RENISHAW
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Aiming high for quality and growth

Customer:
FGP Systems Ltd

Industry:
Aerospace

Challenge:
Produce high quality parts and reduce annual rate of scrap.

Solution:
Investment in Renishaw's innovative products halved scrap rate in the first year.

Dorset based FGP Precision Engineering Ltd. has its sights set on becoming one of the UK's top suppliers to the world's aerospace OEMs.

US-born company owner and CEO Allan Edwards has infused the firm with a new, process-obsessed culture, with one of the most important areas being quality. FGP are reducing the annual scrap rate by rigorously applying best practice and by employing the latest technology from Renishaw, which now includes the addition of a PH20 5-axis touch trigger head system for co-ordinate measuring machines (CMMs), an Equator™ shop floor gauging system, and a QC20-W wireless ballbar.

Mr Edwards explains, "My background was in Investment Banking. In 2004 I started looking for investment opportunities in the UK and I was introduced to FGP as a possible investment. I acquired FGP in 2006 and I've since relocated to England. "Before FGP I had never worked in a company that manufactured parts, so it's been an interesting learning experience - which I am enjoying every minute of."

FGP manufactures critical parts for aerospace applications. "While serving in the Marines, I learned the meaning of Flight Critical on the flight line and the demand on our Helicopters, to be ready at all times. At FGP we understand what it means to be safe in the air and so we take quality very seriously."

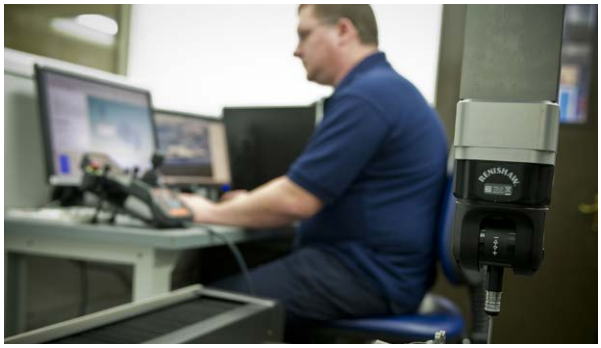
A little over twelve months ago, Mr Edwards appointed aerospace quality expert Nigel Manning, to oversee the transformation of the company's quality processes. What struck Nigel was that the company had some very good, state-of-the art manufacturing equipment and machine tools, but that it needed to invest in the latest quality control processes.

"Before we bought any new equipment, however, we looked closely at our scrap rate," says Mr Manning. "The amount of scrap FGP was producing annually was more than 14.7% of total ouput, so we examined and prioritised ways in which we could quickly and effectively reduce that figure. First of all, we thought carefully about how our CMMs should be used and we decided to retrofit our IMS Merlin with the Renishaw PH20 5-axis head, which offers exactly the level of precision we need for aerospace parts."

Four-fold increase in measurement throughput

The responsibility for FGP's co-ordinate measuring machine (CMM) operations lies with Dave Robins, our CMM programer, whose job as inspection operator is to verify parts before they are shipped to customers.

FGP's 5-axis section manager Simon Griffith-Hughes with one of the company's three DMG CNC milling machines.



Dave Robbins, CMM lead inspector, using the PH20 5-axis probe system, inspecting a tail-rotor component for the AgustaWestland AW139 helicopter.

Some parts are inspected 100%, some are batch- or sample-checked, but increasingly many of the parts being checked on the CMMs are first-offs, where as Mr Robins says, "When the first machined component comes off the machine we then check the machined part to make sure it is to specifications before the operator runs a batch."

Many of the items that are routed to the CMM room are complex parts that would be time consuming to check manually, so the inspection team has to write inspection programmes for them. Mr Robins explains, "for example, on a tail-rotor component for the AW139 helicopter, we have to check all dimensions. It is a critical component machined from titanium. We manufacture a batch of 35 every month and we check 100% of two of them. We measure the outside profile, the holes, their positions, and so on. The programme takes around 15 minutes to measure 350 dimensions. The older, PH10 indexing head took about an hour to measure the same part. The PH20 is a 5-axis measurement system, so it can get to every feature in one set-up. We're so pleased with the PH20 that we're planning to buy another, in 2012."

More accurate and predictable machines

Inaccurate parts may result from bad tooling, worn spindles or workpiece clamping, but defects can often be attributed to positioning errors in the machine tool itself: the result of geometric, dynamic and play-errors within the machine. And it doesn't matter if a machine is new or old; the secret of reject free production is to know just how good a machine really is and to catch potential problems before defective parts reach the CMM.

As FGP's quality expert Nigel Manning explains, "Along with the PH20 retrofit we decided to invest in a Renishaw QC20-W wireless ballbar. It turned out to be another very good decision. The ballbar has really helped us with the specifics on every one of our 5-axis machine tools. We're able to make a part better because our machines are more accurate and more predictable."

The 5-axis section manager for FGP is Simon Griffith-Hughes. He is charged with maximising and maintaining the accuracy of the company's three DMU Evolution CNC milling machines supplied by DMG, which are used to make a wide variety of parts in a variety of materials, from aluminium to titanium alloy.

Mr Griffith-Hughes says, "Parts, like turbine blades, are machined to within two or three microns. We bought the Renishaw ballbar to benchmark the DMG machines and make sure they are in good condition and maintaining their high accuracy. For safety reasons, we don't run the machines with the doors open, so the fact that the QC20 is wireless makes it much easier to use."

"Impressive" in process part measurement

Once FGP had addressed the issue of machine accuracy and final inspection, Nigel Manning turned his attention to

Nigel Manning, FGP's Head of Quality, has overseen the introduction of Renishaw technology that in just one year has helped reduce the cost of scrap by over 60%.

The Renishaw QC20-W wireless ballbar is used to check the accuracy of FGP's 5-axis CNC machine tools.

in-process checking. During a visit to Renishaw he was introduced to the company's new Equator gauging system and was, as he recalls, "very impressed", leading to it being added to FGP's increasing arsenal of quality control options.

"Renishaw's Equator is a small, bench-top system that allows an operator to quickly and easily check a part between ops", explains Mr Manning. "The idea isn't that you inspect every feature, it's that you pick those features that control the process. So, if you're drilling a particular hole twenty times with the same tool, you inspect, say, the first, second and last, which, if they're correct, should give you the confidence to say that the others are also machined correctly.

The Equator's innovative gauging technology is based on the traditional comparison of dimensions on a production part, relative to a reference, master part.

Re-mastering is as quick and easy as measuring a production part, and Equator immediately compensates for any thermal effects, returning accurate data, as if collected in a temperature-controlled quality room.

Simon Griffith-Hughes also gives his thoughts on the benefits to FGP's 5-axis machining operation: "We didn't purchase the Renishaw Equator to take the place of the PH20 but it is to give us another inspection opportunity on the shop floor, to help us quickly double-check and re-check the fine points of the part we are making.

This way we do not have to keep running to the inspector to ask him to check out a dimension. When the parts come off the machine we simply put it on the Equator and we immediately know if we have a problem."

Renishaw's Equator versatile gauging system is used for fast dimensional checks on the shop floor.

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>
> **FGP (UK)**

The compact Equator versatile gauging system is out of the box, up-and-running, in less than 20 minutes. The gauge weighs just 25 kg, requires single-phase power, and doesn't need a costly, compressed air supply.

The intuitive, operator-friendly front-end software requires little or no training and the optimised ratio of working envelope to machine-footprint means the Renishaw Equator can be employed in even the most crowded factory.

Scrap down, order book up

The combined benefits of the new, company-wide culture of quality, as well as the investment in the latest Renishaw technology has resulted in a dramatic decrease in FGP's annual rate of scrap. As Nigel Manning details, "For the first eleven months of 2011, we were down to 4.9% of the overall volume, which means we've more than halved the monetary value of scrap in the first year of using the new Renishaw equipment. For the first quarter of 2012, our current reject rate is tracking at 2.5% of the total ouput."

However, the benefits of an increased focus on quality are also being felt in the company's sales, as FGP's CEO Allan Edwards, concludes:

"Our order book is currently the largest we've ever had in the history of the company. I put this down to the fact that our customers are very pleased with our quality and delivery. I believe that technology is important in improving quality, but we also have to make sure people buy-in to our quality goals; to make sure they are taking ownership and checking their work as they go along. The Renishaw equipment is easy to use and reliable, which makes the task that much easier."

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For more information and to watch the video visit,
www.renishaw.com/fgp

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H-5650-3144-01

Part no.: H-5650-3144-01-B
Issued: 04.2012