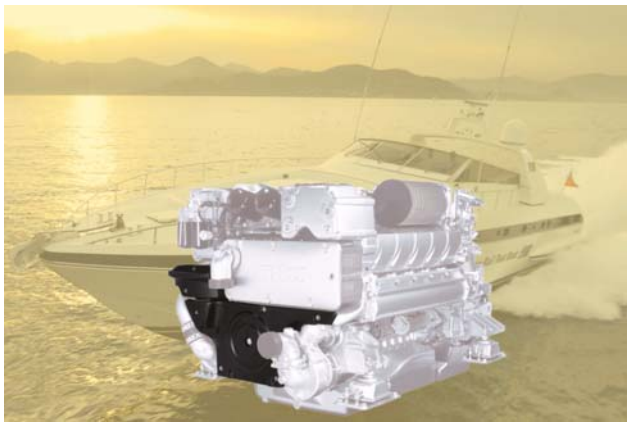
Case Study

Covers for ships' engines:

Thermoforming of polyamide 6 semi-finished products made of Durethan® BKV 315 Z H2.0



Material:	Durethan® BKV 315 Z H2.0
Producer:	Reiss Kunststofftechnik GmbH, Sustaplast KG
OEM:	MTU Friedrichshafen GmbH

Figure 1 Thermoform from Durethan® BKV 315 Z H2.0

Glass fiber-reinforced polyamide 6 (PA 6) can also be processed using thermoforming techniques, as shown by various protective covers for ships' engines manufactured by MTU Friedrichshafen GmbH. Reiss Kunststofftechnik GmbH based in Tettnang, Germany makes the covers from SUSTAVACU® 6 GF semi-finished products. These sheets are among the first thermoformable semi-finished products made of polyamide 6 available on the market. They are manufactured by Sustaplast KG, Lahnstein, Germany, and consist of Durethan BKV 315 Z H2.0 from LANXESS. Their high heat resistance compared with standard thermoformed materials was one of the features that made them particularly useful for ships' engines. Furthermore, vacuum thermoforming is the most cost-effective solution for this application. Compared with injection molding, molds can be built for a fraction of the cost – particularly when large components are to be produced.

Another reason for using PA 6 semi-finished products is their high tensile strength and stiffness. Their stiffness allows the walls to be made thinner than is possible with other thermoformed materials. Although the engine covers are large, dimensional stability is high and warpage minimal. They are also highly resistant to breakage because the PA 6 has been modified for impact resistance. Along with their low weight, this is an important factor in withstanding the high dynamic loads caused by engine vibration. Thanks to the high heat resistance of PA 6, the cover components can withstand continuous working temperatures of 140 °C with short-term temperature peaks of 170 °C. For use in the engine room, they also have the necessary resistance to oil, grease, diesel fuel and many other chemicals typically found on board ships.

The engine covers partially replace earlier sheet metal structures. The largest cover component is 920 mm long, 400 mm wide and weighs 1.25 kg. Like the other parts, it is manufactured from five-millimeter-thick sheets in a thermoforming ratio of 1:2.5.

The Durethan BKV 315 Z H2.0 used to manufacture the semi-finished products is a branched PA 6 with high pseudoplasticity, reinforced with 15 percent by weight glass fibers. This ensures a high melt stiffness which allows the sheets to be thermoformed.

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Unless specified to the contrary, the values given have been established on standardized test specimens at room temperature. The figures should be regarded as guide values only and not as binding minimum values. Kindly note that, under certain conditions, the properties can be affected to a considerable extent by the design of the mold/die, the processing conditions and the coloring.

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