4.Dina Stober, Roko Žarnić, Davorin Penava, Margareta Turkalj Podmanicki. "Application of HBIM as a Research Tool for Historical Building Assessment", Civil Engineering Journal, vol. 4(7):1565, (2018). https://doi.org/10.28991/cej-030919

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MODERN TECHNOLOGIES IN BRIDGE RENOVATION

The renovation of bridges has been significantly influenced by modern technologies, leading to safer, more durable, and longer-lasting structures. Here are some key advancements in bridge renovation technology:

Safety and Durability Enhancements. Civil engineers have focused on improving safety by making bridges more resilient to fire, earthquakes, and high winds. They are also exploring how technology can help monitor new bridges and maintain those already in place. [1]

Many new bridges now have sensors that collect data on their structural behavior and condition, allowing for continuous monitoring and maintenance to extend their design life beyond the previous average of about 50 years. [1]

Use of Advanced Materials and Construction Techniques. The Industrial Revolution brought about the use of industrially produced iron, which paved the way for the development of modern bridges using materials such as steel and reinforced and prestressed concrete. [2]

Innovative new construction materials and advanced construction methods, tools, and software are now available for bridge engineers, enabling more accurate models and detailed analyses of bridges [3].

Intelligent Technology and Information Systems. Intelligent technology based on information technology provides a new opportunity for innovation in bridge engineering, focusing on construction efficiency, management effectiveness, and long-term service [4].

Building Information Modeling (BIM) pairs architects with engineers and construction professionals, allowing for more efficient communication and collaboration throughout the stages of construction. BIM enables engineers and designers to create 3D models that include a wealth of data, from the physical characteristics of a bridge to its functional features [5].

Advanced Construction Methods. Advanced Bridge Construction (ABC) methods, such as building the new structure alongside the old one or underneath it, are being employed, with heavy lifting equipment that can handle more weight and is more compact, facilitating the renovation process [6].

These advancements in technology have not only enhanced the safety and durability of bridges but have also improved the efficiency and effectiveness of bridge renovation projects, ultimately contributing to the development of more resilient and long-lasting bridge structures.

REFERENCES

1.Allsop J. Five modern bridges that are pushing the bounds of engineering // MIT Technology Review. 2021. URL: https://www.technologyreview.com/2021/04/28/1023041/modern-urban-city-bridge-technology-construction-genoa-stockholm-china-seattle/

2.Lomax S., Duffy T. The New Technology of Bridge Design // Structure magazine. 2013. URL: https://www.structuremag.org/?p=760

3.Lee G. Top 5 New Advanced Technologies for Bridge Design // midas Bridge. 2020. URL: https://www.midasbridge.com/en/blog/newstrends/top-5-new-advanced-technologies-for-bridge-design

4.Zhou X., Zhang X. Thoughts on the Development of Bridge Technology in China // Research High Performance Structures: Building Structures and Materials. 2019. URL: https://www.sciencedirect.com/science/article/pii/S2095809919308318

5.U.S. Bridge. Top Emerging Technologies in Construction // U.S. Bridge. 2022. URL: https://usbridge.com/top-emerging-technologies-in-construction/

6.Conexpo CON/AGG /. Technologies To Advance Bridge Construction // Conexpo CON/AGG. 2017. URL: https://www.conexpoconagg.com/news/technologies-to-advance-bridge-construction

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STUDY OF SOIL CONCRETE SAMPLES USING RECYCLING PRODUCTS

We continue to study the physical and mechanical properties of soil concrete samples for low-rise buildings. Taking into account the results of previous studies, such as the selection of the optimal composition of soil concrete, the study of the strength characteristics of soil concrete, which are given in scientific papers [1, 2], it was decided to introduce aggregate for increasing the strength characteristics of soil concrete. The experiment was carried out in the Research Laboratory of the Department of Reinforced Concrete Structures of the PGASEA. In previous studies, the maximum mortar grade for different types of binder was established, namely Heidenberg cement M100 and M75 for Kamianets-Podilskyi cement M75. Since concrete itself requires aggregate, and Ukraine is currently experiencing active hostilities, there is no shortage of recycled products. And after the end of hostilities, there will be a great need to dispose of construction waste, it was decided to use these materials in further research.

At the next stage, the experiment was set up as follows: the type of binder was Kamyanets-Podilsky PC M500, the test cubes were 70x70x70 mm in size, and the aggregate was the recycled products with a fraction of 5-7 mm. The method of manufacturing the samples, the conditions of sample aging, and the test method remained the same as in previous studies [1, 2]. Three aggregate indicators in percent by weight of dry soil and binder, namely: 10%, 20%, 30% aggregate were used (Fig. 1).

a) b)