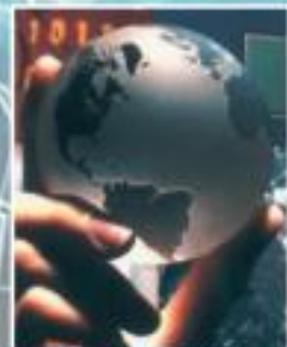




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## SELECTION OF POLYMER BINDING FILLING MATERIALS FOR KPM

**Ibragimova Mukaddas Mukhammadsobir kizi**  
Researcher of the Andijan State Technical Institute  
[ibrohimovamuqaddas9@gmail.com](mailto:ibrohimovamuqaddas9@gmail.com)

**Annotation:** This article covers the selection of types of polymer binders and fillers for composite polymer materials (CPM) and the formation of their optimal composition. In the study, the influence of local fillers - kaolin, graphite, silk waste, and chlorinated polyethylene - on the mechanical and tribotechnical properties of composite coatings based on epoxy resin ED-20 was studied. Based on the experimental results, effective ways of modifying the KPM structure were determined, and the possibilities of obtaining high-strength, wear-resistant, and energy-saving coatings were analyzed.

**Keywords:** KPM, epoxy resin, filler, graphite, kaolin, chlorinated polyethylene, mechanical properties, modification.

In recent years, composite polymer materials with high strength, wear resistance, and light weight have been widely used in mechanical engineering. Such materials have higher tribotechnical and operational indicators compared to traditional metal-based structural materials. The main advantage of composite polymer materials is that their properties can be predetermined by selecting their composition - binding and filler components. Therefore, the use of local fillers, such as epoxy binders, graphite, kaolin, chlorinated polyethylene, and silk waste, is of great scientific and practical importance. In this study, the mechanical, adhesion, and tribological properties of coatings made from such materials are analyzed [1].

The expediency of structuring methods, allowing for the rational use of local raw materials and energy resources, as an effective type of modification of composite polymer materials, is substantiated. Composites and fillers based on the thermosetting binder epoxy resin ED-20: for coatings as the object of research, kaolin, graphite, chlorinated polyethylene and silk processing waste (STP) were obtained from local raw materials (Table 1) [2,3].

Binding epoxide compound - EDk=ED-20 (100 wt.g) +DBF (18 wt.g) +PEPA (12 wt.g)

As a model and control sample, a sample structural material - steel (St3), widely used in the working bodies of large-sized technological machines for processing cotton, was taken.

In the course of the dissertation work, research work was carried out in accordance with clauses 1.4, 2.2, 3.2 of the Cooperation Agreement No. 145 dated 05.01.2018 for a period of 5 years between the Rector of the Tashkent

State Technical University named after Islam Karimov, Professor S.M.Turabdjano and the Director of JV "Uz Dong Ju Paint Co" in the city of Andijan, U.I.Azimov, and the fundamental project plan No. OT-F 2-41. The following indicators were obtained in the accredited testing laboratory of the enterprise, operating on the basis of ISO/IEC 17025:2005 International and O'zDST ISO/IEC 17025:2007 Republican standards:

- HB-microhardness (tvoyodomers No3635 ser. No3389/06 01.05.2019-01.05.2020) and on the PMT-3 equipment of Tashkent State Technical University [4];
- $\sigma_{y\text{д}}$ - impact strength IMPAST TESTER J-020 No5512 ser. No10-951 28.11.2018-28.11.2019 [5];
- $\sigma_{3\text{г}}$ - bending strength Bending Tester No5750 ser. No10-954 28.11.2018-28.11.2019;
- adhesion strength No315 ser 2236 28.03.2019-28.03.2020 adhesiomer;
- No434817 ser., based on the method of non-destructive assessment of the geometric dimensions of the coating. 3374 Standardized method on testing laboratory equipment according to 01.05.2019-01.05.2020.

In the experiments, cotton varieties Andijan-36 and C-65-24 with a conditional moisture content of 8-12% and contamination of 3-12% were used.

The height of the stabilized surface roughness of the coating (Rz), the temperature of the friction surface (Ttr), the coefficient of friction (f) as the main tribometers, the relative mechanical damage of raw cotton to the metal surface ( $\delta_0$ ) and the intensity of linear wear of the coating (Il) were selected as controlled parameters [4].

When optimizing the composition and operational properties of the studied GKPM components and processing the research results, the Lagrange interpolation formula and specially developed programs DGU 06066, 06067 were used [6].

The operational, i.e., tribotechnical properties of multifunctional GC polymer coatings and the relative mechanical damage to cotton were determined in accordance with the state standard (O'zDST 2822-2014), developed for the first time under the leadership of Professor U.A. Ziyamuhamedova. It was determined using a tribometer, which has no analogues in the world, developed under the leadership of Professor A.B. Dzhumabaev.

**Composite materials** have special properties compared to traditional construction materials. This led to the creation of materials and structures with positive properties. **Composite materials** (CM) are complex materials

composed of two or more components, connected in different ways, and possessing unique properties.

will be different. A continuously distributed component throughout the entire volume is called a **matrix**. Intermittent, piecewise materials are called **strengthening or reinforcing** components.

Metal and its alloys; organic and inorganic polymers; ceramics, carbon, and other materials are used as the matrix material. The properties of the matrix material represent the technological process of obtaining the composite material. It represents its density, strength, operating temperature, resistance to fatigue damage, and resistance to an aggressive external environment.

Strengthening or reinforcing elements are evenly distributed along the matrix. They have high strength, hardness, and elastic modulus. These indicators are significantly higher than the matrix indicators. "Fillers" not only increase durability but also affect other properties of the composite material.

Composite materials have significantly higher relative stiffness ( $E/r$ ) and relative strength ( $v/p$ ) compared to modern structural materials.

The modulus of elasticity of the composite material can be raised in any direction, by applying a wedge in that direction.

The reliability of composite materials is also high. In ordinary alloys, cracking and its growth occur rapidly during operation. In composite material, cracking begins with the matrix. It won't grow, as it will end up in a reinforcing filler along the way.

**Conclusion.** The research results showed that the quality indicators of composite polymer coatings based on epoxy resin ED-20 directly depend on their filler and modifier components. The use of local raw materials - kaolin, graphite, silk waste (SRW) and chlorinated polyethylene - significantly increases the adhesion strength, wear resistance, and mechanical stability of coatings. Also, the choice of the optimal ratio of components in the composite composition ensures the energy efficiency of the material. The obtained results are of practical importance in the creation of polymer coatings intended for anti-friction, wear resistance, and long-term operation in mechanical engineering.

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