

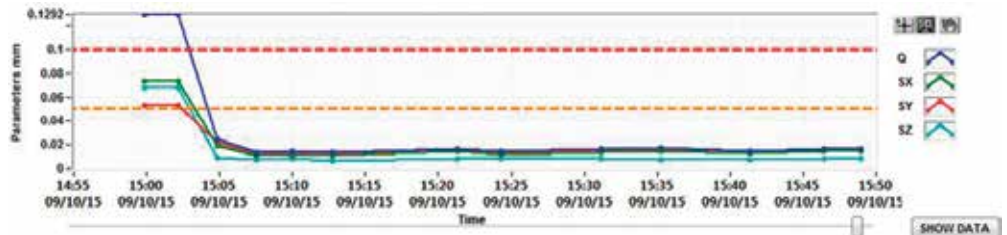
Next-generation 5-axis machine tool metrology

IBS Precision Engineering, metrology experts in Eindhoven, the Netherlands, has launched a new 'Industry 4.0' technology, the Rotary Inspector. It delivers a clear and traceable quality statement for 5-axis machine tools across the factory. As the complexity and precision of machine tools has increased, traditional methods of measuring their performance are failing. With the Rotary Inspector, IBS has pioneered technology which addresses the limitations of current techniques; including automation, dynamic measurement and reduction of the measurement time.



The Rotary Inspector.

KMWE, high-tech supplier for mechatronic systems and complex machined components with headquarters in Eindhoven, is already a customer of IBS for measuring tools. KMWE deploys over 50 state-of-the-art machining centres and its strategy is to be ahead in innovation and technology, in machine equipment but also in processes. Therefore, KMWE was looking for a measuring tool which enables them to conduct quick performance tests on machining centres for both static and dynamic behaviour.



Automatic compensation of a 5-axis machine with a Heidenhain 640 controller. The Q value was reduced from 129 to 16 microns in minutes. Also shown are the underlying maximum individual axis errors (Sx, Sy and Sz).

In cooperation with IBS, KMWE started a project integrating the Rotary Inspector into the machine for measuring. At this moment a pilot is running on five different types of machining centres and the results are very promising. A measuring cycle, in only one minute, during normal production runs, results in a statement about the accuracy status of the machining centre.

The Rotary Inspector is a smart tool for the kinematic quality assessment of 5-axis machine tools following ISO-standardised measurement and generating KPIs defining the geometric and dynamic performance of the machine. Information is provided at a group, cell or factory level, in an auditable manner and real time. As part of the total 5-axis machine tool

accuracy also pivot line offsets and squareness errors are calculated.

Two quality figures are derived from the machine measurement. The Q value is the maximum geometrical error. It provides a boundary for the product form accuracy that may be achieved under 5-axis machining. The P value is a measure of the largest measured dynamic error of the machine, resulting from issues such as backlash or worn bearings. Such errors will be seen in the surface finish of the machined product. With the geometrical and dynamic error data available, manufacturers now have the option for compensation.

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Integration of the Rotary Inspector into a machining centre.