

# Transform manufacturing with flexible gauging

## Q. What is the difference between Equator and custom gauges for shop floor gauging?

**A.** The main differences are in flexibility, resultant reduced cost and the resources needed. Equator is extremely flexible, it can be used just as effectively for one type of part or multiple different parts. ready to gauge any one of them after a change-over lasting a few seconds. Custom gauges are typically designed for just one part and switching to a different part, or a re-designed part, requires physical changes to the fixtures and sensor arrangement. Setting up a custom gauge is a design project in itself – deciding how to gauge features, designing a suitable fixture to position sensors, then commissioning, testing and proving that the custom gauge meets the gauging specification – a costly and time-consuming process.

## Q. What is the difference between Equator and hand gauges for shop floor gauging?

**A.** Consistency and cost. Equator is highly repeatable while an operator using a hand gauge can be inconsistent, and different operators can produce very different results. Cost can be a more significant issue than you might think: the hand gauge itself is relatively low cost, but consider the regular calibration required. When a workshop needs tens or hundreds of hand gauges that calibration cost can be high. The cost of the operators' time also needs to be taken into account. Equator can cut that labour cost down significantly, allowing operators to be re-tasked onto other value-adding tasks.

## Q. When could we use a 'shop floor' CMM, when is Equator more suitable?

**A.** If the temperature varies by more than a few degrees, and in particular if there are rapid temperature changes, you cannot guarantee accurate results from a CMM – the accuracy is only guaranteed for the temperature at which it was certified, although the manufacturer may provide an accuracy profile for different temperature ranges. We would recommend that you monitor the temperature changes on your shop floor, over a 24-hour period and also to understand seasonal variations. Then, knowing the typical temperature variation, taking account of the size of your parts and features, factoring in the appropriate coefficient of thermal expansion, considering the fixture's effect on the part due to temperature change, assessing the tolerances of the features with respect to the measurement uncertainty of your chosen device across that temperature range, and agreeing an acceptable precision to tolerance ratio... you will be able to determine the appropriate measurement equipment for your application.

## Q. How does Equator work?

**A.** Equator is a comparator system. It reports on the difference between the part being gauged and the nominal feature dimensions, taking into account how the master part is different to nominal (this data is recorded when the master is measured in a controlled environment).

## Q. How does Equator cope with temperature change?

**A.** Equator has an on-board ambient temperature sensor that monitors any temperature changes on your shop floor. If the temperature increases or decreases by a user-defined value, the operator is prompted to re-zero the system, using the master part, which changes dimensions in the same way as the production parts. This ensures the same level of calibrated accuracy at any temperature between 10 and 40 C.



**Q. How do we certify the Equator gauging process against international standards?**

**A.** The accuracy and certification of Equator results rely on the standards to which the master-part measuring device is calibrated. This device could be a calibrated CMM or other calibrated devices in a temperature controlled room, and Equator relies on those devices accurately measuring how the master part features relate to the nominals. Equator 'inherits' the accuracy of the calibration certificate from the calibrated device, then the only factor is the repeatability of Equator itself, which can be verified by a Gauge R&R test on the part in question, or by using the Equator Gauge Checker artefact.

**For more information visit [www.renishaw.com/equator](http://www.renishaw.com/equator)**