

# First company in the EU to produce raw material with great application potential: Deutsche Basalt Faser GmbH

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Whether it's in concrete or as structural components of motor vehicles: thanks to their advantages, basalt fibres that are drawn from volcanic rock are an alternative to conventional raw materials such as glass or carbon fibres. The manufacturing process is now being used in Saxony-Anhalt and was developed in Georgia.

Basalt fibre was appreciated in the former USSR. In the Soviet era, the material which was first manufactured in 1963 at the Academy of Natural Sciences in Tbilisi, the capital of Georgia, was used in space travel, although people were reluctant to talk about it. In 1998, the process for the efficient production of continuously drawn basalt fibres was developed further. "The technology was developed by my grandfather, and my father brought it to Germany in 2008." Georgi Gogoladze has been managing the Georgian-German company Deutsche Basalt Faser GmbH Sangerhausen in Saxony-Anhalt since 2017. The company is the only such company to make the fibres in the EU, and one which therefore fills the niche between glass- and carbon fibre.

## The advantages of a natural product

Although the niche might not continue to exist for so long, the raw material offers "an unbelievable number of application possibilities," as Georgi Gogoladze explains. Compared with glass fibres, to take just one example, basalt fibres have a higher tensile strength. They are corrosion-resistant, have a high chemical resistance, are not respirable, and are therefore harmless to health. They can be used at temperatures between minus 260 and plus 750 degrees Celsius, which even makes them of interest for use in aerospace applications. Their manufacturing requires fewer operations and generates significantly less carbon dioxide. In this respect, the natural product has the lowest CO<sub>2</sub> footprint when compared with conventional mineral fibres. And it is also fully recyclable. "The fibres may be more expensive," says Georgi Gogoladze, "but with increasing production volumes, that will change."

## Versatility of use

The raw material, basalt rock of volcanic origin, is found in 60 percent of the earth. In Sangerhausen, the material is returned to its lava state in melting furnaces at 1,400 degrees Celsius before being drawn into fine filaments through precious metal nozzles. These are 13 micrometres thick. By way of comparison: a human hair is roughly 20 micrometres thick! Above all else, the material is used and processed further in lightweight construction, the construction industry and the automotive industry. As integral fibres, for example. The company developed the method for manufacturing the fibres together two years ago with the TU Dresden. The alkali-resistant fibres are mixed with concrete or used on their own making them an environmentally friendly and resource-saving construction method. This makes the building materials more durable, as the fibres don't suffer from damage, even under extreme conditions, which makes their use of interest in industrial flooring and tunnel constructions. The concrete can also be recycled as building rubble. In contrast to conventional materials such as steel or carbon, basalt fibre can remain in the concrete as a natural product.

## Lower rates of cracking

Geogrid, a biaxial mesh which is woven in variable mesh widths, can also be used for road construction. The tensile strength of the basalt fibre reduces the formation of cracks in the road surface to a minimum. By way of comparison: the tensile strength of basalt fibres is three times higher than that of steel, as well as being four times lighter. In addition: Geogrid expands by 1.5 percent, while conventional plastic reinforcement materials expand by ten percent!

Together with the Fraunhofer Institute for Microstructure of Materials and Systems IMWS in Halle (Saale), Saxony-Anhalt, the company is currently completing research into the use of fibres in plastic reinforcement. "Thermoplastics are particularly interesting for the automotive sector," says Georgi Gogoladze, "when they are used as structural parts in the car body. They achieve a higher impact strength than carbon." Georgi Gogoladze says that the bilateral project is still being researched, and he expects production to start next year. The company is also working on the addition of basalt fibres to brake linings, with a view to cooperating with the automotive industry.

The high temperature resistance of the basalt fibres also makes it of interest as an insulation material. In Sangerhausen, a yarn is produced which is processed into a basalt fleece with the use of fibre-bonded technology. Its fibres are non-combustible, not respirable, and due to their density, just as thermally conductive as conventional products. And it is also thinner: the non-woven material is just eight millimetres thick. Another comparison: rock wool is 60 millimetres thick! This makes its use as an insulating material obvious, as more living space remains with the interior insulation. The fleece is also predestined for use as exterior and roof insulation; it is harmless in terms of moisture absorption and does not rot, not does it produce any toxins in the event of a fire.

## Advantages of the research landscape

Additional products are currently being worked on. "There is a pool of research institutions with which we are working together on projects," explains Georgi Gogoladze. These include Kaiserslautern and Dresden Technical Universities, but also institutes in Saxony-Anhalt, such as the Fraunhofer IMWS Institute. The research landscape in the Central German federal state was one of the location factors in favour of the company's decision to set up in Saxony-Anhalt. This was joined by the central location, the favourable transport connections and the good funding conditions available from the Ministry of Economic Affairs. Deutsche Basalt Faser GmbH has since invested some four million Euros, and 15 employees now work for the company in Sangerhausen. While its sister company in Georgia primarily serves the Asian market, Georgi Gogoladze exports to the Benelux countries, Scandinavia and Eastern Europe. 750 tonnes are sent for delivery each year, with the prospects of this amount increasing also being good. According to Georgi Gogoladze, the company's profile is growing, and he is being approached by interested parties more and more often. "The raw material simply offers excellent potential for use."

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