Case study

RENISHAW
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Automotive transmission supplier Flexible Concepts guarantees process capability with Equator™ gauge

Customer:
Flexible Concepts Inc.

Industry:
Automotive

Challenge:
Perform all gauging on one common device and offer customers guaranteed machining capability.

Solution:
Integrated Renishaw Equator gauging systems with automatic part loading and offset updates sent direct to high volume turning centres.

Flexible Concepts Inc. is a large automotive supplier based in Elkhart, Indiana, USA. It set itself the challenge of being able to offer customers guaranteed machining capability, as part of a strategic decision to use innovative engineering to progressively increase the size of its business. For several years, Renishaw's Equator system has helped Flexible Concepts achieve that reliable process control - it can now quote 20 microns (0.0008 inch) roundness capability, as part of a single gauging routine that also checks on geometric features.

The team at Flexible Concepts realised that the best way to succeed in the demanding industries they serve is to maintain high part compliance standards, with attention to detail and well planned inventory control. This enables them to achieve efficiency to be competitive whilst also offering a reliable service, using an ISO certified quality system with a Just in Time (JIT) response when needed.

> "I still have not seen a successful system out there that comes anywhere near Equator."
>
> **Flexible Concepts Inc. (USA)**

High volume turning with guaranteed capability

Flexible Concepts is a big turning subcontractor with 175 Okuma 4-axis CNC lathes; the main business being high volume precision manufacturing. Formed in 1990 as a family owned business and ISO certified since 1997, it predominantly serves the automotive industry, but also produces parts for heavy equipment, RVs, trailers, and the defence industry. The company has now expanded into three facilities, with machinery occupying over 275,000 square feet (25,000 square metres).

Meeting production needs – cycle time and process control

Flexible Concepts has integrated eleven Renishaw Equator systems to date, with automated part loading and offset updates, alongside selected Okuma turning centres. For example, on the cell producing high volume ring gear blanks for automotive transmissions, the Equator system gauges every part, with a combination of rapid touch points and fast scans, in a cycle time of 36 seconds. These gear blanks, with increasingly demanding tolerances, come with requirements to

The gauging data is used, when necessary, to generate feedback to the machines, providing direct process control that keeps the process well within tolerance.

Tim Gerstbauer, Head of Engineering and Vice President at the Flexible Concepts plant, sees the Equator gauging system as a key part of the company's drive for high quality and efficiency. "Now we have 'machine-side', ongoing, real-life inspection," he explains, "plus we've been able to automate it to the point where it runs itself. This has meant there is very little scrap or any issues with controlling the quality of the parts going out the door. Our customers are happy with this, it has removed any problems. I don't know how I would be able to do this successfully without Equator."

Gauging a wide variety of tolerances

That's not the only reason Equator systems suit this manufacturing process so well - Tim Gerstbauer stresses another important function, "The biggest advantage by far is that the Equator system can also watch the geometric tolerances - these are difficult to control unless you can see them directly. Equator allows us to do that."

With previous techniques it was difficult to check these geometric tolerances in production. Now all of these features can be monitored, with roundness being particularly important. Even perpendicularity and parallelism can be checked, without needing to visit the quality room.

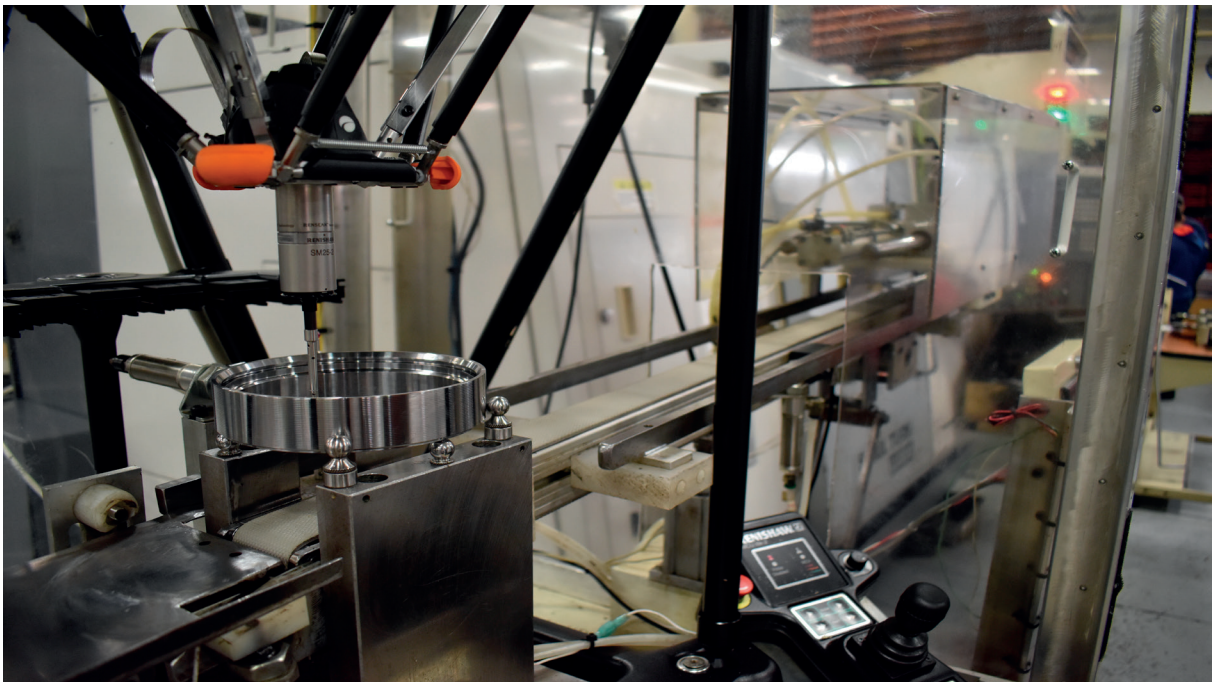
Implementing the flexible gauging process

Flexible Concepts' introduction of the Equator system initially looked at three separate automotive parts for one transmission, and involved twelve different cells.

Tim Gerstbauer, Head of Engineering and Vice President at Flexible Concepts, Elkhart, Indiana, USA.

The processes started with basic raw materials, (either bar stock or forgings), cut into billets with cold saws, before going onto the turning centres. It was a two step turning process, one operation for each side.

The Equator gauging was conducted after the second operation. Trials began with the most difficult part. Matt Kratzer, Flexible Concept's IT Manager, worked with Renishaw for about two months to develop the whole process. "We worked with Renishaw's engineers to get the cycle time of the Equator to match the machine cycle time, which was very low. Renishaw also worked with us on the feedback for the Okuma machines – an average is done on every third part, to keep the tolerances", explains Matt. The update values, if and when required, are constantly calculated and fed back to the Okuma control automatically, without any operator intervention. This brings consistency, without any chance of human error, and removes the need for extra operator time on a tedious task.



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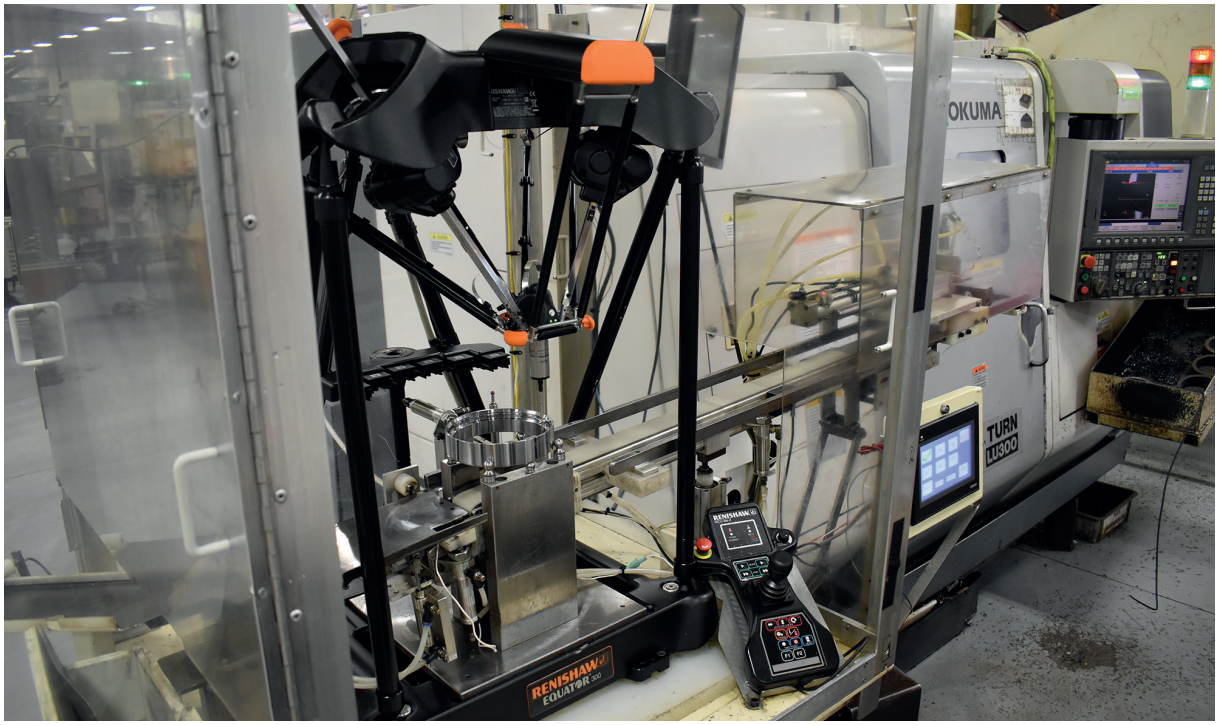
Quality control with automation

Even though the project deadlines were fast approaching, the Equator programming and automation setup was done in a matter of weeks. This involved development and testing of the gauging program, along with integration of a conveyor and simple fixturing. There have now been more than two years of reliable service, with the gauging process running consistently since it was introduced.

Future expansion with Equator

Building on this success, Tim Gerstbauer is planning for the future. “Right now we have eleven Equator systems, and we are currently tooling up for about five more. These will not be operator loaded, instead we will use robots to transfer from the Okumas to the Equator. Frankly, I still have not seen a successful system out there that comes anywhere near Equator”.



Equator system gauging a ring gear blank, then actively updating offsets on the Okuma control as necessary.

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

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