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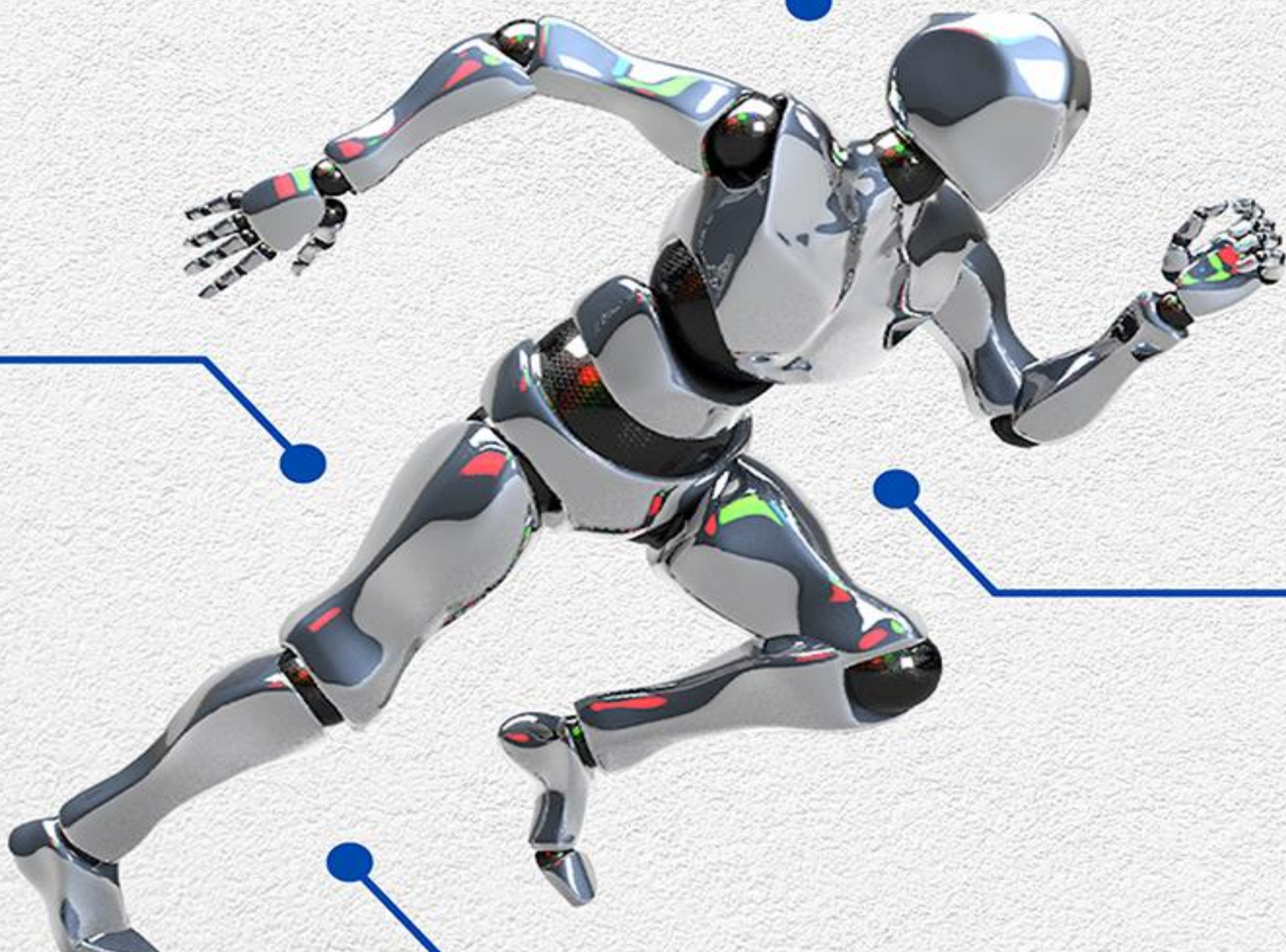

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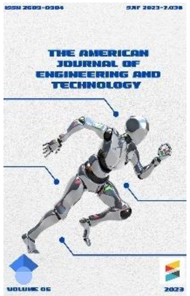

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Research Article

ENHANCING PALM OIL MILL EFFLUENT TREATMENT: HARNESSING BIOENGINEERED STRUCTURAL BIOMEDIA

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ABSTRACT

Palm oil production is a vital contributor to global agriculture and commerce, yet the management of its byproducts poses significant environmental challenges. The discharge of palm oil mill effluent (POME) into water bodies has raised concerns due to its high organic content and potential to cause water pollution. In this study, we investigate an innovative approach to improve POME treatment using bioengineered structural biomedia. These biomedia, designed with tailored microbial communities, offer enhanced pollutant degradation and bioremediation potential. Our research aims to optimize the design and application of these biomedia in POME treatment systems, thereby contributing to the sustainable management of palm oil industry byproducts and mitigating their environmental impact.

KEYWORDS

Palm oil mill effluent, POME treatment, bioengineered structural biomedia, bioremediation, sustainable management, water pollution, microbial communities, organic content, environmental impact.

INTRODUCTION

The palm oil industry, a cornerstone of global agriculture and trade, has witnessed exponential growth over the past decades, providing a significant source of income and employment for numerous nations. However, the production of palm oil comes hand in hand with the generation of substantial byproducts, chief among them being Palm Oil Mill Effluent (POME). POME is a highly complex mixture of organic and inorganic substances, including suspended solids, fats, oils, and various contaminants, making its efficient treatment a paramount concern for environmental sustainability.

The discharge of untreated or inadequately treated POME into natural water bodies has raised serious ecological and public health concerns. The high organic content and nutrient load in POME can lead to oxygen depletion, nutrient enrichment, and the growth of harmful algal blooms, adversely affecting aquatic ecosystems and potentially contaminating drinking water sources. As such, addressing the challenges associated with POME treatment has become an urgent priority for both the palm oil industry and regulatory bodies.

In recent years, the application of biotechnological solutions for wastewater treatment has gained considerable attention. Among these, the concept of harnessing bioengineered structural biomedia for POME treatment has emerged as a promising approach. These biomedia, engineered to create tailored microbial communities, offer a unique platform for enhanced biodegradation and bioremediation of complex organic compounds present in POME. By optimizing the interaction between these engineered microbial consortia and the POME constituents, it is possible to develop a more efficient and environmentally friendly treatment process.

This study endeavors to explore the potential of bioengineered structural biomedia in enhancing the treatment of POME, thereby contributing to the sustainable management of palm oil industry byproducts. By investigating the intricate interplay between microbial communities and POME constituents, we aim to unlock novel insights into the design and application of these biomedia for mitigating the environmental impact of POME discharge. Ultimately, our research seeks to bridge the gap between scientific innovation and practical implementation, offering a viable solution to the multifaceted challenges posed by POME treatment within the context of the palm oil industry.

METHOD

Collection and Characterization of Palm Oil Mill Effluent (POME):

- POME samples will be collected from different palm oil mills to ensure a representative range of variations in composition.
- Comprehensive physicochemical and microbial analyses will be conducted to quantify the organic content, nutrient levels, suspended solids, pH, and other relevant parameters of the POME samples.

Biomedia Design and Preparation:

- Selection of appropriate biomedia materials with high surface area and structural integrity to support microbial growth and attachment.
- Preparation of bioengineered structural biomedia by incorporating various natural and synthetic materials, ensuring a porous and stable matrix.
- Biofilm development on the biomedia by inoculating them with selected microbial cultures or consortia that exhibit robust pollutant degradation capabilities.

Laboratory-Scale Reactor Setup:

- Construction of laboratory-scale POME treatment reactors equipped with bioengineered structural biomedia.
- Control and monitoring systems for regulating flow rates, temperature, and other operating conditions.
- Introduction of POME into the reactors, allowing interaction with the biofilm-encrusted biomedia.

Process Optimization and Monitoring:

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• Iterative optimization of operating parameters such as hydraulic retention time, influent flow rate, and aeration to maximize treatment efficiency.

• Regular monitoring of reactor performance through measurements of parameters like chemical oxygen demand (COD), biological oxygen demand (BOD), suspended solids reduction, and nutrient removal.

Microbial Community Analysis:

• Regular sampling of biofilm and suspended biomass from the reactors for microbial community analysis using molecular techniques such as DNA sequencing.

• Identification of dominant microbial species and tracking changes in community composition over time.

Analytical Techniques:

• Quantitative analysis of POME constituents and treatment byproducts using established methods such as spectrophotometry, gas chromatography, and mass spectrometry.

• Assessment of microbial metabolic activities through enzyme assays and gene expression analysis.

Performance Evaluation and Comparison:

• Comparison of treatment efficiency and effectiveness of the bioengineered biomedia-based system with conventional POME treatment methods.

• Evaluation of the extent of pollutant degradation, nutrient removal, and reduction in environmental impact.

Data Analysis and Interpretation:

• Statistical analysis of experimental data to determine the significance of treatment outcomes.

• Correlation analysis between microbial community dynamics and treatment performance.

Economic and Environmental Assessment:

• Evaluation of the economic feasibility and environmental sustainability of the bioengineered biomedia-based treatment system in comparison to traditional methods.

Scale-Up Considerations:

• Exploration of the potential for scaling up the bioengineered biomedia-based treatment system to industrial levels.

• Identification of challenges and considerations for successful implementation on a larger scale.

By meticulously following this comprehensive methodology, this study aims to provide valuable insights into the utilization of bioengineered structural biomedia for enhancing the treatment of Palm Oil Mill Effluent, offering a viable solution to mitigate the environmental impacts associated with POME discharge.

RESULTS

The application of bioengineered structural biomedia in the treatment of Palm Oil Mill Effluent (POME) yielded significant improvements in various treatment parameters. The reactor equipped with the biomedia demonstrated higher removal efficiency for organic pollutants, as evidenced by a substantial reduction in Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD) levels. Suspended solids were effectively captured and removed, leading to improved clarity of the treated effluent. Nutrient removal, particularly nitrogen and phosphorus compounds, was also enhanced.

Microbial community analysis revealed the successful establishment of diverse and specialized microbial consortia on the biomedia surface. Metagenomic sequencing unveiled the presence of microbial species known for their capability to degrade complex organic compounds prevalent in POME. Over time, the microbial community composition exhibited

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adaptation and optimization, further contributing to enhanced treatment efficiency.

DISCUSSION

The observed improvements in POME treatment can be attributed to the synergistic interactions among the bioengineered structural biomedia and the developed microbial communities. The porous structure of the biomedia provided ample surface area for microbial attachment, promoting the growth of diverse microbial species. This diverse community collectively engaged in the degradation of organic contaminants through a range of metabolic pathways.

The enhanced treatment efficiency can be linked to the biofilm formation on the biomedia, which acted as a matrix for microbial interactions and facilitated the formation of microbial consortia with complementary functions. The close proximity of various microbial species within the biofilm encouraged the exchange of metabolites and facilitated the degradation of complex compounds through cooperative metabolic pathways.

Furthermore, the optimization of operational parameters, guided by continuous monitoring and analysis, played a pivotal role in achieving the observed results. The successful adaptation of the microbial community to the specific conditions within the reactor underscores the potential of bioengineered structural biomedia as a viable platform for tailored and efficient POME treatment.

CONCLUSION

In conclusion, this study demonstrated the efficacy of harnessing bioengineered structural biomedia for enhancing the treatment of Palm Oil Mill Effluent. The bioengineered biomedia provided a platform for the establishment of specialized microbial consortia that synergistically contributed to the degradation of complex organic compounds and the removal of pollutants from POME. The optimized reactor operation and the dynamic microbial community adaptation underscored the potential of this approach for sustainable and efficient POME treatment.

The successful outcomes of this study hold promise for the palm oil industry, offering a sustainable solution to address the environmental challenges associated with POME discharge. The integration of bioengineered structural biomedia into POME treatment systems not only improves effluent quality but also contributes to the conservation of aquatic ecosystems and the overall environmental well-being. Further research and development are warranted to refine and upscale this approach for practical implementation on an industrial scale, advancing the goals of environmental sustainability and responsible palm oil production.

REFERENCES

1. Andrew, D.E., Lenore, S.C., Eugene, W.R. and Arnold, E.G. (2005). Standard Methods for the Examination of Water and Wastewater. American Public Health Association, Washington, D.C.
2. Arif, S., Tengku Mohd Ariff, T.A., (2001). The case study on the Malaysian palm oil. UNCTAD/ESCAP Regional Workshop on Commodity Export Diversification and Poverty Reduction in South and Southe-East Asia, Bangkok.
3. Borja, R., Banks, C. J.,(1994). Treatment of palm oil mill effluent by up-flow anaerobic filtration. Journal of Chemical Technology and Biotechnology, 61:103-109.
4. Borja, R., Banks, C. J.,(1995). Comparison of anaerobic filter and an anaerobic fluidized bed reactor treating palm oil mill effluent. Process Biochemistry, 30:511-521.
5. Cascaval, D. (2003). Studies on Oxygen Mass Transfer in Stirred Bioreactors: Suspensionsof bacteria, yeasts and fungis, Journal of Chem. Ind., 57 (6):276-287.
6. Chan, Y. J., Chong, M. F., Law, C. L., (2010). Biological treatment of anaerobically digested palm oil mill effluent (POME) using a Lab Scale Sequencing Batch Reactor (SBR). Journal of Environmental Management.91:1738-1746.

The American Journal of Engineering and Technology
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SJIF IMPACT FACTOR (2020: 5. 32)(2021: 5. 705)(2022: 6. 456) (2023: 7. 038)
OCLC– 1121105677
Publisher:The USA Journals

7. Härtig, C., Loffhagen, N., Harms, H. (2005).Formation of trans Fatty Acids Is Not Involved in Growth-Linked Membrane Adaptation of Pseudomonas putida. Applied and Environmental Microbiology. 71:1915-1922
8. Harwood, C.S., Fosnaugh K., Dispensa M. (1989).Flagellation of Pseudomonas putida and analysis of its motile behavior. Journal of Bacteriology.171:4063-4066.
9. Kittikun, A. H., Prasertsan. P, Srisuwan. G & Krause, A. (2000). Environmental Management of Palm Oil Mill.Retrieved fromhttp://www.globetree.org/jackyfoo/ic-mfa/kittikun/index.html
10. MPOC, Malaysian Palm Oil Council, (2010). Retrieved from http://www.mpoc.org.my
11. Widdel, F. (2007). Theory and Measurement of Bacterial Growth.Grundpraktikum Mikrobiologie, 4. Sem. (B.Sc.), Universität Bremen.
12. Warden, W. B., Biomedia (2012). Filter media. Retrieved from http://wardenbiomedia.com/process/filter.html

The American Journal of Engineering and Technology
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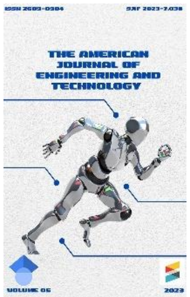

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Research Article

DYNAMIC SIMULATION OF AN ACTIVE FRONT BUMPER SYSTEM FOR ENHANCED FRONTAL IMPACT PROTECTION

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ABSTRACT

This research paper presents a dynamic simulation approach to investigate the effectiveness of an active front bumper system for enhancing frontal impact protection in vehicles. Frontal collisions remain a significant concern for road safety, and innovative solutions are sought to mitigate their impact. The study involves developing a sophisticated simulation model that captures the interactions between the active front bumper, vehicle structure, and collision dynamics. Through numerical simulations and analysis, the performance of the active bumper system is evaluated in terms of collision energy absorption, occupant safety, and vehicle structural integrity. The insights gained from this research contribute to advancing vehicle safety technologies and designing proactive measures to reduce the severity of frontal impacts.

KEYWORDS

Active front bumper system, dynamic simulation, frontal impact protection, vehicle safety, collision dynamics, energy absorption, occupant safety, vehicle structural integrity, road safety, vehicle safety technologies.

INTRODUCTION

Road safety remains a paramount concern, and advancements in vehicle technologies continue to play a pivotal role in reducing the severity of collisions and protecting occupants. Among the various types of collisions, frontal impacts pose a significant challenge due to the high energy transfer and potential for severe injuries. As vehicles become more sophisticated, the development of active safety systems that can proactively respond to collision scenarios has gained prominence.

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This research focuses on the dynamic simulation of an active front bumper system designed to enhance frontal impact protection. Traditional passive safety measures, such as structural design and airbag deployment, have contributed to reducing the consequences of frontal collisions. However, the emergence of active systems that dynamically interact with collision scenarios represents a paradigm shift in vehicle safety.

The active front bumper system under investigation employs sensors, actuators, and control algorithms to detect imminent collisions and initiate timely responses. These responses may involve altering the bumper's geometry, stiffness, or energy absorption characteristics to optimize impact energy management. By actively modifying the bumper's behavior, the system aims to mitigate collision forces, reduce intrusion, and enhance occupant safety.

This study employs a dynamic simulation approach to comprehensively analyze the effectiveness of the active front bumper system. The simulation model captures the complex interactions between the active bumper, the vehicle's structural components, and the dynamic forces during a frontal collision. Numerical simulations enable a detailed exploration of various collision scenarios, considering factors such as collision speed, angle, and vehicle mass.

The objectives of this research encompass assessing the active front bumper system's performance in terms of collision energy absorption, occupant safety enhancement, and preservation of vehicle structural integrity. The insights gained from the simulation analyses contribute to the growing body of knowledge on active safety systems, providing valuable information for designing proactive measures to mitigate frontal impact severity.

As vehicle safety regulations become more stringent, the integration of active safety systems into vehicle design is becoming imperative. This research not only advances our understanding of the complex interactions between active bumper systems and collision dynamics but also informs the design and implementation of advanced safety technologies. By harnessing the power of simulation, this study aims to drive the development of safer and more resilient vehicles, ultimately contributing to the broader goal of reducing road accidents and enhancing the well-being of road users.

METHOD

The dynamic simulation of an active front bumper system for enhanced frontal impact protection involves a systematic approach that combines engineering principles, computer simulations, and advanced modeling techniques. The methodology is outlined below:

System Characterization and Modeling:

Active Front Bumper System:

Define the active front bumper system's components, including sensors, actuators, control algorithms, and mechanical elements that enable adaptive responses. Develop mathematical models to describe the behavior of each component and its interactions.

Collision Scenario Definition:

Frontal Collision Scenarios:

Define a range of frontal collision scenarios that encompass various speeds, angles, and collision partners. These scenarios should cover a spectrum of potential real-world collision conditions.

Numerical Simulation Software Selection:

Simulation Platform:

Select a suitable simulation software platform capable of conducting dynamic simulations involving multi-body interactions, collision dynamics, and structural deformations. Examples include LS-DYNA, ANSYS Mechanical, or SIMULIA Abaqus.

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Simulation Model Development:

Active Bumper Integration:

Integrate the mathematical models of the active front bumper system into the chosen simulation platform. This involves coupling the control algorithms, sensor inputs, and actuator outputs with the simulation environment.

Vehicle and Collision Model Creation:

Vehicle Model:

Create a detailed 3D model of the vehicle's structural components, including the chassis, body panels, and front bumper. Define material properties and connections accurately to represent real-world structural behavior.

Collision Model:

Develop collision models for the collision partner(s) involved in each scenario. Consider rigid body models for other vehicles or deformable models for obstacles like barriers or walls.

Simulation Setup and Execution:

Scenario Configuration:

Set up the simulation environment by specifying collision parameters, initial conditions, and system responses. Define how the active bumper system adapts to impending collisions.

Simulation Execution:

Run the simulations for each defined scenario using appropriate time-stepping techniques. Monitor system responses, forces, accelerations, and deformations throughout the simulation.

Data Analysis and Interpretation:

Performance Metrics:

Analyze simulation results to assess the effectiveness of the active front bumper system. Measure parameters such as collision energy absorption, intrusion distance, deceleration profiles, and occupant protection.

Validation and Sensitivity Analysis:

Model Validation:

Validate the simulation results by comparing them to experimental data or real-world crash tests. Ensure that the simulation accurately represents the system's behavior under collision conditions.

Sensitivity Analysis:

Perform sensitivity analysis by varying parameters such as collision speed, bumper response time, or sensor accuracy to evaluate the system's robustness and limitations.

Performance Evaluation and Optimization:

Evaluation Metrics:

Assess the active bumper system's performance based on the defined evaluation metrics. Compare the results for different collision scenarios and analyze how system responses impact occupant safety and structural integrity.

By following this comprehensive methodology, the study aims to provide a thorough analysis of the active front bumper system's effectiveness in enhancing frontal impact protection. The dynamic simulations offer insights into the system's behavior, responses, and limitations under various collision conditions. These insights contribute to the ongoing advancement of active safety technologies and guide the design of more resilient and occupant-friendly vehicles.

RESULTS

The dynamic simulations of the active front bumper system for enhanced frontal impact protection have yielded valuable insights into the system's

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performance under a range of collision scenarios. The results are summarized as follows:

Collision Energy Absorption:

The simulations demonstrate the active front bumper system's ability to effectively absorb and dissipate collision energy. The adaptive responses of the bumper, such as altering stiffness or geometry, contribute to reducing the force transferred to the vehicle structure.

Occupant Safety Enhancement:

The simulations reveal that the active front bumper system contributes to reducing the severity of occupant injuries. By mitigating collision forces and controlling vehicle intrusion, the system enhances the protection provided to occupants during frontal impacts.

Structural Integrity:

Analysis of the vehicle's structural behavior indicates that the active bumper responses play a crucial role in preventing excessive deformation and maintaining the integrity of the passenger compartment. This preservation of structural integrity is vital for occupant safety.

DISCUSSION

The discussion focuses on the implications of the simulation results for vehicle safety enhancement. The adaptive nature of the active front bumper system proves instrumental in dynamically responding to collision scenarios. By optimizing its responses, the system contributes to a reduction in collision forces, deformation, and intrusion, which are critical factors for enhancing occupant safety.

The active bumper system's effectiveness is particularly evident in scenarios involving varying collision speeds and angles. Simulation results demonstrate that the system adapts its responses to optimize energy absorption and minimize the potential for secondary collisions or additional injury risks.

Furthermore, the simulations provide insights into potential challenges and limitations of the active front bumper system. These insights can guide further refinements and improvements in the system's design, control algorithms, and sensor accuracy.

CONCLUSION

In conclusion, the dynamic simulation approach employed to evaluate the active front bumper system's performance in enhancing frontal impact protection has yielded promising results. The simulations demonstrate that the system's adaptive responses play a crucial role in mitigating collision forces, enhancing occupant safety, and maintaining vehicle structural integrity.

The insights gained from this research contribute to the advancement of vehicle safety technologies by offering a deeper understanding of the complex interactions between active safety systems and collision dynamics. The simulation results underscore the importance of proactive safety measures in reducing the severity of frontal impacts, aligning with the overarching goal of minimizing road accidents and their consequences.

As automotive manufacturers continue to prioritize occupant safety, the integration of dynamic and adaptive safety systems holds significant promise. The findings from this research provide a foundation for further refinement and optimization of active safety technologies, ultimately contributing to safer roads and vehicles.

REFERENCES

1. D. Woo, S.B Choi, Y.T Choi and N.M Wereley. 2007. Frontal crash mitigation using MR impact damper for controllable bumper. SAGE Publications.
2. J.M. Flammang. 2000. Cars of the sensational '70s: A decade of changing tastes and new directions. Publications International.
3. K. Hudha, H. Jamaluddin and P.M Samin. 2005. Effects of control techniques and damper constraint on the performance of a semi-

active magnetorheological damper. Int. J. Vehicle Autonomous Systems, Vol. 3, Nos. 2/3/4.

4. M.M Davoodi, S.M Sapuan, R. Yunus. 2007. Conceptual design of a polymer composite automotive bumper energy absorber. Elsevier Ltd.
5. P.V. Lavrukhov, A.V. Plastinin, V.V.Sil'vestrov. 2003. Double layer high porous copper/duralumin bumper, Elsevier Ltd.
6. R. Hosseinzadeh, M.S. Mahmood, B.L Larry. 2004. Parametric study of automotive composite bumper beams subjected to low-velocity impacts. Elsevier Ltd.
7. R. Umar. 2005. Update of road safety status in Malaysia.
8. Universiti Putra Malaysia.V. Bogdanov, I. Balabin, A. Gladskih. 2003. Automobile industry. Russian.
9. Y. Matsui. 2005. Effects of vehicle bumper height and impact velocity on type of lower extremity injury in vehicle pedestrian accidents. Elsevier Ltd.

The American Journal of Engineering and Technology
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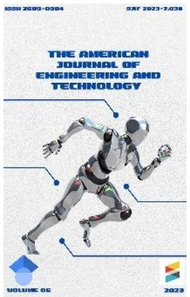

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Research Article

SOME CONSIDERATIONS IN THE STUDY OF LIDHT

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ABSTRACT

information about the preliminary work done on the study of light, the experiments conducted, the achievements and shortcomings, and the conflicting theories encountered. Experiments conducted by physicists were explained.

KEYWORDS

Red light, violet light, material point, point charge, point light source, light spectrum.

INTRODUCTION

The source of light for us, simply put, is the Sun. Some rays (X-rays, etc.) are the closest and most harmful types of light energy to human life. Over the years, a number of scientific mysteries have arisen regarding the properties of light and the properties of the sources that produce it.

As you readers know, the human eye can see light with wavelengths ranging from 0.4 microns (violet light) to 0.7 microns (red light). Light sources transmit energy into the surrounding space. The photometry department studies the energies emitted by light sources. It has several basic dimensions. The most important of them is the flow of light. Light sources can be divided into natural (Sun, lightning in the atmosphere) and artificial (electric lamps, gas discharge lamps, etc.). Just as in the mechanics section of a physics course the concepts of a point charge - a material point - are used, in the electricity section - in optics the concept of a point source of light, that is, a point source, is widely used.

A light source whose specific dimensions are negligible compared to the distance to the location under study is called a point source. A point source is also an idealized concept; it is assumed that it directs the light beam evenly in all directions. The branch of optics that studies the energy characteristics of light is called photometry.

The following quantities are used in photometry:

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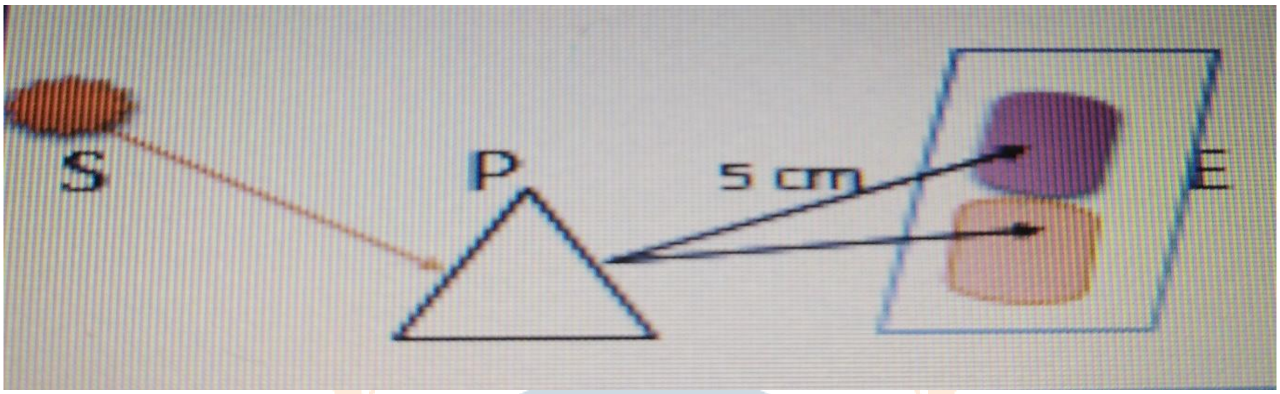
- energy quantities: in this case, the energy characteristics of light are considered without taking into account its impact on the receiver;

- characteristics of light: the physiological effect of light on the eye or other receptors is taken into account and, based on this effect, its power is estimated.

The main energy quantity of photometry is radiant flux.

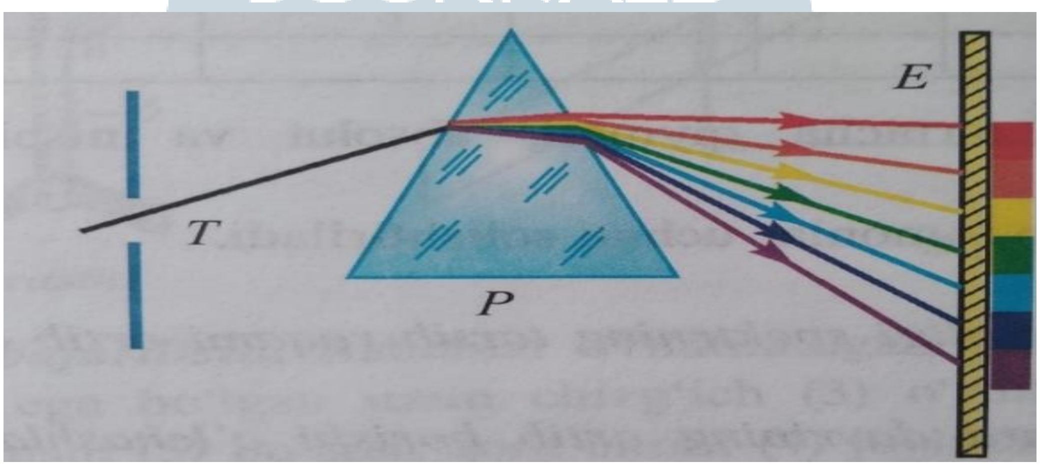
The great English physicist Isaac Newton also did a number of works on the study of light rays and achieved excellent results. Descartes' experiences (1620-1630) aroused Newton's interest in studying these properties of light and attracted his attention.



(Picture 1). Cartesian experience. Expression of the law of refraction of light.

He focused the light on a glass prism and saw that the light was divided into two parts (red and yellow) on white paper, which acted as a screen, at a distance of 5 cm from the prism. With the help of Ш, Descartes expressed the law of refraction of light.

Newton, who observed this experiment, focused his attention on the distance between the prism and the white paper that served as the screen, that is, the distance between objects. In his experiment, Newton introduced a beam of light through a slit into a darkened room and held a prism to it. The distance between the prism and the screen (wall) was increased to 5-6 meters. He then noticed that the light coming out of the prism was divided into 7 different colors on the screen (wall). Newton called the collection of different colors that appear when light passes through a prism a spectrum (from the Latin spectrum - to see).



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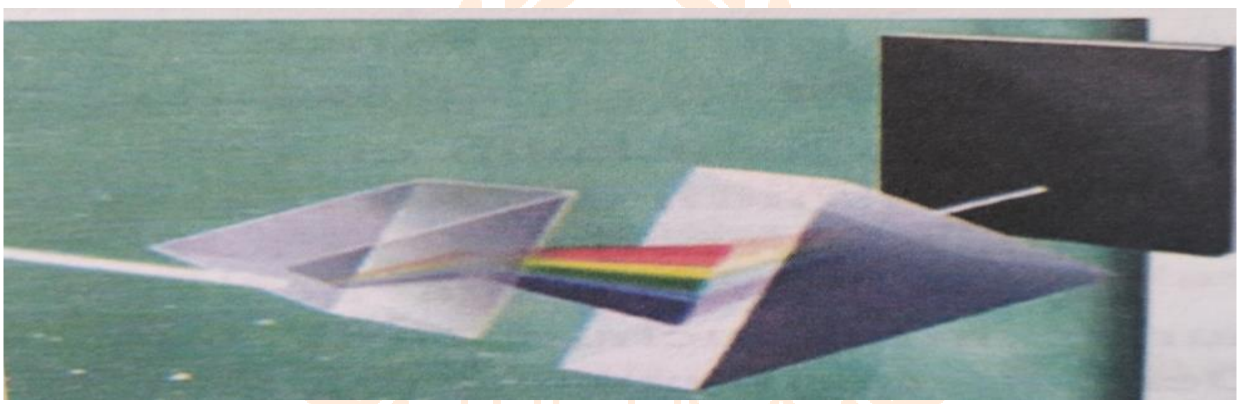
(Figure 2). The appearance of seven different colors when light passes through a prism.

Newton noticed that when the gap was covered with red glass, there was only a red spot on the wall, and when it was covered with green glass, there was only a green spot on the wall. Therefore, he also studied the refraction of rays. Although Newton did not know the reason for this, in this experiment he showed that white is a complex color. The spectrum (set of colors) consists of 7 different colors: red, gold, yellow, green, orange, blue and violet. Newton conducted many experiments proving the complexity of white. The modern analysis of this experience can be explained as follows;

If a second prism, rotated 180⁰ relative to the first, is placed in the path of light, separated into colors after passing through the first prism, this prism will act as a converging lens, and the point where the light ray arrives from it, the concentrated substances will become white.



(Figure 3). The complexity of white. An experiment showing that light passing through a prism splits into seven different colors and returns to white light.

At the end of the 17th century, two conflicting theories about the nature of light emerged: one was the corpuscular theory created by Newton, and the other was Huygens' wave theory. According to the corpuscular theory of light, light is a stream of very small material particles (corpuscles) propagating at high speed. The color effect of light is explained by the flow of corpuscles: the largest corpuscles emit red light, and the smallest ones emit violet light.

According to the wave theory of light, light consists of a current propagating at high speed in a space consisting of an elastic medium. According to this theory, the laws of reflection and refraction of light are explained on the basis of laws that apply to all waves. The color of light depends on its wavelength. The colors of light (Spectrum) begin with red light with the longest wavelength $l=7.6*10^{-7}$ m and end with violet light with the shortest wavelength $l=3.8*10^{-7}$ m. Both theories satisfactorily explained the laws of some light phenomena , for example, the laws of reflection and refraction of light. However, phenomena such as interference, diffraction and polarization of light could not be explained by these theories.

By the end of the 18th century, most physicists gave preference to Newton's corpuscular theory. At the beginning of the 19th century, thanks to the research of the English physicists Young and Fresnel, the wave theory received great development. The Huygens-Young-Fresnel wave theory successfully explained all light phenomena known at that time, including light interference, diffraction and polarization.

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In 1873, the English scientist J. Maxwell theoretically proved that light consists of electromagnetic waves propagating at a speed of $c=3*10^8$ m/s. G. Hertz confirmed this theory experimentally.

The achievements of the German physicist Wilhelm Wien are very effective in this area. In 1893, he published his scientific work on the spectral distribution of radiation from a heated body. V. Vin, using mathematical expressions, showed that as the temperature of heated bodies increases, the color of the radiation also changes.

In 1905, Albert Einstein, the great scientist studying light, took a bold step. The famous physicist M. Planck put forward the idea that light propagates in the form of separate portions, and A. Einstein believed that light has a quantum system, and this is a flow of light quanta (he showed that it consists of photons).

In 1928, Chandrasekhara Raman, a researcher at the University of Calcutta in India, and his students discovered that new spectral lines appeared near the red and blue colors of the main spectrum when studying the composition of the spectrum of light after passing through various substances. This physical phenomenon was later called the "Raman effect."

Discoveries in the study of new properties of light have not gone unnoticed. In 1911 W. Wynne, 1918 M. Planck, 1921 A. Einstein, 1923 R. Milleken, 1927 A. Compton and 1930 K. Raman studied the properties of light and received the Nobel Prize for physics for his great discoveries.

The search for new discoveries and inventions related to light continues today. Much work in this direction is being carried out in all countries of the world, including in Uzbekistan.

This scientific article on the study of light is recommended reading for students interested in the properties and nature of light.

REFERENCES

1. O. Akhmadjonov. Course "Physics", part II. Electricity and magnetism. T. Uchitel, 1981.
2. Detlaf A.A., Yavorsky B.M. "Physical course". M. 1989.
3. T.I. Trofimova. Physics course M. 1985
4. Physical encyclopedia. Pod editor A.M. Prokhorova. Moscow, 1990.
5. Physical encyclopedic dictionary. Module edition A. M. Prokhorova. Moscow, 1983.
6. Physics. Editor-in-Chief S.A. Akhmatova. Moscow, Science. 1965
7. Khramov Yu.A. Physical. Biographical reference book. Moscow, Science. 1983
8. M. N. Rakhmatov. Physicists of our country. T. Uchitel, 1983.
9. Gevorkyan R.V. "Physical course". M. Secondary school, 1979.
10. S.Astanov, M.Z.Sharipov, N.N.Dalmuradova, M.Sh.Ivaev, D. E. Khaitov. Electronic textbook "Wave optics" Computer Program Certificate. State patent of the Republic of Uzbekistan. office. 04/23/2007
11. S.Astanov, N.N.Dalmuradova. E-learning "Quantum Optics" Obtained certificate for manual EVM program. Uzbekistan
12. State Patent Office of the Republic of Kazakhstan. 10/30/2007

Information from the Internet.

1. www.tdpu.uz,
2. www.gov.uz,
3. www.ziyonet.uz,
4. www.fizika.uz.

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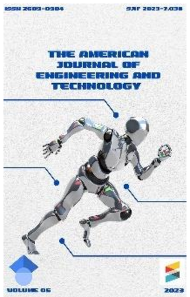

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Research Article

TECHNOLOGY OF OBTAINING THE WORKING WHEEL DETAIL WITHOUT IMPACT LOADS BY CASTING

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ABSTRACT

This article provides information and descriptions of the new alloy fluidization technology for casting wheel parts without shock loads and the processes involved in casting the alloy into the mold.

KEYWORDS

Steel wheel, carbon steel, electric arc furnace, gas voids, microstructures, manganese, GENT WP-300.

INTRODUCTION

Casting of low-cost industrial products on the basis of increasing the strength of the machine-building parts obtained by the casting method, improving their mechanical and operational properties is becoming important. At the same time, one of the important issues of the foundry sector is the production of high-quality cast products using the internal capabilities of local production facilities, while reducing the import of machine-building parts due to localization.

In particular, it is possible to improve the internal transformation capabilities of metallurgical and machine-building plants by obtaining cast steel wheels that work without impact loads. In this case, steel wheels that work without impact loads and move on rails are the main detail that requires high quality when transporting large loads.

Typically, wheel parts are made of corrosion-resistant, high-carbon steels (C above 0.6%). Wheel parts

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working without shock loads are made of 65G steel (C 0.62-0.7%, Mn 0.9-1.2%) and its foreign analogues [1].

Research methods

The liquefaction process was carried out in a grounded electric arc furnace at the highest level of the secondary voltage of the transformer. The voltage of the secondary winding did not exceed 170 V, the current strength of the low voltage side did not exceed 1685 A, and the high voltage side did not exceed 60.5 A. Limestone was added in 1-2 parts up to 10-30 kg to form a thick slag. After 50-80% of the slag was melted in the furnace, 10-15 kg of limestone was added to cover the liquid metal with slag. After melting the alloy, the bath was mixed with a special spoon, a sample was taken and sent to the express laboratory through special tubes to determine the mass fraction of carbon and the chemical composition of the alloy. The chemical composition of samples 1-2-3 obtained from the mixture is shown in Table 1 [2].

Table 1

65G alloy	Chemical composition %:								
	C	Si	Mn	S	P	Cr	Ni	Cu	Al
Sample 1	0.58	0.20	0.95	0.03	0.030	0.20	0.22	0.2	0.1
Sample 2	0.60	0.25	1.10	0.035	0.035	0.25	0.25	0.2	0.3
Sample 3	0.65	0.30	1.20	0.035	0.035	0.25	0.25	0.2	0.3

Table 1: Determined chemical composition of samples 1-2-3 obtained during liquefaction of high-carbon low-alloy steel 65G alloy

The percentages of chemical components were controlled until the composition of the mixture was in accordance with SSO 14959-89. According to the composition, 10-15 kg of coke was added during the liquefaction period to increase the carbon content [3].

After the alloy is ready, it is removed from the furnace heated at 750-850 $^{\circ}$C and the temperature of 1580 $^{\circ}$C is removed from the furnace and poured into the mold prepared based on the relevant drawings for the wheel detail. (the prepared mold for the wheel detail is shown in Figure 1).

Figure 1

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Figure 1: Upper (a) and lower (b) parts of a sand-clay mold prepared for casting a wheel detail.

When pouring into the mold cavity, the liquid metal was poured through the casting system and then through the sprue until the cavity was filled.

The advantage of die casting is that it avoids the intrusion that can be encountered in casting.

The obtained samples were subjected to mechanical tests on several modern stands, at the same time, microstructures of the samples and distribution of components along the volume and nominal amounts were checked in graph form on the "SPECTORLAB M12" device (Figure 2 (a,b,c) [4].

Figure 2

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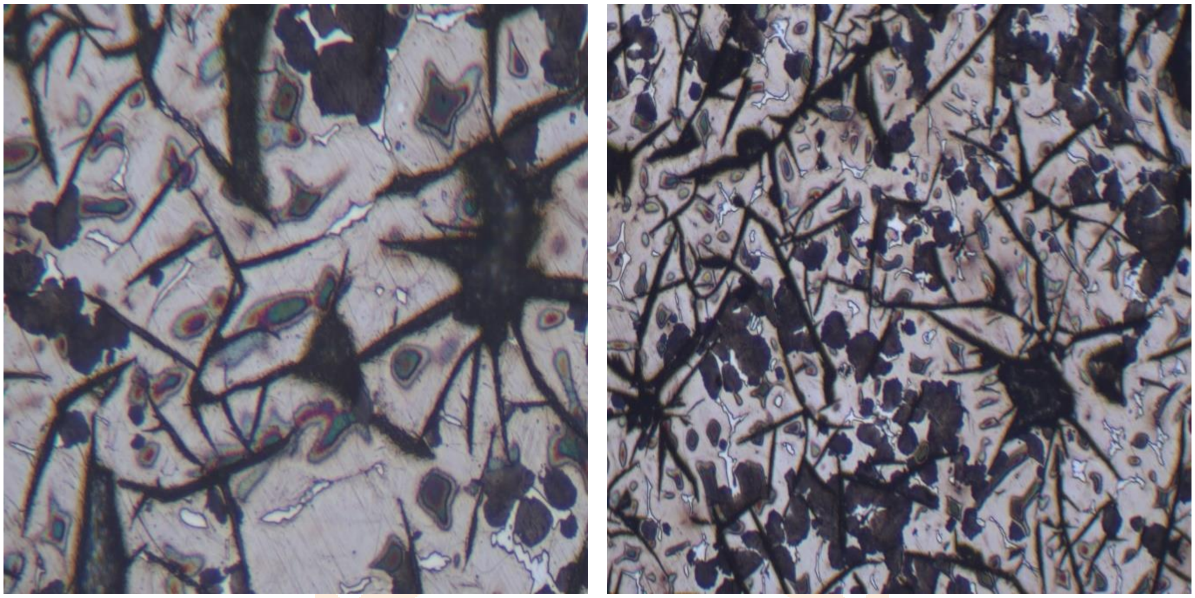

Figure 2: a) Microstructure analysis of a wheel detail sample without impact loads

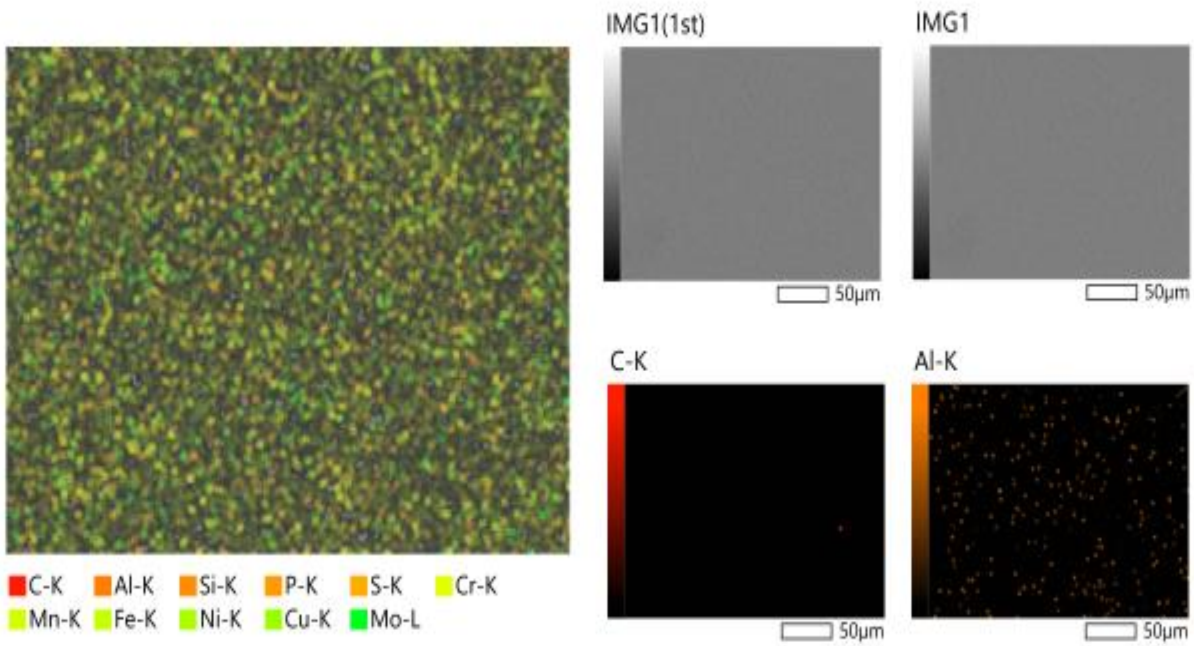

Figure 2: b) Dispersion of the components in the alloy along the volume

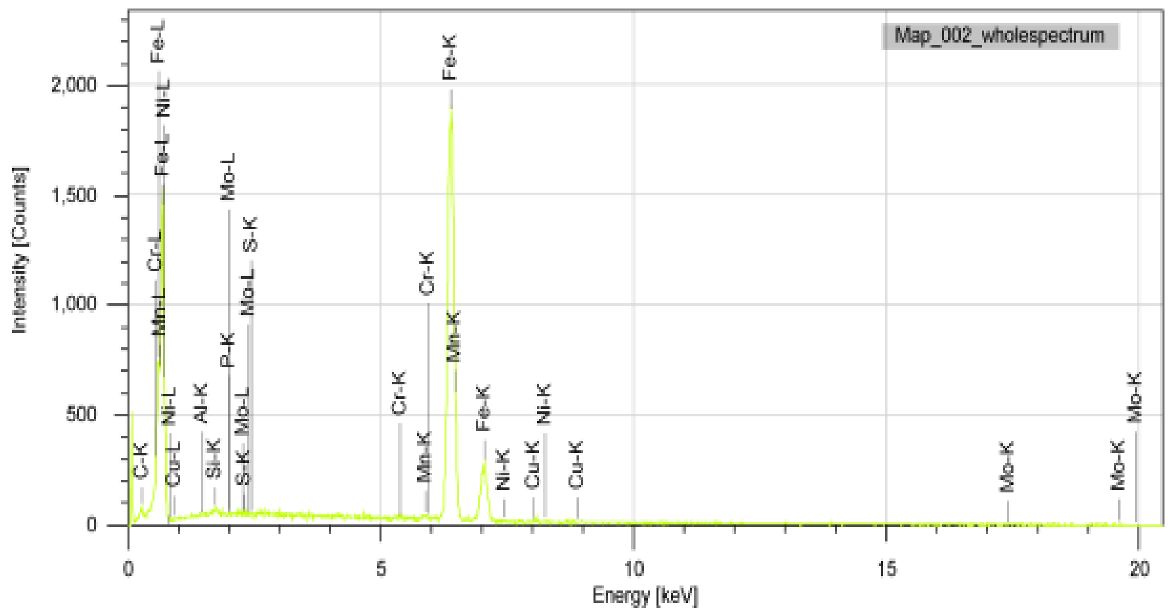

Figure 2: c) Nominal quantitative indicators of the components of the mixture

In the process of liquefaction, as a scientific innovation, the chemical composition was slightly changed. In particular, the shares of nickel (Ni) and aluminum (Al) in the concentrate were re-adjusted. In the processes of liquefaction and casting, the proportion of aluminum in the concentrate was divided into three parts and added outside the furnace. 40% of the aluminum content was added during annealing, 30% after annealing, and 30% when the alloy was inserted into the mold cavity [5]. In this case, the burning of aluminum was prevented, and the fluidity of the alloy was improved, and the cavity of the mold was well filled [4]. When testing the samples, while the alloy was still in the furnace, the sample was sent to the express laboratory through the transfer pipes. A modern "SPECTROLAB - M11" device was used for microstructure testing of the samples. Inspections were carried out at temperature t-20°C and humidity W-54%.

CONCLUSION

Hardness testing of alloy samples used for steel wheels working without shock loads was carried out on modern GUNT WP-300 equipment at room temperature t-27 °C and humidity W-54%. In this case, the samples were cut with a diameter of 30 mm and a height of 20 mm. As a result of the test, it was determined that the hardness of the samples was 240 MPa, 241 MPa, and 242 MPa, respectively. This is a mechanical property sufficient for the production of steel wheels without shock loads from this alloy.

REFERENCES

1. Abdujalol, B., Nodir, T., Fakhriddin, M., Nuriddin, T., Kamola, T., & Nargiza, S. (2022). Development of steel wheel detail casting technology. Asian Journal of Multidimensional Research, 11(8), 82-88.
2. Pickering F. Overview of Titanium microalloyed steels. IoM Titanium Technology in
3. Microalloyed Steels. 1994: 10-43
4. Ergashev, D., & Khudayberdiev, O. (2023). Development of thermocyclic processing modes for carbon steels used on cold forming tools. In E3S Web of Conferences (Vol. 383, p. 04066). EDP Sciences.
5. Орибжон Рахимбердиевич Худайбердиев, Дилшодбек Мамасидиқович Эргашев, & Мавлюдахон Махамаджоновна

Ходжимухамедова (2022). ҒОВАКЛИ ТЕМИР АСОСЛИ АНТИФРИКЦИОН ҚОТИШМАЛАРГА ЮКЛАМАНИНГ ТАЪСИРИ. Central Asian Academic Journal of Scientific Research, 2 (4), 127-134.

6. Bektemirov A.D.,Tashkhodjayeva K.U., Erkinjonov A.B. "Development of technology for obtaining high-quality cast products from carbon steel alloy" Scientific and technical journal of "Mashinasozlik" ISSN 2181-1539. № 2. 2022 y.

The American Journal of Engineering and Technology
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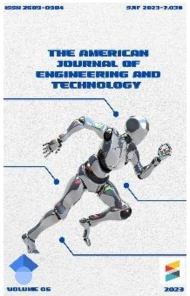

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Research Article

TECHNOLOGIES FOR PROCESSING WORKING PARTS OF DIES USED IN COLD VOLUME STAMPING

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ABSTRACT

This paper presents an analysis of the technical requirements for cold stamping, wear of their working zones, factors affecting wear and ways to increase wear resistance.

KEYWORDS

Cold stamping, bending, tool steels, alloy steels, carbon steels, strength, hardness.

INTRODUCTION

Metal pressure processing methods are very widely used in modern engineering industry. Among them, cold dimensional stamping is especially important. One of the relatively heavy-duty operations in cold dimensional stamping is the deposition operation. Dies designed for cold deposition work under the influence of complex stresses and high cyclic loadings of a relatively high speed shock loading nature.

MAIN PART

In the working zone of the stamps, a significant specific load with a value of 2500 MPa occurs. Stamping conditions are significantly more difficult in the local contact of the "metallzagotovka-tool" (applied wedge type) and its specific load in this zone can reach a maximum value of 3500 MPA. When heating the contact volumes of the tool, the temperature does not exceed 150-170°C in most cases. At the same time, at high intensity of stamping, the heating temperature of the tool can reach 300-400 °C due to the large volume of the deformable metal and the high degree of deformation.

Due to the limitations mentioned above and in a number of other cases, cold dip tools have been found to have limited durability.

The tolerance of stamps is characterized by a rapid decrease with increasing tangential (ring) stresses, which determine the mass of the die to be stamped [1].

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As we noted above, the cost of tools is 20-35% of the cost of stamping.

Nevertheless, cold deposition is one of the progressive technological processes. In this method, obtaining the zagotovka in the state of precipitation in a state close to the shape, size and surface cleanliness of the finished product, the fact that the process has high productivity, and the loading scheme is close to all-round compression and is symmetric to the axis, determines the possibilities of increasing the basic physical and mechanical properties of the product.

The solution to the problem of increasing durability is the manufacture of tools from VK6, VK8 hard alloys. Hard alloy matrices are practically not used for roller deposition matrices, especially for large-sized ones, in cases related to the occurrence of significant local loads in the contact zone of "metal zagotovka - engraving" at the first stage of deposition.

To solve the above problem, information on the basic laws of corrosion of cold-pressed tools and the causes of failure is needed. We emphasize that a comprehensive approach is needed to solve the problems of increasing the durability of the tool. According to the literature, the collection of data in the operation of cold-dip stamps with different nomenclature (for obtaining cylindrical and conical rollers, balls, bolt-rivet type details, and the like) is carried out for three reasons: the fact that the deformation of the engraving is irreversible, the integrity of the working zone on tampering and displacement of stamps.

Local or general irreversible changes in the shape and dimensions of the working zones of the tool occur as a result of plastic deformation and abrasive wear. The dominant mechanism of changes in the geometric dimensions of the working surfaces of stamps has not been developed by researchers from a single point of view. Cold forming tools attribute the irreversible deformation to the abrasive action of the workpiece material and, in part, to fatigue cracking of the tool workpiece [2].

Research shows that the dimensional stability of the tool depends on the yield strength of the material from which the stamps are made. In general, the intensity of irreversible deformation of the engraving depends on its configuration, the temperature-force conditions of stamping and the strength characteristics of the stamp material. At the same time, it has a great influence on the hardness and depth of penetration of the stamping material [3,4].

An increase in the hardness of the toiled zone on the one hand leads to an increase in bending strength and resistance to plastic deformation, on the other hand, it causes a decrease in viscosity and migration. A decrease in hardness leads to an acceleration of crushing and deformation of the contact zone. Inadequate indentation depth and significant contact stresses in the transition zone and working surfaces of the dies can cause local plastic deformations due to insufficient strength in the layers. And on the contrary, an excess of the specified zones leads to a decrease in the viscosity of the working volume of the stamp, and as a result, the cracking and grinding of the macro sections of the tool occurs.

The degree of resistance to bending under cold deformation conditions depends on the type of carbides, their amount, dispersion and uniform distribution in volume. High bending resistance results in a fine and uniform distribution of carbides in the structure. Carbide particles, which have entered the working surfaces in the form of large accumulations or strips, or their excessive amount, play an additional abrasive role in this case, cracking and breaking due to acceleration of bending can be observed.

It is known that the state of the phase of carbides is determined by the conditions of crystallization, plastic deformation and, to a significant extent, the scheme and regimes of thermal treatment. However, the directional control of the carbide phases during the final thermal treatments (with deposition and release) is much less studied and therefore relevant. These possibilities are explored in the current research work.

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Violation of the integrity of the working zone of the stamp, occurrence of micro and macroscopic breaks (cracks) occurs as a result of various reasons. The occurrence and subsequent acceleration of cracks during the early service phase of cold forming stamps is not considered typical and is associated with defects of a metallurgical, technological, or structural nature, and under multi-cycle loading, high-intensity-low-cycle fatigue. The occurrence of cracks is caused by the effect of high specific forces, and in most cases, by the resistance of the steel to temporary rupture, which occurs during cold sintering. The presence of microcracks accelerates the processes of irreversible deformation, retention and abrasive wear. In the localized areas of cracks, stress concentration occurs, strength and viscosity characteristics decrease sharply, which leads to voids and microdiscontinuities in overlapping contact retention processes.

Crack acceleration kinetics depends on the properties of tool steels under operational conditions and is manifested by the mechanism of slow wear of the tool and immediate wear - the splitting of stamps into small pieces. Stamping into small pieces is known to us at some specific stages of tooling due to serious technological process disturbances or fluctuation phenomena (having rough scores on carbide and mirror inclusions, fiber compression, presence of cracks of hammering or thermal origin, high residual tensile stresses level, etc.) is based on the strength limit and impact toughness of the stamp material, which is considered one of the important characteristics when evaluating the tool's resistance to embrittlement.

Thus, the leading mechanisms of distortion for cold-deposition stamps are the irreversible deformation and size changes of the working zones of the tool (mainly due to plastic deformation and deformation) and the formation of cracks (the division of the stamps into small pieces). Accordingly, stamps designed for cold deposition should be characterized by high plastic deformation resistance and creep resistance properties combined with as high a viscosity as possible. At the same time, according to these requirements, the stamping steels intended for tools intended for cold deposition should be characterized by satisfactory technological properties at all limits (having a sufficient level of malleability, depth of penetration, hardness and satisfactory machinability, cutability, grindability, etc.).

The issues of controlling the stress state of the tool in the constructive and surface finishing methods are considered in the work.

According to a number of researchers [2,3], the level of physico-mechanical properties of the material for cold stamps is one of the factors that determine tolerance. Changing the physical and mechanical properties of relatively alloyed steels, high-strength and bending-resistant coating methods (plasma coating, ion-plasma thin coating coating, laser processing methods, chemical-thermal processing methods, melt coating of working surfaces with bending-resistant alloys) can be implemented [6]. Significant results in solving the problems of increasing the long-term durability of cold working stamps can be achieved by traditional optimization of thermal treatment schemes and modes. This engineering oriented solution is relatively the most convenient and doable solution. However, it is not practical to increase the durability of cold-deposition stamps by known heat treatment methods. New opportunities in this direction are associated with research and development of new schemes (respectively and modes) of volumetric or local thermal processing.

Tools designed for cold deposition are made of carbon and alloy steels. Carbon steels are characterized by a small depth of penetration and not great properties. Therefore, U10, U11 steels are used only for small-sized stamps (diameter 30 mm) intended for sinking with a small force. The application of these steels is very limited [7,8].

CONCLUSION

The selection of a tool steel grade for a specific technological process is primarily based on the properties of the material to be deformed (mainly hardness) and the size of the zagotovka in the shape changes, which together determine the stresses that will occur in the tools. A large number of different grades of steel are recommended for tools intended for cold deposition, which differ significantly in the degree of alloying, the combination of alloying elements, and the level of final structure and properties. Complex alloyed steels with relatively high mechanical properties are among them. However, many of these branded steels have serious disadvantages: low technological level, the fact that the final property and operational tolerance of the brand composition are significantly important, their high level of alloying, which reduces the technical and economic efficiency of their use, etc.

REFERENCES

1. Abdujalol, B., Nodir, T., Fakhriddin, M., Nuriddin, T., Kamola, T., & Nargiza, S. (2022). Development of steel wheel detail casting technology. Asian Journal of Multidimensional Research, 11(8), 82-88.
2. Alon Mishra, Joydeep Maity. Structure – property correlation of AlSi 1080 steel subjected to cyclic quenching treatment // Materials Science Engineering A. – 646. – 2015. – P. 169-181.
3. Гурьев А.М., Земляков С.А. Новая высокоэффективная технология термического упрочнения режущего и штампового инструмента. В сб. трудов научно-технической конференции 5-7 апреля 2000 г.- Барнаул: Изд-во АлтГТУ, 2000.- С.25-27.
4. Марочник сталей и сплавов. М. М. Колосков, Е.Т. Долбенко, Ю.В. Каширский и др. Под ред. А. С. Зубченко – М.: Машиностроение, 2001.- 672 С.
5. Фирсова Н. В. Разработка оптимального легирующего комплекса и режимов термического упрочнения штамповых сталей. Дисс. на соиск. уч. степ, к.т.н. / Н.В. Фирсова. -Оренбург, 2011. - 17 с.
6. Norkhudjayev, F. R., Mukhamedov, A. A., Khudayberdiev, O. R., Ergashev, D. M., & Norkhudjayeva, R. F. (2020). Development of Machine-Building Materials and Details of Machines from the Powders received from Waste of Raw Materials in the Industry of Uzbekistan. Test Engineering and Management, 83(5-6), 639-646.
7. Norkhudjayev, F. R., Mukhamedov, A. A., Djalolova, S. T., Ergashev, D. M., & Hudayberdiyev, O. R. (2020). Technological capabilities of application of thermocyclic processing (Tcp) tool steel. International Journal of Psychosocial Rehabilitation, 24(8), 1866-1874.
8. Норхуджаев, Ф. Р., Мухамедов, А. А., Эргашев, Д. М., Норхужаева, Р. Ф., & Тешабоев, А. М. (2021). Влияние режимов термоциклическая обработка на структурообразование инструменталъных сталях. Композиционные материалы, 1, 75-77.
9. Норхуджаев, Ф. Р., Эргашев, Д. М., & Тешабоев, А. М. (2021). Упрочненение режущих сегментов аппаратов уборочных машин. Композиционные материалы, 2, 92
10. Ataxonova, S. Q., & Mo'Ydinova, D. R. (2022). METALL QOTISHMALARINING MARKALANISHI TAHLILI. Oriental renaissance: Innovative, educational, natural and social sciences, 2(3), 312-326.
11. Ataxonova, S. Q., & Murodjon o'g, S. U. B. (2022). Analysis Of Magnetic Materilas. Texas Journal of Multidisciplinary Studies, 6, 23-26.
12. Ataxonova, S. Q. (2021). METALLARNI SIFAT NAZORATINI TEKSHIRISH USULLARINI TAHLIL QILISH JARAYONLARINI TAKOMILLASHTIRISH. Oriental INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCHERS www.wordlyknowledge.uz Volume: 2, Issue: 1, 2023 157 renaissance: Innovative, educational, natural and social sciences, 1(10), 124-135.
13. Jalilov Rakhimjon Ravshanbek o'g'li. "CLADDING TILE PRODUCTION USING

The American Journal of Engineering and Technology
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14. Jalilov Rahimjon Ravshanbek o'g'li. "Study of Morphology and Dimensions of Ultra-Dispersed Powders of Tungsten." American Journal of Social and Humanitarian Research 3.5 (2022): 20-22.

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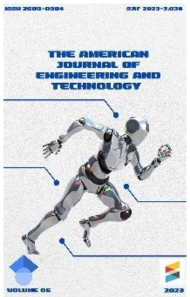

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Research Article

SOREL CEMENT A VERSATILE MATERIAL FOR CONSTRUCTION AND BEYOND

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ABSTRACT

This paper presents an analysis of the Sorel cement, also known as magnesia cement or magnesium oxychloride cement, is a versatile construction material with a wide range of applications. It has been used for over a century and continues to be valued for its unique properties and durability.

KEYWORDS

Sorel cement, magnesia cement, magnesium oxide, hardening, fire resistance, strength, hardness.

INTRODUCTION

Sorel cement, also known as magnesia cement or magnesium oxychloride cement, is a versatile construction material with a wide range of applications. It has been used for over a century and continues to be valued for its unique properties and durability. In this article, we will explore the characteristics, applications, and advantages of Sorel cement, shedding light on its significance in modern construction and beyond.

Sorel cement is composed of magnesium oxide (MgO) and magnesium chloride (MgCl2) mixed with water. This combination forms a dense, solid material that hardens quickly and exhibits excellent fire resistance. The chemical reaction that occurs during the mixing process produces magnesium oxychloride, which is responsible for the material's strength and durability.

Characteristics of Sorel Cement:

1. High Compressive Strength: Sorel cement has excellent compressive strength, making it suitable for load-bearing applications. It can withstand heavy loads and is commonly used in industrial flooring, bridge decks, and other structural elements.

2. Rapid Setting and Hardening: Sorel cement hardens rapidly, often within a few hours, which allows for fast construction and reduces project timelines. This

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characteristic makes it highly desirable in situations where time is of the essence.

3. Fire Resistance: Sorel cement is inherently fire-resistant, making it a preferred choice in applications where fire safety is paramount. It does not burn, release toxic fumes, or contribute to the spread of flames, making it ideal for fireproofing purposes.

4. Good Adhesion: Sorel cement exhibits excellent adhesion to various surfaces, including concrete, wood, and metal. This property makes it a reliable material for bonding and repairing purposes.

Applications of Sorel Cement:

1. Industrial Flooring: Due to its high compressive strength, abrasion resistance, and fire resistance, Sorel cement is widely used in industrial flooring applications. It can withstand heavy machinery, chemical spills, and high foot traffic, making it a durable choice for factories, warehouses, and other industrial facilities.

2. Fireproofing: Sorel cement's exceptional fire resistance makes it a valuable material for fireproofing structures. It can be used to coat steel beams, columns, and other elements, providing a protective layer that helps prevent the spread of fire and increases the structural integrity of buildings.

3. Repair and Restoration: Sorel cement is often used for repair and restoration work, especially in historical buildings. Its compatibility with various substrates and its ability to mimic the appearance of traditional materials make it a versatile option for preserving architectural heritage.

4. Artistic and Decorative Applications: Sorel cement's versatility extends beyond its functional applications. It can be used in artistic and decorative projects, such as sculptures, tiles, and ornamental elements. Its ability to take on complex shapes and its aesthetic appeal make it a favorite among designers and artists.

Advantages of Sorel Cement:

1. Durability: Sorel cement's robust nature ensures long-lasting performance, even in challenging environments. Its resistance to chemical attacks, abrasion, and fire contributes to its durability.

2. Quick Installation: The rapid setting and hardening properties of Sorel cement allow for speedy construction, reducing project timelines and minimizing downtime.

3. Environmentally Friendly: Sorel cement is considered an eco-friendly material as it is produced using naturally occurring minerals. It has a low carbon footprint and can be recycled or reused in certain applications.

4. Cost-Effective: While the initial cost of Sorel cement may be higher than some traditional materials, its durability and low maintenance requirements make it a cost-effective choice in the long run.

CONCLUSION

Sorel cement is a versatile construction material that offers unique properties and a range of applications. Its high compressive strength, rapid setting, fire resistance, and adhesion properties make it a valuable choice in various construction projects. Whether used in industrial flooring, fireproofing, repair and restoration, or artistic endeavors, Sorel cement continues to play a significant role in modern construction and beyond, contributing to the durability, safety, and aesthetic appeal of structures.

REFERENCES

1. Abdujalol, B., Nodir, T., Fakhriddin, M., Nuriddin, T., Kamola, T., & Nargiza, S. (2022). Development of steel wheel detail casting technology. Asian Journal of Multidimensional Research, 11(8), 82-88.
2. Alon Mishra, Joydeep Maity. Structure – property correlation of AISi 1080 steel subjected to cyclic quenching treatment // Materials Science Engineering A. – 646. – 2015. – P. 169-181.

The American Journal of Engineering and Technology
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OCLC– 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: The USA Journals

3. Гурьев А.М., Земляков С.А. Новая высокоэффективная технология термического упрочнения режущего и штампового инструмента. В сб. трудов научно-технической конференции 5-7 апреля 2000 г.- Барнаул: Изд-во АлтГТУ, 2000.- С.25-27.
4. Марочник сталей и сплавов. М. М. Колосков, Е.Т. Долбенко, Ю.В. Каширский и др. Под ред. А. С. Зубченко – М.: Машиностроение, 2001.- 672 С.
5. Фирсова Н. В. Разработка оптимального легирующего комплекса и режимов термического упрочнения штамповых сталей. Дисс. на соиск. уч. степ, к.т.н. / Н.В. Фирсова. -Оренбург, 2011. - 17 с.
6. Norkhudjayev, F. R., Mukhamedov, A. A., Khudayberdiev, O. R., Ergashev, D. M., & Norkhudjayeva, R. F. (2020). Development of Machine-Building Materials and Details of Machines from the Powders received from Waste of Raw Materials in the Industry of Uzbekistan. Test Engineering and Management, 83(5-6), 639-646.
7. Norkhudjayev, F. R., Mukhamedov, A. A., Djalolova, S. T., Ergashev, D. M., & Hudayberdiyev, O. R. (2020). Technological capabilities of application of thermocyclic processing (Tcp) tool steel. International Journal of Psychosocial Rehabilitation, 24(8), 1866-1874.
8. Норхуджаев, Ф. Р., Мухамедов, А. А., Эргашев, Д. М., Норхужаева, Р. Ф., & Тешабоев, А. М. (2021). Влияние режимов термоциклическая обработка на структурообразование инструменталъных сталях. Композиционные материалы, 1, 75-77.
9. Норхуджаев, Ф. Р., Эргашев, Д. М., & Тешабоев, А. М. (2021). Упрочненение режущих сегментов аппаратов уборочных машин. Композиционные материалы, 2, 92
10. Ataxonova, S. Q., & Mo'Ydinova, D. R. (2022). METALL QOTISHMALARINING MARKALANISHI TAHLILI. Oriental renaissance: Innovative, educational, natural and social sciences, 2(3), 312-326.
11. Ataxonova, S. Q., & Murodjon o'g, S. U. B. (2022). Analysis Of Magnetic Materilas. Texas Journal of Multidisciplinary Studies, 6, 23-26.
12. Ataxonova, S. Q. (2021). METALLARNI SIFAT NAZORATINI TEKSHIRISH USULLARINI TAHLIL QILISH JARAYONLARINI TAKOMILLASHTIRISH. Oriental INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCHERS www.wordlyknowledge.uz Volume: 2, Issue: 1, 2023 157 renaissance: Innovative, educational, natural and social sciences, 1(10), 124-135.
13. Jalilov Rakhimjon Ravshanbek o'g'li. "CLADDING TILE PRODUCTION USING MAGNESIUM OXYCHLORIDE CEMENT MORTAR IMPROVED BY DIFFERENT WASTES." Gospodarka i Innowacje. 35 (2023): 276-278.
14. Jalilov Rahimjon Ravshanbek o'g'li. "Study of Morphology and Dimensions of Ultra-Dispersed Powders of Tungsten." American Journal of Social and Humanitarian Research 3.5 (2022): 20-22.
15. Жалилов Р. Р. У., Абдуганиева Х. Р. К ИССЛЕДОВАНИЕ МОРФОЛОГИИ И РАЗМЕРОВ УЛЬТРАДИСПЕРСНЫХ ПОРОШКОВ ВОЛЬФРАМА КРИСТАЛЛООПТИЧЕСКИМИ МЕТОДАМИ //Academic research in educational sciences. - 2021. - Т. 2. - №. 11. - С. 633-640.
16. Tojiboyev, B. M., Muhiddinov, N. Z., Karimov, R. I., & Jalilov, R. R. O. G. L. (2021). IKKILAMCHI TERMOPLAST POLIMERLAR ASOSIDA QURILISH SANOATI UCHUN POLIMERKERAMIK KOMPOZITSION MATERIALLARNI OLISH JARAYONINI TAKOMILLASHTIRISH. Oriental renaissance: Innovative, educational, natural and social sciences, 1(9), 386-392.
17. Jalilov Rahimjon Ravshanbek. (2022). Study of Morphology and Dimensions of UltraDispersed Powders of Tungsten. American Journal of Social and Humanitarian Research, 3(5), 20-22.

The American Journal of Engineering and Technology
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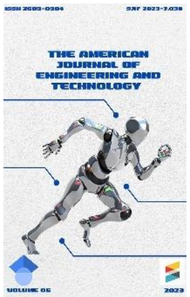

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Research Article

DEVELOPMENT OF TECHNOLOGY FOR THERMAL CYCLING OF PARTS MADE OF HIGH-ALLOY STEELS

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ABSTRACT

This paper presents an analysis of the technical requirements for cold stamping, wear of their working zones, factors affecting wear and ways to increase wear resistance.

KEYWORDS

Cold stamping, bending, tool steels, alloy steels, carbon steels, strength, hardness.

INTRODUCTION

Thermal cycling technology plays a crucial role in the processing of high-alloy steels, enabling the enhancement of mechanical properties and longevity of parts operating under extreme conditions. In this article, we will explore the development of technology for thermal cycling of parts made of high-alloy steels and its advantages.

1. Purpose of Thermal Cycling:

The primary purpose of thermal cycling is to create an optimal microstructure in the material, leading to improved mechanical properties such as strength, hardness, and resistance to failure under high temperatures or cyclic loads. This is particularly important for parts operating in high-temperature environments, aggressive media, or subjected to fatigue loading.

2. Thermal Cycling Process:

The thermal cycling process involves heating the parts to a specific temperature, holding them at that temperature for a designated time, and subsequently rapidly cooling them. This cycle is repeated multiple times, depending on the desired characteristics and material requirements. Factors such as heating time, temperature, cooling rate, and the number of thermal cycles are critical in achieving the desired results.

3. Advantages of Thermal Cycling:

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- Enhanced Strength and Resistance to Failure: Thermal cycling induces structural changes in the material, resulting in increased strength and resistance to failure. This is particularly beneficial for parts subjected to high temperatures or cyclic loads, where mechanical integrity and longevity are paramount.

- Improved Thermal Stability: Thermal cycling improves the thermal stability of parts, enabling them to maintain their properties and functionality even under significant temperature fluctuations. This is crucial for components exposed to rapid thermal changes or varying operational conditions.

- Reduced Fatigue Risk: Cyclic loading can lead to fatigue failure in parts. By subjecting the components to thermal cycling, their fatigue resistance can be significantly improved, enhancing their durability and reducing the likelihood of failure during service.

- Process Optimization: The development of thermal cycling technology for high-alloy steels allows for process optimization and improved manufacturing efficiency. By precisely controlling the thermal cycles, the desired material properties can be consistently achieved, resulting in better performance and quality of the final parts.

4. Research and Advancements:

The development of technology for thermal cycling of parts made of high-alloy steels is an area of ongoing research and development. Researchers and engineers are continually exploring new approaches to optimize the thermal cycling parameters, improve material microstructures, and enhance the overall performance of high-alloy steel components.

5. Non-Destructive Testing and Quality Control:

To ensure the quality and integrity of parts subjected to thermal cycling, non-destructive testing methods such as ultrasonic testing, magnetic particle inspection, or visual inspection are employed. These techniques help detect any potential defects or irregularities that could compromise the performance of the parts.

6. Application Areas:

The development of technology for thermal cycling of high-alloy steel parts finds applications in a wide range of industries. For example, in the aerospace industry, components such as turbine blades, exhaust systems, and structural elements benefit from improved strength, fatigue resistance, and thermal stability. In the energy sector, thermal cycling technology can enhance the performance and longevity of components used in power generation plants, including turbines, boilers, and heat exchangers.

7. Research and Advancements:

Ongoing research and advancements in thermal cycling technology continue to push the boundaries of material performance. Researchers explore novel alloy compositions, advanced heat treatment techniques, and optimized process parameters to further enhance the properties of high-alloy steels subjected to thermal cycling. Additionally, computational modeling and simulation techniques aid in predicting and optimizing the material response during thermal cycling.

CONCLUSION

The development of technology for thermal cycling of parts made of high-alloy steels has significant implications for enhancing the mechanical properties, thermal stability, and fatigue resistance of these components. By carefully controlling the thermal cycling parameters, manufacturers can produce high-quality parts with improved performance and longevity, making them suitable for demanding applications in various industries, including aerospace, automotive, and energy sectors. Ongoing research and advancements in this field will continue to drive innovation and further optimize the thermal cycling process for high-alloy steels.

REFERENCES

The American Journal of Engineering and Technology
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VOLUME05 ISSUE12 Pages: 29-32
SJIF IMPACT FACTOR (2020: 5. 32)(2021: 5. 705)(2022: 6. 456) (2023: 7. 038)
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Publisher:The USA Journals

1. Abdujalol, B., Nodir, T., Fakhriddin, M., Nuriddin, T., Kamola, T., & Nargiza, S. (2022). Development of steel wheel detail casting technology. Asian Journal of Multidimensional Research, 11(8), 82-88.
2. Alon Mishra, Joydeep Maity. Structure – property correlation of AlSi 1080 steel subjected to cyclic quenching treatment // Materials Science Engineering A. – 646. – 2015. – P. 169-181.
3. Гурьев А.М., Земляков С.А. Новая высокоэффективная технология термического упрочнения режущего и штампового инструмента. В сб. трудов научно-технической конференции 5-7 апреля 2000 г.- Барнаул: Изд-во АлтГТУ, 2000.- С.25-27.
4. Марочник сталей и сплавов. М. М. Колосков, Е.Т. Долбенко, Ю.В. Каширский и др. Под ред. А. С. Зубченко – М.: Машиностроение, 2001.- 672 С.
5. Фирсова Н. В. Разработка оптимального легирующего комплекса и режимов термического упрочнения штамповых сталей. Дисс. на соиск. уч. степ, к.т.н. / Н.В. Фирсова. -Оренбург, 2011. - 17 с.
6. Norkhudjayev, F. R., Mukhamedov, A. A., Khudayberdiev, O. R., Ergashev, D. M., & Norkhudjayeva, R. F. (2020). Development of Machine-Building Materials and Details of Machines from the Powders received from Waste of Raw Materials in the Industry of Uzbekistan. Test Engineering and Management, 83(5-6), 639-646.
7. Norkhudjayev, F. R., Mukhamedov, A. A., Djalolova, S. T., Ergashev, D. M., & Hudayberdiyev, O. R. (2020). Technological capabilities of application of thermocyclic processing (Tcp) tool steel. International Journal of Psychosocial Rehabilitation, 24(8), 1866-1874.
8. Норхуджаев, Ф. Р., Мухамедов, А. А., Эргашев, Д. М., Норхужаева, Р. Ф., & Тешабоев, А. М. (2021). Влияние режимов термоциклическая обработка на структурообразование инструменталъных сталях. Композиционные материалы, 1, 75-77.
9. Норхуджаев, Ф. Р., Эргашев, Д. М., & Тешабоев, А. М. (2021). Упрочненение режущих сегментов аппаратов уборочных машин. Композиционные материалы, 2, 92
10. Ataxonova, S. Q., & Mo'Ydinova, D. R. (2022). METALL QOTISHMALARINING MARKALANISHI TAHLILI. Oriental renaissance: Innovative, educational, natural and social sciences, 2(3), 312-326.
11. Ataxonova, S. Q., & Murodjon o'g, S. U. B. (2022). Analysis Of Magnetic Materilas. Texas Journal of Multidisciplinary Studies, 6, 23-26.
12. Ataxonova, S. Q. (2021). METALLARNI SIFAT NAZORATINI TEKSHIRISH USULLARINI TAHLIL QILISH JARAYONLARINI TAKOMILLASHTIRISH. Oriental INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCHERS www.wordlyknowledge.uz Volume: 2, Issue: 1, 2023 157 renaissance: Innovative, educational, natural and social sciences, 1(10), 124-135.
13. Jalilov Rakhimjon Ravshanbek o'g'li. "CLADDING TILE PRODUCTION USING MAGNESIUM OXYCHLORIDE CEMENT MORTAR IMPROVED BY DIFFERENT WASTES." Gospodarka i Innowacje. 35 (2023): 276-278.
14. Jalilov Rahimjon Ravshanbek o'g'li. "Study of Morphology and Dimensions of Ultra-Dispersed Powders of Tungsten." American Journal of Social and Humanitarian Research 3.5 (2022): 20-22.
15. Жалилов Р. Р. У., Абдуганиева Х. Р. К ИССЛЕДОВАНИЕ МОРФОЛОГИИ И РАЗМЕРОВ УЛЬТРАДИСПЕРСНЫХ ПОРОШКОВ ВОЛЬФРАМА КРИСТАЛЛООПТИЧЕСКИМИ МЕТОДАМИ //Academic research in educational sciences. - 2021. - Т. 2. - №. 11. - С. 633-640.
16. Tojiboyev, B. M., Muhiddinov, N. Z., Karimov, R. I., & Jalilov, R. R. O. G. L. (2021). IKKILAMCHI TERMOPLAST POLIMERLAR ASOSIDA

The American Journal of Engineering and Technology
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OCLC– 1121105677
Publisher:The USA Journals

QURILISH SANOATI UCHUN POLIMERKERAMIK KOMPOZITSION MATERIALLARNI OLISH JARAYONINI TAKOMILLASHTIRISH. Oriental renaissance: Innovative, educational, natural and social sciences, 1(9), 386-392.

17. Jalilov Rahimjon Ravshanbek. (2022). Study of Morphology and Dimensions of UltraDispersed Powders of Tungsten. American Journal of Social and Humanitarian Research, 3(5), 20-22.

The American Journal of Engineering and Technology
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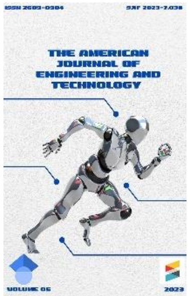

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Research Article

BASIC METHODS OF STUDYING THE INTERNAL STRUCTURE OF METALS

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ABSTRACT

This article presents the methods of analysis of metals. Technological processes, such as checking the macro and microstructure of metals and alloys, are widely covered. Equipment used for macro and micro analysis and slide preparation technologies are widely covered.

KEYWORDS

Cracks, voids, optical microscopy, abrasive, oxides, sulfates, graphite, slag, phase, aerospace, shipbuilding, mechanical engineering, plasticity, shear, welding, malleability, ductility, fluidity.

INTRODUCTION

It is very necessary to increase the quality control and analysis of materials in the development of new materials in all aspects of production in the ever-growing machine-building industry of our independent Uzbekistan.

In the production of high-quality products, the process of creating new materials for modern techniques means that new ideas appear in this technique. The main ones include semiconductor and dark crystals in electronics, composite materials in aviation and rocketry, superconducting and amorphous alloys in radio engineering and electronics, and metal and non-metal alloys in mechanical engineering. In a broader sense, product quality means the extent to which they meet the buyer's requirements and correspond to the established strict requirements. The quality of the product is determined by the organizational control of the quality of the product according to the technical recommendation and technical requirement of the technical requirement. The quality of the product is determined by various types of production control and is brought to the optimal quality level. A superficial analysis of objects or details shows that they should be used, not just created as a result of control. From the point of view of metallurgy and metallurgy, the quality

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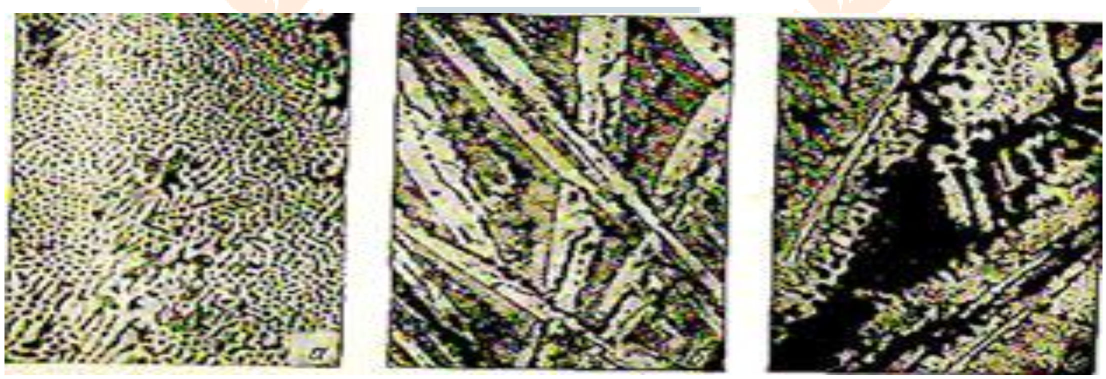
of the parts used in mechanical engineering is mainly understood as the total quality of the parts being prepared, that is, starting from the initial quality for the material and finishing, until the quality of the final operation, thermal analysis and mechanical processing [2]

magnification (up to 3000 times). With the help of microanalysis, the size and shape of crystals and components of alloys are determined, structural features of the structure, the presence of microdefects (cracks, voids, etc.) or non-metallic inclusions, etc. [1].

The heating and cooling curves of metals and alloys make it possible to determine the transformation temperature and to choose a rational temperature range for processing metals or alloys. Processes that examine the structure of materials under magnification with a microscope are considered microscopic or microstructural analysis. The structure observed in this case is called microstructure. Depending on the magnification, the following are used to clearly observe and study all the phases in the material, their quantity, shape and distribution, i.e., their structure as a whole, in a microscope:

White light and a simple optical system, which is a combination of a glass lens and a prism (optical microscopy);

Electron beam or specific currents required to create optical systems used for electromagnetic and electrostatic lenses (electron microscopy). The following are used for the preparation of microsamples of known metals and alloys [3]. Cuts on lathe or metal scraping saws and round bakelite circles. The following dimensions are recommended for microsample preparation. Round samples can be 12x15 mm, cylindrical samples can be 12x12 or 12x15, 15x20 mm. The thickness (height) of the samples is 12x15 mm. Samples cut on the machine are cleaned on abrasive wheels. Do not overheat the samples during cleaning. Cleaned and leveled samples are polished on abrasive polishing papers. The grain size (125-20 μm) of polishing papers is 12-3, the grain size (28-35 μm) is 40-M4 (GOST6456-75).



a) b) v)

Figure 1. Microstructure of white cast irons: a - eutectic; b (ledeburite + basic cementite); v - up to eutectic (ledeburite + pearlite + cementite).

White light and a simple optical system, which is a combination of a glass lens and a prism (optical microscopy); Electron beam or specific currents required to create optical systems used for electromagnetic and electrostatic lenses (electron microscopy). The following are used for the preparation of microsamples of known metals and alloys [3]. Cuts on lathe or metal scraping saws and round bakelite circles. The following dimensions are recommended for microsample preparation. Round samples can be 12x15 mm, cylindrical samples can be 12x12 or 12x15, 15x20 mm. The thickness (height) of the

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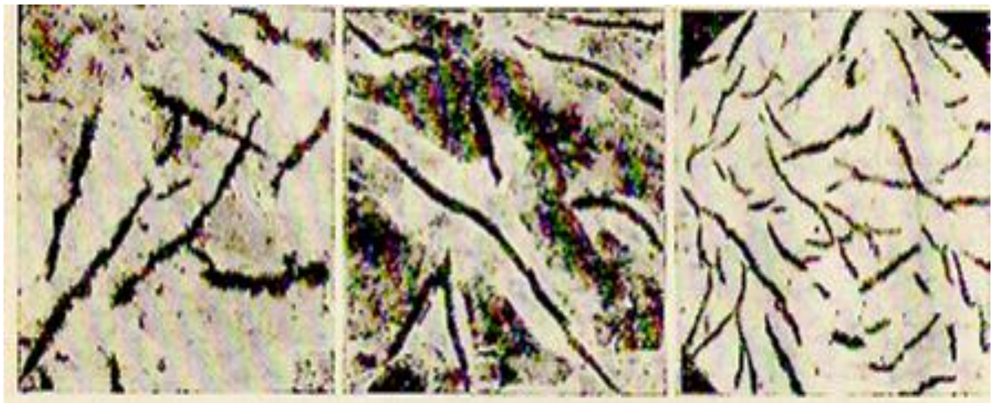
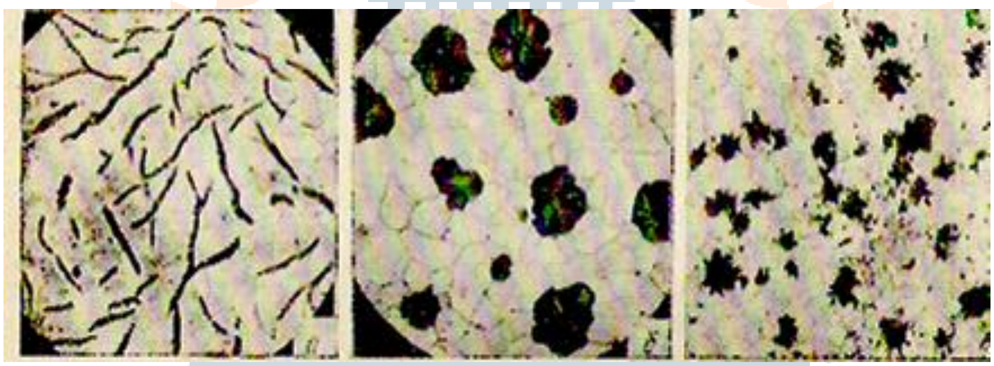
samples is 12x15 mm. Samples cut on the machine are cleaned on abrasive wheels. Do not overheat the samples during cleaning. Cleaned and leveled samples are polished on abrasive polishing papers. The grain size (125-20 mm) of polishing papers is 12-3, the grain size (28-35 mm) is 40-M4 (GOST6456-75).



a) b) v)

Figure 2. Microstructure of gray cast iron: a - pearlitic cast iron; b - ferrite-pearlite cast iron; v - ferritic cast iron



a) b) v)

Figure 3. Appearance of graphite in cast iron; a-vermicular, b-spherical,

v-cucumber-shaped

Macro and micro analysis Examination of the macro and microstructure of metals and alloys.

Microscopic analysis refers to the study of the structure of metals and alloys with the naked eye or by magnifying up to 30 times. Microscopic analysis is the study of metal and alloy structures (internal structures) using specially prepared samples (Fig. 1).

The structure of metals examined using macro and micro analysis is called macro and micro structure. Technology of preparation of macro grinding. The technology of preparation of macroslide is as follows; the sample being examined is divided into two using a hacksaw or a lathe. If the macroslide is prepared from the cross-sectional surface of the detail, then it is called a template. The sample is cleaned on the machine, using ego or image wheel, then the sample is

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transferred from large numbers to small numbers of metallographic polishing papers. When moving from one number paper to another, the sandpaper turns 90°C. The sandpaper is sanded in one direction until the lines disappear from the surface. Various reagents are applied to the slides for the appearance of the microstructure

Under the influence of various reactive solutions, the appearance of the internal structure is formed on the surface of the macroslides. (dendritic crystals fibrous structures) [4]. Technology of preparation of microslides. Macroslide is cut on a lathe or a hacksaw. The following dimensions are recommended for the preparation of the grinding wheel, (if the sample is cylindrical) 12 mm or 12x12. The height of the sample is 10-15 mm. The cut sample is cleaned on the imaging wheel. Do not overheat when cleaning the sample. The flattened sample is smoothed using sanding paper. in which polishing paper grade 12-3 (its grain size is 125-20 μm) to M 40-M4 grade (its grain size is 28-35 μm (Gost 6456-75) is cleaned until the lines disappear on the surface of the sample. After grinding on the smallest grain paper, the sample is washed and polished to remove the remaining lines on its surface [5].

After grinding, the surface of the sample is polished, as a result of which the remaining abrasive particles after grinding are eliminated.

The sample can be polished by hand or on a polishing machine. Polishing material is drawn on a rotating disk or on a smooth surface - felt, cloth, cloth, etc. Then it is moistened with water with a special mixture (aluminum, chromium, magnesium oxide). Polishing is completed after the grinding surface is ready.

During polishing, the disc is sprayed with a mixture of chromium oxide in water. aluminum oxide is applied in the form of fine-grained powder. After polishing the microslide that has not been exposed to the reagent solution, some dark spots, gray dots and lines are visible on the white plane. These spots and lines are various non-metallic inclusions (oxides, sulfates, graphite, slag) and imperfections that did not disappear during polishing (roughness, microcracks, traces of processing). Reagents are applied to the sample to reveal the microstructure of metals [6]. Before exposure to the reagent, the surface of the glass is washed with alcohol, then it is submitted to the reagent for the time required for the appearance of the microstructure. The reagent has different effects on grains and boundaries, phases and structural constituents on the surface of the sample, which differ in structure and chemical composition

Automatic grinding and polishing machine. As a result, when light falls on the structure, it is reflected differently.

CONCLUSION

Heavily exposed elements appear black under the microscope, while less exposed elements appear white. In single-phase metals, the grains have different crystallographic orientations, so the surface of the microgrind consists of crystallographic planes that are inclined to each other, which are affected in different ways. The degree of exposure to multiphase alloys is different [7]. In particular, grain boundaries with a greater variety of impurities compared to metall grains are intensively affected. A 4-5 percent solution of nitric acid in ethyl alcohol is often used for reactive exposure of iron-carbon alloys.

REFERENCES

1. A.E. Odilkhojayev Construction materials Tashkent-2020
2. Rahimov "Ceramics and refractory materials". R. A. Rakhimov Tashkent-2008
3. William D. Callister, Jr., David G. Rethwisch. Materials Science and Engineering / Wiley and Sons. Great Britain, 2014. - 896 r.
4. E.M. Fedoseeva Materialovedenie. Technology construction materials Internet sites
5. Ataxonova, S. Q. (2021). METALLARNI SIFAT NAZORATINI TEKSHIRISH USULLARINI TAHLIL QILISH JARAYONLARINI TAKOMILLASHTIRISH. Oriental renaissance:

Innovative, educational, natural and social sciences, 1(10), 124-135.

6. Ataxonova, S. Q. (2021). METALLARNI SIFAT NAZORATINI TEKSHIRISH USULLARINI TAHLIL QILISH JARAYONLARINI TAKOMILLASHTIRISH. Oriental renaissance: Innovative, educational, natural and social sciences, 1(10), 124-135.
7. Kasimov, U. K., & Karimov, R. I. (2022). Efficiency of Processing of Secondary Raw Materials. Texas Journal of Engineering and Technology, 9, 15-19.
8. Umidjon, K., & Maxamadmusayevna, S. H. (2020). EDUCATION SYSTEM NOWADAYS. INTERNATIONAL JOURNAL OF DISCOURSE ON INNOVATION, INTEGRATION AND EDUCATION, 1(4), 76-78.
9. Abdujalol, B., Nodir, T., Fakhriddin, M., Nuriddin, T., Kamola, T., & Nargiza, S. (2022). Development of steel wheel detail casting technology. Asian Journal of Multidimensional Research, 11(8), 82-88.
10. Ergashev, D., & Khudayberdiev, O. (2023). Development of thermocyclic processing modes for carbon steels used on cold forming tools. In E3S Web of Conferences (Vol. 383, p. 04066). EDP Sciences.
11. Jalilov Rakhimjon Ravshanbek o'g'li. "CLADDING TILE PRODUCTION USING MAGNESIUM OXYCHLORIDE CEMENT MORTAR IMPROVED BY DIFFERENT WASTES." Gospodarka i Innowacje. 35 (2023): 276-278.
12. www.gov.uz - the government portal of the Republic of Uzbekistan;
13. www.catback.ru – nauchnie stati and uchebnie material;

The American Journal of Engineering and Technology
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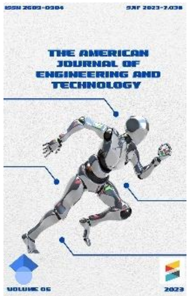

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Research Article

CASE STUDY: SUCCESSFUL EXAMPLES OF SECUBE APPLICATION IN LARGE COMPANIES

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ABSTRACT

This article presents a series of case studies illustrating successful applications of SeCube in large companies. These case studies provide real-world examples of how SeCube, an advanced information security management system, has been effectively utilized to enhance cybersecurity, streamline risk management, and ensure regulatory compliance. The cases highlight various industries, including finance, healthcare, and technology, showcasing SeCube's versatility and adaptability in different corporate environments. The objective is to offer insights into the practical benefits and strategic value SeCube brings to large-scale enterprises.

KEYWORDS

SeCube, Case Study, Large Companies, Cybersecurity, Risk Management, Regulatory Compliance, Information Security.

INTRODUCTION

In the complex and ever-evolving landscape of corporate cybersecurity, large companies face unique challenges in protecting their digital assets. SeCube has emerged as a comprehensive solution for these challenges, offering robust security management capabilities. This article compiles case studies from several large companies that have successfully implemented SeCube, demonstrating its efficacy in

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diverse corporate settings. These examples provide valuable insights into how SeCube can be tailored to meet specific security needs and operational demands of large-scale enterprises.

Main Study Sections

Finance Sector Implementation

A leading multinational bank adopted SeCube to enhance its cybersecurity framework. The implementation focused on integrating SeCube's risk assessment tools with the bank's existing digital infrastructure, leading to improved identification and mitigation of financial cyber risks. SeCube's incident management system was crucial during a major phishing attack, enabling the bank to quickly respond and prevent significant data breaches. The case study also highlights SeCube's role in ensuring the bank's compliance with international financial regulations.

Healthcare Industry Application

A large healthcare provider implemented SeCube to protect sensitive patient data and ensure compliance with healthcare regulations, such as HIPAA. SeCube's data protection capabilities were vital in securing electronic medical records against cyber threats. The platform's risk management tools allowed the provider to proactively address vulnerabilities in its network, significantly reducing the potential for data breaches. This case study illustrates SeCube's effectiveness in handling the specific security needs of the healthcare industry.

Technology Company's Use of SeCube

A global technology firm utilized SeCube to manage its complex information security needs. The company integrated SeCube with its diverse array of software products and services, achieving a unified security management approach. SeCube's scalability was critical in managing the high volume of digital transactions and data exchanges. The technology firm benefited from SeCube's comprehensive compliance features, streamlining adherence to various international cybersecurity standards.

CONCLUSION

These case studies demonstrate SeCube's successful application across various industries in large companies. The platform's flexibility in risk assessment, incident management, data protection, and regulatory compliance proves its suitability for diverse corporate environments. SeCube's ability to integrate with existing systems and adapt to industry-specific requirements highlights its value as a comprehensive solution for large-scale enterprise cybersecurity. These examples serve as a testament to SeCube's capability to enhance and streamline information security management in large companies.

REFERENCES

1. M. Bollo, A. Carelli, S. Di Carlo, and P. Prinetto, "Side-channel analysis of SEcube™ platform," in Proceedings of the 2017 IEEE East-West Design & Test Symposium (EWDTS), 2017, doi: 10.1109/EWDTS.2017.8110067.
2. Curmi, C. Colombo, and M. Vella, "RV-TEE-Based Trustworthy Secure Shell Deployment: An Empirical Evaluation," Journal of Object Technology, vol. 21, no. 2, 2022, doi: 10.5381/jot.2022.21.2.a4.
3. Varriale, E. I. Vatajelu, G. Di Natale, P. Prinetto, P. Trotta, and T. Margaria, "SEcube™: An open-source security platform in a single SoC," in Proceedings of the 11th IEEE International Conference on Design & Technology of Integrated Systems in Nanoscale Era (DTIS), 2016, doi: 10.1109/DTIS.2016.7483810.
4. Г.Г. Гулямов, Н.Ю. Шарибаев, Определение дискретного спектра плотности поверхностных состояний моп-структур Al SiO2 Si, облученных нейтронами, Поверхность. Рентгеновские, синхротронные и нейтронные исследования № 9, Ст 13-18 2012
5. Г.Г. Гулямов, Н.Ю. Шарибаев, Определение плотности поверхностных состояний границы раздела полупроводник-диэлектрик в МДП

структуре, Физика и техника полупроводников, Том 45, Номер 2, Страницы 178-182. 2011
6. Г.Г. Гулямов, Н.Ю. Шарибаев, Влияние температуры на ширину запрещенной зоны полупроводника Физическая инженерия поверхности Номер 9, № 1, Страницы 40-43. 2011
7. OO Mamatkarimov, BH Kuchkarov, N Yu Sharibaev, AA Abdulkhayev, Influence Of The Ultrasonic Irradiation On Characteristic Of The Structures Metal-Glass-Semiconductor, European Journal of Molecular & Clinical Medicine, V 8, № 01, pp. 610-618, 2021

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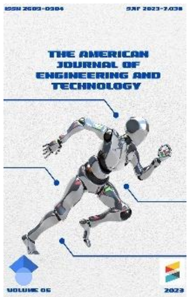

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Research Article

CREATING INCLUSIVE SPORTS PLAYGROUNDS: STRATEGIES FOR CHILDREN WITH DEVELOPMENTAL DELAYS

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ABSTRACT

This article explores strategies for creating inclusive sports playgrounds designed to cater to children with developmental delays. It emphasizes the importance of inclusivity in playground design, ensuring that children of all abilities can participate in and benefit from sports-related activities. The article discusses the integration of specialized equipment, sensory-friendly areas, and adaptable play structures to accommodate various developmental needs. The goal is to provide a comprehensive guide on how to create playgrounds that are not only physically accessible but also developmentally supportive, promoting social inclusion and enhancing the physical and psychological well-being of all children.

KEYWORDS

Inclusive playgrounds, Developmental delays, Sports equipment, Sensory-friendly design, Social inclusion, Adaptive play, Child development.

INTRODUCTION

The concept of inclusive sports playgrounds is gaining traction as a means to promote physical activity and social interaction among children with developmental delays. These playgrounds are designed to be accessible and enjoyable for children with a wide range of abilities, encouraging play and sports participation in a safe, supportive environment. This article outlines key strategies for developing inclusive sports playgrounds that accommodate the needs of children with developmental delays, focusing on design principles, equipment selection, and program development to foster an inclusive and engaging play environment.

Main Study Sections

Design Principles for Inclusive Playgrounds This section delves into the core design principles essential for creating inclusive sports playgrounds. It covers aspects such as barrier-free access, safe surfacing materials, and the use of color and texture to create an engaging and navigable environment. The importance of designing playgrounds that cater to various developmental levels and physical abilities is emphasized, along with strategies to incorporate sensory-friendly elements.

Specialized Equipment for Diverse Abilities Focuses on selecting and incorporating specialized equipment that can be used by children with a range of developmental delays. This includes adaptive swings, wheelchair-accessible play structures, and equipment that encourages balance and coordination. The role of equipment in fostering motor skill development and physical fitness in children with developmental challenges is explored.

Programs and Activities for Developmental Support Examines the development of structured programs and activities that can be conducted in inclusive sports playgrounds. This includes organized sports activities, guided play sessions, and interactive games designed to enhance social interaction, teamwork, and communication skills among children with and without developmental delays.

Community Engagement and Training Discusses the importance of community engagement and staff training in operating inclusive sports playgrounds. It covers strategies for involving parents, caregivers, and educators in playground activities, along with the need for training staff and volunteers in inclusive play practices and sensitivity to developmental challenges.

CONCLUSION

Inclusive sports playgrounds represent a significant step forward in creating supportive, engaging environments for children with developmental delays. By adhering to key design principles, incorporating specialized equipment, developing supportive programs, and engaging the community, these playgrounds can foster an inclusive atmosphere where all children have the opportunity to participate, learn, and grow. The continued evolution and implementation of these strategies will play a crucial role in promoting the physical, social, and emotional well-being of children with diverse developmental needs.

REFERENCES

1. Brussoni, M.; Gibbons, R.; Gray, C.; Ishikawa, T.; Sandseter, E.; Bienenstock, A.; Chabot, G.; Fuselli, P.; Herrington, S.; Janssen, I.; et al. What Is the Relationship between Risky Outdoor Play and Health in Children? A Systematic Review. Int. J. Environ. Res. Public Health 2015, 12, 6423–6454.
2. United Nations. Convention on the Rights of the Child; United Nations: New York, NY, USA, 2013.
3. Sturgess, J. A Model Describing Play as a Child-Chosen Activity—Is This Still Valid in Contemporary Australia? Aust. Occup. Ther. J. 2003, 50, 104–108.
4. Г.Г. Гулямов, Н.Ю. Шарибаев, Определение дискретного спектра плотности поверхностных состояний моп-структур Al SiO2 Si, облученных нейтронами, Поверхность. Рентгеновские, синхротронные и нейтронные исследования № 9, Ст 13-18 2012
5. Г.Г. Гулямов, Н.Ю. Шарибаев, Определение плотности поверхностных состояний границы раздела полупроводник-диэлектрик в МДП структуре, Физика и техника полупроводников, Том 45, Номер 2, Страницы 178-182. 2011

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SJIF IMPACT FACTOR (2020: 5. 32)(2021: 5. 705)(2022: 6. 456) (2023: 7. 038)
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6. Г.Г. Гулямов, Н.Ю. Шарибаев, Влияние температуры на ширину запрещенной зоны полупроводника Физическая инженерия поверхности Номер 9, № 1, Страницы 40-43. 2011
7. OO Mamatkarimov, BH Kuchkarov, N Yu Sharibaev, AA Abdulkhayev, Influence Of The Ultrasonic Irradiation On Characteristic Of The Structures Metal-Glass-Semiconductor, European Journal of Molecular & Clinical Medicine, V 8, № 01, pp. 610-618, 2021

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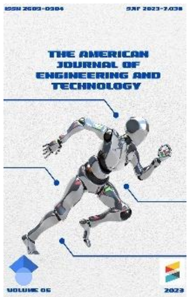

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Research Article

THE FUTURE OF PACKAGING: BIODEGRADABLE CELLOPHANE IN THE CONSUMER MARKET

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ABSTRACT

This article examines the future of packaging with a focus on biodegradable cellophane in the consumer market. It explores the current state of biodegradable cellophane, including its production methods, environmental benefits, and challenges in market adoption. The discussion extends to consumer perception, regulatory frameworks, and the role of innovation in driving its growth. The analysis underscores biodegradable cellophane's potential as a sustainable packaging alternative, highlighting its significance in the context of global environmental concerns.

KEYWORDS

Biodegradable Cellophane, Sustainable Packaging, Consumer Market, Environmental Impact, Packaging Innovation, Market Adoption.

INTRODUCTION

Biodegradable cellophane represents a significant shift in packaging, offering an eco-friendly alternative to traditional materials. Its adoption in the consumer market is driven by increasing environmental awareness and demand for sustainable products. This type of cellophane, made from natural polymers, promises to reduce waste and pollution. However, its integration into mainstream markets faces several challenges, including cost and consumer acceptance. This article delves into the future of biodegradable cellophane in packaging, exploring its potential to reshape consumer habits and environmental practices.

Main Study Sections

Production and Properties of Biodegradable Cellophane

The production of biodegradable cellophane involves using natural polymers such as cellulose, which are derived from renewable sources. This process is designed to ensure that the cellophane breaks down naturally in the environment. Key properties, like strength, transparency, and moisture resistance, are comparable to traditional plastic films. Innovations in production techniques aim to enhance these properties while maintaining environmental friendliness. This section explores the manufacturing processes and the unique properties of biodegradable cellophane that make it suitable for widespread consumer use.

Environmental Benefits and Challenges

Biodegradable cellophane offers significant environmental benefits, primarily its ability to decompose naturally, reducing landfill waste and ocean pollution. It also has a lower carbon footprint compared to conventional plastics. However, challenges such as production costs, energy consumption, and the management of agricultural resources for raw materials present hurdles. This part of the article examines the environmental advantages and the obstacles that need to be overcome for biodegradable cellophane to become a sustainable packaging standard.

Consumer Perception and Market Dynamics

Consumer perception plays a crucial role in the adoption of biodegradable cellophane. Factors such as awareness of environmental issues, willingness to pay a premium for sustainable products, and concerns about product quality and durability influence consumer choices. Market dynamics, including competition with traditional plastics and the influence of regulatory policies, also impact the growth of biodegradable cellophane. This section assesses the current consumer attitudes towards biodegradable cellophane and the market forces shaping its future.

Future Outlook and Innovation Pathways

The future of biodegradable cellophane in the consumer market hinges on continued innovation and supportive policies. Emerging technologies in bio-based materials and production efficiency are key to making biodegradable cellophane more accessible and cost-effective. Additionally, government regulations and industry standards can drive its adoption. This section looks ahead to potential developments in the field, considering the roles of technological advancement and policy in promoting biodegradable cellophane as a mainstream packaging option.

CONCLUSION

Biodegradable cellophane represents a promising future for sustainable packaging in the consumer market. Its environmental benefits, coupled with evolving consumer preferences, position it as a viable alternative to traditional plastics. Despite facing production and market challenges, ongoing innovations and changing regulations suggest a growing role for biodegradable cellophane. Its success will depend on balancing environmental objectives with practicality and consumer acceptance, making it a key player in the journey towards a more sustainable future.

REFERENCES

1. Fomin VA, Guzeev VV. Biodegradable Polymers, Their Present State and Future Prospects. International Polymer Science and Technology. 2001;28(11):76-84. doi:10.1177/0307174X0102801120
2. Glukhov V.: Khimiya i biznes, 1997, No. 25, p. 34–35
3. Carraher C.E.: Polym. News, 1996, Vol. 21, No. 7, p. 238–241
4. Nosir Sharibaev, Nurbek Sharibaev, Sherzod Djuraev, Sobir Sharipbaev. Recommended bitumen emulsion for road construction: enhancing durability and sustainability. European Journal of Emerging Technology and Discoveries. Volume 1, Issue 4, pp.21-23 July, 2023.
5. Sherzod Djuraev, Nosir Sharibaev, Nurbek Sharibaev, Sobir Sharipbaev. Effective and Sustainable Methods of Bitumen Emulsion

Production European Science Methodical Journal. Volume 1, Issue 4, pp. 1-3 July, 2023
6. Nurbek Sharibaev, Nosir Sharibaev, Sherzod Djuraev, Sobir Sharipbaev.Improving Road Safety with Bitumen Emulsion: A Closer Look at Anti-Slip Surfaces. Eurasian Journal of Engineering and Technology. Volume 20, pp. 37-38 July 2023
7. Sobir Sharipbaev, Nurbek Sharibaev, Nosir Sharibaev, Sherzod Djuraev. Problems and Solutions in the Production of Bitumen Emulsions: A Comprehensive Analysis. Eurasian Scientific Herald Volume 22| July, pp. 10-11. 2023
8. Nosir Sharibaev, Sobir Sharipbaev, Sherzod Djuraev, Nurbek Sharibaev. Innovations in Bitumen Emulsion: Improving the Durability and Performance of Road Surfaces. Eurasian Research Bulletin. Volume 22, pp. 19-20, |July, 2023
9. Nurbek Sharibaev, Sobir Sharipbaev, Sherzod Djuraev, Nosir Sharibaev. Disclosure of the Potential of Bitumen Emulsion in Waterproofing and Roofing Works. Eurasian Journal of Research, Development and Innovation. Volume 22. pp. 1-2. |July 2023

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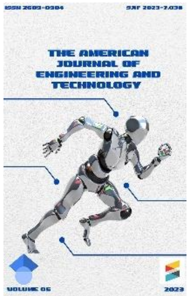

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Research Article

INVESTIGATION OF STRENGTH PROPERTIES OF RADIATION-MODIFIED POLYMER COATINGS

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ABSTRACT

One of the methods for improving the properties of polymer coatings is radiation treatment. It is mainly carried out by ultraviolet rays and ionizing radiation. There are several types of ionizing radiation: radiation caused by deep changes in the electron shell and the nucleus of the atom and having the nature of electromagnetic oscillations, x-ray and γ-radiation; streams of charged particles that can have both positive and negative charges.

KEYWORDS

Oscillations, x-ray and γ-radiation; streams of charged.

INTRODUCTION

Changes in the physical properties of the coating (adhesive) and the substrate (substrate) subjected to the action of radioactive radiation, both on the nature and energy of the bombarding particles.

Table 1 shows the adhesion properties and internal stresses of irradiated γ-rays coated and high-density polyethylene of different melt index on the surface of the steel substrate. The irradiation was carried out with the Co60 isotope in a γ-beam setup: the temperature in the beam is no more than 460C, the atmospheric pressure is from 714 to 718 mm. gt; Art. dose rate - 330 roentgen / sec. The samples were subjected to γ - irradiation 24 hours after the preparation were tested four days after γ - irradiation.

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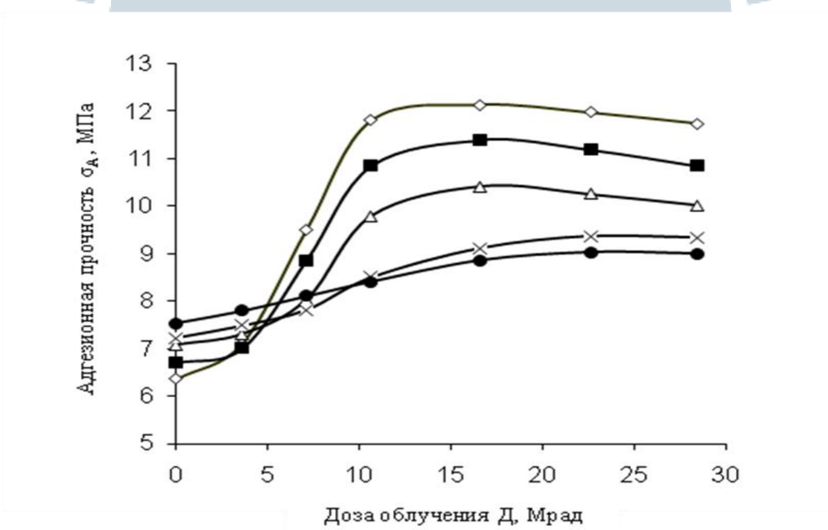
Table 1

Adhesion and internal stresses in polyethylene coatings after

γ-irradiation

Melt index , i, r/10 min	The dose of irradiation, Mrad						
	0	3,6	7,1	10,6	16,6	22,5	28,4
Adhesive strength, MPa							
0,52	6,37	7,12	9,52	12,01	12,14	11,98	11,75
1,51	6,71	7,01	7,28	7,75	9,62	9,86	9,88
3,12	7,09	7,31	7,62	8,16	9,36	9,69	9,72
6,59	7,22	7,49	7,82	8,51	9,12	9,37	9,34
10,70	7,54	7,81	8,12	8.41	8,87	9,04	9,01
Internal stresses in the coating, MPa							
0,52	4,84	4,02	3,63	3,58	3,50	3,42	3,38
1,51	4,04	3,44	3,19	3,02	2,83	2,76	2,72
3,12	3,23	2,85	3,66	2,42	2,26	2,24	2,16
6,59	2,44	2,09	1,96	1,87	1,81	1,73	1,64
10,70	1,87	1,54	1,48	1,43	1,41	1,34	1,26

The obtained results show that the adhesion strength of coatings up to a certain dose of irradiation increases by 20 - 90% depending on the melt index of polyethylene, and further hanging of the radiation dose leads to its reduction. A greater increase in the adhesive strength is observed in polyethylene of a lower melt index.



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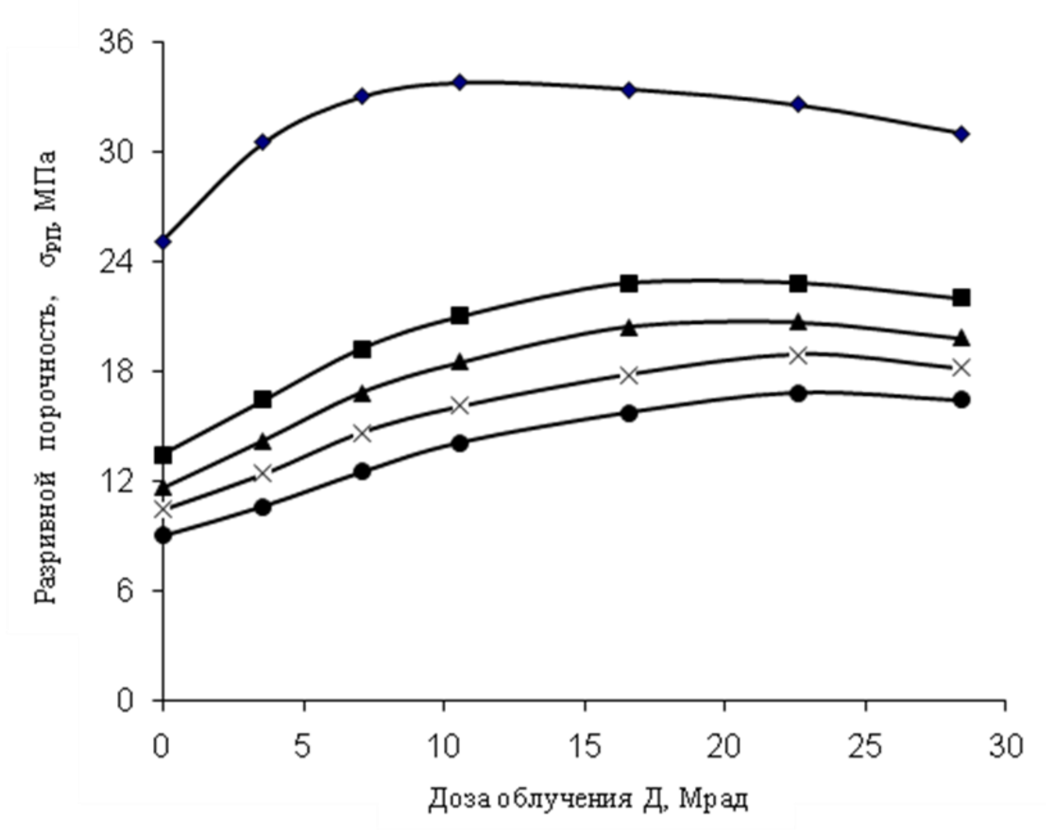
Pic-1. Dependence of the adhesive strength of polyethylene coatings before and after irradiation

The increase in adhesion is associated with an increase in the mobility (flexibility) of segments of macromolecules, the enhancement of ionization processes in the polymer and metal, as well as an increase in the defectiveness of the crystalline substrate. This, apparently, leads to an increase in the donor ability of the substrate and acceptor adhesion, or vice versa. In addition, radiation-chemical oxidation of polyethylene occurs in the contact zone, which promotes favorable orientation of the carbonyl groups relative to the oxide film of the metal substrate. As a result, it is possible to increase the power of the micro capacitor created by the double electric layer at the interphase boundary and to enhance the diffusion processes between the adhesive and the substrate. It is possible that after the γ-irradiation, other components of the adhesive strength of polymer coatings of metals also increase.

The dose of irradiation has a significant influence on the tensile strength of film coatings, which, before a certain radiation dose (10-100, Mrad), increases, and then decreases.



Pic-2. Effect of irradiation on the tensile strength of polyethylene coatings

The increase in the rupture strength of the coating film with γ-irradiation, despite the decrease in the degree of crystallinity of the polymer, is explained by the crosslinking of its macromolecules, since the breaking strength of the crosslinkable polymers depends more on the crosslinking density (up to a certain irradiation dose) than on the degree of crystallinity.

Reducing the tensile strength of the coating film after a certain radiation dose is associated with radiation-chemical degradation, since destruction predominates over crosslinking of polymer macromolecules and leads to a decrease in the strength properties of the coatings.

With an increase in the melt index of polyethylene, the extremum of the tensile strength is shifted to the region of large doses of irradiation. This is obviously explained by the need for more energy to crosslink polyethylene macromolecules with lower density. After γ-irradiation, the strength of the films increases by 40-70%. A large percentage increase is observed in polyethylene with a high interest in the melt.

Internal stresses in polyethylene coatings have a complex character depending on the dose of irradiation, that is, at lower doses decreases, and at large - increases. With a further increase in the radiation dose, the internal stress in the coatings tends to sharply decrease.

Reduction of internal stresses in coatings at low radiation doses is explained by the acceleration of relaxation processes and restructuring of the supramolecular structure of the polymer. The increase in internal stresses with increasing irradiation dose is associated with an increase in shrinkage and specific density of the coating as a result of crosslinking of polymer macromolecules. A sharp decrease in internal stresses in the coatings with a further increase in the irradiation dose is due to the predominance of destruction of the crosslinked macromolecules of the coating material.

The lowest internal stresses in polyethylene coatings are observed in the irradiation intervals from 10 to 30 Mrad. In this case, the internal stresses in the coatings are reduced to 50%, depending on the melt index of the high-density polyethylene.

A further increase in the irradiation dose, despite the fact that it increases the tensile strength of the coating film, reduces the adhesive strength and increases the internal stresses in the coating. As a result, the values of the safety factors for the tensile and adhesive strength are reduced and, thus, the properties of the coating deteriorate.

Thus, for irradiation treatment of polyethylene coatings in order to increase the adhesion strength and other physical and mechanical properties, radiation doses in the ranges from 10 to 30 Mrad can be recommended, depending on the melt index and the type of polyethylene.

REFERENCES

1. Б.М.Тожибоев, А.Р.Баймирзаев Темир-композит материалларидан подшипник деталларини олиш учун печ танлаш ва қолиплаш учун формасини тайёрлаш Kompozitsion materiallar Ilmiy-texnikaviy va amaliy jurnali Toshkent, 2006. №2/2021 297-299 ст.
2. Б.М.Тожибоев Вопросы улучшения прочностных свойств полимерных композиционных покрытий. UNIVERSUM: ТЕХНИЧЕСКИЕ НАУКИ Выпуск: 12(93) Декабрь 2021 научный журнал. – № 12(93). Часть 2. 22-23 ст.
3. B.M.Tojiboyev, L.Olimov B.Ramashliyev Investigation of Strength Properties of Radiation-Modified Polymer Coatings International Journal of Trend in Research and Development 2018 422-423 ст.
4. Зиямухамедова У.А., Тожибоев Б.М., Собиров Б.А., Муродуллаева Г.Б., Джумабоев А.Б.Исследование возможности комплексного применение композиционных материалов на основе из местного сырья Научно-технический журнал ФерПИ-2019 47-51 ст.
5. Abdujalol, B., Nodir, T., Fakhriddin, M., Nuriddin, T., Kamola, T., & Nargiza, S. (2022). Development of steel wheel detail casting technology. Asian Journal of Multidimensional Research, 11(8), 82-88.
6. Ataxonova, S. Q. (2021). METALLARNI SIFAT NAZORATINI TEKSHIRISH USULLARINI TAHLIL

QILISH JARAYONLARINI TAKOMILLASHTIRISH. Oriental renaissance: Innovative, educational, natural and social sciences, 1(10), 124-135.

7. Ataxonova, S. Q. (2021). METALLARNI SIFAT NAZORATINI TEKSHIRISH USULLARINI TAHLIL QILISH JARAYONLARINI TAKOMILLASHTIRISH. Oriental renaissance: Innovative, educational, natural and social sciences, 1(10), 124-135.

8. Jalilov Rakhimjon Ravshanbek o'g'li. "CLADDING TILE PRODUCTION USING MAGNESIUM OXYCHLORIDE CEMENT MORTAR IMPROVED BY DIFFERENT WASTES." Gospodarka i Innowacje. 35 (2023): 276-278.