



## Press release

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### **SANDVIK HELPS SAVE VASA THROUGH R&D COOPERATION WITH THE VASA MUSEUM**

**The Vasa Museum and Sandvik cooperation involves a critical project to replace 5,000 wrought iron bolts on the Swedish heritage vessel with unique bolts in highly advanced stainless steels from Sandvik, normally used within the demanding oil/gas-industry.**

A Swedish national treasure, Vasa capsized and sank as it prepared for its maiden voyage in 1628, it was successfully raised from the bottom of the harbour in 1961 and carefully restored. It has since become a top visitor attraction in Stockholm, attracting in excess of 1.1 million visitors a year from all around the world.

The research and development cooperation between the museum and Sandvik, which it is estimated will take over 5 years to complete, will see the replacement of the majority of iron bolts, installed in the 1960's, with unique bolts in highly advanced stainless steels from Sandvik, suited for the most demanding environments. The existing iron bolts were installed for their strength and durability, but have since been discovered to be reacting with the atmosphere and consequently causing chemical erosion, which is damaging the historic woodwork of Vasa.

Initial discussions between the Vasa Museum and Sandvik took place 2 years ago, leading to further investigations into the existing iron bolts and potential replacement materials.

The Vasa Museum was keen to test different materials on a sample of 200 bolts exchanged in order to test viability and suitability. The final choice came down to a decision between carbon fibre and high-alloyed stainless steels from Sandvik.

“We decided to go with the high-alloyed stainless steels from Sandvik because they proved to be the most suitable and versatile, and from our point of view the easiest to work with,” explains Magnus Olofsson, Head of Vasa Unit. “The carbon fibre option took longer to exchange the bolts, whereas there was a very good exchange using the Sandvik material”.

The replacement of the bolts is a complex procedure because the Vasa Museum has to remain open and active at all times, to continue to bring in visitors who provide crucial revenue, so important in the continued preservation of the vessel.

During the process it is vital not to cause any undue movement in the ship that could compromise its structure. This makes bolt replacement a slow process. Therefore, the detailed plan is to replace 3 bolts in any one area at a time and an estimated maximum of 6 per day. Overall, the aim is to replace around 1,000 bolts per year.

“We had to meet stringent material requirements with our replacement bolts,” explained Jan Haraldsson, Manager R&D Machining Lab at Sandvik Materials Technology. “The bolts had to be long lasting – for a minimum of 100 years, non corrosive, safe, strong, but also flexible enough to fit holes that are potentially misshaped, in order to fit in with the long-term plan of preserving Vasa for another 1,000 years.”

“Each Sandvik stainless steel bolt is made up of 7 or 8 separate items, including tube, bar, nuts, washers and springs and can vary in length, with some up to 2 metres long,” explained Björn Larsson, Sandvik Marketing & Sales Manager, Tubular Products, Sweden.

“We are using special super-duplex materials, in addition to Sandvik SAF 2707 HD®, an advanced hyper-duplex stainless steel developed by Sandvik.”

“The replacement process time varies,” explains Anders Ahlgren, Engineer and Project Coordinator, from the Vasa Museum, “many of the holes are at difficult angles. In some cases the wood around the bolt is damaged so this has to be cleaned and repaired before the bolt can be fitted”.

A mechanical tool is supplied by Sandvik, which helps to carefully extract the corroded iron bolt. The hole is then cleaned, removing any corrosion and clay acquired from the sea bed, before the same mechanical tool is used to help install the new bolts made from Sandvik stainless steel.

Sandvik and the Vasa Museum agreed that the first 1,000 bolts should be installed followed by a period of monitoring crucial factors including, the bolt itself, the wood around the bolt and the movement of the bolt in its position. The results of this analysis can then be used to determine the ongoing progress of the project and if any adjustments are required.

“Having the opportunity to test our material in a meticulously controlled environment, as the one Vasa offers, is very important for us; the time frame for the project gives us a unique opportunity to follow the material in a way that would otherwise be nearly impossible to mimic.” says Olle Wijk, R&D Director for Sandvik Materials Technology.

Dr Marika Hedin, Vasa Museum Director, explains, “Working in conjunction with Sandvik we aim to preserve Vasa for another 1,000 years, which should be completely feasible taking into account the preservation carried out on the timber structure of Norwegian churches of a comparable age.

“We have 10 full-time people engaged on a daily basis ensuring Vasa is being continually preserved. With a vessel of this age it is an essential, on-going requirement. It has been a pleasure working so closely with the Sandvik people not least because the company’s extensive history which shows a lot of similarities to that of Vasa, and the museum: Both Sandvik and Vasa were built with a clear international focus, using the cutting edge technology of its day, and now Sandvik and the Vasa museum again apply cutting edge technology in order to preserve the ship for another 1000 years.”.

Coincidentally, the announcement of the cooperation comes just before the 50<sup>th</sup> Anniversary of when Vasa broke the surface in Stockholm harbour back in April 1961. This Anniversary will be celebrated from April and throughout 2011. And next year, 2012, Sandvik will celebrate its 150<sup>th</sup> Anniversary.

### **Sandvik Group**

The Sandvik Group is a global high technology enterprise with 47,000 employees in 130 countries. Sandvik’s operations are concentrated on three core businesses: Sandvik Tooling, Sandvik Mining and Construction and Sandvik Materials Technology – areas in which the group holds leading global positions in selected niches.

### **Sandvik Materials Technology**

Sandvik Materials Technology is a world-leading manufacturer of high value-added products in advanced stainless steels and special alloys, and of medical implants, steel belt-based systems and industrial heating solutions.

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