Building bridges to better insight

Sund & Bælt finds value in intelligent infrastructure

by Ryan Bertrand

6-minute read

Around the US, more than one in three bridges are crumbling and need repair.

The 2020 American Road & Transportation Builders Association (ARTBA) Bridge Report (external link) says that more than 46,000 US bridges are “structurally deficient” and are in poor condition — and that those bridges are crossed 178 million times a day.

Crumbling infrastructures are a concern throughout the world. The G20 Global Infrastructure Outlook (external link) predicts that there will be a USD 15 trillion gap between infrastructure funding and the work that must be completed by 2040.

Sund & Bælt Holding A/S owns and operates some of the largest infrastructures in the world, including the Great Belt Fixed Link — an 11-mile bridge and tunnel combination that is the largest construction project in Danish history. The company knew that one of its greatest challenges was the slow and manual process for conducting regular maintenance inspections. To inspect bridges, Sund & Bælt often hired mountaineers to scale the sides and take photographs for examination. An inspection could take a month, and the process had to be repeated frequently for bridges near oceans or

in other corrosive environments. The company also needed to inspect all of its tunnels and other infrastructure elements.

“Quite a bit of our operation is doing inspections of our concrete services and other assets,” says Bjarne Jørgensen, Executive Director of Asset Management and Operations at Sund & Bælt. “We have more than 300,000 square meters of concrete that has to be visually inspected every six years. That is heavy work to do manually, and it’s very expensive.”

Sund & Bælt identified that it could reduce time and costs while improving quality if it automated more of its inspection work. “Three years ago, we decided to take our maintenance to the next level. We wanted to move into the green field of digitization and go from repair and maintenance to asset management,” Jørgensen says.

Projected lifespan extension for Great Belt bridge

100

years

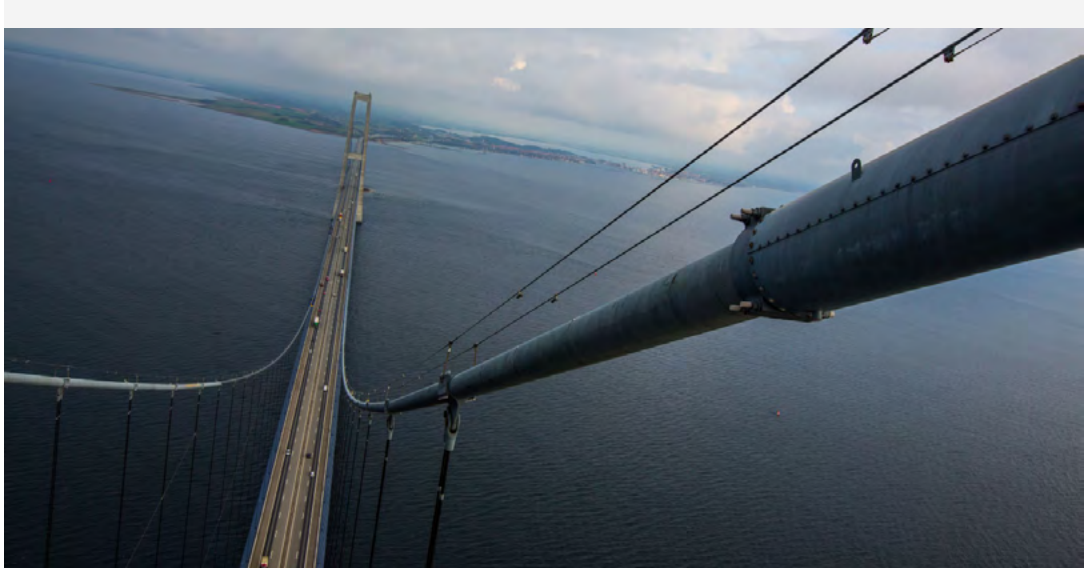
CO_2 emissions saved by extending the bridge’s lifespan

750,000

tons

The clarity of data

To inspect and maintain civil infrastructure in a more technologically advanced way, Sund & Bælt sought a technology partner with global expertise and comprehensive capabilities. The company chose IBM, and together they formed a collaboration to create what became the IBM® Maximo® for Civil Infrastructure solution. Now, Sund & Bælt is using the Maximo software to monitor and manage its critical infrastructures.



The new solution includes the IBM Maximo Application Suite, with technology that helps Sund & Bælt inspect infrastructures, access insights with mobile devices on location and use AI technology to carefully and efficiently analyze data about the conditions of bridges, tunnels and other infrastructure elements.

With the new solution, Sund & Bælt gathers data from drone photographs to monitor status without dangerous and time-consuming human inspections. The solution consolidates this data with maintenance records, design documents and 3D models to help identify cracks, rust, corrosion, displacement and stress.

“Now we know the traffic load, repetitions, how it is actually swinging — and through that, we can calculate

the lifetime and look at the most critical areas," Jørgensen says. "We are developing digital twins, and we can make calculations to answer, 'If traffic load is changing, how will that affect our bridge?'"

Accelerated work order management and contract management functions help the company respond to the latest data. With improved defect management, asset management and decision-making capabilities, the company can make faster and better decisions if emergencies develop — but it can also plan ahead.

"We use 3D models to optimize the maintenance work," Jørgensen says. "We can prepare for the work before we actually send 50 – 100 people down there into a tunnel that is five miles long. We have very narrow windows for closure, and we have to be efficient in those windows."

> "We wanted to move into the green field of digitization and go from repair and maintenance to asset management."

Bjarne Jørgensen, Executive Director of Asset Management and Operations, Sund & Bælt Holding A/S

The value of proactive vision

The Maximo for Civil Infrastructure solution gives Sund & Bælt capabilities that both streamline inspections and clarify predictive maintenance strategies. The company has seen benefits that are on course to yield significant value in the next 10 years.

“Within a timeframe of 5 – 10 years, we’re looking at an increase in productivity of 15% – 25%,” Jørgensen says. With streamlined inspections and real asset management, the company can improve its responses. “We are looking at how we can reduce the risks and reduce the time from when we see an incident to when we can repair it. There, we’re looking at a reduction in time of more than 30%.”

With a better understanding of asset health and the risks to address with proactive maintenance, Jørgensen estimates that the solution will help increase the lifetime of bridges, tunnels and other assets. “This is where it really gets interesting. Our own Storebælt (Great Belt) Bridge has been built for a lifetime of 100 years, but with the right use of data and digital solutions we expect to increase the bridge’s lifespan by 100 years. By increasing the lifetime, we are also decreasing our total carbon footprint.”

In the future, Sund & Bælt is planning to expand visual inspections even further. With such large areas to inspect, the company is always driven to find problems sooner and more efficiently.

“The more we can use robots, drones and other new technology to do our inspections, the more safety and quality we can achieve from the inspections,” Jørgensen says.

About Sund & Bælt Holding A/S

Sund & Bælt (external link) was established in 1991 as a public limited company for the construction of the Great Belt Fixed Link, an 11-mile bridge and tunnel combination that is the largest construction project in Danish history. Headquartered in Copenhagen, Denmark, the company now develops and operates a range of bridges, tunnels and roads. Sund & Bælt Holding A/S also handles the overall management of its subsidiaries A/S Storebælt, A/S Øresund, Sund & Bælt Partner A/S, BroBizz A/S, A/S Femern Landanlæg and Femern A/S.

Solution components

- IBM® Maximo® Application Suite
- IBM Maximo for Civil Infrastructure

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