Payload fairing of the Ariane 5 launcher made from Basotect®

Case Study

BASF foam in the payload fairing of the Ariane 5 launcher

The Ariane 5 launcher, which delivers satellites into space under the responsibility of the European Space Agency ESA, is now making use of Basotect®. The Swiss company Contraves Space AG employs this BASF melamine resin foam in the payload fairing at the top of the rocket in order to protect the sensitive satellites against the high sound pressure to which the launcher is exposed during lift-off. The decisive factors for the use of this thermoset material include three of its properties: this lightweight foam (9 g/l) has a high sound-absorbing capacity and its low density makes it very flexible. A first Ariane test flight with this material has shown that Basotect® performs well meeting the exacting requirements of space flights in this particular configuration.

Specific network structure

Owing to its open-cell structure consisting of very thin filaments, Basotect® is instrumental in reducing the high vibration frequency and thus lowering the sound pressure during the first stage of flight. After having left the earth atmosphere, when no sound pressure can damage the satellite being transported, the payload fairing is separated at an altitude of approximately 110 km. The filigree network structure of Basotect® also accounts for the high elasticity of the material, which is hard and brittle by nature. Thus, on each launcher the foil-coated Basotect® plates are mounted so as to precisely match the conically shaped inside of the payload fairing. The foam retains its flexibility without becoming brittle, even when exposed to high as well as low temperatures ranging from + 200 °C to - 200 °C. Another factor is the favorable combination of chemical and mechanical properties such as high resistance to chemicals and safe burning behavior.

Comprehensive material tests

The development phase, starting with the material selection and qualification testing, going all the way to production, took about one year. “The raw material passed our comprehensive test programme and demonstrates consistent behaviour during on-going production testing. An on-site visit at BASF established that BASF can reliably and flexibly deliver the raw material at a constant level of high quality,” explains Joseph Moran, manager technology R & D at Contraves Space. This Swiss company is the world leader in the design, development and manufacture of payload fairings for launchers in composite technology. It built its first fairing in 1979 for the first European launch system, the Ariane 1. Since then, approximately 175 Ariane rockets with payload fairings made by Contraves Space have taken off from the space port Kourou in French Guiana (on the north-eastern coast of South America) with outer space as their destination.