

Strong, Lightweight Composite Tanks and Pipes for Demanding Applications



NASA's Marshall Space Flight Center is offering licensing and/or joint development opportunities for its newest composite layered tank, vessel, and pipe technologies. These technologies offer an attractive combination of improved technology at lower costs—they enable the production of strong, lightweight, adaptable, uniquely shaped, insulated, chemically resistant, cryogenic tanks, vessels, and pipes while reducing fabrication costs.

Benefits

- Does not require large investments in tooling or equipment—cost effective to fabricate
- Provides a high permeation barrier to natural gas and helium
- Enables fabrication of uniquely shaped tanks and pipes (e.g., donut and toriodal shapes)
- Enables vessels up to 40% lighter than aluminum and 20% lighter than fiberglass to be fabricated
- Provides strength with graphite/epoxy structural support layers
- Ensures compatibility with chemically aggressive, corrosive, and cryogenic fluids
- Withstands large temperature and pressure extremes
- Provides high leak and crack integrity
- Resists abrasion, fire, and impact

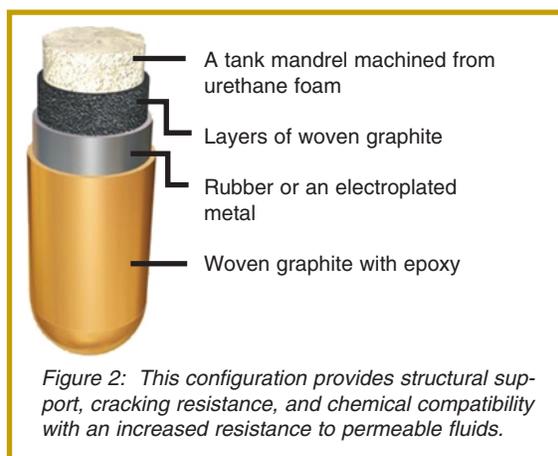
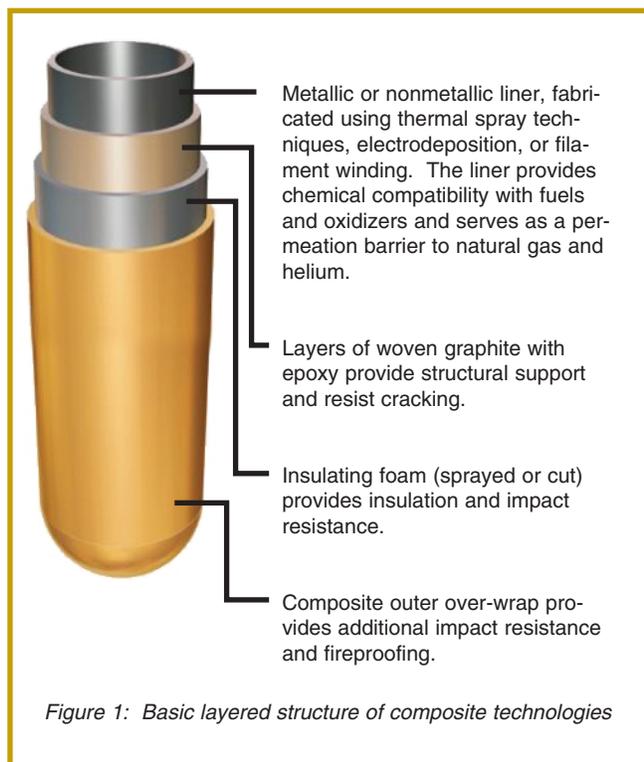


Commercial Applications

- Alternative-fuel motor vehicles (e.g., oxygen and hydrogen tanks in fuel-cell vehicles)
- Fuel tanks for reusable launch vehicles, upper-stage launch vehicles, and other spacecraft
- Offshore drilling, oil production, and petroleum refineries
- Storage tanks for cryogenic fluids, pressurant gases, and fossil fuels
- Chemical processing and pharmaceutical manufacturing industries
- Self-contained breathing apparatus tanks for firefighters and military scuba divers
- Fuel tanks for over-the-road tankers—more fuel can be carried for the same weight

The Technologies

NASA Marshall's composite tank and pipe portfolio consists of five technologies. Figure 1 presents the basic configuration of three of the technologies. Figures 2 and 3 show the separate configurations of the other two technologies.



Prototypes of the tanks and pipes have been built, and preliminary tests have been run. A series of 16-inch x 22-inch vessels have been produced and tested with multiple cycles of liquid nitrogen followed by liquid hydrogen fill-and-drain cycles. Several pressure vessels have been leak tested with helium and other vessels have passed the DOT Bonfire tests. NASA is currently working on building large-diameter (up to 50-inch) pressure vessels using these technologies.

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www.nasasolutions.com

Commercial Opportunities

These technologies are part of NASA's technology transfer program, which seeks to stimulate development and commercial uses of NASA-developed technologies. NASA is flexible in its agreements, and opportunities exist for licensing and/or joint development of these tank, vessel, and pipe technologies.

Patents for these technologies include U.S. Patents 6,193,917 and 6,158,605. In addition, three other patent applications have been filed.



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