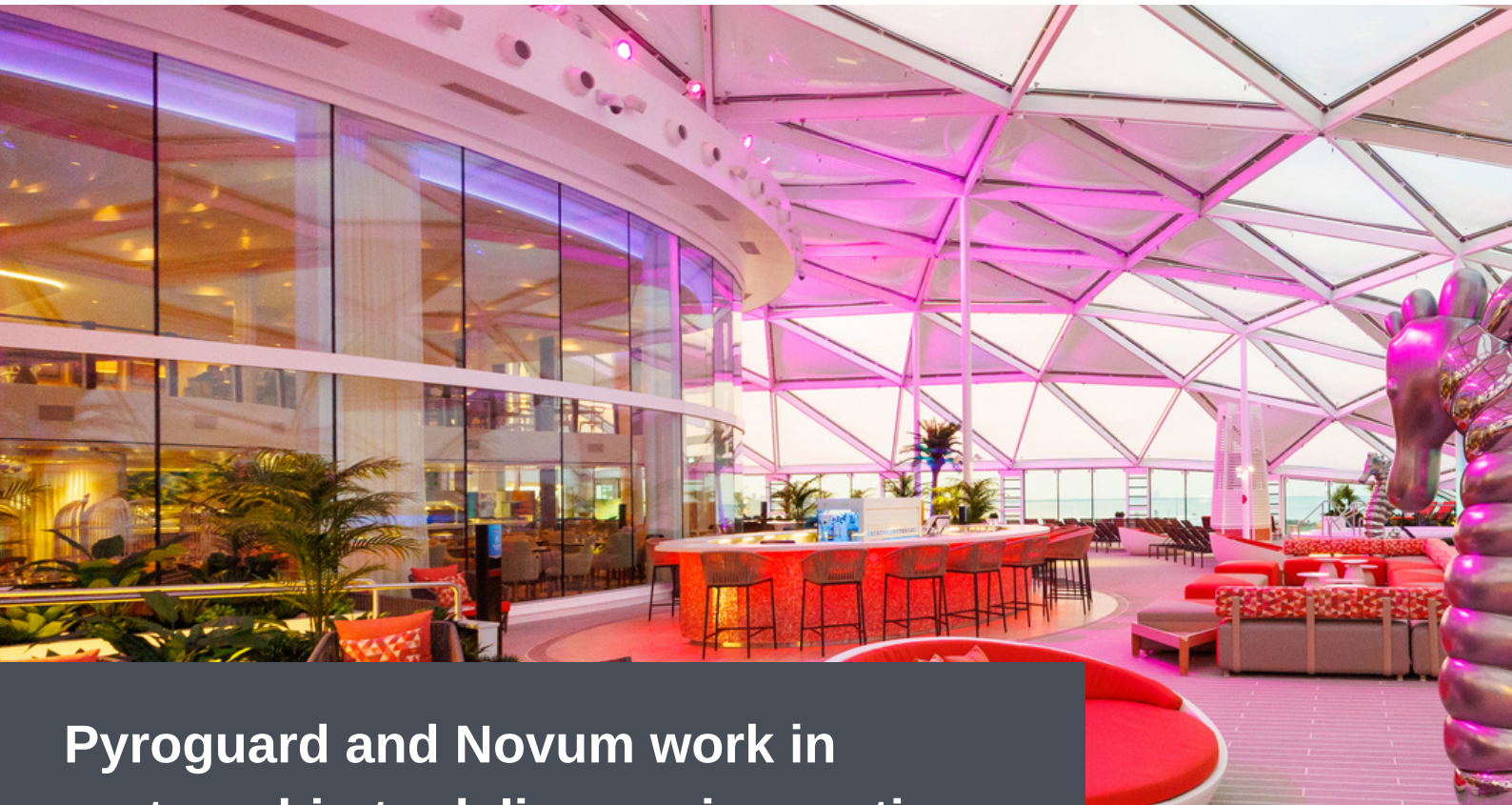


Royal Caribbean's 'Wonder of the Seas'



Pyroguard and Novum work in partnership to deliver an innovative clear view façade glazing system that meets fire and performance requirements of a luxury cruise liner

Product: Pyroguard Marine

Client: Royal Caribbean

Installer: Novum Structures

Date: 2022

Novum Structures, a globally recognised specialist marine contractor in glass, steel and ETFE, and Pyroguard, the world's leading independent provider of fire safety glass, have worked in partnership to design a fire-rated, clear-view façade glazing system that is fully tested and accredited to meet A30 and A60 fire resistance criteria for use on cruise liners.

The innovative solution was developed for the Royal Caribbean Group and first used as part of its latest 'Wonder of the Seas' liner, which was launched in 2022.



You're in safe hands



Novum Structures approached Pyroguard to support the company in meeting the challenges and specific requirements of the project. The requirement was to produce glazed wall panels and a clear-view façade which complied with fire safety standards whilst meeting aesthetic requirements and achieving a lightweight design.

Designing and implementing fire safety glass on a cruise ship presented a series of complex challenges that required Pyroguard's technical expertise and close collaboration with Novum.

One of the main challenges of supplying glass solutions to the marine sector is ensuring the system does not exceed stringent weight recommendations. In shipbuilding and the marine sector, weight is a crucial factor as it can impact overall efficiency, fuel consumption, stability, balance, and performance.

Novum's design aimed to achieve the maximum glazed area, with minimised steel frame, offering an unimpaired vision for the passengers.

This presented additional challenges, as the system needed to maintain its structural integrity to meet strict fire resistance and other marine standards.

This project also had stringent requirements for noise reduction, impact resistance, and load-bearing capacity. The glazing system had to deliver exceptional fire resistance while maintaining a clear-view façade glazing system without obstructing frame elements. Specifically, it had to meet A30 and A60 fire-resistance criteria.

A key engineering challenge was the curved configuration of the glazing system. Traditional curtain wall systems would have required extensive use of steel supports, significantly increasing the overall weight and obstructing passenger vision.



To address the design and weight challenges of the project, Pyroguard, in collaboration with Novum, proposed the use of a butt-jointed glazing system. This provided a structurally efficient and lightweight solution that offers the necessary flexibility.

This approach also enhances visual clarity, light transmission and UV stability without compromising safety. The design of the system minimised the use of additional steel reinforcement, meeting the unique design requirements and significantly reducing the overall structural load.



Pyroguard's toughened fire-rated glass is designed to withstand fire exposure for up to 60 minutes. The installation consists of 280 m² of 32 mm thick glass comprising three layers of toughened safety glass with two active gel interlayers. The internal cavities of the profiles are filled with non-combustible insulating materials to minimise heat transfer, resist high temperatures and provide excellent insulation, effectively preventing the spread of flames, smoke and heat.

The glazing system is supported by a robust stainless steel profile structure, made from 1.4401 grade steel, which was selected for its superior corrosion resistance in marine environments.

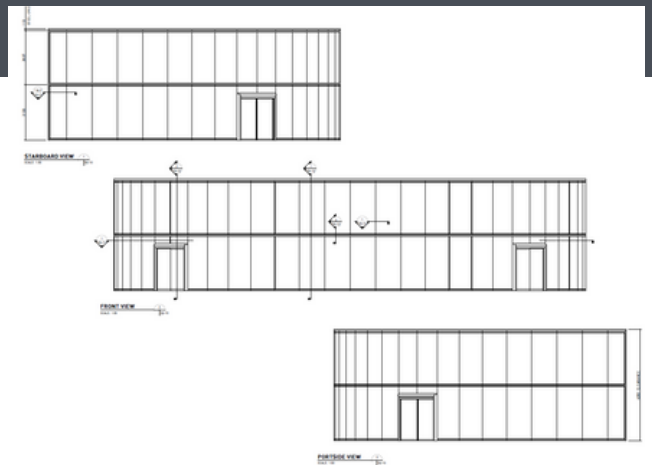




The system was tested to ensure that it met the required fire safety standards for the marine environment. The testing was carried out by the accredited test laboratory Efectis in France. To meet the A60 class requirement, the system must withstand flame for 60 minutes without catching fire on the unexposed side. The system successfully achieved an A60 class rating for straight walls and an A30 class rating for faceted walls.

The Pyroguard and Novum glazing solution achieved IMO MED (International Maritime Organisation Marine Equipment Directive) certifications, which ensure the system meets strict fire and safety performance for marine applications.

Steve Goodburn, Business Development Director, at Pyroguard, said: *"We are delighted to be working closely with Novum to develop fully tested and certified fire-rated, clear-view façade glazing systems for cruise liners. This was a complex project that involved the expertise of our technical teams and it was great to partner with Novum from an early stage on the project. Once the system was fully tested and certified, it was delivered on schedule to meet the client's exacting requirements."*



"We are excited to offer the cruise market a fully tested and certified fire-glazed system, and it was fantastic that its first use was on such a prestigious cruise liner. The project had its challenges and complexities but by working closely with Pyroguard, we were able to meet all the fire safety and performance requirements of the glazing system. Together we have pushed the boundaries of design and innovation with this newly developed curved glazing façade that complements the aesthetic requirements with maximum light transmission and minimum weight."

Richard Mattocks, Managing Director, Novum Structures



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