INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
eISSN 2394-6334 Impact factor: 7,854 Volume 12, issue 12 (2025)

ADVANCED TECHNOLOGY FOR DEVELOPING WEAR-RESISTANT COATINGS FOR MOLDS OF REINFORCED CONCRETE PRODUCTS UTILIZING INNOVATIVE COMPOSITE POLYMER MATERIALS

Mukhitdinov Muzaffar Baxtiyorovich

PhD, Associate Professor (Namangan State Technical University)

(+99897 230-00-47,) muzaffarbek0047@gmail.com.)

Khamidov Muhammadali Shodmonali ugli

Master's Student (Namangan State Technical University)

Abstract: This article presents methods for increasing the durability of wear-resistant composite polymer materials and the development of technology for producing coatings from them for equipping architectural and artistic reinforced concrete products

Key words: Metal equipment, wear resistance, adhesive strength, physical and mechanical properties, coatings, thermosetting polymer, epoxy resin, coating, reinforced concrete products

In the world, the demand for architectural and artistic, concrete and reinforced concrete products for the construction of buildings and structures, their aesthetic decoration is increasing from year to year. In this regard, in order to significantly improve the quality of architectural and artistic and prefabricated reinforced concrete products, reduce the cost of building structures and improve the quality of metal molds that give them shape, it is important to develop an effective technology for using polymer materials on working surfaces, reducing labor and energy consumption [1].

The following scientists have made a significant contribution to the development of composite polymer materials and coatings and their application in various industries, and have made a significant contribution to the use of polymer materials in the production of building structures and the study of the physicochemical and technological properties of materials: N.S. Enikolopov, S.N. Jurkov, V.V. Korshak, A.N. Pravednikov, V.A. Beliy, Yu.S. Lipatov, M.A. Askarov, S.S. Negmatov, S.Sh. Rashidova, A.T. Djalilov, T.R. Abdurashidov, M.S. Akutin, G.M. Bartenev, A.A. Berlin, V.E. Gul, I.M. Gunyaev, B.V. Perov, T.S. Sirlibaev, R.S. Tillaev, A.D. Yakovlev and others. In the field of polymer materials and products for the production of building structures, Yu.M. Bazhenov, V.A. Voroboev, V.A. Voskresensky, S.S. Davidov, A.G. Komar, V.V. Laturaev, Yu.A. Sokolova, V.I. Khrulev, V.G. Dodin, B.A. Shipilevsky and many other scientists conducted scientific research[2,3].

The purpose of our research is to determine the basic laws of the erosion process and improve the adhesion and other properties of composite materials by introducing physically modified organomineral fillers into the polymer composition, and to develop a technology based on them.

As the object of research, epoxy resins ED-16 and ED-20, polyethylenepolyamine-PEPA, dibutyl phthalate-DBF, technical piperidine, as well as the main composition of the polymer binder AT-1, including 100 mass parts of epoxy resin ED-16, 12 mass parts of polyethylene polyamine hardener, 20 mass parts of dibutyl phthalate, were selected for the production of polymer binders. AT-2, including 100 mass parts of epoxy resin ED-16, 7 mass parts of hardener

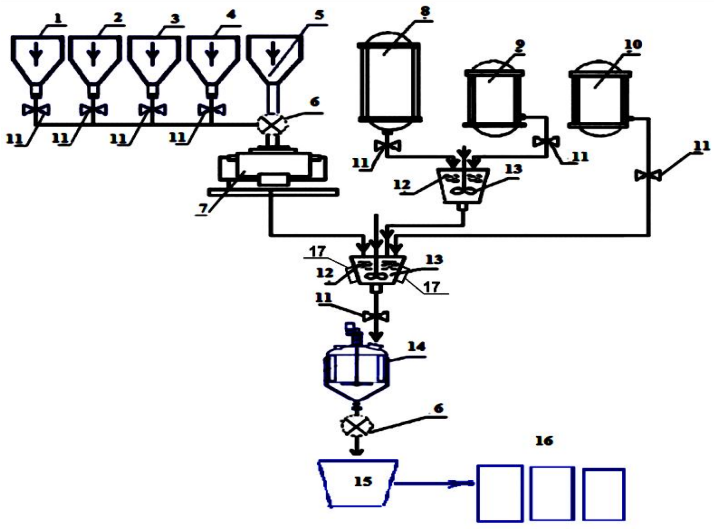
piperidine and 20 mass parts of aliphatic low molecular weight epoxy resin-TEG-1, as well as concrete were used.

As fillers, graphite S-1, graphite flakes, DG-100, iron powder, cement, talc A, kaolin, glass fiber TJO-6, carbon fiber TN, fluoroplastic M-4, high-density polyethylene were selected[4,5,6].

It should be noted that one of the properties that determine the long-term durability of composite polymer coatings is their adhesion strength to the working surface of forming metal molds[7,8].

We consider the development of a technology for obtaining wear-resistant composite epoxy polymer materials and coatings based on them for use in molds for reinforced concrete products.

Based on the analysis of numerous literatures and the results of our preliminary research, the scientific, methodological and technological principles and production technology for the production of wear-resistant composite epoxy polymer materials and coatings based on them, the stages of technological processes for their production, as well as a modular technological line for the preparation of wear-resistant composite epoxy polymer materials and coatings based on them were developed, and it is shown in Figure 1 below. An improved technological scheme for the production of wear-resistant composite epoxy polymer materials and coatings based on them, developed on the basis of scientific and methodological principles, is shown in Figure



1,2,3,4,5-bunkers for graphite powder, kaolin, iron powder, cement, fiberglass; 6-dosers; 7-vibrating screen; 8-reservoir for thermosetting oligomer; 9-container for plasticizer;

10-container for hardener; 11-valve;

12-metal mesh; 13-mixer;

14-reactor mixer; 15-container for finished products;

16-packaging containers;

17-ultrasound device.

Figure 1. Improved technological scheme for obtaining wear-resistant composite polymer materials and coatings from them on the surface of molds for architectural and artistic reinforced concrete products

Based on the scientific results obtained on the development of a technology for increasing the long-term durability of wear-resistant composite polymer materials and obtaining coatings from them for architectural reinforced concrete product molds:

Tests were conducted at the Jizzakh Reinforced Concrete Products Plant to produce wear-resistant composite thermosetting epoxy polymer materials created as a coating for the working surface of metal molds in the production of reinforced concrete building structures, and it was found that the performance and durability of the coatings increased by 2.2-2.5 times.

The composite epoxy polymer materials developed based on the above technologies serve to increase the durability of the working surfaces of the molds used in the production of reinforced concrete structures and products, as well as to increase the quality and productivity of the produced reinforced concrete products.

List of references:

1. Negmatov, S. S., Abed, N. S., Ulmasov, T. U., Alikabulov, Sh. A., Rajabov, Yo. S. U., & Mukhiddinov, M. B. (2022). Study of the influence of operating modes of metal tooling on the wear resistance of composite polymer materials. Universum: technical sciences, (11-5 (104)), 54-59.
2. Alikabulov, Sh. A., Rajabov, Yo. S., Abed, N. S., Mukhitdinov, M. B., Kamolov, Yo. O., & Ulmasov, T. U. Application of composite polymer materials in molds to improve the production efficiency of reinforced concrete building structures. Composite Materials, 169.
3. Radzhabov, E. S., Alikobilov, Sh. A., Negmatov, S. S., Kamolov, T. O., Mukhitdinov, M. B., & Ulmasov, T. U. Comprehensive analysis of the current state of reinforced concrete forming equipment in the production of building structures and products, ways to improve their efficiency. Composite Materials, 172.
4. Negmatov, S. S., Abed, N. S., Imomnazarov, S. K., Alikobilov, Sh. A., Umirova, N. O., & Mukhitdinov, M. B. & Ulmasov, TU Study of the influence of the content of various fillers on the wear resistance and other physical and mechanical properties of composite epoxy polymer materials. Composite Materials, 72.
5. Mukhitdinov, M. B. (2023). INFLUENCE OF THE CONTENT OF VARIOUS FILLERS ON THE WEAR RESISTANCE OF COMPOSITE POLYMER MATERIALS. Journal of Integrity in Ecosystems and Environment, 1(4), 40-54.
6. Mukhitdinov, M. B. (2023). DEVELOPMENT OF OPTIMAL COMPOSITIONS OF COMPOSITE POLYMER MATERIALS FOR COATING THE WORKING SURFACE OF MOLDS IN THE PRODUCTION OF REINFORCED CONCRETE PRODUCTS. Universum: technical sciences, (12-3 (117)), 52-56.
7. Mukhitdinov, M. B. (2023). Journal of new century innovations, 43(1), 180-191.
8. Mukhitdinov, M. B. (2024). INFLUENCE OF ULTRASONIC TECHNOLOGY ON THE PROPERTIES OF COMPOSITE POLYMER MATERIALS AND COATINGS BASED ON THEM. Universum: technical sciences, 2(1 (118)), 32-34.