

Case study

Mitutoyo's metrology helps Hone-All's precision



One of the specialities offered by Hone-All Precision Ltd. of Leighton Buzzard, Bedfordshire, is the machining of nickel-chromium-based superalloy components to tight tolerances. These oxidation and corrosion resistant materials, typified by Inconel and Hastelloy, are well-suited for service environments subject to extreme pressure and temperature and so are favourites of the petrochemical industry, but are very difficult to machine. Accelerated tool wear is a constant concern. This is especially true in the case of bored-hole features that sometimes approach three metres in length and which usually have to be finished by honing to meet stringent customer specifications.

“The quality and service is what keeps us coming back to Mitutoyo”

Andrea Rodney,
Director – Hone-All Precision

Form accuracy shaped up

Due to the length of a typical bore, obtaining the accuracy potential of single-point tooling is impractical, except for a small length at the mouth of a bore to provide an accurate start for the tool. Instead, solid tooling is used with multiple cutting edges designed to balance the cutting forces from the centre of the bore all the way out to the edge of the cut. Large bores need several passes with progressively larger boring tools to achieve the final diameter, and it is vitally important to achieve excellent roundness and straightness with every cut so that the succeeding tool can maintain the high form accuracy needed for the final honing operation.

➤ To help meet customer expectations in the realm of deep hole boring, where diameters are more than 20 mm, Hone-All use Mitutoyo's Holtest two-point bore micrometers and Surftest surface finish testers. Measurement is generally done in-process, on the

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machine, so portability, lightness and convenience in handling are important attributes of instruments, as well as the all-important factors of accuracy and calibration stability.

"One aspect of our service is finishing part-machined components to drawing. Sometimes the form accuracy produced by the initial machining is not as good as we would like, and it is a challenge to correct that," says Hone-All Precision Director Andrea Rodney. *"This is especially an instance where we rely absolutely on the skill of our workforce aided by accurate measuring equipment, such as our Mitutoyo two-point bore micrometers."*

Surface finish brought up to scratch

The superfinishing process of honing uses abrasive stones of various types to generate excellent form accuracy and impart a superior surface finish to a hole or bore, and this must be maintained throughout the whole length of the feature. Hone-All use Mitutoyo SJ-310/411 Surftest portable surface roughness testers to help achieve and maintain the specification demanded by the customer. These models feature a colour display with large numerals for easy reading of parameter values, with auto-calibration and printout of results on demand. The SJ-411 provides skidless measurement results if required by the customer's specification.

"The Surftests are easy to use – the portability is important for us as measurements are made in-process, while the part is still on the machine – and all the

parameters needed are there at the touch of a button," says Wayne Wilson, Business Improvement Manager. *"This is important as surface roughness is a complex subject and customer requirements vary widely. The specification may call for only a single parameter to be measured with just an upper limit, but often as many as four parameters are required with upper and lower limits applying to at least one."*

Partnership means excellent support

Inspection result credibility is vital, and Wayne went on to say, *"Mitutoyo are always ready to offer advice and we have excellent support from Chris Pullen, the Mitutoyo Area Technical Representative. I remember a query from*



one of our customers on a variation between their surface roughness results and ours on a particular component. Chris identified a difference of measuring equipment specification, and once this was remedied the issue was resolved to everyone's satisfaction."

The concept of partnership is very important in the vendor/customer relationship, a point well understood both by Hone-All Precision and Mitutoyo. As Andrea says, *"The quality and service is what keeps us coming back to Mitutoyo. And of course association with the Mitutoyo brand helps – it gives customers confidence."*

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