

# News Release



## Stays cool even when it's hot

- **Charge air duct by MANN+HUMMEL made from the BASF high-temperature polyamide Ultramid® Endure BM for blow molding**
- **Now in serial production in the BMW 2.0 liter four-cylinder engine with turbocharger**

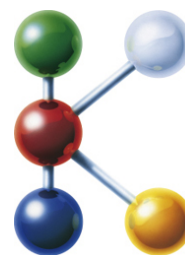
High pressure at high temperatures: Pipes that are exposed to this challenge between the turbocharger and the charge air cooler can best be manufactured by blow molding with the BASF high-temperature polyamide Ultramid® Endure D5G3 BM. This is demonstrated by the new charge air duct which MANN+HUMMEL, Ludwigsburg, has manufactured for the 2.0-liter four-cylinder turbo engine of the BMW Group. The turbocharger with integrated charge air cooler is used in numerous vehicles, e.g. in the BMW 4, 5 and 7 series as well as in the X3, X4 and X5 models of the BMW Group.

With Ultramid® Endure D5G3 BM (BM = blow molding), charge air ducts can be efficiently manufactured by blow molding. The BASF polyamide 66 with 15% glass fibers has a high heat-aging resistance, can be processed easily and shows extraordinary acoustic properties. It is temperature resistant up to 220°C at continuous use, with possible peak temperature loads of up to 240°C. The blow molding type supplements the Ultramid® Endure portfolio for injection molding, which has been successfully established on the market since 2010. Like the injection molding grades, Ultramid® Endure BM obtains its extraordinary heat stabilization through a well-established technology, which suppresses the oxidative attack by atmospheric oxygen. The protection is not limited to the surface, but pervades the material as a

October 14, 2016  
P326/16e  
Dr. Ulla Biernat  
Phone: +49 621 60-42241  
[ulla.biernat@basf.com](mailto:ulla.biernat@basf.com)

### BASF at K 2016

Hall 5, booth C21/D21



[basf.com/k2016](http://basf.com/k2016)

BASF SE  
67056 Ludwigshafen  
Phone: +49 621 60-0  
<http://www.basf.com>  
Communications Performance  
Materials  
Phone: +49 621 60-42241  
Fax: +49 621 60-49497  
[www.plasticsportal.eu](http://www.plasticsportal.eu)  
[www.pu.basf.eu](http://www.pu.basf.eu)

whole.

The tailor-made properties of Ultramid® Endure BM yield numerous benefits for molders and car manufacturers: favorable system costs due to lower processing temperatures, shorter cycle times and reduced energy consumption are combined with a high technical performance, which leads to durable and powerful engines. Thus Ultramid® Endure BM shows a better cost-performance ratio than, for example, polyphenylene sulfide (PPS) or aluminum, from which conventional charge air ducts are manufactured. Within the charge air duct, the charge air pipe guides compressed hot air from the turbocharger into the integrated charge air cooler. Here, pressures higher than 2.5 bar can occur.

With Ultramid® Endure BM, processors save assembly costs and car manufacturers component weight. The high-temperature polyamide can replace pipes made from rolled aluminum sheets. As the tubular sections can no longer be round in the small installation spaces, metal pipes must be manufactured in expensive hydroforming. Pipes made from the BASF material can also be blow-molded into different pipe forms. The interior surface remains smooth here, which leads to reduced air resistance compared to other plastics.

### **Excellent processing: high melt stability, good swelling, simple welding**

For blow molding, the plastic is also required to have a special melt strength and favorable swelling properties. A high melt stability counteracts the length variation of the pipe. The smaller the variation in length, the better suited the product is for suction blow molding. The same applies to pipe swelling: a certain amount of swelling is required, yet too much swelling causes problems when inserting the pipe into the mold. What is more, materials that swell severely tend to expand, which leads to a frusto-conical shape of the pipe. Ultramid® Endure BM, however, remains largely cylindrical. As it also responds well to changes in the processing parameters, corrections can be made easily during the production process.

Ultramid® Endure BM can be welded particularly well with PA66 components using e.g. infrared welding. Components under the hood are often connected with one another by welding. Due to the reduced glass fiber content, the weld line can represent a weak spot, particularly after aging. The innovative stabilization mechanism in Ultramid® Endure BM not only protects the polymer itself, but also strengthens this potential weak spot. The weld lines also withstand continuous operation at high temperatures very well. Even after 1,000 hours at 220°C, there is no sign of any cracking at the joint. The weld line strength remains just as high.

### **Very good acoustic properties**

Acoustics have become a relevant brand factor and are extremely important in the automotive industry. New engine concepts and increasing demands from customers and legislative authorities call for materials that are acoustically advantageous. Ultramid® Endure BM shows excellent damping behavior and is therefore suitable for demanding acoustic requirements. For example, Ultramid® Endure can be used to reduce the production of disturbing airborne noise emitted from the vibrating component surface directly at the source. Depending on the temperature and the level of humidity, the material has damping values which are up to ten times better compared with polyphenylene sulfide.

For more information: [www.ultramid-endure.basf.com](http://www.ultramid-endure.basf.com)

### **BASF at K 2016**

Where your ideas become ideal solutions: BASF at K fair from October 19-26, 2016 in Dusseldorf, Germany, in hall 5, booth C21/D21. You can find all related press releases, photos and further information here: [www.basf.com/k2016](http://www.basf.com/k2016).

### **About BASF's Performance Materials Division**

BASF's Performance Materials division encompasses the entire materials' know-how of BASF regarding innovative, customized plastics under one roof. Globally active in four major industry sectors - transportation, construction, industrial applications and consumer goods – the division has a strong portfolio of products and services combined with a deep understanding of application-oriented system

solutions. Key drivers of profitability and growth are our close collaboration with customers and a clear focus on solutions. Strong capabilities in R&D provide the basis to develop innovative products and applications. In 2015, the Performance Materials division achieved global sales of € 6.7 bn. More information online: [www.performance-materials.basf.com](http://www.performance-materials.basf.com).

### **About BASF**

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. The approximately 112,000 employees in the BASF Group work on contributing to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio is organized into five segments: Chemicals, Performance Products, Functional Materials & Solutions, Agricultural Solutions and Oil & Gas. BASF generated sales of more than €70 billion in 2015. BASF shares are traded on the stock exchanges in Frankfurt (BAS), London (BFA) and Zurich (AN). Further information at [www.basf.com](http://www.basf.com).