

ENVIRONMENTALLY-COMPATIBLE, SHOCK-ABSORBING CONCRETE (SACON®) 2008 Nova Award Nomination

SACON® Shock-Absorbing Concrete: An innovative, foamed concrete for construction of small-arms training facilities

The Innovation: SACON® high-performance, fiber-reinforced, foamed concrete is a revolutionary product that allows the construction of facilities for small-arms training and sport shooting that are safe and environmentally-friendly. The ability of this advanced concrete product to absorb incoming rifle and pistol rounds and fragments without producing ricochets has allowed it to become a complete replacement for wooden rubber panels or scrap tire stacks that were previously used to construct non-ricocheting surfaces on ranges and other live-fire training facilities. SACON® is the only bullet-trapping structural material that contains phosphate and aluminum compounds that react with heavy metals such as lead and copper to prevent the leaching of these metals into the surrounding soil and/or groundwater. Unlike other bullet-trapping structural materials, SACON® blocks and panels have no special requirements for handling as a hazardous material when removed from service.

Why it is innovative: The density and compressive strength of the foamed concrete is tailored to allow the penetration of rifle and pistol rounds and fragments without producing any wide-spread spalling or ricochets. The high concentration of synthetic fibers produces a wood-like texture that resists spalling and maintains a bullet-trapping capability even when hundred of rounds impact over a concentrated area. The concrete blocks and panels have zero-flame spread and zero-smoke generation fire ratings. SACON® eliminates the problem of ignition from tracer rounds and other explosive and pyrotechnic devices that are used on the range including flares and grenades. The concrete does not degrade when exposed to sunlight like rubber and will not rot or support insect growth like wood or fiberboard.

What it changed or replaced: SACON® is used to replace earthen berms, plywood-and-sand composite walls, and rubber tiles over wood or steel panels in firing range construction. No other range construction material is as versatile, safe, and economical as SACON® concrete.

Competing Products: There are currently no competing foamed, concrete products used on ranges or in shoothouse training facilities. SACON® concrete is the only non-ricocheting, fire-resistant, and environmentally-safe training range construction material that is currently available.

Where and when it originated, has been used, and is expected to be used in the future:

In the late 1970's, investigators at the USAE Waterways Experiment Station evaluated the use of foamed, fiber-reinforced concrete in collecting blast fragments and developed target materials. The first shoot house/grenade house was designed by engineers with the US Army Corps of Engineers and constructed at Ft. Bragg, NC, with a second unit constructed at Camp Blanding, FL. Ft. Hood, TX adapted the foamed concrete technology for the construction of full-scale mock tank targets.

In 1996, the Environmental Security Technology Certification Program initiated a three-year evaluation of SACON®-type concrete on US Army firing ranges. The testing program spurred new interest in adapting the SACON® technology for use in bullet traps and in live-fire training facilities. The first adaptations of SACON® resulted in new modifications of SACON® that allowed the materials to react with and immobilize heavy metals leaching from corroding bullets. Patents on the SACON® formulation for concrete were filed by the US Army in 1997 and 1998 and issued in 1999 and 2001. Four commercial licenses were completed by 2004.

In 2004, Mississippi Prison Industries Corp. (MPIC) licensed the US Army SACON® patents and developed standardized high quality SACON® blocks that can be quickly manufactured in quantity. The MPIC blocks were adapted for the construction of bullet-traps, backstop walls, and target protectors.

Ballistics Technology International (BTI) was among the first to license the technology from the US Army and began designing and supplying shoothouses and grenade houses for the US Army and US Marine Corps. In 2005, BTI completed the largest SACON® project, a training facility at Bullion Range, CA that contains 29 structures including both one- and two-story buildings.

Super Trap Inc. (STI) adapted SACON® panels and blocks for use in conventional firing range designs for military, law-enforcement, and civilian applications, and designed ranges with SACON® at locations from New York to California.

The full SACON® trap design was patented by the US Army in 1999. A special trap design that incorporates a chunk rubber-trapping medium in a SACON® framed trap was developed and patented by the US Army and its industrial partner, STI, in 2008.

The ERDC-GSL received the Southeastern Regional Technology Transfer Award from the Federal Laboratory Consortium in 2004 for its work on SACON®. In 2006, SACON® was recognized as a nominee for the Army's Greatest Invention Award.

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