2005. The research assesses criteria outlined in EN 15251 and draws on methods from ASHRAE 55 and CBE IEQ survey. Occupant surveys complemented by physical measurements were used to assess the compliance of IEQ parameters for thermal, visual and acoustic comfort and indoor air quality. The relationship between the performance of the building envelope and occupant comfort is described across retrofitted and non-retrofitted zones of the building. The results suggest that ad-hoc retrofitting of the façade did not make any significant difference to IEQ and occupants continued to adapt personally to the existing conditions. Their preferred satisfaction levels in the survey were lower than the measured thermal sensation. It is recommended that future retrofits are adequately planned and optimised to improve both IEQ and energy performance. A whole building retrofit approach must balance and include factors such as human health, building fabric and energy savings to avoid the pitfalls of current practice.

Keywords: Standards for Retrofits, field study, Indoor Environmental Quality, thermal comfort, indoor air quality, occupant survey

Download English Version:

<https://daneshyari.com/en/article/6697085>

Download Persian Version:

<https://daneshyari.com/article/6697085>

[Daneshyari.com](https://daneshyari.com)