Case study

NUCLEAR AMRC
ADVANCED MANUFACTURING RESEARCH CENTRE

Insphere collaboration brings innovation to market

Innovative metrology company Insphere launched its new rapid machine tool verification product Baseline at the Nuclear AMRC, after working with the centre to develop and test the technology on its largest machining platform.

The Bristol company's Baseline technology can provide full verification of a large machine tool in less than one hour, facilitating regular checks and providing confidence in performance before cutting metal.

It can reduce machine downtime and material scrap rates, and supports the industry move towards digital manufacturing technologies.

"Our product philosophy is to develop the next generation of metrology products to enable Industry 4.0 manufacturing solutions," Insphere founder and CEO Ben Adeline told delegates at the commercial launch of Baseline, held at the Nuclear AMRC in March 2019. ***"We want to design an ecosystem of metrology products to drive productivity."***

Insphere worked with the Nuclear AMRC's metrology and machining team over a year to test and develop Baseline on the Soraluce FX12000 machine.

Capable of working on pieces of up to 12 metres length and five metres diameter, the Soraluce is the largest machining platform available for collaborative R&D in the UK.

"The aim is to develop a system that will run round and do a full health check on the machine, providing data that can be used to compensate for errors," says Simon Cavill, metrology technical lead for the Nuclear AMRC. ***"That normally takes days, but could be done within an hour or so using Insphere's technology."***

Because current techniques can be very time-consuming, large machines in a busy factory often run for months without verification. Environmental influences, high machining forces, and general wear and tear can all lead to an undetected loss of precision, until workpieces fail inspection and have to be scrapped.

The Baseline system uses laser tracking technology, provided by Nuclear AMRC member Hexagon Manufacturing Intelligence, to rapidly create an accurate three-dimensional picture of the machining platform.

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Insphere's software runs the instrument to gather the data, then applies a set of algorithms to determine variations in any of the 21 forms of geometric error encountered in three-axis machine tools, plus any variation in the rotary axis.

The process takes between 30 and 60 minutes for a rapid "health check" verification of all axes and squareness. A full verification, including tests of the machine's dynamic response, can take from 45 minutes to two hours depending on the size and complexity of the machining platform. The system can also run a full ISO230 compliant test.

By allowing rapid identification of any problems, Baseline can improve productivity by enabling preventative maintenance before anything goes awry, minimising the risks of any unexpected downtime, and reducing scrap. The data can also help integrate large machine tools into data-driven digital manufacturing systems.

"Because you can deploy and run it in such a short time-frame, you can do your machine tool verification much more regularly," says Ben Adeline, Insphere chief executive.

"If you've got to take a machine tool out of production for a week to verify it, you're only going to do that once a year. If it takes just 30 minutes, you can do it every day or every shift. That regular verification lets you get real benefits from the data by tracking your machine tool performance over time."

The Baseline development project was funded by the Aerospace Technology Institute through the National Aerospace Technology Exploitation Programme, and also involved Hexagon Manufacturing Intelligence, Rolls-Royce and the University of Huddersfield.

Adeline sees the biggest market for Baseline in the aerospace sector, for companies making large high-value components such as fan casings and large gear components, but the technology could improve productivity across other large-scale high-precision engineering sectors such as nuclear.

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