AERATED AUTOCLAVED CONCRETE (AAC) FOR MASONRY VAULTING

ABSTRACT

Aerated Autoclaved Concrete (AAC) is an advanced masonry product that is used in residential and commercial structural walls. It has many advantages in the building trade, including light weight, high R-value, fire resistance, ease of cutting and assembly, and ready-to-finish surfaces. These qualities make AAC an excellent material for ongoing investigations into advanced structural forms at the Building Technology Program at MIT. Research programs at MIT are working both theoretically and practically to engage in the design and construction of load-bearing masonry.

We propose to design, build, and test three vaulted structures built using AAC with the resources of MIT's Department of Architecture and testing facilities in MIT's Department of Civil Engineering.

The MIT research group seeks to develop design tools and construction systems for structural masonry. Our research follows the buildings and techniques of Antonio Gaudi, the Raphael Guastavino company, and the Mediterranean tradition of Catalan vaulting. Through structural analysis of historic buildings and an understanding of traditional construction methods, we seek to apply our knowledge to contemporary materials and engineering.

AAC is an ideal material for further exploration in Catalan vaulting. Traditional Catalan construction uses fl at, rectangular terracott a tiles bonded together with plaster. In this manner, longspan vaults can be built without formwork. The largest is the dome of St. John the Divine in New York City, at over 100' in diameter. The strength of the resulting structural vaulting is remarkable. Recently, our team at MIT constructed a shallow vault spanning six feet in ½ inch thick thin-brick which supported a load of 1200 pounds with no visible deflection.

AAC offers significant advantages over brick in the construction process for masonry vaulting. Its light weight means that the unit size can be bigger, allowing more rapid construction of the vaulting. The ease with which AAC can be cut and worked is an asset when fitting tiles to the curves required for a variety of vaulted forms.
Finally, the texture of the AAC surface will increase the bond to the fast-setting plaster which is used in Catalan vaulting.

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