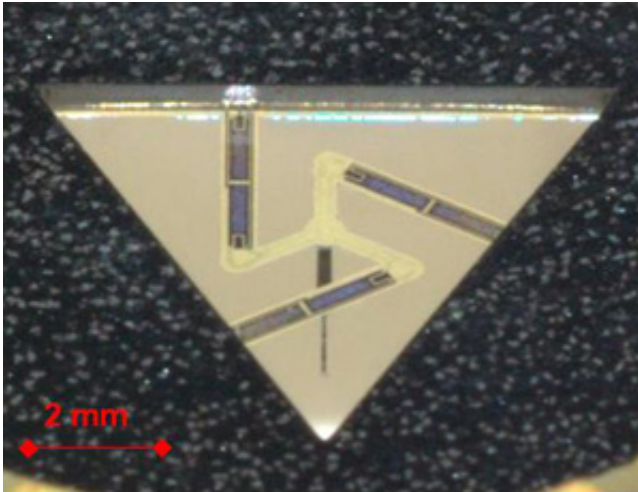


# Mini robot builds NPL probe

August 31 2012

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The micro-scale CMM probe was designed at NPL and built in Germany at TU Braunschweig.

Precision engineering requires accurate measurements and these are often made using co-ordinate measuring machines, or CMMs.

The measurements need to be, at the very least, of equal accuracy to machining capabilities, especially when working with small components with functional micro-scale features. While some new micro-CMMs are capable of making such [accurate measurements](#), many existing probing systems lack the functionality to do so.

To address this, NPL has developed a novel micro-scale CMM [probe](#) that aims to reduce the [measurement uncertainty](#) of micro-CMMs to

below 100 nanometres (or 0.0001 millimetres). The probe consists of a three-legged flexure device and a micro stylus with a spherical tip.

Each flexure is 2 mm long, 0.2 mm wide and around 0.02 mm thick. The stylus is 2 mm long and 0.2 mm in diameter with a 0.07 mm diameter spherical tip.

The probe is a MEMS device (micro-electrical mechanical system). It has built-in piezoelectric film coated onto the flexures so they act as [sensors and actuators](#), allowing the device to vibrate away from measurement surfaces and counteract surface forces that are very strong at these tiny distances. The [vibration](#) also allows the probe to operate in non-contact mode.

To assemble such a device there is a need for high-precision, repeatability, flexibility and low cost, as well as a [workspace](#) that takes up as little room as possible. In order to meet these demands, a miniaturised assembly setup using a robot called Parvus (which is Latin for 'small') was constructed. The robot was built at the Technische Universität Braunschweig, Germany, to function as a mini industrial production robot, to demonstrate the possibility of reducing the size of assembly lines and realising a 'desktop factory'.

The video below, put together by TU Braunschweig, shows the assembly process:

**More information:** [View a poster on the CMM probe](#)

Provided by National Physical Laboratory

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