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**New developments in understanding rotary axes performance**

Renishaw has further extended its solutions for checking the alignment and positioning performance of machine tool rotary axes with the launch of new off axis rotary software for its XR20-W rotary axis calibrator.

The new software for the highly successful XR20-W now allows it to be used to measure the rotary positioning accuracy of an axis on many configurations of five axis machine tools, where the XR20-W often cannot be mounted on the centre of rotation. Together with Renishaw’s existing AxiSet™ Check-Up system, which provides machine users with a fast and accurate health check of rotary axis and pivot points, users now have comprehensive tools to identify errors with their rotary axes.

**XR20-W for use ‘off axis’**

The XR20-W rotary axis calibrator combines with Renishaw’s XL-80 laser interferometer to allow rotary axis positioning performance to be measured with ± 1 arc sec accuracy. With the new “off axis” test capability, users can now test more types of machine tools than was previously possible with XR20-W, giving a better return on investment and, in the case of service companies, offering a more attractive service to their customers.

The method for off axis measurement works by synchronising movement of rotary and linear axes so that the XL-80’s laser beam is kept aligned throughout the test. Because the linear axis is moving, the measurements made by the XR20-W may include additional angular errors (e.g. pitch) from the linear axis. These contributory angular errors are then measured separately (using the XL-80 laser and angular optics) and removed from the initial rotary axis results. The end result is a set of data reflecting only the errors from the rotary axis itself.

The Off axis rotary software is provided as an extra cost option for XR20-W and includes a suite of software utilities, part program generators and an electronic format manual. The manual details all the requirements for the mounting set-up and associated custom hardware manufacture.

**AxiSetTM Check-up**

Key to precision machining is the ability to understand the location of the centres of rotations of the rotary axes relative to the machine’s linear axes. Without accurate data about these ‘pivot points’, a machine’s controller will be unable to reliably control the relative positions of the tool and the component as the rotary axes are moving, leading to inconsistent machining results.

Renishaw’s AxiSet Check-up provides accurate and repeatable results using automated probing routines to gather performance data from a reference artefact, and includes simple yet powerful analysis. Alignment and positioning performance checks are carried out rapidly to benchmark and monitor complex machines over time. All tests utilise existing spindle-mounted Renishaw touch probes, which are standard option on most multi-axis machines, with probing routines generated using machine-specific macro software supplied with Check-up. To ensure the highest accuracy, the use of OMP400 or RMP600 touch probes with patented Rengage™ strain gauge technology is recommended.

Set-up is fast and simple. To perform the test a user quickly locates a supplied calibration sphere within the machine tool’s working envelope using a magnetic mount. Using the supplied custom macro software, a touch probe is then programmed to automatically take reference measurements around the sphere.

Measurement results from the test are output to a PC and presented in a Microsoft® Excel® spreadsheet, enabling easy to understand analysis of data in different formats. These include a graphical representation of performance that highlights tracking and centring errors, a function that compares two sets of data from the same machine, a simple ‘pass’ or ‘fail’ test against the user’s pre-defined tolerances, and a history screen that allows comparisons of the performance of rotary axes over time.

**Other checks and tests**

To ensure the optimum analysis of rotary axis performance using Check-Up, it is important that machine’s standard three linear axes are also performing within specification. This should be determined and corrected if necessary using Renishaw’s XL-80 laser calibration system, and then regularly checked using a Renishaw QC20-W ballbar. Together with the XR20-W rotary axis calibrator and AxiSetCheck-up these powerful performance testing products combine to ensure the highest quality parts can be consistently produced by five axis machining centres and multi-tasking machines.

This portfolio of products provides an unparalleled machine diagnostic solution, targeted at removing variation from the machining process, helping to maximise productive metal cutting.

More information about Renishaw’s calibration and performance monitoring products can be found at [**www.renishaw.com/calibration**](http://www.renishaw.com/en/laser-calibration-and-telescoping-ballbar--6330) and [**www.renishaw.com/AxiSet**](http://www.renishaw.com/en/axiset-check-up--11353)

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