

Virtual mission control cuts costs at wind farms

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Running wind turbines is a costly business but Brunel engineers are developing a digital platform that ramps up efficiency and halves costs.

WindTwin will act like a pilots' control panel for wind farm managers, giving them live condition checks on each turbine's working parts.

It will feed data from sound sensors on the turbines' gearbox, generator and other mechanical parts into a 3-D virtual model or 'digital twin' that predicts which need fixing – and when. That lets companies scrap scheduled maintenance and replace or repair broken parts before they do damage.

"The data this software generates has huge potential benefits for the wind turbine industry," said Dr Miltiadis Kourmpetis, at [Brunel Innovation Centre](#).

The savings could be vast – by 2025, running 5,500 offshore turbines could cost a yearly £2bn – almost the same service bill as UK passenger planes.

"Our goal is to develop digital models or clones of a wind turbine which combine mathematical models describing the physics of the turbine's operation, with sensor data from actual parts during day-to-day running," added Dr Kourmpetis. "These virtual models will allow wind farm operators to predict failure and plan maintenance, reducing maintenance costs and downtime."

The digital twin platform will use [big data analytics](#) and advanced visualisation and analysis to draw a real-time picture of the [turbine's](#) condition. This will help maintain and optimise real [wind turbines](#), cutting upkeep costs by up to 30%, researchers calculate. Early breakdown detection will up reliability by as much as 99.5% and reduce losses from downtime by 70%. It also lets workers monitor and control entire [wind](#) farms digitally and remotely.

Digital twin technology is already changing manufacturing and forecasters predict billions of things will be represented by a digital twin with aerospace, oil and gas and transport at the forefront.

The Brunel Innovation Centre team working on WindTwin will target parts for monitoring and use their own machine learning algorithms to crunch the data. They'll also identify sensors needed to track faults.

Brunel University London is working on the £1.4M 30-month WindTwin projects with experts including Agility3, ESI and TWI. Funded by the government's Innovate UK, they plan to sell the digital twin platform worldwide and look at how other industries could use it.

"This is one of the most interesting technologies we are working on," said Dr Kourmpetis.

Provided by Brunel University

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