Workers' Dust Protection

By Ray Schallom III

There have been articles, safety tips, and numerous discussions over respirators and dust masks in past issues of *Shotcrete* magazine that show and talk about what your workers should be wearing. These date back to the early 1970s, when the industry began a growing awareness of lung impairments resulting from exposure to cement dust for long periods of time. Cement dust can build up in your lungs if you do not wear any type of dust protection. I can remember when one of the old-timers who mentored me during that time had a heart attack; the X-rays showed he had a small cement buildup in his lungs. The company immediately went out and outfitted every shotcrete crew with half mask and full face mask respirators. Forty years later, I am now one of those old-timers and I still wear my respirator in and around the shotcrete operation. Unfortunately, the latest industry challenge we face today is the confusion between silica fume (also called microsilica), which has a very small round particulate, and larger silica sand particulates, which are jagged. The jagged particulates from the silica sand do not pass through your lungs like the rounded silica fume particulates do. Figures 1 through 3 show different types of N-95 rated masks and filters.

This article will deal with dust generated by the shotcrete processes and which mask meets Occupational Safety and Health Administration (OSHA) and National Institute for Occupational Safety and Health (NIOSH) minimum requirements. I have been around the dry and wet shotcrete processes for close to 40 years as a worker/mixer/gun tender, gun runner/operator, nozzleman, finisher, foreman, superintendent, project manager, and now owner. Over the past 40 years, I have been put through tests to check the level of dust generated during the work shift, which showed what type of dust protection my crew and I needed for the job. I have been on simple bridge repair projects to very difficult confined space projects. The dust monitors all came back with almost the same results. If the worker was wearing at least an N-95 dust mask (Fig. 1), the dust generated by the shotcrete

Fig. 1: Honeywell odor-removing double band

Fig. 2: 3M half mask with P100 dust filters

Fig. 3: MSA half mask with N-95 prefilters

process would protect the worker adequately during an 8-hour work day. The double rubber band paper mask meets OSHA and NIOSH minimum requirements. (N series is for environments free of oil aerosols, R series is resistant to oil mist for up to an 8-hour shift, and P series is oil proof with time use restrictions specified by the manufacturer.)

One problem with the double rubber band dust masks is when the worker breathes; the exhaust breath has nowhere to escape but upward around the nose, causing the worker's safety glasses to fog up. Another issue with the paper mask is a worker can go through five paper masks in 1 day because of moist breath, sweat, or other types of mists in the air. Now multiply that by 5 days—you now bought at least one box per worker for the week. If the conditions are right, you may be able to get by with one mask per day, but that's highly unlikely in most nozzling conditions.

Back when I was promoted to superintendent, one of my many tasks was controlling personal protection equipment (PPE) safety costs. I looked at every item closely; some were obvious, which were corrected right away. The main issue was the costs of dust masks versus the cost of a fitted half mask respirator per worker. For me it was easy; I had dealt with the paper mask issues as a worker and realized it was cost-effective to properly fit each worker with a half-mask respirator. These half-mask respirators can be cleaned and disinfected on a regular basis. The only steady cost would be the cartridges and prefilters or just the N-95 prefilters. There are several brands and models—some of which require cartridges where you can place an N-95 prefilter over top of the cartridges, then snap on a retaining cap to secure each prefilter. This protects the cartridge from clogging up, and for the most part all you do is replace the prefilter. I use an MSA Comfo Classic half mask, which comes with the cartridge receptacles. I am able to place two N-95 prefilters in each receptacle and snap on the retainer caps to keep the prefilter pads in place, which is shown in the mask in Fig. 3. (This particular mask is 6 years old!) Everyone has their preference on half masks. The projects I have been on the past 20-plus years only required me to use the prefilters for dust protection. My last CAT scan of my lungs showed up clear. In my last breathing exam, I was able to exceed the passing limits set on the machine—the technician had to reset the machine higher each time to check my maximum lung capacity. I am happy to say that wearing the approved OSHA and NIOSH respirators my entire career is proof that it pays off in the long run.

This article is not intended to make everyone go out and buy half-mask respirators. It is intended to make you aware that as long as your workers are wearing N-95 rated masks, you have met the minimum requirement. Remember that different environments and projects may require the use of half masks with certain cartridges or air-fed masks. In some cases, it's cheaper to buy either the double rubber band dust masks or half masks with prefilters in bulk than it is to buy one at a time. There are safety supply houses around the country that have good deals on safety items in bulk. It adds up at the end of the year when you start buying one at a time at a local lumber yard on an as-needed basis.

Think smart, be smart, and wear your PPE correctly. It's the later years in life that you begin to have health issues which could have been avoided.

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