

How Important Is Shooting Sequence?

By Dan Millette

When someone does something a certain way long enough, it often becomes the way it is done—whether proper or not. When one gains experience from performing this task for a long time, he/she is often the one who trains the newcomers. Therefore, sometimes, a task done improperly for so long just becomes the standard. That doesn't make it right.



Fig. 1: Sprayer operator spraying the roof before the walls



Fig. 2: Sprayer starts at bottom of wall on right and sprays up, over, and down the opposing wall—overspray is deposited on the left side wall

I have seen this in the underground shotcreting industry, although it has been much more prevalent in mining than in tunneling. When you go into a mine in the Americas to watch a shotcreting operation, you will frequently see the nozzleman do the following:

- Start spraying the overhead portion of the opening and, oftentimes, shoot all over the place with the nozzle;
- Spray along the wall of the opening, then go straight up, over the crown, and down the other side; and
- Spray areas all over the opening and then return to fill in the bald spots.

These application methods are more common when the nozzleman is shooting with a remote-controlled boom than when shooting is done with a handheld nozzle (Fig. 1 through 4).

I have often been underground with a person who knows shotcreting and yet nothing is ever said about the spraying sequence. Has it just become the way it is done and no one notices the potential problems?

When spraying a mine opening or tunnel, a specific spraying sequence should be followed to ensure proper application of the concrete to the opening. To begin with, the surfaces of the opening need to be washed down to prepare for shotcreting. The washing should start at the crown and the opening should be washed from the top down. It is just common sense: if you wash from the bottom up, you will get dirty water flowing over the area you have just washed.

When shooting the opening with concrete, you need to start at the bottom of the wall on one side of the opening and shoot in a horizontal direction to the end of the area. If using a remote-controlled sprayer, this can be done by simply running the nozzle assembly back and forth on the lance, if so equipped, and then raising the lance upward as the material is applied.

This spraying method should be used until the opening is covered beyond the shoulder and up onto the roof. The next step is to go to the opposite

Nozzleman Knowledge



Fig. 3: Even some hand nozzling is improperly sequenced

side of the opening and repeat the procedure. Once both sides of the opening are shot above the shoulders, then a side-to-side motion can be used to cover the crown.

I have often been asked by well-seasoned nozzle men, “What is the problem with starting on the overhead section?” Of course, the problem with starting overhead is that rebound and much of the overspray from the overhead shooting gets

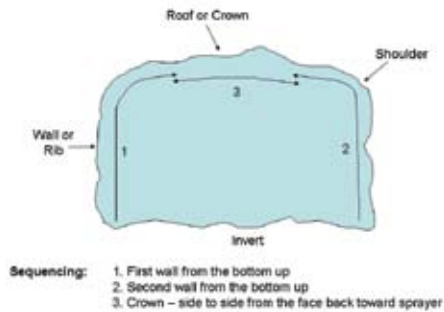


Fig. 4: Proper sequencing for shooting a tunnel or mine opening

deposited on the walls of the opening. By the time the nozzle man does shoot the walls, he/she is then spraying over the rebound and overspray, causing the shotcrete application to be porous and weak and compromising the bond to the substrate that is necessary for a quality application. This can also commonly result in debonding of shotcrete, especially lower on the walls.

So the next time you are in a mine or tunnel watching someone spray shotcrete, take note of the sequence the nozzle man is using—it may surprise you. It’s never too late to do it right!



Dan Millette, a Mining Engineer, is the Director of the Mining and Tunneling Division of The Euclid Chemical Company. He is a member of ASA, Chairs the ASA Underground Committee, and is also a certified EFNARC Nozzleman Examiner.