



ColorGard® Case Study — Wings Over the Rockies Air & Space Museum



At-A-Glance

Project

Wings Over the Rockies Air & Space Museum

Location

Denver, Colorado

Project Consultant

Alec Garbini

Architect

AH Architecture

Roofing Contractor

Colorado Custom Metal

Roof Profile

New Tech Series 675 Snap-Lock 18" Standing Seam Metal Roof

Industry

Museum

Situation

The new metal roof for the Wings Over the Rockies Air & Space Museum had a slick satin finish, which although aesthetically-pleasing posed the threat of rooftop avalanches and sliding snow, potentially endangering patrons and museum property below.

The Result

ColorGard® was custom-designed and engineered for this project, and dramatically reduced the risk of sliding snow and rooftop avalanches. It provides safety to patrons, while complementing the historical look of the museum with a clean appearance and perfect color and finish-matching, all designed to last the life of the roof.

The S-5! snow retention system did not compromise the roof integrity and is exclusively recommended by Colorado Custom Metal, the roofing contractor.

Stats

- Roof Measurements: curved roof with a circumference measurement from eave-to-eave over the top of the barrel @ 308 lineal feet
- Roof Pitch: 10/12 pitch at the eaves
- Used 92,400 square feet of 24-gauge, 18" wide standing seam roofing over 6" of ISO insulation nestled between rows of 16-gauge Galvanized Zee Purlins
- Used S-5! ColorGard® snow retention system:
 - o 2400 lineal feet of unpunched ColorGard®
 - o S-5-V Clamp (1600)
 - o VersaClip (1600)



The Project

Transferred from the United States Air Force to a group of volunteers in 1994, Wings Over the Rockies Air & Space Museum is located at the former Lowry Air Force Base in Denver. The museum boasts more than 182,000 square feet of hangar space full of iconic aircraft, space vehicles, artifacts, military uniforms and much more.



Visitors can experience thrilling flight simulators, discover various educational programs and participate in dozens of exciting museum sponsored events. Each year, the museum welcomes roughly 160,000 visitors from all 50 U.S. states and 34 countries worldwide.

The existing 20-gauge corrugated metal roof on this large airplane hangar had reached its useful life and performed well since it was installed in 1938—that's a 70-year life-span. The roof was retrofitted with 92,400 square feet of curved standing seam roofing using the New Tech Series SSQ II™ MultiPro Roof Panel Machine with 675 tooling. It features ColorGard® by S-5!, the ultimate snow guard solution for standing seam metal roofs.

The Challenge

The challenge was to remove and replace this large radiused roof during the cold winter months, while keeping the museum open for its patrons. Increasing the difficulty was the shape and height of the roof – curved and more than 100' off the ground with a circumference measurement from eave-to-eave over the top of the barrel at 308 lineal feet.

Another challenge was to meet the standards of the City & County of Denver's Historical Landmark Preservation Commission – to maintain the same historic look of the building with the new roof system.

"I was particularly impressed with S-5! They were the only snow retention company in the marketplace who could tell us the mathematical equation required to calculate the snow loads for their products.

There was no guess work – an engineered avalanche control system with no messy glues or adhesives. We didn't even have to penetrate the roofing envelope to achieve our desired results. The ColorGard system also provided added strength to the overall diaphragm of the new roof system."

— Mark Orsborn, President, Colorado Custom Metal, Inc.



The Solution

The project consultant and architect were tasked with finding a roofing contractor to custom-design and construct a system, and also handle the removal and replacement of the large radiused roof.

Colorado Custom Metal, Inc., was selected as the roofing contractor and proposed to leave the existing corrugated metal roof in place and retrofit a new light-weight roof system. This approach would allow for the museum to remain open while the new roof system was constructed.

Mill-finished Galvalume material was selected for the standing seam panels to preserve the look of the old hanger and meet the criteria of the historical society.

Colorado Custom Metal fabricated 25,000 lineal feet of 6" high Zee (Z) Purlins from 16 Gauge GI steel in their metal shop. Installers attached the Z Purlins through the existing corrugated deck and into the main frame of the building. By securing the Z Purlins to the main frame, they transferred the load of the new roof system and raised the new fastening point 6" higher.

Next, they laid down 6" of new ridged insulation nested tightly between the newly secured Z Purlins and chose to use two layers of 3" foil-faced isocyanate insulation board, providing the building with an added R-value of 38. Finally, installers enclosed the insulation and Z Purlins with a high-temperature ice and water shield membrane.

Colorado Custom Metal manufactured the 308' long panels in four separate lengths with each panel 77' long. They designed a custom expansion joint end-lap-detail to attach the panels together, making them span the full length of the barrel.



Winslow Crane Service hoisted the panels and New Tech Machinery's panel forming machine up to the roof level, suspending it a few inches off the roof deck where 92,400 square feet of roofing panel was manufactured utilizing the 18" wide 1 3/4" snap seam profile. The panels were curved around the radius of the barrel as each one was installed.

Once the new roof was installed, the project consultant observed heavy snow sliding off the new satin-finished metal roof panels in greater volume than the pre-existing corrugated roof panels. He advised something would need to be done to control rooftop avalanche conditions.

Colorado Custom Metal contacted S-5!, who designed and engineered the **ColorGard**® snow retention system to mitigate the avalanche problems. Manufactured from high-tensile, certified aluminum and extensively tested for load-to-failure results, **ColorGard** dramatically reduces the risks associated with rooftop avalanches and complements the look of the roof, with a clean appearance and perfect color and finish-matching, designed to last the life of the roof.

How Did S-5! Products Help?

- Provided safety measures to both patrons and museum property
- Eliminated the risk of a voided roof manufacturer warranty—no holes/no damage
- Reduced the amount of product and cost required due to S-5! engineered system capacity
- Provided the aesthetic solution the architect wanted

Long-Term Outlook

The Wings Over the Rockies Air & Space Museum was able to achieve a new roof system, maintain its historical look and reduce the risk of sudden and unexpected release of snow slides, posing a serious threat to patrons and museum property below.

The S-5! ColorGard system maintains the roof integrity and will not void roof warranties.



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