

Robotically Aided Regionalism

Reawakening stone stereotomy through robotic fabrication

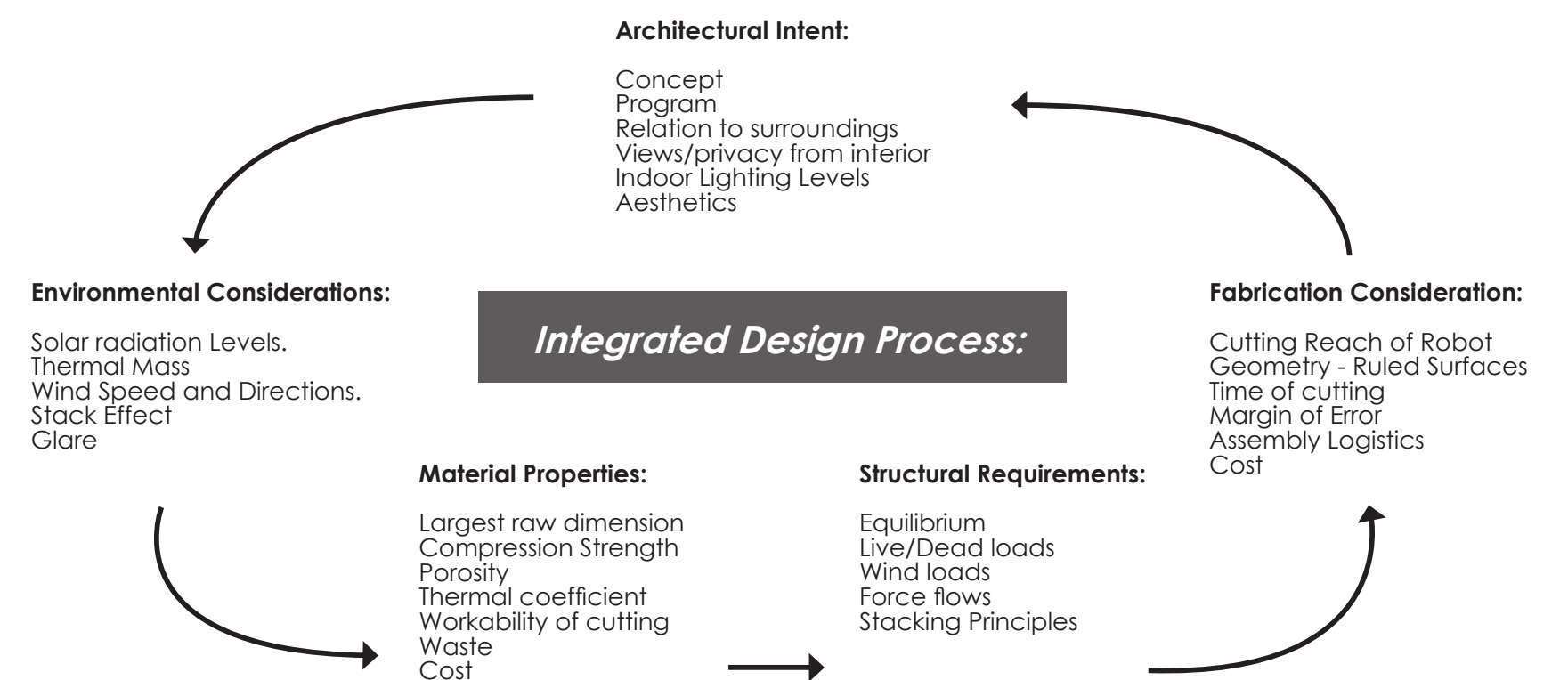
How can computational design and digital fabrication help in the reinterpretation and to extend the performance of vernacular stone architecture?

The research is based on the Maltese archipelago, a collection of islands with no other building material available apart from Globigerina limestone. Importing materials before the industrial revolution was an impractical endeavour which led for the inhabitants of the island to learn and master ways how stone can be used in a variety of ways. This restriction resulted in a cultural landscape made out of one material, hence the material has not only transcended from a building resource to a building system but also became a predominant factor in the cultural identity of the island. Furthermore, stone's natural and massive qualities arises the sense of firmness and timelessness, qualities which are rarely found in contemporary architecture. Alas, this building tradition is being replaced by modern industrialised materials and building techniques which depend on standardisation and require much less craftsmanship. The knowledge of this art and technique of cutting volumetric stones and assembling it into a building (stereotomy) is becoming less and less of a viable option, hence in risk of becoming stagnant and redundant.

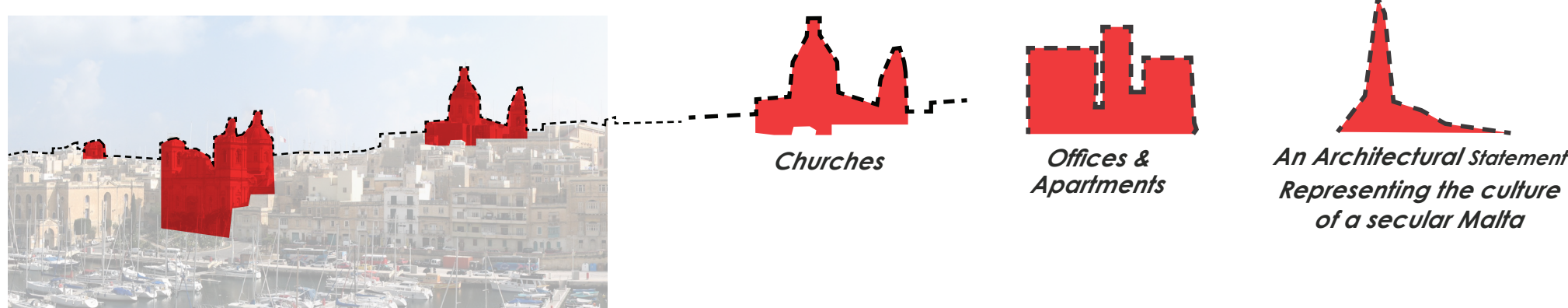
This study explores regionalism from a technologic and material point of view. It investigates the combination of traditional building techniques with current emerging technologies in digital fabrication with the goal to understand, reinterpret and also extend the performance of stereotomy as building technique through the use of computer aided craftsmanship. For this reason the starting points of this research were the material characteristics and craftsmanship considerations; more specifically, compression-only structural system and 6-axis industrial robotic arm with an abrasive diamond wire cutter. This ultimately strives for the preservation and contemporary reinterpretation of a cultural identity enrooted in the use of stone. The design case set prior to this research follows a similar trail of thought. The house for Maltese literature 's design intent is to give an architectural statement that would show an alternative to what post colonial Maltese society could identify themselves with. Both stone stereotomy and Maltese literature share the idea of transcendence from the mundane into the extraordinary; a narrative which was also the main driving force for the architectural gesture shown in the building's morphology.



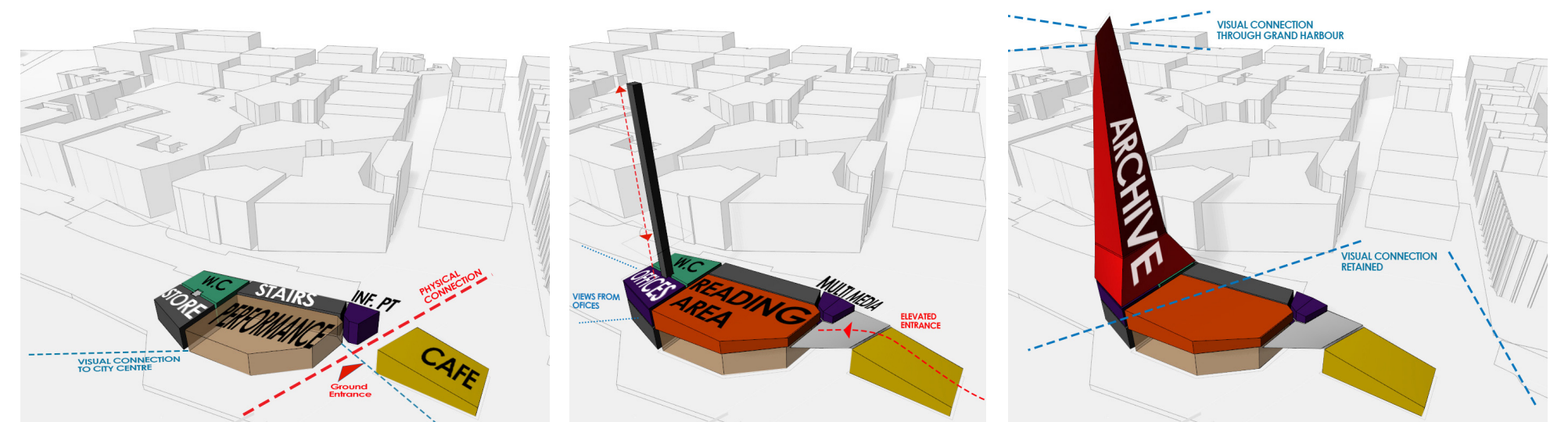
Research context.



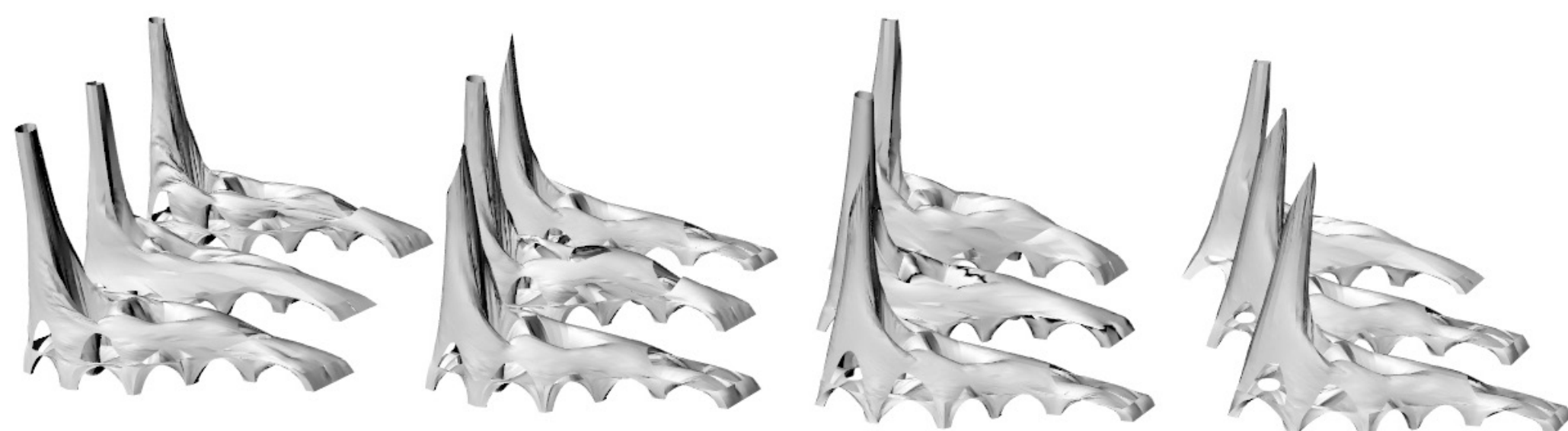
Overall design methodology.



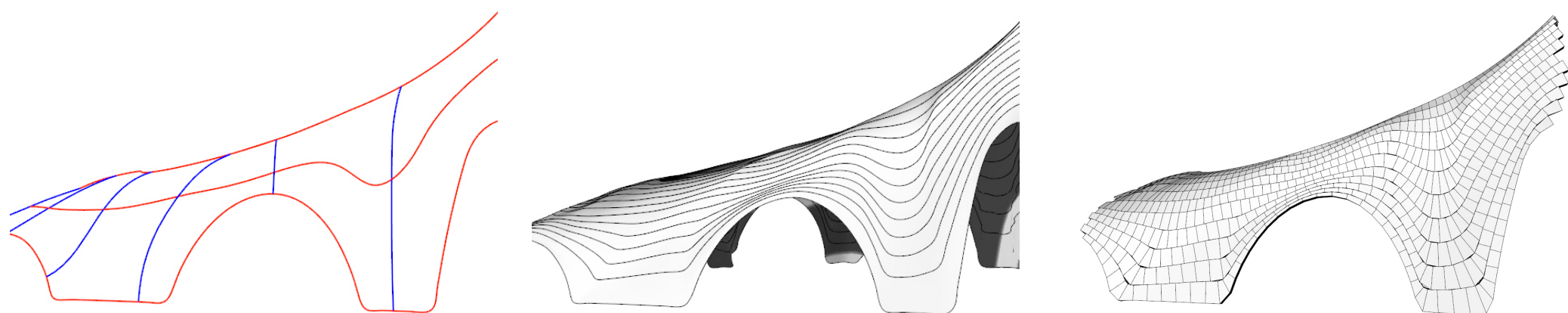
Architectural Intent.



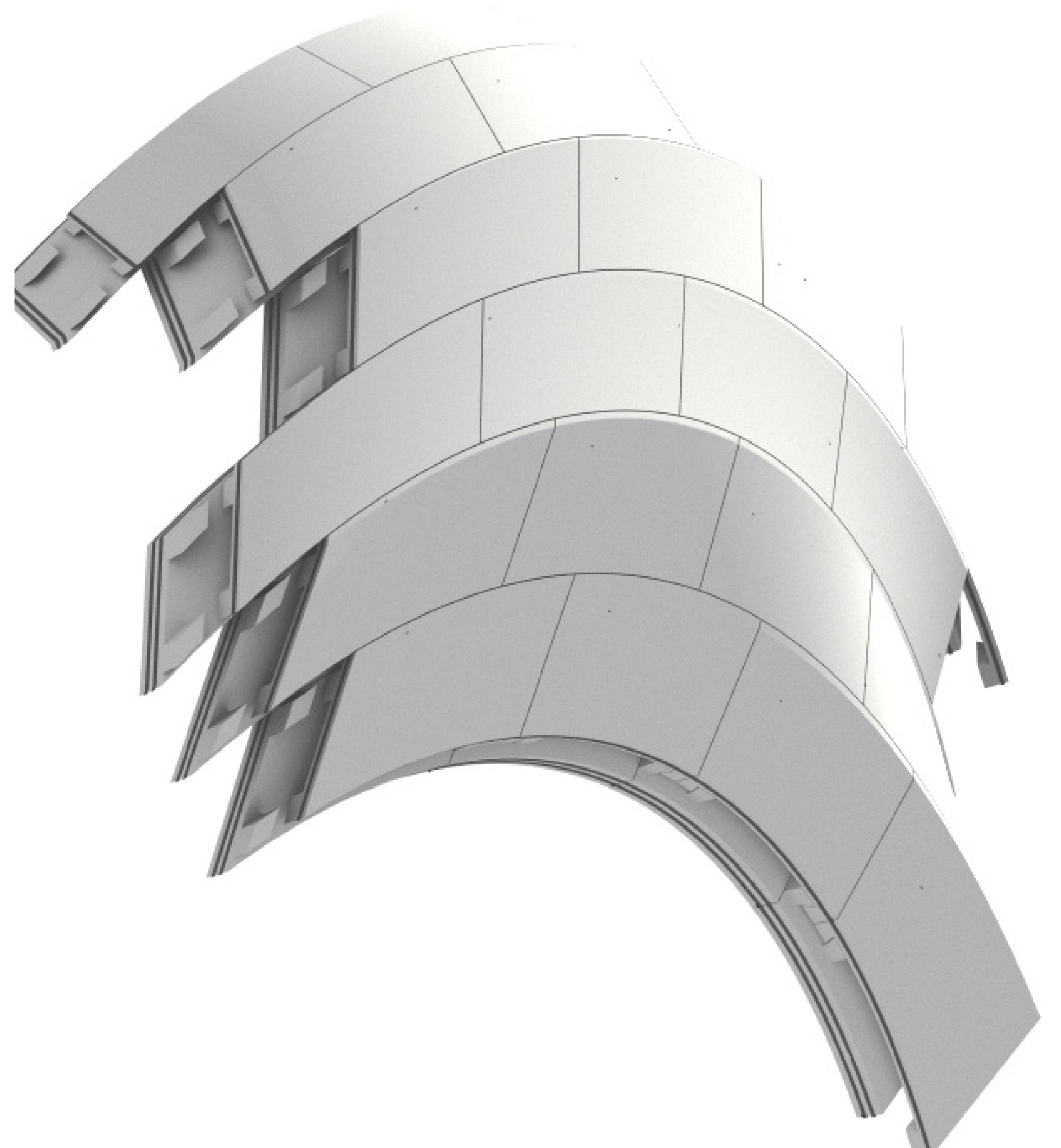
Program on site.



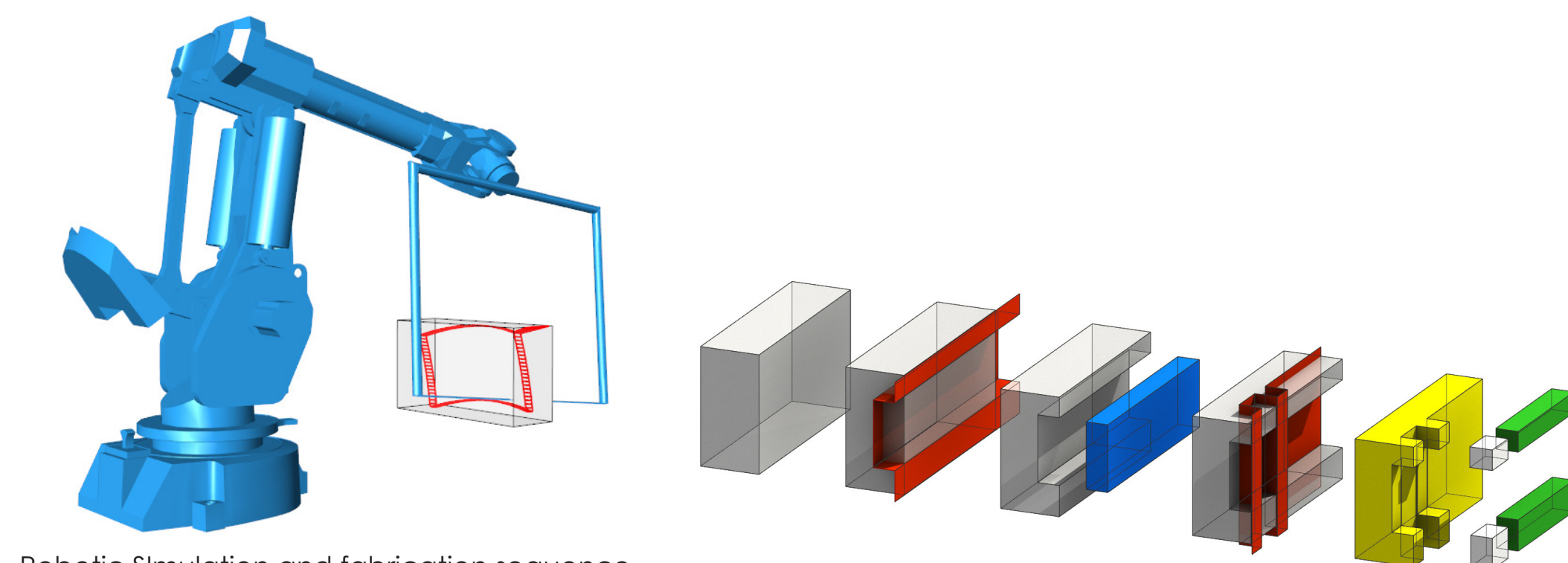
Hanging chain simulation - Morphological Iteration Set.



Tessellating surface in accordance with stereotomy principles and fabrication considerations.



Detailed prototypical shell fragment.



Robotic Simulation and fabrication sequence.

