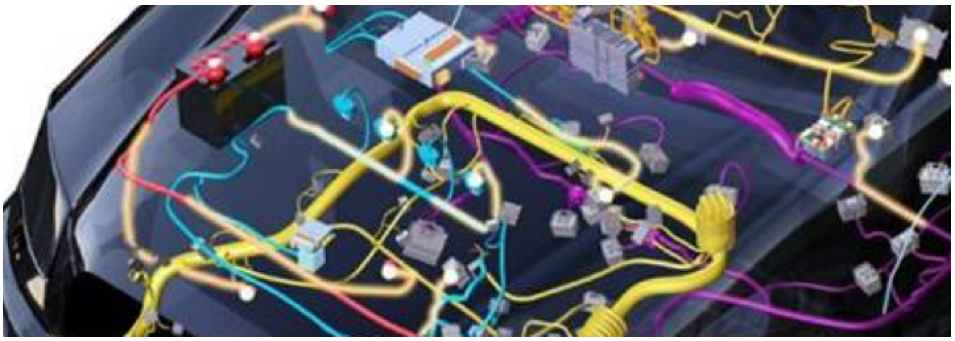
CASE STUDY

Celanese

HIGH PERFORMANCE OF CELANESE ZYTEL® PA PLUS MAKES IT THE TOP PICK FOR TE CONNECTIVITY AUTOMOTIVE ELECTRICAL HIGH PERFORMANCE CONNECTORS



PROJECT

When Celanese and TE Connectivity (TE) teamed up to create a connector for automotive electric and data systems, they knew the product had to be robust and reliable. TE products connect almost every electrical function in cars — from alternative power systems to infotainment and sensor technologies. In addition to carrying out its primary function—to connect wires and retain contact— the connector must also withstand the high-temperature environment of a combustion engine and deliver long-term performance over the life of the vehicle.

CHALLENGES

HARSH ENVIRONMENT

TE required a resin for connectors designed to perform in harsh environments close to the combustion engine where snap fits may be exposed to:

- aggressive chemicals
- sprays of water
- temperatures > 180°C

CHEMICAL RESISTANCE

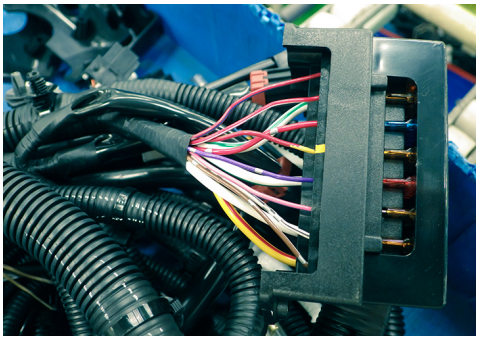
OEMs require resistance against typical automotive fluids according to the automotive connector test standards, including technical requirements with the former norm LV214.

ELECTRICAL AND FLAMMABILITY PROPERTIES

Connectors must provide good electrical tracking and insulation resistance as well as flammability properties according to FMVSS302 and UL94-Class HB requirements for performance and safety.

SOLUTION

Celanese Zytel® PA PLUS was selected to meet these challenges. Following several heavy test runs, executed jointly by Celanese and TE, Zytel® PA PLUS demonstrated 1,000 hours of high performance at 180° C and higher peak temperatures. Previously used resins performed up to 150° C.



The close and long-standing collaboration with TE Connectivitiy led to the success of this project -- the first time Celanese Zytel® PA PLUS was used for an automotive connector.

SHIELD TECHNOLOGY FOR BETTER PERFORMANCE

Celanese Zytel® PA PLUS nylon resin was developed with Celanese's unique SHIELD Technology to enhance the heat-aging performance of resins. It allows TE to make connectors that balance toughness with stiffness and demonstrate:

- high mechanical strength
- high-temperature performance
- good electrical (tracking/insulation resistance)
- good flammability properties
- superior chemical resistance

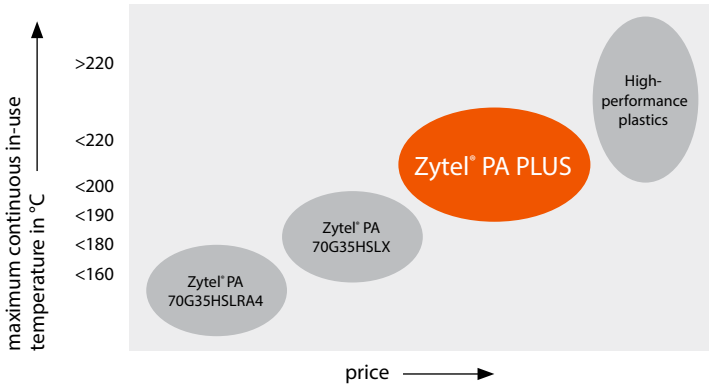
Celanese Zytel® PA PLUS also adds value because it is available as Electrically Friendly (EF) material. Its low-halide content, due to the organic heat stabilization and additive system, improves reliability in electronic components.

COLLABORATION PAYOFF

The collaboration between Celanese and the TE Automotive - Platform Engineering Elements (PEE) and Customer Engineering Teams in EMEA, to create a connector that is proven to perform in the harshest environments, reflects the commitment by both companies to develop innovative solutions.

"Our relationship with Celanese goes back decades. We know we can count on them to share their expertise, know-how, and commitment to finding a solution that meets our challenges best," says Franz Janson, Principal Product Development Engineer for TE's PEE Global Resin Material Platform, leading global resin selection and release processes.

The development of a resin formula using Celanese Zytel® PA PLUS for automotive connectors has allowed TE to extend it's entire connector portfolio for harsh environments. These new products help position the company to expand its market and increase profitability.



New Celanese Zytel® PA PLUS polyamide provides high performance at a lower price compared to high-temperature polyamides (PPAs) and other high-performance thermoplastics.

CELANESE ZYTEL® PA PLUS PERFORMANCE DATA

Celanese Zytel® PA PLUS nylon gets its ability to withstand long term exposure to heat and chemicals from SHIELD Technology available only from Celanese.

By combining several innovations, including polymer modifications and a special set of additives to enhance many performance characteristics, Celanese Zytel® PA PLUS can:

- withstand longer periods of exposure to hot air vs. standard nylon
- withstand significantly higher temperatures than standard nylon
- withstand more than 3,000 hours exposure to hot oil and 3,000 hours exposure to hot automotive coolant
- last 2 to 3 times longer than other nylons (PA66) exposed to aggressive chemicals—such as road salt—and hot environments
- retain most of its weld strength after 1,000 hours at 210° C, while traditional materials have dropped to almost zero.

These improvements are achieved while maintaining excellent processability and delivering superior surface aesthetics.

Form No. 001-20012-HMC0123