Technical Tip

Swimming Pool Scaffolding

By Mason Guarino

In the shotcrete swimming pool installation process, proper work platforms have always been a necessity during the shotcreting process. Not only are work platforms for working comfort but they are also necessary to give nozzlemen ready access to the correct angles for shooting the material into place. Without proper work platforms, the nozzlemen would have difficulty controlling rebound and properly encapsulating the reinforcing bars. In addition to the nozzlemen’s access requirements, the finishers need to be able to reach the shotcrete surfaces to provide the final shotcrete finish. Unfortunately, the work platforms for nozzlemen and finishers are typically different. The nozzlemen need to be a few feet away from the work and typically a little bit above it, whereas a finisher needs to be much closer. The always-changing work surface and different access requirements for the various shotcrete team members constantly present a challenge regarding how to accomplish the work in a safe manner while still being able to work efficiently.

In the course of a single day, the crew may need at least four different working positions. In the same placement area, the nozzlemen and the finishers need two different working locations and it is not uncommon to install multiple courses of material in one day. Due to the different distances from the working surface required, it is impossible to simply install all the scaffolding beforehand, as would be typical for a masonry crew installing a concrete block wall. Basically, if all the scaffolding is erected beforehand, much of the scaffold would get in the way, preventing proper nozzle technique. This creates the need for a scaffolding setup that can be moved, or disassembled and assembled quickly and easily. Powered boom lifts are out of the question because they would have to be set inside the pool. If the pool floor is shotcrete, there would not be enough time for the shotcrete to gain enough strength to carry the weight to use them. There are many options of staging available; however, due to safety guidelines, the options have become more limited than they were in the past.

In the past, this scaffolding has been taken care of quickly and easily with the use of shotcrete jacks, which are scaffold pieces made of steel that hold three 2 x 4 in. (50.8 x 101.6 mm) pieces of lumber to create the legs and supports. Two legs go to the ground while the plank support is then fastened to the reinforcing bar. This type of staging was fast and convenient but is, in light of today’s safety standards, very questionable. OSHA requirements and corporate safety programs have made most commercial general contractors very strict on scaffolding they allow on their job sites. Specifically, scaffolding now must clearly state the structural weight limits. This eliminates the option of jacks holding 2 x 4 in. (50.8 x 101.6 mm) pieces of lumber to be used as scaffolding. South Shore Gunite Pools & Spas, Inc., had been using the jacks without issue of an injury or being questioned up until the mid-2000s. When the questioning of the jacks first began, we were able to convince cautious general contractors to let us use them by adding extra jacks, multiple planks, and fabricating guard rails out of additional 2 x 4 in. (50.8 x 101.6 mm) pieces of lumber. We even used them as high as 8 ft (2.4 m) when working on 12 ft (3.7 m) deep pools. This practice came to an end in 2008, when South Shore Gunite was awarded a Navy Training Pool project with a 12 ft (3.7 m) deep end.

When first awarded this job, we were told that the Navy enforced a very strict safety policy, which would require us to re-evaluate our scaffolding. The U.S. Navy follows safety guidelines created by the U.S. Army Corps of Engineers (USACE). These guidelines are stricter than OSHA requirements. For example, OSHA’s requirements for fall protection on scaffolding say that anything over 10 ft (3 m) in height requires fall protection with a guard rail, a midrail, and a toe board; the USACE guidelines require the same guard rails, but starting at a height of 6 ft (1.8 m). Additionally, OSHA has a rule that says when a work platform for scaffolding is substantially complete enough for someone to stand on, the workers may stand on the platform to complete the installation of final planks and any necessary guardrails. According to the USACE, if possible, all work must be done from stepladders. When working for the Navy, you will find they have construction personnel
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Shown here is a scaffolding setup in a pool larger than the Navy pool using a larger movable setup. (Due to Navy rules, we are unable to use actual site pictures)
whose specific job is to ensure quality and safety of the construction at all times. After learning about the USACE requirements, it became clear that we needed to acquire the correct scaffolding for this project.

The next step was to decide what type of scaffolding would work best for our shotcrete placement. The main goal was to create a setup that could be moved around quickly and easily. Our decision was fairly conventional with a few tweaks. We went with the typical 7 ft (2 m) long and 5 ft (1.5 m) wide staging sections in 6 and 3 ft (1.8 and 0.9 m) heights similar to what a masonry crew would use on a building. We opted to use 7 ft (2.1 m) long aluminum and plywood plank pieces, however, rather than the 16 ft (4.9 m) long, 2 x 12 in. (50.8 x 304.8 mm) pieces of OSHA-approved plank. The aluminum and plywood plank sections still met the requirements of OSHA and the Navy; however, for ease of assembly, movement, and disassembly, these planks were much lighter and easier to handle. We also opted to use wheels to make the sections easily movable.

The final obstacle was the cove of the pool—in our case, a 2 ft (0.6 m) radius between the wall and the floor; this would not affect the nozzlemen’s scaffold platform because 2 ft (0.6 m) is a nice distance to stand and shoot on a wall, but it created an issue for the finishers, as they needed to be against the wall. The problem was solved for the finishers by the use of scaffold side brackets that made the work platform 2 ft (0.6 m) wider so the finishers could reach the final surface properly.

Once the scaffolding was in place, we needed to establish a system to keep the shotcrete crew moving efficiently. We did not want the scaffolding to slow them down. The nozzleman would have one platform for himself and the blow pipe operator, the finishers would have a second platform, and there would be a third platform ready for the next course of shotcrete when the nozzlemen needed to move higher. Using the third platform made it easy for the nozzlemen to immediately move to the next course so the shotcreting placement could continue with minimum interruption. Once the nozzling started on the next course, a laborer would begin rebuilding the first platform for its next use. This helped to eliminate down time between changing working elevations. All of these setups were on wheels and two sections long, making the work platforms a total length of about 14 ft (4.3 m). This size was small enough so that it could be moved fairly easily by the laborers working on the floor but big enough so that it did not have to be moved constantly. This size of a setup was very stable up to our highest work platform elevation of 9 ft (2.7 m).

The movable scaffolding worked very well for the parts of the pool that were deep and relatively flat; however, we did need to build scaffolding without wheels where the pool had steep slopes between different elevations. For access to the scaffolding, we used job-built ladders for the lower platforms that were only about 3 to 4 ft (0.9 to 1.2 m) off the ground and used extension ladders for the platforms 6 ft (1.8 m) and above.

The entire Navy job went very well with no major issues. It was completed on time and even the shotcrete crew, who in the beginning did not like the “new way” of building and using the scaffolding, eventually came around. One of the biggest hurdles was getting the crew to change the way they typically like to move when shooting. They like to start at one spot and continue linearly and without interruption through the job. Due to the somewhat time-consuming processes of building staging and breaking it down, especially where there were steep slopes, they had to move around the pool to the areas that were ready for them to shoot. The jumping around frustrated them, but it did keep the shooting production fairly high. Since the Navy job, we have successfully used the same scaffolding approach on many other commercial swimming pool projects.

Mason Guarino started in the pool industry when he was 14, learning how to install reinforcing bar. Since then, he has worked on all phases of the swimming pool industry. Guarino has been with South Shore Gunite Pools & Spas, Inc., full time since graduating from Wentworth Institute of Technology, receiving his BS in construction management in 2009. Guarino is an active member of ASA and an ACI Certified Nozzleman.