

# **MODERN RESEARCH: TRANSPORT INFRASTRUCTURE AND INNOVATION TECHNOLOGIES**



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**The materials are presented in the author's edition**

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# МАТЕРІАЛИ

## II Міжнародної науково-практичної конференції здобувачів вищої освіти, викладачів та науковців «СУЧАСНІ ДОСЛІДЖЕННЯ: ТРАНСПОРТНА ІНФРАСТРУКТУРА ТА ІННОВАЦІЙНІ ТЕХНОЛОГІЇ» 29-30 листопада 2023 р., м.Київ

### Частина 2

*Конференція проведена при підтримці Міністерства освіти і науки України та зареєстрована в ДУ «Український інститут науково-технічної інформації» (УкрІНТЕІ) за № 396 від 09.10.2023р.*

**Сучасні дослідження: транспортна інфраструктура та інноваційні технології:** Матеріали II Міжнародної науково-практичної конференції здобувачів вищої освіти, викладачів та науковців 29-30 листопада 2023р. м. Київ, вид-во: Київський інститут залізничного транспорту Державного університету інфраструктури та технологій, реєстр. УкрІНТЕІ №396 від 09.10.2023, 2023. Ч.2. 379с.

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До електронного збірника увійшли матеріали доповідей, поданих до II Міжнародної науково-практичної конференції здобувачів вищої освіти, викладачів та науковців «СУЧАСНІ ДОСЛІДЖЕННЯ: ТРАНСПОРТНА ІНФРАСТРУКТУРА ТА ІННОВАЦІЙНІ ТЕХНОЛОГІЇ», яка організована Київським інститутом залізничного транспорту Державного університету інфраструктури при підтримці Міністерства освіти і науки України.

Електронне наукове видання призначено для апробації наукових досліджень бакалаврів, магістрів, аспірантів, докторантів, викладачів та наукових співробітників, а також для розширення наукового кругозору дослідників транспортної галузі та суміжних сучасних галузей знань, інформування широкого кола вчених та практиків щодо існуючих сучасних проблем у галузі та розвитку міжнародної співпраці.

*Матеріали подано в авторській редакції*

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<i>Столярчук Д.П., Підгорний Н.А., Кузнєцов Ю.М.</i>	
МОБІЛЬНІ УСТАНОВКИ ДЛЯ ГРУП ШВИДКОГО РЕАГУВАННЯ ППО	
MOBILE INSTALLATIONS FOR RAPID RESPONSE GROUPS OF AIR FORCE.....	313
<i>Терещук А.О., Щербина Ю.В.</i>	
ДОСЛІДЖЕННЯ ВТОМНОЇ МІЦНОСТІ КОТЛА ВАГОН-ЦИСТЕРНИ ПРИ ВИНИКНЕННІ КОРОЗІЇ	
RESEARCH OF FATIGUE STRENGTH A TANK WAGON BOILER IN EVENT CORROSION.....	316
<i>Фомін О.В., Козинка О.С., Черкашин О.П.</i>	
ОСОБЛИВОСТІ КОНТРОЛЮ КОМПОЗИТНИХ КУЗОВІВ НАПІВВАГОНІВ	
FEATURES OF CONTROL OF COMPOSITE GONDOLA BODIES.....	321
<i>Фомін О.В., Козинка О.С., Лісничий В.С.</i>	
ОСОБЛИВОСТІ КОНТРОЛЮ ТИПОВИХ КУЗОВІВ НАПІВВАГОНІВ	
FEATURES OF CONTROL OF TYPICAL GONDOLA BODIES.....	325
<i>Шевченко С.І., Полупан Є.В., Черкашин І.А.</i>	
ДОСЛІДЖЕННЯ ЯКОСТІ УПРАВЛІННЯ ДВОМАСОВОЇ СИСТЕМИ З ПІДВІСОМ ВАНТАЖУ	
INVESTIGATION OF THE QUALITY OF CONTROL OF A TWO-MASS SYSTEM WITH CARGO SUSPENSION.....	328
<i>Ostrowski A., Bernatowicz D., Duer S., Woźniak M.</i>	
EXPERT KNOWLEDGE BASED ON THE DIAGNOSTIC OF WIND FARM EQUIPMENT.....	334
<i>Ponomarenko O.V.</i>	
IMPACT OF THE FREIGHT CAR MAINTENANCE AND REPAIR SYSTEM ON THE LIFE CYCLE COST.....	339
<i>Tytuła J., Zaremba A., Nitkiewicz S.</i>	
VIRTUAL TRACK GENERATED FORCES AND THEIR RELATIONS TO REAL WORLD FEEDBACK ON A RACING SIMULATOR.....	342
<i>Тус К., Bramowicz M.</i>	
THE ANALYSIS OF THE PHASE COMPOSITION OF X2CrNiMoN22-5-3 STEEL.....	346
<i>Zaremba A., Tytuła J., Nitkiewicz S.</i>	
VIRTUAL REALITY ENVIRONMENT FOR FIRST CONTACT VR USERS AND ASSESSING THEIR TYPE OF PERFORMANCE.....	351
<b>Секція 9: МЕТРОЛОГІЯ ТА ІНФОРМАЦІЙНО-ВИМІРЮВАЛЬНІ ТЕХНОЛОГІЇ</b>	
<b>Section 9: METROLOGY AND INFORMATION AND DIGITAL TECHNOLOGIES.....</b>	
	<b>355</b>

3. Name (specifies the supplied rule's name).
  4. Category (defines a certain block).
  5. A set of replies ( {yes, no} ).
  6. Block (defines the block symbol for which the rule was written).
  7. Mathematical description (explains how the rule was developed).
  8. Verbal description (describes potential causes of damage or a specific operating situation).
- Response (determines if the rule is followed).

**Conclusion.** The development of expert knowledge bases presents a complex technological and informational endeavour. When constructing knowledge bases, a substantial quantity of engineering data is required, including the analysis of the design, functioning, and upkeep of the equipment under examination. In addition, possessing a comprehensive understanding of information technology in the context of construction is vital, along with the capacity to gather, document, and evaluate data within knowledge repositories.

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## IMPACT OF THE FREIGHT CAR MAINTENANCE AND REPAIR SYSTEM ON THE LIFE CYCLE COST

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**Abstract.** *One of the main requirements for a railcar fleet is its reliability and safe operation throughout its entire life cycle. In turn, the life cycle cost of a freight car is determined by many factors. However, an important factor that directly affects the life cycle cost of a freight car is an effective rolling stock maintenance and repair system. The efficiency of freight cars is determined not only by their initial cost, but also by the costs of maintenance and repair during their service life. The life cycle of a freight car is defined*

*as a sequence of stages, starting with research during the development and design of a car and ending with the termination of its operation and subsequent utilization.*

**Keywords:** *life cycle, railway rolling stock, scheduled repair, freight car, maintenance system, operation cost.*

**Relevance of the work.** An effective maintenance and repair system for rolling stock reduces the costs associated with the maintenance and repair of freight cars, highlighting the relevance of the research.

**Research Purpose** is to determine the impact of the rolling stock maintenance and repair system on the life cycle cost of freight cars.

Freight cars are one of the most important components of the railroad industry, ensuring the smooth transportation of goods. The cost of a freight car's life cycle is determined by numerous factors, one of which is an effective rolling stock maintenance and repair system [1].

The life cycle of railcars, as part of a complex rail transportation system, is a key aspect that determines the efficiency and economic profitability of the rail industry. The life cycle cost of freight cars includes not only the cost of their production, but also all stages of their operational life, as well as the cost of their disposal and environmental impact.

The first stage of the freight car life cycle requires significant financial, technical resources and includes the following main stages, namely:

- design (at this stage of the life cycle, the technical requirements and prospective characteristics of new railcars are determined, and the design of the railcar is developed, including its construction, dimensions, materials and other technical details);
- production (in accordance with the approved project manufacturing railcars in accordance with the approved project, using special equipment and technologies for assembly and welding of components, quality control at each stage of production);
- testing (conducting various tests, such as strength tests, brake tests and other technical inspections, to determine the compliance of railcars with standards and safety regulations);
- delivery of the railcar to the customer.

The second stage of the freight car life cycle is the operation stage. At this stage, the cars are subjected to regular maintenance and repairs to ensure their smooth and safe operation.

The freight car maintenance and repair system is a key aspect of ensuring the long and efficient operation of a vehicle and directly affects the life cycle cost of a freight car. Repairs are aimed not only at eliminating damage that has already occurred, but also at preventing possible malfunctions through regular maintenance. This becomes a valuable aspect in the context of reducing the overall cost of a freight car over its life

cycle. Firstly, an effective maintenance and repair system helps to keep the freight car in the best possible condition. This not only contributes to transportation safety, but also avoids large repair costs in the future. Regular maintenance and scheduled repairs help to identify problems at an early stage, when they can be fixed at a lower cost.

The main aspects of the impact of the freight car maintenance and repair system on the life cycle cost include quality of maintenance, which affects the efficiency of railcar operation. Regular and high-quality maintenance of railroad rolling stock can increase the reliability and service life of railcars by reducing overdue and unscheduled repairs. Another important aspect is safety, which is characterized by one of the main reasons for the careful maintenance and repair of freight cars. Effective repair contributes to the safety, durability and cost-effective operation of the vehicle. It is known that the majority of accidents and incidents in transportation are caused by technical malfunctions [2-5].

This approach is key to the sustainable development of transport infrastructure and ensuring the best use of resources.

The third stage - utilization - becomes important in the context of environmental issues. Proper railcar disposal includes the recovery and recycling of materials for further use. This helps to reduce the negative impact on the environment and use resources efficiently.

**Conclusions.** Key aspects of effective life cycle cost management include optimizing production processes, introducing innovations in maintenance and modernization, and developing and implementing environmentally friendly recycling technologies. All of these aspects are related to the efficiency and sustainable development of the rail transportation industry. Ensuring an efficient railcar life cycle requires a systematic approach, taking into account all stages and combining technical and economic solutions. Such an approach can guarantee the sustainability and competitiveness of rail transport in today's environment.

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