

Shotcrete Application in Skatepark Construction

By Charles Timothy Payne, James Hedrick, Lance Spiker, and Tony Walsh

Shotcrete is a crucial component in custom skatepark construction and is the most desirable and effective way to place concrete in the skatepark industry. The high velocity at which shotcrete is applied creates perfect placement and compaction for flawless radii and vertical surfaces of skate bowls and pools, as well as other skateable features contained in skateparks. Without shotcrete, it would be very hard to accomplish the smooth contours incorporated within skatepark designs. The urethane skateboard wheels on a shotcrete finish make for the best riding experience.

Formwork, Excavation, and Reinforcing Bar

The formwork is the first of many steps taken before shotcrete is applied. These forms create the custom layout, grade, and shape for applying the shotcrete. The use of steel pipe is used for the skating edge and is traditionally referred to as the “coping.” The coping also becomes the form to which crews shoot and cut off from. After the forms are complete and the coping is set, excavation can begin. The main excavation is completed by machinery, while fine hand tuning is necessary to ensure the correct thickness of the shotcrete. Once excavation is complete, reinforcing bar is set according to the forms, which are typically placed on 12 in. (305 mm) centers. The

grid pattern is adjusted according to the vertical height and sometimes beyond vertical where the reinforcing bar may be placed as close as 6 in. (152 mm) on center.

Mixture Designs and Placement

After many years of working with the shotcrete medium, a specialized mixture has been refined. The hand finishing process calls for the slump to be a bit more on the wet side. Fly ash is used in the mixture, which is air entrained with a water reducer. The use of additives is usually avoided because it produces a “lumpy” product. A large amount of portland cement is also used for a good pumpable mixture and a smooth finish surface optimal for skateboarding. Retarding admixture and accelerators are only used when the temperatures are conducive to do so. The refined mixture design is a 4000 psi (28 MPa) mixture, though it can be exceeded but breaks at 6000 psi (41 MPa). The placement of the shotcrete is the most exciting



Team Pain crew member Curt Baker front side grinds around the Colorado Springs “Combi Bowl”



Team Pain’s Construction Superintendent, James Hedrick, testing the freshly placed “capsule” at the Kortrijk, Belgium, skatepark

part of the job because it means the park will soon be skateable. To accomplish an efficient work flow and maintain constant communication with the pump operator and nozzleman, the line pump is placed as close as possible to the sections the crew is shooting. When shooting, the mixture is layered so the cut, float, and finish will be uniform and the amount of concrete placed is less than a typical swimming pool. Each placement is separated by a form at about 18 to 24 yd³ (14 to 18 m³) so the quality of the final product can be controlled. All of the floating and finishing is accomplished with pool-style plaster trowels and specialty, custom-made tools. Immediately after placing and shooting the concrete, a cure/seal agent is applied to control evaporation and help retain the moisture, followed by a 7-day or longer moisture-induced curing period. After all these steps are complete and the concrete has been cured, it's time to skate!



Overview of an 18,000 ft² (1672 m²) skatepark in Englewood, FL

Beyond Vertical

A few years ago, a skatepark in Kortrijk, Belgium, was built that features a “cradle” structure, which is basically a full pipe closed on one end and open on the other. It called for a special mixture design to speed up the shotcrete application because it was being shot overhead. This mixture design called for a special nozzle that had a third port with valve control to dispense an accelerator that makes the mixture flash. A total of 3 yd (3 m) was shot using the tunnel mixture, taking only 8 hours, compared to using a regular mixture which would have taken up to 14 hours.

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