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Composite Materials

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Annotation: This article discusses the properties of composite materials, matrices and their types. You can learn about the composite material in the aerospace industry, its place, and how powerful the composite material is.

Keywords: Material, composite, industrial, aerospace, matrix, binder, compound, reinforcement, metrix, with, fiber, particle, epoxy, polyester, high, temperature, chemical, property.

Composite materials are materials that do not interact with each other, are formed by volumetric aggregation of chemically indistinguishable components, and the components are separated by a clear boundary. Composite materials are characterized by characteristics that are not unique to each of them, as they combine the best properties of each component (strength, corrosion resistance, etc.). Typically, composite materials consist of a plastic (metallic or nonmetallic inorganic or organic) base or matrix and compounds: metal powders, fibers, fibrous crystals, thin fibers, fabrics, and so on. Types of composite materials: fibrous (reinforced with fibers or filamentous crystals); dispersion-compacted (reinforced with disperse particles) and layered (pressed or rolled various materials).

Important technological methods of preparation of composite materials are impregnation of the matrix material on the reinforcing fibers, cold pressing of the components on the reinforcement and matrix tapes, then spraying the matrix on the joining reinforcement, then diffusion welding of multilayer tapes of tensioning components. Composite materials are used in aviation, aerospace, rocketry, automotive, mechanical engineering, mining, construction, chemical industry, textiles, agriculture, household appliances, radio engineering, energy, pipe production and other industries.

There are several types of composite materials:

Composite materials with a metric matrix: Composite materials consist of a metrix (usually consisting of al, mg, ni and their alloys) mainly with metal (scattered and cut materials) and harder (caudal materials) Metal matrix consists of fibers (scattered particles) connects to the whole number. Fiber (dispersed particles) and a bundle (matrix) that forms one or another composition got the name composite materials.

Non-metric matrix composite materials: Composite materials with a metal matrix are widely used. Non-metallic matrices, polymer, carbon and ceramic materials. From the polymer matrix, epoxy, phenoloformaldehyde and polyamide. Coal matrices are formed from synthetic polymers that have been subjected to pyrism, with or without grit. The matrix binds the composition giving it its electronic forms.

Composite materials have unique properties that distinguish them very well among traditional building materials. New materials are created due to the natural desire of manufacturers to improve the properties of existing and commissioned facilities. These technologies, mastered by builders, create new opportunities for the development of more modern structures and technologies. One of the most striking manifestations of the development properties of polymeric materials is that the composition is very widely used in various fields of construction. Composite materials can rightly be called the raw material for the construction of the XXI century. They have the highest physical and mechanical properties at low densities. They are harder than steel and aluminum alloys.

Composite materials: These are polygonal heterogeneous (non-similar) structures formed by combining reinforcing elements with an isobtropic binder. The supporting element can be in the form of a thin fiber, thread, rope or fabric, which provides the physical properties of this material, which ensures that the fiber is strong and rigid in the direction, and the matrix ensures the integrity of the structure. The composite materials used have a specific strength and hardness in the direction of the reinforcement, and this figure can be 4 times higher than products made of steel, aluminum reinforcement and titanium alloys.

In the composite material, the matrix is the most important component, which ensures the integrity of the composition, determines its shape and the location of the reinforcing fiber. Provide an optimal method for the production of elements due to the matrix material, as well as the appropriate level of working temperature of the composition, resistance to chemical irritants, movement of the composition under the influence of precipitation and high or low temperature. The matrix can be made of epoxy, polyester and some other thermoset, polymer and thermoplastic materials. In composite

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materials with fibrous construction, the stresses caused by external loads are absorbed by high-strength fibers. They also ensure the strength of the structure.

The properties of dispersion-strengthened metal composites are isotropic and the same in all directions. The addition of 5-10% reinforcing fillers (refractory oxides, nitrides, borides, carbides) leads to an increase in the load resistance of the matrix. , the addition of a fine powder of thorium oxide or zirconium oxide to a heat-resistant chromium-nickel alloy. This alloy allows the product to be able to increase the operating temperature from 1000 C to 1200 C for a long time. Dispersion-strengthened metal composites are obtained by the addition of filler powder to the molten metal or by powder metallurgy.

Reinforcement of metals with fibers, fibrous crystals, wire significantly increases the strength and heat resistance of the metal. For example, aluminum alloys reinforced with barium fibers can operate at temperatures of 450-500 C instead of 250-300 C. Oxide, boride, carbide, nitride metal fillers and carbon fibers are used Ceramic and oxide fibers prevent plastic deformation due to brittleness, while the use of more plastic, metal fillers is a material that causes significant technological difficulties in product manufacturing allows it to harden excessively. Such composites result in impregnation of fiber bundles with metal solutions, electrode position, mixing with metal powder, and subsequent sintering.

There are several types of composite binder matrices Composite binders and matrices can be different. Often an epoxy binder formed from an epoxy group material is used. This material has a three-dimensional structure resistant to alkali, acidic and halogen solutions. Epoxy adhesive is widely used in various fields. It is used for bonding various types of reinforcing elements and obtaining high quality composite material. It is also used as a means of sealing electronic devices, various boards and other objects. This adhesive is widely used in construction work, as well as for domestic purposes.

Polyimide binder is less commonly used. These substances belong to the class of heat-resistant materials that have a complex structure with many bonds between particles. Due to the heat resistance of these particles, this material is used as a binder in thermal protection systems for spacecraft, in the rocket industry, as well as in many other products used at high temperatures. The choice of this type of binder should take into account the toxicity factor of this material, a very high level of adhesion at normal temperatures, the high cost associated with a long production process.

Polyester binders are products formed during the polymerization of saturated esters. The peculiarity of this substance is that it contains a high amount of styrene, which is formed during the polymerization process. This can lead to two negative properties of this material, in addition to its porous structure, it can also be toxic. However, this bond is cheaper than epoxy binder, as well as has lower adhesion and is easier to apply.

Phenol formaldehyde binder has a special property, it is important that the operating temperature is very high. It is also important that this material is very inexpensive because it is a by-product of petroleum product synthesis. It has good flow, which allows you to get products in different configurations. Using this bonding material, it is possible to obtain a reinforcing element that is well absorbed in the composite material.

The carbon binder allows the production of products with very high physical and mechanical properties. Its linear thermal expansion coefficient is ≈10-7-10-8; Thermal conductivity up to 1000 W m.K; elastic modulus E≈600 GPa. This substance has high electrical inertness as well as excellent electrical properties. This set is used in the manufacture of motor nozzle blocks, heat-resistant tiles, as well as in electrical elements.

The cyanide ester binder has high radiation resistance, variable mechanical properties depending on the processing time, as well as low moisture absorption and low dielectric constant. In addition, cyanide ester binders are very resistant to temperature changes, which can lead to micro-cracks and subsequent disintegration in other materials. Due to these properties, cyanide esters are widely used in composite materials for the aerospace industry. This substance is used for the manufacture of reflectors, coatings, antennas, reflectors, as well as dimensional stable spatial structures.

LIST OF USED LITERATURE:

1. https://optolov.ru/uz/steny-i-nastennye-pokrytiya/kompozicionnye-materialy-vidy-primenenie-v-stroitelstve.html
2. https://fayllar.org/ozbekiston-respublikasi-oliy-va-orta-v4.html?page=2
3. https://assz.ru/uz/chto-takoe-kompozicionnye-materialy-kompozicionnye-materialy/
4. https://uz.wikipedia.org/wiki/Kompozitsion_materiallar
5. https://passportbdd.ru/uz/rabota-s-pk/specialnye-polimernye-kompozicionnye-materialy-mihailin-yu/
6. https://uz.eferrit.com/kompozit-materialning-tarifi-nima/
7. https://makemone.ru/uz/okna-i-dveri/kompozitnye-materialy-v-stroitelstve.html

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