# *Challenging the* SPACE FRONTIER

**There is probably no better seal of approval than being a supplier to the United Space Alliance, the prime contractor for NASA's Space Shuttle program.**

**TEXT:** ALEXANDER FARNSWORTH **PHOTO:** GETTY IMAGES, ISTOCKPHOTO

**Seventy-seven** seconds after the Space Shuttle launches from the Kennedy Space Center in Florida, its two solid rocket booster tanks disconnect and fall into the Atlantic Ocean.

In order to keep the tanks from burning up in the atmosphere, they are sprayed with an ablative heat shield, a covering designed to accept the heat and burn-off associated with high-speed travel through the earth's atmosphere. This shield, which is partially made of Trelleborg Eccospheres, resins and other fillers, vaporizes on its way through the atmosphere, taking the heat with it and leaving the tanks intact.

**"Eccospheres** work in the same way as the insulation in your attic," says Gary Gladysz, Vice President Technology at Trelleborg in Mansfield, Massachusetts, in the U.S. "In both cases, trapped air pockets are what gives them their value as insulation materials. And our hollow glass microspheres on the solid rocket booster tanks on the Space Shuttle keep the heat away from the critical structure underneath."

Recently, United Space Alliance and NASA paid special tribute to the Trelleborg team involved in develop-

## THE UNITED SPACE ALLIANCE

Headquartered in Houston, Texas, US, the United Space Alliance was jointly founded by the Boeing Company and the Lockheed Martin Corporation in 1996. As one of the world's leading space operations companies, the United Space Alliance is NASA's primary industry partner in human space operations. Being the prime contractor for NASA's Space Shuttle Program, the consortium is responsible for the day-to-day operation and management of the U.S. Space Shuttle fleet and the International Space Station.

ILLUSTRATION: NASA

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ing the Eccospheres used on the Space Shuttle solid rocket booster tanks.

"We were recognized for our quality product, on-time delivery and for all of our hard work in fine tuning the Eccosphere material to the United Space Alliance and NASA's increasingly stringent specifications," says Gladysz. "We now have a plaque in the office from NASA saying 'Appreciation for a job well done.'"

Specifically, the Trelleborg team worked on optimizing the particle size and distribution of the Eccosphere glass material as it is sprayed onto the tanks at the United Space Alliance facility in Louisiana.

"We have moved the properties of the microballoons to a portion of the specification that will make the material easier to process for the United Space Alliance," says Gladysz. ■

## About the Eccospheres

Eccospheres® are Trelleborg's branded range of hollow glass microspheres.

The unique properties of microspheres and syntactic foams were first exploited and are still used for buoyancy in deep-sea submersibles and oil-drilling equipment. Today five different series of Eccospheres, each with specific chemical and physical properties, are manufactured by Trelleborg Offshore, a unit within Trelleborg Engineered Systems, at its facility south of Boston in the U.S.

They are used throughout the aerospace industry to manufacture strong, lightweight structures such as fuselages, bulkheads and floors, and in turbine blades, among many other applications.

Hollow microspheres, also known as microballoons, are also used to create syntactic foams. These are composite materials synthesized by filling a metal, polymer or ceramic with microspheres. The presence of hollow particles results in lower density, a higher strength-to-weight ratio, a lower thermal expansion coefficient and, in some cases, radar or sonar transparency for military applications.

The IG 201 range of Eccospheres used on the solid rocket booster tanks on the Space Shuttle were specifically engineered according to the United Space Alliance and NASA's specifications. They have the diameter of a human hair. Because they are spheres with a smooth surface, when in a pile, Eccospheres behave like a liquid.

PHOTO: TRELLEBORG

**A buoyancy module is a composite product, with a core consisting of micro- and macrospheres contained in a matrix of syntactic foam or epoxy resin.**

The technology to manufacture such hollow glass spheres dates back to the 1950s. An early aerospace application was on the Viking Lander that landed on Mars in 1976.

Due to their exclusive glass chemistry and method of manufacture, Eccospheres glass microspheres exhibit a number of different properties that can be fine-tuned for different applications. These include high temperature resistance up to 800°C, good density-to-strength ratios, clean surface chemistry and low thermal conductivity.