



Composite Lifesavers

Lightweight air tanks could reduce first-responder fatigue.

by Joe Singleton/jsingleton@nttc.edu

New linerless composite tanks developed with MDA funding could lighten the load for firefighters and rescue workers when responding to emergencies, thereby forestalling fatigue and allowing first responders to do their jobs more safely.

Developed by Composite Technology Development, Inc. (CTD; Lafayette, CO), the tanks are made of a carbon-fiber-reinforced epoxy, without the use of metallic or plastic liners. The composite tanks can provide a cost-effective and lighter option to currently employed air breathing systems, such as self-contained breathing apparatus (SCBA) used by firefighters and rescue workers.

MDA originally funded CTD's linerless composite tank technology through a 2003 SBIR Phase II contract. CTD's project focus included designing lightweight, composite cryogenic and chemical storage tanks for use in aircraft as part of the Airborne Laser program.

CTD's technology is driven by the concept that lighter is always better. To make the tanks light, company engineers start with a lightweight, carbon-fiber-reinforced epoxy made of resins designed not to microcrack when the tank shrinks due to temperature changes or expands to mechanical loading. These tanks, which use the composite materials not only as the structure but also as the permeation barrier of the tank, are engineered never to burst or explode, even if overpressurized or operated in abnormal conditions. Benign leaks are the most extreme damage the tanks could incur in such high-pressure or abnormal conditions.

Safety and weight savings are reasons first responders such as firefighters and rescue crews may favor CTD's technology over conventional tanks. Standard-issue tanks carried by firefighters generally have about a 7-liter capacity, and have a gross weight of about 8 pounds. CTD's tanks can provide firefighters with the same 7-liter capacity, but at a gross weight of less than 7 pounds—more than a 10 percent weight reduction. Saving just 1 pound can significantly reduce a firefighter's chance of exhaustion, should a tank be lugged around for hours or hauled up staircases, according to Mike Tupper, CTD executive vice president. The price tag on the composite tanks also would be competitive with conventional tanks.

While weight savings is a key selling point to many potential customers, size can be important, too. CTD can make tanks that have the same capacity and weight as conventional storage vessels, but are roughly 10 percent smaller in size. This feature may be of interest if constrained space is a factor in conducting a rescue.



▲ Firefighters could benefit from CTD's composite air tanks, which offer a 10 percent weight savings over conventional self-contained breathing apparatus.

Beyond the small tanks likely to hit the market, CTD is targeting the automotive industry. Fuel cells, a possible future power plant for vehicles, combine hydrogen and oxygen to create power, with water as a byproduct. Automotive manufacturers are looking for a safe and efficient storage apparatus for hydrogen, with the goal of enabling a car to travel roughly 300 miles per fueling. CTD is ready and able to manufacture pressure or cryogenic tanks for hydrogen storage in automobiles that can store more fuel than currently envisioned, weigh less than conventional tanks, and increase the range of travel, all at a competitive price.

Tupper said he expects the smaller composite tanks, or ambient pressure vessels, which would most likely be used for first-responder tasks, to be available within the next 12 to 24 months, depending on the company's funding levels. Cryogenic pressure vessels are available for commercial sale now, he added.

CTD is looking for strategic partners and product manufacturers that would be interested in further developing or integrating the composite tanks, as well as to help commercialize the technology.

CONTACT INFO

Mike Tupper
Composite Technology Development, Inc.
Tel: (303) 664-0394, ext. 111
E-mail: mike.tupper@ctd-materials.com
Web: www.ctd-materials.com