Re-Engineering of a Stainless Steel Fire Boom for use in Conjunction with Conventional Fire Booms

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ABSTRACT

Many existing refractory fabric fire booms will deteriorate quickly in use and may require frequent replacement in a large-scale burn operation. These problems can be minimized, or even eliminated, by using a highly durable and fire-resistant material in the pocket of the boom where the highest heat and stress loads exist.

In this project, an existing, large stainless steel boom was re-engineered to reduce its size, weight and cost. The large boom was designed, constructed and tested successfully in the early 1980s; however, because of the rigorous criteria used for the original design, it is expensive, heavy, and cumbersome to deploy.

The project was completed in nine phases: (i) the existing boom was redesigned to reduce its cost, size, weight, and handling problems, and to make it compatible with existing boom systems; (ii) a prototype section of the re-engineered boom was constructed for testing; (iii) the boom was tested in Lake Erie to evaluate its towing and sea-keeping characteristics; (iv) the prototype was tested at Ohmsett to quantify its oil-containment capability; (v) three hours of burn tests in waves were conducted in a diesel fire at the US Coast Guard Fire and Safety Test Detachment in Mobile, AL; (vi) post-burn tow tests were performed at Ohmsett to confirm the containment capability of the boom after the diesel-fire exposure; (vii) three hours of burn tests in waves were carried out in enhanced propane flames at Ohmsett; and, (viii) destructive testing was used to estimate the operational life of the flexible connector sections, and the tensile strength of several key load-bearing components. Finally, the design of the boom was refined and final detailed engineering drawings and a report were produced.

The boom passed all the tests. The final design is presented in the paper. The boom may be purchased commercially from Applied Fabrics Technologies, Inc.