

# THE VALUE OF RETROFITTING WITH METAL ROOFS

BY SCOTT KRINER



**B**uilding owners and property managers want relief from soaring operating and maintenance costs, appearance issues, and more demands for energy efficiency.

Many are now finding a solution to these challenges by retrofitting their buildings with metal roofing. Metal offers long-term durability, enhances a building's appearance, improves energy efficiency, and reduces environmental impact. Metal roofing can also provide reflective and emissive benefits to help reduce heat gain and the building's carbon footprint. It also has recycled content and is fully recyclable at the end of a building's useful life.

For more than 25 years, retrofit systems have been a quick, cost effective solution for problematic roof geometry, maintenance issues and outdated appearance. Now they are becoming known for the thermal efficiency and energy savings they offer when combined with metal roofing.

Metal's durability is a key benefit. It reduces roof maintenance needs and offers a service life of nearly double its closest competitive roofing system, which currently is modified bitumen or built-up roofing (BUR), according to a market survey of building owners conducted by Ducker Worldwide, Troy, MI. The study showed the life of a Galvalume ® metal roof at 41.6 years; BUR at 23 years; and modified at 23 years. Statistics

Northwest Arkansas Community College, Bentonville, AR has solved its roof leakage problems by retrofitting all its buildings with metal, including this three-storey, 189,000-square-foot building.

from the same study put maintenance costs of metal roofing at 10 cents (USD) per square foot per year, compared to BUR and modified, both at 17 cents (USD).

Before a retrofit project begins certain steps must be taken to ensure the integrity of the fully engineered system and the project, including:

- Have an independent engineer analyze the building's ability to accept the new system;

- Inspect the existing roof thoroughly;
- Analyze the roof structure to ensure it can hold the added weight of 2 to 5 pounds per square foot, depending on the required gauge of the new roof and support framing system to meet building codes;
- Determine the engineering needed on support framing and anchorage systems;
- Specify temporary waterproofing at anchors into existing structure;
- Ensure that the new retrofit system will be properly anchored to the existing roof's structural system so it can withstand severe wind uplift.

The most common retrofit applications are metal over existing flat roofs and metal over existing sloped roofs. The common types of installations are low slope and steep slope roofs.

Low slope installations are usually utilitarian and economically driven. They provide a pitch from ¼ to a maximum of 2:12, which also improves discharge of rainwater. Steep slope installations have a slope greater than 2:12 and are more architecturally driven. During a retrofit installation the building interior is not exposed to outside elements or contamination from construction.

When steep sloped metal roofs are installed over conventional membrane, tear-off of the existing roof is normally not required and removal of existing roof insulation may not be necessary unless required by local codes. The International Building Code (IBC-2006) requires some existing membrane materials to be removed, but it allows an exception for re-roofing buildings that have existing metal roofs. A metal roof does not have to be removed.

A key consideration in designing a retrofit system for flat roofs is location of the rooftop equipment. How this equipment fits into the retrofit is up to the designer, but the equipment's location usually dictates what can be done.

The designer may also use the opportunity to improve energy efficiency and provide significant savings for the owner by adding elements to the retrofit system. These include adding high performance insulation systems to improve thermal resistance, installing a radiant barrier, and installing renewable solar technologies for domestic and/or process hot water, solar thermal heat recovery and solar power.

A major energy benefit of a retrofit system over an existing slope roof is the increased natural ventilation provided by convection that is inherent in a retrofit application. This is referred to as above sheathing ventilation (ASV).

Research from Oak Ridge National Laboratory (ORNL), Oak Ridge, TN confirms that ASV provides up to a 30 per cent reduction in heat gain through the roof. This can be increased to 45 per cent when a "cool" surface, such as the cool coatings offered on metal roof systems, is used.

Adding solar systems for heat recovery, water heating or power production may also help qualify the building owner for solar-energy rebates or credits from a number of sources.

The benefit of combining metal with a fully engineered, easy-to-install retrofit system is a long-lasting solution many building owners are happy they chose. ❖

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