

Shotcrete = Sustainability

The Summer 2013 issue of *Shotcrete* magazine's Sustainability column marked the completion of a 10-article series detailing the "Top 10 Sustainability Benefits of Shotcrete." We've had great contributions to the series by various authors, including Cathy Burkert, Michael Cotter, Oscar Duckworth, Charles Hanskat, Joe Hutter, Ray Schallom III, Ted Sofis, and Marcus von der Hofen.



Shotcrete sprayed in place against one-sided forms saves 50% of the forming required in cast-in-place installations

As a reminder, our "Top 10" series covered these topics:

1. Formwork savings of 50 to 100% over conventional cast-in-place construction.

2. Formwork does not have to be designed for internal pressures.

3. Complex shapes require very little—if any—formwork.

4. Crane and other equipment savings or elimination.

5. Labor savings of at least 50% in repair applications.

6. New construction speed savings of 33 to 50%.

7. Speed of repair reduces or eliminates downtime.

8. Better bonding to the substrate enhances durability.

9. Adaptability to repair surfaces that are not cost-effective with other processes.

10. Ability to access restricted space and difficult-to-reach areas, including overhead and underground.

Additionally, over the course of the 2-1/2 years our "Sustainability Top 10" series has run, we've had many other articles in *Shotcrete* magazine that have addressed sustainability topics, either directly or indirectly. In many ways, sustainability is becoming a key aspect of all types of shotcrete work we report on in *Shotcrete* magazine. In fact, three articles in last Fall's issue directly relate to sustainability!

- The Technical Tip, "Material Velocity at the Nozzle," by Nicolas Ginouse and Marc Jolin, detailed practical research on nozzle material velocity with the intent to develop future guidance on optimizing—and hopefully reducing—rebound.



No flat surfaces here—shotcrete is a natural choice for this project

Sustainability

This enhances sustainability because we can use less material and labor to produce the same structural element.

- “Limestone Cement in Shotcrete” looked at the growing use of ground limestone “filler” as partial portland cement replacement in shotcrete mixtures. Although the amount of limestone “filler” that can produce equal durability in combination with lesser amounts of portland cement is being widely debated, the substitution of any amount of cement has sustainability benefits due to the reduced production of greenhouse gases associated with cement production.
- “The Use of Recycled Glass in Shotcrete,” by Isabelle Fily-Paré and Marc Jolin, looked at replacement of a portion of portland cement in our mixtures with recycled glass. Cutting cement and the greenhouse gases associated with cement production and recycling glass that may otherwise go into a landfill are both factors that lead to enhanced sustainability. Take a moment to review our Top 10 list on the previous page...

When you look closely, it is clearly evident that nearly everything we do with the shotcrete process is more sustainable than normal cast-in-place concrete. Shotcrete inherently creates enhanced sustainability because we have:

- Fewer forms, and when we use forms they create much lighter construction;
- Easy construction of curved or variable-thickness shapes, which allows maximum structural efficiency with the least amount of material;
- Less heavy equipment on the job site;
- Substantially less labor with the reduction in formwork activities;
- Less material and labor, which equates to faster completion of a given structural section; and
- Adaptability to nearly any repair, renovation, or repurposing of a structure, which means we can substantially prolong the life of existing concrete structures with more durable



Shoring, forming, and casting this repair would be extremely difficult, but shotcrete makes it easy

shotcrete rather than require demolition and rebuilding of the structure that uses more resources.

If you find yourself promoting the use of shotcrete in lieu of cast concrete on a project, pull out this Top 10 List, our ASA Sustainability brochure, or go to the shotcrete sustainability web link, shotcrete.org/pages/why-shotcrete/sustainability.htm, to prove that not only will the project have cost and time benefits but by enhancing the sustainability, you will also ultimately help preserve our world for future generations.

It's clear from everything we do as an industry: Shotcrete = Sustainability.