The roof of Japan National Stadium

Member company

NIPPON STEEL Stainless Steel Corporation

The Challenge

The Japan National Stadium was the main venue for an international sports event held in 2021. This stadium was intended to be in harmony with the forest adjacent to the stadium (Jingu no Mori), and to remain high-quality and durable for a hundred and more years in the future.

In addition, the stadium was designed to make use of the wind, instead of air conditioners, to control rising temperatures. We needed to work closely with the roof designer and builders to identify the optimum stainless steel grade and to develop the surface finish needed to achieve their design goals.

Why?

While stainless steel had been used for roofs, the Japan National Stadium was intended to be an iconic structure based on the concept of sustainability. Therefore, we believed that this was a good opportunity to promote the features of stainless steel, and to develop new application for the pre-coated stainless steel sheet.

Needed action

We needed to select the best material that would meet the requirements, so together with the roof designer and builder, we selected SUS445J2. SUS445J2 is a high-purity ferritic stainless steel. This is a resource saving stainless steel grade with high corrosion resistance, and its linear expansion coefficient is low as that of carbon steel.

In order to mitigate the temperature rise of the surface by solar radiation, we achieved the highest level of whiteness for a pre-coated steel sheets with highly durable (fluorine) coating material.

We produced samples of the material for the builders, who tested and verified its workability.

Action review

Specific: We confirmed the optimum steel grade and stability of coating film with the data that we have already collected through previous applications, samples, and through exposure and lab tests.

Measurable: Color stability limits were assessed and confirmed by analyzing the brightness and color difference of the coating film.

Achievable: We used SUS445J2 and highly

durable fluorine coating material. Because of this, we achieved goals of providing durable and heat mitigating material.

Realistic: We were able to complete the production in a reasonable process and period, because we had a lot of experiences of supplying ferritic stainless steel for roofs since 1989.

Time-bound: Construction was completed as planned for the international sports event scheduled for 2020 (actually held in 2021).

Horizontal Expansion Capability

We believe that more stainless steel roofs are used for future construction projects where harmonizing with the environment and reducing CO2 emissions are important goals.

Outcome

Extending the life of structures became a more important issue worldwide, as well as harmonizing structures with the environment. We are proud to be able to contribute these challenges by providing our product.

Roofs are not just installed in new buildings. We expect the potential needs of renovation of roofs in order to improve existing structures. We believe that stainless steel with its excellent surface finish increases energy efficiency and durability of structures.