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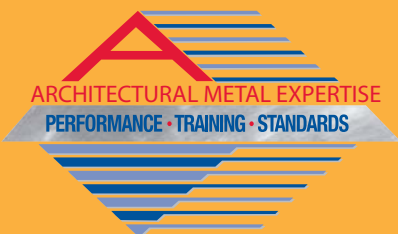
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## A Different Kind of Project Sparks Enthusiasm From A Northwest Sheet Metal Contractor



### **CITY OF EVERETT GATE WAY PROJECT, EVERETT, WASH.**

**Architect:** *Designs Northwest Architects, Stanwood, Wash.*

**Sheet Metal Contractor:** *Eckstrom Industries Inc., Everett, Wash.*

The City of Everett Gate Way Project was designed to improve the pedestrian experience for the city while also incorporating art in a meaningful way.

Designs Northwest Architects’ project included stainless steel sail panels and an archway leading to the city parking garage. The space was designed with the idea that it would be used to display artwork of local area artists on a rotating basis.

From the beginning, Eckstrom Industries Inc., of Everett, Wash., was involved with the city and architectural design team, offering advice on the types of materials that could be used, providing samples and recommending construction methods that would maintain the quality of fabrications while keeping within the project budget.

As a courtesy to the City of Everett, all of the work performed to develop the design was done free of charge by Eckstrom with no guarantee that they would be awarded the project.

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# A Different Kind of Project Sparks Enthusiasm From A Northwest Sheet Metal Contractor

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This one-of-a-kind project consisted of a set of sail panels fabricated from T304 stainless steel and finished with a unique grain pattern. Powder-coated mild steel columns support the panels. The 21,000 pound archway was fabricated from mild steel and was given an enamel finish.

As this \$120,000 project progressed, the employees at Eckstrom Industries began to take ownership of this work of art. They found the Gate Way project intriguing and really enjoyed that it was different than their usual work. The pride that the Eckstrom employees had in this city project was a direct result of all their hard work and time they invested in helping improve the city's pedestrian experience.

The Everett Gate Way Project received a Merit award from the Northwest American Institute of Architects. The competi-



tion judges found the project "delightful, accommodating and safe and it incorporates art in a meaningful way. It signals an awareness of the value in improving the pedestrian experience that is good for the city on many levels." ■

## On The Cover



## New Architectural Training Curriculum Introduced

**N**eed architectural training? The International Training Institute (ITI) is continuing to work on the development of its new architectural training curriculum.

The new architectural curriculum replaces the existing training materials that are nearly two decades old. The updated curriculum will cover architectural sheet metal in much greater detail and also provide information about the latest materials, technology, fabrication, installation and safety.

"Many JATCs are not providing apprentices adequate training for architectural sheet metal work. This curriculum provides more than 340 hours of training that can be customized for local needs," says Robert Zahner, senior vice president of A. Zahner Company in Kansas City, Mo.

For more information on the new training curriculum, visit the Partners in Progress Web site at [www.pinp.org/resources/PIP/summer2005.pdf](http://www.pinp.org/resources/PIP/summer2005.pdf). ■

## Architectural Forum

### Tools Of The Trade – Finishing Techniques

**I**nterested in learning the current trends in cutting methods for various different types of metals? The Architectural Contractors Forum, Monday Oct. 17 during SMACNA's annual convention, will offer contractors an opportunity to explore current trends in cutting methods for various types of metals, including specialty metals, in both the field and shop. "Tools of the Trade – Finishing Techniques" will include a presentation by Architectural Sheet Metal Council members Dennis Bailey and Harold Munder and a discussion on the long-term effects of cutting techniques, including quality issues.

Following this segment, the forum will include a discussion and presentation on various finishing techniques focusing on providing aesthetic finishes to metal. A guest speaker will also discuss vapor barriers, roof ventilation and the effects of mold associated with various barrier products.

An overview of a new series of PowerPoint presentations currently under development by the Architectural Steering Committee will be shown to members so that they may use them with clients, architects and owners. The forum will conclude with a round table discussion on current issues and concerns in the architectural sheet metal industry. These topics include PVC application and removal, coatings, one-way vapor barriers and ventilation issues.

For more information on the annual convention, Oct. 16-20, contact Mary Lou Taylor, director of meetings and convention, at (703) 803-2998 or [mtaylor@smacna.org](mailto:mtaylor@smacna.org), or visit the SMACNA Web site at [www.smacna.org/events/annualconvention/](http://www.smacna.org/events/annualconvention/). ■

# Colored Stainless Offers A Rainbow Of Possibilities

**W**hen stainless steel is specified, there is no reason to limit the color choice to silver. A rainbow of choices is available in both opaque and translucent colors providing considerable design flexibility. This is the first installment of a two-part article on coloring methods for stainless steel. Part one features the electrochemical and ceramic coloring processes. The design possibilities provided by these finishes are much broader than the color options. The underlying finish texture is visible and contributes to the finish's design flexibility and aesthetic appeal. Both of these finishes will last the life of the building if they are used appropriately and well maintained. Stainless steel's superior corrosion resistance makes colored stainless steel an excellent sustainable material choice for demanding applications.

## Electrochemical coloring

Electrochemical coloring (also called light interference coloring) is achieved by immersing sheets of stainless steel in a series of chemical and electrochemical baths. This process thickens the transparent chromium oxide layer, which makes stainless steel corrosion resistant and changes the way light is reflected by the surface. A full spectrum of translucent colors are available including gold, champagne, bronze, purple, blue, red, black, charcoal and green. Darker colors are produced as the chromium oxide layer thickens as the result of longer immersion times.

The color will not fade when exposed to sunlight or weather. Figure 1 shows the roof of a Shakaden Temple in Japan, which was installed in 1975. After 30 years, there has been no color change in the electrochemically colored roof panels, which are black with small gold circles. The roof clips are also colored gold.

The color can be applied uniformly or deliberately varied for a rainbow effect. There will be slight variations in color, and, on larger projects, it is important to obtain samples that illustrate the range of color. Because the color is dependant on the way light is reflected through the chromium oxide film and the film thickness, curving or forming the panels will change the appar-



Figure 1: Shakaden Temple roof. Photo courtesy of the Nickel Institute

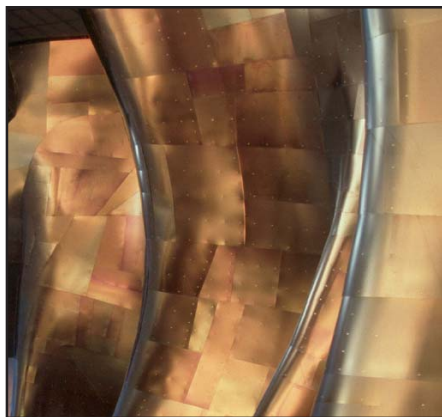


Figure 2: Experience Music Project. Photo courtesy of RIMEX

ent color of the stainless steel and this should be considered during design. The color variation achieved by curving panels can be used effectively as a design element as shown in the Experience Music Project in Figure 2. These panels were fabricated by SMACNA member A. Zahner Company.

Since the color is translucent, the finish beneath it is visible. The underlying finish choice changes the appearance of the color. Mirror-like substrate finishes produce brighter colors and duller finishes produce subtle, rich colors. If the underlying finish is directional, the final electrochemically colored finish will also be directional, so it is important to install all of the panels in the same direction. Different color and finish combinations create unique effects. Figure 3 shows the exterior of the recently completed UCSD Cancer Center, which has a Green Granex® finish that is achieved by applying green electrochemical color over a glass bead-blasted finish. The natural color variation adds depth to the finish. If a pattern is desired, color can be removed se-

lectively by etching, polishing or engraving. Alternatively, selective screening can produce a finish that combines different electrochemical colors as is shown on the Shakaden Temple roof.

Electrochemical color can be damaged or removed by scratching and abrading and it is not repairable. Wind-blown sand will remove the color from exterior panels. Flat panels are not suitable for areas where vandalism or accidental scratching may occur. In applications where color damage is a concern or when a two-toned three dimensional pattern is desired, color is applied to embossed panels and the high areas are buffed to remove the color. The remaining color is recessed and protected (Figure 4). Electrochemically colored stainless steel cannot be welded or soldered as these high temperature treatments will permanently damage the finish.

Research has shown that the electrochemical coloring process slightly increases the corrosion resistance of the stainless steel, because it thickens the protective chromium oxide passive film. This increase in corrosion resistance is minimal and should not be taken into consideration when selecting an appropriate stainless steel for the environment. This coloring process does not limit the recyclability of the stainless steel.

## Ceramic Color

This coloring process is sometimes identified as sputtering, plasma vapor deposition (PVD) or by the materials and color (Ti-gold). The first two descriptions refer to how the color is achieved. The stainless steel is cleaned to ensure good coating

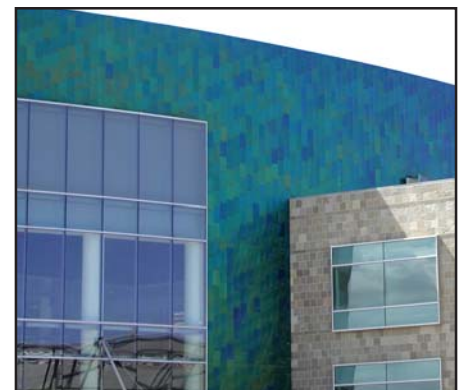


Figure 3: UCSD Cancer Center. Photo courtesy of RIMEX

## Colored Stainless Offers A Rainbow Of Possibilities

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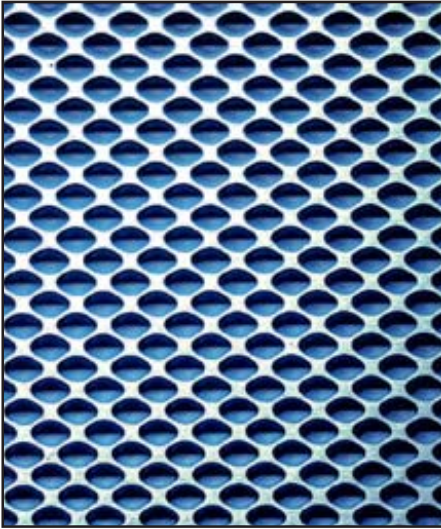


Figure 4: Embossed, electrochemically colored and buffed stainless steel. Photo courtesy of the Specialty Steel Industry of North America.

adherence and then placed in a vacuum chamber with a “target” that is made of the metal that will be used to create the coating. After the chamber is evacuated to a high vacuum level, a small amount of argon gas is injected. A high voltage circuit joins the stainless steel and target to create an electrical potential difference. In this plasma state, the argon ions bombard the target to release atoms of the target metal, which are deposited on the stainless steel substrate. This process is called sputtering and causes deposition of plasma on the stainless steel surface (PVD).

The colors and surface layer compositions that can be obtained using this process include: gold (TiN), rose gold (ZrN), bronze (TiAlN), blue (TiAlN), black (TiAlCN), and wine red (ZrN). This ceramic coating is very thin and the texture of the underlying finish is visible. The pattern of underlying finish is visible after the ceramic color is applied and it is not unusual to obtain patterns by etching, polishing, or engraving prior to coating the stainless. A sample of this finish can be seen in Figure 5. The color will not fade over time and it is more uniform in color and more abrasion resistant than electrochemical coloring. Although it has been used for aggressive applications like door hardware, it is important to note that the color can be damaged if it is attacked aggressively and the damage is not repairable. Figure 6 shows a revolving door colored by this process after

ten years of service. If welding is needed, this should be done prior to applying the ceramic coating.

If the stainless steel will be bent or formed during fabrication, it is important to make product acceptance dependant on a bend test after receipt of the material. It is only necessary to bend a small piece of metal to determine if there is a problem with surface adhesion. If there are processing problems, the coating may delaminate during bending or impact. This is generally not a problem with a high quality supplier. Unlike electrochemical coloring, the color does not change when viewed from different angles but there will be a slight color lightening at bends. This coloring process does not limit the recyclability of the stainless steel.

### Conclusions

The electrochemical and ceramic finishing processes offer tremendous aesthetic variety when combined with other finishing techniques. Suppliers can provide



Figure 5: Etched and ceramic-coated stainless steel. Photo courtesy of the Specialty Steel Industry of North America.



Figure 6: Revolving door with a gold TiN ceramic coating. Photo courtesy of Nisshin Steel.

samples and work with designers to obtain unique one-of-a-kind finishes. Ceramic finishes are more scratch resistant than electrochemical finishes but both of these finishes can sustain scratching damage. This should be taken into consideration during finish selection and placement. Neither of these coloring options can be welded or soldered after coloring without destroying the finish. Bending or curving can change the appearance of electrochemically colored finishes. If more consistent color is preferred, ceramic coloring methods should be considered.

The appearance of these colored stainless steel surface finishes is not defined by standards, so a finish sample should be used as a visual standard. Their appearance can vary from lot to lot or piece to piece and it is important to assess a potential suppliers experience and ability to match colors when working on large projects. Furthermore, multiple samples should be considered to define allowable variation.

Long-term performance is dependant on a regular maintenance program using cleaning methods approved by the finish supplier. Inappropriate cleaning can cause permanent damage. Conversely, there are many long-term installations which show the permanence of these colors when appropriate maintenance techniques are followed.

It is important to select an appropriate stainless steel for the service environment or the finish will eventually deteriorate due to corrosion. Additional information on stainless steel selection is available from the Nickel Institute at [www.stainlessarchitecture.org](http://www.stainlessarchitecture.org). The Specialty Steel Industry of North America (SSINA) has a free brochure on special finishes for stainless steel which can be downloaded from their Web site at [www.ssina.com](http://www.ssina.com). ■

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# Metal Roofs And Walls Provide Building Owners And Architects With Plenty Of “Green” Options

**M**etal roofs and walls come in a variety of colors, but it's the “green” makeup of metal that is prompting many building owners and architects to sit up and take notice.

For building owners and architects committed to preserving natural resources, metal roof and wall panels offer a unique, environmentally friendly solution to their building's requirements.

Metal roofs and walls can contribute considerably to the “green” building movement because of their high recycled content, recyclability, sustainability and energy efficiency.

The recycled content for steel used in metal roofs and walls, for example, is at least 25 percent. This level of recycled content reduces both the cost and environmental impact of making new steel, as it conserves energy and other natural raw materials.

The fact that the recycled content of steel is at least 25 percent by weight also helps earn points in the U.S. Green Building Council's Leadership in Energy and Environment Design (LEED) program, a national rating system based on a series of prerequisites and points. The program's objective is to encourage the design and construction of buildings that have little or no negative impact on occupants and the environment. Minimum LEED certification for a building requires 26 points.

Steel's recycled content is especially important when it is compared to other materials such as concrete, which has a recycled content of only 3 percent (fly ash) and even less when the weight of the recycled material is factored in.

Other metals are also high in recycled content. For example, a recent survey indicated that the recycled content of domestically produced, flat rolled aluminum construction products was approximately 80-85 percent. The average recycled content of all copper and zinc products is 44 percent and 9 percent respectively. Copper roofing contains approximately 75 percent recycled material.

## Metal Roofs Recyclable at End of ‘Useful’ Life

In addition to their recycled content, metal roof panels offer the added benefit of being recyclable at the end of their “useful” life. For example, while other old roofing materials are dumped by the ton in landfills, the steel, aluminum, copper and zinc used in metal roof panels is 100 percent recyclable, contributing to future products' recycled content.

Moreover, in many retrofit applications, metal roofs can be installed over old flat roofs. This eliminates the need to remove the old roofing material, and helps preserve valuable landfill space.

And, as in the case of recycled content, metal has an advantage over many other construction materials in terms of LEED point calculations since metal can be reused, while roofing materials such as asphalt or rubber membranes usually end

up in a landfill. Wall materials such as precast concrete, stucco and EIFS often find their way to landfills as well.

## Recycled Metals Reduce Raw Material Needs

Of the metals used in roofs and walls, steel is the most recycled. The annual recycling rate currently exceeds 70 percent, and its recovery rate is even higher, near 90 percent. Easily separated from other materials via magnetics, steel is reclaimed through a vast collection and processing network.

New steel made with recycled material uses as little as 26 percent of the amount of energy that would be required to make steel from iron and other materials extracted from nature. The original embodied energy of steel products is amortized as steel is recycled again and again into new steel products.

Aluminum is also recycled extensively, and, like steel, aluminum building products can be repeatedly recycled back into similar products with no loss of quality. Producing aluminum from recycled materials requires only 5 percent of the energy required to produce aluminum from bauxite ore, and every ton of recycled aluminum saves four tons of bauxite.

Copper is yet another routinely recycled metal. The reclaimed material is melted down and reformed into a variety of products. The remelting uses only about 15 percent of the total energy consumed in mining, milling, smelting and refining copper from ore.

Zinc can also be recycled. In fact, more than 30 percent of zinc used in all applications comes from recycling. And, this percentage is expected to increase as demand grows. The amount of energy used to produce zinc from ore is the lowest of non-ferrous metals. Energy consumption is even lower when zinc is produced from recycled material.

## Metal Roofs and Walls Are Extremely Durable

Building owners and architects have long recognized metal roofs and walls for their strength and functionality. Increasingly, they are now also recognizing another of metal's attributes...a long, sustainable service life.

Metal roofs and walls are extremely durable, thereby lowering the demand for raw materials needed to produce replacement systems. Metal roofing, for example, is unaffected by the hot-cold/wet-dry weather cycles and weather extremes that can break down other roofing materials. Metal roofing also has the ability to hold up against other weather forces including wind, hail, ice and snow.

Also contributing to the extended service life of metal roofs and wall panels are today's generation of metal coating systems. Modern technology has introduced quality paint and coating systems that not only protect and beautify metal panels but are also warranted for 20 to 30 years.

Metal roof and wall panels are also low in weight. This means there is less of a structural load on a building, helping extend the life of the facility.

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# Form And Function Come Together To Create A Pedestrian Bridge For Chicago

## MILLENNIUM PARK BP PEDESTRIAN BRIDGE, CHICAGO, ILL.

**Architect:** Frank O. Gehry Associates  
Los Angeles, Calif.

**Sheet Metal Contractor:** Custom Metal Fabricators Inc. (CMF), Orange, Calif.

Chicago's Millennium Park, is a \$475 million project that spans 24.5 acres. Located between Lake Michigan and Michigan Avenue, the site was formerly marked as an eyesore. It now serves as a cultural park, tourist magnet and landmark for the city.

One of the highlights of the park is the 925-foot-long winding Millennium Park BP Pedestrian Bridge, designed by Frank O. Gehry Associates. This \$12.1 million pedestrian bridge is architect Frank Gehry's first-ever bridge. A truly beautiful structure, the bridge is clad in gleaming stainless steel panels and has a gentle slope and hardwood deck. This snaking structure provides an acoustic barrier between



the audience using the park and the traffic noise on Columbus drive.

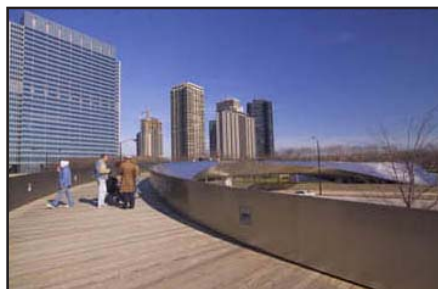
Custom Metal Fabricators Inc. (CMF) was the sheet metal contractor selected for the project. The project was performed over a six-month period and took

5,900 field hours. CMF used 22-gage stainless steel #316 with an angel hair finish and a flat interlocking panel process. The fabrication of 10,400 stainless steel trapezoidal panels in 17 different shop fabricated configurations involved 1,000 shop hours.

The design of the bridge consisted of convex, concave and radius areas stretching a total of 1,728 lineal feet, which is the total length of both sides of the bridge. A specific horizontal line had to be maintained throughout the bridge, which demanded 4,400 field-fabricated custom panels. To complete the project 57,000 square feet of materials were used.

Due to extremely cold weather conditions, CMF had to build special warm enclosures to continue working. CMF installed the belly of the bridge over an open four-lane highway within the Chicago city limits. They also designed, fabricated and installed a custom #4 brushed stainless steel handrail on the bridge.

For their work on the Millennium Bridge project, CMF was presented the 2005 Tom Guilfooy Memorial Architectural Sheet Metal Award, by California SMACNA. "This project successfully combined a renowned architect's vision and technically advanced requirements with good old-fashioned know-how to create a bridge like no other," noted CMF Vice President Dave Duclett.



# **Metal Roofs And Walls Provide Building Owners And Architects With Plenty Of “Green” Options**

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## **Cool Metal Roofs Help Reduce Energy Usage**

In addition to their other environmentally friendly attributes, metal roofs and walls can also help reduce energy consumption. Metal roofs, for example, can be finished with heat-deflecting coatings to lower energy usage by reducing cooling loads. Available with baked-on finishes or granular-coated surfaces, “cool metal roofs” can reflect up to 70 percent of the sun’s rays, resulting in less heat transfer to the interior of the building and saving owners up to 40 percent in energy costs.

Moreover, metal has a low thermal mass, meaning that it dissipates heat very quickly once the sun goes behind a cloud or sets for the day. Other construction materials such as concrete have greater thermal mass and will continue to radiate captured heat into the structure, even when the sun is not shining.

For more information on green design and other benefits of metal roof and wall products, visit [www.themetalinitiative.com](http://www.themetalinitiative.com). ■

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