
ReSKIN: Parametrically Defined Insulated Metal Panels

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The pressures of population growth and the ensuing urban development will likely lead to an overhaul of existing building stock as well as additional new construction. The Brookings Institution projects that roughly one-quarter of today's existing building stock will be demolished and replaced between 2005 and 2030.¹ New buildings start their productive lives with an environmental debt that includes energy from the impact of construction, among them material acquisition, production, and transportation. Recent reports quantifying the embodied energy in existing building stock demonstrate that even the most energy efficient new building cannot offset its embodied energy for many years.²

Of the estimated 2.96 million existing masonry buildings in the United States, 1.34 million were built before the 1973 Oil Embargo.³ These buildings will require energy retrofitting to meet contemporary performance standards. The most ornamental buildings necessitate interior retrofit procedures to preserve the exterior envelope's appearance. However, a great many existing masonry buildings lack historic detail and could benefit from an exterior retrofit that provides both additional insulation and a new appearance for the building.

Exterior retrofitting is ideal from a building physics perspective and provides the least disruption to inhabitants during construction. Insulated Metal Panels (IMPs) excel as an affordable option for commercial energy retrofits, creating a weather-tight surface with

minimal thermal bridging and R values of 7.5+ per inch. Composed of aluminum laminated to a layer of polyisocyanurate insulation, the panels are widely available in a variety of sizes and finishes. Full-height panels can span up to 48 feet vertically. However, the monolithic nature of these panels creates a loss of scale and detail that the public typically cherishes in the masonry buildings.

This project proposes a variable metal panel section that would modernize the skin's appearance and bring tactility and scale to the new insulated envelope.

Based on the existing IMP lamination system, ReSKIN parametric panels lend visual variety to a highly efficient envelope. The panels vary in both depth of relief and degree of geometric complexity, affording a vast array of configurations. The manufacturer can offer a set variety of panels, but through different edge-matching scenarios the system would boast a vast number of configurations.

Customers can select the desired level of customization for their project, mixing standard flat panels with parametric ReSKIN panels. The foam and aluminum components of the ReSKIN panels are then cut using CNC tools and assembled in a factory for transport to the building site. The installation process - identical to the IMP system - is quick and unobtrusive.

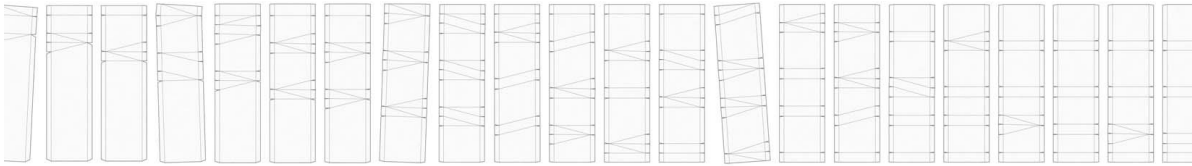
The ReSkin modular, customizable system offers an intensively insulated and aesthetically individual retrofit strategy.

ENDNOTES

1. Arthur C. Nelson, "Toward a New Metropolis: The Opportunity to Rebuild America" (Washington: Brookings Institution, 2004).
2. Preservation Green Lab. The Greenest Building: Quantifying the Environmental Value of Building Reuse. (Washington: National Trust for Historic Preservation, 2011). Available at: http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The_Greenest_Building_lowres.pdf. Accessed 6/21/2013.
3. United States Energy Information Administration. Commercial Buildings Energy Consumption Survey 2003. General Building Information and Energy End Uses 2003. Available at: <http://www.eia.gov/consumption/commercial/data/2003/index.cfm?view=microdata>. Accessed 6/21/2013.



PARAMETRICALLY DEFINED INSULATED METAL PANELS



TRANSFORMING MASONRY BUILDING ENVELOPES TO MEET CURRENT ENERGY REQUIREMENTS

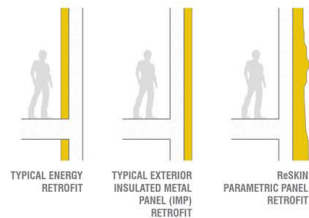
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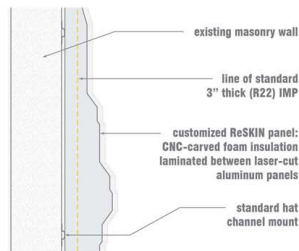
Exterior retrofitting is ideal from a building physics perspective. **Insulated Metal Panels (IMPs)** excel as an affordable option for commercial energy retrofits, creating a weather-tight surface with minimal thermal bridging and R values of 7.5+ per inch. Composed of aluminum laminated to a layer of polyisocyanurate insulation, the panels are widely available in a variety of sizes and finishes. Full-height panels can span up to 48 feet vertically. However, the monolithic nature of these panels creates a loss of scale and detail that the public typically cherishes in the masonry buildings.

This project proposes a variable metal panel section that would modernize the skin's appearance and bring tactility and scale to the new insulated envelope.



Based on the existing IMP lamination system, ReSKIN parametric panels lend visual variety to a highly efficient envelope. The panels can vary in both depth of relief and degree of geometric complexity, affording a vast array of configurations. Designers use software to quickly generate many iterations based on specified parameters, and a simple coding system translates the pattern into standardized panel profiles. Customers can select the desired level of customization for their project, mixing standard flat panels with parametric ReSKIN panels. The foam and aluminum components of the ReSKIN panels are then cut using CNC tools and assembled in a factory for transport to the building site. The installation process - identical to the IMP system - is very quick and inobtrusive.

The ReSKIN modular, customizable panel system offers an intensively insulated and aesthetically individual retrofit strategy.



CUSTOMIZING AN EXISTING BUILDING PRODUCT FOR INDIVIDUALITY, TACTILITY, AND SCALE

Sources:
 1. Arthur C. Nelson, "Toward a New Metropolis: The Opportunity to Rebuild America" (Washington: Brookings Institution, 2004).
 2. Preservation Green Lab, "The Greenest Building: Quantifying the Environmental Value of Building Reuse." (Washington: National Trust for Historic Preservation, 2011). Available at: http://www.preservation.org/information-center/sustainable-communities/green-lab/ta/The_Greenest_Building_lowres.pdf. Accessed 6/21/2013.
 3. United States Energy Information Administration, Commercial Buildings Energy Consumption Survey 2003. General Building Information and Energy End Uses 2003. Available at: <http://www.eia.gov/consumption/commercial/data/2003/index.cfm?view=microdata>. Accessed 6/21/2013.

