

GB Precision Latest Grinding Challenge – When too Good is Not Good Enough

West Midlands-based GB Precision is used to tackling difficult grinding jobs – it's what they do every day – but sometimes a job comes along which is just that little bit more demanding. That was the situation recently when the company was asked to grind three identical components to three specified finishes: 0.2Ra, 0.4Ra and 0.8Ra.

As Director, Paul Turner explains; "Usually, the specified level of finish is effectively an upper limit of permitted roughness, so that if the final finish is "better" than that, the job is considered done and the customer is happy. In this case, however, the situation was different, the finish on the 0.4Ra component could not approach 0.2Ra, and the finish on the 0.8Ra component could not approach 0.4Ra." In other words a component with a "better" finish would be rejected.

This request to specify a grinding finish to within narrow roughness levels could become more common as customers want ever-better control and understanding of every component. In this example, for the automotive sector - an area where high-precision grinding requirements are only set to increase - the customer wanted to test what level of finish was necessary to achieve the desired mechanical objective, if there was no functional necessity to specify a finish of 0.2Ra on production-run parts, then cost could potentially be saved by specifying a finish of 0.4Ra, or even 0.8Ra.

Achieving very exact finished roughness is commonplace using EDM technology, where the parameters of each particular machine will exactly determine the finish achieved at each specified power level. However, with grinding, due to its complex nature and the number of variables involved, this is not the case; many decisions must be taken and many compromises made to achieve the desired outcome. These decisions include not only the choice of grinding wheel, the grinding fluid, the mounting of the wheel, feeds and speeds, but many more, in fact the German Society of Engineers (VDI) has distinguished over 100 relevant factors. Not surprising then, that grinding is still sometimes considered something of a "black art."

In GB Precision's experience, delivering the controlled "rough" finish of 0.8Ra proved the most challenging task. The geometry of the components was extremely simple, 50 mm diameter, 20mm deep, in case hardened steel, so achieving the 0.2Ra finish was really "business as usual", with controlled grinding speeds, fine wheel dressing, etc., but achieving the 0.8Ra finish required considerable experimentation, as Paul says; "We had to get really quite aggressive with the grinding, changing many parameters, including the wheel grit, the wheel dressing, and so on, before we could consistently achieve the desired result."

Naturally, with a task such as this, suitable Metrology equipment to check the final finish is as important as having the appropriate grinding technology and expertise. GB Precision was able to use its high-accuracy Mitutoyo Surface Test SJ-401, technology that can measure curved-surface roughness by removing the radius-effect with a filter, and then process the data as if it was taken from

a flat surface. Those measurements are then statistically processed by the machine and the data can be displayed and printed in a variety of different formats, from the purely numerical to histograms and charts. This enables GB Precision to provide the information to the customer in a suitable format for further analysis in the light of the components' performance when tested.

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