TECHNOLOGICAL METHODS OF INCREASING THE PERFORMANCE OF PARTS

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The functionality of the parts largely depends on the nature of their surface layer. Under operating conditions, the surface layer of parts is exposed to the strongest physical and chemical effects - mechanical, thermal, magneto electric, photochemical, etc. influences. At the same time, in most cases, the service properties of surfaces associated with wear, corrosion, erosion, cavitation, fatigue cracks, and other destruction in the part begin to deteriorate. This degradation starts right at their surface. Therefore, higher demands are placed on the quality of the surface layer of components than on their volume [1].

According to modern ideas, surface quality is a complex, complex concept defined by two groups of characteristics. These are geometric and physic mechanical properties. When designing machines, the designer must carefully regulate the parameters that characterize both the geometric and physical properties of the surfaces. However, the targeted formation of a surface layer with defined properties has become a priority in modern mechanical engineering in recent years. At the same time, many features of the surface finish of components that affect their performance characteristics depend on technological processing methods. It turns out that the quality of the surface layer of the parts largely depends on their wear resistance, fatigue strength, and corrosion resistance. In addition, with the intensification of operational processes, associated with an increase in the speed of movement of working bodies, and an increase in temperatures and pressures, the surface of the parts must be sufficiently strong, have compressive residual stresses, and have a finely dispersed structure, a smooth form of micro-size with a large range of the bearing surface.

It is known that the surface of the part has several properties compared to its inner part. At the same time, every atom that is in a solid with an ideal crystal lattice is in a mobile stable state of equilibrium, since the intensity of the force field is the same for it in all directions. In this position, it depends on the atoms that are on the surface. They are more active, and have excess or free energy compared to the atoms inside. The metal surface of the parts in real conditions is adsorbed by atoms of environmental elements, which are covered with layers of adsorption gases, water vapor, and fats, forming various oxides [2]. Diffusion in the surface layer creates chemical bonds between the base material and substances penetrating from the outside. The diffusivity of atoms can lead to a redistribution of the concentration of alloying elements, which in some cases reduces their content in the surface layer. All this negatively affects the performance of the parts as a whole. Therefore, the targeted formation of a surface layer with defined properties in the manufacturing process of components is one of the most important tasks of modern mechanical engineering. A significant reserve in the increase should be sought in the correct design of the interface depending on its service function, and the designer should know, and the technologist should be able to perform the task.

Many features of surface quality that affect operational properties depend on the technological method and conditions of part production. Based on these properties, it is possible to assign a definition of the processing condition (technological method, processing modes, etc.), providing a surface with the required quality parameters. Various technological processes can be used to give the surfaces of components special properties. The diverse possibilities and the expediency of using these processes are not only determined today by the conditions for ensuring high productivity but also by the creation of optimally load-bearing surfaces. When the surface of the component is exposed to elevated temperatures of aggressive media, other physicochemical properties of the surface layer, such as its chemical composition and electrode potential, are of great importance. It is necessary to influence these properties of the surface layer and change them in a favorable direction, for which it is necessary to change the chemical composition of the surface layer or to create metallic or non-metallic protective layers on the surface. Technological methods for increasing performance are naturally divided into three groups. These are special processes, processes for hardening treatment and increasing corrosion resistance. From all of the hardening processes, processes can be distinguished that are associated with elastic-plastic deformation of the surface of parts.

Special processes ensure, above all, optimal micrometry of the surface. In contrast to conventional methods of surface treatment, special processes are characterized by two features: On the one hand, the micro-relief is not created by the cutting process, but by indentations that significantly influence the shape of the surfaces: On the other hand, the drawing of the micro-relief is regulated, i. H. the process of shaping the geometric properties of the surface becomes manageable. Hardening surface treatment methods are mainly aimed at improving the physical and mechanical properties of the surface layer: the hardness of the surface layer increases, deformation hardening, and compressive or tensile residual stresses appear in it. During hardening treatment of areas of stress concentration (Galtels, etc.), the effect of these stresses on the strength of the part decreases. The influence of strain hardening and residual compressive stresses is favorable for increasing fatigue strength, which increases the service life of parts, especially under cyclic loading. The value of residual stresses, the depth and degree of deformation hardening, and the resulting roughness of the surface layer depend on the material of the workpiece, the selected hardening method, and its technological parameters. Technological methods of increasing corrosion resistance ensure the stability of the working surfaces of parts in aggressive environments and can be classified in three directions:

When alloying materials, alloys are mixed with special elements, resulting in corrosion-resistant materials. Therefore, alloying steel with chromium (about 13%) dramatically increases its electrochemical potential due to a protective oxide film. the selection of special alloys and the conditions of their thermal and mechanical processing, in which additional anti-corrosion protection is not required, i.e. special cutting modes on the surface of steel parts (30XGSA steel) create a microstructure of marten site of a special kind with high corrosion resistance, which at the same time increases fatigue strength and wear resistance. The application of various coatings (metallic and non-metallic) to the surface of parts, is the most common direction and includes a large group of methods of protecting surfaces from contact with corrosive media. The above, in our opinion, once again shows the great and underutilized possibilities of advanced technological methods that increase the performance of parts in the process of their manufacture.

References:

1. Gulamov, A. A., Ozatbekov, Y. F., & Ozatbekova, O. N. (2022). INNOVATION-ORIENTED WAY OF DEVELOPMENT OF A MODERN UNIVERSITY. *Journal of new century innovations*, *15*(3), 53-59.

2. Ozatbekova, O., Ozatbekov, Y., & Gulamov, A. (2022). DISTINCTIVE FEATURES OF THE TURKISH INVESTMENT POLICY. *Current approaches and new research in modern sciences*, *1*(1), 4-8.

3. Ozatbekova, O., Ozatbekov, Y., & Gulamov, A. (2022). ТЕОРЕТИЧЕСКИЕ ОСНОВЫ ИПОТЕЧНОГО КРЕДИТОВАНИЯ В ЭКОНОМИКЕ. *Solution of social problems in management and economy*, *1*(1), 4-6.

4. Ozatbekova, O., Ozatbekov, Y., & Gulamov, A. (2022). THE IMPORTANCE OF THE DEVELOPMENT OF FINANCIAL MARKETS IN THE ECONOMY OF UZBEKISTAN. *Zamonaviy dunyoda ijtimoiy fanlar: Nazariy va amaliy izlanishlar*, *1*(20), 40-45.

5. Abdullayevich, G. A., & Qizi, R. S. S. (2022). ИҚТИСОДИЁТНИ РАҚАМЛАШТИРИШ ШАРОИТИДА РАҚАМЛИ МАРКЕТИНГНИНГ ЎРНИ. *Трансформация моделей корпоративного управления в условиях цифровой экономики*, *1*(1), 149-154.

6. Abdurakhmanov, O., Gulamov, A., & Shjaumarov, S. (2021). Improving the needs of economic sectors for transport services on the basis of national standards.

7. Abdullaevich, G. A., & Khikmatullaevna, S. M. (2021). A study of increasing the economic efficiency of transport services. *South Asian Journal of Marketing & Management Research*, *11*(9), 34-40.

8. Abdurakhmanov, O. K., Gulamov, A. A., Shaumarov, S. S., & Kandakhorov, S. I. (2021). ON THE RETURN ON INVESTMENT FOR THERMAL RENOVATION OF CIVIL BUILDINGS. *ТЕМИР ЙЎЛ ТРАНСПОРТИ*, (3), 99.

9. Gulamov, A., Abdurakhmanov, O., & Shjaumarov, S. (2021). Improving Methodological Approaches to Assessing the Effectiveness of Using Fixed Capital in Railway Transport. *International Journal on Orange Technologies*, *3*(10), 1-12.

10. Abdullaevich, G. A. (2020). ECONOMIC VALUATION OF THE SHARE CAPITAL OF THE JOINT STOCK COMPANY" UZBEKISTAN RAILWAYS. *Science and Education*, *2*, 3.

11. Гуламов, А. А., & Дадабоева, З. С. К. (2020). Проблемы развития железнодорожного транзитного потенциала Республики Узбекистан. *Universum: технические науки*, (5-1 (74)), 64-67.

12. Abdullaevich, G. A. (2020). ECONOMIC VALUATION OF THE SHARE CAPITAL OF THE JOINT STOCK COMPANY" UZBEKISTAN RAILWAYS. *Science and Education*, *2*, 3.

13. Abdullayevich, G. A. (2019). Management of the Reproduction Process of the Main Capital of the Railway Company. *Asian Journal of Technology and Management Research (AJTMR) Volume*, *8*(02).

14. Abdullayevich, G. A. (2019). Depreciacion en el aspecto de la estrategia de modelado de inversion y analisis de los procesos de reproduccion del capital fijo del transporte ferroviario. *Religación. Revista de Ciencias Sociales y Humanidades*, *4*(14), 319-331.

15. Abdullaevich, G. A. (2019). IMPROVEMENT OF ECONOMIC METHODS OF DEPRECIATION IN THE JOINT-STOCK COMPANY “UZBEKISTAN RAILWAYS”. *Methods and problems of practical application*, 143.

16. Гуламов, А. А. (2019). ЎЗБЕКИСТОН РЕСПУБЛИКАСИДА ТЕМИР ЙЎЛ ТРАНСПОРТИНИНГ ЗАМОНАВИЙ РИВОЖЛАНИШ ҲОЛАТИНИНГ ТАҲЛИЛИ. *Ресурсосберегающие технологии на транспорте*, *20*(1), 297-305.

17. Abdullayevich, G. A. (2019). Depreciation in the aspect of modeling strategy of investment and analysis of reproduction processes of fixed capital of railway transport. *Religación: Revista de Ciencias Sociales y Humanidades*, *4*(14), 319-330.

18. Гуламов, А. (2019). Экономическая оценка основного капитала акционерного общества Узбекистон темир йуллари. *Экономика и инновационные технологии*, (2), 1543-163.

19. Гуламов, А. А. (2019). МОДЕЛЬ ОЦЕНКИ ЭФФЕКТИВНОСТИ ВОСПРОИЗВОДСТВА ОСНОВНЫХ ФОНДОВ В ЖЕЛЕЗНОДОРОЖНОМ ТРАНСПОРТЕ. *Транспорт шелкового пути*, (1-2), 82-91.

20. Abdulaziz, G. (2019). Retrospective analysis of reproduction processes of fixed capital of railway transport. *Бюллетень науки и практики*, *5*(2), 235-244.

21. Гуламов, А. А., Мерганов, А. М., & Рахматов, З. Н. (2017). Тариф как фактор повышения конкурентоспособности национальной экономики. *Міжнародний науковий журнал Інтернаука*, (5), 115-19.

22. Расулов, М. Х., Ризаев, А. Н., & Гуламов, А. А. (2016). К вопросу управления кадрами в инновационной среде железнодорожного транспорта акционерного общества" Узбекистон темир йўллари". *Инновационный транспорт*, (3), 13-16.

23. Гуламов, А. А. (2016). Совершенствование методов целевого использования амортизации в воспроизводственном процессе основных фондов железнодорожной компании. *Міжнародний науковий журнал*, (9), 103-105.

24. Гуламов, А. А. (2011). Методика оценки воспроизводства основных производственных фондов железнодорожной компании. *Известия Петербургского университета путей сообщения*, (1), 257-266.

25. Гуламов, А. А. (2011). *Экономическая оценка воспроизводства основных фондов железнодорожной компании* (Doctoral dissertation, Петербургский государственный университет путей сообщения).

26. Гуламов, А. А. (2010). Обоснование рационального метода начисления амортизации в условиях оптимизации воспроизводства грузового вагонного парка транспортной компании. *Известия Петербургского университета путей сообщения*, (2), 163-176.

27. Гуламов, А. А. (2010). Прогнозирование объёмов перевозок грузов на узбекской железной дороге. *Известия Петербургского университета путей сообщения*, (1), 82-93.

28. Gulamov, A. MODEL FOR ASSESSING THE EFFICIENCY OF REPRODUCTION OF FIXED ASSETS IN RAILWAY TRANSPORT.