by Steve Thomas

Extreme STUCCO

Hot and cold conditions present the biggest challenge to a successful stucco job

One of the principal virtues of stucco is that it's maintenance-free — no painting, no staining, no "oil canning" as with aluminum siding. It won't burn, rot, or rust. Correctly applied, it should last a long time, whether you live in Nome or New Mexico. But for stucco to survive application during the extremes of snow, ice, and desert sun, it must be mixed, applied, and cured to exacting standards. Here's a roundup of "extreme stucco" rules that I've learned during the last 20 years.

Stucco Basics

Stucco is mostly sand and Portland cement. It is typically applied in three separate coats that add up, more or less, to 7/8 inch for one-hour fire-rated construction. The three layers include a 3/8- to 1/2-inch scratch coat, a 1/4- to 3/8-inch brown coat, and a 1/8-inch "color," or finish, coat.

The scratch coat is applied directly to a clean block wall or, on wood structures, over "D" or better paper and galvanized metal lath, preferably a self-furring variety. A metal rake is used to create "scratch" lines in the still-wet surface. The furrows create a rough surface into which the brown coat can key for a good bond.

The brown coat is applied as a smooth coat, usually "rodded" with straightedges and wooden floats (see Figure 1). In the West, a steel trowel is used to produce an adobe look when the brown coat is the final coat. Once applied, the two coats should be allowed to cure, or rest, for at least a week, preferably two, before applying the finish coat. This allows the scratch and brown coats to strengthen, settle down, and do all the cracking they intend to do.

After this curing period, the finish coat can be applied (Figure 2). It's 99% likely your client is going to want a colored finish, which is achieved by adding iron oxide pigments to the otherwise white finish material. There are many types of pigments available at different prices; I like the products made by Tamm's Industries (7101 Muirkirk Rd., Beltsville, MD 20705; 800/638-4444). These pigments are more expensive than some, but since the finish coat is what's visible when the job is complete, as well as the layer that's exposed to the elements, it's foolish to opt for inexpensive colorants. Cheap pigments will fade and are inconsistent from batch to batch.

Proper Mixing Is Crucial

The mixing of stucco must be carefully controlled (Figure 3). In a perfect world, "proportioning boxes," which ensure a perfect ratio of ingredients, would be used whenever a batch of stucco was mixed. This would guarantee consistent, uniform batches of scratch, brown, and — most important — finish mud on every layer of every job. Regrettably, this is rarely the case. The guy on the mixer can get interrupted by a question, a cigarette, or pausing to drink from the cooler. As a result, he loses track of how many shovels of sand or cement or gallons of water he's put in the mixer, and the outcome is a mismatched batch. This can reveal itself as a different color or texture, and even years later, it can effloresce or worse.

Figure 1. The brown coat is smoothed with a straightedge in preparation for the finish coat.

Figure 2. The 1/8-inch-thick finish coat is applied with a trowel.

Figure 3. Close attention must be paid to mixing stucco to ensure a uniform and durable coating.

Figure 4. Careful lath and flashing installation sets the tone for a high-quality job.

Other consistency rules include sizing batches for complete use within one hour after mixing, and withholding 10% of the mixing water until mixing is almost complete (strive to keep water to a minimum).

Pigments, especially in the finish coat, must be mixed carefully and consistently. The mixer must be allowed to run until the color is dispersed throughout the entire load of finish material. Undermixing the finish will permit lumps of raw color to be left in the finish, and the results will be horrific.

Substrate Concerns

Even if you have a robot at the mixer producing consistent, uniform batches of finish material every time, the color coating will be affected by the absorption (relative water-drawing potential) of what it's being applied to. If you apply finish mud over a 10-day-old brown coat and an adjacent surface of 15-year-old concrete block, for example, the different rates of absorption will cause a radical shift in color where the two adjacent surfaces meet — in spite of the batches being uniform.

Unlike its thicker cousin, concrete, stucco is not tolerant to movement of the underlying surface. Build a wall of truly inert material, such as concrete block, and you can guarantee no cracks. Build a house out of today's third-growth, guaranteed-to-warp-and-split lumber and there's no question: The stucco covering will crack. The point is, in wooden structures, you can safely predict vertical hairline cracks in stucco that are in no way the fault of the stucco contractor. Nevertheless, everything possible should be done to avoid lathing over *wet* wood framing and sheathing. Even water from the stucco mix can wet the wood enough to cause it to expand. When applying stucco over wood framing, always use a layer of a water-resistant paper such as grade-D paper or housewrap. The *Uniform Building Code*, enforced in most western states, requires *two* layers of grade-D paper over wood sheathing.

No Lathing Matter

It's the paper and wire guys who set the tone for the correctness and profitability of the whole stucco job (Figure 4). They know they've got to get the job done because there's a mud crew breathing down their necks. So it falls to them to read the prints and determine where the stucco is to be applied, cope with imperfections in the work of prior trades (such as block layers and framers), and flash and mount stucco trim pieces so the job is both durable and follows the prints.

Control joints are another important part of a quality job. Use them anywhere you expect building movement; for example, where the substrate changes from masonry to wood framing.

Curing Is Critical

If the stucco is mixed properly and applied over a stable substrate with properly nailed lath, then the conditions under which it cures will determine the quality of the finished product.

If you want stucco that will last 100 years, pray for a period of cool, damp days — temperatures in the 50s and 60s, no wind, and high humidity. Applying stucco in extremely hot or cold conditions presents a real challenge: Stucco applied in the cold needs to be heated up, and in extremely hot conditions, it needs to be cooled down. Or said another way, if the weather is hot and dry, you'll want to slow the curing, and if it is cold and damp, you'll want to speed it up.

Extreme Stucco

When clients call and say "the finish coat of stucco is falling off my house," I immediately suspect a dead-of-winter job. Delaminating (unbonded) finished coats, which fall off the wall in random-sized pieces like peanut brittle, should be inspected for a telltale crystalline pattern on the back side of the finish layer. That pattern suggests a finish coat that was applied over a frozen (glazed) brown coat during winter conditions.

What typically happens is that sleet or blowing rain or snow soaks the brown-coated walls. Unknowingly, the stucco contractor applies the finish coat over a difficult-to-see glaze of ice on the brown coat. Regardless of the ambient temperature, if a finish coat is applied to the glazed walls, the bond between the brown and finish coats will be lost.

Cold-Weather Precautions

The bottom line in working in the cold is don't use frozen material, don't apply stucco to frozen or frosted surfaces, and

don't mix materials or apply stucco when the ambient temperature is less than 35°F.

If you can swing it, gutters and "shoot-outs" to direct the melting snow and rain away from the walls make winter work much easier. Scaffold planks should be pulled away from the walls and tipped up so as not to serve as splash points for rain to pelt the walls in horizontal bands and then freeze in the night.

Cement has an inherent degree of salinity, or natural salt content. Adding an antifreeze, such as a calcium-based accelerant, to the mixer in cold weather will delay freezing, but it also heightens the salt content by magnitudes. This greatly increases the likelihood of efflorescence — the migration of salts to the surface — which leaves a powdery white residue.

If cold weather is an issue, you can heat the water, warm the sand with kerosene heaters, keep the raw materials covered at night, and work in the sun, however meager it may be. You can also cover or tent a house, but doing so is both time consuming and expensive (Figure 5). Nevertheless, with large enough heaters, your working season can be year-round, even in the northern states.

Hot-Weather Solutions

When it's 75°F or higher in the sun and a hot wind is blowing, it should be obvious that any mud applied to an exposed surface will dry far more quickly than normal. And just like concrete, stucco that dries too fast, or flash-dries, is weaker than stucco that is allowed to cure slowly. In extremely hot, dry, or windy weather, all your attention should be aimed at slowing down the stucco's drying and curing time and protecting it from uneven and excessive evaporation.

First, keep the materials out of the direct sun. Sand holds a lot of heat, as does water. If both are cold, the stucco will dry slower. But don't moisten the sand in an attempt to cool it: Doing so will just confuse your mixing ratios.

Another simple way to avoid problems with the sun is to start work early in the morning and plan to apply the stucco so that the crew "chases the shadows" for the rest of the day (Figure 6). Working in shadows will slow down drying times. And be aware that scaffolding planks may cast horizontal shadow lines on the wall, causing those areas to dry more slowly. The stronger stucco in these slow-cure areas will have a different rate of absorption than the areas above and below the plank's shadow. Later, when the color coat is applied, it will be "sucked" to the dissimilar areas unevenly, resulting in a blotchy finish.

Misting and Draping

Your next defense against flash-drying is to keep the surface of the new mud damp. This can be done on small areas and low walls with a garden sprayer. On higher walls and over larger areas, use a garden hose with a misting or fogging head (Figure 7). For the best results, the walls should be "hit" every hour or so until the sun and wind are no longer a factor. Draping new work with Visqueen or burlap also retards the evaporation of water and prevents flash drying. And a soaker hose can be run at the top of the wall to keep the burlap wet.

Flash Curing

Another solution is to use a retardant like Sikafilm (Sika Corp., 201 Polito Ave., Lyndhurst, NJ 07071; 800/933-7452), an emulsified alcohol product that retards flash drying. It is sprayed on the scratch or brown coats soon after application, then washed off before the next coat is applied. Because the product has an orange color, it is not recommended for finish coats.

Depending on how fast the scratch coat is curing, it's possible to use the double-back method: The scratch and brown coats are applied and cured as one system. The brown coat may be applied as soon as the scratch coat is rigid enough to receive the second coat without damage. This is a judgment call. You run the risk of "stacking" too much mud too quickly, thereby increasing the likelihood of checking in the brown coat. If you double-back, misting becomes even more important — I recommend doing it for 48 hours.

When it comes to the finish coat, you really have no choice but to wait for a moderate day. Misting a finish coat creates the potential for splotchy walls. ■

Steve Thomas *worked for Reitter Stucco, of Columbus, Ohio, for seven years. He credits his knowledge of the stucco trade to his mentor, Dick Reitter.*

Figure 5. Covering stucco in cold or inclement weather extends the curing period and protects against a washout in case of rain.

Figure 6. Working in the shadows is a good way to prevent rapid drying on a hot day.

Figure 7. Spraying stucco in hot, dry, or windy weather prevents excessive evaporation.