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**IMPROVEMENT OF CONCRETE PRODUCTION TECHNOLOGY
FROM DRY BUILDING MIXTURES**

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Concrete is one of the most widely used construction materials, but its production is associated with several problems, such as labor intensiveness, long curing time, high cost, and negative environmental impact. One of the promising directions for solving these problems is the use of dry building mixtures (DBMs) and modified water.

The aim of research is to explore how various concrete production technologies and water qualities can affect the hydration process of cement, ultimately influencing the strength development of concrete. The objective is to propose improved technologies for the production of concrete from DBMs using modified water, which allow to increase their strength, frost resistance, water impermeability, mobility and other characteristics.

The results of the study can be used to develop new technologies for concrete production, allowing to improve the quality, reduce costs and shorten construction time.

Dry mix concrete, or packaged dry concrete, is a blend of cement, sand, and aggregates mixed and bagged at a plant or factory and then transported to the construction site, where water is added before application. This article will discuss the differences, advantages and disadvantages of dry-mix concrete for various applications.

Table

Basic differences between conventional concrete, and packaged dry concrete

Conventional concrete	Packaged dry concrete
1. All ingredients are mixed and placed in formwork directly at the site.	1. The dry ingredients are mixed separately in a controlled environment and then water is added at the time of application at the site.
2. Batching and measurement is done on the field, which is prone to error and quality issues. 3. Aggregates moisture content is environment dependent and difficult to control.	2. Batching and mix proportioning is done at the plant, which ensures proper quality and minimal or nearly zero error. 3. Aggregates moisture content is well controlled while packaging at the plant and is independent of environmental conditions at a construction site.
4. Admixture is usually added on-site, which is prone to site variation and several mishandling issues due to the unorganized sector of the Industry. 5. Quality assurance from the supplier is on raw materials only and not the finished concrete.	4. Dry admixture can be added to the prepackaged mix itself, which is well-controlled and ensures quality. 5. Quality assurance on the concrete is ensured as the mix is already prepared and only water is added at the site

Following are the few advantages of dry-mix concrete.

Increased Strength and Durability. Dry-mix concrete is typically mixed with less water than wet-mix concrete, resulting in higher strength and durability. Its lower water-cement ratio reduces shrinkage and cracking, making it a popular choice for structural applications.

Easy to Use. Dry mix concrete is pre-mixed and bagged, making it easy to transport and store on-site. It also eliminates the need for on-site mixing equipment, saving time and costs.

Consistency and Quality Control. Dry mix concrete is produced in a controlled environment, ensuring consistent quality and strength. It also eliminates the potential for variations in mix proportions, which can affect the final product's strength and durability.

Reduced Wastage. The pre-mixed nature of dry mix concrete eliminates the need for excess material, reducing wastage and saving costs. It also reduces the environmental impact of on-site mixing and the waste generated during construction.

Following are the few disadvantages of dry-mix concrete.

Limited Working Time. Dry mix concrete typically has a short working time, making it unsuitable for large-scale projects or complex structures. It sets quickly and cannot be reworked once it has hardened.

Water Availability. Dry mix concrete requires water on site, which can be a challenge in areas with limited water availability. It can cause delays in the construction process and increase costs.

Limited Range of Applications. Dry mix concrete is not suitable for all types of construction projects. It is primarily used for structural applications and is not recommended for decorative or surface finishes.

Dust and Respiratory Hazards. Dry mix concrete can produce significant dust during mixing and application, which can be a respiratory hazard for on-site workers. Proper safety measures must be taken to ensure worker safety.

The findings highlight that dry-mix concrete has numerous advantages over wet-mix concrete. However, it also has some disadvantages. Overall, dry-mix concrete is an excellent choice for structural applications, repairs, and renovations, but it may not be suitable for all construction projects. When choosing the right mix for the job, careful consideration must be given to the application and environment.

Focus on water. Stricter water quality control through pre-fabricated cleaned or distilled water production can significantly improve the consistency and long-term durability of concrete.

Utilizing pre-fabricated cleaned water in concrete production offers a crucial step towards sustainable construction by mitigating the impact of variable water quality on concrete performance.

Pre-fabricated cleaned water together with DBMs can enhance the compressive strength and early strength development of concrete compared to using traditional mixing water sources.

The controlled use of pre-fabricated or distilled water and dry building mixtures in concrete production has the potential to reduce quantity of water needed and improve the resistance of concrete to chemical attack.

Moving forward, further research is needed to evaluate specific impurities and their effects, comparing the strength of concrete made with clean water versus water containing contaminants for conventional concrete, and packaged dry concrete. For more specific results we need also to investigate a particular type of cleaned/distilled water (e.g., reverse osmosis water) and its impact on a specific concrete property (e.g., freeze-thaw resistance, compressive strength). Compare the economic feasibility of use pre-fabricated cleaned water against traditional methods in specific construction scenarios.

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