

Hose and Fitting Wear

Critical Safety Issues in Shotcreting

By Sean Madole

In May of 2016, our company, Madole Construction, participated in the rehabilitation of the historic Lincoln Hall Dormitory at the University of Nevada in Reno, NV. The dormitory was constructed in 1896. Lincoln Hall is one of the oldest buildings on the University of Nevada's campus and was continuously occupied from 1896 through 2015. Part of the structural retrofit for the building included placing structural shotcrete walls around the perimeter of the basement and the two lower floors of the building.

We had several new crew members as we started the project and decided it would be an excellent time to bring in an outside trainer to refresh everyone on shotcrete principles and safety. During the training, the criticality of checking wear parts in a shotcrete system for damage or excessive wear was thoroughly discussed. I am acutely aware of danger involving worn hose and parts because my Dad was injured on a jobsite in 1970 by a failed concrete pump reducer. Over the course of my childhood, he spent 3 years on crutches and had over 17 surgeries because

of that injury. It should be noted he was not a part of the concrete pumping or placing operations and was working about 80 ft (24 m) away from the pump.

After several hours of a classroom safety session, we went outside as a group to visually inspect the hoses and fittings on our concrete pumping system. When checking the pipe and fittings we had been using we found a 3 to 2 in. (75 to 50 mm) reducer that had excessive wear. That started a conversation among the group: When does a part have enough wear to be replaced? Our consensus was, at the point a part is worn 0.25 in. (6 mm), it should be replaced. On the reducer in question, we handed the tape measure to each person on the crew and got several different measurements ranging from 3/16 to 5/16 in. (5 to 8 mm).

After the class, my Dad and I had several conversations about coming up with a more reliable way to measure the wear on the steel parts in a pump system. Even if a crew member religiously checked a part with a tape measure there is a good chance they could make a mistake and install an



a)



unsafe part in the system. So, to try and make evaluating wear as foolproof as possible, we developed a hose wear indicator from a piece of aluminum round stock. The concept for the indicator was simply building it as the reverse of a case gauge used in handloading ammunition. A round aluminum stock piece was machined in a lathe with a taper to just have the end fit inside a new 2 in. fitting. As the part wears, the gauge will slide deeper to accurately measure the wear. One side of the taper rabbeted to provide marks showed how much wear was present. We added green lines to show acceptable wear levels and a red line for excessive wear. The tapered gauge is a more reliable indicator of wear, easier to use, and can quickly measure the pipe in more than one direction.



Sean Madole is the President of Madole Construction Co. Inc. based in Reno, NV. Madole Construction is an AB Licensed contractor in Nevada and California, performing foundation repairs and specialty contracting. Madole is an ACI Certified Nozzleman and performs daily oversight for operations and management. He is a 1994 graduate of the United States Air Force Academy.

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Fig. 1(a) and (b): Gauge to measure wear levels