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# Optimizing the Architectural Layouts and Technical Specifications of Curtain Walls to Minimize Use of Aluminium

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## Abstract

During recent decades it has become common to enclose large buildings with lightweight, weathertight walls that hang, like curtains, from the floor edges. The frames of these curtain walls are, usually, extruded aluminium – a material whose production is highly energy-intensive. Although means of enhancing the thermal performance of building envelopes have been scrutinized, comparatively little attention has been given to the cost and embodied energy savings that can be achieved through efficient structural design. No guidelines for efficient use of aluminium in a curtain wall have been published, and architects therefore have not known the impact that their decisions have upon the facade's material content.

In this study more than 1,000 unique curtain wall systems have been optimized numerically, each one to a different set of design criteria, and the results show the extent to which aluminium content is influenced by floor height, locations of supports, number of horizontal members per panel, width of the extrusions, spacing between mullions, design wind pressure, and the minimum

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