atvise® scada

SAFE PASSAGE

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The construction of the Cuxhaven sea lock in the 1960s provided access to a new fishing port. The aim was to protect the harbor from ocean tides. At the same time, the connected lock system protects both port and city from storm surges. The operating technology was completely replaced in 2022 – with atvise® scada from Bachmann.

The Cuxhaven sea lock is 190 meters long, 24 meters wide and 9 meters deep. The facility has three lock gates, one each in the outer, middle and inland sections. The special feature here is that both the upper and lower lock gates also function as bridges for road traffic. To open the gates, the bridges are raised and the lock gate slides underneath the road – a spectacular feature that has attracted thousands of visitors over recent decades. In addition to shipping traffic, the lock keeper must also monitor civilian traffic, which is made possible with the help of sophisticated video surveillance.

Future proof control

Due to its role in flood protection, the Cuxhaven sea lock is defined as critical infrastructure. In order to maintain operational safety, particularly against a background of constantly increasing traffic, the control system had to be replaced. Spare parts were no longer available and operator Niedersachsen Ports faced various challenges. Firstly, the main control station had to be connected redundantly in accordance with the latest safety standards. The system is connected by fiber optics and located a few kilometers away at the harbor master's office. One server is located there, a second one is installed at the lock tower in the second (emergency) control station. At the same time, the new solution had to be able to integrate the existing lock technology, as well as numerous surveillance cameras.

Safety first

So, they were in need of a future-proof SCADA solution that could be designed redundantly and worked via the web. "The redundant system design was our first priority, because the lock has to function at all times in the event of an impending flood," says Jürgen Höpcke, Technology Project Manager at Niedersachsen Ports. Due to its critical status, the lock can always be closed in an emergency, even by hand: "If the control or visualization system goes down, then we can go to the control station in the lock tower and bypass the PLC manually," explains Höpcke. "If that doesn't work, then, as a last resort, we can throw a belt on the drive and connect the motor directly to the lock mechanics." At that moment, only one thing matters: Closing the gates, no matter what, to secure the port and facilities behind it.

Modern meets antique

Another challenge was to combine the existing drive technology, which is over 60 years old, with modern operating logic. The door operators are controlled by a Ward-Leonard system. This electric motor speed control is an old but extremely robust and stable technology. Replacing it would be extremely costly, and would also involve shutting down operations. In addition to the electrical components, the drivetrains on both gates would have to be replaced.

Comprehensive risk assessment

Despite the demand for economic efficiency, the top priority was and is system safety and reliability. "The risk assessment and coordination of the entire sys-tem was carried out in accordance with the Machinery Directive 2006/42/EC and with a corresponding Failure Mode and Effects Analysis (FMEA)," explains Jan Block from HIT Hafen- und Industrietechnik, the project's system integrator. Each gate therefore has its own fail-safe control system and can be operated completely autonomously.

Familiar operation

Security issues were also a top priority in the operating technology. Therefore, operation from outside the company network was deliberately excluded: "It's about cyber security, but it's just as much about availability and operability, which can't be guaranteed with an external workstation," says Jürgen Höpcke.

The implemented SCADA system was based on atvise® from Bachmann, which really shows its strengths here: "There are several points of operation within the facility that require a visualization of the lock. This is much easier with pure web technology, and it is also equipped for the future," says Jens Schürmann, owner of the engineering office JSEngineering, which planned and implemented the system. "In addition, atvise® delivers a strong database platform, making it easier for us to carry out the necessary operational data logging." Schürmann was impressed by the openness of atvise®, which enabled him to base the user interfaces very closely on previous versions: "This not only increases operator acceptance of the new solution, but also definitely improves safety. A familiar environment is of great help in a stressful situation."

More than expected

"I think we did a good job," says Jürgen Höpcke. "We have a future-proof platform that we could get familiar with very quickly. Every participant had the flexibility to respond to requests throughout the project. This allowed us to make some additional gains, for example with new displays that we could not visualize at all in the old control panel view. And we found that any problems were solved extremely quickly."

The Cuxhaven sea lock control room: Several operators can work simultaneously thanks to atvise® web technology.

A ship entering the Cuxhaven sea lock.

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