SPRING 2025

Metal Builder®

ROLLFORMING MAGAZINE SPECIAL SECTION

USING COLD-FORMED STEEL IN YOUR NEXT PROJECT

HOW TO GET STARTED

SEALANTS FOR METAL BUILDINGS

WHAT YOU NEED TO KNOW

TRANSPIRED SOLAR COLLECTORS

SIMPLE INSTALLS WITH LOW RISK OF CALLBACKS

Cold-Formed Steel

Fired Up for Wildfire Resilience

The California wildfires that erupted in January burned tens of thousands of acres, destroyed more than 17,000 structures, caused over $250 billion in damage, and killed at least 29 people. In addition, more than 200,000 people were forced to evacuate.

They were California's most destructive wildfires but far from the first, nor will they be the last. The fires have been an ongoing problem for decades. Unfortunately, it will take years, probably decades, to recover from this one.

Federal, state, and local governments, as well as insurance firms, other private businesses, and homeowners will all be shouldering rebuilding costs, so all have a stake in reducing the risks of future wildfire destruction.

The magnitude of this disaster will undoubtedly prompt a hard look at the materials used in rebuilding. While research to develop more fire-resistant building materials and practices has been evolving for generations, the improvements weren't implemented fast enough to prevent this catastrophe.

Given Los Angeles' prominence and influence, and that it will be at the center of the world's attention during the 2028 Summer Olympics, the impact of the fires will remain front and center. There's plenty of incentive to make major changes. We simply can't afford not to.

So what's the answer? It will require a wide range of initiatives, from introducing new building materials, methods, and codes to improving wildfire prevention and control strategies.

One major solution may be replacing wood and other combustible materials with steel. Cold-formed steel framing is noncombustible so it can play a big role in increasing fire resistance.

Interestingly, Australia has had major challenges with wildfires, too, and has responded by increasing its cold-formed steel frame construction.

Metal roofing and siding has been growing in popularity here in the U.S., partly because of its fire resistance as well as its long lifespan. Insurance companies strongly favor metal roofing because of its fire and wind resistance.

Recent technological improvements in roll forming, paints, coatings, and textures have allowed metal roofing and siding to transform from a plain, commercial look to replicating natural materials like woodgrain and stone an amazing authenticity. The topic is covered in the April 2025 issue of Frame Building News and in the May 2025 issue of Rural Builder.

Cold-formed steel and metal roofing and siding are experiencing significant growth in construction and all indications suggest that the growth will continue. It's an exciting development in the industry and a potential gamechanger in reducing wildfire losses.

—Dan Brownell

Contents

On the cover: A worker connecting components for a cold-formed steel frame structure. PHOTO COURTESY OF FRAMECAD

BY KAREN KNAPSTEIN

Transpired Solar Collectors

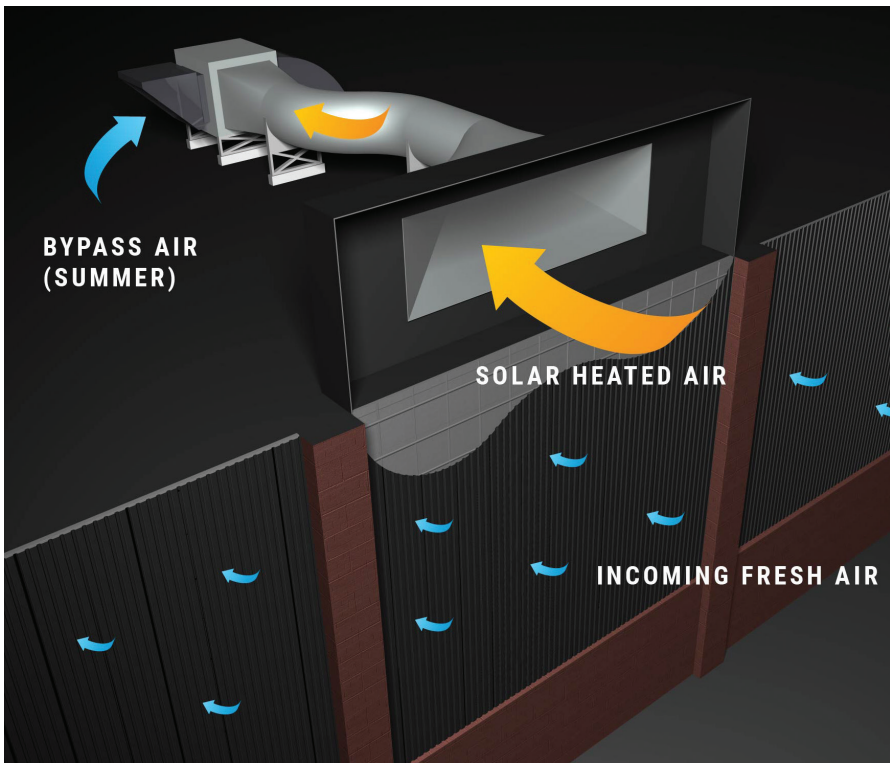
Simple Installs For Contractors With Low Risk of Callbacks

The metal components in metal buildings are subject to significant expansion and contraction, so the correct sealants must be used for these applications. Also, sealants should be chosen based on their specific application and purpose in the building.

AS A BUILDER, YOU KNOW your customers want a building that serves its intended purpose. It's even better if that building doesn't cost a lot to own and operate. Heating outside air is often the most expensive energy budget item in a building. Harnessing free solar energy to heat the outside air can have a huge impact on a building's energy needs; that energy can be captured with a "low-tech" transpired solar collector—best installed during initial construction—which will help heat the building during cold weather and lessen heat gain during hot weather.

According to the Department of Energy's *Federal Technology Alert: Transpired Collectors (Solar Preheaters for Outdoor Ventilation Air),* "[A transpired collector] preheats the ambient air by up to 40°F, reducing all or a portion of the load on a heating system during daylight hours. Although the transpired collector may not be able to achieve the required indoor air temperature on cloudy days or when the outside temperature plummets, it provides useful energy and reduces utility bills.

"In addition to meeting a portion of a building's heating load with clean, free solar energy, the transpired collector helps save energy and money in other ways," the report continues. "It recaptures heat loss through a building's south-facing wall; heat that escapes through the south wall is captured in the air space between the structural wall and the transpired collector and returned to the interior. Also, by introducing make-up air through ceiling-mounted ducts, the system eliminates the wasteful air stratification that often plagues high-ceiling buildings." *[Read or download the full Alert at https://bit.ly/airpreheat.]*



Make-up air preheating system diagram from ATAS International. The collector is located upstream of the air handling unit to directly preheat incoming outside air. This type of system is often found in schools and institutional buildings. It is also perfect for spray paint booths, driers, and 100% outside air systems.

PHOTO CREDIT: ATAS INTERNATIONAL

ATAS International has been involved in the manufacture of transpired solar collector panels since 2002. In 2006, the company released its InSpire wall solar air heating system. Christian Vachon, P.Eng., M.Sc., Director of Solar Technology at ATAS, explained that solar collectors are used on commercial buildings requiring a large amount of air exchange. "Some buildings require a lot of outside air to be brought in; it's really costly to have to frequently exchange and heat outside air. What the solar collector does is preheat the outside air for free." Examples of buildings that are good candidates for transpired solar collectors include schools, hospitals, agricultural facilities, sports complexes, warehouses, office facilities, garages and workshops, and other facilities that require large amounts of air exchange.

When asked if transpired solar collectors were used on residential buildings, he explained that, by comparison, a residence doesn't require nearly as much air exchange as commercial buildings. "Very little air is exchanged in a residence," Vachon said. "A school requires a lot of outside air. It would work on a residential level, but paybacks would be long. Residential application is on the fringe."

The region in which the building is located also helps determine whether or not installing a transpired solar collector

makes sense. Commercial buildings in areas that are cold but have a lot of sunlight are excellent candidates.

INSTALLATION

The components of a solar air-heating system are relatively simple. For example, according to ATAS International, the InSpire Solar Air Heating Collector consists of vertical z-channels installed on the exterior wall, with horizontal hat sections attached to the verticals to create the framing structure for attaching the perforated panels. In addition to acting as an attachment structure, the girts and sub-girts also create a plenum behind the panel through which the warmed air travels up to the ventilation intake. Solar radiation warms the collector and creates a layer or film of warm air on the surface of the panel. An intake fan within the building then pulls this warm air through the perforations, into the plenum, and then into the normal air handling system.

An InSpire Solar Air Heating Collector from ATAS International was installed on The Hamilton Ridge School in Minnesota. Top: Construction in progress. The south-facing wall on which the transpired solar collector will be installed. Top: Note the duct intakes through which the solar-warmed air is drawn into the ventilation system. InSpire can be installed over any non-combustible wall material. PHOTO CREDIT: ATAS INTERNATIONAL

ATAS manufactures its InSpire solar collectors with aluminum or zinc, both of which are coated with 70% PVDF coating. Vachon said 95% of the InSpire panels they sell are aluminum, with the balance being zinc. "We use aluminum or zinc because once perforated, the metal will be exposed to the environment. There may be corrosion if using steel because the panels will be exposed to rain and snow."

No special skills or tools are needed to install an InSpire Solar Air Heating Collector, but there is a process to follow. Architects work with ATAS which will design a system specifically for each project. Once the project plans are complete, the job goes out for bids. The contractor who wins the bid buys the InSpire collector from ATAS, which manufactures everything in the system and ships it directly to the jobsite, along with the "installation instructions" (shop drawings).

"Typically contractors sometimes they think, because it's solar it must be complicated," Vachon said. "This system is very simple. They also think that because it's solar it may break," he continued. "But it

won't. Air doesn't freeze or overheat so basically nothing bad is going to happen to the InSpire collector. Sometimes contractors have had bad experiences with different solar systems, which can make them uncomfortable with solar. But with a solar air heater, you install it, go home and sleep and think about your next job. The system will be fine."

Vachon added: "There's no maintenance on a solar collector. Once the contractor leaves the job, they're done. They don't need to worry about breakdowns [or callbacks]."

ATAS provides the detailed shop drawings for contractors to follow. Vachon cautioned, however, that to have a successful project, contractors need to work together. "The mechanical, general, and cladding contractor all need to coordinate. They need to make sure they all connect so everyone does their part right." Vachon also cautioned that contractors should not attempt to design and create their own systems. In his experience, when that happens, the system doesn't work.

"ATAS has been in the solar collector business for more than 20 years. We know what perforations are needed, we know the proper wall spacing and how to work the air intake locations," Vachon said. "We take on the responsibility that it will work. And we can include a monitoring system if the buyer wants to know their savings."

EFFICIENT AND DEPENDABLE

As a builder, if your customers are exploring solar energy options, knowing how efficient solar air-heating systems are compared to the more expensive photoelectric panels will give you an additional talking point. As it turns out, transpired collectors are much more efficient than electric solar panels. "Photoelectric panels are 15% efficient," Vachon said. "These panels are 70-75% efficient. You get a lot more energy per square foot than what the electric panels would give you. "You can save 33% or more of your outside air heating costs by using the InSpire. Can be more, can be less."

Not only is the system efficient, it lasts a long time, too. Vachon sold his first transpired solar collector in 1997 and that system is still working. Until the building is shut down or revamped, he doesn't see why or when it would stop.

"As long as the ventilation system is still running, that system will keep working," he said. "There are no moving parts. It has the lifetime of the outside panel on the wall."

Although your customers may be most enthusiastic about a transpired solar collector lowering their energy bills, you can be confident that this is one green energy upgrade that you can install and move on without worry. Since there are no moving parts and no maintenance, the system will last for decades and you can rest knowing you've made your customer happy and made the world a greener place. MB

BY RAY BAGLEY

Incorporating Cold-Formed Steel Into Your Next Project

Applications, Process, and How to Get Started

PHOTOS COURTESY OF FRAMECAD.

As the demand for faster, more efficient, and sustainable construction grows, cold-formed steel (CFS) framing represents significant advancements in strength, design flexibility, and the ability to unlock new levels of efficiency. Despite its growing popularity, many are unsure how to start using CFS.

Unlocking the value of CFS begins with understanding which projects are a good match for it, the production methods and applications of CFS, and how to incorporate it into projects for the most successful outcomes.

REAL-WORLD APPLICATIONS OF CFS FRAMING

The durability and resilience of CFS make it ideal for residential, commercial, and industrial projects. Buildings as high as eight stories tall can be built faster and more efficiently with CFS than traditional structural steel, wood, or concrete.

While some may think of CFS framing as limited to non-structural interior walls, its applications are far-reaching.

Roof Trusses: CFS is ideal for roof trusses because of its fire resistance and durability. It weighs less than comparable systems, allowing for lighter foundations, which can lead to cost savings. The design flexibility available with CFS trusses means that one roll-forming system can economically make trusses for a variety of spans and loads.

Interior Walls: CFS has long been the preferred choice for interior partition walls due to its low cost and high finish quality. Compared to wood, the inherent straightness and consistency of steel framing reduces labor costs when installing drywall interiors to high finish standards. Steel framing also eliminates shrinkage and settling, which lead to drywall cracks and repair costs. Designed-in service holes for mechanical, electrical and plumbing systems also reduce the labor cost for those trades.

Load Bearing Walls: CFS is lightweight and efficient for vertical and lateral load resistance. CFS wall systems can deliver the required lateral strength through internal members, strap bracing, and sheathing. Individually or in combination, these construction methods provide lateral resistance to wind and seismic loads sufficient to satisfy all building codes.

Floor Joists: C-channel floor joists made in standard heights are designed with stamped-in service passages for MEP systems. CFS webbed joists can be designed at standard or non-standard heights and have complex profiles for recessed floor sections. CFS joists are dimensionally stable and can accommodate various floor spans and loads.

Facades: CFS's high strength-to-weight ratio makes it ideal for fabricating complex facade structures for multi-story buildings. Architects appreciate the design freedom enabled by CFS, while builders appreciate the dimensional accuracy of panels and facades that can be installed quickly with minimal crane time.

UNDERSTANDING THE DESIGN FOR MANUFACTURING AND ASSEMBLY PROCESS

CFS framing construction is most cost-effective when designed from the beginning, and the benefits multiply when Design for Manufacturing and Assembly (DfMA) principles are incorporated.

DfMA brings all stakeholders to the table early to foster collaboration and communication. This approach allows build-

ers and developers to optimize the flow from initial design to manufacturing components and on-site assembly. The process is divided into three main stages: design and engineering, manufacturing and panelization, and construction.

Design and Engineering: The DfMA process begins with 3D modeling to conceptualize and refine key aspects of framing and design. This ensures that every decision enhances manufacturability and assembly efficiency. By working together, architects and engineers can explore design possibilities that offer structural flexibility and aesthetic appeal.

The structural detailer uses purpose-built software to completely specify the framing details in compliance with the engineering requirements and manufacturing capabilities. The resulting detailed framing model is used in BIM coordination to ensure efficient construction without physical conflicts on the jobsite.

Manufacturing and Panelization: CFS framing components are produced from high-quality steel coils using roll-forming machines. The coils are fed through the machines, which shape them into the desired profiles to create components such as framing, roof trusses, walls, and floor joists.

There are two main categories of roll-forming machines: single-profile and multi-profile. Single-profile roll formers are ideal for high-volume, consistent production and offer efficiency and cost-effectiveness. In contrast, multi-profile machines provide versatility and flexibility, making them suitable for diverse and custom projects.

The machines not only cut CFS components to precise lengths that meet the specifications of the frames required for the building project, but they also punch and form all the necessary features to make panel assembly fast and accurate. These components include openings for electrical wiring and plumbing systems, simplifying installation and integration into the overall building structure. This level of precision and design-led process help streamline the construction process and ensure the

systems can be installed efficiently. Before being shipped to the construction site, each panel or module undergoes rigorous quality checks to confirm it meets industry standards and specifications.

Construction: Steel frames are delivered to the jobsite pre-assembled and straight, eliminating the need for on-site welding or cutting. The lightweight nature of CFS means no heavy lifting equipment is needed. Steel frames are unaffected by moisture, reducing weather-related delays and carry no fire risk, which dramatically reduces insurance costs. Their precision ensures a perfect fit, which accelerates construction and reduces on-site labor costs.

Adopting a design-led, focused approach and aligning all stakeholders is paramount. It shapes the project and determines its outcome, ensuring the final product aligns with the intended design, and prevents many of the challenges typically encountered on the job site.

GETTING STARTED

Builders and developers interested in exploring CFS should look for fabrication partners who specialize in pre-manufactured components and systems, such as CFS framing. Jobsite downtime is costly, and reliability is paramount to keeping production schedules on track, so it's essential to seek manufacturing partners who use high-quality roll-forming machines. Builders should research which manufacturers have the quality, reliability, and variety to support their projects.

As the adoption of cold-formed steel framing continues to rise, technology advances are enabling more efficient workflows and collaboration between CFS manufacturers and builders.

End-to-end production management platforms designed specifically for CFS framing give manufacturers and builders visibility into production scheduling and monitoring, traceability of materials, and better coordination from the factory to the jobsite. A manufacturing partner that uses a production management platform will give builders the visibility into a project status and delivery timelines needed to stay on schedule and manage labor planning. MB

Ray Bagley *is the director of enterprise solutions for FRAMECAD, the leader of steel framing building innovation. Bagley has an engineering background and decades of experience in CAD, CAM, and construction technology. His expertise and knowledge are helping drive innovation and delivery of new FRAMECAD products and solutions, including Nexa, the first production management platform designed for CFS manufacturing. FRAMECAD delivers the most efficient end-to-end steel framing systems and the framework to simplify and optimize the way the world builds.*

BY DAN BROWNELL
WITH LJ STROHM, DYNAMIC FASTENER

Sealants for Metal Buildings

Types, Features, and Applications

The metal components in metal buildings are subject to significant expansion and contraction, so the correct sealants must be used for these applications. Also, sealants should be chosen based on their specific application and purpose in the building.

PURPOSES

Sealants used in metal buildings are used to achieve several goals, including weatherproofing, adhesion, and corrosion prevention.

Weatherproofing

External sealants are designed to create a weathertight barrier to prevent infiltration of water, humidity, air, dust, and dirt.

Adhesion

Metal sealants join panels and help provide structural strength yet retain the flexibility to expand and contract without cracking.

Corrosion Prevention

Sealants for metal buildings also help prevent corrosion that can give them a service life of 30 years or more.

TYPES

There are three commonly used types of sealants and a fourth hybrid type that's less commonly used but is becoming more popular.

Butyl

Butyl is the most widely used metal building sealant and is available in tape and gunnable forms. It is non-curing, so it remains flexible throughout its lifespan to allow cyclical joint movement in all temperatures and weather conditions. While butyl is used for exterior applications, it is not meant to be used where exposed to sunlight because it's not UV resistant. It has a long service life, designed to last as long as the metal panels that it seals.

Polyurethane

Polyurethane has excellent adhesive properties but is not as flexible as butyl. Unlike butyl, it cures and hardens, which makes it more susceptible to cracking and failure. It can be used to connect dissimilar materials such as concrete to metal. It is UV-resistant so it can be used in external applications exposed to sunlight. It is waterproof and available in a wide variety of colors for exterior applications where color matters.

Silicone

Silicone is gunnable, easy to apply, and cures quickly. It isn't as strong as butyl and polyurethane, however, so it can fail more easily. Silicone is used to seal gaps in joints where different materials meet. Because it is UV stable and available in a clear form, it's good for sealing windows. Most silicones are not paintable, but they are available in many colors. Silicone is noncombustible and those that are USDA compliant can be used in food processing areas, such as kitchens with stainless stee food prep surfaces.

Polyether

Polyether combines some of the attributes of polyurethane and silicone but is newer and not as widely used. It has strong adhesive qualities but is more flexible like silicone. It is UV-resistant, so it can be used in applications exposed to sunlight. It is available in many colors, so it is an option for exterior use where color is important. It is paintable if its color eventually fades.

FEATURES

A number of factors should be considered when selecting a sealant, including compatibility, strength and flexibility, class, service life, and UV resistance.

Compatibility

It's important that a sealant is not only chemically compatible with its substrate, but it also meets adhesion requirements for that substrate. It must be able to withstand the metal's constant cycling of expansion and contraction without peeling off.

Strength and Flexibility

The sealant must be strong enough for its intended use and yet not brittle. It has to endure the stretching needed to adhere firmly to the substrate yet accommodate the expansion and contraction of metal without cracking, splitting, or tearing.

Class

Sealants are classified according to their level of flexibility that ranges from 12.5 to 100. The number corresponds to the percentage that the sealant can expand and contract. A single number means that the percentage of expansion and contraction is the same. For example,12.5 means the sealant can expand 12.5% and contract 12.5%. Two numbers mean that expansion and contract rate are different. A 100/50 sealant can expand 100% and contract 50%.

Service Life

Since the cost of sealant is a relatively small part of a building's overall cost, it is worth investing in high quality sealant from a reputable company.

Metal Roof Repair

A common use of sealants is for repairing seams on old metal roofs. As shown in the example below, some sealants can fill relatively large gaps. Sealant flexibility is an important feature in this application because the temperature extremes will cause the metal panels to move. This partiucular sealant has a service temperature range of -40° F to 180° F.

A severe horizontal seam, before and after application of Drop-Stop®.
PHOTOS COURTESY OF DYNAMIC FASTENER.

UV Resistance

A sealant's intended application and placement will determine whether or not it needs to be UV-resistant. A sealant that will be exposed to sunlight will need to be UV-resistant to prevent breakdown and failure of the sealant.

APPLICATION

Builders should follow the building component manufacturer's instructions to avoid voiding product warranties. Correct application will take into account joint characteristics, temperature and humidity, surface preparation, application techniques and tooling, and cure time.

Joint Characteristics

The sealant requirements for joints will be affected by factors such as the type of metal, required adhesion strength, and the joint width, depth, and expansion and contraction tolerances.

Surface Preparation

The sealant will have surface preparation requirements for the metal substrate, including cleaning the surface with specific solvents to remove contaminants and ensuring it is completely dry before applying the sealant. Roll formers use lubrication to form metal panels, which will need to be removed to ensure proper adhesion between the sealant and metal surface. In addition, primer is recommended for some metal substrates.

Temperature and Humidity

Another factor to consider is the temperature and humidity at the time of application. While sealants are designed to have wide tolerances, in some cases, it may be necessary to coordinate the timing of the application to suitable conditions.

Application

Manufacturers provide guidelines for how sealants should be applied, including the amount to be applied. Using too much or too little can dramatically decrease the effectiveness of the sealant. It's critically important that the job is done correctly and supervised and inspected properly to avoid the cost of having to redo a job.

Cure Time

The cure time for sealants can vary widely. Silicone's surface may "skin" over in 15 to 20 minutes and cure in 24 hours. Full cure time for polyurethane and polyether can range from 24 to 48 hours.

CONCLUSION

To ensure the maximum performance and lifespan of metal components in a metal building, it's crucial to select the right sealants based on their unique characteristics and the specific applications in which they are intended to be used. Equally important is making sure they're applied correctly, carefully following the manufacturers and building component supplier's directions to achieve the desired results for the client. MB

SOURCES

- Dynamic Fastener
- EPDM Coatings
- Lakeside Construction Fasteners
- Nationwide Protective Coatings
- Novagard
- Red Dot Products
- Triangle Fastener