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CONSIDERATIONS FOR DESIGNING A NEW WAVE GENERATOR SYSTEM IN AN EXISTING FLUME

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ABSTRACT

Van Halteren Technologies Boxtel B.V. (formerly known as Bosch Rexroth B.V.) has designed, manufactured, installed, and commissioned the new electrical driven wave generator system in the existing Large Wave Flume (GWK) at FZK in Hannover.

The aim of the replacement was designing a new wave generator system, with optimized performance in the given space in the existing flume, and replace the hydraulics for an electrically driven system.

The width and depth of the flume are five and seven meters respectively. The water depth is variable up to five meters. In order to get the most out of the finite length of the flume the space for the wave maker is limited. Given the limited space for the wave maker we had to apply a dry back wave generator system which has the advantage of a rather compact design compared to a wet back wave generator. This also introduced challenges such as a seal system around the moving wave segment at the side walls and floor as well as a compensator for compensating the static force of the variable water depth. The hydrodynamic forces are provided by the electrically driven system.

The wave generator has been provided with an Active Reflection Compensation system (ARC) for compensating the reflected waves traveling to the wave segment. This ARC must be capable to handle variable water depths, even when the water depth is changed in order to simulate high and low water conditions.

What optimization should be worked out during the design of such system?

- Stroke of wave segment vs available space in existing flume.
- Reaction forces of wave generator system vs available concrete foundations.
- Required electrical power vs. available power.
- Strength vs stiffness vs dynamic performance of wave segment (wave performance).
- Dedicated solutions and parts vs standard available solutions and parts.
- System settings / configurations vs user requirements.

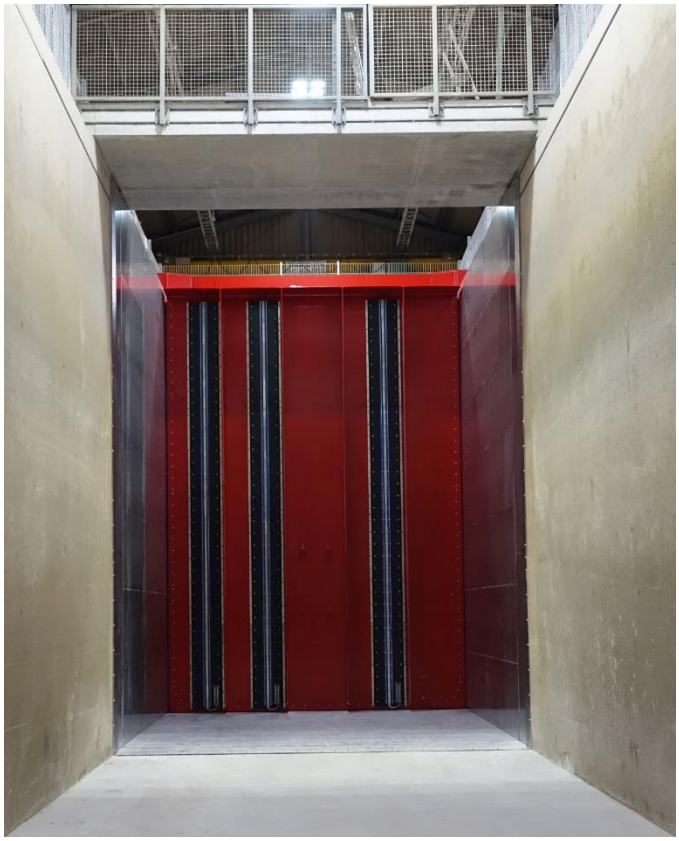

Figure 1. The new Van Halteren Wave paddle in Hannover.

During the presentation, VHT will focus on the above mentioned items, the consequences of choices to be made as well as showing the final result of this development.