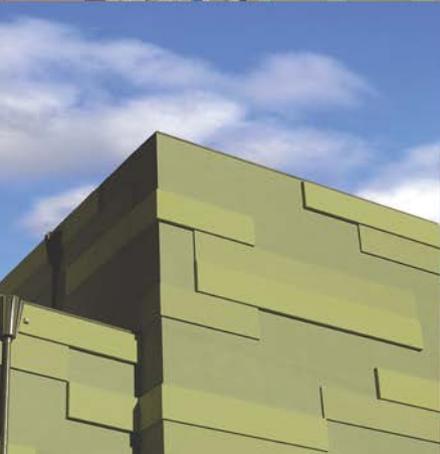


Building Envelope

A Versatile Cladding for Buildings

There's more to EIFS than simulating stucco.

By David Johnston and Scott Robinson, EIMA



(Top left) EIFS' ability to showcase a large portfolio of color and texture offers flexibility to designers and architects. Here, The University of New Mexico Children's Hospital shows off several EIFS finishes. Photos courtesy of EIMA. (Bottom left) Though the front elevation of the Fine Arts Building at New Mexico State University (shown here) looks like sandstone, it's actually EIFS, as are the other sections of the building exterior.

The ability of EIFS (Exterior Insulation and Finish System) to reproduce the appearance of stucco on building exteriors is well known. What's not so well known is that, except for glass, the EIFS finish coat can also replicate just about any other building material, from clay brick to metallic finishes. It can be hard to tell the difference sometimes, even when you're standing next to the building.

EIFS comes in a variety of textures, colors, shapes and designs. EIFS can make possible sometimes cost-prohibitive exterior architectural detailing, allowing for special features that might not be practical with other exterior wall cladding options.

"When it comes to a complex, multi-curved building form, there are not many exterior materials that can be used," says Jeffrey H. Page, RA, principal, SpaceLine Design Architects and Interior Design LLC, Dubai, United Arab Emirates, as quoted in *Snap* magazine.¹

"For a luxury residence in the desert heat of Phoenix, [with] a collision of geometric curves with minimal straight runs, EIFS was my first choice. Because EIFS is troweled on, you can literally sculpt the desired forms."

EIFS Background and Typical Components

Following introduction in the United States in 1969, EIFS became widely popular during the energy crisis of the 1970s. While being a popular renovation option in post-World War II Europe, EIFS was seen in the United States as an alternative exterior wall cladding option that offered greater energy benefits than other systems for both new and aging buildings.

EIFS then, like today, included a continuous layer of insulation that allowed for a higher level

of thermal performance. The high level that EIFS performs to is something that still carries it today.

The hiccup in the road came during the 1990s, when it was reported that moisture intrusion issues were present in EIFS. Investigations showed the intrusion wasn't through the EIFS but through windows, doors and poorly designed construction details. It should be noted that EIFS was not alone, as homes with other facades suffered similar issues.

During this time several EIFS manufacturers were already working on and had released an EIFS system with a drainage channel between the insulation board and substrate. In addition to the improved EIFS with drainage, the industry also made advancements with water-resistant barriers, further helping to address instances when moisture gets into wall systems.

The EIFS finish coat adds to the protection, offering a colorfast and crack-resistant acrylic finish that enhances the exterior's performance attributes.

EIFS typically consists of these components:

- A water-resistive barrier (WRB) that covers the structural wall and creates a drainage plane.
- An insulation board with an air space of about one-eighth of an inch between it and the drainage plane. Vertical ribbons of adhesive secure the insulation board to the WRB while being thick enough to maintain airspace between them. The insulation board is typically made of expanded polystyrene (EPS) and is often secured mechanically as well as adhesively.
- Glass-fiber reinforcing mesh embedded in the water-resistant cementitious base coat which is applied on top of the insulation to serve as a weather barrier.

- An optional primer that covers the base coat before the finish coat application.
- A cementitious finish coat that typically uses colorfast and crack-resistant acrylic co-polymer technology.

In a three-year study of wall-system performance, conducted 2005-2008 by the Department of Energy's Oak Ridge National Laboratory (ORNL), jointly funded by the EIFS Industry Members Association, researchers found:

"The best performing wall system was the EIFS wall consisting of four inches of expanded polystyrene insulation board without any interior stud insulation (no fiberglass). This wall outperformed all other walls in terms of moisture while maintaining superior thermal performance."²

The study examined moisture intrusion, drying potential and energy performance of various configurations of exterior cladding systems, including several EIFS wall variations, all of which performed well; brick; stucco; concrete block; and cementitious fiberboard siding. Researchers also evaluated the impact of features such as liquid-applied moisture control membranes, smart vapor retarder systems, and exterior cladding venting on the performance of EIFS, according to phase one of the three-phase report.

Decorative and Specialty Finishes

By selecting appropriate finishes, designers can create almost any surface they can envision. The finish coat can include functional, protective attributes such as water-repellency as well, to withstand the rigors of time and weather. Success depends on selecting the right products for the job and applying them correctly.

Aggregate size and trowel motion govern the texture of many finishes. Typically, crushed quartz or marble aggregate can range in size



Reflective finish coats are a standard EIFS manufacturer's product offering, applied the same way as non-reflective finishes. These finishes are designed to simulate the gleam and crispness of factory-applied metal.



Applicators used stencils and pigmented EIFS finish coats to recreate the look of masonry on this high-end residence retrofit.

from 0.5 mm to 3.0 mm and larger. Finishers can create circular patterns or long striations in the finish coat by using a trowel to drag aggregate through the coating.

Smaller aggregate and a smoother finishing style can create a sand-like texture, similar to the look of limestone. Still other larger aggregate finishes produce a pebbly texture, ideal for masking surface imperfections such as bumps in the basecoat, and are able to produce surfaces of any roughness.

Brick, limestone, metal and granite are just a few of the decorative or specialty finishes EIFS manufacturers can provide, usually at less cost than masonry or architectural metal. The potential for lower expense can help projects meet or come in under budget, while also offering energy benefits unique to EIFS, as noted in ORNL's study.

An EIFS Finish That Looks Like Masonry

While stucco seems to be the most common appearance for EIFS, let's take a look at what's involved in creating a different appearance — brick masonry.

Although optional, a primer is recommended.

A primer can help:

- Reduce the chances of efflorescence arising from the cementitious base and finish coats.
- Promote uniformity in the finish coat.
- Enhance the appearance of the finish coat.
- Improve finish-coat coverage.

If you're using a primer, it should be whatever color you want for the "mortar joints" in

the brick-finish design. If you're not using a primer, then the base coat should be that color. Because the base coat is cementitious, it will likely already resemble mortar.

Most EIFS manufacturers can supply compatible pigments for the base coat or primer, if you want other colors.

Once the primer or base coat has dried at least 24 hours, it's ready for the finish coat. Place a brick-patterned peel-and-stick stencil over the section set for finishing. Make sure the stencil aligns appropriately with windows and doors. You'll also want to make sure the stencil meets any predetermined lines in order to maintain the planned look.

With the stencil in place, apply the brick finish coat over the stencil. Manufacturer recommendations vary on the exact way to apply the finish. Some recommend diagonal strokes, while others suggest an up, down, left and right approach.

With a roller, you can apply thin, paint-like finish coats. For coatings with a hint of three dimensions, trowel on a thicker mixture.

Either way, it's important to completely fill in the stencils.

While the coating is still fresh and wet, carefully peel the stencil from the surface. Take



The EIFS market is mostly commercial. Here, popular shopping mall Tysons Corner in Fairfax County, Va., features a variety of EIFS colors, patterns and textures on its exteriors.



EIFS simulates limestone on this residence, using a finish coat blended from a mixture of minerals, primarily quartz, and pigments blended together in a 100-percent acrylic polymer matrix.

care to keep the wet coating on the stencil from staining the exposed “mortar joint” base coat or primer.

You can use a damp sponge to clean off any such irregularities, though leaving a few can add to the wall’s natural masonry appearance.

The appearance of limestone is also easily achieved. Many EIFS manufacturers create finish coats with the appearance of natural stone from a mixture of minerals, primarily quartz, and pigments blended together in a 100-percent acrylic polymer matrix.

The quartz makes up anywhere from half to almost three-quarters of the weight of this finish (about 8 to 15 pounds per gallon). It is hand-applied to the exterior wall with a trowel.

Colored Metallic Finishes

Factory-coated metal, often in bright colors, is another popular cladding for buildings. That’s also an appearance EIFS can match, often at less cost. There’s no special procedure for creating such a finish. Reflective finish coats are a

standard EIFS manufacturer’s product offering, applied the same way as non-reflective finishes.

EIFS’ ability to showcase a large portfolio of color, while appearing just as crisp as any metallic finish, offers flexibility to designers and architects.

The College of Fine Arts building, New Mexico State University, showcases EIFS finishes in metallic colors of green and orange, as well as a section reproducing the look of sandstone masonry. The project, completed in February 2013, won EIMA’s Quarterly Project Award for design excellence.

EIFS’ combination of insulation and aesthetics makes it a popular choice for commercial clients, says Ryan Johnson, Assoc. AIA, LSE Architects, Minneapolis, Minn., quoted in *Architect* magazine.³

“We’ve been trying to move the insulation to the outside of the building on all of our projects, no matter if it’s an EIFS project,” he says. “But EIFS is the only option that offers true continuous insulation. Other product manufacturers

aren’t figuring out how to attach their product back to the building without going through the exterior insulation. If it’s metal panel on the outside, and it’s got exterior insulation, you’re still punching little holes all through the insulation to attach it to the building.”

From the Bellagio hotel and casino in Las Vegas to St. Mary and St. Mena Coptic Orthodox Church in Cranston, R.I., EIFS is used on every type of commercial, institutional and governmental building.

Chances are you’ve seen the system and maybe even admired its design and appearance, even if you didn’t realize what it was.

About the Authors



David Johnston is executive director and CEO of the EIFS Industry Members Association (EIMA), a position he has held since 2009. Before joining EIMA,

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Notes

¹“Wall Claddings for Times of Crisis?” *Snap, The Magazine of Sweets*, August/September 2009. p. 17.

²“The Hygrothermal Performance of Exterior Wall Systems: Key Points of the Oak Ridge National Laboratory NET Facilities Research Project,” p. 2, Achilles Karagiozis, Ph.D.

³“Water Under the Bridge,” Elizabeth Evitts Dickinson, *Architect*, July 2013. **D+D**

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