



MAIN AND RIGHT: The range of Cellobond phenolic resins is used to make parts meeting EN 45545 HL3, required for European trains travelling underground



Safe investment

POTENTIAL APPLICATIONS

There are numerous ways in which Cellobond resins can be manufactured and deployed. Inside train cars, Cellobond resins have been used to form parts for ceilings, floors, side panels, window surrounds, standbacks, luggage racks, drivers' desks, toilet modules and heat shields. Externally they have long been used for train fronts, roofs and doors.

The Cellobond resins are suitable for a wide range of manufacturing methods, including vacuum infusion, resin transfer molding, hand lay-up, compression molding, hot press molding and pultrusion.

advantages over polyester systems. "Phenolics are intrinsically fire retardant – they do not need fillers, fire retardancy treatments or intumescent gel coats to meet the most demanding standards, such as EN 45545 HL3," she says. "This means fire safety is always ensured, whatever manufacturing process is used. By contrast, highly filled polyester systems require intumescent gel coats and more fire-resistant painting systems to pass the most demanding FST requirements. In addition, filled polyester systems present difficulties in resin transfer molding or vacuum infusion because the formed parts may not have uniform fire retardancy and are not cost-competitive."

The Cellobond product line is used in applications where fire safety is a priority. Hexion holds approvals for the product in the aerospace interior, building and automotive markets. The range has passed demanding fire tests for new applications in electric vehicles. Frattini says Cellobond resins also provide sustainability benefits through their light weight, which reduces energy/fuel consumption. She says that compared with highly filled resin systems, phenolic resin-based composites can be 10% lighter or more.

Recent upgrades

The parts on display at InnoTrans will showcase Hexion's ULF technology, a recent development made to address concerns in the industry regarding the use of formaldehyde. "With all our resins,

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Sara Frattini, Hexion

The Cellobond product range is used to create EN 45545 HL3-compliant lightweight composites, and was recently improved to minimize formaldehyde and improve manufacturing efficiency

At InnoTrans 2018, to be held in Berlin, Germany, on September 18-21, 2018, Hexion will present two product ranges, showcasing the breadth of its expertise as a supplier of materials for the rail industry. First, it will launch the Bakelite product portfolio for brake systems. Hexion's Bakelite resins are used to manufacture friction products for rail braking systems to meet upcoming European regulation intended to reduce noise while improving safety and wear performance.

The company will also showcase new parts from Siemens and Hitachi Rail that were manufactured from its new Cellobond ultra-low free (ULF) formaldehyde phenolic resins and gel coat to comply with the European EN 45545 HL3 fire, smoke and toxicity (FST) standard.

Fire retardancy

The range of Cellobond resins is used to make composite parts for inside and outside railcars. Sara Frattini, global market segment leader at Hexion, says that this phenolic range has many



RIGHT: A toilet module part created by Alte Technologies from Hexion's Cellobond ULF resin



LEFT: Cellobond resins have been used to create parts used on London Underground train cars



RIGHT: Alte Technologies has adopted Cellobond ULF resin to make all its toilet modules

the free formaldehyde content is now below 0.1%," says Bernd Wellhaus, European sales director at Hexion. "In 2017 Composites UK gave us the Health and Safety award in recognition of quantifiable improvements that go beyond the legal requirements."

Hexion has also recently expanded its portfolio of ultra-low free formaldehyde emitting Cellobond resin products to include a cost-saving gel coat and fast-drying pre-preg resin. Cellobond ULF GC84-500, a gel coat based on ULF phenolic technology, allows direct painting on composite parts without surface preparation, which Wellhaus says saves up to 30% production time compared with before. A further product, Cellobond ULF PS90-204, is a pre-preg resin designed to deliver faster drying speeds. As with the rest of the Cellobond product portfolio, Cellobond ULF GC84-500 and Cellobond ULF PS90-204 have been designed to meet the most demanding fire safety standards, including EN 45545 HL3 for trains and FAR 25.853 for aircraft.

Happy customers

One recent Cellobond product convert is Alte Technologies of Parets del Vallés, Spain, which adopted Cellobond ULF resins for the manufacture of toilet modules on all its new projects – including for the NS Sprinter Lighttrain in the Netherlands, and for Greater Anglia and South Western Railway in the UK.

Cellobond resin technology was new to Alte and a period of adaptation was required for staff. One of the differences, for example, is that the surface paste is different from the one Alte had been using, and a pigment had to be added. However, Alte reported that Cellobond ULF resin technology enabled it to meet demanding fire and smoke standards and ensure a safe process for its staff. Alte has had positive feedback from its customers and intends to continue using Cellobond ULF resins, saying the advantages are remarkable compared with the technologies previously used.

Another customer, FTI in the UK, chose Cellobond ULF J6021 X01 for its FibaRoll PH SMC (sheet molding compound), used to mold parts according to London Underground's S-1085 specifications. FibaRoll PH SMC has been developed for use in compression molding where fast, high-volume processing is required. It met and exceeded the FST requirements for London Underground and also passed British Standard BS6853 and EN 45545 HL3. FTI reports that the parts had an excellent surface finish straight out of the mold, minimizing the amount of finishing required prior to painting.

Meanwhile Datum, a UK supplier of composites, uses client-approved phenolic resins for manufacturing cabs, passenger information screen covers, universally accessible toilet modules and valances for UK train projects including the Elizabeth Line, London Overground and Greater Anglia. The company uses a variety of methods, including hand lay-up, compression molding, hot press molding and vacuum bagging.

Cellobond resins were selected to meet stringent British fire requirements, and for their reliability and proven performance in service. Datum says that phenolic resins are a stable material and suffer no shrinkage in service, are unlikely to distort on hot days, also making them ideal for insulation and exhaust shielding. ☺

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