

Need for Nozzleman Certification in the Swimming Pool Industry

by Bill Drakeley

As I travel across the country presenting seminars on the shotcrete process in the pool and watershape industry, it continually amazes me as to how much we, as an industry, don't fully understand its usages. The shotcrete process has suffered from incorrect definitions, misconceptions, and implementations. These problems are largely derived from a lack of education and proper training. The goal of this message is to encourage those of us who use the shotcrete process that there is more to learn and always more to improve upon.

The American Concrete Institute (ACI) states that "shotcrete is a method of shooting concrete at sufficient (high) velocity to ensure proper compaction." Add to this definition proper encapsulation of reinforcing steel and low permeability of concrete, and you have a clear intent of what the process is supposed to accomplish. Believe it or not, the shotcrete process was not invented by, or for, the pool industry. We have borrowed the technology for our structures and, to be honest, we have borrowed it poorly in far too many cases. To use this technology for pool construction without the proper training or education of the process is like buying all the raw materials for a

house and calling yourself a homebuilder without acquiring the training and education required to properly assemble those raw materials. To show how far we have to go, there is currently no separate recognition of pool builders by ACI, even though our industry uses an average 12 million yd³ (9 million m³) of concrete per year. Why? It probably starts with the fact that the building of pool structures has no universally accepted standards and plenty of shotcrete failures come from the pool and spa sector.

Is our quest for education and knowledge hopeless? Not at all. In fact, we have vehicles (some new, some existing) that will help our industry raise the bar in the pool/watershape construction industry. A starting point for education is nozzleman certification.

The American Shotcrete Association (ASA) provides training to prepare candidates to take the ACI Nozzleman Certification examination. The training program teaches the basics of proper implementation and placement practices. Why does ASA do the training and ACI the examination? ASA is a trade association interested in increasing the awareness of the benefits of the shotcrete method of concrete placement. It has a vested interest in seeing the market share for shotcrete increase. ACI is an independent organization comprising concrete experts who enable it to "effectively operate a nationally-recognized certification program." This independence provides credibility and recognition that would not be possible if the shotcrete industry did the certifying by itself. According to the ACI website, there are only 39 certified nozzlemen in the vertical dry-mix shotcrete process and 393 certified nozzlemen in the vertical wet-mix process. This number represents the entire shotcrete applicators, of which pools are a part.

Why Certification?

Let's start with terminology and intent. Some call it gunite, some shotcrete. I know of one uneducated builder who even calls his wet-mix delivered by a ready mix supplier "true gunite." If you don't understand what the process is as defined by ACI, how can you sell it or build it? Ready mix suppliers rely on the contractor (as they should) for proper mixture design. Where do many pool



contractors come up with mixtures calling for water-reducing agents and other admixtures for a pool application? Previous experience is the usual answer given to this inquiry. The guy who came before left his habits and best guesses for the next person to pick up. This has been the history for too many contractors in the swimming pool business. Verbal instructions of mixture design and observed habits of placement virtually guarantee that your knowledge of the intent of shotcrete usage will be limited and always behind changes in materials and mixing methods. Not only do materials and equipment continue to evolve, there are regional differences in materials and environment that can dramatically affect the end product. Case in point: most experts in our industry (engineers, tile experts, plasterers, designers) will state that pool shotcrete is not waterproof and requires a sealer to be watertight. This is not the intent for our process. Shotcrete is supposed to yield low permeability, high-density concrete that is designed to be watertight. So why the statement? Because a) for some time now, many shotcrete shells are porous and will not hold water; and b) many pool contractors do not know that the intent of the process is to be watertight. If we knew, as a group, what to strive for, the end result becomes a bit clearer. Another case in point: most pool builders accept the claim that “all pool shells have bleed water that leaks out of the shell.” What happened to primary objectives such as density, velocity, and encapsulation? Does anyone consider these objectives before shotcrete placement? It seems few do. If the contractor and customer are not clear on the intended result, how do you know if you have achieved your objective?

Our Experience

As we began our construction company, my fellow workers and I realized that written information on the pool shotcrete process was lacking. We immediately purchased ACI 506R-90(95), “Guide to Shotcrete” by ACI Committee 506, Shotcrete. We still use this guide today. There were still questions, however, regarding on-site applications when certain situations or circumstances arose. Our crews had the required field hours of shotcrete nozzling experience for applying to take the ACI Nozzleman Certification examination. We contacted the closest ACI-approved shotcrete examiner, George Yoggy. His decades of involvement in the shotcrete concrete industry was, and still is, invaluable to an up-and-coming firm. He explained the ASA training and ACI certification process and the potential benefits in establishing a firm with a reputation as a serious builder of high-quality projects. The training covered a number of topics including basic concrete technology; shotcrete types, uses, and limitations; equipment; testing and quality control; job site preparation; and proper

application, finishing, and curing procedures. Safety concerns were also covered.

This new working knowledge opened our eyes. Before the training provided by Yoggy, the required shooting velocity, placement methods, density, reduced porosity, curing, and admixtures were usually an afterthought. After the classroom sessions, we took a written exam to test our retention of the information discussed. We then had to demonstrate shooting/placement techniques into a test panel with cross sections of different size reinforcing bar. Those cross sections were then core drilled to evaluate the quality of shotcrete encapsulation around the reinforcing bar. Failure to encapsulate properly meant no certification. As a result of the training and examination process, our company changed compressor size, mixture design, and placement procedures. We now consistently achieve good density, low-permeability concrete. When we cure our pool shells, they actually hold water and fill up. Our shells are now watertight. This result is the intent of the shotcrete process.

Domino Effect

Knowing good placement procedures, we now looked at other site parameters that would be integral to the proper placement of shotcrete. Things such as weight-bearing soils, forming, drainage, plumbing, and steel placement became as big a priority as shotcrete placement. A knowledgeable contractor takes everything into account that can have an affect on good placement. As pool builders, we know that there can be variables that may affect the job. Our company sometimes encounters fill ground conditions and/or significant elevation differences. We know that the concrete will suffer because of



unsuitable soils or formwork moving and/or shifting. ASA training, coupled with ACI certification training, provides the knowledge that acts as a check-and-balance system overflowing to all aspects of a project, not just shotcrete placement.

Going Forward

Our company has formatted ASA and ACI training materials expertise into our procedures without major alterations. The basics of concrete technology and understanding of fundamentals are crucial to success. Contours and shapes of the vessel may change minor procedures, but a working knowledge of the intended result will guarantee a project worthy of ASA and ACI recognition.

How many pool contractors know these fundamentals? In my experience, only a few. We were called to consult at the end of a pool installation in Clearwater, FL. The pool shell contractor had already been chosen. We were not able to get to the site until after the shotcrete was placed. On the phone the day after the shooting, I began asking the pool contractor what measures he was taking for curing the shotcrete. His response caught me off guard. "We don't need to cure these types of pools. They're called shotcrete pools and are at full strength right after being installed." I was shocked! This type of ignorance of basic concrete technology is far too commonplace. Our industry needs to embrace the certification process and its educational benefits to overcome this type of appalling ignorance.

Organizations such as the Genesis 3 Design Group, with its prestigious construction school, and ASA represent two bright spots in education available to the pool industry. Quality construction is not something you conjure up on your own. There are guidelines and precedents, set long before any of us picked up a shotcrete hose. In my case, these procedures have catapulted our firm to one of the top high-end pool builders, not only in the region, but in the entire country. Without certification and the knowledge learned and applied, we would be like others in the swimming pool industry—guessing for quality. The shotcrete process, both dry- and wet-mix, can provide high-performance shotcrete structures when done properly. It is not acceptable for our placed shotcrete to be of lesser quality than intended. For far too long, poor quality in shotcrete pool construction has been

accepted as the industry standard. Learning the fundamentals of quality shotcrete is the beginning of quality construction. High quality costs less in the long run, generates repeat business, and provides a sustainable market.

Finally, I hear this statement occasionally, "I have been shooting pools for 25 years. Never had a problem. I don't need training and testing." Three problems are evident with this statement. One, just because you have been doing something for 25 years does not mean you have been doing it right. And if you really believe you are doing it right, take the ACI Nozzleman Certification examination and prove it. Two, no matter how careful a contractor is, there are problems from time to time. The key is to recognize conditions that create the potential for problems so that you can deal with them before a problem occurs. Three, in today's society, we all need continuing education. Materials and equipment are constantly evolving and so should our knowledge.

The ASA training and ACI Nozzleman Certification programs offer a chance to take your company to a new level of quality. It happened to me and it can happen to you.



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