*Composite photo of an optimized flight path for the TU Delft kite (August 2017)*

*Flying the 25 $m^2$ kite of Kitepower at a tether length of 250 m (27 July 2017)*

# Systematic Reliability and Safety Analysis for Kite Power Systems

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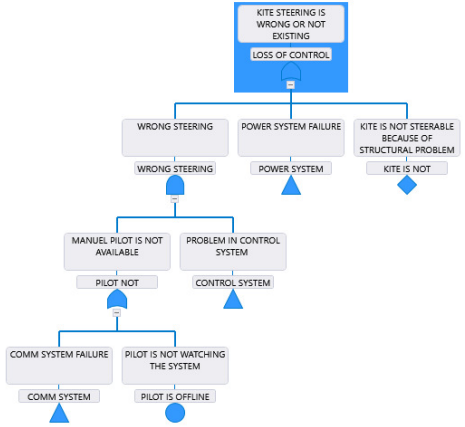
Due to the emerging interest in Airborne Wind Energy, a considerable number of prototype installations is approaching a commercial stage. As a consequence, operational safety and system reliability are becoming crucial factors for technology credibility and public acceptance.

In our case study, we investigated the reliability and safety level of the current 20 kW technology demonstrator of Delft University of Technology, which is also the starting base of the EU Horizon 2020 project REACH. The objective of the REACH consortium is to develop a commercial 100 kW version of the demonstrator. The project team systematically improves the system's reliability and robustness with the aim of demonstrating 24 hours of continuous automatic operation without any pilot intervention. To achieve this goal, reliability and the safety level of the system are analyzed using two traditional methods, FMEA (Failure Mode and Effects Analysis) and FTA (Fault Tree Analysis). From the conducted analyses, hazardous situations and the mechanisms that lead to unoperational or hazardous states are defined. Consequently, mitigations are offered to prevent these mechanisms. It is found that a majority of the proposed mitigations can be performed by a Fault Detection, Isolation and Recovery (FDIR) software component. Development process improvements are offered for the components for which it is impossible to decrease the risk using the FDIR.

In this talk, author will present the key points and the important results of the reliability analyses. In addition, proposed FDIR architecture will be discussed.




*Loss of control subtree from Fault Tree Analysis*