

Kamenny Vek: the Russian basalt-fibre specialist

Established in 2002 in Dubna (Moscow region, Russia), Kamenny Vek manufactures high quality continuous basalt fibres to offer a broad range of products (direct rovings, assembled rovings, twisted yarns, chopped strands, etc.) and technical solutions for many different applications, such as thermoinsulation, construction industry, automotive parts, windmill blades, friction applications, high-pressure cylinders, and more.

Kamenny Vek has headquarters about 100 kilometres north of Moscow in the town of Dubna, which developed after World War II as the site of one of the world's largest nuclear research institutes. A number of elementary particles were discovered there, including element 105, which was named "dubnium" in honour of the town. Kamenny Vek has production facilities there, and at another site about twenty kilometres away.

Production

The graded basalt rock is loaded onto a conveyor belt and carried to the furnaces. On the way, the rock is rinsed with water and inspected visually for quality by an operator. The rock arrives in the gas furnace, where rocks are melted and then melted basalt enters the electrically heated bushings.

The process is similar to the glass-fibre fabrication process, with two exceptions: 1) the oven receives rock instead of a silica-oxide-flux mixture and 2) the temperature required for basalt is about 300°C higher (1,500°C). It takes 24 hours to melt down and homogenize the basalt. The melted basalt is drawn through a bushing with 400 to 800 holes, and wound by a winder while sizing is applied. The entire fibre fabrication process is fully automated and managed from a control room. Once they have been dried in a drying oven, the fibres are sent to the further processing such as assembling or twisted yarn production, and then packaged for delivery according

to international standards (with product tracking labels for each batch). Kamenny Vek stresses the fact that it uses equipment from the top European and American manufacturers for getting the best performances and to guarantee to its customers consistent high quality of products. The maximum annual output is currently at 2,000 metric tons (MT) and could reach 3,000 - 5,000 MT in 2009-2010 if the economy revives. Kamenny Vek claims to be ready to expand to 15,000 MT/year in 18-24 months if necessary. The company manufactures strands with filament diameters in the 9-21 µm range. Its portfolio consists of rovings, chopped strands, twisted yarns, needle punched mats, nonwoven and woven fabrics. The company is open to collaboration for the manufacture of special design fabrics and braided sleeves.

Main advantages

According to Kamenny Vek, its basalt fibres show 15-20% higher tensile strength and modulus (Figure 1), better chemical resistance, an extended operating temperature range (up to 580°C), and better environmental friendliness and recyclability than regular E-glass, all in a single material – approaching and sometimes outperforming high-strength glasses and other specialty fibres, but at a better price. Continuous basalt fibres are ideally suited for applications requiring high temperatures, chemical resistance, durability, mechanical strength and stiffness, low water absorption or

aesthetic application. Basalt fibres also have better sound insulation properties than glass fibres. They also lose only 20% of their initial strength after exposition under 400°C, while the strength of E-glass under the same conditions drops more than 50%.

+ Main characteristics ...

- Higher mechanical properties than that of the E-glass
- Higher chemical resistance than E-glass in both acidic and basic environments
- Extended temperature range (up to 580°C)
- Environmental friendliness
- Easy recycling/disposal in comparison with glass
- Cost effective material

In Europe, Japan and the United States, fibre-reinforced PP and PE auto parts are often recycled by incineration. The problem with this is that the glass-fibre reinforcement melts and builds up on the bottom of the ovens, which must be shut down for cleaning. In the same conditions, basalt fibre burns down into a fine powder, so the ovens can continue to operate with an extractor. The extracted powder can then be used as a filler for resins or in road materials. Moreover, this powder is a natural material (basalt powder), not a chemical substance as in case with the E-glass. Thus using basalt-fiber reinforced parts instead of the E-glass fibre reinforcement allows car



**AN INTERVIEW WITH
BORIS MISLAVSKY,
PHD,
DIRECTOR OF STRATEGIC
DEVELOPMENT & GLOBAL
MARKETING,
KAMENNY VEK, RUSSIA**

JEC Composites Magazine: Why did Kamenny Vek set up business in Dubna?

BORIS MISLAVSKY: The town was originally a major centre for research in fundamental physics. Military combat aircraft and missiles are also manufactured there. Dubna was an ideal choice for quality production because of the qualified labour there, and its closeness to Moscow. Dubna is also becoming more and more a kind of “Silicon Valley”, creating a real competitive spirit.

JCM: Where do you get the basalt you use?

B. M.: The graded rock is delivered to us by truck from the Ukraine. We also have a site in Russia where the composition of the basalt is the same as the Ukrainian basalt, which guarantees our supply and also a consistent quality.

producers effectively meet strict end-of life requirements.

Applications

Further processing of basalt fibres does not require special equipment or technologies. All existing processes including weaving, pultrusion, filament winding, etc... can be used, also basalt fibres are compatible with most types of resins. Basalt fibres have a combination of properties that enables their use as a replacement for asbestos, standard E-glass and high-strength glass, silica, chemical-resistant glass and other special fibres in many applications. There are also a number of applications where basalt fibres may be the best material, due to their unique combination of physical and chemical properties. Applications for Kamenny Vek’s products include high-pressure vessels, tanks and cylinders, load-bearing profiles, windmill blades, boats, SMC/BMC parts for the automotive industry, car muffler fillers, concrete reinforcement, friction materials, thermoinsulation, industrial filters and many more.

For windmill blades, Kamenny Vek high-

JCM: Who are Kamenny Vek’s shareholders, and what is their impact?

B. M.: Kamenny Vek is a wholly-owned subsidiary of a British private equity fund that believes in the market potential of basalt fibre. As a result, our plant is equipped with the most modern manufacturing hardware for achieving the highest properties and the best-quality basalt fibres. The best labs and specialists worldwide are also involved in the development, production, testing, and quality control of products.

JCM: What is your production capacity?

B. M.: Our annual production capacity is 2,000 metric tons, but it would take us only 18 to 24 months to increase that to 15,000 MT/year. We have the necessary space with our second site located 20 km away from Dubna. Our technology is now well established, so all we have to do is build more production units. We already have plans to build a third and larger furnace in the short term if the world economy recovers, and that would increase our production capacity to

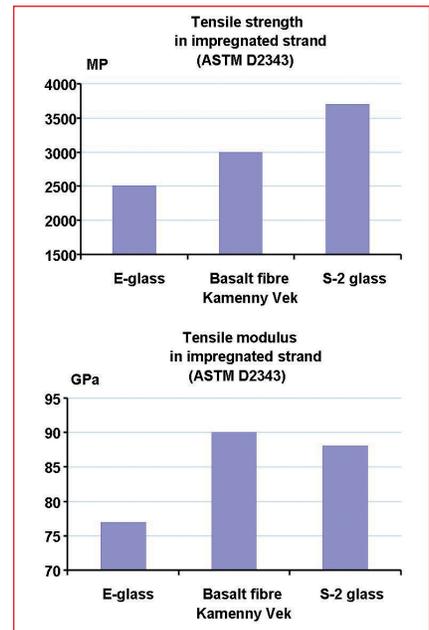
lights the better price/properties ratio of basalt fibres, compared to carbon and specialty glass fibres. The company estimates the global market at about 100,000+ MT, including some 35,000 MT for structural core parts, with a 15-25% annual growth expected until 2015. The company draws 17µm fibres that are dedicated to the infusion process, applied to the manufacture of windmill blades. Recycling is a key issue in the automotive industry. Basalt-fibre-reinforced plastics are more easily disposed of than glass-fibre-based materials. Several western companies has qualified basalt veils for automotive headliners and are buying basalt wet chops from Kamenny Vek on a regular basis. A lot of other customers are testing fibres in BMC and SMC processes and in thermoplastic materials.

For building and construction applications, Kamenny Vek provides high-strength basalt roving specially designed for pultrusion. Basalt fibre can be used to produce stiffer and stronger concrete rebars, and advanced basalt stucco nets are ideally suited for the renovation of

3,000-5,000 MT/year.

JCM: What development projects are in the works?

B. M.: Basalt fibre is highly competitive because it is cost-effective, corrosion resistant and recyclable. We are very confident that it will develop into a commodity for the composite industry. The market potential is huge. When we obtain certification for the wind energy sector, that will open up a potential market for us of 10,000+ MT/year. There are many potential user sectors, and the automotive sector in particular could account for large volumes. We have invested in equipment from the major brand names to guarantee the best possible quality. We count heavily on quality. In order to create product that ideally suits requirements of the wind mill blades producers and to develop optimal technology of the UD production, we have recently bought a machine for the fabrication of UD fabrics. Furthermore we are ready to pass this technology to our partners. ■



Tensile strength and modulus comparison.

old concrete structures and for reinforcing the outer coating of buildings. A Norwegian customer won a JEC Award in 2006 for its reinforcement for concrete applications. ■

More information: www.basfiber.com