Edited by ***Ryan Gehm***

Benecke-Kaliko compact film adorns C-Class IP

The new **Mercedes-Benz** C-Class lineup incorporates a host of material technologies from **Benecke-Kaliko**, a company in the **ContiTech** family. Those products include TEPEO2 compact film for the center console, TEPEO expanded vinyl for the door trim, and ROY PVC (polyvinyl chloride) expanded leatherette for the seats.

ContiTech

Benecke-Kaliko's TEPEO2 compact film provides for optimum grain strength and homogeneity across the entire component surface. The technology appears on the instrument panel of the new Mercedes-Benz C-Class.

The new TEPEO2 compact film for instrument panels is said to demonstrate Benecke-Kaliko's development competence and market leadership in the area of film and surface materials. "TEPEO2 exhibits a number of advantages over slush skins," explained Eberhard Rost, Product Developer at Benecke-Kaliko, claimed to be the sole manufacturer of this type of technology. "These advantages noticeably enhance the high-value impression conveyed by the automotive interior and underscore our competence as regards creative design, materials, and process technologies."

Surface materials are a key factor in passenger compartment comfort, and homogeneous and durable grain structures enhance the ambience of a vehicle interior. According to Benecke-Kaliko, slush skins used to be the only way to create instrument panels with the appearance of flawless workmanship. With a temperature range of 25°C (45°F), TEPEO2 film widens the processing window and facilitates shaping in the deep-drawing process. As a result, TEPEO2 provides for optimum grain strength and homogeneity across the entire component surface, says the supplier. The grain structure remains intact even in areas where it is otherwise highly prone to distortion—for instance, in the scooping and surface contouring on instrument panels.

Other stated advantages of the TEPEO2 film technology compared to slush skins are shorter development times, along with better color coordination, grain design, and haptic quality. Attractive patterns are obtainable employing laser engraving and leather simulation technology. In addition, TEPEO2 is said to meet the automotive industry's demand for a halogen-free, lightweight product that does not pollute when thermally recycled.

"[Customers] can still use their established processing technologies and don't have to invest in expensive new processes just for this material," noted Rost.

ContiTech multiple-ribbed V-belts, fuel management system diaphragms, and steering boots are also found in the new C-Class. With its long service life and temperature stability over a range from -30 to +80°C (-22 to +176°F), ContiTech's multiple-V-ribbed belt offers high power transmission and enhanced pliancy, and no retensioning is required in the case of serpentine drives, according to the company.

The steering gear boots are from the ContiTech Vibration Control business unit, while the fuel management diaphragms come from ContiTech Elastomer Coatings.

Beyond this, **Continental** manufactures the tire models ContiPremium Contact 2 and ContiSport Contact 3 in sizes 16, 17, and 18 in. for the new C-Class. These tires are approved for speeds of up to 300 km/h (186 mph). Safety and riding-comfort systems supplied by Continental's Automotive Systems division include the electronic stability control system, the continuous damper control device, and the door control unit as well as brake boosters, brake hoses, and brake calipers. The U.S. version of the C-Class also contains a telematics unit from Continental.

Ryan Gehm

Emissions requirements drive shift to thermoset truck parts

For components facing a long, hard existence in the engine compartments of heavy trucks, the material choice has often been some type of metal. But metal components can add a lot of weight to truck designs, which is a major concern at a time of rapidly rising fuel costs. What's more, metal components have a greater impact now that the U.S. **EPA** has introduced new restrictions on diesel-engine emissions.

Many designers of under-the-hood truck components are switching from metals to thermoset composite materials. Thermosets meet all the requirements of under-the-hood applications but are much lighter than metal alternatives, making it easier for designers to comply with the new emissions standards without adding weight. Thermosets can also handle the higher engine-compartment temperatures that result from compliance with the standards. And, as an added bonus, the materials provide excellent corrosion-resistance properties and slash the time and costs involved in manufacturing under-the-hood components.

In the heavy-truck industry, SMC provides strength and durability for under-the-hood components such as oil drain pans, heat and noise shields, and valve and timing chain covers.

Composite materials consist of glass-fiber reinforcement in a polymer resin. Two common thermosets are bulk molding compound (BMC) and sheet molding com-

pound (SMC). SMC includes more reinforcement and longer glass fibers than BMC, so it provides higher mechanical strength than its thermoset counterpart. Suitable for the demanding service conditions in heavy trucks, SMC provides at least as much impact resistance as steel and up to four times as much as BMC.

In the heavy-truck industry, SMC provides strength and durability for under-the-hood components such as oil drain pans, heat and noise shields, and valve and timing chain covers. And it maintains excellent strength during prolonged exposure to high temperatures. This has become more important with the advent of more-stringent EPA diesel-engine emissions requirements, which make heavy-truck engines run at higher temperatures.

Truck designers also prefer SMC because it offers a higher strength-to-weight ratio than steel and most other metals. As a result, SMC components are typically 25-35% lighter than steel parts of equal strength. Because SMC is lighter than metal alternatives, it offsets some of the additional engine weight introduced by the EPA emissions requirements, and therefore reduces the fuel consumption of heavy trucks. Class 8 trucks must now carry an additional 300-500 lb (136-227 kg) of emissions-reducing equipment to comply with new EPA standards.

Besides adding to vehicle weight, the new emissions equipment adds $5000-7000 to the cost of a heavy truck. With designers looking to offset these higher costs, SMC is even more attractive when compared to metals, which have become much more expensive in recent years.

SMC lowers costs in other ways as well. In metal manufacturing, complex designs may require components consisting of multiple parts that are made separately and then assembled to create the final product. But by using SMC, manufacturers can mold many features into a component in a single step. This consolidation of multiple parts into one can significantly reduce manufacturing costs, as well as shorten design and production time.

Manufacturing expenses are also lowered by the switch to composite tooling, which costs less than half as much as steel stamping tooling. Less-expensive tooling has a particularly significant impact on the overall cost of products made in low-volume processes, such as those typically used to manufacture under-the-hood truck components.

Parts have to meet a formidable list of requirements to assure their survival and success under the hoods of heavy trucks. Besides handling a combination of mechanical stresses, under-the-hood components must withstand exposure to harsh environments for projected truck lifetimes measured in decades rather than years.

Unlike metals, which are notoriously susceptible to corrosion, SMC will not rust or corrode when used in harsh environments. Without a protective coating of paint, thermoset material provides superior resistance to gasoline, motor oil, coolants, lubricants, automatic transmission fluid, cleaning agents, and water with a wide range of pH values. SMC also maintains its chemical resistance for the entire life span of the truck.

Another advantage of SMC is its ability to reduce engine noise. Tests show that the internal damping of the thermoset is 10 times that of steel and aluminum. Superior damping means that under-the-hood component designers who switch to SMC can expect 10-15% reductions in engine noise levels.

SMC is also dimensionally stable, which minimizes warping and thereby helps parts maintain flat mounting surfaces. This allows SMC components to provide better oil sealing, which helps allay warranty-related concerns of truck makers.

Featuring light weight and long-term resistance to high temperatures, SMC helps heavy-truck designers meet stringent new emissions requirements. SMC also provides superior physical properties and reduces manufacturing complexity and costs. Thus, SMC is an increasingly popular alternative to metals among those seeking to improve the design, manufacture, and performance of under-the-hood truck components.

Gary Littell, Applications Development Engineer at IDI Composites International, wrote this article for *AEI*.