

Len Saundry, Calibration Laboratory Manager for Mitutoyo UK Ltd, discusses the important role of metrologists in manufacturing and engineering.

CALIBRATION

— an **essential activity** for any company

Reliable dimensional measurement underpins many elements of everyday life, particularly in manufacturing and engineering. Measurements of size and form are routinely made during the manufacturing process to determine if the Geometrical Product Specifications (GPS) are being met, and hence if that element of the quality equation is satisfactory. International trade demands that the accuracy of a measuring instrument used for production, wherever it may be in the world, is known in relation to the international standard of length, the metre, through a process of traceable calibration to national standards.

The subject of measurement has a long and distinguished history and the need for reliable measurement systems has grown rapidly over the last thirty years or so, in large part due to the number of companies seeking registration under the ISO 9000 series of standards. The introduction of ISO standards for quality assurance systems has played an important role in raising the profile of measurement in

the industrialised world and evidence of satisfactory calibration of any measuring tool involved in production is usually required for compliance. In the UK alone there are over 50,000 companies registered as compliant with ISO 9000. In Europe, and elsewhere, ISO 9000 registrations are growing as young certification bodies emerge and registrations increase.

National Measurement Systems

Ensuring confidence in the accuracy of measurement is of paramount importance and it is the National Measurement System (NMS) of a country that provides the bedrock on which confidence is built. The NMS is the technical and organisational infrastructure that ensures a consistent and internationally recognised basis for measurement. Calibration and testing laboratories in the UK, particularly those accredited by the United Kingdom Accreditation Service (UKAS), play a vital part in the NMS.

Many companies consider it economic to

calibrate small instruments in-house and set up accordingly. This may be fine for micrometers and calipers but the crucial calibrations – gauge blocks, for example – should either be entrusted to a national metrology institute, such as the National Physical Laboratory (NPL) in the UK, or an independent laboratory that holds UKAS accreditation. This is because only an organisation that has been assessed to internationally recognised standards of competence, impartiality and performance can be entrusted with calibrating the most accurate instruments and artefacts on which all lower-level calibrations depend.

It is a fact that the characteristics of gauges and measuring instruments, whether simple gauges or state-of-the-art systems, change slowly with time. The question frequently arises: how often do we calibrate this device? This can be difficult to answer. New tools should be calibrated relatively frequently in order to establish repeatability (metrological stability). If successive calibrations show this to be substantially better than the uncertainty required then the interval between calibrations can be extended – if requirements in standards don't specify otherwise. However, at the other extreme where repeatability approaches the uncertainty needed then the calibration intervals should be much shorter; perhaps weekly – or even daily.

Do all instruments need calibration?

There are situations where an instrument need not be calibrated, for example where its readings are *For Information Only*. But in this case it is important to be careful that false assumptions are not accidentally built into the hand-waving generalisations that sometimes accompany arguments for not calibrating an instrument. The cost of calibration is sometimes the main factor in deciding not to have a device calibrated and clearly it is important to take economic issues into account. But there can be hidden costs and significant risks taken through not calibrating an instrument, and hence not controlling or understanding a process adequately. These considerations ought to tip the balance.

A calibration certificate or report, provided by a UKAS accredited laboratory, gives assurance that the work has been carried out to the highest standards in that the laboratory issuing the certificate has been stringently assessed by independent experts, the agreed or specified methods and procedures have been followed, and the measurements are traceable to national standards. Only a laboratory that holds such accreditation can issue an accredited certificate or report.

Choosing a calibration laboratory

UKAS provides a regularly updated list of Accredited Calibration Laboratories on its website where the services offered by each organisation can be inspected. Mitutoyo UK Ltd has held UKAS accreditation since 1990, providing a range of calibration services at its state-of-the-art, environmentally controlled calibration laboratory at the company's Coventry Metrology Centre. This purpose-built facility is equipped to handle practically every dimensional calibration need and its highly experienced team of metrologists performs around 12,000 calibrations per annum on any brand of gauge or instrument, providing a fast turn-around to ensure that customers are not without their measuring equipment for any longer than necessary. ✨



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t: 01264 353123