Software showcase

Renishaw's role in the life of a machine tool
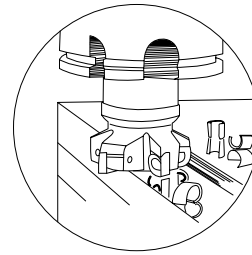
RENISHAW

apply innovation™

Welcome to this showcase of the end-to-end support available for the machine tool industry...

Maximise machine tool productivity with our software solutions for machine tool builders and system integrators

Digital technologies are transforming the industrial sector, enabling manufacturers like us to embrace data-driven end-to-end manufacturing. Like many manufacturers around the world today, Renishaw collects and processes more data than ever before to identify where our processes can be improved and, ultimately, maximise our profitability. End-to-end process data capture provides insight for analysis and the improvement of manufacturing processes, enabling us to predict, identify and correct process errors before they happen.

As manufacturers, we understand that the software you use every day should enhance how you use your data to operate and make decisions. That's why software development at Renishaw has been focused on growing an innovative software ecosystem, consisting of practical, user-friendly macro, PC, and smartphone solutions. We aim to provide software that is flexible, easy to use and enables you to better visualise data and extract more value from your hardware.
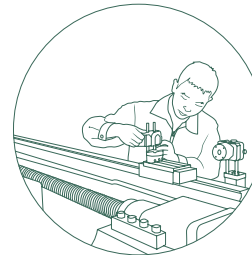
Machine tool design and development

Machine tools are vital to the manufacturing industry. While they retain the fundamental characteristics of their 20th-Century counterparts, modern machine tool design is optimised for high precision, efficiency and repeatability. We offer a wide range of information and products to support the development and build of high-performance machine tools.
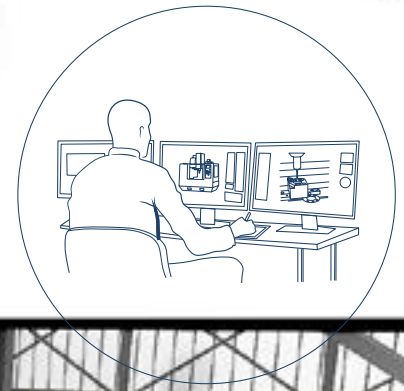
Technical drawings and CAD models of Renishaw hardware

High-quality documentation: installation guides and product data

High-quality technical support

Local support and global expertise

Custom products design service

Performance testing and evaluation of development machine models

Machine tool apps (on-machine and smartphone)

Calibration technologies integrated into products to support on-board performance diagnostics

Component production for machine tools

As manufacturers, we know that to achieve higher productivity, we must eliminate or control sources of variation in CNC processes. In our own factories, we developed a framework for process control, the principles of which are now in use by Renishaw customers worldwide. This approach to process control and our range of smart manufacturing technologies can support machine tool builders operating their own machine shops, enhancing the productivity and efficiency of their operations.

**Transform component production**

Renishaw technologies play a key part in helping the world's leading machine tool builders control their in-house machining processes. Class-leading CMM inspection technologies, such as the PH20 5-axis touch-trigger system with infinite positioning capability, allow easy access to features at any angle and increase throughput.

www.renishaw.com/processcontrol

Machine tool assembly
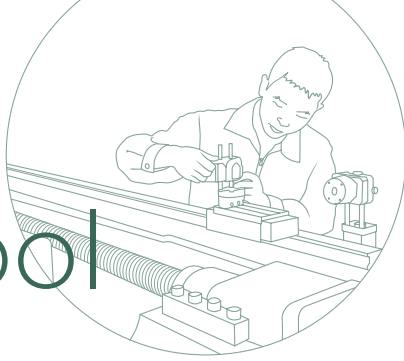
The quality of every component produced on a CNC machine tool is dependent on the machine's performance. We offer a range of calibration and alignment software for every stage of the CNC machine tool build to ensure precise alignment and performance.

Intelligent software for maximising the performance of your motion system

Our CARTO software suite for calibration products provides data capture, analysis and compensation applications, to simplify the process of improving and calibrating machine axes.

Compatibility with all Renishaw laser calibration and optimisation products means that your test methods and results are stored together and accessed via CARTO Explore. Multiple reporting and error-correction preferences can be configured easily in the software.

→ XK10 alignment laser system

Laser alignment of rails and bearings during machine assembly reduces errors in linear and rotary axes

The XK10 alignment laser system allows easy set-up and measurement of axes during assembly and service. The XK10 software is pre-installed on a rugged handheld display unit, so it's ideal for use in machine tool assembly environments. It provides an intuitive and simple interface with easy navigation. A step-by-step approach for each measurement type guides you through each process, making the software accessible to a wide range of operator skill levels. Live readings and graphical displays are shown on screen during alignment and measurement so that adjustments can be made in situ. This reduces the time during machine assembly processes and on-site service, including regular maintenance or following a collision. With accurately aligned axes you can ensure your machine performs at its best and minimises wear.

CARTO software

www.renishaw.com/carto

→ XK10 alignment laser system

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"The reports that the XK10 produce are also highly intuitive, and through a choice of tables or charts, clients can very quickly determine the status of a machine tool during an acceptance inspection. Now that we have the XK10, we can quickly ascertain whether the source of deviation is connected to the assembly process, rather than workpiece machining or cast part rigidity. And if we discover issues with the precision of the workpiece machining, we can rapidly respond by checking the CNC machines and performing any necessary adjustments. It has really helped us to drive up efficiency."

Hurco Manufacturing Ltd (USA)

🌐 To read the full case study, visit **www.renishaw.com/hurco**

→ Ballbar 20 software

The industry standard for fast, simple and effective machine tool performance verification

Ballbar testing allows you to verify the performance of your machine tool after assembly and during commissioning. It provides a simple, rapid check of a CNC machine tool's servo performance to recognised international standards. This allows you to benchmark and verify the condition of your newly built machines.

The QC20 ballbar and Ballbar 20 software allow you to carry out testing in three orthogonal planes with only a single set-up. The software calculates the collected data's overall measurements of positioning accuracy (circularity, circular deviation). Reporting allows you to diagnose many additional individual machine errors.
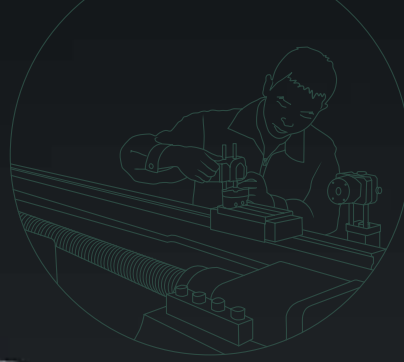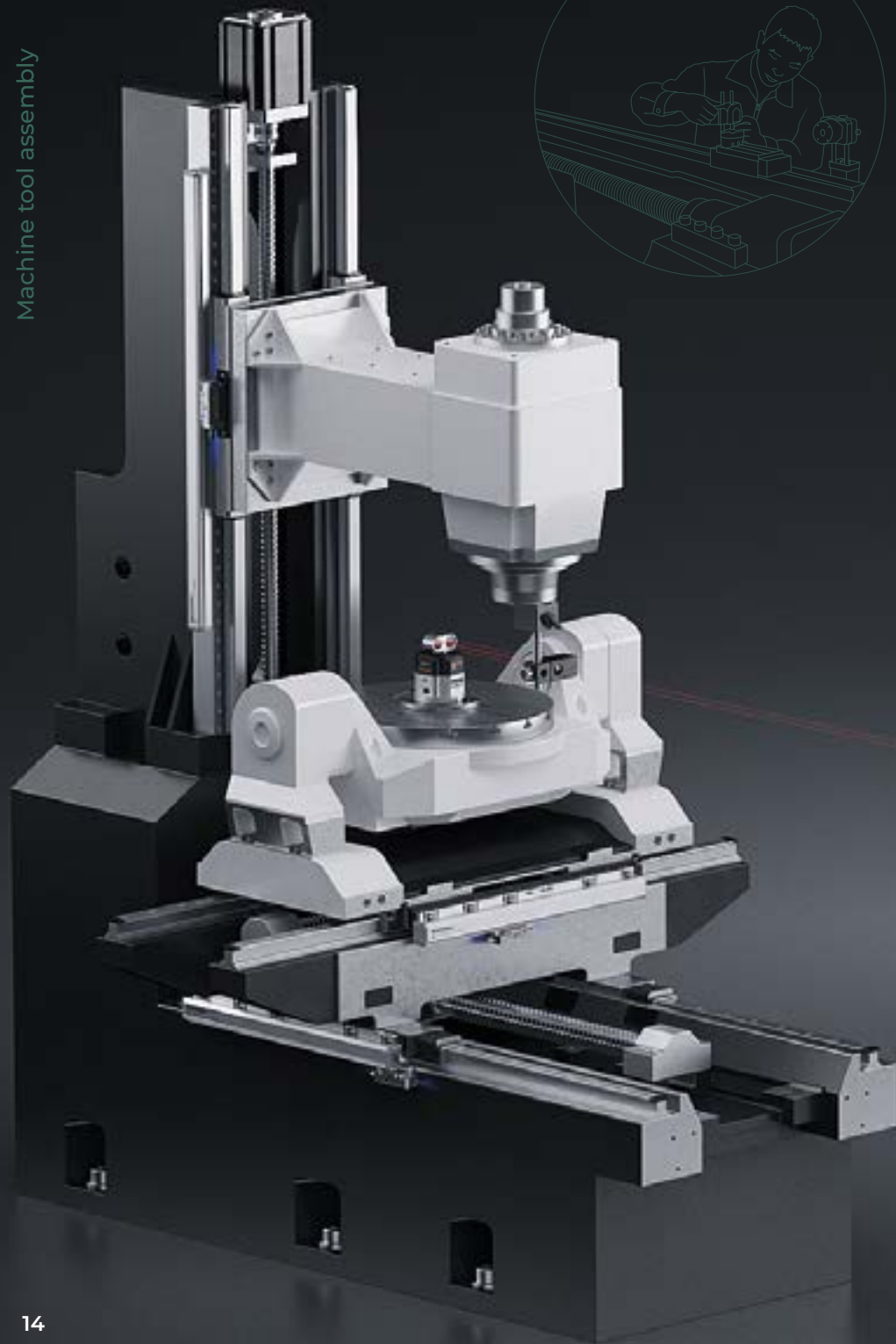
Machine tool builders

For over 40 years, Renishaw has been producing equipment and systems designed to maximise the performance of CNC machine tools. The automation of manual set-up and process control activities ensures high-quality, highly productive manufacturing across all industrial sectors.

Our close working relationships with machine tool OEMs ensure our latest technologies are easily integrated into new machine designs. Our rich experience and flexibility allow specific product development and customised variants when required by our customers.

Visit our machine tool builder web space, where we're showcasing our innovative manufacturing solutions for machine tool OEMs and system suppliers. Scan the QR code to watch the latest video.

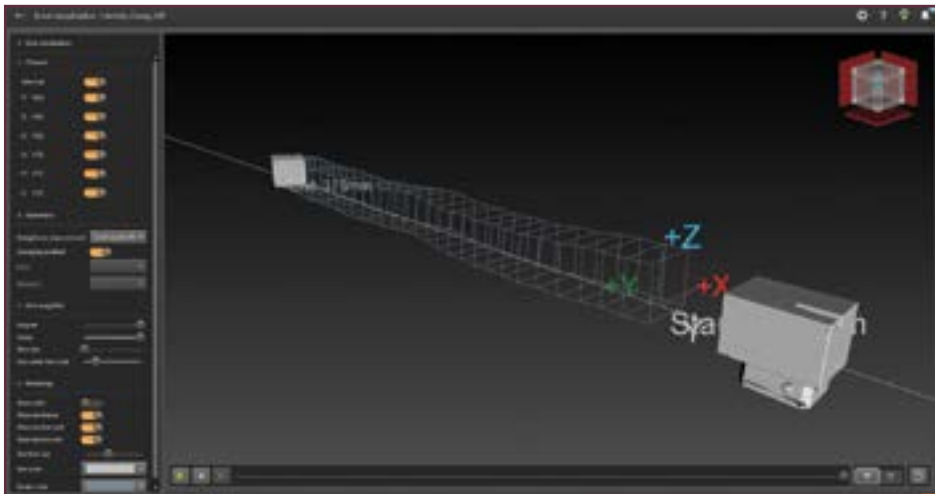**www.renishaw.com/machinetoolbuilders**

Commissioning machine tools and machining cells

Renishaw apps and on-machine software can be used during commissioning to install, configure and test a new machine. They can then, of course, be used for support and as part of maintenance routines (see Lifetime support on page 24). We provide a range of software to support the set-up and realignment of machine tools after installation in a customer's factory.

CARTO software

🌐 **www.renishaw.com/carto**

Measure machine performance and alignment on larger machine installations

For the machine tool industry, CARTO is the single software solution for our range of calibration and optimisation products, satisfying development, assembly, commissioning and service needs.

Data is collected using the CARTO Capture application and the Explore application is used for data analysis. Capture and Explore are used with Renishaw XL-80 laser interferometers and XM-60 multi-axis calibrators after machine installation to measure positioning performance and alignment.

The capacity for customisation throughout the CARTO suite means that both Capture and Explore can be tailored to suit individual requirements. Capture features automatic sign detection, reducing the chance of user error, and automated ISO-10360 test set-up. Explore offers a powerful data analysis package while Compensate produces error maps in native machine controller languages.
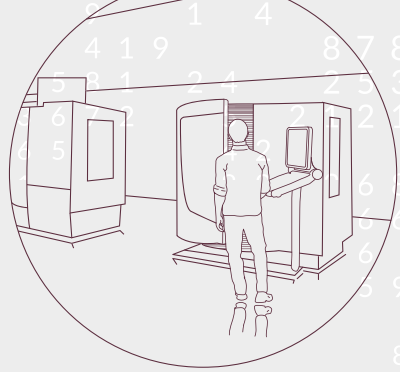
→ Ballbar 20 software

Check and diagnose servo performance errors and path deviations

For commissioning and throughout the life of your machine tool, this powerful and easy-to-use software, captures and automatically analyses ballbar data. Captured results can be displayed as analysis reports in a variety of international standards (including ISO 230-4, ANSI B5.54), as well as a comprehensive Renishaw analysis format. Ballbar 20 software ranks each diagnosed error according to its impact on overall machine accuracy, allowing easy and targeted improvements to be made.

Ballbar Trace

Flexible software for time-based data capture

Ballbar Trace software for use with the QC20 ballbar can be used to test the kinematic accuracy of 4- and 5-axis machines (machines with three linear and one or two rotary axes). Ballbar Trace captures real-time data, including maximum to minimum deviation, which is a requirement of the ISO 10791-6 reporting standard.

www.renishaw.com/ballbartrace

Ballbar Trace software

ADT View encoder software

Your toolkit for enhanced encoder set-up and installation

For use with Renishaw rotary and linear optical encoders, the Advanced Diagnostic Tools can be used to support challenging installations and to report on encoder performance.

ADTa-100 (for absolute encoders) and ADTi-100 (for incremental encoders) acquire comprehensive real-time data from encoder readheads. This assists with quick and easy encoder installation and in-field fault finding, potentially saving time and reducing installation and maintenance costs.
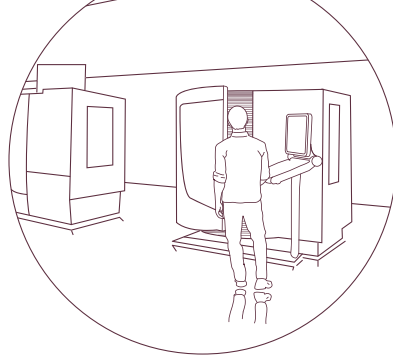
Our ADT View software application provides a user-friendly graphical interface of advanced diagnostic information from Renishaw encoders, including signal size, Lissajous plots, digital position readouts (DRO) and system configuration information. ADT View offers several options to export and store key data.

www.renishaw.com/adt

Smartphone apps for machine tool probing

Software used in factory environments must be simple to use by everyone, at any time. The role of software is to make doing your job quicker, simpler and more enjoyable. So, to make programming and reporting on machine tool performance easier, we developed a range of on-machine and smartphone apps. With intuitive interfaces that provide information in a simple, convenient format, our smartphone apps are ideal for new and experienced users.

www.renishaw.com/smartphoneapps

Probe Setup

The Probe Setup app simplifies the process of configuring machine tool probes compatible with Trigger Logic™ and Opti-Logic™ technologies (see below). The app provides clear, step-by-step visual instructions and video tutorials to guide you through the process of setting up and configuring a Renishaw machine tool probing system. The apps contain a 'share' function, which allows machine tool users to send diagnostics data to support teams.

- Opti-Logic is the process of transmitting and receiving data from the Renishaw smartphone app to a Renishaw probe using pulses of light. Use the Probe Setup app to review and configure probe settings or to partner a radio probe and interface.

- Trigger Logic involves following a sequence of stylus deflections (triggering) to guide you through the various configuration menus and options.

Renishaw smartphone apps are available globally on the App Store™ and on Google Play.

Download on the **App Store**

GET IT ON **Google Play**

Apple® and the Apple logo® are registered trademarks of Apple Inc. Google Play and the Google Play logo are trademarks of Google LLC.

NC4 app

NC4 non-contact tool setters offer high-precision, high-speed, non-contact tool measuring and broken tool detection across many machine types.

We developed the NC4 app to simplify configuration, providing a single point of reference for set up, maintenance and troubleshooting tasks. The app features detailed animations, help text and step-by-step instructions.

HP arms app

The HP arms app provides interactive support for high-precision tool setting arms. The app makes set-up, maintenance and troubleshooting tasks simple with easy-to-follow animations.

Check and improve rotary axis performance in minutes

Ideal for use during machine tool building and commissioning, the AxiSet™ Check-Up app is a cost-effective solution for regularly checking the alignment and positioning performance of machine tool rotary axes.

The system enables you to maximise the stability of the environment and machine. When used alongside the Renishaw QC20 ballbar system and laser interferometers, AxiSet Check-Up provides unparalleled machine diagnosis capabilities. You can quickly identify poor machine alignment, geometry and pivot point errors that can cause extended set times and non-conforming parts. Where possible AxiSet Check-Up automatically corrects on-machine pivot point parameters.

The system components include machine-specific macros written for a range of CNC controllers to drive the machine and collect measurement data; the app provides a detailed and graphical representation of the measurement data produced by the macro software; and a single calibration sphere is used as the reference feature for measurements.
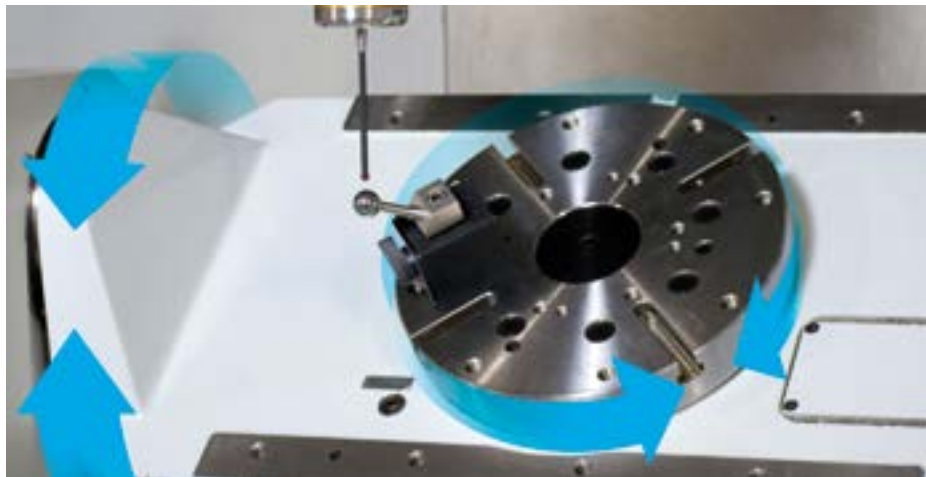
"We recommend that customers use AxiSet Check-Up to test the machines' rotary axes after they are installed, as factory conditions may differ significantly from Hartford's manufacturing conditions, in terms of foundations and how level surfaces are. Shipping and installation can also cause precision errors, so AxiSet Check-Up automatic compensation allows machine tools to maintain high levels of precision and quality."

Hartford (Taiwan)

To read the full case study, visit
www.renishaw.com/hartford

www.renishaw.com/axiset

Lifetime support

We support our machine tool builder and end-user customers with an extensive range of complementary software and digital solutions for the visualisation and monitoring of machine, process and part data.

Making it easy to program your machines

Inspection Plus is the industry-standard macro package for machine tool probing, offering solutions for part setting, inspection and in-process measurement. Compatible with all major machine tool controller platforms, this machine-resident package makes programming easy.

Experienced users can create and execute cycles using traditional G-code techniques. New, or less-experienced users can use one of our user-friendly programming options, such as the GoProbe smartphone app or the Set and Inspect graphical user interface (GUI).

GoProbe

Our GoProbe app is designed to make it easy to use machine tool probes and tool setters

Key to the simplicity of GoProbe is its intuitive interface, which eliminates the need for extensive knowledge of machine codes and programming techniques. Simply select the required cycle and populate the data entry fields. The result is a single-line command that is entered into the CNC controller. Supporting spindle probes and tool setters – including the latest NC4 laser tool setting system – the app allows even new and inexperienced users to quickly become proficient in programming cycles.

www.renishaw.com/goprobe

→ Set and Inspect

Set and Inspect is a simple, on-machine probing app, which machine tool builders can integrate into their controller systems

An intuitive interface guides you through the process of creating a probing cycle, automatically generates the required machine code for the probing cycle and loads it to the controller, eliminating data entry errors while reducing programming times. 'Single cycle' allows you to manually position the probe and quickly program and run individual cycles. 'Program builder' allows you to program multiple probing cycles in a single program that can be automatically run as part of the manufacturing process.

www.renishaw.com/setandinspect

→ Reporter

Reporter is a powerful real-time process monitoring app which can be used and integrated with a wide range of machine tools and controllers to visualise component measurement data

Measurement data can be viewed on the machine tool or analysed externally. It allows you to view real-time and historical measurement data for every part measured. Data can also be shared and streamed, according to a wide range of Industry 4.0 standards.

www.renishaw.com/reporter

Equator gauge with IPC software

Use automation, measurement and feedback to create high-productivity machining cells

The Equator™ off-machine gauging system with IPC (intelligent process control) software allows you to validate and control CNC manufacturing processes, delivering quality assurance close to the point of manufacture.

IPC software can take recent historical gauging data and use it to determine process corrections. Connection to a compatible machine tool can be as simple as connecting an Ethernet cable from the Equator to the CNC machine.

Optimised processes monitor not only the condition of parts, but also the performance of machines, process trends, interventions, and environmental effects. Measurement data and connectivity can enable highly automated accurate manufacturing with low overall labour costs.

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For more information on our approach to successful process control, visit **www.renishaw.com/machinetoolbuilders**