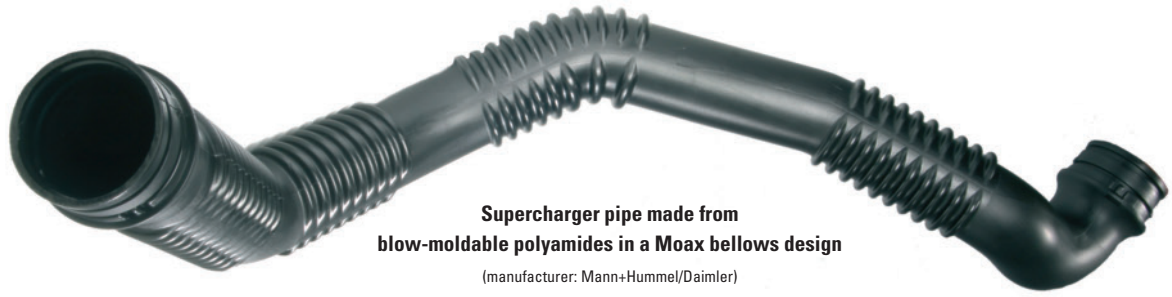
Blow Molded Supercharger Pipe. It is now hard to imagine any engine compartment without polyamides. Specially blow molded supercharger pipes made from this engineering plastic account here for a significant proportion. In order that such pipes can be produced more reliably in the process the oil used hitherto as lubricant in the mold has been replaced by a specially developed surface modification.

Process Quality Improved



Supercharger pipe made from blow-moldable polyamides in a Moax bellows design
(manufacturer: Mann+Hummel/Daimler)

RALPH KETTL

Vehicle engines are becoming ever smaller. Reasons for this include, on the one hand, weight reduction and buyers' growing awareness of the environment and costs. For this reason turbosuperchargers have been employed to date – especially in diesel engines. But even in the case of gasoline engines size is increasingly playing an important role and even there the use of a turbosupercharger is now steadily becoming more accepted. An example of this is the 1.4 l TSI engine recently launched on the market by Volkswagen.

By substituting metals in turbosuperchargers polyamides have already been contributing for many years to weight reduction under the hood. Examples of this include injection molded parts such as throttle bodies or the supercharger intercooler end cap made from the highly heat resistant polyamide Grilon TSG-35/4W (Fig. 1). However, not only in injection molding, but also in blow molding can parts made of metal be substituted by suitable polyamides. For many years now Grilon products from Ems-Grivory, Domat/Ems, Switzerland, have been used in air intake systems (see ***Kunststoffe*** international 08/2001). The polyamide specially developed for blow molding exhibits in comparison with polyester up to 50 % more rigidity at high temperatures. Due to lower wall thicknesses this in turn allows the pipes to be substantially lower in weight by up to 50 %.

The sequential blow molding of a bellows joint (Moax design) using rigid and flexible materials also allows the parts weight of supercharger pipes to be reduced by up to 30 % due to substitution of rubber and metal. Costs fall by up to 20 %.

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Heat Aging Properties

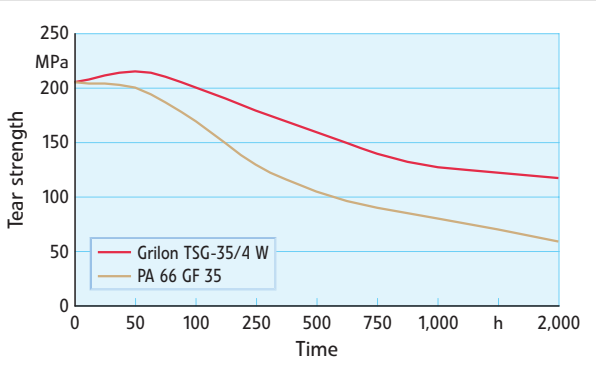

Fig. 1. Heat aging properties (200°C) of the highly heat-stabilized polyamide Grilon TSG-35/4W in comparison with a standard product

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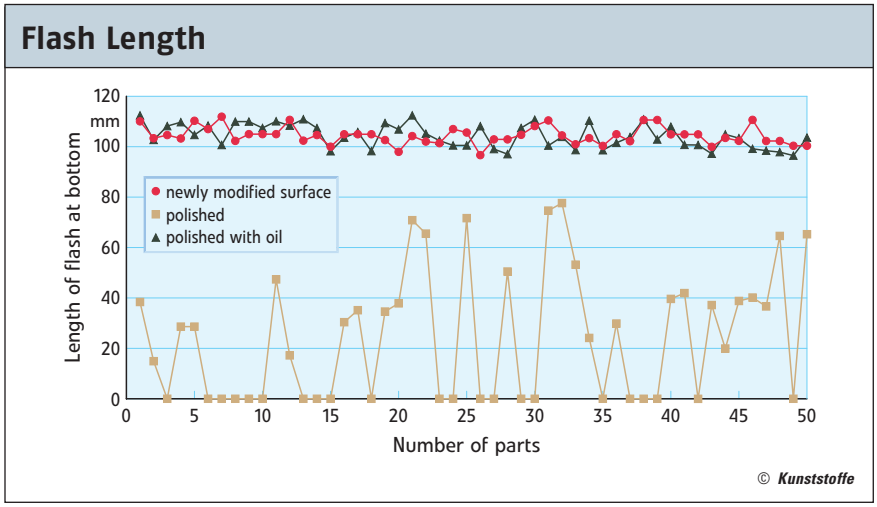

Fig. 2. Illustration of flash length for different surfaces and with oil (material: polyamide Grilon ELX 50H NZ sw. 9210)

Modified Surface instead of Oil

Air intake pipes are frequently manufactured by the suction blow molding process. In suction blow molding technology the parison is sucked through the mold by means of suction air. In doing so the parison seeks the shortest path, i.e. in the curves the parison rests on the inside curve on the mold and slides over the surface of the mold. In order that the complex geometries can be produced more reliably oil is frequently used as lubricant so that the parison slips more easily through the mold. The use of lubricants, however, is associated with disadvantages. Here thought was given to an improvement.

The solution was found in the surface of the blow mold. In the course of a study of the process the surface of the mold was modified. This allowed clean and reliable production of blow molded pipes without the use of oil spray. Figure 2 presents the test results. With a polished mold surface great variation in the length of the lower blow molding flash can be seen (flash is excess material found at the parting line of a molded product. It is typically caused by leakage of the material between the two surfaces of a mold). When the parison is too short it could also occur that the value fell to 0 because the parison could not be blown up. With the aid of a polished surface produced by oil spray a constant process or a constant flash length could be achieved. The modification of the mold – and the surface newly developed by this means – finally gave rise to the same process constancy or constancy of the flash length, but now without oil spray.

The trial described here was carried out with a flexible polyamide (Grilon ELX 50 HNZ). The same improvement was also achieved with unreinforced polyamide (Grilon EB 50 H) and polyamide reinforced with 15 % glass fibers (Grilon EBV-15H). ■

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