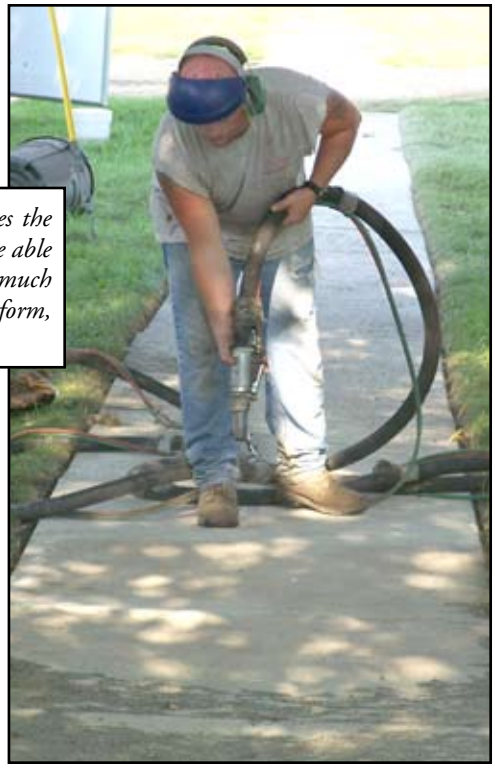
Lofty Goals, Pitiful Performance, Dreadful Results

By James Warner, P.E.

And to what are we referring? Research! Yes, research, that activity that improves the materials we use, the codes under which we perform, and indeed, the benefits we are able to pass along to our clients. Properly performed, research and development bring much benefit; shoddily accomplished however, they can limit our ability to optimally perform, and can actually be the root of poor performance.



Courtesy of C[3] Overlays.

In our industry, much research is funded by government grants of one sort or another, much of which go to academic researchers in universities. I am told by some of my professor friends that "publish or perish" is no longer the rule, but it is rather "bring in research dollars or perish". I am not about to suggest that academics are not capable of good research, but the fact is that most are primarily thinkers and few have practical construction experience. Thus, they often lack an understanding of the practical aspects of construction, the details of which are so essential to the development of valid materials and methodologies.

A long time ago while I was still operating as a contractor, a professor with whom I was acquainted was directing a very large scale laboratory investigation of seismic resistance of various beam-column connection designs. Essentially full size specimens with a variety of reinforcing had been cast and were to be loaded to failure. Epoxy injection had not been widely used at the time, and many engineers and controlling officials questioned its ability to effectively repair such damage. The huge specimens had been cast and broken at a very high cost; why not inject them and reload to failure. A very small additional investment could bring a huge increase in knowledge. But such was not included in the scope of the grant, and those in charge refused further funding.

The professor agreed to my offer to provide the material and equipment to do the injection without cost, if they would simply reload the repaired sections to failure. To assure proper repair, I personally went to the laboratory to give any assistance I might offer. On arrival, it was obvious the repairs were not being properly made. An effort to discuss the work with the young PhD candidate heading the operation was fruitless; he bluntly stated the repair procedures were not important, he was only interested in the analysis. No amount of effort could get the specimens properly repaired, and a great opportunity to better understand epoxy injection and perhaps procure its approval by building officials was lost. And to add salt to the wound, the injection pump was damaged during return shipping.

In another instance, a research grant was made to identify optimal surface preparation procedures for bonding new concrete to old. On reviewing the draft findings, I was stunned to read that it made no difference if the prepared surface was *sandblasted* or not, either way bond would be about the same. I immediately contacted the professor and inquired what kind of abrasive was used. His reply was "it was done professionally, whatever the professionals use". Further probing discovered a buyer in the purchasing office had called all the firms listed under *sandblasting* in the local phone book. The lowest bidder was used. Nobody asked his intents, explained the purpose of his work, or told him what type of abrasive to use. Now, as repair professionals, we know our objective is to roughen the surface as deeply as practicable which requires a coarse, hard, angular grained abrasive. On further investigation it was found that a fine, soft, round grained abrasive was used. "Most of our work is cleaning, so we don't want to pit the surface," stated the sandblaster. The result is, to this day, abrasive blasting is not required in some seismic strengthening guidelines, a clear deficiency that any repair professional would recognize.

Yes, we need deep thinkers and academic research. But to be effective, the practical aspects of concrete repair must also be considered. Let us maintain our lofty goals, but provide the input required for brilliant performance and extraordinary results!▪

James Warner, P.E., is an independent Consulting Engineer specializing in foundation and structural restoration and repair. Formerly a contractor in these specialties, he organized the original concrete repair program for World of Concrete and presented those seminars for 19 years. It was at one of his seminars that the seeds were sown for what is now the International Concrete Repair Institute (ICRI). He continues an active consultancy and is an Honorary Life Member of the Institute.

This article originally ran in the ICRI Concrete Repair Bulletin, Volume 20, No. 5 (Sept/Oct 2007) and is reprinted with permission.