Workers trowel on a synthetic color coat over a cement base coat.

One-Coat Stucco

by William Prull

Stucco is the most common exterior finish in the Southwest. Builders here use stucco to finish almost any style of residence: frame, adobe, masonry, and even straw bale homes.

Traditional "three-coat" stucco, as the name implies, consists of three separate layers of cement plaster materials: a trowel-applied "scratch coat," which receives a grooved surface with a special scratching tool; a sand-finished "brown coat," which keys into the scratch coat; and a finish, or "color," coat, which is usually cementitious. During the 15 years that I've been building custom homes in Santa Fe, N.M., I've used three-coat stucco on most of my company's projects.

Two Coats in One

In the past seven or eight years, however, builders in my area have turned increasingly to "one-coat" stucco systems. After careful consideration, I began using one-coat stucco on some of our homes about six years ago. Often known as "thin-coat stucco" or "fiberglass reinforced stucco" (FRS), one-coat systems have some distinct advantages. In one-coat systems, we replace the traditional scratch and brown coats with a single, thinner base coat. Then we apply either a cementitious color coat or one of the newer acrylic-based synthetic color coats.

The process of covering a combination scratch/brown base coat with an acrylic stucco finish is called "one-coat stucco" because only a single base coat is required. (In fact, many thin-coat systems are code-approved with or without any finish coat — see "One-Coat and the Code"). But the term can cause confusion, because the term "one-coat" could also describe an exterior insulation and finish system (EIFS), in which an acrylic stucco finish is applied over a rigid insulation board, like extruded polystyrene sheathing. EIFS is used

New thin-coat stucco systems speed installation, reduce cracking, and simplify color-matched patches

Figure 1. *In preparation for one-coat stucco, a worker staples wire netting on wood-framed pony walls at the top of a masonry building.*

Figure 2. *With wire netting installed over weather-resistive paper, this house is ready for stucco. Note the expanded metal lath around the windows and at the "canales," or rain scuppers, in the parapet walls.*

regularly here in New Mexico on commercial buildings, but rarely on homes (and is outside the scope of this article). Compared with EIFS, one-coat stucco systems more easily and accurately reproduce the soft, rounded shapes and bullnose corners that people in the Southwest associate with a stucco finish. One-coat stucco also offers the durability of a Portland cement base coat.

Preparing the Building

One-coat systems and traditional three-coat systems have a number of elements in common. In both, we first cover the building's sheathing with Grade D weather-resistive barrier, a lighter-weight felt paper such as Plastercraft by Leatherback Industries (P.O. Box 594, Hollister, CA 95024; 800/538-5950). This provides a breathable isolation barrier. The Uniform Building Code requires two layers over wood-based sheathing; for all-masonry buildings, one layer is sufficient.

Self-furring wire. Next, we fasten on a layer of stucco netting, similar to heavy-gauge chicken wire (see Figure 1). Three-coat stucco uses a 17-gauge netting with 1 1/2-inch-diameter holes, while one-coat systems use a lighter, 20-gauge stucco netting that has 1-inch-diameter holes. Although one-coat stucco uses a lighter metal reinforcing (because the overall system is lighter), the time it takes to "wire the building" is about the same for both systems.

In the past, we needed special furring nails to hold the netting off the building surface 1/4 inch or so, allowing space for the applied cement coats to fully embed the wire. Today the stucco wire is self-furring, meaning it's manufactured to stand off the building surface when it is nailed or stapled on.

To attach the netting to the building, we use 8-penny nails (often a "round top" nail with a large metal cap), or 1-inch or larger pneumatic staples. We space the fasteners every 6 to 8 inches vertically on studs 24 inches on-center, or 8 to 10 inches on studs 16 inches on-center.

Expanded metal lath. The last step before applying the stucco is to nail expanded metal lath reinforcement around doors, windows, corners, parapets, and any built-up shapes that will be subject to unusual stress (Figure 2).

With either one- or three-coat systems, it is essential that the stucco netting and metal lath be installed properly. In Santa Fe, the lath is inspected by a building inspector before the base coats can be applied. Be sure that the self-furring stucco netting has the proper face out and that it is adequately fastened. It should run horizontally to reduce the number of joints, and be taut, with no sagging. Joints should overlap by at least 8 inches.

It is important with any stucco system to load the roof system and install any interior lath, drywall, and shear walls before troweling any material onto the outside of the building. Otherwise, vibration or structural movement may damage the stucco materials before they have had a chance to cure.

Base Coat

In traditional three-coat stucco, the first two coats are made of a site-mixed cement plaster. Each batch contains measured amounts of Portland cement, hydrated lime, fine sand, and water. To reduce the cracking that is common with stucco, contractors have learned over the years to modify this basic mix with a variety of materials. Liquid polymer additives are used to increase strength and improve curing. Some contractors add chopped fiberglass for reinforcement, or may even trowel a woven fiberglass mesh into the brown coat, although this adds considerable time and expense. A clear penetrating sealer over the completed stucco job helps repel moisture and reduces the effects of freeze-thaw cycles.

All these additives cost money and require skill to use. Moreover, mixing up each batch on site introduces many possibilities for variation in the material, which can translate into noticeable inconsistencies in the building's appearance.

One-coat advantages. With one-coat stucco, on-site mixing is greatly simplified. The single base coat is a factory-prepared, fiberglass-reinforced cement plaster with modifying polymers already mixed into each bag. Sand and water are the only additions on the job site. This factory batching eliminates much of the variation that can occur with site batching.

When it comes to trowel work, one-coat has a real time advantage (Figure 3). Obviously, troweling on one base coat takes less time than troweling on two. In addition, you don't have to wait as long for the material to cure. In traditional three-coat stucco, the scratch coat should cure a minimum of 48 hours before the second coat is applied. The brown coat then has to cure for a minimum of seven days before the cement-based color coat can be applied. Like many builders here, I wait four weeks to allow the brown coat to achieve full strength. Often people let it cure even longer, sometimes over a season or until the building is almost completed, hoping that this will lessen the amount of cracking in the stucco later on.

With one-coat systems, by contrast, the combination scratch/brown coat can receive a cementitious stucco finish after a minimum of 48 hours. A synthetic stucco finish can go on after 24 hours. (Whatever the finish, however, it is better to wait at least seven days if possible before color coating.)

Downside. One-coat stucco is not as impact-resistant as three-coat stucco, which is almost twice as thick when completed. Also, the finish appearance of a one-coat stucco job does not always perfectly capture the three-coat stucco look. One-coat systems imitate the rounded pillowed softness of three-coat stucco, but because there is less material to build up, the difference is noticeable on outside corners, bullnose details, and parapets (Figure 4,). However, many buildings do not call for such soft, rounded details, and in those cases the one-coat is hard to tell apart from the three-coat.

LIONBERGER/WESTERN STUCCO

Figure 3. *A worker smooths a cementitious base coat in preparation for a synthetic color coat.*

Color Coats

The color-coat finish used in traditional three-coat stucco is a factory-prepared mix of Portland cement, hydrated lime, pigment, fine sand, and other additives. It comes in 80- to 94-pound sacks, depending on the manufacturer. Each stucco manufacturer has 16 or so standard colors to choose from. On site, the stucco contractor mixes the bagged material with water and trowels it over the brown coat at a thickness of about 1/8 inch.

The color coat is usually floated to a sand finish, but an experienced applicator can vary the texture with trowel techniques. Different textures affect the final color: A smooth texture next to a rough one will be lighter in color, even if the material came from the same bag.

Traditional cement stucco finishes come with a number of potential problems. They can suffer from cracking, freezing, flash setting, and color variations. They are sensitive to environmental and application conditions,

One-Coat and the Code

The *Uniform Building Code* (*UBC*) was originally written for generic three-coat stucco, which is mixed on site from commonly available materials. Individual manufacturers of thin-coat products can ask the International Conference of Building Officials (ICBO), which writes the *UBC*, to evaluate their products individually and issue an Evaluation Report (ER) certifying that the product conforms to minimum standards and is an acceptable substitute for three-coat stucco. At last count, 19 manufacturers had received ERs for thin-coat materials. ICBO-certified products usually display an ICBO ER number prominently on their packaging. It's best to use a certified product, particularly if the *UBC* is enforced in your area. (For a list of certified manufacturers, see the source list at the end of the article.)

The many thin-coat products available have different formulations, and the manufacturers tend to guard their recipes closely. No one can really say whether one manufacturer's base coat will work properly with another manufacturer's finish coat — ICBO's reports only apply if the product is used according to instructions.

The reports also give details on the correct use of each product. To make sure your application complies with the code, you can get the full report for any given product from ICBO (5360 Workman Hill Rd., Whittier, CA 90601; 310/699-0541).

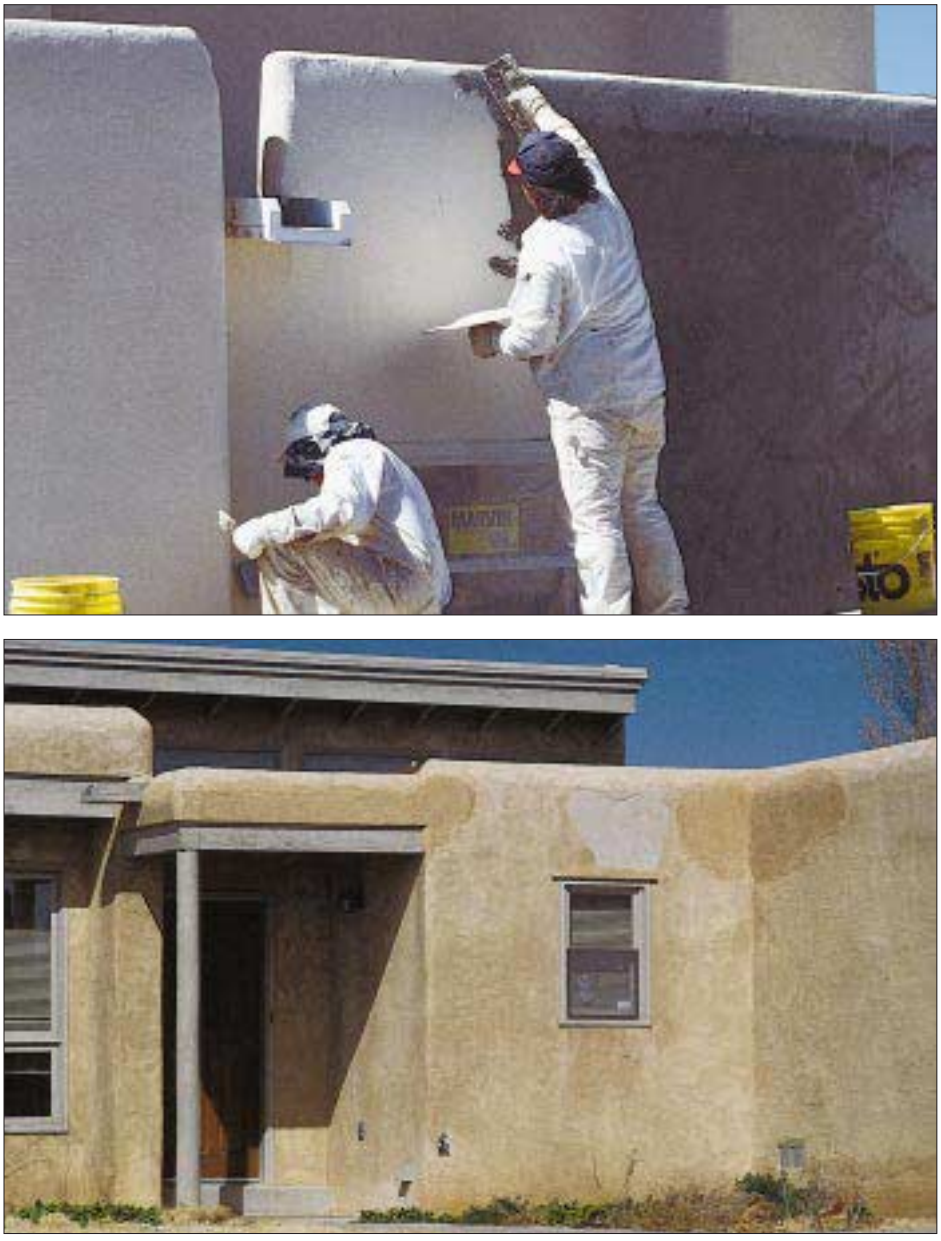

Figure 4. *There are aesthetic tradeoffs to be made when comparing one-coat to three-coat stucco. Because there is less material to work with in a one-coat application (top), it is harder to achieve the soft, rounded corners characteristic of adobe-style three-coat stucco. On the other hand, color consistency is not an issue with one-coat stucco, as it is with traditional stucco (above).*

including the amount of water used in mixing them, moisture and texture variations in the base coat, ambient air temperature, humidity, and direct sunlight. The slower the finish dries, the darker the color will be. Because of these variables, entire walls need to be applied at one time, with cold joints only at wall corners; otherwise, the inherent shade changes in the material would show up too strongly. This also makes it virtually impossible to make spot patches that will match.

Also, three-coat stucco is a brittle material subject to cracking and spalling. Minor cracks may not be detrimental to the wall system as a whole, but they can upset clients, especially those who have not been educated about the nature of cementitious stucco. (I always let my customers know that if they choose three-coat cement stucco, they should expect some cracking. This is especially true here in the high desert, where we get large daily temperature swings.)

Synthetic color coats. Synthetic stucco finishes eliminate most of the problems associated with traditional color coats. These products are a mixture of an acrylic polymer base (much like exterior latex paint but more flexible, more durable, and heavier bodied), fine aggregate, pigments, and other additives. They come factory-mixed in five-gallon buckets, and are troweled directly over the cured thin-coat base material (Figure 5).

Synthetic finishes can be tinted to almost any color, and are not subject to shade variations. This eliminates having to work to corners and reduces the effect of the weather, because drying time does not effect the final color. It also means that spot patching is possible at any time.

But the best thing about synthetic stucco finishes is that cracking is almost eliminated. The elastic nature of the material allows it to bridge gaps. Large cracks caused by structural problems may still occur, but a synthetic color coat is devoid of the hairline cracks and spalling normally found in a cement-based color coat.

Some of the aesthetic differences between synthetic and cementitious stucco finishes are a matter of taste. For instance, synthetic stucco is monochromatic and somewhat more reflective than cementitious stucco, whose color shades tend to be more muted, and move or shift across a wall. Also, cement stucco darkens when wet from rain or snow, while synthetic stucco stays the same color regardless of moisture. Someone who likes the look of traditional stucco — cracks, color shades, and all — might prefer an old-fashioned cementitious finish to a synthetic one.

I usually bid custom projects for both traditional three-coat and synthetic stucco over a thin-coat base. This gives me the opportunity to explain the cost implications as well as the technical and aesthetic considerations to my customers. However, when building a spec house or tract home, I prefer to use synthetic stucco. I do not know how long the home may be on the market, and I want it to look the best it can for the longest time. Also, if we need to make an addition or alteration in order to make a sale, it is easier to do if the project has been done in synthetic stucco.

Application Tips

With any kind of stucco, weather is a factor when applying base coats as well as color coats. Avoid working in intense direct sun and hot blowing

wind in the summer. Following the shade around the building helps, and wetting down the base coats as they cure will help them harden better.

Also avoid freezing temperatures — the air temperature should be at least 40°F. This often means starting late and quitting early, or not working at all in extreme cold. Accelerators called anti-hydros are available to speed curing time, but they can weaken the material. Be sure to follow the manufacturer's recommendations carefully when using these products.

When using synthetic stucco, check to see if the manufacturer trains and certifies installers. This is often the case, and if so, I recommend the use of certified installers. They will be more familiar with the materials, and you will usually get a warranty from the manufacturer as well as from the installer.

Figure 5. *Synthetic color coats come in premixed five-gallon pails, ready to apply.*

Durability a Question

Because it is a new product, the long-term durability of one-coat stucco is still untested. Traditional stucco has been around for centuries, and we know that a well-maintained building will last a very long time. Buildings with three-coat stucco are usually repaired, patched, and refinished with color coat after 20 to 30 years.

Most manufacturers of synthetic stucco finishes tell me their products will hold up for about 15 years. At that point, you should be able to patch the walls, and then recoat with any color you want. This will probably cost more than refinishing a cement color coat job, because of higher material costs. There is also a possibility with synthetic stucco that after a few refinishes, the built-up layers of finish coats may have to be removed. Or it may be necessary to remove the base coat as well, and completely rewire and restucco. ■

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One-Coat Stucco Manufacturers

For information on specific one-coat products, contact the manufacturers. The companies listed below hold ICBO Evaluation Reports for code-compliant one-coat stucco systems.

American Building & Cement Products Inc.
P.O. Box 6188
Phoenix, AZ 85005
800/875-4016

CTS Cement Manuf. Co.
8741 Glenoaks Blvd.
Sun Valley, CA 91352
800/929-3030

El Rey Stucco Co.
4100 Broadway SE
Albuquerque, NM 87105
505/873-1180

Expo Stucco Products
7465 Carroll Rd.
San Diego, CA 92121
800/748-5707

Highland Products
15148 Oxnard St.
Van Nuys, CA 91411
800/423-9592

Imasco Minerals
19287 98A Ave.
Surrey, BC, V3T 4W2, Canada
604/888-3848

La Habra Products
P.O. Box 3700
Anaheim, CA 92803
714/778-2266

Magna Wall Inc.
P.O. Box 847
Boerne, TX 78006
210/249-9735

Omega Products
2041 S. Susan St.
Santa Ana, CA 92704
714/556-3830

Parex Inc.
P.O. Box 189
Redan, GA 30074
800/537-2739

STO Industries
P.O. Box 44609
Atlanta, GA 30336
800/628-2738

Superwall
836 N. Arizona Ave.
Chandler, AZ 85224
602/437-8099

Triple "R" Brand Inc.
5901 Emerald Ave.
Las Vegas, NV 89122
702/435-0424

Ultrakote Inc.
327 S. 27th Ave.
Phoenix, AZ 85009
800/224-2344

Western Stucco Products
P.O. Box 968
Glendale, AZ 85311
800/582-9767