MEMBRANE STRUCTURES
A Comparative Performance Study of
Tensile Membrane Structures and Pneumatic Structures
for Events Architecture

by

JULIE CHOO HUI HOON
HD982515M

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ABSTRACT
Buildings do not have to be predominantly constructed of rigid elements such as concrete and steel. In some instances, this may actually prove to be inefficient, structurally and economically, taking into consideration the purpose it is intended for and its required period of service.

Membranes and fabrics can perform as structural elements, especially with recent advances in materials and technology. They may be employed merely as tent envelopes with forms dictated by rigid posts and beams. Going beyond this tent concept, these flexible skins are also capable of being supported exclusively by structural properties such as tension and air pressure, as demonstrated by tensile and pneumatic structures. Besides structural functions, the properties of membranes may also be exploited or cultivated to create a certain desired ambience or to control an interior environment.

There is a history of these structures being used in the USA and Europe, and membranes are slowly gaining popularity in Singapore and its surrounding countries. Because our local climate and practice here vary from the western nations, a better understanding of its structural characteristics and purpose is needed.

This dissertation examines how membrane structures perform, with the aim of evaluating the appropriate use of tensile and pneumatic membrane structures for local events. To aid in this analysis, two local case studies (one for each structural type) will be assessed.