Civil Engineering for Sustainability and Resilience International Conference, **CESARE '14**
Amman, Jordan, 24-27 April 2014

THERMAL BRIDGING ANALYSIS ON CLADDING SYSTEMS FOR BUILDING FACADES

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Keywords: point thermal bridge, external cladding systems, heat transfer

ABSTRACT

In the contemporary architecture, cladding is widely used as the outer skin of new and retrofitted buildings. Among its most important advantages are the flexibility in developing interesting aesthetic effects due to the numerous alternatives of cladding materials, as well as its ability to outline efficient multi-layered building elements, providing thus the necessary protection against the ambient environment and contributing to the formation of comfortable indoor conditions.
In most façade cladding systems, self-weight and wind loading are normally transferred to the building structure with the use of a metallic frame and steel brackets, which penetrate the thermal insulation layer. In terms of thermal performance, the area of the bracket's anchorage is the weakest, due to the point thermal bridging effect occurring at the junction of the metal brackets and the external solid wall.
The objectives of the proposed paper are to define the magnitude of this thermal bridging effect and its interrelation with the bracket's characteristics, the thermal resistance of the solid wall behind the external cladding, as well as with the ventilation rate of the air cavity formed between the two elements (the external cladding and the solid wall). The analysis is conducted under steady state conditions as a multi-parameter study through the use of specialized software for thermal modelling, which enable the calculation of the point thermal transmittance x (W/K) and its visualization through isothermal images for every case.
Although heat transfer through the cladding elements is very complex and depends highly on the final choices of the façade engineer, the derived quantitative information regarding the extent of the thermal bridging effect for the alternative scenarios of cladding characteristics is still very essential, especially in cases where a high energy performance is required.