

SHOTCRETE TECHNOLOGIES, INC.  
PROJECT SHEET  
SAN FRANCISCO HYDROELECTRIC PROJECT. ECUADOR.

**San Francisco Tunnel Repair, Ecuador**

Shotcrete Technologies, Inc. (STI) was contracted in 2010 by Construtora Norberto Odebrecht, S.A. (CNO) to perform a very challenging job in Ecuador that was completed in early 2011.

STI provided the crews needed to work around-the-clock, operating four Shot-Tech Robotic Arms mounted on tractors. They shot close to 8,000 cubic yards of shotcrete, for the lining of an 8-mile, 21-ft diameter tunnel close to Rio Verde, Ecuador. CNO acquired the four complete trains from STI, including the robotic arms, tractors, accelerator pumps, and shotcrete pumps.



STI supplied for four trains consisting of Shot-Tech Robotic Arm, Tractor, Accelerator Pump and Shotcrete Pump

The San Francisco Tunnel is used to feed water to a hydroelectric power plant that is an important part of the national power generation network.

Once the tunnel was emptied, the trains took an unexpected but very useful role, when they were used to washing the tunnel in conjunction with the custom equipment that the client already had on site. The very high water pressure achieved by the Shot-Set Nozzles allowed for a fast and very efficient cleaning of the upper part of the tunnel.



The Shot-Tech Arms and Nozzles played an unexpected role, when efficiently used to wash the upper part of the tunnel

However, what was very critical for the effective operation of the robotic arms was CNO's decision to use STI's liquid accelerator Shot-Set 250 in the shotcrete mix that was provided by CNO for the lining of the tunnel.



The combination of Shot-Tech Robotic Arms, Nozzles and Shot-Set 250 allowed for high quality shotcrete application

In many circumstances, where there was some water permeating through the rocks, the use of Shot-Set 250 permitted the robot operators to do some water control, by performing what is called "flash-lining" to momentarily stop the water, allowing the final shotcrete lining to be properly applied.



STI's experienced personnel worked with CNO's 700-men on site to deliver a successful job up to international standards

STI's personnel joined efforts at every moment with CNO's 700 people on site, adapting together to an ever changing and challenging schedule due to the nature of a major repair like this, achieving very successful results.

For additional information about this or any other projects, please call Shotcrete Technologies at (303) 567-4871 or send an e-mail request with name and address to [info@shotcretetechnologies.com](mailto:info@shotcretetechnologies.com).

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