RENISHAW
apply innovation™

Conquer your manufacturing process challenges

Traceability and automation
Automate your process, reduce human error, and improve safety

Control
Take control of your machine tool accuracy, maintenance and performance

Flexible manufacturing
Respond quickly to your customers' changing requirements

Challenging manufacturing

Every day, the oil and gas industry challenges its supply chain to provide high quality, high value components. They must withstand harsh environments and comply with international standards.

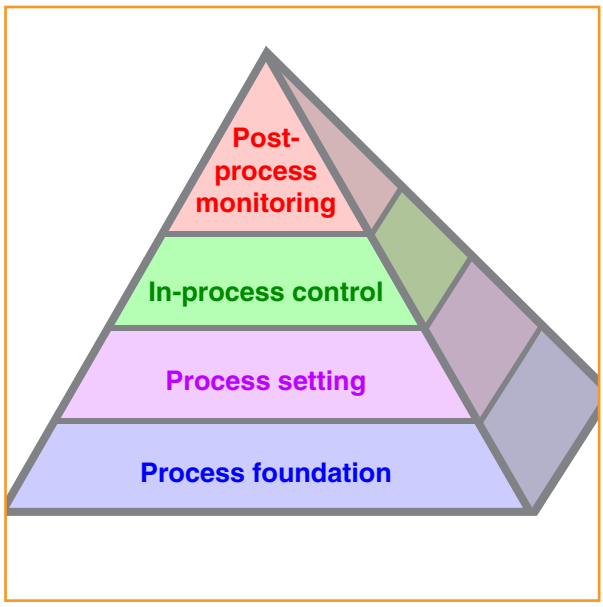
Renishaw develops and produces innovative products which help its clients to transform their manufacturing processes. We enable precision machining operations to deliver high quality components with fully traceable production history.

Machining subcontractors face growing competition and increasing levels of regulation. Our manufacturing process control technologies could bring traceability, control and flexibility to your operations.

About us

Renishaw is a global engineering technologies company with key strengths in machining, metrology and process control. For over 40 years our innovative products have enabled users across the world to improve their manufacturing processes, helping them to stay competitive in a diverse range of industries.

The highest engineering standards are needed when manufacturing components for hostile environments.



Renishaw's Productive Process Pyramid™ is a framework developed to address sources of variation during manufacturing.

Renishaw's Productive Process Pyramid™

We have developed a framework for addressing sources of variation through our extensive manufacturing experience in-house and with our customers. It brings a range of benefits, allowing users to reduce scrap, increase throughput and reduce human intervention, all of which contribute to make manufacturers more profitable.

Renishaw's process control solutions enable you to:

- Certify products through traceable production methods
- Control and have confidence in your processes
- Respond to your customers' needs for varying batch sizes and lead times.

Each layer of the Pyramid builds on those that come before it, helping you to identify and control variation in your factory at every stage of your manufacturing process.

Process control will help you to fulfil your quality requirements: deliver reliable parts within specifications, on time.
Stay competitive.

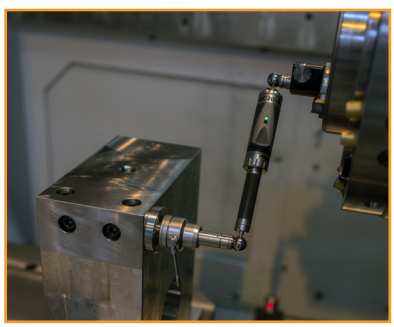
Customer testimonials

FMC Technologies

FMC Technologies is a Houston, Texas-based developer and manufacturer of oil and gas Production Control Systems (PCSs), which consist of topside (surface) controls, power equipment, the Subsea Control Module (SCM), various sensors, and subsea electrical and hydraulic distribution equipment.

FMC Technologies has operations around the world, close to the major oil and gas industry epicenters. Its UK manufacturing operation occupies several buildings on and around the Pitreavie Business Park, Dunfermline.

Craig Simpson and Mike West are FMC Technologies maintenance technicians, with responsibility for the service and support of 20 CNC machine tools of various types, makes and ages. Also in their charge is one of the company's more recent investments: a £2.5 million, purpose-designed and built, SCM machining cell, consisting of two Okuma Space Centre MA-600HB CNC horizontal boring machines, loaded and managed by a Fastems automation system.



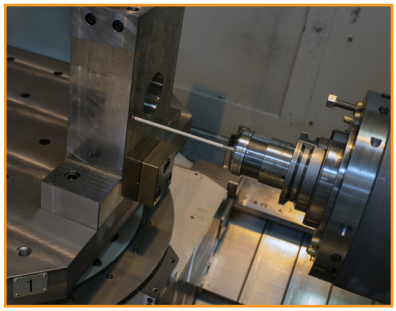
FMC Technologies uses Renishaw's QC20-W wireless ballbar to check the accuracy of its CNC machine tools.

The Fastems automated cell is used to machine the stainless steel hydraulic manifold block, which is a critical control element in an SCM assembly. "Quality control in the new cell is extremely thorough," adds Mr. Simpson. "The finished part is 100% inspected and has to be precise and flawless before it can be shipped to assembly."

For example, since each SCM manifold block takes up to 35-hours to machine, FMC Technologies engineers need to know that the Okuma machines in the Fastems cell are performing exactly as they should be. Scrapping a semi-finished or finished part due to an inaccuracy in the machine geometry would be very expensive.

To ensure that its 20 machines are accurate, the FMC Technologies' maintenance department services them all, up to three times annually. All machines are checked with a Renishaw QC20-W wireless ballbar. The Okuma machines are serviced twice a year, at which point machine geometries are checked and rectified. Once a year the company also checks them with a Renishaw XL-80 laser measurement system and linearity is corrected. Every second year, at their annual service, all machines are leveled, aligned and checked with the XL-80 system.

Data from both the Renishaw ballbar and also the Renishaw XL-80 are collected and collated using Renishaw's CNC Reporter software package.



Renishaw's RMP60 touch-trigger probe can be used for component setting or inspection on machining centres.

Mr. Simpson says the maintenance programme in FMC Technologies in Dunfermline is evolving continually: "When I first started at the company, six years ago, our preventive maintenance was far less structured and much more time consuming. Now, we are very well organised and using the Renishaw equipment means we know much more about our machines and our processes."

Read the full story here:
www.renishaw.com/fmctechnologies

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Conroe Machine

Equator™ programmable gauges help create the ultimate automation cell for mud-motor bearing machining and parts sorting

Based in Texas, USA, Conroe Machine's automation team deploys Equator programmable gauges for measuring and sorting mud-motor bearings. The company claims the process-controlled hard turning cell paid for itself in just 18 days. The team has also developed a similar unmanned cell for a customer.

In oil field service shops, used motors are disassembled, refurbished and put back into service. "The customer was visually inspecting used races to determine if the parts were reusable, and they knew they were throwing away some good parts – and money," says James Wardell, CNC Programmer. "We wanted to give them a plug-and-play measurement and sorting system that takes human judgement out of the process, so more good races can be salvaged.

"For our machining cell, there was no other cost-effective, shop-floor measuring tool comparable to the Equator," Wardell adds. "And we hope that our venture into cell integration for a customer opens a new business avenue in this area for our entire company."

Read the full story:
www.renishaw.com/conroe

GE Oil and Gas

"Huge reductions in inspection time and the ability to measure form – REVO® has opened a new frontier"

GE Oil and Gas Florence transformed the performance of a DEA Global CMM with a retrofit system direct from Renishaw, allowing far higher data collection rates, and thus form analysis, never before practically possible on the DEA CMM.

As Claudio Bartali (Manufacturing Technology Project Leader) explained "The demonstration was spectacular – inspection time on a typical impeller reduced by 4 times. However, that is not the main reason we started the project and employed Renishaw to retrofit the CMM with REVO. The exciting part will start soon when we use the massive amount of accurate REVO-measured data to compare the form of inspected surfaces with the 3D CAD models."

With a requirement for 100% inspection, there was a high demand on the CMMs and programming systems, which needed to adapt constantly. At the GE plant in Florence, the DEA Global was used to perform dimensional inspections on components varying in size and geometry up to 1000 mm diameter.

As Mr Bartali concluded, "REVO has brought us a far better and more comprehensive method of inspection in a shorter time, now we will be implementing quality standards for form measurement, something we could never do before."

Read the full story:
www.renishaw.com/ge

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Transform your manufacturing

Traceability and automation

Advanced manufacturing has intelligence to make decisions reliably, reducing the need for human intervention and enabling extended periods of 'lights out' production.

Program controlled processes record all inputs during manufacturing. Working with our process control experts and technologies allows you to capture process parameters and record decision making. Certify your processes and components with comprehensive reporting.

Automation enables you to reduce your dependence on hand gauges and other manual technologies, eliminating the potential for human error, improving safety, and making your process fully traceable.

Control

High value components often require complex machining processes. Controlling tool life, machine accuracy and production scheduling is critical to your success.

Renishaw's manufacturing framework gives you control and helps you to fully understand your operations. Tracking your machines' performance over time enables you to develop a preventative maintenance schedule, and eliminate unplanned downtime. Automated processes have consistent and predictable cycle times, improving your scheduling accuracy and maximising machine utilisation.

- **Automate your process: reduce human error**
- **Certify your products are within specifications**
- **Conform to international standards with auditable processes**

Flexible manufacturing

Meeting your customers' requirements for flexible batch sizes, short lead times and design changes necessitates a flexible manufacturing process. Automated setting eliminates the need for custom fixturing, cutting your costs and development time.

Improve your productivity. On-machine tool setting and in-process control ensures machines are never sat idle awaiting operator intervention. Flexible gauging and advanced 5-axis inspection technology can keep pace with your production output to maintain throughput.

When you can quickly respond to your customers' requirements, you can grow your business.

Renishaw's CNC reporter is a PC-based statistical analysis tool designed to interrogate measurement data returned by probing software.

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About Renishaw

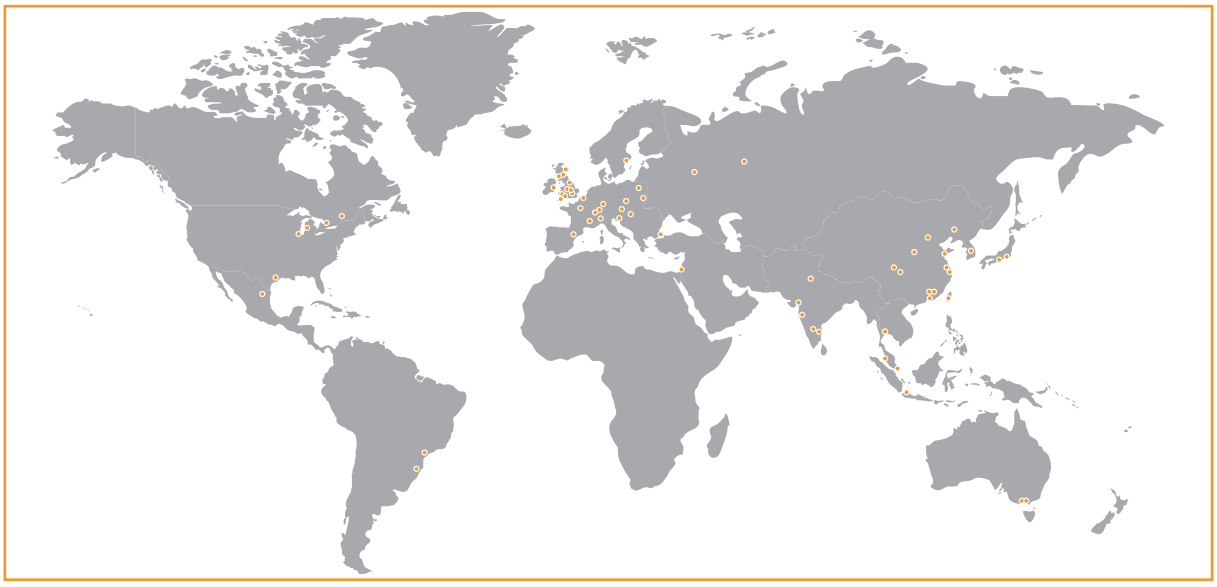
Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Products include:

- Additive manufacturing, vacuum casting, and injection moulding technologies for design, prototyping, and production applications
- Advanced material technologies with a variety of applications in multiple fields
- Dental CAD/CAM scanning and milling systems and supply of dental structures
- Encoder systems for high accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications

For worldwide contact details, please visit our main website at www.renishaw.com/contact



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