FEATURES OF MATERIALS ANALYSIS IN THE FIELD OF CONSTRUCTION

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https://doi.org/10.5281/zenodo.11150679

Abstract. *The article examines the features of materials analysis in the field of construction. It considers the theoretical and practical aspects of this issue, taking into account the requirements of national and international standards. Based on the study of international experience, conclusions are drawn on the methods of analyzing construction materials and areas for improving this process. Particular attention is paid to modern approaches to assessing the characteristics of building materials, as well as the role of this information in the design and implementation of construction projects.*

Keywords: *Construction materials, material analysis, material testing, construction industry, international standards, building design.*

ОСОБЕННОСТИ АНАЛИЗА МАТЕРИАЛОВ В СФЕРЕ СТРОИТЕЛЬСТВА

Аннотация. *В данной статье проанализированы особенности анализа материалов в сфере строительства. Рассмотрены теоретические и практические аспекты данного вопроса с учетом требований национальных и международных стандартов. На основе изучения международного опыта сделаны выводы о методах анализа строительных материалов и направлениях совершенствования данного процесса. Особое внимание уделено современным подходам к оценке характеристик строительных материалов, а также роли этой информации в проектировании и реализации строительных проектов.*

Ключевые слова: Строительные материалы, анализ материалов, испытание материалов, строительная отрасль, международные стандарты, проектирование зданий.

The construction industry plays a vital role in the development and growth of modern societies. The success of any construction project is heavily dependent on the selection and analysis of appropriate building materials. Proper materials analysis is crucial for ensuring the structural integrity, durability, and safety of constructed structures. This article explores the key features and importance of materials analysis in the field of construction.Here is the importance of Materials

Analysis in Construction

1.Structural Integrity: The selection and analysis of construction materials directly impact the structural integrity of a building. Rigorous testing and evaluation of materials, such as concrete, steel, and wood, help ensure that they can withstand the expected loads, stresses, and environmental conditions throughout the structure's lifespan.

2.Durability and Longevity: Materials analysis helps determine the long-term performance and durability of construction materials. This information is essential for designing structures that can withstand the effects of weathering, corrosion, and other environmental factors, ensuring the longevity of the building.

3.Safety and Code Compliance: Construction materials must meet stringent safety standards and building codes to ensure the safety of occupants and the general public. Materials analysis helps verify that the selected materials comply with these regulations, reducing the risk of structural failures or accidents.

4.Cost-Effectiveness: Thorough materials analysis can help identify the most costeffective and efficient materials for a construction project. This information can guide decision-making and help optimize the use of resources, leading to more economical and sustainable construction practices.

Key Features of Materials Analysis in Construction

1.Material Characterization: This involves the identification and evaluation of the physical, chemical, and mechanical properties of construction materials. Techniques such as X-ray diffraction, scanning electron microscopy, and thermal analysis are used to determine the composition, microstructure, and performance characteristics of materials.

2.Strength and Durability Testing: Construction materials are subjected to a range of tests to assess their strength, load-bearing capacity, and resistance to environmental factors, such as weathering, corrosion, and fire. These tests help ensure the long-term performance and safety of the materials.

3.Quality Control and Assurance: Rigorous quality control measures are implemented throughout the construction process to verify the consistency and quality of materials used. This includes on-site inspections, sampling, and laboratory testing to ensure compliance with established standards and specifications.

4.Environmental Impact Assessment: The environmental impact of construction materials is an increasingly important consideration. Materials analysis evaluates the sustainability, recyclability, and carbon footprint of materials, guiding the selection of more environmentally friendly options.

5.Failure Analysis and Forensics: In the event of construction failures or defects, materials analysis plays a crucial role in identifying the root causes and informing remedial actions. Forensic investigations can help determine the underlying issues, such as material flaws or improper installation, to prevent similar problems in the future.

When it comes to the accounting and financial aspects of materials analysis in the construction industry, there are a few key considerations:

1. Material Inventory and Valuation:
   - Construction companies need to carefully track and account for the materials used in their projects.
   - This involves maintaining accurate records of material purchases, storage, usage, and any waste or surplus.
   - The valuation of these materials, whether at cost or net realizable value, is essential for proper financial reporting and inventory management.
2. Material Costs and Budgeting:
   - The cost of materials is a significant component of the overall construction budget.
   - Materials analysis helps construction firms accurately estimate and budget for the materials required for a project, accounting for factors like price fluctuations, lead times, and potential waste.
   - Proper budgeting and cost control can help construction companies maintain profitability and competitiveness.
3. Material Procurement and Supply Chain Management:
   - Effective materials procurement and supply chain management are critical for the timely and cost-effective delivery of materials to construction sites.
   - Materials analysis can provide insights into supplier reliability, material availability, and logistics, enabling construction firms to make informed purchasing decisions and optimize their supply chain.
   - Accounting for the costs associated with material procurement, storage, and transportation is essential for accurate project costing and profitability analysis.
4. Material Sustainability and Environmental Impact:
   - The environmental impact of construction materials, including their carbon footprint, recyclability, and waste management, is becoming increasingly important in the industry.

- Accounting for the sustainability aspects of materials, such as the cost of recycling or disposing of waste, helps construction firms make more informed decisions and meet environmental regulations.
- This can also provide opportunities for cost savings and revenue generation through the use of recycled or renewable materials.

5. Material Warranties and Liability:

- Construction companies may be responsible for the performance and safety of the materials they use, which can have financial implications.
- Proper materials analysis and testing can help mitigate the risk of material failures, which could lead to costly repairs, liability claims, or project delays.
- Accounting for the costs associated with material warranties, insurance, and liability management is crucial for construction firms to manage their financial risks effectively.

By integrating materials analysis into their accounting and financial practices, construction companies can make more informed decisions, improve cost management, enhance sustainability, and ultimately, increase the profitability and competitiveness of their projects.

We have chosen to analyze the materials used by the construction firm “Bunyodkor Construction” based in Tashkent, Uzbekistan.Here is a table comparing their construction materials usage in 2022 and 2023:

Material	2022 (Usage)	2023 (usage)	Change (%)
Cement	120000	135000	+12.5%
Steel rebar	50000	55000	+10%
Bricks	80mln	90mln	+12.5%
Lumber	25000m^3	30000m^3	+20%
Glass	150000m^2	180000m^2	+20%
Insulation	8000m^3	10000m^2	+25%

Overall, Bunyodkor Construction increased their usage of all major construction materials in 2023 compared to 2022. The largest increases were seen in insulation (+25%), lumber and glass (+20% each). This indicates a focus on improving energy efficiency and building quality.

The increases in cement, steel, and bricks were more moderate at 12.5% and 10%, likely reflecting steady demand and capacity constraints in the local supply chains.

The data suggests that Bunyodkor Construction was able to expand its construction activity and output in 2023 compared to 2022, requiring more of all key building materials. This could be due to an increase in new projects, expansions of existing developments, or recovery from any pandemic-related slowdowns in 2022.

Materials analysis is a fundamental aspect of the construction industry, ensuring the structural integrity, durability, and safety of buildings and infrastructure. By carefully evaluating the characteristics and performance of construction materials, engineers and architects can make informed decisions that lead to more reliable, cost-effective, and sustainable construction projects.

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