



The use of fibre-optic sensors for in-service structural monitoring of tidal energy turbines

Abstract

Tidal energy turbines have to operate in an unusually aggressive environment. In addition to hydrostatic pressure and corrosion, they have to withstand very high drag loads, large variation in water velocity across the diameter of the rotor and often a highly turbulent flow. Accurate measurement of the in-service loads on the blades and base structure can provide vital information for verifying the design load cases, and the response of the structure. This is key information to enable optimisation of future designs. In addition, such measurements can enable long term health monitoring of structure throughout its operational life.

Fibre-optic sensing technology has now been applied with great success on a significant number of tidal energy projects. In this paper we will provide a brief overview of the theory of fibre-optic sensing and of the reasons why it is appropriate for this type of application. We will then examine the practical aspects of designing, installing and operating a fibre-optic sensing system on a typical tidal energy project and will also look at some typical data from an operational turbine.

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