



Hambro Modular Parking System

St. Lambert, Quebec



A gleaming utilitarian marvel, the Hambro Modular Parking System is an ingenious construction with wide-reaching market implications. The portable parking structure comprised of a parking deck and ramp, rails, and fencing elevated on support columns, all assembled over an existing parking lot to increase the number of usable parking spaces.

The moveable structure offers the flexibility to resolve issues of limited parking space, typically encountered in urban areas. The parking system can be used to alleviate pressure on popular lots, or serve as a temporary solution when part of a lot is taken out of commission for construction purposes, fairs and markets, or other temporary events that reduce available parking. Potential markets that could benefit from such a structure include airports, train stations, hospitals, shopping malls, university campuses, and more.

Because the components of the structure are prefabricated and partially pre-assembled, field installation is quick and economical, taking only four to six days. The construction is carried out on an already-paved surface, thus eliminating the need for a foundation, and the entire structure can be disassembled, then reassembled at a new location and even reconfigured. When the structure is no longer needed, the area previously occupied by the modular system will be returned to its original state, undamaged.



The entire structure has been hot-dip galvanized, top-to-bottom, from the deck panels and railings, to the fencing, and supports. It was a logical choice to utilize galvanized steel throughout the system, as these modules must be able to stand strong and corrosion free against the abuses of steady traffic and varied environments. The abrasion resistance of galvanized steel makes it an ideal construction material for this project, because the portable nature of the structure means increased exposure to rough handling during transport and assembly. A tough, durable corrosion protection system was necessary to preserve the attractive metallic aesthetic of the parking structure, which will be visible in close proximity due to the intended public use.

Hot-dip galvanizing protects steel from the inside out, utilizing both tough barrier protection and intrinsic cathodic protection to defend against corrosion. The durable barrier protection will guard the steel from constant exposure to sunlight, moisture, road salts, and grit carried in by tires. Because the zinc coating created during the hot-dip galvanizing process is harder than the substrate steel, it creates a tough-to-penetrate barrier that will defend the steel against corrosive moisture and vehicle pollutants. →

Galvanizer
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Hambro Modular Parking System

St. Lambert, Quebec



The metallurgical reaction that occurs during the galvanizing process also protects the steel cathodically – meaning nicks and scratches (up to ¼ inch in diameter) exposing the substrate steel will be protected from corrosion by the sacrificial properties of the surrounding zinc. This makes galvanized steel particularly well-suited for the potentially rough garage environment, where vehicles may bump or scratch exposed beams.

Not only does the galvanized steel provide superior protection from the inevitable exposure to corrosive elements and superficial damage, it does while remaining maintenance-free for 75 years or more. This means none of the direct or indirect costs of routine maintenance will be incurred, as the structure will not need to be taken out of commission.

This aspect also lends itself to the sustainable nature of the portable structure. Because the system is to be used and reused time and time again, the structure should also utilize the most sustainable corrosion protection system on the market. Utilizing 100% natural, abundant, and recyclable zinc and steel, hot-dip galvanizing remains maintenance-free over the life of the project. This means no wasted energy or materials on continuous upkeep, which supports the earth-friendly nature of this parking solution.

For this specific system, the entire 300-plus ton project was completed in only one month, from the design assessment and the galvanizing of the pieces, to the last shipment to the site. This

quick turnover is characteristic of the galvanizing process, which is factory-controlled and can be conducted regardless of weather or environment.

The fast track planning and execution of this project called for close and effective cooperation between the engineers and the galvanizer to quickly come up with manufactured components that achieved the high aesthetic quality necessary, were free from distortion, while remaining cost-effective for both the fabricator and galvanizer.

Two completed modules were leased to the city of St. Lambert, Quebec to accommodate business owners and shoppers during the reconstruction of a busy thoroughfare in the heart of the city. The new, portable two-story parking facilities provide the municipality with a total of 70 additional parking spaces.

The concept of the portable parking system offers new and exciting market potential highlighting the inherent qualities of galvanizing, including durability, abrasion resistance, and sustainability. The aging urban infrastructure of our inner cities promises many more applications for this system, and the use of hot-dip galvanized steel guarantees the structures will stand strong and corrosion-free, from location to location, for generations to come. ♻️

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Light Chamber Denver Judicial Center

Denver, Colorado



With gracefully arched petals blooming skyward, the Light Chamber sculpture blossoming at the entrance of the Denver Justice Center utilizes organic curves and natural materials to generate a sense of airy, natural lightness and movement. Artist Dennis Oppenheim, who has incorporated galvanized steel in several outdoor artistic displays, wanted to create a free-flowing sculpture of leaves and flowers to symbolize the wide variety and multitude of decisions made in the judge's chambers.

The artist explained the structure to be a three-dimensional representation of the mental process exercised by the judges and juries within the center, where the complexities of decision-making are represented by the myriad metal pathways comprising each petal of the piece.

Located at the corner of Colfax Avenue and Elati Street, the sculpture is at the center of one of the most highly trafficked roads in downtown Denver. Light Chamber was developed in the hope of creating a vibrant city plaza for visitors and pedestrians, as well as a visual escape for workers of the Justice Center. The prominent and visual nature of the piece warranted the best corrosion protection system available to prevent the unsightly scarring and damage of rust stains.



Long-life and low maintenance were high priorities for this outdoor structure, which must stand strong against the varied and sometimes extreme fluctuations of the Denver climate. All components of the main structure – totaling more than 29 tons of steel – were galvanized to ensure the 45-foot tall outdoor display would remain stately and corrosion free for generations. The durable barrier protection of the zinc coating will protect the piece from the harsh sun and exposure to snow and rain, while the cathodic protection of the galvanized coating will still protect the piece from any nicks and scratches. All this will be done with no required maintenance for 75 years or more – ideal for maintaining low cost. →

Galvanizer

Valmont Coatings - Calwest Galvanizing

Specifier, Architect, Engineer

Denver, Department of Public Works

Artist

Dennis Oppenheim

Engineer

Charles Keys – Martin/Martin
Consulting Engineers

Fabricator

La Paloma Fine Arts

artistic





Light Chamber Denver Judicial Center

Denver, Colorado



The size and aesthetic nature of the structure presented challenges for the completion of Light Chamber. Because of the large size of the elements, the engineer was required to pay particular attention to the design aspects of each component to ensure the substructures would fit within the galvanizer's kettle dimensions.

Not only were the components designed to fit a deep kettle, they also required special consideration to ensure the venting and drainage necessities were kept to a minimum and relegated to areas of low visibility on the final structure. With the engineer, fabricator, and galvanizer working together, the process was completed successfully within the project schedule.

The final appearance of the sculpture was an appealing, natural and consistent silvery gray that blends into the surrounding city elements, while allowing the organic shape and structure of the piece to stand out amid the straight-edged buildings surrounding it. With hot-dip galvanized steel, this piece will stand tall and lovely, unaffected by the ravages of corrosion, for decades of decision-making. 🐞



Galvanizer

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Specifier, Architect, Engineer

Denver, Department of Public Works

Artist

Dennis Oppenheim

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American Galvanizers Association



Snow Bugs

Park City, Utah



Standing as playful gatekeepers to the ski runs of Park City Ski Resort (PCSR), a collection of 12 individualized Snow Bugs serve to indicate terrain difficulty throughout the resort. With spherical, sharp-toothed bodies and googly eyes, the bugs each have a distinct personality and purpose – visually directing skiers and snowboarders to the appropriate run for their skill level.

PCSR caters to visitors of all ages and levels of expertise, and the Snow Bugs were designed with facial expressions and body positioning that can be interpreted cross-culturally. With the ability to carry more than 30,000 skiers and snowboarders an hour up the hill, the resort needed a quick visual cue to direct visitors where to go, as they do not consistently carry maps with them. Also, the large portion of international clientele necessitated a visual way of communicating levels of difficulty that cannot always be read or interpreted on the maps.

The large Snow Bugs stand as sentinels at the head of each trail, towering 10-30 feet above ground, and are effective visual cues easily interpreted by all visitors. The more free-spirited looking Bugs are posted higher up for adult novices and experts, while the sillier and more fun-looking ones are placed lower for children to recognize.

Garnering almost 400 inches of harsh weather and snowfall annually, PCSR understood the value of hot-dip galvanizing. Almost all steel on the mountain has been galvanizing, including lifts, and the resort quickly learned hot-dip galvanizing is a superior corrosion protection system even for smaller, new products like the Snow Bugs.

All of the equipment at the resort is permanently set and needs to incur as little maintenance as possible, as the ability to access the pieces can be nearly impossible in the winter time. For the following order of 12 Snow Bugs – comprised of 2 tons of steel – the resort chose to galvanize the pieces because of the proven performance and endurance of the zinc coating.

The first Bug was commissioned after one of the resort owners came across the sculptures of artist Fred Conlon, who developed a similarly fashioned “Gnomes be Gone” line of sculptures. He created the original Bug with plain, ungalvanized steel. It was placed on the mountain, exposed to the elements, and began to rust at a rapid pace – though the piece was very popular with the resort visitors. One PCSR employee said of the black-steel, corroding bug “with this much snowfall, the piece accelerated into a 5-year rust ball!”

Thanks to the durability and low-maintenance nature of the hot-dip galvanized steel used to create the Snow Bugs, they will withstand blizzard after blizzard to inform and entertain tens of thousands of visitors long into the future. 🐛

Galvanizer
Jordan River Galvanizing

Specifier
Park City Ski Resort

Artist
Fred Conlon, Sugar Post Metals

artistic



Knox County Bridge Rehabilitation

Knox County, Ohio



Nestled into a lovely, pastoral scene, the Knox County Bridge was in desperate need of rehabilitation. The bridge, which was older and originally painted for corrosion protection, had fallen into disrepair and was facing the possibility of a complete teardown. The advent of the green movement has inspired several counties to attempt renovating old bridges similar to the Knox Bridge rather than creating the waste of scrapping them altogether.

Fortunately, the local county engineer was in favor of preserving the bridge in this manner, so work began. Taking caution to protect the existing elements, the old steel structure was disassembled, blasted, rehabilitated, galvanized, and reassembled. While the steel was being recycled and reused, the paint did not fare so well – some of the paint was suspected to be lead paint, and had to be completely removed and contained. In all, 150 tons of structural steel, bolts, diaphragms, and floor sections were galvanized and re-installed.

The sustainable nature of hot-dip galvanized steel made it a perfect fit for this project. To keep with the natural beauty of the area, the specifiers wanted a natural, raw aesthetic to blend in with the surroundings. Utilizing a 100% natural zinc coating for corrosion protection reflects the earth-friendly intention of renovating the bridge, while using natural materials to blend into the surrounding area. The zinc of the hot-

dip galvanized coating is infinitely recyclable and essential for life, while the unbeatable corrosion protection means no energy or materials will be wasted on routine touch-up and maintenance required by other corrosion protection systems – perfectly in tune with the green effort.

The rededication of the renovated bridge was widely covered by local television, radio, and newspapers, noting its high value to the community and increasing its level of visibility. The gleaming new bridge now sits comfortably atop the water, protected from corrosion by a durable system that will require little or no maintenance over the next 75 years or more. 🌱

Galvanizer

V&S Columbus Galvanizing LLC

Specifier

Knox County

Engineer

Richland Engineering

Fabricator

U.S. Bridge

bridge & highway



American Galvanizers Association



Hess Tower

Houston, Texas



Though the Hess Tower may blend seamlessly into the skyline of downtown Houston, it stands head above the rest with its durability and dedication to environmental efficiency. With its tall, stretching rows of reflective window paneling, the structure seems an extension of the yawning, blue Texas sky.

Ten wind turbines are housed atop the building, which was designed to capture windflow to power the building. The obvious energy efficiency of the 10 wind turbines compliments the surrounding architecture and the adjacent 12-acre park and wading pool. The area is quickly being surrounded by residential high rises, restaurants, hotels, arenas, and other amenities meant to bring downtown living to Houston.

This 774,000 square foot office building is designed as an extension of the landscape, clad in a combination of stone and glass and supported by hot-dip galvanized steel. The developers of this project embraced the concepts of low environmental-impact living, implementing design and city planning efforts that could influence the design of similar structures in the future. Operating under the assumption people want to live, work, and play with little or no automobile travel, as well as desire to see energy efficiency and cost-effective design at work, the Hess Tower hopes to set a new standard for sustainable building.

Galvanized steel contributes to these principles through the accumulation of LEED® points, sustainability, and low-maintenance durability – all providing benefits passed along to the consumer. The project took a sustainable approach to building construction, using the wind farm located on the roof of the building as a primary feature. Hot-dip galvanized steel braces and columns support the wind turbines, which help supply power to the 30-story building.

All structural steel used for bracing of the roof-mounted wind turbines and HVAC equipment were galvanized – a total of 350 tons. →



Galvanizer

AZZ Galvanizing Services – Houston

Architect

Gensler

Fabricator

Berger Iron Works

building & architecture



American Galvanizers Association



Hess Tower

Houston, Texas



The tower is supporting the energy efficiency movement with a number of conservation methods to obtain the LEED® Gold certification. HDG contributed to the certification by providing two points under *Materials and Resource Credit 4: Recycled Content*. Not only do the galvanized elements of the structure take advantage of the sustainable nature of natural, highly recyclable zinc and steel, the inherent maintenance-free nature of galvanized steel means no waste or emissions will be expended on routine maintenance.

Though the galvanized framing and supports are constantly exposed to the corrosive urban wind and humidity of the tropical marine climate of Houston, the zinc coating life predictor indicates the structure will last 75–100 years before any maintenance is necessary. At that point it could be painted for extra protection without any deterioration on the substrate steel.

Low maintenance means low costs over the life of the project. While the initial cost was competitive, as well, it was the life-cycle cost of hot-dip galvanized steel that made galvanizing the clear choice. Low initial and life-cycle costs, paired with durability and sustainability, made galvanizing the ideal choice for corrosion protection in this environmentally efficient project. ↶



Galvanizer

AZZ Galvanizing Services – Houston

Architect

Gensler

Fabricator

Berger Iron Works

building & architecture



American Galvanizers Association



Oeuvre Coburn

Val Saint-François, Quebec



It's a peaceful, bucolic panorama – heavy, muscled work horses heaving a load of logs over rolling pasture hills, a sleepy barn nestled into the trees beyond. It is a scene that invites the viewer to take a step back, enjoy. The interactive nature of the framework and sculptural horses serves to draw the visitor into direct contact, to play and partake in the peaceful vision of a time long passed.

This public artwork by Mr. Jean-Marc Tétro aims to highlight the 50th anniversary of the death of notable artist Frederick Simpson Coburn. A native of Melbourne, Quebec, Coburn is one of the few internationally recognized Quebec artists to have achieved success in his own lifetime. He helped raise awareness of rural life in Quebec, first by his illustrations, then by his winter paintings.

The galvanized steel of the permanent art installation was donated with respect for the pastoral lifework of Frederick Simpson Coburn. Tétro was very familiar with the dependable durability and appealing, natural aesthetic of hot-dip galvanized steel. He felt the strong

abrasion-resistance created by the metallurgical bonding of zinc to steel would serve the sculpture well, as it is intended to be a tactile, interactive work of art. Not only will the tough barrier protection of the zinc coating stand as a first line of defense against corrosion, the cathodic protection created during the galvanizing process will also sacrificially protect the piece from nicks and scratches.

This sculpture will serve as both a lovely tribute to Coburn and a beacon of the aesthetics and durability of galvanized steel. This cultural project is sure to become a popular tourist attraction, and a symbolic 'postcard' for the town of Val Saint-François. Residents of the region and tourists alike will enjoy paying tribute to this influential artist for decades to come. 🐾

Galvanizer
Corbec Corp.

Specifier
Centre Local de Développement

Master Builder
Création Tétro

Contractor
Jean-Marc Tétro

civic contribution



American Galvanizers Association



Ironworkers Walk of Fame

Mackinaw City, Michigan



Standing tall and strong, the Ironworkers Walk of Fame sculpture was commissioned by the Village of Mackinaw City as an extraordinary tribute to commemorate and celebrate the legends and stories of Ironworkers and Mackinaw Bridgemen from North America.

The striking sculpture of an ironworker is comprised of an amalgamation of more than 3,000 ironworker tools and steel building components, donated by ironworkers from across the USA and Canada. Additionally, pieces of iconic steel structures, including the World Trade Center, Golden Gate Bridge, George Washington Bridge, and Mackinaw Bridge were also used to create the tribute. Three tons of galvanized steel were used to create the piece, which took approximately 400 hours to assemble prior to galvanizing.

Hot-dip galvanizing was chosen to preserve this timeless piece, which will be exposed to corrosive elements such as rain and snow. The superior barrier and cathodic protection of galvanized steel will ensure this tribute remains eye-catching and rust-free for decades. Specifiers felt the attractive natural appearance of zinc was more aesthetically pleasing and appropriate than what a coat of paint could provide.

At its unveiling, 160 ironworkers were inducted into the Ironworkers Walk of Fame. However, thanks to the durable, long-lasting protection of hot-dip galvanized steel, the sculpture will stand witness to the dedication and hard work of past and future ironworkers for generations. 🚧



Galvanizer

V&S Detroit Galvanizing LLC

Architect

Moran Iron Works

civic contribution



American Galvanizers Association



Center for Great Apes

Wauchula, Florida



With a winding maze of chutes and walkways woven throughout the treetops, the Center for Great Apes is a charitable organization created to provide sanctuary for chimpanzees and orangutans that have retired from the entertainment industry, completed research, or formerly served as pets.

After working in Borneo tracking and observing orangutans in 1984, Patti Ragan developed a passion for great apes. She had the vision and desire to provide long-term care and sanctuary for the animals, who can never be returned to the wild, and worked to develop an enjoyable, functional, and durable facility to achieve this goal. Ragan bought a tract of land in south central Florida and created a facility that would provide the animals with a habitat as close to natural as possible.

It was also necessary for the structure to be hardy and durable, as the apes will scratch, chew, and abuse any building material. The humid coastal environment, corrosive ape wastes, and continuous habitat cleanings also would provide extreme challenges for corrosion protection. A duplex system of paint over hot-dip galvanized steel was the ideal solution to meet all of these needs.



A duplex system combines the superior corrosion protection of galvanized steel with the additional benefits of another corrosion protection system, such as powder coating or paint, to extend the life of the piece even further. It also allows you to match your project to a specific color scheme, if desired. For the Center, Ragan wished to paint the project in shades of green and brown in order to help the structures blend with the natural environment, without sacrificing the long-lasting, maintenance-free durability provided by galvanized steel.

The durable zinc coating of the galvanized steel is extremely difficult to penetrate, with zinc-iron alloy layers of up to 250 DPN hardness protecting the steel underneath. This means the galvanized steel can stand strong against the gnawing and pounding of the apes, unlike paint alone, which would simply flake off and be rendered ineffective for corrosion protection. The cathodic protection created during the galvanizing process also helps to this end. Cathodic protection means the zinc will ionically sacrifice itself to protect areas around small scratches – preventing rust and corrosion from spreading like wildfire across a structure upon the first small breach. →

Galvanizer

Valmont Coatings - IGA - Tampa

Specifier

Center for Great Apes

duplex system



American Galvanizers Association



Center for Great Apes

Wauchula, Florida



The habitat areas are large domed or barn-shaped structures made of hot dip galvanized steel beam, angle, channel, and plate, with heavy wire mesh used to create the side panels. Inside the habitats you will find an assortment of toys and swings, where the apes spend their days playing, eating, and napping. There is a concrete night house equipped with hot dip galvanized steel cages where the apes go at night to sleep, as well as a veterinary clinic on site.

steel, these structures will require little to no maintenance for more than 75 years, making wise use of the donated funds. Because the apes can live to be 60 years old, a corrosion package with long-term efficiency is critical. After discussing the extended time to first maintenance and the benefits of hot dip galvanizing, Ragan replied, "It is good to know these structures will be here providing sanctuary to these apes long after I am gone."



The clinic, night house, and all habitats are connected by a system of chutes and walkways elevated 10–15 feet above the ground to give the apes the feeling of traveling through the trees. These chutes and walkways are also made of hot dip galvanized steel angle, channel, and mesh. They have tracks made of galvanized flat bar welded down the lower inside portion of the walkways in order to give the apes a smooth surface for walking.

Now home to more than 40 great apes, the Center will serve as a sanctuary for the life of its inhabitants. The duplex system of paint over hot-dip galvanized steel means the structure will stand strong and maintenance-free against corrosive moisture and waste, and general wear-and-tear from the apes. Galvanized steel will allow Ragan to achieve her dream of an efficient, safe, and happy home for these retired animals. 🐼

The Center for Great Apes is a charitable organization supported only by donors from across the globe. By utilizing hot-dip galvanized



Galvanizer
Valmont Coatings - IGA - Tampa

Specifier
Center for Great Apes

duplex system



Salvador Dali Museum

St. Petersburg, Florida



A fitting tribute to an iconic artist, the new Salvador Dali Museum is a work of art reflective of the artist's characteristic juxtaposition of classical and fantastic elements. The structure, designed by Yann Weymouth and Novum Structures, features an undulating, abstract 75-foot glass structure that flows from the plaza up and around the cubist "treasure box" museum. The innovative structure of this popular museum will receive worldwide attention, as the geometry of the glass structure is groundbreaking in the architectural world.

The structure, located in the highly corrosive Floridian coastal environment, faced several development challenges. All steel elements of the museum needed a durable, low-maintenance

corrosion protection system to guard against unsafe and unsightly corrosion; however, the appearance of the structure must also be pleasing to the eye, without distracting from the glass structure. Finally, the complexity and scale of the architecture required the steel elements be fabricated, processed, and delivered to the jobsite in order and without loss.

Incorporating a duplex system of powder coating over hot-dip galvanized steel for corrosion protection was the ideal solution for addressing all of these concerns. A duplex system combines the superior protection of galvanized steel with the additional benefits of another corrosion protection system, such as powder coating or paint, to extend the



Galvanizer

Valmont Coatings - IGA - Tampa

Specifier

Novum Structures

Architect

Yann Weymouth, HOK Architects

Additional

Custom Colors Powder Coating
Sandman of Sarasota

duplex system

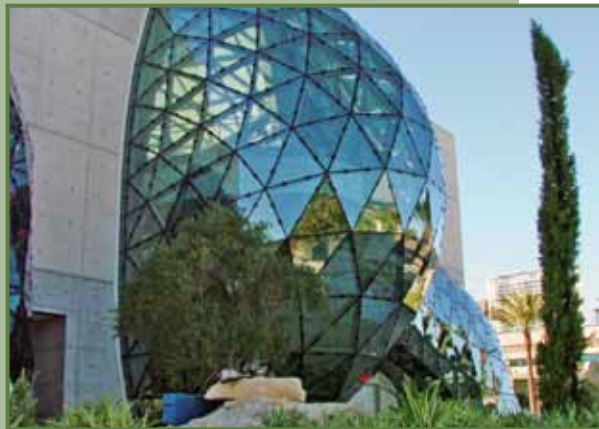


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Salvador Dali Museum

St. Petersburg, Florida



maintenance-free life of the project. The powder coated finish allowed a color selection that would blend with the facility, while the galvanized steel beneath ensured the pieces would be protected by the most durable corrosion protection system available – the best of both worlds.

Galvanizing was ideal for the elements of this project, as the glass structure is formed with structural steel tubing, with access holes that would expose the inside of the tubing. As the steel pieces are lowered into the zinc bath during the galvanizing process, the molten zinc flows in and throughout the element being dipped. This means the interior of hollow tubes develop the same corrosion protection as the exterior – and will be protected from corrosion both inside and out.

In collaboration with the galvanizer and powder coater, the fabricator utilized a barcode technology that would withstand the galvanizing, sandblasting, and powder coating processes, then get the pieces to their final destination in the correct order without any losses. Novum fabricated the parts at their plant, and then shipped them 1,300 miles to the galvanizer.

Because the galvanizing process is conducted indoors, there were no weather-related delays or interruptions to slow things down. After quick turnover by the galvanizer, the pieces moved on to the sandblaster, then the powder coater, and then finally to the jobsite with precision. This fast and efficient process saved the specifier thousands of dollars in repairs due to transportation damage or lost parts.

Now fully constructed, the museum is a 66,450 square foot behemoth offering 50 percent more gallery space than the previous facility. The 18-inch thick concrete walls and glass structure are designed to withstand 165 mph winds, so the valuable artwork within will be protected in up to a Category 5 storm surge. As the design will protect the building from the onslaught of weather extremes, so the duplex system of powder coating over hot-dip galvanized steel will work to protect the structure from the ravages of corrosion for generations. 🌿

Galvanizer

Valmont Coatings - IGA - Tampa

Specifier

Novum Structures

Architect

Yann Weymouth, HOK Architects

Additional

Custom Colors Powder Coating
Sandman of Sarasota

duplex system



American Galvanizers Association



Wind Turbine Klug Hill Farm Optiwind, Inc.

Torrington, Connecticut



Located at the site of a 120 year-old dairy farm, the Klug Hill Farm windmill was specially developed to support the green movement as well as decrease cost and increase energy efficiency. Optiwind began the design of this windmill after realizing a need in the market for a smaller windmill that could still power commercial applications such as schools and factories. This smaller, more practical windmill would create a significantly smaller footprint on the landscape, and would be known as a Compact Wind Acceleration Turbine (CWAT).

Galvanized steel utilizes 100% natural, abundant zinc, a reflection of the earth-friendly nature and intent of renewable energy production. The zinc in hot-dip galvanized steel is infinitely recyclable and essential for life, while the unbeatable corrosion protection means no unnecessary energy or materials will be wasted on routine touch-up and maintenance required by other corrosion protection systems. The sustainable nature of galvanized steel is the perfect complement to the Klug Hill Farm initiative.



Optiwind designers had specific criteria in mind when developing the windmill. They wanted to create a sustainable, ecologically-friendly, cost-effective way to generate wind energy for smaller markets. The galvanized steel utilized throughout the structure helps the project achieve all of these goals. As the country and world make the transition to renewable resources, it is important for designers and engineers to incorporate sustainable solutions for corrosion protection into their designs. Made entirely of galvanized steel, the windmill adds another level of sustainability to its already carbonless production of electricity.

Not only is the project sustainable, it is also energy-efficient. The CWATs at Klug Hill produce enough electricity to power the entire farming operation, or up to 50 homes. Using a self-erecting tower with a rotating cylinder around it, wind is accelerated around the cylinder and forced through a series of smaller fans mounted on each side of the structure. Galvanized steel shrouds encompass the fans to help protect wildlife such as birds and bats. →



Galvanizers

American Galvanizing Co., Inc.
Hubbell Galvanizing

Architect/Specifier

Optiwind, Inc.

Additional

Connecticut Light & Power

electrical, utility, & communication



American Galvanizers Association



Wind Turbine Klug Hill Farm Optiwind, Inc.

Torrington, Connecticut



The engineers at Optiwind briefly considered painting the structure for corrosion protection, but quickly realized the routine upkeep of a painted structure would add maintenance costs for years to come. The long-term durability and coating protection of galvanized steel, paired with little or no maintenance over the life of the windmill met the environmental and economic goals of the project. The superior barrier and cathodic protection of galvanized steel will protect the structure from the inevitable daily ravishes of exposure to sun, moisture, wind, and abrasion in the outdoor setting.

Good communication between the galvanizer and fabricator was a necessity for completing this complex project, which involved hot-dip galvanizing 100 tons of steel. Many of the structure's connection points were designed with very tight tolerances, and masking was required for some of the moveable parts – all of which was addressed in the early stages of the project. The galvanizers sat down with the engineers at Optiwind, and made sure they knew what to expect from the hot-dip galvanizing process, and made modifications to ensure the structure was successfully galvanized.



Special considerations were made to ensure the structure would maximize both energy and cost efficiency. The CWAT design accounts for and accommodates the lower wind speed that generally surrounds the targeted rural areas. The turbines were also developed to allow the installer to erect the windmill without the use of a crane, thus reducing installation costs typically associated with larger windmills.

This groundbreaking project has mass appeal to broad base of smaller institutions that will benefit from the development of cost-effective and environmentally-friendly energy solutions. Hot-dip galvanized steel is an essential part of the project's success in meeting these goals. The long-lasting, no-maintenance, and sustainable nature of galvanized steel will make the CWAT design an integral player in the renewable energy market. 🌱



Galvanizers

American Galvanizing Co., Inc.
Hubbell Galvanizing

Architect/Specifier

Optiwind, Inc.

Additional

Connecticut Light & Power

electrical, utility, & communication



American Galvanizers Association



Agriculture Bulk Material Handling Equipment

Springfield, Ohio



The evolution of Sweet Manufacturing's (SM) agriculture bulk material handling equipment is a testament to the proven, durable, and long-lasting nature of hot-dip galvanized steel. A user of galvanized steel elements for over 20 years, SM began to expand upon their line of food and grain conveyors.

In addition to barrier protection, hot-dip galvanizing also provides cathodic protection, which means the zinc will sacrificially corrode to protect the areas around any small scratches ionically – preventing the nick from future corrosion. Galvanized steel will ensure the piece arrives undamaged and ready to be put in the field.



The new conveyers were developed to be much larger than previous versions, and were intended to be shipped internationally to Mexico, Chile, Brazil, and other South American locations. Because of the treacherous nature of shipping large items abroad, the specifier required a coating that could survive the rigors of transportation.

The quality of galvanized steel has proven itself to SM, who went from galvanizing only a few small elements of the piece, to exclusively galvanizing all possible elements of the conveyors. They now utilize 350 tons of galvanized steel per year for the conveyors, which arrive at their destinations with a gleaming zinc finish ready to perform for generations. 🌱



Galvanized steel is the ideal choice for corrosion protection under these circumstances, as the durable zinc coating provides superior barrier and cathodic protection for the pieces. The zinc coating is tightly bonded to the substrate steel zinc-iron alloy layers of up to 250 DPN hardness protecting the steel beneath. Such strength is important, as the pieces are likely to be exposed to rough handling during shipping.

Galvanizer
V&S Columbus Galvanizing LLC

Fabricator/Specifier
Sweet Manufacturing Co.

food & agriculture



Marathon Oil Bridge

Detroit, Michigan



Spanning eleven active railroad tracks, the Marathon Oil Bridge needs durable protection from the rough, corrosive industrial environment of the Detroit railway system. With a rigorous and intensive production schedule, the bridge was able to take advantage of the quick turnover provided by the hot-dip galvanizing process.

Over the years, expansion of the oil refinery was limited due to the fact the industrial property owned by Marathon Oil is split into two tracts divided by a span of railroad tracks. Economic conditions lead Marathon management to link the two tracts in an effort to expand production capacities and create new jobs for the local market. Time and budget constraints dictated a bridge carrying large pipes over the tracks was the most viable option for connecting the two tracts.

Limited access to the private railroad property meant it was necessary to pre-construct the bridge, and then lift it into place in large sections. The steel elements were speedily hot-dip galvanized before pre-construction. The galvanizing process is performed indoors, independent of weather, allowing for the quick turnover necessary to keep a project on schedule. The structure was then assembled, disassembled, shipped, and reassembled before being lifted into place by cranes.

Because of the strictures of private property access and need for speedy installation, there would be no time for coating touch-up, nor was there access once installed. Paint for corrosion

protection would have required such efforts, both initially and continuously throughout the life of the structure. Because future access to the structure was not guaranteed, the structure needed a maintenance-free corrosion protection system – hot-dip galvanized steel meets this requirement.

Located in the harshest of the five environmental categories – industrial – the bridge needed durable, long-lasting protection for the 950 tons of structural steel ladders, handrails, sheet steel and fasteners. The tough zinc coating, which is more difficult to penetrate than the substrate steel itself, will protect the bridge from nicks and scratches caused by flying gravel or daily wear-and-tear.

The project, originally scrutinized by the public, will now serve as a testament to the quick turnover and superior corrosion protection of galvanized steel. Because the pieces could be galvanized and immediately put into the field, crews were in and out of the private property in short order, while the bridge will provide years of maintenance-free service to Marathon Oil. 🌱



Galvanizer

AZZ Galvanizing Services - Hamilton

Specifier

Marathon Oil Company

Architect/Engineer

Bristol Steel & Conveyor Corporation

industrial



Mobile Training Tower (MTT) for First Responders

Hawkinsville, Georgia



Settled atop a large trailer bed, the Mobile Training Tower (MTT) appears to be little more than an attractive, futuristic metal mobile home; however, when upended, the project reveals its true purpose – the MTT is actually a 4½ story portable training simulator for first responders and law enforcement agencies. Exposed to the rigors and abuse of transportation and extreme environmental conditions, it was necessary for this project to take advantage of the most durable, low-cost, and sustainable solution for corrosion protection – hot-dip galvanizing.

Equipped with adaptable configurations created to provide various firefighter and police training scenarios, the tower provides first responders the ability to practice rappelling, ground ladder operations, aerial operations, high-rise firefighting, standpipe/sprinkler operations, sniper operations, agility training, and more. Each floor is equipped with outlets for smoke distribution, a standpipe with valve and hose connection, a protected light, and a fire sprinkler with shutoff.

With zinc-iron alloy layers of up to 250 DPN hardness protecting the steel beneath, the durable zinc coating of the structure is more difficult to penetrate than the substrate steel itself. This means the galvanized steel will stand strong against the abuse of constant, heavily-booted foot traffic and the impact of carabiners and other emergency equipment. Corrosive chemicals and continuous exposure to water via sprinklers and hoses means the durable barrier and cathodic protection of galvanized steel is a necessity for this project. →



Completely contained on a customized low-boy trailer with a 1,500 gallon water tank for drafting and water shuttle operations, the MTT can be transported using a semitrailer to virtually any training site, and raised into position in 15 minutes or less. The mobile nature of the tower means the exterior covering of heavy gauge, galvanized, corrugated steel siding will be constantly exposed to the dings, scratches, splash-back, and even road salts associated with highway travel. Thanks to the dual barrier and cathodic protection of hot-dip galvanized steel, small nicks and abrasions will not compromise the stability of the structure.

Galvanizer

Valmont Coatings - Salina Galvanizing

Specifier

Fred Joiner, Riverside Metal Craft, Inc.

Additional

Mary Jane McCommons

original equipment manufacturing



American Galvanizers Association



Mobile Training Tower (MTT) for First Responders

Hawkinsville, Georgia



The complexity of the structure requires a low maintenance corrosion protection system, as continuing maintenance not only wastes time and effort, but money as well. Catering to strictly budgeted public service institutions, the galvanized structure will ensure no unnecessary money or waste will be expended on routine maintenance. This fact, paired with the infinite recyclability of steel and zinc elements, allow the structure to conserve resources and future expenditures. The maintenance-free, sustainable nature of galvanized steel perfectly aligns with the goals of the MTT – training to conserve public and private property.

They see the value doubly when examining the long-term fiscal advantage of utilizing a maintenance-free, durable corrosion protection system that will extend the life of the project by decades. Galvanized steel only constituted approximately 2.5% of the overall end-user cost of the unit, making it very appealing to the bottom line while ensuring the project will remain strong and corrosion free for generations. These times of austerity show the value of building products that last and do not require costly life-cycle repair.

Fire Departments across the country have utilized this training apparatus since 2003, and the galvanized zinc coating on the oldest unit still looks new – with no signs of rust without any maintenance in the 6+ years of its operation. Every MTT manufactured has been galvanized. Aside from the appropriate functionality of the galvanized steel in this project, the coating also maintains an aesthetically pleasing, professionally impressive appearance. It conveys strength and durability, quality, and pride – characteristics of both the galvanized structure and the heroes who train within it. 🚒

MTT is the only mobile training tower currently on the market, and the project's versatility allows smaller jurisdictions to share training apparatus. This makes training a viable option for departments previously inhibited due to economic restrictions. The tower is a paragon of fiscal responsibility. Available for use and reuse, and portable to reach far and wide, the public sees the value of this product as a beneficial and cost-effective training opportunity.



Galvanizer

Valmont Coatings - Salina Galvanizing

Specifier

Fred Joiner. Riverside Metal Craft, Inc.

Additional

Mary Jane McCommons

original equipment manufacturing



American Galvanizers Association



Orange Bubble Express

Park City, Utah



Like a strand of Christmas lights strung to the top of the mountain, the vividly orange protective shields and glimmering galvanized steel of the Orange Bubble Express Lift chairs stand out amidst the crisp white snow blanketing the landscape.

This ski lift, located at The Canyons in Park City, Utah, is a one of a kind, state-of-the-art structure. Featuring heated seats, the orange, bubble-like enclosure provides lift passengers protection from the wind and snow. The clear orange plastic allows riders in the quad-lift to observe the surrounding scenery as if through a pair of ski goggles. As the first of its kind in North America, it is important the lift remain visually appealing and free of unsafe and unsightly rust stains.

The lift is located just outside the resort's Grand Summit Hotel and takes skiers to mid-mountain Lookout Peak, before continuing uphill just south of the current Sun Peak lift. The express lift increases capacity from the base mountain by 47% and carries skiers to the top of the mountain in nine minutes, accommodating 2,400 passengers per hour.

At an elevation of 8,700 feet, the harsh mountain environment demands a coating that is both durable and maintenance-free. Thanks to decades of battle-proven performance, most ski lifts produced in the world are designed to be hot-dip galvanized. The amount of pipe and tubular product, such as towers and chair bails, in this project are considerable and hot-dip galvanizing for corrosion protection of these elements is ideal.

Unlike other systems, the hot-dip galvanizing process allows molten zinc to flow within and around tubular products, protecting both the internal and outside surfaces with a uniform, consistent coating. Two hundred tons of lift towers, cross-arms, lifting frames, chair bails, restraint bars, walkways, ladders, and handrail were galvanized for this project.

One of the main design objectives of the lift was to improve visibility for the passenger. The galvanized coating provides aesthetic appeal coupled with the uniquely designed orange bubble shields that protect the passengers from the weather. Despite constant exposure to moisture and daily passenger wear-and-tear, the zinc coating guarantees the lift will continue to protect riders as well as remain aesthetically pleasing and corrosion free for 70 years or more.

In addition to the interior and exterior corner protection offered by a hot-dip galvanized coating, barrier and cathodic protection were the most important attributes considered when selecting a corrosion protection system for the Orange Bubble Express. The coating's superior abrasion resistance and bond strength were also key factors in selecting hot-dip galvanizing. The galvanized steel utilized in the lift will keep it operating at top speeds, without interruption, for decades.

Galvanizer

Valmont Coatings
Intermountain Galvanizing

Architect/Engineer/Fabricator

Doppelmayr USA



recreation & entertainment



American Galvanizers Association



Memphis Air Traffic Control Terminal Freedom Tower

Memphis, Tennessee



The Memphis Air Traffic Control Terminal is a towering sentinel keeping watch over the busy air traffic at Memphis International Airport. The tallest air tower in the south, the terminal is uniquely constructed to incorporate the latest seismic engineering, due to its proximity to the New Madrid Fault. The project design and contractor performance earned the tower the Associated Builders and Contractors (ABC) *Excellence in Construction Award*, and the structure was so impressive to the community, it was later christened the “Freedom Tower” by a U.S. House Resolution.

The tower’s positioning near a major fault line meant the construction materials chosen needed to possess seismic resistance. Hot-dip galvanized steel is ideal for this purpose, as it is able to meet any seismic criteria or terrorist threat that could otherwise suspend operations. Able to bend within reason without breaking, the tensile strength of steel can protect the structure from extreme damage during seismic activity, protecting the builder’s investment. Eight hundred tons of structural steel, columns, 4x10 tubular rails, handrails, grating, HVAC racks, and precast concrete connections and embeds were hot-dip galvanized for the Tower.

To give due justice to this honor, the Freedom Tower took advantage of the most cost-effective, sustainable, and low maintenance corrosion protection available – hot-dip galvanized steel. The control tower is subject to the corrosive humidity of the Mississippi River area, as well as chemicals from deicing and aviation exhaust facing one of the busiest airports in the country. The high quality barrier and cathodic protection provided by the zinc coating created during the galvanizing process will protect the steel elements of this structure from the ugly and unsafe corrosion created in these conditions.

Built to accommodate the 20-year master plan of the Memphis area, the Freedom Tower’s effort toward longevity goes far beyond this goal. The durable, maintenance-free life expectancy for hot-dip galvanized steel in this environment is 75 years or more, exceeding even the FAA minimum expectancy requirement of 50 years. →



Galvanizer

AZZ Galvanizing Services – Jackson

Architect

USR

Fabricator

Quality Iron Fabricators

transportation



American Galvanizers Association



Memphis Air Traffic Control Terminal Freedom Tower

Memphis, Tennessee



The Federal requirement is a step toward establishing sustainable building practices, a goal which aligns to the benefits of utilizing hot-dip galvanized steel. Galvanized steel contributes positively to sustainable development initiatives because of its maintenance-free service life, 100% recyclability, and minimal environmental impact. Natural and abundant zinc, like steel, is infinitely recyclable without the loss of any mechanical properties, making it a highly sustainable building material. Additionally, because galvanizing provides maintenance-free corrosion protection often for 70+ years, no energy or materials will be wasted on routine upkeep. Galvanized steel works in tandem with the government's sustainable development goals.

In addition to promoting achievements in sustainability, galvanized steel worked to ensure the Tower was erected smoothly and in quick order. Memphis International Airport is the main

transportation hub for FedEx Corp., providing cargo transportation to scores of cities across the intercontinental U.S. and numerous nonstops to Europe, South America and Japan. It also serves as a passenger hub for Delta Air Lines Inc.

This new facility will enable air traffic controllers to continue providing the safest, most efficient service to passenger and cargo flights at Memphis and surrounding airports. The cost effective, low-maintenance sustainability provided by galvanized steel means this project will serve as a model for future FAA construction. The 336-foot tower, replacing the 200-foot existing structure, will stand strong against any seismic events and resist corrosion for generations to come. 🌱



Galvanizer

AZZ Galvanizing Services – Jackson

Architect

USR

Fabricator

Quality Iron Fabricators

transportation



American Galvanizers Association



Dredge Edward S. "Ned" Reed

New Orleans, Louisiana



It's a dirty job, but somebody's got to do it. A tough, hardy little powerhouse, the Dredge Edward S. "Ned" Reed works up and down the Mississippi River on the east bank to provide access to the cruise terminals, where up to 5,000 people per cruise are likely to see him hard at work adjacent the River Walk of New Orleans.

In order for freight containers and cruise lines to have access to the Port of New Orleans, the Port Authority must maintain reliable depths at each of the wharves. The Mississippi leaves a natural accumulating deposit of sand and silt on the east side of the river that, if not removed on a regular basis, would make that side of the river inoperable. The Port had previously been contracting the dredge work, but discovered the costs had become insurmountable.

Replacing the A. Robert Bleakley Dredge, Dredge Reed was christened in 2010 after the post-Katrina years showed a marked increase in freight and cruise line traffic, as well as greater opportunities for commerce and wharf accessibility. The manufacturer was tasked to build the Reed, a bigger, more powerful dredge to meet the challenge of the job.

The Mississippi River, dubbed the "Big Muddy," has a high salt content at the mouth of the river is full of rough sand. That, paired with the abrasion of fast moving water, make an extremely harsh and corrosive environment. Hot-dip galvanized (HDG) steel is the only corrosion protection system strong enough to withstand the abuses of life on the Big Muddy. With zinc-iron alloy layers of up to 250 DPN hardness protecting the steel beneath, the durable zinc coating

is more difficult to penetrate than the substrate steel it protects. Such strength is required on a watercraft that will continually be exposed to rough handling, moisture, and chemicals in its day-to-day operations.

New to galvanizing, the manufacturer worked closely with the galvanizer to ensure all steel would galvanize successfully and on time. The dredge had to be ready for its christening in August, so communication and turnaround time of the galvanized elements were critical. As hot-dip galvanizing is an indoor, factory controlled process, the galvanizer was able to provide a customized turnaround to meet production schedules. All stairs, ladders, walkways, work platforms, and handrails of the dredge were galvanized, totaling 10 tons. Upon completion of the project, the manufacturer was so impressed with the quality of galvanized steel, he rewrote their specifications to include HDG.

Use of galvanized steel on the dredge is having an impact on the entire workboat market operating on America's rivers and waterways. Owner/operators and government agencies are searching for durable, cost-effective methods of corrosion protection in this harsh, abrasive environment, and galvanized steel is the ideal solution. 🚧

Galvanizer

AZZ Galvanizing Services - Hobson

Specifier

John Lightsey

Engineer

Dredging Supply Co. Inc.



water & marine



American Galvanizers Association



Indianapolis Motor Speedway

Indianapolis, Indiana



With scores of silvery seating rows spanning far into the distance, Indianapolis Motor Speedway (IMS) is the largest race track in the world and an American icon. For decades the only corrosion protection used to protect the massive collection of steel used in this structure was paint; as a result, it was necessary to hire a full-time crew of men to move from one section to another, providing year-round maintenance and upkeep on the deteriorating paint coating.

The cost of perpetual painting was overwhelming, with no end in sight. Finally, in 1991, IMS decided to test hot-dip galvanized steel by incorporating it into the new construction being built on Turn 3. A thousand tons of steel bleachers were galvanized, to great success. After a year of maintenance-free corrosion protection using galvanized steel, the owners realized it would be more cost-effective over the life of the structure to tear down the steel elements, sandblast the failed paint system, and galvanize them one section at a time.

While the cost of incorporating galvanized steel was competitive initially, the long-term cost-effectiveness has proven to be an enormous savings over the past 19 years. When the sections were initially galvanized in 1991, the mil readings indicated excellent coverage of the steel. Over the decades, the galvanized steel has stood strong and maintenance-free, earning back every penny of the initial investment.

Because of this proven performance, IMS set a goal to galvanize one section of bleachers each year between scheduled events, so eventually the whole structure would benefit from such dependable corrosion protection.

Subject to the abrasive foot traffic of millions of race fans every year, the stadium needed maintenance-free protection from unsafe and unsightly corrosion. In a corrosive industrial atmosphere with race track emissions and exposure to harsh Midwest winters, rain, and sun, the bleachers have taken advantage of the superior barrier and cathodic protection created during the galvanizing process to keep the stadium structurally sound and free of rust.

The formation of the zinc patina has turned the steel to a uniform and traditional matte gray well suited to the urban surroundings and raceway environment. The zinc patina is the formation of zinc corrosion byproducts on the surface of the steel. Zinc, like all metals, begins to corrode when exposed. As galvanized coatings are exposed to both moisture and free flowing air, the corrosion byproducts will naturally form on the coating surface. →

Galvanizer

AZZ Galvanizing Services - Muncie
AZZ Galvanizing Services - Plymouth

Specifier

Indianapolis Motor Speedway



lifetime achievement





Indianapolis Motor Speedway

Indianapolis, Indiana



The patina is impervious, and passive, which slows the corrosion rate of the zinc, thus providing long lasting protection from damaging rust. Proving the durable nature of galvanized steel, an inspection in 2009 indicates little zinc lost since the initial galvanizing in 1991 and enough to last an additional 75+ years from now. The coating is still well above the minimum coating thickness required by ASTM A 123 – still working hard to protect the steel from corrosion, without maintenance.

Indianapolis Motor Speedway Produced 1977, Tested 2009:					
Sample Area	Readings (mils)				Average
Stairs	13.2	13.1	13.3	13.2	13.2
Bleachers	16.4	16.6	16.1	16.5	16.4
Wheelchair Access	7.6	7.7	7.6	7.5	7.6

As IMS continues to galvanize one section of bleachers each year between scheduled events, turnaround time is critical to meet the schedules, and galvanized steel is well suited to this need. An indoor, factory-controlled process, hot-dip galvanizing can be done regardless of weather conditions. All structural steel, including formed columns, stringers, rail risers, steps, handrail, debris fences, poles, tubular columns, angles and horizontal beams were galvanized for each section of these updates.

After making it through the galvanizing process

in a speedy manner, the parts are ready to be put into use. Hot-dip galvanized steel is a highly sustainable building material, utilizing the most earth-friendly corrosion protection system available. Utilizing 100% natural, abundant, and recyclable zinc and steel, hot-dip galvanized steel remains maintenance-free over the life of the project. This means no wasted energy or materials on continuous upkeep. This particular project adds to the sustainable nature of galvanized steel by recycling previously used and painted steel – meaning the stadium can be fully enjoyed without compromising the needs of future generations.

The Director of Engineering for IMS reported the objective for corrosion protection in the stadium has always been safety for the fans, durability, and low-maintenance. Hot-dip galvanized steel has met or exceeded all of these expectations and then some, with a corrosion- and maintenance-free life-expectancy of 75 years or more. As the performance of galvanized steel has been proven by real-life, in-the-field experience and data, IMS now requires any steel used on the raceway property be galvanized, meaning the speedway will stand safe and strong against the damaging effects of corrosion for generations of fans to enjoy. ♿

Galvanizer

AZZ Galvanizing Services - Muncie
AZZ Galvanizing Services - Plymouth

Specifier

Indianapolis Motor Speedway

lifetime achievement