The ultimate deformation value, and low shock and

The main function of the fibers is tocarry the load in their longitudinal direction, on this, fibers are responsiblefor the strength and stiffness of the composite material. Fibers ratio rangingfrom 30 to 70% of the composite material according to manufacturing method. There are a lot of fibers types such as Carbon, Glass, Aramid, Basalt fibers. The Glass fiber is the most widelyused due to its low cost. Glass fiber comprise of various oxides (Most ofsilica oxide) and unprocessed material (for example, limestone, clay …. Etc.). The main characteristics of the glass fibers are: high strength with elasticrupture behavior, surface activity, excellent insulating, high density, sensitivity to abrasion, low modulus of elasticity, and sensitivity tomoisture, UV, and alkaline environment.

TheCarbon fiber used in a high-performance structure. The utilization of Carbonfibers were expanded from the beginning of 1998, reaching more than 30000 tonper year. Carbon fibers used in strengthening structure elements such as beamand column, and repairing of damaged elements.

The main characteristics of thecarbon fibers are: high strength to weight ratio, low coefficient oflongitudinal heat expansion, low sensitivity to fatigue load, resistance tomoisture and chemicals, high heat and electric conductivity, moderate ultimatedeformation value, and low shock and shear resistance. Due to the increase in the construction market and therequirements for newer economic and environmental material, the reinforcement potentialof newer and newer fibers is investigated in the leading research institutes ofthe world. Basalt fibre is the most appropriate for applying in the polymermatrix composite instead of glass fiber. High rigidity and low elongation orextension at break make basalt fiber the best choice for the material scientistto replace steel and carbon fiber.

Its supreme tenacity value makes it as auseful reinforcement material in the present and also for the future era tocome. Basaltfibres are non-combustible, they have high chemical stability, and goodresistance to weather, alkaline and acids exposure. Moreover, basalt fibres canbe used from very low temperatures (i.

e. about _200°C) up to the comparativehigh temperatures (i. e. in the range 600-800°C). High modulus, good strengthand elastic behaviour make also this kind of fibres a good alternative to thetraditional ones and in particular, continuous basalt fibres are competitivewith glass fibres.

Another feature of the basalt fibres is their goodcompatibility with the matrix materials. Basalt fibres can beconsidered environmentally friendly and non-hazardous materials. It is not anew material, basalt originates from volcanic magma and flood volcanoes, a veryhot fluid or semifluid material under the earth's crust, solidified in the openair. Basalt is a common term used for a variety of volcanic rocks, which aregray, dark in colour, formed from the molten lava after solidification. The basalt has low densitylike 2. 8 g/cc to 2. 9 g/cc, which is much lower than metal (steel) and closer tocarbon and glass fibers though cheaper than carbon fiber and high strength thanglass fiber.

Hence basalt is suitable as low weight cheaper tough compositematerials. (Pearson, Donchev and Salazar, 2013) compared the long-term behaviours of prestressed basalt ? bre reinforcedpolymer bars and steel ones. To this aim, three basalt reinforced polymersamples, two steel high yield reinforcing bars, and one high tensile steelcable sample were tested carrying out creep tests at room temperature andsetting tension equal to 16 kN. The experimental results showed that prestress losesare seen to be equal or less with basalt reinforced bars and steel incomparison to steel cable.

(Dorigato and Pegoretti, 2012) compared the fatigue properties of epoxy based laminates reinforcedwith woven fabrics of basalt, E-glass and carbon ? bres. All the laminates wereprepared by means of vacuum bagging technique. The investigation of the fatiguebehaviour indicated higher performances of the laminates reinforced with basaltfabrics with respect to the corresponding glass ? bre composites, with animproved capability of sustaining progressive damaging and slightly higherdamping properties. The first attempts totransform basalt rock into fibers by extrusion started at the beginning of the1920’s and were attributed to the French Paul Dh`e, that was granted a U. S. Patent in 1922.

Around 1960, Soviet Union began to investigate basalt fiberapplications too, particularly for military and aerospace purposes, succeedingin developing the first attempt of production technology for continuous basaltfibers. In subsequent years many technical studies have been conducted inEurope and more recently in China, aiming to improve quality of themanufacturing process as well as to enhance the physico-chemical features andmechanical performance of basalt fibers. Mechanical properties and stress-strain relationship of different typesof fibers are shown in fig. 1-3 and table 1-1