
Dry-Mix Shotcrete Application Using Hydro-Mix System

By Gregory McFadden

Shotcrete is a form of concrete placement using airflow to provide high velocity to the concrete material stream. This concrete placement technique allows for the creation of complex structures, particularly in areas that are difficult to reach or form using conventional casting methods. Variations on the hydro-mix system have been used for decades. Using a hydro-mix system can improve the performance and efficiency of dry-mix shotcrete, offering enhanced mixture control, reduced material waste from rebound, reduced dust, and improved placement quality.

In traditional dry-mix shotcrete application, dry concrete materials are conveyed by airflow through the delivery line to the nozzle, where water is injected immediately before the nozzle tip. The hydro-mix system simply moves the water injection point further back in the shotcrete hose. The additional exposure time of the dry concrete materials to the injected water improves the mixing of water with the dry concrete materials and reduces dust and rebound.

Pre-dampening nozzle options have been around for many decades, and through the years, dry-mix shotcreters have used and perfected the use of the hydro-mix. While the 'correct' spacing of the hydro-mix water injection point placement in the hose has varied from manufacturer to manufacturer, the more experienced shotcrete contractors typically elected an 8 to 10 ft (2.4 to 3.0 m) placement of the hydro-mix water body for better mixing and dust control of the concrete material. We adopted this method for our company, building on their successful experience — however in adopting the hydro-mix

system, we found the ability to inject water against the air pressure in the material hose was a challenge. We overcame the challenge by developing a booster pump system to provide water pressure well in excess of the air pressure in the dry-mix hose.

One of the key advantages of using the hydro-mix system is its ability to produce a more consistent concrete mixture. With the ability to closely control the water and the resulting water-to-cement ratio, the quality of the shotcrete placement is more predictable, resulting in improved strength, low permeability, and improved overall durability of the concrete.

The well-mixed consistency of the concrete improves its flowability, allowing for smoother application, better encasement of embedded reinforcing, and easier finishing of the final surface. This is particularly beneficial for vertical or overhead applications, where proper workability is crucial to prevent sagging and material loss.

Using the hydro-mix system can provide more thorough mixing with water and ensure the concrete mixture is more fully hydrated, even in challenging environmental conditions

such as extreme heat or wind. This is especially important in building concrete swimming pools, ensuring a consistent and durable finish where high-quality, crack-resistant concrete is essential to watertightness and long life of the concrete pool shell.

Using a hydro-mix system represents a significant advancement in the dry-mix shotcrete industry, providing more efficient, consistent, and environment-conscious solutions for shotcrete placement. With its ability to optimize material use, improve workability, reduce dust, and enhance the overall quality of the final structure, hydro-mix technology has become an essential tool in our quality dry-mix shotcreting.



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