REPOINTING SHORTCUTS CAN CAUSE PREMATURE MORTAR FAILURES, BUT "ULTIMATE MORTAR" SYSTEM PROVIDES RELIEF

Although properly proportioned, installed and cured masonry repointing mortar should be expected to provide at least 50 years of service, actual results too often fall far short of that. The reasons can frequently be traced back to shortcuts taken in the repointing process, including omission of labor-intensive steps required to minimize shrinkage and maximize bond strength.

1. A system of hoses and spray nozzles attached to the scaffolding on this stone repointing project, and connected to a timer to automatically mist new mortar several times a day, represents proper mortar curing. This costly step is often omitted, compromising mortar performance and durability.

Because mortar is a vital functional component of a masonry building's waterproof envelope, premature mortar failures can lead to moisture infiltration problems and premature coating failures on exterior and/or interior surfaces on certain structures. Ideally, owners or their representatives would enforce use of best industry practices to assure the full performance and durability of their repointing work, but costs for doing this work properly can be substantially higher than what many owners expect – or are willing – to pay.

While there is never a justification for poor workmanship, a new pre-packaged mortar system can greatly simplify repointing requirements, providing reliable high performance while reducing labor requirements. The two-component mortar system consists of a pre-packaged dry mix based on Natural Cement, rather than Portland cement, and a liquid polymer that is used in place of water when mixing the mortar. Manufactured by Edison Coatings, Inc. (Plainville, CT), the system is available in a wide range of strengths and custom colors.

Repointing Is Labor Intensive

2. As portland cement-based mortars age and carbonate they embrittle and may lose bond to one side of the joint or the other. These small cracks are sufficient to allow leakage through the masonry assembly and this indicates the need for repointing.

Mortar is considered to be a sacrificial component in masonry construction, and periodic partial-depth replacement of failing mortar is an expected maintenance requirement. Modern mortars based on mixtures with Portland cement carbonate with age, rendering them brittle and prone to cracking and/or delaminating over time. A crack of just 0.008" width will leak when exposed to rain.

The process of removing failing mortar to a proper minimum depth, preparing cavities for repointing, and then properly placing, compacting and curing the new mortar is labor-intensive. In the competitive world of commercial building maintenance and restoration, a project's successful low bidder will have often planned on taking shortcuts, skipping certain steps to reduce their costs.

Proper Repointing

The rules for proper repointing are not secret, and useful guides have been published such as Preservation Briefs #2 by the National Park Service and the appendix of ASTM C270, among others. But how often are these rules actually followed?

- Old mortar must be removed to a minimum depth, typically specified as either 2-1/2 times the joint width, or a minimum of some specified depth between ½" and 1", or to the depth required to reach sound mortar, whichever is *greater.* Superficial striping over old mortar is not effective.

- Joints must be properly prepared for repointing after old mortar removal, typically involving washing out all dust and debris to achieve a clean bonding surface.
- Masonry must be pre-dampened before repointing, to assure that the new mortar does not dry out too quickly.
- New mortar must be correctly selected, proportioned and mixed to the proper consistency. Proper repointing consistency is the driest paste that is workable. Making wetter mixes to facilitate use of grout bags or pointing guns results in smearing and excessive shrinkage.

So far, the list includes nothing extraordinary, though even these basic steps are often compromised. The costlier steps revolve around proper placement, compaction and curing.

- Cement-based mortars are supposed to be pre-hydrated for 30 minutes after they are mixed, and then remixed and adjusted to proper consistency before use.
- Mortar is supposed to be placed in "lifts". While guidelines vary somewhat, typically at least 2 or 3 lifts are required. Often lifts are restricted to ¼" depth.
    - A "lift" consists of placing ¼" of mortar into the joint cavity, compacting the mortar with a slicker that is narrower than the joint, and waiting for the mortar to achieve "thumbprint hardness" before placing the next lift.
- Once the final lift is placed and achieves thumbprint hardness, final tooling is performed.
- After tooling the mortar must be misted for a minimum of 72 hours to achieve proper initial cure.

3. RILEM tube testing can be performed to assess mortar's water absorption rate. Excessive absorption can be an indication of improper placement, compaction and/or curing.

These steps are rarely done, because they are time-consuming and expensive, yet their omission can have a major impact on shrinkage, bond strength and general property development. The curing requirements are most problematic, as they require a laborer to come to the site on weekends to mist mortars placed late in the week, unless an automatic irrigation system is set up. Because curing deficiencies may not be immediately obvious, it is assumed by many that proper curing is not necessary, or that contractors will at least not be held accountable for taking shortcuts whose impact may not be discovered until several years later.

While there is no justification for poor workmanship, materials technologies to overcome some of the more burdensome requirements are now available. In particular, fast-setting mortars based on Natural Cement conforming to ASTM C10/10M pass through the period of vulnerability to plastic shrinkage rapidly. This allows them to be placed in a continuous operation, rather than in separate lifts that may require

several hours of cure between applications and several return trips to the same area by the installing mechanic. Edison Coatings produces a wide range of natural cement mortars under its Rosendale and Translantic 12M labels.

4. Test panels of Rosendale 12M/ICE -9RL "Ultimate Mortar" resisted 50 cycles of freeze-thaw beneath ponded deicing salt solution without damage.

Natural cement alone normally still requires a minimum period of wet curing, however, but Edison's proprietary ICE -9RL mortar admixture based on hydrolysis-resistant polymer modifier can convert mortars to dry-curing systems. This eliminates the need for keeping mortars damp beyond the first day. In testing with a variety of mortars based on various binders including Portland cement/lime, Natural Cement and Natural Hydraulic Lime, the admixture effectively eliminated wet curing requirements, reduced shrinkage, increased bond strength, maintained 75% of the mortar's "breathability" and reduced water absorption by 80%. Dramatic improvements in freeze-thaw and salt-scaling resistances were also documented.

Together, these systems represent the Ultimate Mortar, an ideal combination of performance, durability and economy of installation.

Long-Term Value

While the system increases mortar material costs, masonry repointing is not a material-intensive operation. Labor, access, equipment and mobilization costs may represent 97-99% of the cost of a typical repointing project, while materials represent just 1-3% of total cost. The new system raises the material costs to perhaps 5-10% of project cost, but provides a much higher level of performance while assuring that full mortar potential is achieved without having to pursue the far more costly approach of increasing labor costs for mortar placement and curing.