The research commercialisation office of the University of Oxford, previously called **Isis Innovation**, has been renamed **Oxford University Innovation**

All documents and other materials will be updated accordingly. In the meantime the remaining content of this Isis Innovation document is still valid.

URLs beginning www.isis-innovation.com/... are automatically redirected to our new domain, www.innovation.ox.ac.uk/...

Phone numbers and email addresses for individual members of staff are unchanged

Email : enquiries@innovation.ox.ac.uk

Tip timing trigger

Available to licence: Tip timing monitoring method

Enabling accurate and reliable measurement of turbine blade motion delivers improved condition monitoring and a reduction in unplanned downtime for turbine operators

Tip timing

A turbine is typically composed of a number of equi-spaced blades (see image). A sensor monitoring the arrival of the tip of each blade provides a method for diagnosing the health of individual blades; the turbine and the machine of which the turbine is a part. To take one example, if the blade's arrival time is later than expected then the blade may be missing, damaged or displaced by vibration. The Oxford invention addresses this problem directly. When the "tip timing" is both accurate and reliable, monitoring each blade's arrival in real time enables an invaluable health monitoring capability.

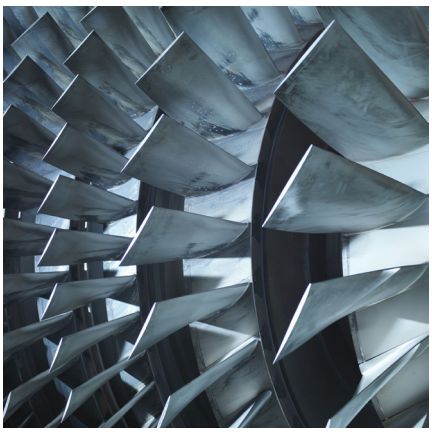
Benefits

- Improved engine availability through early detection of blade faults allowing machine operators to offer premium service offerings: in industrial power applications the value of offering 95 percent availability can be up to £30k/yr for a 14MW machine.
- Reduced support costs to turbine operators through 24/7 data gathering covering master alarms, foreign object damage (safety critical in aero engine applications), monitoring of operational modes e.g. detection of blade flutter, and long term trending.
- Reduction in unplanned downtime through significant improvements in accuracy and reliability over current state-of-the-art solutions allowing enhanced condition monitoring, e.g. vibration mode detection.
- Improved data gathering provides audit capability for turbine manufacturers to avoid and resolve service delivery disputes with customers.

The Oxford invention is designed to overcome limitations in existing tip timing solutions using eddy current sensors. In addition it can be retrofitted to existing installations and adapted to other sensing modalities. Consequently the invention can find application wherever tip timing sensors can operate, for example across a range of operating temperatures and pressures and a range of turbomachinery.

Commercial opportunities

Concept and simulation work has been completed. Funding is in place through the EPSRC's IAA programme to build and test a blade health monitoring system incorporating the new tip timing trigger in collaboration with a major turbine manufacturer. The goal of this work is to validate a prototype system incorporating the new trigger in a simulated operational environment to TRL 5. It is anticipated that on successful completion of the IAA programme the technology could be in service within 18 months. This project will be of interest to sensor companies and others active in the aero and industrial gas turbine and related turbomachinery markets.



For further information please contact:
Dr Andy Robertson
andy.robertson@isis.ox.ac.uk
+44 (0)1865 280931
www.isis-innovation.com
Project number: 10927

Technology Transfer from the University of Oxford