



BUMAX solves corrosion issues on one of the world's largest wooden roller coasters

The Balder roller coaster at the Liseberg amusement park in Gothenburg, Sweden, is said to be one of the best in Europe – but was in urgent need of a high strength and corrosion resistant screw solution following two failed fastener solutions.

Customer demands

The Balder roller coaster was opened in 2003 with 8.8/10.9 carbon steel screws that began corroding, rusting and braking after only a few years. Liseberg started replacing the carbon steel screws with A4 screws, but these were too weak and also started breaking.

A strong but flexible and fatigue resistant screw was needed to secure the roller coaster rails to the wooden frame, which expands, contracts and moves throughout the different seasons. Corrosion resistance was also necessary to deal with the impregnated wood, and the corrosive local environment caused by vehicle emissions from the adjacent E6/E20 highway and salt water from the nearby sea.

The BUMAX solution

The Liseberg amusement park approached BUMAX for a solution, and 355 mm long specially designed M10 BUMAX® 88 screws were used to successively replace the existing carbon steel screws between 2009 and 2018.

As of March 2019, no issues have been reported with the BUMAX® 88 screws installed.

BUMAX partner collaboration

BUMAX cooperated with Liseberg to develop a custom-made BUMAX® 88 screw specifically for use on the Balder roller coaster.

One of the main reasons why BUMAX® 88 was a success compared with the fasteners Liseberg had previously tested was its excellent fatigue resistance.

About BUMAX:

BUMAX is the world-leading specialist manufacturer of premium stainless steel fasteners in a variety of steel grades that provide optimal safety and reliability in the most demanding customer applications. Customers include CERN, ABB, Alfa Laval, Alstom, Vestas, Rolls Royce and many more in industries such as marine, automotive, oil and gas, chemical processing, energy, defense, pulp and paper, construction and general engineering. BUMAX is headquartered in Åshammar in Sweden's steel district and has a global footprint with offices or distributors in more than 30 countries on four continents. BUMAX is fully owned by the listed Swedish Bufab Group. Find out more at <https://www.bumax-fasteners.com/>.

Third-party tests have shown that standard BUMAX® 88 can withstand 10 million cycles at a preload stress of 400ff155 MPa with no screw fracture. This compares with 0.4 million cycles before an A4-80 screw fractures.

Customer benefits

Cost savings

Before all the screws were replaced with BUMAX® 88, fractured screws had to be replaced on an ad hoc basis, which resulted in ongoing costly maintenance and operational delays for the roller coaster.

Safety benefits

Roller coaster safety is paramount and BUMAX® 88 ensures that the roller coaster continues to function safely. There is also now no need to replace screws on the roller coaster, which previously required potentially risky maintenance work at height for the Liseberg maintenance team.

Environmental benefits

Stainless steel is 100% recyclable and retains its original physical properties in the process. This recyclability reduces the use of virgin material and lifecycle carbon emissions.

Key facts – BUMAX® 88 screws

Crucial properties:

- High strength and flexibility
- Fatigue resistance
- Excellent corrosion resistance

Number of screws:

8,000-10,000