



A new wave of technology

new wave generation system
based entirely on electric technology

Hannover University is known for being able to offer the very best in coastal research, and one part of its facility is the large wave flume which contains a hydraulic wave generation system. However, the university wanted to be able to improve the quality of its waves and the efficiency of its facility, and asked Van Halteren Technology to engineer a new wave generation system based entirely on electric technology.

In coastal research facilities like the one at Hannover University, being able to accurately create waves and water behavior is essential. Researchers want to be able to see how different conditions will affect bridge materials or coastal structures, and make construction and design decisions based on this information.

The hydraulic system in place is capable of this, but technology moves on and improves, so the decision was made to modernize and upgrade its wave generation system. The university asked VHT to design a fully electrical system with the best possible wave performance and optimal efficiency.

The better the wave performance, the better the research outcomes become. This, in turn, leads to more requests to use the facility and, ultimately, increased funding. It's also crucial to the accuracy of the testing, as almost everything is done on a scale to ensure everything can fit in the flume. This means if there's a small inaccuracy on a coastal or civil test that's being done at a scale of, for example, 1:50, this variance will be multiplied in the real world which can have significant impacts and could lead to misinformed decisions and costly mistakes.



Electrical expertise

Although hydraulic systems are effective, they also require specialized knowledge due to their complexity, and they require frequent maintenance. Also, in the event of failure, oil can leak from the system into the water, which affects wave performance and the accuracy of test results. Hannover University want to change its wave generation technology but keep the same flume, and VHT has engineered the ideal solution.

The new system is driven only by electricity, and is smaller, easier to maintain and more energy efficient. VHT has extensive expertise in electrical drive and control systems, and used that experience to design a state-of-the-art wave generation system. During the design process, it also became clear that Hannover University needed to update the existing flume to better cope with the anticipated forces from waves, and VHT was also able to provide input data how to reinforce the concrete structures, and subsequently adapt the wave generation system's design.

The target is to get better wave performance and they also have a tidal simulation system. The wave generator needs to work with this tidal technology, which changes water the water levels in the flume. With this new system, the customer has a flume and research institute that is producing better quality waves and tidal simulations, and has a system that's ready for the next 30-40 years.

State-of-the-art technology

Moving from a hydraulic system to an electric solution designed by VHT will have a number of benefits. Most importantly, the wave quality will be higher than ever before, allowing for better, more reliable research. This, in turn, will lead to the research center being even more in-demand than before. It's also a more efficient, environmentally friendly solution, and takes up less physical space.

The support and engineering expertise VHT is offering is very important to the customer. From the initial design and changing the design to fit the new foundations, to the projected performance of the new system the customer has really appreciated our input throughout the project. As a collaboration, we have all experienced and offered great flexibility, cooperation and communication throughout.

Future proof

Hannover University is happy with the results so far, and VHT is looking to provide more of these system upgrades in the years to come. This project is unique, and gives VHT new exposure to show the world what it's capable of. The waves and wave performance coming from the electric drive are unique in their quality, and it will be state of the art for a long time. Most similar facilities use hydraulics, so electric wave generation is unique in this niche market.

