The CSI INTENT
Pikes Peak Chapter
The Construction Specifications Institute

February, 2017 Volume 48, No 5

This Month's Program:

Advanced Coatings for Healthcare Facilities
Wednesday, February 22

AN AIA ACCREDITED PROGRAM

See page 2 for Course Description and Learning Objectives

SHERWIN-WILLIAMS.

SPEAKER BIO:

Peter Kremm has been with Sherwin-Williams for 29 years. In his time with Sherwin-Williams, he has held the positions of Sales Rep, San Diego and Fort Collins. In 2009, Peter received Sherwin-Williams Sales Rep of the year for the Central Area and in 2016 CSI awarded Peter Trusted Advisor of the Year for the Southwestern Region. Peter lives in Fort Collins with his wife and has 2 daughters attending CSU. His passions include FlyFishing and selecting the right paint for the right substrate.

Date: Wednesday, February 22, 2017
Time: 11:30 a.m. to 1:00 p.m.

Southside Johnny's
528 S. Tejon Street
Colorado Springs, CO 80903

No cost to Pikes Peak Chapter members
Please RSVP at www.pikespeakcsi.org
by noon on
Monday, February 20

If you have difficulty, RSVP to
Greg Gulliksen at (719) 473-7225 or
gog@csnaarchitects.com

Peter Kremm, CSI
The Sherwin-Williams Company
Area Architectural Account Executive
Peter.kremm@sherwin.com
303-902-7239

Advanced Coatings for Healthcare Facilities

COURSE DESCRIPTION:

Traditionally considered principally in terms of aesthetics, technological advancements in paint and coatings now let them deliver much more to a healthcare environment than a soothing color. In this course, you will learn how innovations in certain coating technologies support critical initiatives in acute-care and long-term care facilities. Whether it's by battling hospital-acquired infections by helping to prevent the spread of certain bacteria, reducing common indoor odors, or improving indoor air quality by reducing VOC levels from potential sources like insulation, carpet, cabinets, and fabrics, find out more about how paint can take an active role in the health care setting. Examining the cumulative benefits, learn how these advanced coating technologies generate real value for facility managers while enabling architects and designers to specify wall and surface coatings that are visually stimulating *and* much more.

COURSE OBJECTIVES:

- Learn how microbicidal paint can offer healthcare facilities an important new tool to help combat certain bacteria that can cause hospital-acquired infections (HAIs).
- Understand how formaldehyde-reducing and odor-eliminating technologies help to improve the indoor environment of patient rooms in acute and long-term care facilities.
- Learn how coatings with anti-microbial technology can inhibit the growth of mold or mildew on the paint film in patient bathrooms, food service areas, exam rooms and other areas where moisture is present.
- Consider applications for high-performance coatings that are chemical and abrasion-resistant.
- Understand how strategic color selections can help you enhance the healthcare environment.

COURSE DETAILS:

Course Name:	Advanced Coatings for Healthcare Facilities
Provider :	Sherwin-Williams Company
AIA/CES Program #:	HC2016
AIA/CES Provider #:	K065
AIA/CES Credits:	1LU|HSW
GBCI Course #:	
GBCI Credits:	1 CE Hour
IDCEC Course #:	
IDCEC Credits:	.1 CE Credit

ASK SHERWIN-WILLIAMS™

For nearly 150 years, Sherwin-Williams has been an industry leader in the development of technologically advanced paint and coatings. As the nation's largest specialty retailer of paint and painting supplies, Sherwin-Williams is dedicated to supporting both do-it-yourselfers and painting professionals with exceptional and exclusive products, resources to make confident color selections and expert, personalized service at its more than 4,000 neighborhood stores across North America. Sherwin-Williams has been ranked "Highest in Customer Satisfaction among Paint Retailers, Three Years in a Row" in the J.D. Power 2015 Paint Satisfaction Study™.

Visit us on the web at: swspecs.com

February is the shortest month of the year, but that doesn't keep it from being busy and full of important dates. February 2 is Groundhog Day and Candlemas Day. February 14 is of course Valentine's Day and the third Monday of February is President's Day.

Pikes Peak Chapter CSI also has a lot of important dates coming up. Peter Kremm from Sherwin Williams will be presenting Advanced Coatings for Healthcare Facilities at our February Chapter Meeting. Sherwin Williams offers a microbial paint that helps healthcare facilities combat bacteria, eliminate odor and inhibit growth of mold and mildew, in addition to providing color options that enhance patients' well-being while healing. Peter is a long-standing member of our Chapter as well as many other Chapters in our Region and we are very excited to have him present to our membership.

Stephanie Stacey with Wurth Louis & Company will be our February tabletop sponsor, presenting information on Formica Infiniti™ and deCOLeather™. See the ad at the back of The Intent for further information on these products.

On March 15, we will offer a JE Dunn jobsite tour at the UCCS-ENT Performing Arts Center. This will be a combined tour with CSI, SMPS and AIA invited. There is a maximum number of attendees, so please mark your calendar if you are interested and be sure to RSVP as soon as the invitation is sent out. We will gather at a restaurant nearby after the tour for networking. Details on the location for the networking will be included with the invitation.

Bret Terry from the Rocky Mountain Masonry Institute will present "Masonry and Accessories" at our March Chapter meeting on March 22. We will provide more detailed information on this presentation in next month's edition of The Intent.

We are actively looking for sponsors and advertisers for our website. Access to information on chapter events will soon be only available via the website, so advertising on the site will provide exposure to members and guests that are registering for events. If you are interested, please contact any board member for details.

Don't forget that registration for CSI Certification exams is still open! Passing the CSI Certification exams helps develop your understanding of the entire construction process and provides detailed knowledge of specific skills such as construction documentation, specification writing, product research and sourcing and communication with the project team. You can register for any of the exams at www.csiresources.org.

I look forward to seeing all of you very soon. Thanks to each of you for your continued membership in our Chapter.

Joni Zimmerman, CSI Pikes Peak Chapter President

CSI
Pikes Peak Chapter

See Page 7 for more info on Spring Education Exams

Spring 2017 Dates

Standard Registration: Jan 17—Feb 27

Final Registration: Feb 28—March 14

Interested in Advertising on our new Website?

Our website committee has been working very hard and we are now ready to start accepting sponsors and advertisers for our website!! For a very reasonable fee, we will place your company's logo and a link to your website on our homepage so that everyone that visits the site will have the opportunity to see that you are a PPCSI sponsor and can click the link to visit your website. This is a great way to get exposure to our members and guests for your company. If you are interested, please contact any board members for additional information.

If you're organization would like to advertise Your business or upcoming events in *The Intent*, please contact Andy Baturevich at

abaturevich@hcdaengineering.com or 719-633-7784

Upcoming Program Dates

Folks, please make sure to mark your calendars for the following dates and join us for our Monthly Meetings!

Wednesday, March 15, 2017 Special Tour
Wednesday, March 22, 2017
Wednesday, April 26, 2017

CSI Certificate/Certification Program

CSI is the construction community's authority on communication and construction documentation.

Through CSI's Certificate/Certification Program, you can develop a conceptual understanding of the entire construction process and concrete skills in:

- Construction documentation development and administration
- Specification writing and enforcement
- Product research and sourcing
- Communication with the design and contracting teams

CDT

CSI's Construction Documents Technologist **(CDT)** program has provided foundation training in construction documentation for architects, contractors, contract administrators, specifiers, and manufacturers' representatives for decades. As the cornerstone of CSI's certification program, it's also prerequisite to CSI's advanced certification exams.

Getting your CDT means:

- Understanding how a project unfolds from conception to delivery
- Understanding the documentation involved

CCCA

A CSI Certified Construction Contract Administrator (CCCA) develops, administers and enforces construction documentation.

Getting your CCCA means:

- Developing an in-depth understanding of quality assurance and quality control
- Having advanced skills in bidding and negotiating procedures
- Developing skills in construction observation and inspection
- Understanding Division 01, General and Supplemental Conditions, agreements, and all other documents related to the project
- Understanding enforcement and liability

CCS

A CSI Certified Construction Specifier (CCS) is a skilled product researcher who knows how to investigate and identify cost-effective, efficient solutions, and then communicate those solutions through the specifications.

Getting your CCS means:

- Developing an in-depth understanding of agreements, conditions of the contract, Division 01, and their relationships to specifications
- Having advanced skills in specification development, enabling you to write specs and use spec-writing software more effectively
- Understanding how to research and source products

CCPR

A Certified Construction Product Representative (CCPR) is a trusted advisor, a valued resource called upon by the design team again and again.

Getting your CCPR means:

- Making sales calls, presentations, construction meetings, and product shows more effective
- Knowing the parts of construction product marketing collateral that are of most interest to designers and contractors
- Understanding roles and responsibilities of everyone involved in the project, and how and when to communicate with them
- Understanding all phases of the construction documentation, and your role in each phase
- Speaking the same language as the design and contractor teams

Learn more, or register for an exam at ***CSIResources.org***.

FORMICA®

WÜRTH
Wurth Louis and Company

LOOK BEYOND THE SURFACE

SURFACING OFFERING SUSTAINABLE LUXURY

New specialty products from Formica®. Visually striking at first glance, but with state-of-the-art functionality and surprisingly little maintenance required — that is just the beginning...

As beautiful as it is durable, Formica Infiniti™ features a soft-to-the-touch super-matte finish, resists fingerprints and bacterial growth, and has thermal healing capabilities. Hardworking, super-matte Formica Infiniti™ is right at home in cafes, casual diners and quick-service restaurants, hotels and stores, healthcare, commercial offices or any setting that calls for countertops, tables, doors, partitions, cabinets and furniture.

dECOLeather™ brings earthly elegance to interiors and creates an appealing aesthetic, providing all the best of leather including the look, feel and aroma, with increased durability. dECOLeather™ is ideal for hotels, restaurants, stores, offices or any setting that calls for tables, furniture, doors, cabinets, and feature walls.

FOR MORE INFORMATION OR SAMPLES, CONTACT STEPHANIE STACEY, WURTH LOUIS AND COMPANY SPECIFICATION REPRESENTATIVE
CELL: (720) 955-8020 • EMAIL: SSTACEY@WURTHLAC.COM • WWW.WURTHLAC.COM

Albuquerque, NM	(888) 422-5852	Denver, CO	(888) 422-5852	Oklahoma City, OK	(800) 444-0043	San Antonio, TX	(800) 444-0043
Anaheim, CA	(800) 422-4389	Fremont, CA	(800) 422-4467	Phoenix, AZ	(800) 472-7755	San Diego, CA	(800) 545-6847
Austin, TX	(800) 444-0043	Grand Prairie, TX	(800) 444-0043	Portland, OR	(800) 452-2621	San Marcos, CA	(800) 422-4389
Baton Rouge, LA	(800) 444-0043	Houston, TX	(800) 798-4150	Sacramento, CA	(800) 422-4467	Seattle, WA	(800) 452-2621
Benton, AR	(501) 778-6500	Idaho Falls, ID	(800) 224-8490	Saint George, UT	(800) 224-8490	Spokane, WA	(800) 452-2621
Brea, CA	(800) 422-4389	Las Vegas, NV	(800) 472-7755	Salt Lake City, UT	(800) 224-8490	West Jordan, UT	(800) 224-8490

Building Construction Knowledge & Leadership in the Southwest

CSI SOUTHWEST REGION EDUCATION CONFERENCE

CSI Building Knowledge Improving Project Delivery

APRIL 20 - 22, 2017

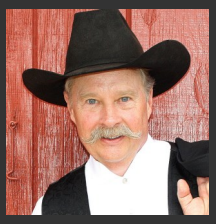
Lodge on the Desert, Tucson, AZ

ALL ABOUT U

EDUCATION from EXPERTS

- CONSTRUCTION DOCUMENTS ED
- SPECS 101
- SUBMITTALS & SUBSTITUTIONS
- BUILDING CODES
- CCPR FOR YOUR PROJECTS
- PRESENTATION SKILLS
- LEADERSHIP TRAINING

Visit www.csisouthwestregion.org for sponsor info and attendee registration, starting Jan. 16, 2017



CSI Pikes Peak Chapter would like to thank Rob Haddock

for agreeing to include his award winning seven part article series on metal roofing in the *Intent* each month. The article series won the Carl G. Cash Award from ASTM D 08 Committee on roofing and waterproofing. Part 5 of the series is included at the end of this newsletter.

Pikes Peak Chapter

President:
Joni A. Zimmerman CSI, CDT
TK-Architecture, LLC
719-393-2987

President-Elect:
Rob Hixon, CSI
Stresscon
719.390.5041

Vice-President:
Manny Mungaray
GCC of America
720-579-6288

Secretary:
Luke Bleichrodt CSI
RW Specialties
303-880-5584

Treasurer:
Larry W. Gilland, CSI, CDT, LEED AP
LGA Studios
719.635.0880

Past President:
Shane David, CSI, CDT
H+L Architecture
303.298.4808

Directors:

Charlie Lengal III,
QCP, CxA, CPD, CCCA
M-E Engineers, Inc.
719.536.0036

Bob Stanton, CSI, CDT
Stanton Construction Co.
719.471.7891

Ben Pollock, CSI
Webb Design
719.344.8350

Greg Gulliksen, CSI, CDT, AIA
CSNA Architects
719.473.7225

Bruce W. Barr, CSI, AIA, LEED AP
Art C. Klein Construction, Inc.
719.570.6060

WHITE PAPER

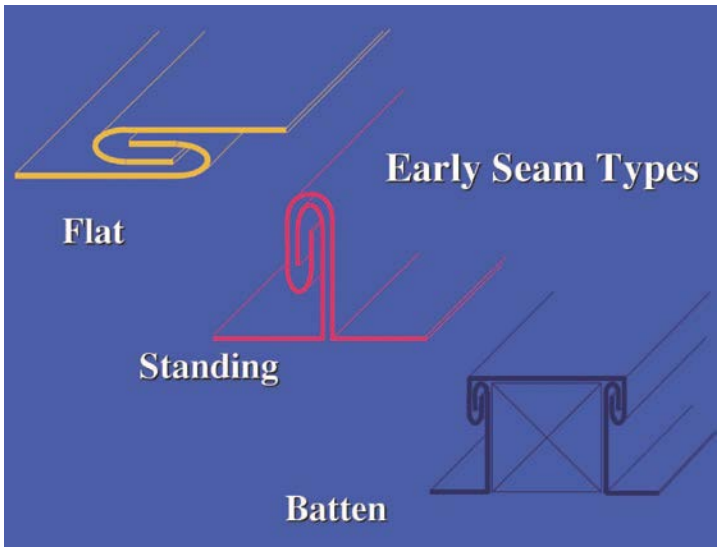
Part 5: Metal Roofing From A (Aluminum) to Z (Zinc)

Profiles and Profiling Equipment

The original shapes of metal panel profiles were quite simplistic, as were the tools used in their making. Smiths hammered out small plates of brass, copper or gold more than 2,000 years ago. They were then folded at their edges and interlocked one-to-the-next to form the "flat-locked" or "flat seam" style roof. The anchorage was accomplished with a small cleat folded into the joint area during installation. This style is believed to be the original metal roof type and is still popular today, especially for irregular shapes, like domes and onion domes. With the advent of soldering in the mid-to-late 1800s, these roofs could be used dead flat with soldered "hydrostatic" joints.

At some point, more than 1,000 years ago, craftsmen learned they could fold the adjacent edges of a flat plate up at 90 degrees and then fold the uppermost portion of the upstanding edges together into a tightly formed 360 degrees, creating a double-folded lock. This resulted with the joint being raised above the drainage plane of the plate an inch or so, hence it was more water-resistant. The joint was now standing up in a vertical orientation, rather than lying flat—hence "standing seam" was an appropriate designation to differentiate from the earlier "flat seam." Once again, the anchorage was accomplished via a small cleat nailed to the structure and folded into the seam. At this stage of evolution, the plates were also growing in length—more like longitudinal "panels."

When the craft migrated from the Middle East to Europe during the Crusades, metal-panel profiles were adapted to the styles of architecture and climate prevalent in western Europe and Scandinavia. Steep roof areas and "tiered" architecture (roofs above lower roofs) would dump snow and ice, damaging fragile standing seams below. A strip of wood inserted between the upstands of adjacent panels would support the seam area, increasing the durability of standing seams and creating a new style—the "batten seam," so called because of the wooden batten strip.

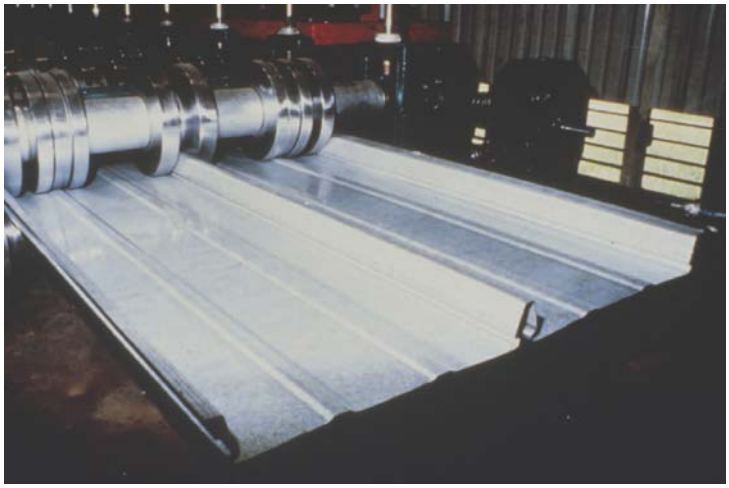


▲ The earliest seam styles (above, left) were simple and fabricated by hand with malleable metals and hand tools. The first profile in history—the "flat seam"—was also the first "hydrostatic" metal profile type when soldering came along. It is still used today (above, right) and is a popular profile for covering irregular shapes, like domes. *Illustration courtesy of Metal Roof Advisory Group, Ltd., Colorado Springs, CO. Photo courtesy of Rob Haddock.*

A significant nuance was the introduction of a separate joining component—the batten cover that locks into two twin up stands and completes the joint. This was a departure from the other profiles that used a “male” and “female” seam edge, which were then interlocked with each other. A modification of the batten seam is the “batten roll.” This profile uses a raised “lap seam” (no separate batten cover) and was developed with and for lead roofing to provide more gentle radii for this unique material.

All these styles were fabricated at the point of installation and with very simplistic tools—mallets; small anvils; tongs; hand and foot brakes; and later, simple pan formers. The metals used were soft, malleable materials and could be meticulously formed, folded and jointed using these tools, shapes and techniques. And so was the craft of metal roofing for centuries of time. It was installed by highly skilled (and highly compensated) copper and silver smiths, and remained relatively unchanged for nearly a thousand years until the Industrial Revolution. Until that point, a metal roof was the finest and most expensive roof that could be had, thus its use was limited to prestigious structures, like palaces, castles and cathedrals.

▼Rollforming technology brought on a host of changes and represented real mass production.

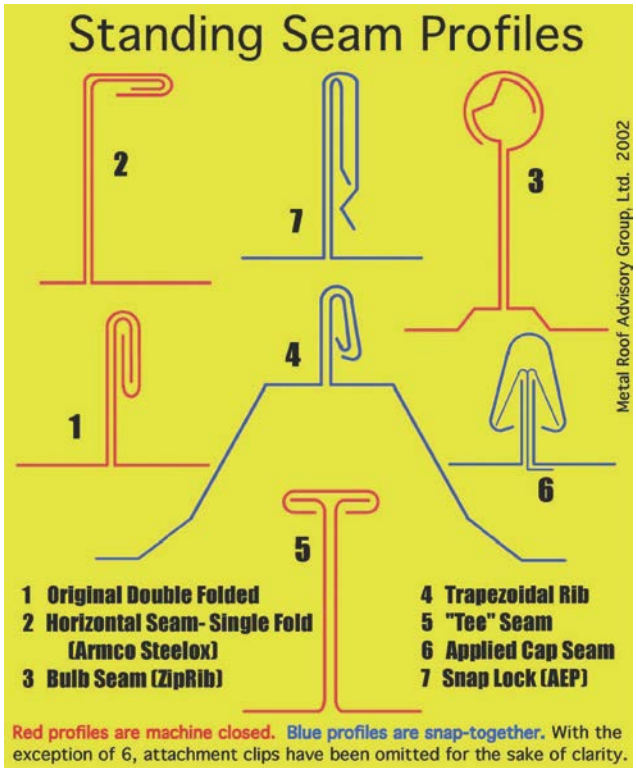


▲Tools became more sophisticated. From the top, an early wooden brake, circa 1860. Next, a variety of early hand tools, including hand shears, spades and malletting anvils. Next, an early pan former for lead “batten roll,” circa 1840. *Photos courtesy of Rob Haddock.*

METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

The Effects of Changing Fabrication Equipment

With improvements in mining and milling techniques, as well as innovation in fabrication tools and equipment, new styles of metal roofing began to emerge. New materials were coming onto the scene, as well. The steel industry was making huge strides into the commercialization of sheet goods in the early and mid-1800s. The harder, less-expensive material could be fabricated in a newfangled contraption called a “leaf brake.” This device had a long jaw and a hinged apron that could clamp the material and fold a perfect, straight bend far more quickly and accurately than the old (and much shorter) hand and foot brakes. This new equipment made any metal roof style more affordable, saving much time by “pre-bending” standing- and batten-seam profiles in a production environment by less-skilled workers rather than on the roof.



▼ In this sample of shapes, 5 and 6 utilize twin male components with a female cap. The others are male-female interlocks. Many variations of all these profiles are available. For instance, combining a 1 seam type with a 4 rib geometry creates Butler Manufacturing’s “MR-24,” MBCI’s “Double-Lok®” or VP Buildings’ “SSR.” Combine a 6 seam type with a 4 rib geometry for Behlen’s standing seam. Add a small hook to the 2 seam type for McElroy’s “Maxima.”

▲Rollforming technology brought on a host of changes and represented real mass production.

Corrugating

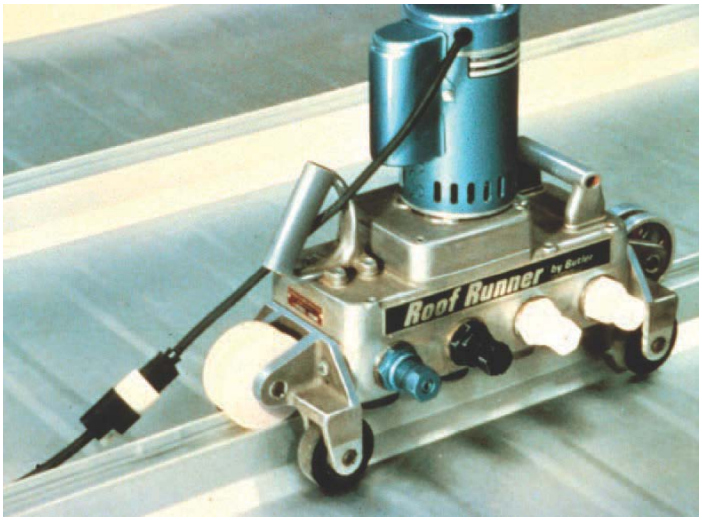
Another interesting development around the turn of the 20th century was a process called “corrugating.” Steel producers found they could take a very thin sheet of galvanized steel and press lengthwise wrinkles into it by passing it beneath a “corrugating drum.” The wrinkles stiffened the sheet such that the metal could now span over open supporting structural members without benefit of a continuous deck. Thus a “structural” covering would fulfill the function of deck and roof membrane with one material.

The corrugating of steel panels was the first real mass-manufacturing process for metal cladding, and the resulting products made metal an economical roof material for the first time in history. Whereas metal had always been the most expensive roof, now it could also be the least expensive, making the quantum leap from castles to barns and industrial buildings.

This corrugated metal was attached with exposed fasteners. It was, in other words, “face-fastened,” or “through-fastened,” meaning the weathering surface was pierced with nails (and later screws) to secure the product in place. Early applications located the nails in the “high corrugations,” but later weather-sealing washered screws came into use, as well. Side-seams were joined in overlapping style, as with the earlier “batten roll” methods of roofing.

METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

BUILD LEGACIES METAL



▲ Butler Manufacturing introduced "MR-24®" in the late 1960s. It utilized the original double-folded standing-seam profile (see standing seam profile previous page) atop a trapezoidal rib shape and closed the seam with an electric machine–in essence, a miniature 4-stage rollformer. *Photo courtesy of Rob Haddock.*

Rollforming

Innovation continued throughout the next half century, and the leaf brake helped birth a few new profiles, including the integrated batten seam; the button punched standing seam; and another structural panel, the "trapezoidal rib." But the most significant advancement in manufacturing did not come along until World War II when "rollforming" technology was invented. This approach to making a profiled sheet was the first departure from a one-at-a-time manufacturing mentality. The progressive roll tooling of such a mill could produce a finished profile in a continuous process rather than step-by-step bending or sheet corrugating one-by-one.

Another benefit attributable to this new manufacturing method was the precision with which panels could be formed. One end of the panel would be dimensionally consistent with the other—within thousandths of an inch! This had never been possible with leaf braking. The rollforming process also opened the spectrum of available metal panel profiles, allowing intricate shapes, lines and bends never before possible or affordable. This equipment today can operate at line speeds of up to 600 feet per minute, automatically measuring and cutting panels to length with amazing accuracy at the same time.

The concept of continuous manufacturing—dealing with an endless strip of material—now pervades almost every aspect of production and fabrication, including painting, profiling, curving, seam closing, slitting, leveling and even sealant injection. The rollforming process has found its way from large in-plant mills to smaller, portable "on-site" forming machines, as well as electric seam-folding machines. Whenever long, parallel bend lines are found on metal panels, it is a reasonable bet the profile was made by this process.

▲ The concept of roll-tooling and continuous feed are also utilized by other material-handling equipment, including levelers (that stretch and flatten material), cut-to-length lines, slitters and curving machines. *Photos courtesy of Rob Haddock.*

METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

BUILD LEGACIES METAL

Sometimes press-forming is used in tandem with rollforming to produce still different effects, like some of the popular tile facsimiles available in the marketplace for "crimp curving" or to break a profiled (rollformed) sheet over the ridge area. Press forming is also used for the manufacture of individual shingles or tiles and other textured shapes that are not characterized by long panels with parallel bend lines.

Of course, rollforming technology has made a whole host of new profiles possible and the manufacture of the old ones much more cost-effective. Another new concept to come along in panel profiling within the last few decades was the creation of snap-together seams and snap-on caps. This method uses the spring action of harder and higher-yield metals along with the dimensional consistency of modern rollforming equipment to develop locks and joints that do not require field folding or crimping.

Profiles and Joints for "Structural" Panels

The use of standing-seam joints and profiles on structural steel and aluminum panels is a trend that started with Armco Steel pre-1950. The concept was boosted with Kaiser's introduction of a product called "Zip-Rib" in the 1960s. This was a "bulb seam" design held in place with concealed clips, and it was popularized worldwide. Also in the 1960s, a sheet-metal craftsman and consultant from Sweden (Ola Svensson) invented an electric rollforming machine that could perform the labor-intensive, double-lock standing-seam folding—automatically. Meeting with rejection in his home country from the trades who relished hand methods, he brought his machine to the U.S. and showed it to Butler Manufacturing in the late '60s.

Around 1970, owing to Svensson's invention, Butler Manufacturing™ introduced MR-24 in the U.S.: the first standing-seam joint used in conjunction with a trapezoidal rib panel profile, all machine folded with Svensson's contraption. It was a curious blend of old and new. A 1,000-year-old joint on a relatively new material and pro-file—then used atop pre-engineered metal buildings and with the addition of factory-applied seam sealant. This revolutionized the metal-building industry and, since then, every major U.S. manufacturer of pre-engineered steel buildings now offers a structural standing-seam alternative.

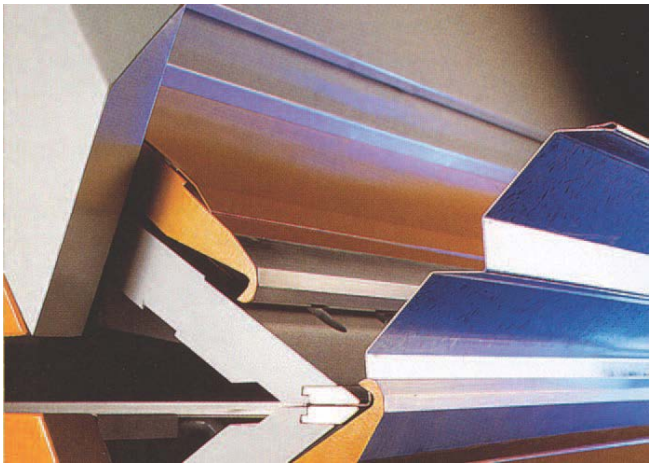
There seems to have emerged from within the metal-building industry two panel geometries: the flat pan and the trapezoidal rib. Two different types of joints also have emerged: male-female interlock and applied cap. With applied-cap profiles, the cap is the female component of the assembly, and the panel edges are mirrored male components. Additionally, either of these joint types (interlock or applied cap) may be snapped together or mechanically crimped or folded. It seems that recent trends are more toward mechanically folded seams—probably because they are generally more durable with respect to wind resistance. Clearly, snap-together-type seams are less labor intensive to install. For that reason, they will always remain popular.

Which Is Best?

There is no clear answer to the question: "Which seam and profile is the best?" Everyone has biases, and there are pros and cons to any profile and seam type. My personal favorites are generally folded seam profiles that involve no void within the panel's cross-section.

Profiles that have void areas within the seam are cumbersome shapes to deal with at panel termination points, especially when those points are skewed, like at hips or valleys—enlarging the void, which must be somehow closed and sealed. But on the other hand, if the job does not involve such conditions, the trapezoidal profile (having the largest void area of any shape) may offer cost efficiencies not enjoyed by other profiles because it has such a material-efficient shape.

METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org



▲ Modern state-of-the-art sheet-metal brakes can handle hard metals and are veritable fabrication centers with computerized controls and automated processing. *Photo (above, left) courtesy of Roper Whitney, Rockford, IL. Photo (above, right) courtesy of RAS Systems, Peachtree City, GA.*

All things considered, it is hard to beat the original double-folded standing seam. It has been around for more than 1,000 years and is sure to be around for a very long time to come.

New Technology Brings New Challenges

Prior to the advent of rollforming, panel lengths were generally limited to 8 or 10 feet—the length of a traditional leaf brake. With the rollforming process, panel lengths grew longer and longer, not being limited by fabrication equipment, but only by transportation restrictions. This makes sense because longer panel lengths mean fewer end-to-end joints that are expensive to execute and can be problematic.

As the panel lengths increased, however, we also began to experience roof failures associated with thermal effects. With increasing panel lengths, panel-attachment methods had to gain sophistication to accommodate the increased effects of thermal cycling.

In the next segment, we will look at dealing with thermal-cycling characteristics of metal panel systems.

Rob Haddock is president of the Colorado Springs, CO-based Metal Roof Advisory Group Ltd. He is a consultant, technical writer, training curriculum author, inventor and educator. In 2012 he became a charter inductee of Modern Trade's "Metal Construction Hall of Fame" for his many contributions to the industry.

Founded in 1983, the Metal Construction Association brings together the diverse metal construction industry for the purpose of expanding the use of all metals used in construction. MCA promotes the benefits of metal in construction through:

- Technical guidance
- Product certification
- Educational and awareness programs
- Advocating for the interests of our industry
- Recognition of industry-achievement awards
- Monitoring of industry issues, such as codes and standards
- Research to develop improved metal construction products
- Promotional and marketing support for the metal construction industry

METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

BUILD LEGACIES METAL

• Publications to promote use of metal wall and roof products in construction

For more information, please visit the MCA Web site at www.metalconstruction.org

This bulletin is for general information only. The bulletin is designed to delineate areas requiring consideration. Information contained in the bulletin should not be used without first securing competent advice with respect to its suitability for any given application. MCA does not assume responsibility and disclaims any representation or warranty, express or implied, that such information is suitable for any general or particular use. Anyone making use of the bulletin assumes all liability resulting from such use.

The existence of the bulletin does not in any respect preclude a member or nonmember of MCA from manufacturing, selling, or specifying products not conforming to the bulletin, nor does the existence of an MCA bulletin preclude its voluntary use by persons other than MCA members. The bulletin does not purport to address all safety problems associated with its use or all applicable regulatory requirements. It is the responsibility of the user of the guideline to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before use of the bulletin.

The Metal Construction Association reserves the right to change, revise, add to, or delete any data contained in the bulletin without prior notice.

It is the responsibility of the end user to verify the applicability of this information with the local building and fire officials.

METAL CONSTRUCTION ASSOCIATION
8735 W. Higgins Road, Suite 300, Chicago, IL 60631
847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

BUILD LEGACIES METAL