

High Precision Engineering

Small parts for mass spectrometers

For over 50 years, Waters Corporation has developed innovative analytical science products. These need to be manufactured with very high precision, sometimes down to micron level, to ensure they meet strict medical standards.

One such example where high precision is key, is that of cone assemblies for mass spectrometers, used for determining the chemical structures of molecules. Samples passing through the cones need to be very closely regulated to ensure accurate analysis. The design requires perfectly circular holes to be drilled into the top, which in some cases can be less than 0.2mm wide.

For the past 30 years, Waters have used Dawson Precision Components (DPC) to produce these parts. DPC employs the Hardinge Conquest GT to meet these needs. For machine operators with the right experience, this allows for highly precise production and can be programmed to create parts with features down to 5 microns (0.005mm). This requires considerable expertise, but the real skill lies in grinding bespoke tools to produce the holes. These need to be produced by hand – small and accurate enough to produce the 0.2 mm holes, but strong enough to produce many parts without degrading or breaking.

For larger batches, parts can be produced by the Citizen M32 13 axis Sliding Head Lathe, which can be used for parts from 1mm-32mm creating complex specifications in a single run, with the finer details being created afterwards on the Conquest GT.

Mistakes can be costly in such important industries, so the production process must be supported by the latest high quality inspection equipment. Mistakes can lead to the final machines failing to meet standards, meaning wasted money for the manufacturer, or in the worst case, return inaccurate data with worrying implications for people's health.

With such dangers associated with any errors, it is vital that each part is identical and each goes through a rigorous and traceable inspection process and assigned a corresponding serial number. DPC inspection systems are accredited to ISO9001:2008, and these cone assemblies are inspected using the OGP Flash Smartscope. DPC provides Waters with bespoke inspection reports for each individual component to guarantee complete precision and accuracy in even the smallest detail of every part they produce.