

Demonstration of a Condition Monitoring System for Tidal Stream Generators / TIDALSENSE DEMO

the objective of the project

To develop a technique for structural health monitoring of tidal stream generators using combination of long-range guided waves and acoustic emission.

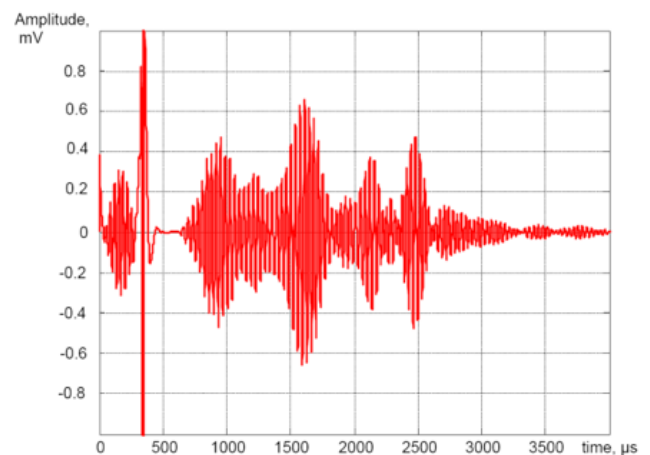
To develop a novel transducers and array of transducers with integrated acoustic emission and long-range ultrasonic capabilities. These transducers enable effective detection and localization of structural flaws in the elements.

To develop a new multi-functional and multi-channel hardware for generating and receiving the signals with possibilities for transfer of collected data using wireless communications channels and software for data visualization and collection, focusing, signal processing, structural noise reduction and data transmission.

To integrate individual components of the system and to develop a prototype in order to make laboratory, and trials on real elements under simulated conditions.



The example of tidal power plant installation



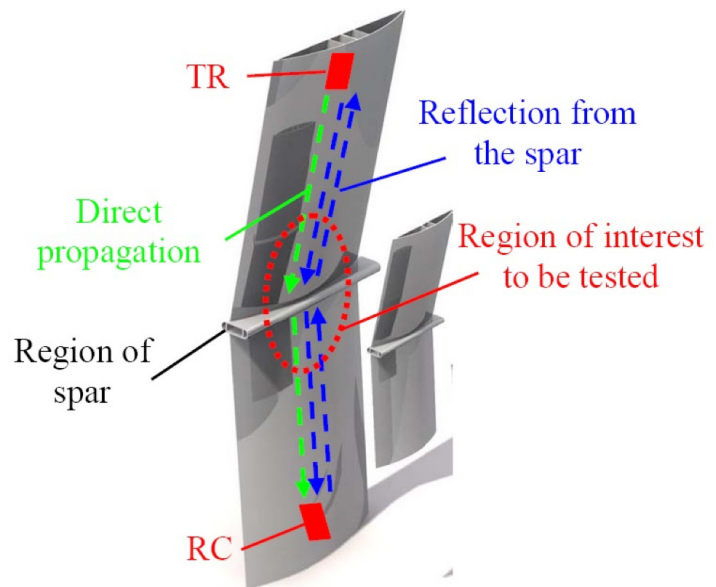
Waveform of the ultrasonic guided wave signal transmitted along composite sample of hydrofoil

problem

At present, there is no inspection technique for tidal stream generators other than visual inspection using ROVs, but there are many methods that could be applied for inspection of tidal stream generators, such as ultrasonic testing and radiography. Unfortunately, most of these inspection methods are not suitable for monitoring of tidal stream generators, mostly because their application is very difficult and dangerous under water and because of their low inspection speed and high price. The solution could be the development of the fast technique which can monitor and inspect a large component using a single location. Remote condition monitoring would reduce or eliminate the need for inspection personnel to travel out to these installations, which would be located in regions of fast-moving tidal flow and may be completely submerged, making access hazardous.

ultrasound institute

Carried out the modeling of guided wave propagation in the composite samples of tidal power plant and estimated the optimum transducer configuration. Ultrasound Institute was also involved in the development of the transducer arrays and in the implementation of the measurement instrumentation.



Arrangement of ultrasonic transducers on hydrofoil

related publications

1. R. Raišutis, L. Mažeika, V. Samaitis, A. Jankauskas, P. Mayorga, A. Garcia, M. Correa, B. Neal. Application of ultrasonic guided waves for investigation of composite constructional components of tidal power plants, Application of contemporary non-destructive testing in engineering : conference proceedings of the 12th international conference of The Slovenian Society for Non-Destructive Testing, Portorož, 4-6 September 2013, Slovenia. Ljubljana, 2013, p. 1-8