

Composite aiming for the stars

ENGINEERED FABRICS

Aerospace is one of a number of advanced industries that use high-performance polymer-coated fabrics in their processes and products. Automotive, marine, transport, safety and health also make use of them, and Trelleborg offers more than 100 years of experience to help develop customized solutions. Trelleborg's general aerospace experience in engineered fabrics for a wide range of industries benefits each new customer, including those in the fast-moving aerospace sector.

Vega is not just the name of the second-brightest star in the northern hemisphere. It is also the name of a new satellite launch system that Trelleborg has helped become reality.

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VEGA – an acronym for *Vettore Europeo di Generazione Avanzata*, or *Advanced Generation European Vehicle* – is a launch system for commercial satellites. It is designed and manufactured by Avio, a full systems integrator and prime contractor, through its subsidiary ELV. Standing 30 meters (98 feet) tall, the Vega launch vehicle carries equipment for GPS systems, environmental surveys and global mapping, for Google Earth for example, into space.

During the development of its solid rocket motors in recent years, Avio began looking for a partner to help transform its thermal protection rubber, developed for manual application, into a tape format with a semiautomatic application process to be used in manufacturing solid boosters. Avio sought a company with proven reliability, technical competence, a long-term perspective and preferably with a base in Italy, says Antonio Santin, Sales Director within Trelleborg Coated Systems.

“We were short-listed because we had know-how in rubber and fabrics, in addition to other requisites,” Santin explains. With more than 100 years of experience in engineered fabrics and a production facility in Lodi Vecchio, southeast of Milan, Trelleborg satisfied all of Avio’s requirements.

“**TRELLEBORG HAS ALWAYS** been ready to cooperate with Avio both in the R&D process and in the resolution of problems during the production phase,” says Francesco Giliberti, who has technical responsibility for Vega Solid Rocket Motors at Avio.

Because this project represented a new challenge in a demanding sector for Trelleborg, the company was eager to show that its expertise could be applied effectively for engineered fabrics in the aerospace industry.

On April 30, 2014, a Trelleborg product was aboard

meet specific aerospace requirements: low density, high thermal insulation, abrasion resistance and flame-retardant properties.

It forms one layer in the booster rocket, wrapping around it to absorb some of the excess heat generated by the solid rocket propellants. With temperatures that can reach 3,000 degrees Celsius in the combustion chamber, this layer becomes carbonized in the course of operation.

Dealing with extreme conditions is only one of the challenges of working in the aerospace industry. Besides the technical requirements, aerospace first-tier suppliers must be able to provide accurate traceability documentation for every component they supply; their suppliers must do the same.

Because Trelleborg in Lodi Vecchio is UNI EN ISO 14001 qualified for environmental management systems concerns, and UNI EN ISO 9001 qualified for quality management systems, it already had the basic qualifications for the Vega project.

“Traceability and document control are almost as important as product performance in this sector, but this was just the starting point,” Santin explains. “The fully committed dedication to this project between Trelleborg’s R&D center and the team of Avio engineers has been a key success factor in completing this project.”

Product performance is essential. According to Avio, the biggest hurdle in development was setting up the manufacturing process to ensure that the properties of the rubber formulation would remain intact. Trelleborg’s offering met the challenge.

Vega has scheduled four additional launches beyond the three already done – one in 2014 and three more in 2015. This means that the composite rubber sheet produced in Lodi Vecchio will have gone into orbit seven times by the end of 2015. ■

Vega’s formal commercial launch from the Guiana Space Centre in Kourou, French Guiana. Trelleborg’s contribution, in partnership with Avio, is a composite material that provides thermal protection to parts of all three rocket booster stages. The composite material is made with glass fabric laminated with a special rubber sheet designed to

THE GUIANA SPACE CENTRE

More commonly known as the *Centre spatial guyanais (CSG)*, the Guiana Space center is a French and European spaceport near Kourou in French Guiana. Operational since 1968, it fulfills the two major geographical requirements for a spaceport:

1. Quite close to the equator, so that the spinning earth can impart some extra velocity to the rockets for free when launched eastward.
2. Uninhabited territory (in this case, open sea) to the east, so that lower stages of rockets and debris from launch failures cannot fall on human habitation.

The European Space Agency (ESA), the French space agency CNES (National Centre for Space Studies), and the commercial Arianespace company conduct launches from Kourou.

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