Fast Cycle Times – Cost-Effective Injection Molding

Chicago, IL – June 19, 2006 – Polyamide assemblies with an additional sealing function are increasingly being used in the engine compartment. Some examples are oil pans, intake pipes, and valve covers. These assemblies all need to cope with the tough conditions such as high temperatures under the hood and ideally they should function reliably and remain free of leaks for the lifetime of the car. A joint project between the LANXESS Semi-Crystalline Products and Technical Rubber Products Business Units has resulted in the development of a new hard/soft composite that not only withstands the rigorous demands made on such components in the engine compartment, but can also be injection-molded extremely cost-effectively. “The composite is based on special grades of Durethan® polyamide, serving as the hard engineering thermoplastic, and a variant of Therban® hydrogenated nitrile butadiene rubber (HNBR) as the elastomer component,” explains Maik Schulte, a Customer Engineering Service specialist in the Semi-Crystalline Products Business Unit.

The high-performance components enable an efficient manufacturing process. The thermoplastic component can be manufactured with an integrated elastomer seal in just one production step using multi-component technology. “Multi-functional components can be manufactured cost-effectively with fast cycle times, which is a first for this material combination,” says Dr. Dirk Achten, a chemist in the Technical Rubber Products Business Unit. Fast cycle times are crucial for profitable production when working with high machine-hour rates. If the parts have a material component that requires thermal crosslinking, the cycle time is primarily dependent on the crosslinking time. “Our developments aim to achieve cycle times similar to thermoplastic component cycle times,” says Achten.

Components such as oil pans can be produced cost effectively in a single operation by two-component injection molding. Just one mold and one machine are required. Two-component injection molding involves thermoplastic and rubber being injected successively into e.g. a turntable mold, thus forming a strong composite. There is no need for complex manual operations, such as inserting or gluing components, which improves the quality and cost-effectiveness of the process and reduces the risk of waste.

The strength of the composite plays a key role alongside the excellent properties of the individual components, such as the high impact and heat resistance of the Durethan® grade and the chemical resistance to aging of the Therban® grade, for example. The two resins developed by LANXESS are optimally integrated and form a reliable adhesive bond. Various tests such as tightness analyses were performed directly on media containers to evaluate how well the component was functioning. These included burst pressure tests at room temperature. The thermoplastic component
displayed excellent material behavior in terms of elongation when subjected to internal pressure. The impressive sealing qualities of the elastomer component were confirmed by determining the compression set after long-term alternating temperature tests up to 150°C (302°F).

As well as the materials, LANXESS provides comprehensive application-specific expertise on two-component injection molding. “We provide our customers with everything from a single source, including rheological examinations for optimum design of the injection molds and simulative observations of component behavior,” explains Schulte.

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