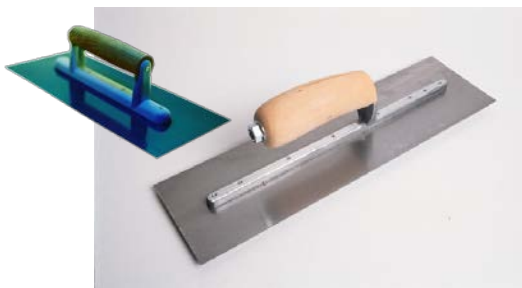


## How to Harden Concrete Floors

Many times we see the need for concrete floors to be hardened, not necessarily because we are concerned about the industrial floor failing structurally, but rather because the abuse that the surface will receive in its work environment. This abuse comes from abrasion or repeated impact. Prior to the advent of specialized toppings or treatments it was almost impossible to protect concrete floors in places like tool rooms or shops from gouges or in storerooms from abrasive movements of equipment and inventory. Today there are four ideas or methods to help protect your floors, the first is the "old school" and the later three are more recent and technically advanced.

1. Hard troweling, just before the concrete floor makes its initial set and before the concrete starts to hydrate, forces entrapped air and moisture out of the extreme surface of the slab. This gives the very top of the slab a tighter crystalline structure and provides you with a more abrasive resistant slab.
2. Most civil engineers understand that as the water to cement ratio decreases then the compressive strength increases and you can use this ratio as a means of providing your slab with a harder surface. As you get nearer a compressive strength of 8,000 psi then the abrasive resistance increases, and like the hard troweling method of the surface, the entire slab achieves a tighter crystalline structure to result in a harder and more abrasive resistant floor.

3. Chemical hardeners, most concentrated with silica, can be added to the surface of a floor where the silica compounds react with the calcium hydroxide to produce a calcium silicate hydrate (CSH). This "densifies" or hardens the surface of the concrete to provide you with a wear surface that will stand up to greater abuse and give longer life to the concrete.
4. The last way to harden concrete uses a very hard aggregate added to the surface of the concrete floor and there are various application methods. The first application method is "seeding" a floor's top with hard mineral aggregate just after the concrete has been poured and prior to troweling (floating) the surface. A second method is to use a dry "shake-on" hardener, comprised of specific minerals or metallic aggregates that have been blended with Portland cement as an admixture to spread over the top of the concrete floor prior to its curing. Shake-on hardeners typically affect only the very extreme surface of the floor (fractions of an inch deep). A third application is known as "toppings". Toppings are just what they sound like...they are a separate layer of material added on "top" of the concrete floor. These toppings may be from a fraction of an inch to several inches thick. The thicker the topping the greater dispersion of the forces from which you are attempting to protect your concrete slab.



"The Barn" built in the 1930's to house Welsh ponies, serves as Mid-South's offices.

# Impatience & Safety



Hurricane Katrina has everyone focused on what we need to do in the future to be safe. So maybe now is a good time to remind everyone on how important it is to properly take equipment to a “zero” energy state before we try to clear a hang-up or work on a machine center.

Recently, a worker on an industrial site reached into a machine having a top cutting tool and severed several digits. The proper “lock-out & tag-out” procedures were not followed even though everyone knew the importance of safety policies. Most times it is the impatience of a worker or contractor that leads to such a mishap. I’ve seen this in production lines where an operator attempts to clear a jammed piece of product without shutting the machine line down and their arm or fingers are pulled into the operation and they are hurt for life. I once witnessed the aftermath of a maintenance worker “who knew better” taking a pipe connection loose during a pumping operation and he received third degree burns from the material being pumped at over 400°C when it sprayed into his face. None of these individuals ever thought they would be hurt. But the sad reality is that they will never again be the same. These are good smart people who made a mistake. A few minutes following the “lock-out & tag-out” policies may mean a life spent in good health.

Spend time training your employees and contractors in the risks associated with your facility. Instructions and proper education are well worth the time spent in keeping everyone safe. Always “lock-out & tag-out” the machinery before you try and dislodge a piece of product or debris. This isn’t just electric motors, but also valves (air, hydraulic, steam, thermal oil, etc.) and the potential energy of gravity allowing a piece of machinery to fall if it isn’t properly “pinned” or “blocked”. Allow the machinery to come to a complete stop. Rotating masses can take several minutes to come to rest. Never reach or place yourself into an area until you have properly locked it out, tagged it out, and tested to see if the locks have properly de-energized all sources of danger.

Before you re-start machinery, it is important to check that any tools or loose items have been removed from the operation and that all guards are properly installed. Never “by-pass” safety devices, they are there for good reason...YOU.

The cost of cleaning up from Katrina will be enormous. The cost in lives can never be measured. Similarly, the cost for not following “lock-out & tag-out” procedures is expensive, but the biggest cost will always be measured in terms of people.



## Jack Copeman retires after 36 years with Mid-South Engineering

Jack “Cope” Copeman, a civil/structural engineer and Senior Vice President of Mid-South Engineering, has shown our clients and employees his professionalism and expertise for the past 36 years. Drop by and join us as we wish Cope a happy retirement.

**Retirement Reception:** Hot Springs Country Club, 101 Country Club Drive, Hot Springs, Arkansas, Tuesday, October 18, 2005, 5:30 – 7:00 p.m.

## Mid-South Engineering Company

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