

The sky's not the limit for NDPP



NDPP's managing director, Nick Squire eyes up the manufacturing challenge of machining the meteorite

Barnstaple-based North Devon Precision Products (NDPP) faced a challenge from outer space when it was called on to cut precision parts from a meteorite.

As managing director Nick Squire explains: "In Autumn 2013 we were approached by James Marchant from Ion Core Ltd in North Devon acting on behalf of Richard Dinan, entrepreneur and co-owner of Armour Surveillance Security Equipment and Technology Ltd.

"James was looking to find a local precision manufacturing company that had the in-house experience and expertise to machine high-quality, high-accuracy components for a new, exclusive and limited range of ultra-stylish and ultra-sophisticated micro keyless entry system bracelets for London-based and Dinan-owned Senturion Technology Ltd.

"What was particularly exciting about the project was that the raw material used to machine the components was to be a 4 billion year old meteorite."

The meteorite (known as a Gibeon meteorite) is composed of an iron-nickel alloy containing significant amounts of cobalt and phosphorus. The crystal structure of the meteorite provides a classic example of fine octahedrite and the Widmanstätten pattern exhibited after machining, chemical etching and polishing the material is renowned for its aesthetic beauty and explains why it is used for high-value jewellery.

Mr Squire says: "We accepted the challenge but, prior to the meteorite arriving at our facility, we spent time researching the physical and metallurgical properties and composition of meteorites in general and developing initial thoughts and ideas about the machining methods we would/could employ.

"It's worthwhile remembering that there were no 2-D drawings to refer to with regard to the bracelets so we had to effectively reverse engineer the job from 3-D models supplied by the customer."

Owing to its non-contact and stress-free characteristics it was determined that EDM machining was the best process to use for machining the meteorite - however NDPP were aware that this method could create a potential problem down the line.

Because the composition of the meteorite was not known the presence of conductive non-conductive material would affect the process.

“We were machining blind and didn’t know if we would hit a pocket of non-conductive material which would render the EDM process redundant. To combat this we created sophisticated jigs and fixtures to hold the meteorite in place, and believed that we could index the meteorite around if we hit a non-conductive area.”

NDPP cut the meteorite on a high-performance, high-precision AgieCharmilles wire EDM machine.

Initially the company attempted using 0.25mm diameter brass wire to machine slices off the meteorite but, the hard exterior surface of the rock caused deflection and the wire to break. Better, but slower, results were achieved with 0.25mm diameter zinc-coated wire.

After 2 weeks NDPP had cut the meteorite into 4 slices, and then used the machine to wire cut the profiles of the prototype bracelet.

The next step was to use NDPP’s spark erosion machines to create the intricate cavities and delicate interlocking mechanism of the bracelet. In total 8 different graphite electrodes were machined on a high-speed milling machine and these were used to spark erode the components.

- See more at: <http://www.engineeringcapacity.com/news101/process-news/machining/the-skys-not-the-limit-for-ndpp#sthash.brizLn6C.dpuf>