



The Star's Multi Use Entertainment Facility (MUEF) undergoes final cleaning and inspection after completion. Its complex geometry is supported by a galvanized steel frame that was integral to the successful on-time delivery of a low-maintenance structure. Photo: Brookfield Multiplex.

Don't Gamble on Your Coating Selection

Introduction

The redevelopment of the Star City Casino (now known as 'The Star') beside Sydney's Darling Harbour is a recent application of Hot-Dip Galvanized (HDG) steel in a high profile project. The use of architecturally exposed structural steel is becoming increasingly popular, and was a key design feature of the new Multi Use Entertainment Facility. Given the nature of the design and the high building utilization, a resilient coating was required. HDG from Industrial Galvanizers was chosen as the project required a corrosion protection system that would remain maintenance-free for at least 10 years. The durable nature of the HDG coating ensures it will exceed the warranty period, providing a maintenance-free service you can bet on!

Background

Originally completed in Pyrmont, Sydney during the mid-90's, The Star has recently undergone a significant upgrade. The \$760 million redevelopment has produced a 3,000m² gaming facility featuring a new entrance facing Sydney Harbour, a floor-to-roof glass façade and a 3,000 seat Multi Use Entertainment Facility (MUEF). The MUEF is a 40x60m complex geometric structure that utilizes a 300 tonne steel frame to support internal walls and an external glass façade, which is internally lit at night to spectacular effect. Its 16m height is split into three levels that include a theatre and loading dock. The structure is located on the roof of the existing casino, which continued operation during construction.

Why Hot Dip Galvanized Steel?

The principal builder on the project was Brookfield Multiplex, who engaged ICMP to manage the innovative construction methodology. Chris Mathews of ICMP says there were a number of challenges and constraints that made the choice of Industrial Galvanizers' HDG very suitable for this application:-

Limited Lay-down Area

The construction zone was in a cul-de-sac that also contained the entry to the casino car park and the loading dock for the Lyric Theatre. All building deliveries had to take place in a 30m area that also contained the base of the tower crane, leaving just 16m of useable space. Storage space was limited and available locations were constrained by the load capacity of the concrete slabs. As a result, the size of prefabricated steel structures was dictated by transport and on-site crane size. The vital erection sequence of the steelwork was split into stages that were erected sequentially to minimize storage and maximize structural stability and safety. Project success depended on:-

- Steel delivery to a schedule, as required.
- Off-site preparation and storage of completed, coated steel.

Tight Construction Schedule

The Star is a gaming facility, in use for 24 hours every day. Normal operations were to continue during the redevelopment, with minimal disruption and risk to important clientele. Ensuring schedule adherence

was important to the success of the project, which also depended on:-

- Minimising weather interruptions

Trading Operations

Given the need to minimise disruption and impact on trading, the effect of local environmental issues also become important in project delivery. Demolition of pre-existing structures was a necessity, as was reconstruction work; but on-site preparation – including painting – needed to be minimised to:-

- Lessen the potential impact of dust and fumes

A Low-maintenance Corrosion Protection System

The Star is on the shoreline of Sydney Harbour, and exposed to a marine environment. This is within one hundred metres of a sheltered coastal



The MUEF during final construction phase; the internal sound-proof walls are in place, the stainless steel framework has been fixed to the HDG steel and the first glass panels have been installed. Photo: Industrial Galvanizers.

area with low deposition of chlorides and classified by ISO 9223 as C3, a "Medium" corrosivity environment. Despite its partially enclosed environment the steel does require a protective coating to prevent corrosion that will either create aesthetic problems (surface rust); require maintenance in a timeframe that is shorter than planned or budgeted; or – in the worst case – significantly reduce the life of the asset through loss of structural integrity.

Aesthetics were a consideration in the selection of HDG steel, as the steel frame is visible through the glass façade as well as at internal locations. The use of HDG as architecturally exposed structural steel (AESS) has become popular with architects and engineers due to its texture, characteristic surface appearance, speed and ease of erection and long low-maintenance life. Its selection for the MUEF project underlines the growing acceptance of exposed HDG steel in high profile buildings.

The steel framework has a glass façade, which is exposed to sunlight. Despite

the filtering effect of the glass, impact of UV light on the coating must also be considered. HDG is not affected by UV and this was one benefit of its selection.

The need for off-site preparation and lack of on-site storage meant that any protective coating on the steel needed to be tough and resistant to handling damage, as it would be craned directly into position from the back of the transport. The thick alloy layer that coats HDG steel proved highly beneficial in this application. The galvanic protection provided by the HDG coating ensures that scratches have minimal impact on service life or aesthetics.

Finally, there was limited access for maintenance post-completion. Effectively, the steel frame was sandwiched between the interior soundproof walls of the MUEF and the attractive external stainless-steel and glass façade. In such a structure, the asset owner needs a guarantee that minimal - or no maintenance will be required for an extended period; Industrial Galvanizers was able to guarantee this for a period of 10 years.

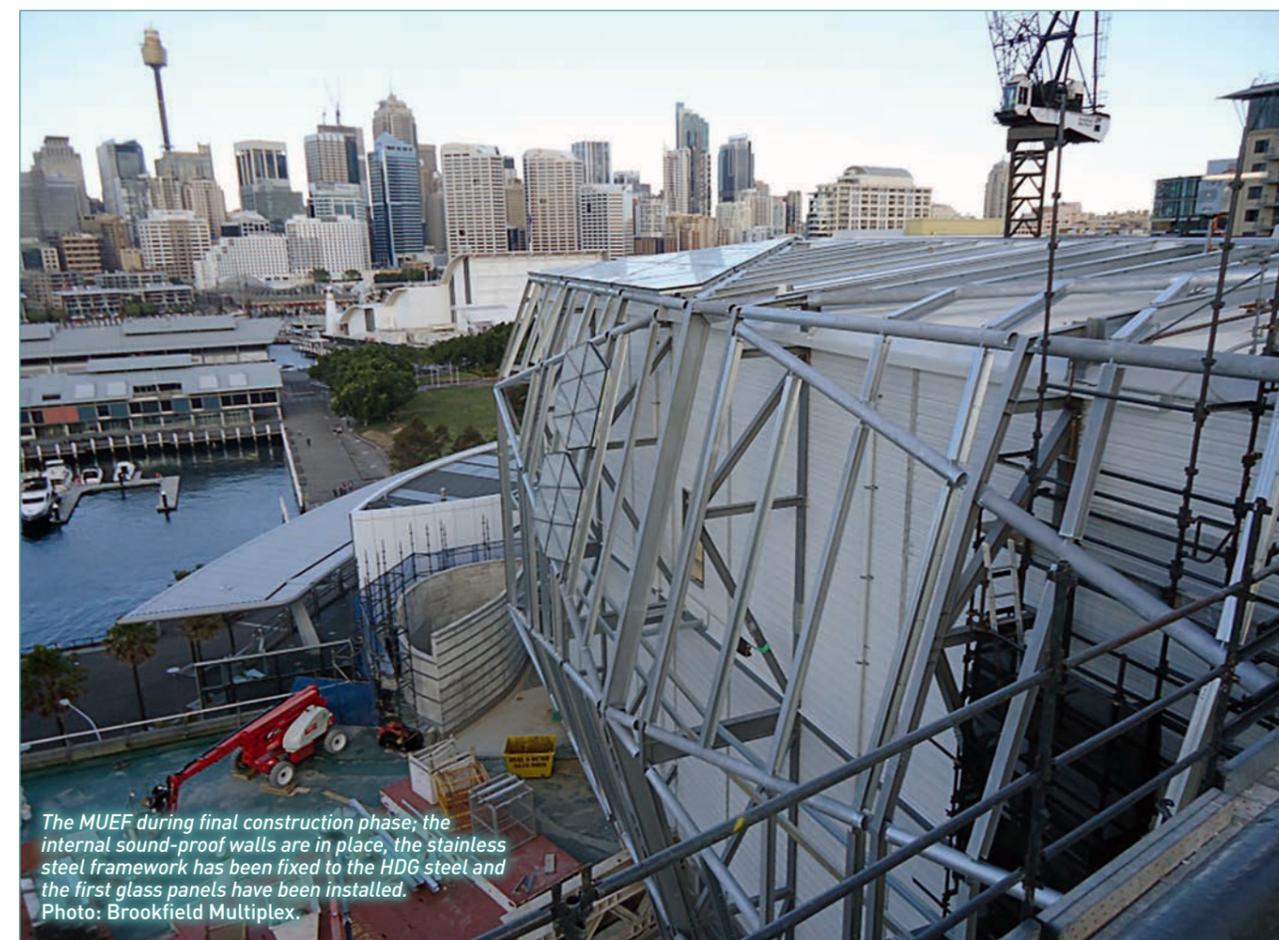
The stainless steel framework for the external glass façade was insulated from the HDG steel frame to prevent bimetallic corrosion. The integrity of the insulating barrier was inspected on site before and after installation of the glass.

Summary

The particular challenges faced by principal builder Brookfield Multiplex on The Star redevelopment advocated the use of Hot Dipped Galvanized steel. The need for a guaranteed low maintenance corrosion protection system in a marine environment; sequential delivery of off-site prepared steelwork; resistance to on-site handling damage; ability for rapid erection with minimal weather interruptions, and the aesthetic appeal of the industrial galvanized surface all made the choice of HDG steel the best solution for this application. The coating guarantee provided means that low maintenance is a sure bet!

Alex Spillett

Industrial Galvanizers (Australia)



The MUEF during final construction phase; the internal sound-proof walls are in place, the stainless steel framework has been fixed to the HDG steel and the first glass panels have been installed. Photo: Brookfield Multiplex.