

Evaluating Ready Mix Suppliers

By Mark Bradford

Oscar Duckworth has covered the keys of the equipment necessary for successful wet-mix shotcrete in the past few “Nozzleman Knowledge” articles. This article discusses the importance of the material supplier in the equation.

One of the most critical pieces to what we do, as wet-mix shotcrete contractors and nozzlelemen, is monitor the quality and consistency of the concrete that we are placing. As we all know, shotcrete is a method of placing concrete. The ingredients in concrete vary in dosages, but with the right mixture design, the concrete should provide good quality with long-lasting results.

Let us discuss a key variable in the equation that is often overlooked: the ready mix supplier. The supplier consists of the dispatcher, the batch plant, the delivery truck, and the truck driver.

A good concrete supplier can help make your day of shotcreting very smooth. A bad supplier can make your day or job a nightmare.

To begin with, you need to determine where the job is located. Then determine which suppliers service that particular area. Some areas are serviced by several suppliers; some areas are only serviced by one or two. In conjunction with determining who services that area, you should ask around to get a feel for the performance of each supplier. Generally, other contractors, engineers, and architects should be able to give you input on the choices available in that particular area.

The majority of this discussion will be based on ready mix suppliers, not mobile mix trucks. However, mobile mix trucks can be a great alternative for certain jobs based on parameters, such as location (usually more remote jobsites) and amount of concrete needed. A mobile mix truck’s quality and consistency is heavily dependent on the skill and experience of the driver operator.

A few key decision points for choosing a ready mix supplier are:

- Proximity to the jobsite (if one supplier is 5 minutes away and another is 45 minutes away, that is a huge difference, especially if

the job specifications require placement within 90 minutes of batching);

- Willingness to work with you to get to a desired mixture design;
- Flexibility of schedule (availability of trucks);
- Quality and cleanliness of their trucks;
- Knowledge and demeanor of their drivers and staff;
- Extra (sometimes hidden) costs; and
- Price per yd³ (m³).

Notice that price was the last on my list of key factors. That is because we have found that most suppliers are very competitive on price. What sets the suppliers apart for our specific needs in the shotcrete industry is service. Service includes several different items.

Starting with the mixture design, it is crucial that the plant is willing to provide a mixture design to meet your needs/specifications. Shotcrete mixtures can be very different in composition compared to cast-in-place concrete mixtures. The ingredients are not different but the amounts of each ingredient are usually very different. It is not uncommon for a supplier/batch plant to have never seen or produced a shotcrete-specific mixture. Several times we have gotten pushback from suppliers saying that a mixture design will not work. That is where previous experience and documentation become important. We do our best to keep on file each mixture design that we use and the compressive strength cylinder tests that are taken (Fig. 1). We share this information with the supplier so that they have documentation for the future. Admixtures are critical in making a good shotcrete mixture and the supplier’s ability to provide the correct admixtures in the correct dosages is very important.

Once a mixture is chosen, it is critical that the mixture is consistent from truck to truck. That is where batch recordings are necessary. Make sure the supplier can and will provide batch records for the specific quantities in every load. Not only do batch records give you the complete picture of what is in the truck but they also give you the

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Fig. 1: Cylinder tests

information necessary to calculate how much water can be added to the mixture to stay within the specified water-cementitious material ratio (w/cm) (Fig. 2). Most jobs will require third-party testing and any reputable testing firm is going to require batch weights. We can not stress enough how important batch records are. They are a critical piece of information that is very often overlooked.

Quality and cleanliness of the trucks is a much bigger factor than most would think. We are not concerned by the outward appearance of the truck. We are only concerned about the inside of the drum—mainly the fins—and if they have excessive buildup on them (Fig. 3(a) and (b)). A dirty barrel with excessive buildup on the fins is not effective at properly mixing the concrete. Proper mixing is much more critical in very low w/cm shotcrete mixtures than it is with standard concrete mixtures. Trucks with excessive buildup on the fins will produce inconsistent concrete throughout the discharge cycle that leads to poor-quality, inconsistent in-place concrete. The consistency of a mixture is crucial when doing vertical and overhead work. We have rejected trucks and banned trucks from returning to jobs due to them not being clean enough to properly mix the concrete. How do you determine if a supplier has clean or dirty trucks? Take a look at some of their trucks and you will be able to get a feel pretty quickly about how clean their fleet of trucks is kept. We have found that suppliers who require the drivers to chip their trucks have much



Fig. 2: Batch recordings



Fig. 3(a): Clean truck



Fig. 3(b): Dirty barrel

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cleaner drums than suppliers who do not make the drivers chip their own trucks.

Depending on job factors, such as temperature and volume, the ability to have a steady flow of trucks becomes increasingly important to the quality of the finished product. Fresh concrete is always preferred, and on some jobs concrete that is more than 90 minutes old may not be placed. Due to the slower nature of shotcrete placement, a lot of times 6 or 7 yd³ (4.6 or 5.4 m³) trucks provide needed flexibility for a particular job. I find that trucks that only have 7 yd³ (5.4 m³) are much more consistent throughout the mixture than trucks with 9 or 10 yd³ (6.9 or 7.7 m³) in them. I also prefer to completely pump my hopper down in between trucks to make sure that the concrete in the hopper of the pump is as fresh as possible. A supplier who has enough trucks available to get a quick cleanup load to complete a job is also a great benefit, as sometimes shotcrete jobs can be difficult to accurately calculate the amount of material needed due to irregular shapes and the amount of rebound or sluff that is removed once a particular shape is cut/sculpted.

The knowledge and temperament of the ready mix drivers is an often overlooked but key deciding factor. This information is much harder to come by than just a quick phone call or trip to their plant. Information about the drivers who work for a particular supplier is usually relayed from others' experiences and your own experience with a particular supplier. Drivers who show up with bad attitudes can really sour the mood of a jobsite, which leads to lowered productivity and quality.

Drivers who lack the knowledge of how to properly operate their trucks can be a big problem. There can be several key issues involved—from the driver's inability to keep the hopper full (which leads to surging at the nozzle), to overflowing the hopper and making a giant mess, to a host of other issues. We once had a driver who was chipping his truck with a hammer while discharging and letting big chunks fall into the pump. This caused a couple of blockages before we determined the root cause of the blockages. Needless to say, the driver was banned from ever coming to our job again. We have had numerous drivers who refuse to listen to instructions and would not spin the drum enough to adequately mix the concrete; they would then add water without permission, creating an unusable mixture.

Standby time and short load fees are a factor in choosing a plant, but not as big of a factor as those previously mentioned. If you have multiple suppliers that are all similar in the other deciding

factors, a swing vote may be achieved by determining the cost differences in short load and wait time charges. Some other charges that may be a factor are color addition and cleanout charges, as well as returned material charges. Make sure to get a complete list of all applicable charges so there are no surprises. We have seen exorbitant charges for high-range water-reducing admixtures (upwards of \$20 per yd³ [\$26 per m³] for medium dosages) and other admixtures. If you are aware of these charges going into the job, you can choose to add some or all of the admixtures to the truck on-site to save money.

Price per yd³ (m³) can vary wildly depending on mixture, location, admixtures, and availability of materials locally. Make sure to get a quote in writing for your specific mixture design, including the admixtures. Some plants will quote you a low per-yard (meter) price but it will not include the necessary admixtures to make the mixture workable. Some plants will quote the material and the haul charge separately. Some plants will only allow for 3 minutes per yard (meter) of unloading time and then start the clock on wait time. As we all know, it is not feasible to place a 6 yd³ (4.6 m³) truck in 18 minutes from arrival on-site. It usually takes 10 minutes to get the mixture to a usable state before the discharge cycle even starts. This amount of time can increase with a supplier who does not understand slump and how to accurately gauge slump, and will not send the mixture as desired. We find it disheartening at how few suppliers are able to batch concrete based on a specific *w/cm*. Most will ask for the desired slump, but few will be able to consistently and accurately deliver as desired.

With all that being said, the best way to choose a supplier is to get a reference from another company that performs work similar to what you are doing. Their experience is the best gauge on how well a particular supplier will work for your particular situation. We find that most contractors are more than willing to share their experience regarding a particular supplier.



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