

Hub maker for Nissan – guaranteed process control

Renishaw's tool setting solution aids competitiveness at leading UK automotive supplier

One of the most efficient suppliers to Nissan, UK, is Geo. W. King Ltd, where a high degree of manufacturing automation, including Renishaw probe systems, has been put in place.

In 1996, triggered by Nissan's make-or-buy policy, and a strategic decision to out source the hubs for their 4-wheel drive models, Geo. W. King secured the contract for their manufacture. The installation of a bespoke 'Flange Cell' in 1997, was initially conceived by an internal project management team, as part of the successful pitch. The cell consists of turning, heat treatment, drilling, broaching, grinding, sub-assembly, final inspection, and wash-and-pack operations. Each operation is an automated cell within a cell, all served by an Ewab conveyor system, as Production Manager, Andy Emmerson explained.

"A fully automated line; assessor operators with a thorough understanding of the operation, service the machine tools and oversee the lights out operation, where raw product becomes a finished component. The line has a conveyor system, 'the main highway', which runs around the cell. Raw material in the shape of air-cooled steel forgings, placed on bespoke fixtures, are loaded manually on to the conveyor, and carried to 'satellites', from which a variety of robotic load/unload systems present a component for machining. The satellites are filled on a 'one for one' basis as a machined component exits. Until called into the satellite, waiting products remain on the main highway.

Manufacturing the hubs for each of the models, the first and most important of the machining operations comprises four, twin-spindle CNC lathes, each fitted with Renishaw's HPRA tool setting arms. The lathes are dedicated in pairs to each model, and electronic sensors around the highway ensure that the relevant part is conveyed to the assigned machining operation. However, depending on demand, flexibility exists to utilise any number of the lathes for a particular model.

"A load/unload robot, integral to each of the lathes, picks up a forging and feeds it into the chuck for the first of two turning operations," continued Emmerson. "The part is rotated, and after repeating the turning operation, the machined component is delivered into an electronic gauging operation at the rear of each lathe.



Conducting 100% post-process inspection guarantees information is relayed back to the lathe in relation to size etc, for subsequent operations. This inspection routine is carried out on each operation. If a part fails any aspect of the quality checks it will be sent to a quarantine chute, but to date no rework has been necessary."

In relation to the lathe cycle time, a 'known' machine operation, the minimum number of tools is backed up by sister tooling stored in the carousel. A tool management system is in place, that with a known tool life will see an alarm signify the need for a complete tool change after 4 hours of unmanned running. Having replaced the tools, the Renishaw HPRA tool setting arm is located into a fixed base within the lathe, and a program is called up by the operator to run a mini-sequence using the arm. This automatically corrects offsets and ensures each tool is in position to start the machining sequence. This operation is repeated in the second cabin of the twin-spindle lathe.

"The Renishaw HPRA was not part of the initial cell concept and needed to be reviewed," stated Emmerson. "We were generating too much scrap using optical presetters to measure our KM units. Also, following this form of measurement, a bank of data of some 150 characters had to be typed into the CNC control by the operator. One human error could result in crashing a £200K machine tool. We could have opted for direct feedback from the presetters, but the Renishaw option was more cost-effective.

Today, the repeatability is guaranteed, operator error is minimised, and scrap rates eliminated."

From the lathes, each turned part is conveyed to a heat treatment operation which tempers the bearing journal. Having been machined, mechanical flagging identifies each operation. A pick-and-place unit presents each part from a carousel and places it onto the track, as is the case outside any of the robotised machine cells. This is followed by independent broaching, drilling, and first and second operation CNC grinding - each dedicated to a specific model.

"Since the very first run, we are certain that our automated line is as productive as anywhere in the world and with the technological capabilities of our cell partners, we will continue to win business. One thing is certain; all future machines will come fitted with Renishaw probing," concluded Andy Emmerson.