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The effect of organic fibers Oxalon on micromechanical characteristics of phenylone C-1

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Areas of application of polymeric composite materials are plentiful, modern rocket-space equipment, aviation, ship building and mechanical engineering would be unthinkable without them. It is also important that the waste in the manufacture of parts of the PCM does not exceed 10-30 % of the material, while similar details made of high strength alloys of titanium and aluminum used in aircraft construction, might contain waste 4-12 times exceeding the weight of the product.

Micro-hardness measurement is a non-destructive, most affordable, easily and quickly held kind of mechanical testing of materials, which are widely used for research purposes and as a way to control products in many industries. An opportunity to indirectly evaluate other mechanical properties as to hardness is particularly significant if there is a definite correlation between the two. Thus, hardness can allow to determine elastic properties of the material, fracture resistance, compressive deformation, the adhesion strength, tribological properties. The hardness value is widely used to study the behavior of the material in operation. One of the most common methods for determining hardness is the Vickers method.

An increase in the microhardness of the matrix (phenylone C-1) by 12% compared to the pure polymer (260 MPa) is observed at fibre content of 10 wt.%. These results can be explained as follows. During the micro-hardness test, in case of indentation of diamond pyramid, plastic deformation occurred in the area immediately adjacent to the testing area. As is well known, it is nothing but the movement of dislocations. At the fiber content 10 wt. %, dislocation slowed down in its movement, at the account of increasing the thickness of the boundary layer "polymer-fiber". This process is inevitably accompanied by an increase in the density of dislocations close to such "barriers", which in turn led to an increase in strength and, consequently, to an increase in micro-hardness, which was recorded during the experiments.

The results of these tests indicate that the reinforcement phenylone C-1 heat-resistant fiber Oxalon allows you to create new polymer composite materials for constructional purposes. It was found that the highest-conical micromechanical parameters has organoplastics containing 10 wt. % fiber.