Case Study: Battery Bag

Morgan Advanced Materials and German Wings
The challenge

German Wings were looking for a solution to combat the issues that come with the transportation of lithium-based batteries on civil aircraft.

These batteries are generally reliable; one issue with them is their ability, in a small number of cases, to overheat and catch fire. While this may be less of an issue and more easily contained in land-based environments or other modes of transport, the prospect of a fire is something which simply cannot be countenanced in the enclosed space of an aircraft, which may be carrying several hundred passengers, as well as crew.

These batteries are subject to the problem of thermal runaway. This can be defined as auto-acceleration of heat generation, with a rapid temperature increase, characterised by the expulsion of flammable gases and liquids from the product casing. Put simply, just one battery overheating can result in a matter of a few minutes in an uncontrollable fire, explosion or pressure wave - or even all three. A number of very serious incidents have occurred over the years, bringing them to the attention of international aviation authorities who have taken strong measures to increase the safety surrounding their transportation as cargo.

However, these batteries are still carried by thousands of passengers and with their propensity to overheat, they pose a constant danger.

The key challenge is to prevent propagation between cells, modules, packaging and surroundings – on an aircraft, the aim is to extend the time available for emergency measures to be employed and for safe landing to occur.

Why German Wings partnered with Morgan

Morgan Advanced had the innovative solution to the issues associated with the lithium batteries that German Wings was looking for. Morgan’s expertise in the area of high-performance insulation to prevent the spread of thermal energy is globally renowned, not least in the supply of materials used to encapsulate flight data recorder FDR and cockpit voice recorder (CVR) products, and perhaps even more so in the Oil & Gas sector where its FireMaster® Marine Plus Blanket used to surround the living quarters in offshore extraction facilities, protecting the structure to allow sufficient time for those working on the rig to escape in case of a fire outbreak.

“Morgan’s expertise in the high-performance insulation is globally renowned”
Recognising the problems associated with overheating batteries and the need to minimise fire risk and provide insulation to contain heat spread, Morgan set out to harness the capabilities of its extensive range of state-of-the-art insulation technologies to develop a solution.

Working in partnership with German Wings, various configurations and combinations of Morgan’s material range were examined and considered to contain heat and fire, minimise further fire risk and counter the issue of heat transfer.

The result was the battery bag solution. The ideal bag solution uses at its core the same product—FireMaster Marine Plus blanket, which is typically used to protect FRP composite, steel and aluminium structures for extended periods.

The outer layer comprises a silicone-coated glass cloth and hook-and-loop tape fastener to secure the bag once the contents had been placed inside. The materials have been chosen to maintain their integrity even when they come into contact with water, which can be added immediately to help cool down the overheated battery.

The bags have been extensively tested together with Germanwings, which is part of the Lufthansa group.
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