

Polymer composite provides better fire protection than steel

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The U.S. Navy needs lighter materials so ships will go further faster. One way to do that is to use new composite materials. But how will these materials respond to fire -- one of the most critical safety concerns on a ship? Virginia Tech material scientists have developed models to test composites for fire resistance – and have a recommendation.

John Bausano, a doctoral student in the chemistry-engineering interdisciplinary Macromolecular Science and Infrastructure Engineering program at Virginia Tech, will present his research in the Excellence in Graduate Polymer Science Research Symposium at the 231st American Chemical Society National Meeting in Atlanta on March 26-30.

Working with Jack Lesko, associate professor of engineering science and mechanics, Bausano developed a testing method – a one-sided heat flux test that can be used on a sample as small as one inch by six inches (1x6") to test a commercially available material – E-glass vinyl ester composite laminates. One side of the material is heated to simulate fire on one side of a wall. A load is placed on one edge to simulate a load-bearing wall. "We measure the deflection, failure, and how hot it gets on the cool side," said Bausano. "That is an important issue because you don't want the fire to spread."

His findings are that the composite material being tested does localize heat, "especially compared to steel, which conducts heat in all directions."

His recommendation as other materials and processing are considered is, "Develop the material with as high a glass transition (T_g) temperature as you can in order to sustain structural rigidity. That would help the engineers and the sailors. The longer the material stays above T_g , or the softening point, the longer the wall will stand. T_g is the upper temperature level of usefulness."

Composite materials would also be useful on oil platforms, where fire is also a concern, he said.

Source: Virginia Tech

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