

# Shape and Strength: load-bearing digital geometries

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## Abstract

The field of architecture, particularly its academic side, is filled with complex imagery of forms that can easily be constructed digitally yet are not based on any structural understandings of how they would behave under real world stresses. They are generated in a digital vacuum, completely independently of structural principles or realities. Some work has been focused on translating these digitally generated forms to CNC cutting and fabrication methods, yet this remains as a translation rather than an organic integration. The forms are rarely load-bearing, and an understanding of their structural behavior is never a primary generator of shape. They are strictly aesthetically driven.

This project will be an investigation into how the structural behaviors of complex load-bearing surfaces, and their realities of constructability, can serve as co-generators of form. We aim to develop a better understanding of these behaviors, and the possible structural advantages of non-linear architecture. We will be investigating the inherent connection between strength and shape that is not being fully exploited with digital form generation. We will use a combination of creative architectural design skills and data gathered from structural analysis software tools to make this investigation. We will be investigating structural principles of non-linear forms and whether they imply corresponding architectural aesthetic languages.

This research will culminate in the actual full scale construction of the computer generated form from this project that is most successful in both its structural efficiency, and its constructability using digitally controlled tools.