

CASE STUDY

How volumetric mixers and fast setting concrete keep everyday moving

DATE:

March 16, 2020

WEBSITE:

vmmb.org



Which is worse — being stuck in traffic on your way to a road repair project with a fresh load of concrete or arriving on time but discovering it's the wrong mix design?

Enter fast setting concrete and volumetric mixers. Depending on the design mix used, the cure time can be as little as one hour. This significantly reduces labor costs and road closures, providing a boon to everyone involved. But, it also has many applications across commercial and residential uses — all of which can be accomplished with a volumetric mixer.

WHAT IS FAST SETTING CONCRETE?

It's the end product of mixing a rapid set cement powder with aggregates and water. This type of concrete is known for its rapid strength gain, high durability, and low shrinkage. While the cement powder used has a similar appearance to Portland cement, it's non-metallic with no additional chlorides. Because fast setting concrete is designed to last years once set, it has numerous everyday commercial and residential applications.

WHAT IS FAST SETTING CONCRETE?

Fast setting concrete is commonly used for roadway construction and repair due to its ability to withstand traffic in a matter of hours. Yet, many sidewalks, footings, industrial floors, and machine bases also use this type of concrete as it can bond to many surfaces, such as brick and stone.

HOW TO USE FAST SETTING CONCRETE WITH VOLUMETRIC MIXERS?

Because all needed material is stored separately in a volumetric mixer, it creates an ideal situation for producing fast setting concrete and repairing affected concrete surfaces. Since the unit is technically a batch plant on wheels, it has job site accessibility not permitted by drum mixers.

Meeting & Exceeding Tight Deadlines

With more than 65,000 vehicles per day traveling along Interstate 280 near downtown San Francisco, time and natural fatigue took a major toll. By 2014, the thoroughfare needed significant repair and reconstruction. Bridge hinge replacement was scheduled during three major holiday weekends — Memorial Day, Fourth of July, and Labor Day.

Precision Concrete in West Sacramento, California poured 130 cubic yards per hinge inside the 100-hour window of allotted closure time. According to the Precision project manager, the use of traditional concrete would have required six-months to complete but crews were able to meet the condensed timeline.

"For the last two hinges we did, we were only given three weekends to do all the work. That's complete removal and replacement and reopened to traffic," Precision Concrete said.

The key was using a continuous pour set up during the project duration. Aggregates were continuously loaded into the mixer, along with one-ton super sacks of fast setting cement. Because all concrete was batched on-site, crews were able to ensure the mix met all designated specifications and adjust if necessary.

“Controlling the mix, working with the crews, having the ability to make minor adjustments to the mix [such as] it’s with the amount of admixture that we’re doing, the versatility of the equipment,” they continued. “Everything about the volumetric mixers is essential and a very good benefit of incorporating the equipment into this type of specialty work, but also for the other projects and pavements we do here as well.”

Quality & Efficiency Go Hand-In-Hand

Since the mid-1990s, Nation’s Mini-Mix in Springfield, Oregon has used volumetric mixers for the company’s range of projects. Owner Rick Nation understands the importance of meeting and exceeding project specifications set by Departments of Transportation. Each year, the company uses their small fleet of volumetric mixers to complete road and bridge projects with fast setting concrete.

In 2016, Nation’s handled a 2,000 yard, two-month project for Interstate 5 in Seattle with continual monitoring from the Washington Department of Transportation (WSDOT). Though the project first began with proving the value of the concrete and its production method, it resulted in another large-scale pour along the interstate in 2017.

Saving Labor & Traffic Delays

Overnight roadway repairs are dangerous for the contractors working and drivers moving down the road. Reflective cones, signs, and lights remove a part of the risk, but it remains until all equipment and workers are off the roadway. Yet, safety coupled with austere deadlines means there’s no leeway for delay on these projects. For indus, a pavement preservation company based in Massachusetts, volumetric mixers allow them to align the necessary time and labor.

After taking a section of pavement down to the rebar, the operator filled it with a fast setting concrete – with the initial set developing in 20 minutes. According to indus foreman Kenneth Jorge, traffic is moving again an hour after the pour when compared to similar jobs.

“Typically it’ll set within 20 minutes then within an hour you can put traffic on it,” Jorge said. “You can be poured out in 20 minutes. It’s [the mixer] is really easy to run once you learn it.”



Using volumetric mixers also reduces the physical impact of the crew working. Jorge noted before the company needed multiple employees on the truck with more placing and finishing. Now, an operator with two working the repaired section is all they need.

“It’s a lot quicker process and a lot easier on the guys,” Jorge said. “We really want to be pouring at a certain time so we could be picking up cones and putting traffic back on.”



Repairing A Common Summertime Roadway Issue

For motorists and pedestrians, even a small pavement buckle poses a risk. For municipalities and Departments of Transportation, time is of the essence to make repairs for risk mitigation. That’s when having the ability to pour high-quality concrete quickly and when you need it is more than helpful.

Causes Of Road Buckling

It’s commonly caused by distinct air temperature increase or cement hydration and more frequently occurs in older pavement. As heat increases, the concrete expands, fills the joint spacing, if applicable, and forces the slabs upward. How much the slab expands and contracts vary based on:

- The type of aggregate, such as granite, limestone, shale, or siliceous gravel;
- Cementitious material content;
- Water-cement ratio;
- Temperature range;
- Age of the concrete; and
- Ambient relative humidity.

The aggregate type plays the largest role in expansion due to the individual thermal properties. Siliceous aggregates have the highest tendency for expansion, but this type of pavement distress is found in all three pavement types.

Concrete Pavement Repairs

Full-depth repair is common when a pavement issue, such as buckling, occurs at or near a pavement joint. To prepare the area for replacement, saw cuts spanning the lane width extend downward to the base. Then, crews remove the damaged concrete before base repairs proceed the placement of new concrete.

VMMB MEMBERS



VMMB
VOLUMETRIC MIXER
MANUFACTURERS BUREAU
vmm.org

FOR MORE INFORMATION, VISIT VMMB.ORG

© NRMCA, 2020. All rights reserved.

FORM 13994 - 03/2020