A massive and continuing market is developing for the installation of exterior walls and steel roofs on existing nonresidential buildings, for energy conservation and compelling reasons listed below.

From surveys of owners, architects, and construction professionals, the overall remodeling market in the U.S. and Canada—commercial, industrial, institutional, and government buildings—is estimated at some $35.2 billion annually.

This figure becomes even more significant because it does not include land, foundation, or structural framework costs. These are important in new construction, although the total encompasses all exterior and interior renovation as well as equipment purchase.

Even if an extremely-conservative one percent were allocated to re-roofing and re-walling, this segment alone would comprise $350 million a year. There are important reasons for the anticipated upsurge in retrofit construction.

Increasingly, retrofit has become the economical alternative to new construction costs that are escalating faster than the inflation rate, to sky-high land prices, and to site shortages. As a rule of thumb, installation of a modern steel roof and walls is a relatively small percentage of the cost of a new building.

Often performed in conjunction with building expansion, they are, almost always, added atop existing roofs and walls, with no need for demolition or facility interruption.

Obviously, today’s major impetus for reconstruction is energy conservation. Virtually every building...
erected before the onset of vastly higher energy costs is thermally inefficient, designed in eras when there was little concern for maximizing insulation values.

In fact, Department of Energy figures estimate 25 billion square feet of existing roofing area which either has no insulation or insufficient amounts. With properly insulated walls and roofs, a direct result of retrofitting, buildings can diminish their heating/cooling expenses one-third or more.

Another spur to renovation is the phenomenal growth of pre-engineered steel buildings, which commenced in the early 1950’s. As these low-rise structures approach the 20- to 30-year mark, they alone account for a backlog of needed replacement, be it walls, new roofing, or increased insulation requirements.

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Until now, specifying the standard built-up roof was almost a reflex action. But problems can come with weather damage and the constant expansion and contraction of roof movement. Resurfacing with improved coated steel systems answers these problems.

Finally, new tax incentives are helping to further the trend toward updating existing buildings. The U.S. Revenue Act of 1978 extended the 10 percent investment tax credit to the rehabilitation of certain older buildings. Roughly the equivalent of a 20 percent reduction in cost, rebuilding expenditures are often eligible if a building has been in service at least 20 years.

Uncluttered Spans Offer Opportunity

While just about any building can reap benefits, those considered most suited to this exterior remodeling have long, uncluttered spans of roofs and/or walls. Typically, these include arenas, garages, industrial plants, laboratories, motels, nursing homes, offices, power plants, schools, stores, supermarkets, theaters, and warehouses.

Citing the last-named example, one case involved a severely leaking, 50,000 square foot warehouse roof that threatened the carton-packed inventories of the Johnson Rubber Company in Middlefield, Ohio. After twice in 10 years replacing a built-up composite roof, the firm decided upon a steel roof system which also provides adequate water drainage.

Typical, in many aspects, of most new steel roof installations, crews first drilled hundreds of holes through the old roof to permit evaporation of trapped condensation. Purlins (hat-shaped sections) were attached on five-foot spacings to the warehouse’s primary structural members and the aluminum-coated steel panels were then laid down in sections over a new, two-inch barrier of insulation.

A self-propelled, roll forming

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machine wrapped, compressed, and locked the panel edges of each course into a tightly-crimped, 180-degree standing seam, incorporating a sealant to resist capillary leaks. The seams, standing about three inches above the main panel surface, are removed from the hazards of water or snow melt, which run off because of the roof’s slope. Seamed into the roof are slotted clips comprising the panel-to-structural connection that permits the entire steel roof membrane to adjust for any thermally-induced expansion and contraction.

In this and similar re-roofing work, the total time required was between two and three man-hours per 100 square feet, plus the time needed to install trim and accessories.

Another example proves the effectiveness of field-insulated steel panels. By covering windows alone, the Electrical Products Division of Portec, Inc., Cleveland, reduced its wintertime use of natural gas 26 percent, even after adding a 13,000 square foot bay to its existing 70,000 square foot brick-walled plant.

"Wall renovation, like roofing, is normally a field-insulated operation."

The job, done by H.H. Robertson Company, involved construction of the new bay with insulated panels, and retrofit of the old, single-pane plant windows with 1½ inch fiberglass insulation and then with profiled steel wall sheet (topped with a zinc-asbestos-polymeric resin coating), both fastened to the existing mullions. Operating windows are left exposed for summer ventilation, then sealed with the panels in winter.

The third example illustrates another feasibility: complete replacement of old exterior walls with new, field-insulated panels. This is what was done at the Gismo Division plant of Guarantee Electric, in St. Louis. Its renovation was triggered not only by soaring winter fuel costs but also the difficulty, in the 50-year-old
building, of heating some of the working space to more than 40 degrees.

**Perimeter Partitions Closed Up Daily**

The new walls were put in by the technique of using an interior perimeter partition to daily close up the areas opened by removal of the old exterior wall. Later, the partition served as a finished wall in office spaces. The final result was a 20 percent cut in energy consumption.

For re-roofing, the sheet steels available include those coated with aluminum or aluminum-zinc alloy, and galvanized-painted sheet; often in thicknesses of .019" to .024". Aluminum-coated stock, sometimes with silicon added, combines the strength of steel with the weather resistance/heat reflectivity of aluminum, and has been used successfully in highly-industrialized and marine environments. Presenting a pewter-like appearance, it can outlast an unpainted G-90 galvanized finish five or more times.

Wall renovation, like roof, is normally a field-insulated operation. It involves affixing a new steel wall, over insulation, to a building’s existing wall, be it masonry, wood, or metal.

Painted-galvanized steel has been the traditional panel material, but aluminum-coated, aluminum-zinc alloy, and weathering steel are other options. Some panel makers also bond acrylic film to steel as a fade-, chip-, and peel-resistant surfacing. Panel walls 24 to 30 feet high are feasible, and even higher when panels are spliced atop one another.

In the installation procedure, a sub-purlin is fastened horizontally, as a girt, either to the old wall or the structural framing. Blanket insulation, from 3 to 5 feet wide, is temporarily adhered to the existing wall and the new panels then screwed or riveted through the insulation to the sub-purlins.

Color caps, matching the panels, cover and hide the fasteners. Panels are precut to accommodate windows and to blend with solid, half-glass or full-glass doors.

In some instances, new walls are designed as impermeable, solid surface (except for doors) from one end of the building to the other, to completely seal a structure and prevent air infiltration.

It is recommended that, before any roof or wall reconstruction is planned, local codes be checked to ensure that the projected alterations meet possible new and stricter requirements. For example, in erection of new roofing on buildings over 30 feet in height, some codes may require a heavier panel material.

Information on sources of steel building materials for roof/wall retrofit systems is contained in the “Directory of Manufacturers of Steel Building Construction Products,” obtainable from the Sheet Committees, American Iron and Steel Institute, 1000 16th Street, N.W., Washington, D.C. 20036.