ARCHITECTURAL METAL

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The Drama of the Sky Meets The Drama of the Stage

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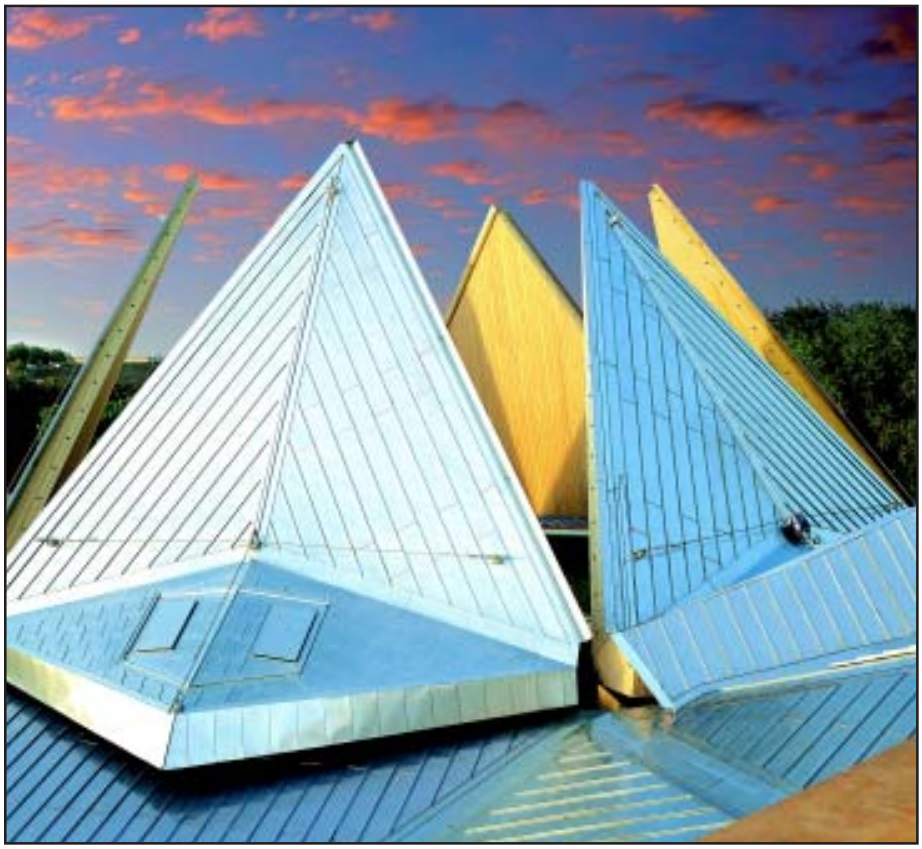

STARLIGHT THEATRE, ROCKFORD, ILL.

Architect: *Studio/Gang O'Donnell, Chicago, Ill.*

Sheet Metal Contractor: *Master Sheet Metal Contractors, Rockford, Ill.*

Even before the curtain rises, audience members experience the drama of the night sky through the distinctive star-shaped opening in the roof of the Starlight Theatre on the Rock Valley College campus in Rockford, Ill. Cast with a leading role in the "construction production" was SMACNA member Master Sheet Metal Contractors.

As the main venue for community theatre, the Starlight Theatre was due for some much-needed renovations to create an atmosphere as breathtaking as the perfor-

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The Drama of the Sky Meets the Drama of the Stage

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mances it hosts. Thanks to a generous donation from a local general contractor, the theatre's three-phase transformation was completed this year with Master Sheet Metal Contractors substantially contributing throughout the project.

Master's design/build expertise converted the architect's conceptual drawings for the exterior of the 150-foot proscenium stage house into reality. Their work on the facility's exterior included fabrication and installation of close to 20,000 square-feet of 20-ounce copper panels to include all copper parapet coping, flashing, counterflashing and trim.

But it was the construction of the roof that provided the most challenging aspect of the project. The design called for a six-panel retractable section. When closed, audience members would see a hexagonal dome roof. When open, the six center panels parted from the center point like the petals of a flower. The roof design protects members of the audience from stormy weather but only when they cannot enjoy the open air.

"This was a one-of-a-kind design," commented Eugene Schoon, project manager. "It was a challenge in every aspect. From making the six operable panels open and close without interference with each other, to being able to keep the rain out when the roof was closed. Many of the flashing details were worked out in the field because of the complexity of the different angles and lines of the structure."

When the roof is open, the audience enjoys theatre under the stars. Specially selected by the architect for its color and texture, a custom 2D finish was applied to the stainless steel at the mill.

The unusual design required the team to install the roof components in reverse order. Instead of beginning with the ridges and valleys, they installed the main roof panels and then worked to connect them. The triangular-patterned roof consisted of 20 stationary and six retractable sections.

Using 24-gage Type 316 stainless steel, each roof section was fabricated as "tongue and groove planking" set on laminated wood beams covered with ice and water shield. The roof panels were fabricated in 15-inch widths and stock lengths ranging from four to eight feet. Once at the jobsite, the panels were cut to the dimensions needed for the various angles on the building.

The roof construction began in January 2003 and was completed in June. Working through the winter required heated tents onsite to assemble the stainless steel roof sections to the beams, planking and edging.

In addition, the Master Sheet Metal team installed air-conditioning units for the backstage areas and expanded the audience seating area.

COPPER DOME, LOS ALTOS, CALIF.

Sheet Metal Contractor: *Foothill Air Conditioning and Heating, Los Gatos, Calif.*

The fabrication and installation of this 1,200-pound dome at this California estate provided the craftsmen at Foothill Air Conditioning and Heating an opportunity to step away from their primary business of installing commercial, industrial and custom-residential HVAC systems. It was a challenge they accepted with excitement.

"Fabricated from 500 pounds of 16-ounce copper, the dome took more than 200 man-hours to complete," explained Joe Martin, shop foreman. Using 36 standing-seam panels, the crew fabricated the dome with radius cleats and a floating skirt. To give the dome an aged look, they treated it with liver of sulfur solution, highlighted it with scotch pads and sealed it with wax.

Installation at the client's house provided another challenge. The garden was not accessible by trucks. So the dome was lifted by helicopter and placed onto the cement base in the garden.

The 1,200-pound dome provides another focal point in the home's garden.

CATHEDRAL OF SAINT PAUL, ST. PAUL, MINN.

Architect: *Miller Dunwiddie, Minneapolis, Minn.*

Sheet Metal Contractors: *Dalco Roofing and Sheet Metal Inc. Plymouth, Minn.*
John A. Dalsin and Son Inc., Minneapolis, Minn.

Restoring the luster to a monument of faith built more than 95 years ago, best describes the restoration of the Cathedral of Saint Paul completed in August 2002. With more than 200 craftsmen from 15 contracting firms representing 18 building trades, participation in this daunting project was a labor of love for each employee lucky enough to be associated with the extraordinary work of art created from stone, copper and wood.

Designed by French architect Emmanuel Masqueray, construction of the fourth largest cathedral in the United States began in 1906 with the first services held in 1915.

Characterized as Classical Renaissance with a twist, Masqueray took the best aspects of European cathedrals and added American flavor. Constructed from 250,000 cubic feet of gray-pink granite quarried in nearby St. Cloud, Minn., the imposing structure is 307 feet long and 216 feet wide.

The responsibility of restoring and renovating close to 100,000 square feet of copper roofing along with related flashing and ornamentation went to the employees of John A. Dalsin and Son and Dalco Roofing and Sheet Metal. Completed six months ahead of schedule, the $30 million renovation project was accomplished in two years.

"I've had two sons confirmed in the cathedral," commented Mike Connelly, an employee with John A. Dalsin and Son Inc. "It's a special place for me and my family and being able to work on this project makes it all the more special."

Scaling imposing heights of more than 300 feet, the restoration of the cathedral's main dome was the most extensive portion of the project. Crews removed the existing copper and rosin then repaired the tile below. The new roof, comprised of 20- to 32-ounce copper sheets, was meticulously installed over two layers of plywood, two layers of ice and water shield, two layers of #30 felt and finally one layer of rosin paper. One sheet metal worker commented, "Someday another crew may be back here performing work, but hopefully they won't find the dome in as bad a shape as we did."

In addition to the main dome over the altar and body of the cathedral, there were many other copper domes smaller in size but nonetheless elaborate in their individual designs. The main chapel domes had lanterns at four locations. The two bell tower domes flank each side of the front entrance. Six copper domes cover the apse roofs over the "all nations" chapels in the rear of the cathedral. The copper roof over the ambulatory covers the passage behind the altar.

There were also major narthex areas on three sides of the main body of the cathedral which required flat, batten-seam copper paneling with locked caps. The narthex copper roofs sloped down to flat drainage areas where American Hydrotech

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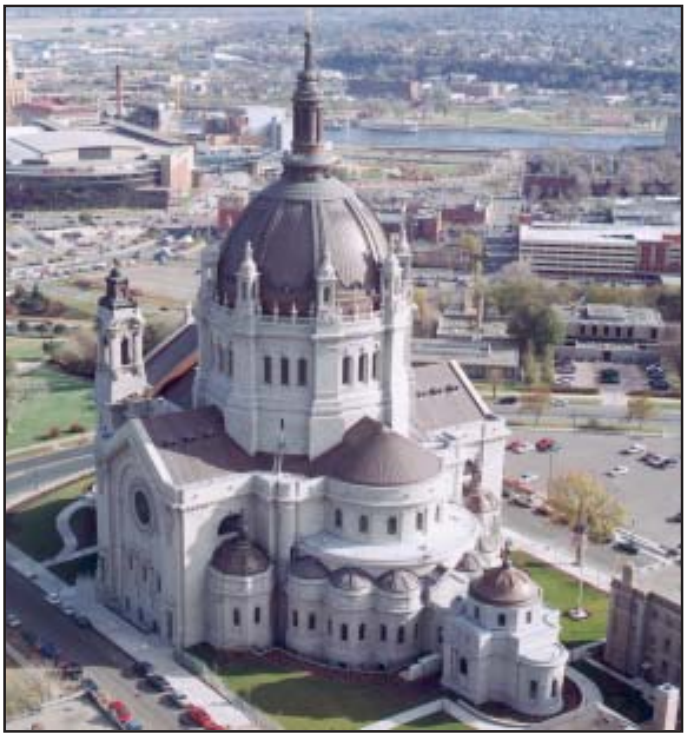

The complete $30 million restoration and renovation of the Cathedral of Saint Paul included roof replacement, copper restoration, exterior granite repair, interior building repairs, electrical system renovations and mechanical system renovations.

An Architect's Wish List

Knowing what an architect wants is more than half the battle. SMACNA's Architectural Metal Council recently surveyed 30-plus architects and learned firsthand what SMACNA Contractors need to know in order to deliver the skills and knowledge these professionals require.

Hands down, architects want to hire an architectural sheet metal contractor with experience as their strong suit. According to one architect, "The architectural sheet metal contractor must have at least five years commercial experience, have a well-equipped shop, and a skilled staff with at least three years of experience in fabricating and installing architectural sheet metal."

More specifically, architects would appreciate updates on new or improved products to keep up with the latest trends. In addition, they're interested in learning more about "real" details that are actually used out in the field as well as the latest tried and true solutions to sheet metal detailing. In particular, these architects are looking to a sheet metal contractor for help on oil canning.

An experienced SMACNA architectural contractor can solve an architect's oil canning problems, supply the desired details to put an architect's mind at ease, and keep the architect up to date on the latest trends. Throw in a capabilities statement and problems you've solved on your last couple of jobs and your firm will be at the top of every architect's wish list. ■

Training the Next Generation Of Architectural Sheet Metal Craftsmen

By David Meyer, Ralph J. Meyer Co., Pittsburgh, Pa.

Every day, across the United States and Canada, thousands of young men and women head off to campus. They settle in computer and technical labs, pull up chairs in math and geometry classes and congregate in lecture halls.

But these students are not on a typical college campus. They do not pay tuition or purchase textbooks. In between their studies, these students work in their chosen field, practicing and refining their acquired skills. They are sheet metal apprentices, and their campuses are state-of-the-art training facilities jointly administered by the Sheet Metal Workers' International Association (SMWIA) and SMACNA.

The structured facilities are comprised of high tech computer labs, American Welding Society (AWS) accredited welding rooms, service, testing and balancing areas, and fully-equipped sheet metal shops and classrooms. The credentialed instructors are highly-skilled journeymen who educate the students in the latest cutting-edge technology in the sheet metal industry. Upon graduation, apprentices take with them a combination of classroom, lab and on-the-job-training skills, and as a result, become knowledgeable, productive, safe and responsible mechanics.

As proof of the industry's forward-thinking philosophy on education, the International Training Institute (ITI), a jointly-trusted training and developmental organization co-sponsored by the SMWIA and SMACNA, is developing and rolling out its core curriculum program. This unique program will give apprentices several years of introductory and increasingly more complex training in all areas of the industry, allowing them to experience first-hand all that a career in sheet metal has to offer.

Then, in their final two years, apprentices will have the opportunity to pursue an area of specialty and select elective courses in that field. Apprentices specializing in architectural sheet metal will select from courses ranging from soldering and custom fabrication to restoration work and interior and exterior detailing. They will apply classic and time-tested methods in conjunction with CAD design and high-end equipment to achieve results that are both

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RICHARD B. FISHER CENTER FOR THE PERFORMING ARTS ANNANDALE-ON-THE-HUDSON, N.Y.

Architect: *Frank O. Gehry and Associates, Santa Monica, Calif.*

Sheet Metal Contractor: *A. Zahner Company, Kansas City, Mo.*

The Richard B. Fisher Center for the Performing Arts, on the campus of Bard College, is another Frank Gehry project that features the metal expertise of the craftsmen at the A. Zahner Company. After nearly 20 years of collaboration, the two firms enjoy a dynamic working relationship that continues to evolve and push back the boundaries of what is possible to design and build using metal.

The $62 million center houses a 900-seat theatre that opened this past spring. The stainless steel design reflects the colors of its surroundings and the beauty of nature.

Zahner Company designed, engineered, tested and fabricated the entire roofing subsystem and the exposed "angel hair-finished" stainless shingles of the building. Sheet Metal Workers' International Association (SMWIA) Local 2 members in Zahner's Kansas City shop worked more than 27,000 man-hours on the project.

Completed pre-cut and pre-shaped modular panels were shipped to the New York jobsite and erected in 40,000 man-hours by members of SMWIA Local 38. A total of 760 modular panels were required – comprised of sub-panels formed with ¼-inch aluminum plate bottoms with riveted custom aluminum extrusions top and bottom and then 16-gage galvanized top plates serving as an exterior sheathing with an ice-water shield applied.

Thanks to the members of SMWIA Locals 2 and 38 this magnificent structure of flowing, brushed 16-gage stainless steel shingles has become a structure of beauty that seems to change with the seasons.

One of the World's Most Sophisticated Concert Halls

DISNEY CONCERT HALL, FOUNDER'S ROOM AND AMPHITHEATRE
LOS ANGELES, CALIF.

Architect: *Frank O. Gehry and Associates Santa Monica, Calif.*

Sheet Metal Contractor: *CMF Inc. Orange, Calif.*

From the stainless steel curves of its striking mirrored exterior to the exceptional acoustics of the hardwood-paneled main auditorium, Walt Disney Concert Hall, new home of the Los Angeles Philharmonic, is one of the most sophisticated concert halls in the music industry.

"It's unlike any building in the world," said Dave Duclett, vice president and general manager of CMF. The crew of CMF fabricated and installed 34,800 square feet of bright annealed, Type 316, 24-gage stainless steel panels. The structure's unusual shape presented some technical challenges when installing 4,300 flat metal panels, most 2-by-3 feet in size.

"There are lines and shapes and curves going in every direction," Mr. Duclett explained. "We had to take flat 2-by-3 panels and place them onto this building that's shaped in and out and all around. We had to hook each to one another and not destroy each of these panels while we were doing it."

Designed to meet a 50 PSF wind load, the flat lock seam panels are hemmed on four sides and hook together in rows. Using 22-gage stainless steel clips, the panels are attached to the structure. "We attached each piece with our system of 2-inch-wide clips which gave a better fit than what anybody expected," said David Lee, project manager. "The unique pattern design did not allow for any defects in the metal. We were able to control any kinking or oil-canning."

In addition to the panels created by the CMF shop, an onsite custom fabricating shop was built to produce panels.

As if the unusual shape of the structure wasn't enough of a challenge, CMF was allowed only three weeks to complete the project. A carefully planned schedule was mapped out and a crew of 16 craftsmen worked six days a week to complete the job. An elaborate system of scaffolds and swingstages was erected to ease installation on 21 varying elevations.

Occupying a city block in downtown Los Angeles, the striking mirrored exterior of the Disney Concert Hall reflects its famous neighborhood – just south of the Dorothy Chandler Pavilion, home of the Academy Awards.

The strict guidelines of Frank Gehry's design did not allow for any defects in the bright annealed, Type 316, 24-gage stainless steel panels.

Cathedral of Saint Paul, St. Paul, Minn.

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membrane was ballasted with concrete pavers to contain and control evacuation of the runoff.

The coordinated efforts of Dalco Roofing and John A. Dalsin also involved the restoration of many large-scale ornamental copper pieces. Each piece was lowered to the ground where it was numbered, tagged and photographed so it could be re-installed in its original location.

The restoration and repairs were performed in an onsite sheet metal and carpentry shop. An innovative sandblasting technique, very similar to the method used to clean and restore stone, was used on several pieces that did not require total restoration. A separate booth was constructed to sandblast copper pieces and capture the water and copper salts for proper disposal. ■

MEDINAH TEMPLE ONION DOMES, CHICAGO, ILL.

Architect: *Daniel P. Coffey and Associates, Chicago, Ill.*

Sheet Metal Contractor: *Metalmaster Architectural Sheet Metal Inc., McHenry, Ill.*

Built in 1912, the Medinah Temple is regarded as one of the finest examples of Middle Eastern-style Shirine architecture. Originally constructed to serve as the meeting center for the Chicago chapter of the national Shrine fraternal organization, the temple was well-known for its 4,200-seat auditorium and fine acoustics. It reopened in February 2003 as a Bloomingdale's Home and Furniture department store.

Interest in the building increased when, in 2000, it was placed on the World Monuments Watch List of the 100 Most Endangered Sites. When local awareness peaked, government funding was secured to renovate the historic site.

As part of the exterior renovation of the temple, the crew of Metalmaster restored the two copper onion domes on each corner of the front facade. Measuring 24 feet tall and 28 feet at its widest diameter, each dome required more than 1,550 copper panels laid in 22 courses around the dome. Each panel was measured, tapered and fabricated to meet the exact dimensions of each course. The panels were secured with four clips and then screwed into place with stainless steel screws. In addition, the crew custom fabricated a vent cover for each dome.

The clock was ticking on this unusual renovation project. "We completed our portion of the project in 29 working days," commented Gloria Smeja, president. "In 13 days, our in-shop crew fabricated over 200 sheets of 36-inch-by-120-inch 16 ounce copper into panels. Each copper sheet weighed 30 pounds. Then our installation crew completed the work onsite in 16 days during January in Chicago!"

Each dome was brought down to street level for the copper installation. Working in very tight quarters, the crew re-skinned the substrate of each dome with more than 110 sheets of 22 gage galvanized steel. The substrate was covered with a high temperature ice and water shield before the copper was placed. "The original domes were covered in terra cotta," Ms. Smeja explained. "Replacement copper was installed in the 1960s by another contractor, but it was installed improperly allowing moisture to rust the substructure."

Once completed, each 15,000-pound dome was placed by crane back on the roof of the temple. "The city issued a permit to close the street from 2 a.m. to 2 p.m. on a Sunday so the domes could be craned to the roof," Ms. Smeja explained.

Measuring 28 feet at the widest point, the copper onion domes were placed by crane back in their original positions. With more than 1,550 copper sheets on each dome, craftsmen cut every panel to exact measurements for each course around the dome.

COPPER COUNTERTOP (PRIVATE RESIDENCE)

Sheet Metal Contractor: *Vickers Metal Works Inc., Orlando, Fla.*

The exceptional craftsmanship of the team at Vickers Sheet Metal Works created a beautiful focal point for this Florida residence.

Using 20-ounce copper, the Vickers team spent 60 man-hours fabricating the countertop. Placed over a ¾-inch plywood substrate, the structure measures 132-inches-by-51-inches. The homeowner provided a hand-hammered copper double-bowl sink which was soldered into the surface and finished as required. Due to the overall size of the island, seams were soldered and finished as necessary.

A quilted backsplash and trim for the range hood were also fabricated using 24-gage stainless steel.

The custom-fabricated copper elements add unique character to this kitchen.

FAB FOCUS

TRANSIT AUTHORITY OF RIVER CITY TROLLEY STATIONS, LOUISVILLE, KY.

Sheet Metal Contractor: *Harpring Inc., Louisville, Ky.*

Complimentary trolley car service provides residents and visitors to Louisville an easy way to get around the city as well as a place to seek shelter.

Unfortunately, run-ins with street traffic had completely destroyed many of the trolley stops. Louisville's Transit Authority of River City (TARC) turned to the craftsmen at Harpring Inc. to fabricate and install several replacement trolley car stations in October 2002. This time, the new canopies are designed to break away from the base to allow easier replacement should future accidents occur. The structures were also moved farther back from the curb for added protection.

Constructed from aluminum pipe and tubing with an opaque glass roof, the structures are reminiscent of Victorian style buildings. "The new stops are an attractive addition to downtown as well as a great place to get out of the rain," commented Mike Harpring, president.

This weatherproof trolley stop adds a unique flair to the city streets of Louisville.

"Our crew used computerized layout, CNC controlled machinery, state-of-the-art aluminum welding and electrostatic painting equipment to fabricate the structures in the shop," explained Mr. Harpring. "The entire stand was fabricated as one assembly and erected in less than a day."

Plans are in the works to expand the trolley system to other areas of downtown Louisville.

ST. COLUMBKILLE CHURCH PARMA, OHIO

Sheet Metal Contractor: *Willham Roofing Co. Inc. Strongsville, Ohio*

Replacing the shingle roof on St. Columbkille Church was an intricate project for the crew of Willham Roofing.

"The greatest challenge during this project was the layout and sequencing of the installation," explained Steve Willham, president.

The project began by removing the existing materials and exposing the wood deck of the church. The crew then installed polyisocyanurate insulation, a layer of plywood and ice shield. Standing seam 20-ounce 1.5 inch UC-3 double-lock copper panels were installed on the lower sloping church roof. The steeple was lined with 16-ounce flat-lock copper panels.

"We performed the installation in segments to insure the standing seam and flat seam panels were aligned properly. First, the flat seam panels were installed from midway to the top of the steeple. At the same time the roof panels were installed from the gutters working 27 feet toward the center of the roof. Once the tower was completed, the scaffolding was removed and the standing seam panels were installed on the lower portion of the roof. Sheet Metal Workers from Local 33 transitioned to the flat seam panels and then completed the tower base."

Even to an untrained eye, the importance of the sequencing and layout of the copper panels on this project is easily apparent. The 16-ounce flat-lock copper panels are perfectly aligned from roofline to peak.

PRIVATE RESIDENCE, ANCHORAGE, ALASKA

Sheet Metal Contractor: *General Mechanical Inc. Anchorage, Alaska*

Architect: *Mark Ivy, Anchorage, Alaska*

Nestled in the woods overlooking a wildlife refuge, this Alaska residence steals attention away from the breathtaking view.

The 7,000-square-foot home is topped by a 12,000-square-foot copper roof of custom-designed shingles. Each 16-ounce copper shingle was hand-fabricated in the General Mechanical shop and transported to the jobsite.

The crew spent six months shingling the roof. "The variety of steep 8/12 pitches created a unique jobsite situation for the crew," explained Don Burns, president/owner. "We designed a rigging system to keep the workers safe and protect the shingles during installation. Thick padding to protect the copper was secured to ladders. Then scaffolding boards were attached with brackets across the two ladders. Each worker was tied off and could sit or kneel against the board while they installed the shingles."

"This was a very rewarding project, however we were, at times, distracted by the wildlife and scenery around us."

With its 12,000-square-foot copper roof, this residence is easily identifiable in the lush landscape.

Safety was a primary concern during the six month project. Workers were tied off and used platforms to provide steady footing.

Training the Next Generation Of Architectural Sheet Metal Craftsmen

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aesthetically pleasing and structurally sound. The sheet metal industry has become highly specialized and task specific. This program will generate journeymen and women whose concentrated training makes them valuable members of a sheet metal contractor's team.

What makes this educational process so unique is the commitment of local signatory contractors who fully- or partially-fund these training centers, and who provide these apprentices with gainful employment between their studies. Through an annual financial contribution of more than $70,000,000 toward local training centers and national trusts, these contractors provide an invaluable service and unmatched dedication to the future of the sheet metal industry and their own business operations. Contractors reap the benefits of this monetary investment as it assures them a source for their most valuable asset: well-trained, safe and productive employees.

The sheet metal industry is dynamic and continues to grow. The advent of technology as it relates to architecture and engineering has created an environment that demands a qualified and highly-skilled workforce. Sheet metal contractors and their union partners are fully committed to providing a workforce that parallels these demands on every level. This combined effort redefines the assurance to stakeholders, i.e., owners, architects, general contractors, engineers, and other contractors, of the commitment to advance the industry through the training of the next generation of sheet metal workers. ■

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