Abstract

Previous research conducted at The Cooper Union for the Advancement of Science and Art **[4]** has demonstrated that the use of expanding polyurethane foam in hollow structural sections postpones the effects of local buckling in structural elements subject to flexure and compression by bracing the thin walls of hollow tubes such that the walls cannot buckle before the entire section fails by a more conventional mode. This thesis seeks to further develop the theory on foam interaction within a hollow tube and conduct a series of tests to check the practical use of such a composite system. These tests involve connection feasibility testing, dynamic testing, and more flexural and compression testing using both manufactured sections and welded built-up sections. Furthermore, a cost analysis will be conducted to compare whether or not the addition of foam really saves weight in the structure relative to the amount of load increase the section sees and whether or not these sections compare favorably to sections with thicker walls, less likely to fail by the local buckling modes.