Pre-formed multicolor porcelain-on-steel panels were employed both for utility and esthetic effect in the Main Auditorium of the Ferris Institute, Big Rapids, Michigan. The ceiling panels serve as adjustable acoustical baffles in the huge hall. Architect: Roger Allen & Associates

PORCELAIN-ON-STEEL: Growing in Usage

With the energy impact, this product is finding increasing usage in many markets

Perhaps the biggest compliment one can pay to a product is to say that it does what it’s supposed to do.

If so, such a statement is porcelain-on-steel. Not only does it do what it’s meant to do but, more important, architects, building owners and contractors, aware of the attributes of a glass-like surface on a steel base, are utilizing the material more often, according to manufacturers.

• Several of its prime advantages—longevity, virtually no maintenance, no painting, resistance to graffiti—coincide with today’s urgent needs to reduce zooming labor costs, deter vandalism and ensure economies that will last for the life of a structure.

• In insulated wall panels, porcelain-enamed steel fills the bill as an energy saver. Some schools are cutting fuel costs up to a third by replacing full glass windows with a combination of partial windows and insulated porcelain panels that are said to be four times as effective as insulated glass. Conversely, other buildings “keep their cool” in summer and reduce air conditioning wattage via use of the material with an insulation core.

• Interior use of the material is in an uptrend: It is showing up in hospital wards and operating rooms, and on the walls and ceilings of food plants and restaurant kitchens. Cheery colors and a prank-proof surface give it a chance to be the No. 1 material for school corridors, classrooms and labs.

• Not widely known is the fact that close to 90 percent of the chalkboard used in U.S. schools today is porcelain-on-steel. Now, a new dustless writing system (“rite on-wipe off”), combining porcelain-on-steel wall boards and dry marker pens, is being introduced.

• Looming on the horizon is the solar energy field where porcelainized steel would function as a warmth-absorbing collector surface that transmits heat to water-filled tubes.

Essentially Lifetime

Today’s architectural porcelain enamel is an alumina-borosilicate glass that is melted and literally fused to steel at temperatures of 1400° F to 1600° F. As a result, the special enameling steel used primarily—either thin panels porcelain-coated, or thicker, custom-designed formed panels—is essentially enclosed in a lifetime glass shield. A ground or base coat of porcelain enamel is applied to the steel’s front and back surfaces, surmounted by a cover or color coat on the front or face surface.

To manufacture thin-style insulated panels (the classic vehicle for
PORCELAIN

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porcelain enamel curtain wall), porcelain-enamed steel is lami-
nated to cement asbestos board or tempered hardboard, backed by a one- or two-inch core of insulating material — usually polyurethane foam, expanded polystyrene or per-
lite board — and then backed by cement asbestos board and a rear surface of either painted galvanized steel or porcelain-on-steel. This back surface of the double-faced panel often serves as a building’s inside wall. The overall lamination is said to be equivalent in insulation quality to a 12” brick wall. Where fire rating is required, some two-
inch-thick types are U.L.-listed at a 1½-hour rating.

A second type consists of cus-
tom porcelain enamel panels, which permit the architect to de-
sign the panel’s shape, specify its color or colors, finish, texture, in-
sulation and back-up finish. Fre-
quently, existing dies can be used to reduce costs of the custom ver-

A high percentage of exterior veneer panels, another type, is used in modernization of older buildings that are sound in struc-
ture but dated in appearance. These panels consist of the porcelain-coated steel laminated mostly to tempered hardboard or cement asbestos board and backed by a sheet of galvanized steel.

Stock veneer and insulated panels are normally manufactured in 2', 3', 3½', 4' and 5' widths, and in standard lengths of 6', 8', 10' and 12', although they have been made in lengths up to 35’. Thick-style custom panels are produced in di-
mensions up to 6’ x 12’.

Variety of Designs

Besides the flat-surface material, a variety of embossed designs, both stock and custom, employ thicker steels and are used often for col-

In a recent development, there’s even a porcelain-on-steel panel that can be formed at angles up to 90°

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without spalling, chipping or crazing. This special material, using an aluminum-coated steel base, eliminates the need for moldings by a special sealing technique that allows panel to be butted snugly against panel. It’s utilized primarily in interior walls and ceilings.

Synonymous with permanent color, architectural porcelain enamel is available in the 35 Porcelain Enamel Institute standard colors—19 glossy and semi-glossy, 16 full-matte—plus virtually any shade in the rainbow on a custom basis. It also offers such effects as multicolor, stippling and marbleizing.

But the big story in porcelain-on-steel is the burgeoning list of applications and markets for the material.

Originally, porcelain-on-steel roofing and siding saw service as an identification-type facing for gas stations, store fronts and food franchises (the best known is the orange/red roof on Howard Johnson restaurants). Now, architects can employ the exterior material whenever a long-lived, aesthetic enclosure is desired, compatible with other steels, precast concrete, brick and glass. It’s big in schools, hospitals and office buildings, growing in motels and apartment houses, and penetrating other categories of construction. In industrial areas, where plants are exposed to concentrations of pollutants, the vitreous enamel siding is proving a solution to problems of durability and maintenance.

Interiors Increasing

The material is experiencing its biggest sales surge in interiors. Offering an opportunity for an antiseptic environment via a smooth, nonporous surface on which disease and odor-forming bacteria cannot nest and multiply, it’s used widely in laboratories, cleanrooms, hospitals and all types of food processing facilities. Since grease, chemicals, heat and fumes can’t corrode, burn or peel the glass surface, plant engineers are just starting to specify it for interior factory walls.

Building owners find that the panels can be economically installed over existing bathroom walls by their in-house maintenance crew.

One factor in the progress of porcelain-enamed steel is the fact that architects and interior designers can specify colors and finishes to match already-existing products using the surface: cabinets, chalkboard, chimney jackets, counters, dishwashers, doors, fireplaces, freezers, kitchen sinks, lab equipment, refrigerators, signs, space heaters, stoves and washing machines.

Anticipating the growth of mass transportation, bus shelters have been designed with side and back panels of the exposure-resistant and graffiti-proof panels. With the expected comeback of passenger rail travel, station platform panels loom as another growth field.

Ceilings of vehicular tunnels already comprise a huge market, as witness two examples: the Inner Loop tunnel under the mall in Washington, D.C. has the largest porcelain-on-steel ceiling ever installed, an expanse of 565,000 square feet, or just under 13 acres; another 250,000 square feet, composed of 12,000 panels, line the Hampton Roads tunnel ceiling in Virginia.

Interestingly, anything that can be photographed can be reproduced by a silk screening technique on porcelain, in color or black-and-white, opening up a new dimension in architectural graphics. Already, paintings, photomurals and directional maps, all on porcelain-coated steel, are used in Boston subway terminals.

Unquestionably, porcelain-on-steel is an architectural material with continuing potential. Embodying excellent resistance to the elements, it probably requires less maintenance to stay looking like new than any other construction material. In exterior use, self-cleaning, in interior all it requires is an occasional hosing or wiping down with a damp cloth.