

Foam concrete utilization research, Toronto, ON, Canada



The Assembly of first forming concept Image Sequence Summary (ISS).



The bending of 1/4" rebar mesh ISS.



The making of reusable formwork lid plate ISS.



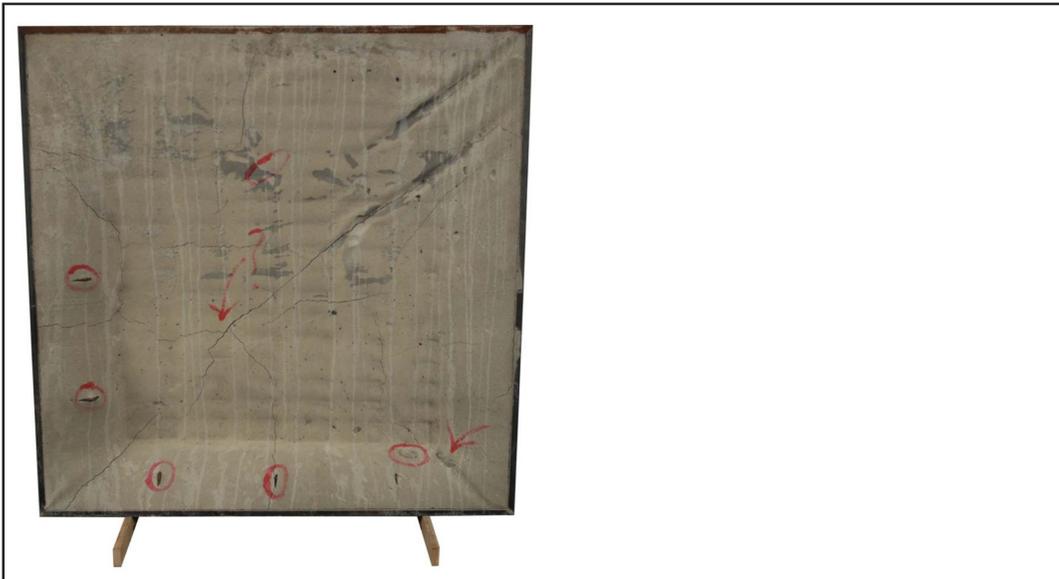
The making of reusable formwork ISS.



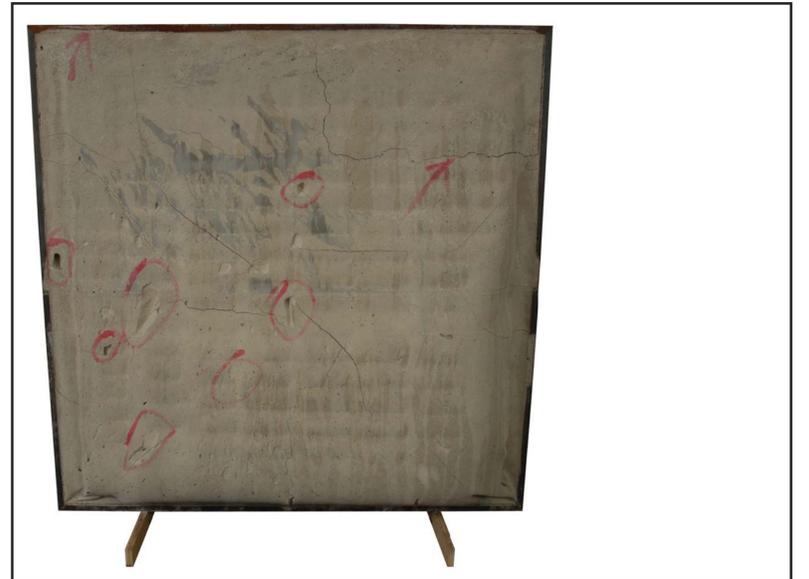
The making of reusable connector assembly for second forming concept ISS.



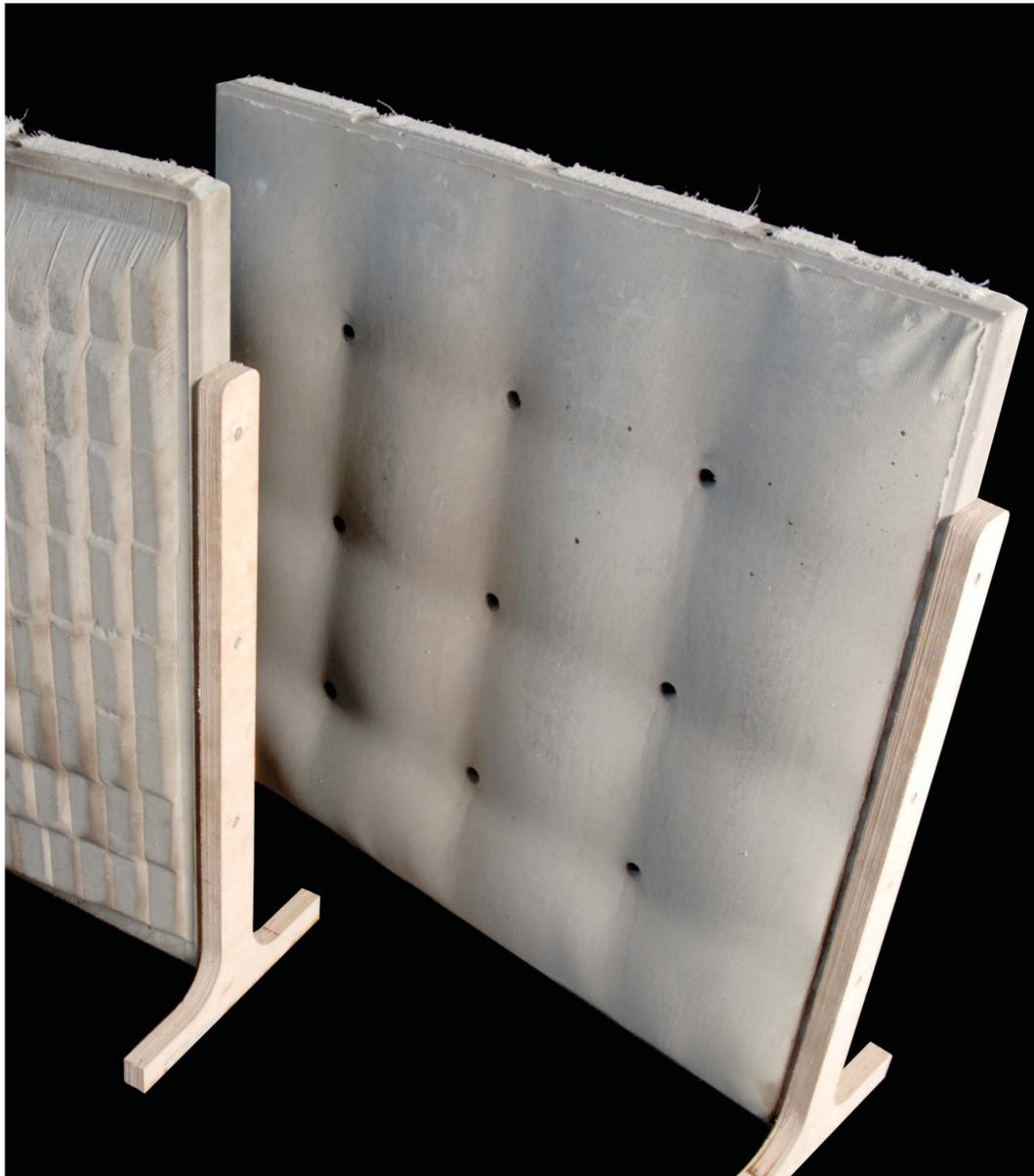
The making and subsequent casting of foamed concrete ISS.



View of panel one backside findings (Made using first forming concept).



View of panel one front side findings (Made using first forming concept).



Partial view of panel five made using first forming concept (Left side): view of panel six made using second forming concept (Right side).

Innovation and Transferability – Progress (continuation)

The use of foam concrete around the world is comparable to that of wood. The way one uses wood can be completely different than another. Cutting solid shapes out of trees and engineering those same shapes are two entirely different solutions to the same problem. Particularly as our resources become scarcer we must seek new ways to reduce our consumption while maintaining or even advancing its substance. Product development in one area of industry can often be applied to another, however without avidity progress stands calm. As students we must ask the right questions which are difficult to formulate based only on theory. Understanding comes from experience and experience comes from practice. Deciding to "sketch in real material" as my supervisor would word it was a means of determining what questions to start asking.

Ethical standards and social equity – People (continuation)

Architecture is habitually plagued by its own drive to propel design into new possibilities without adequate groundwork. Its past failures need to serve as catalysts for its improvement and continuing advancement. To fully understand concrete and its potential is to understand the opportunities for its deployment into production of urban renewal. After all, concrete is the material from which most cities are made. Our greatest construction resource is also one of our greatest polluters. Social improvement must be provided at a greener cost.

Environmental quality and resource efficiency – Planet (continuation)

Beyond the previously mentioned information, this material can also be consolidated with normal concrete. This merger would benefit both by taking advantages of each other's strengths to minimize or even eliminate each other's weaknesses. As an example consider an Oreo cookie scenario where the hard outside part could be normal concrete while the softer filling is foamed concrete. Both are essentially the same materials made from different ingredients which allow them to fuse seamlessly without any fasteners or other connections.

Economic performance and compatibility – Prosperity (continuation)

Typical concrete masonry units (CMU) employed in North American construction practices are limited in sizes by their weight since their assembly is still accomplished by masons. In non-load-bearing scenarios, the CMU require the same amount of energy to deliver, produce and erect as in the load-bearing scenarios. Furthermore, these non-load-bearing uses of CMU add unnecessary dead load to the structure which increases its costs. The broad range of densities and compressive strengths available in foamed concrete can offer healthier solutions. A similar argument can be delivered for Insulated Concrete Forms (ICF) where normal concrete is currently used. Particularly in residential applications where the loading requirements are lesser could foamed concrete act as a substitute? Thereby reducing consumption of natural resources as well as improving the thermal efficiency of the envelope by supplementing the ICF with its inherently good thermal values.

Contextual and aesthetic impact – Proficiency (continuation)

The magnetic formwork system (Second forming concept) was derived late in this research and only attempted in the last panel (Panel six) produced just prior to concluding this dissertation. While normal concrete requires considerable vibration to acquire the shape of its formwork, foamed concrete does not. As the research findings would show, the high slump quality of this material along with its lightweight offers a potential for highly intricate formwork comparable to that being used in metal casting. The magnetic formwork concept is one such proposal which has every chance of success as exhibited in this thesis. Further exploration of this proposal is currently being reviewed by the Engineering department at the University of Toronto.