Research and development

Since the company's formation, there has been a high commitment to research and development which, annually, together with engineering expenses, amounts to approximately 14% of sales. Renishaw's investment in research has resulted in a comprehensive range of highly accurate probes, accessories, measuring systems and other innovative products which have significantly advanced the frontiers of knowledge in measurement technology for the manufacturing industry, as well as research activities throughout the world.

As in past years, Renishaw's own research activities continue to generate important patents which form the basis of current and future products. New technologies which are important to all product lines are evaluated and developed, as are new product ideas.

In addition to the New Mills site, research activities are carried out at Renishaw S.A. in France, with specialist product development at the Heriot-Watt campus, Riccarton, Edinburgh and the University of Exeter Innovation Centre.

Research and development for calibration, laser scale and spectroscopy products are currently undertaken at Old Town, Wotton-under-Edge.

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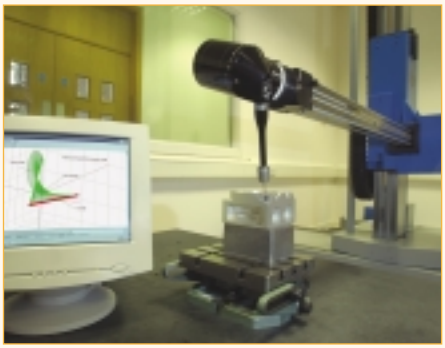

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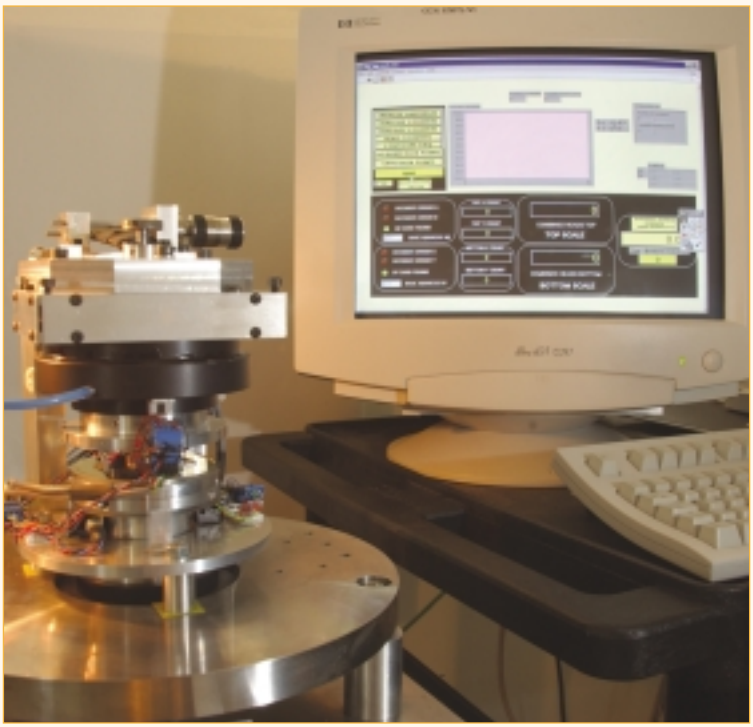

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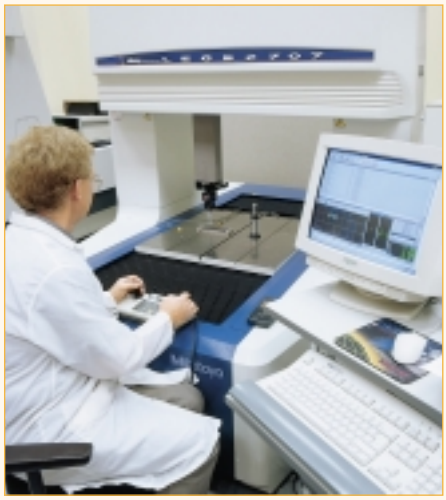

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1. PHS1 motorised head integration development.
2. Software development.
3. Custom product undergoing final test.
4. CMM controller development, Riccarton.
5. New product development, Riccarton.
6. New product testing in the Development Laboratory, New Mills.
7. Software development, Woodchester.
8. Concept planning meeting, Woodchester.
9. Library located in the Atrium, New Mills.

Manufacturing

Following the acquisition of the site at Woodchester, Gloucestershire in 2000, it was decided to centre the Group's major UK manufacturing activities on this site. Extensive refurbishment of the existing buildings is being carried out and a phased relocation of the relevant departments from New Mills is taking place. Prototype machining and assembly operations will remain at New Mills.

Renishaw has consistently invested time and money in the development of innovative and cost-effective manufacturing processes. The result of this is a revolutionary automated manufacturing system that maximises the potential of standard machine tools, enabling milling, turning and inspection on a single machine, together with automated loading and unloading of materials and tools.

Highly flexible manufacturing is achieved from the ability to produce a variety of components using a single unmanned system. Novel methods are used to enhance the measurement accuracy automatically. This system, called RAMTIC (Renishaw's Automated Milling, Turning and Inspection Centre), which gives in excess of 130 productive hours weekly with assured quality, has won a number of prestigious awards.

Machine tools are regularly calibrated using Renishaw's automated QC10 ballbar routines and laser interferometers. Automatic tool setting and spindle probing routines ensure that components are machined correctly, first time, to traceable standards.

In 1981, Renishaw (Ireland) Ltd was established near Dublin to provide additional independent manufacturing facilities for the Group's products. In 1998 it relocated operations to a new purpose built factory at Swords, Co. Dublin, where components are assembled for the Group's mature products.

Currently, production of Renishaw's calibration and spectroscopy products is carried out at Old Town, Wotton-under-Edge, with additional manufacturing facilities for some of the Group's specialised probing products at Renishaw S.A., France.

Assembly of components on Renishaw's sites is undertaken in "cells" where multi-skilled assemblers take the complete responsibility for the build, test and quality of the finished product. This delegation of responsibility results in high levels of commitment and motivation, and is a key factor towards achieving consistent levels of high quality output.

Investment has been made in the automated assembly of electronic circuit boards using surface mount technology (SMT) which allows a high density of miniature components to be placed onto various substrates, at very high speeds. This miniaturisation of the electronics has provided the opportunity to place greater functionality at the front-end of many products whilst reducing the size of its installation.

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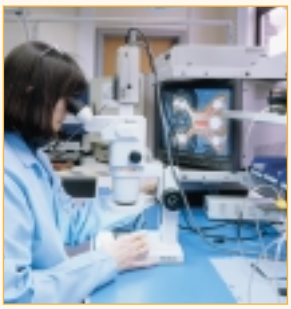
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1. Renishaw plc, Bath Road, Woodchester, UK.

2. Automated component mounting, New Mills using latest surface mount technology.

3-7 Assembly, Woodchester.

8. Present Machine Hall, New Mills showing advanced turning centres in the foreground and RAMTIC systems left side.

9-11. Assembly, Ireland.

12. One of the company's latest investments is a 5-axis CNC Walter Helitronic power regrinder, with automatic loader, to manufacture new cutting tools and refurbish worn cutting tools, as well as machining carbide blanks for Renishaw's tool setting probes.
(Inset picture, close-up of grinding head).