Case Study

Tubes with soft segments

Figure 1 Blow molded tube

Grade: Durethan® BC 700 HTS

The new Durethan BC 700 HTS from specialty chemicals group LANXESS is an exceptionally soft polyamide 6. It has an elasticity modulus of only 210 MPa (conditioned). This non-reinforced material is perfect for manufacturing charge air tubes with integrated bellows as a single-material solution using extrusion blow molding. This gives processors a cost-effective alternative to sequential coextrusion involving two polyamides of differing hardness, which is more time-consuming and sensitive in terms of the process employed. The new material is so soft that it also has excellent sealing properties. This made it possible for prototype charge air tubes made from it to be flangemounted to charge air coolers and air intake manifolds using just one bracket without leaks occurring. The need for additional sealing rings was thus eliminated.

Under the hood there is a trend towards supercharged engines with exhaust gas recirculation to cut fuel consumption and thus CO_2 emissions. Charge air tubes with integrated bellows compensate for the relative movements of these engines and assembly tolerances. As a result of exhaust gas recirculation, the charge air tubes need to be highly resistant to exhaust gas / blow-by gas condensates. LANXESS therefore conducted appropriate tests using the new polyamide 6 grade in accordance with the OEM testing regulations. These showed that the material is more resistant to oils, fuels and acidic condensates than thermoplastic polyester elastomers and elastomer block copolyamides, which are also used for blow molding charge air tubes in series production.

Special blends of polyamide and polyolefins are also frequently used for flexible blow molding tubes. However, compared to Durethan BC 700 HTS, these materials exhibit much lower thermal aging stability, which is also the case with polyester elastomers. This gives Durethan BC 700 HTS the edge over these rival materials in at least one key property.

The new material has already been successfully trialed on series molds for charge air tubes with several customers, confirming its excellent processing properties in extrusion blow molding.

One reason for this is its high melt stiffness, which ensures the extruded parison barely sags under its own weight. Durethan BC 700 HTS can therefore be blow molded within a wide processing window in a stable process.

The new polyamide 6 grade is also ideal for injection molding of components with very strict toughness requirements and has already been successfully tested on series molds. It can be used, for example, to injection mold multi-flexible hose connections.

LANXESS boasts a wide product portfolio of high-viscosity and heat-stabilized polyamide 6 and 66 grades for blow molding air-ducting hollow components in engine compartments. It includes both non-reinforced and filled materials with glass fiber contents of 15 and 25 percent. The “range of hardnesses” extends from very soft grades such as Durethan BC 700 HTS to hard polyamides with an elasticity modulus of 5,300 MPa (conditioned).

Material grades for cooling circuit tubes that are particularly resistant to hydrolysis are also part of the range. Detailed information on the product range for blow molding can be found at www.durethan.com.