

ISO Information

Certification versus Calibration

- A certification of a machine is defined as we are certifying the machine meets a specification (OEM or customer specification).
- A calibration makes adjustments to a machine to bring the machine back to OEM specification. A certification is then performed to verify the machine after adjustments are made.

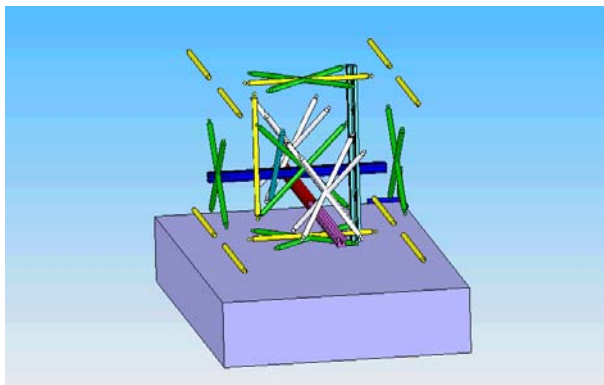
What defines an ISO calibration?

After adjustments to the mechanical or internal compensation file have been made, we perform a certification to verify the machine now meets specification.

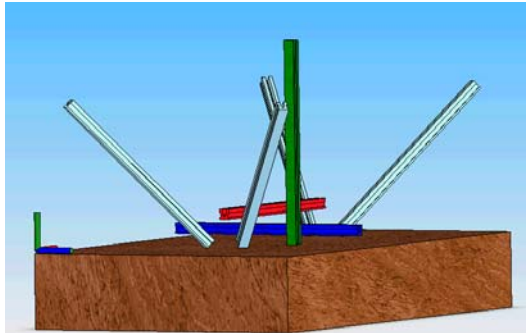
- The ISO Specification is divided into 2 sections
 - 2 Verification
 - P-Test (Sphere)
 - Length Test (length, bi-directional measurements, Volumetric accuracy)
 - 4 Scanning
 - THP – High density points Predefined path
 - TLP – Low density points Predefined path
 - THN – High density points Non-predefined path
 - TLN – Low density points Non-predefined path

How does an ISO calibration differ from a B89 or other type of certification/calibration?

- The B89 specification is divided into 5 sections
 - Repeatability (Sphere)
 - Linear Displacement Accuracy (LDA, length measurements)
 - Volumetric Accuracy (Ball Bar)
 - Bi-Directional Measurements (Gage Block) [When Applicable]
 - 3D-Alpha (Rotary Table) [When Applicable]



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Outline what an accredited calibration is...

ISO 17025 is an internal specification governing how we perform calibrations and certifications in the field. We, the calibration service, must have records of

- training of our employees on the procedures and specifications
- procedures of how the certification is done
- a plan to perform proficiency testing on employees that perform the testing (making sure they know the procedures).
- testing of the equipment used to make sure the equipment is within specification.
- the uncertainty of calculations taken during the certification that where applied to the measurements
- our scope of certification

We can provide an ISO 17025 certification provided the testing procedures (B89, ISO 10360) are on our scope.

Which customers need to have ISO calibration? How does the customer know they need an ISO calibration?

We provide a certification based on how the machine was sold, however the customer is free to choose what specification they need. In my opinion they both have advantages and disadvantages where

Top 2 Pros

- B89
 - 5 tests can be performed to measure every aspect of the machine geometry and probing system
 - An additional test can be performed (TVE) to de-rate the machine based on the environment around the machine
- ISO
 - Within the 2 tests the machine is verified for probe verification, repeatability, length and volumetric, and bi-directional measurements
 - The specification has a provision to test the scanning capabilities of the machine

Top 2 Cons

- B89
 - No provision to test the scanning capabilities of the machine.
 - Requires more equipment and a long test time.
- ISO
 - No provision to de-rate the machine for the environment. The customer must meet the manufacturer's environmental specification
 - The specification requires that the bar length is 66% of the longest diagonal

What types of equipment are used in an ISO certification/calibration?

The 10360-4 program requires the machine to have a scanning head. The ball bar is used in the B89 specification, and the stepgage is used for both ISO 10360-2 and B89 4.1 LDA, however a laser can replace the stepgage when we are talking about performing an LDA with B89.

How does an ISO calibration benefit the customer?

In some cases it is a more rigid test and is more reliant on the room specification meeting OEM specification. They are simply two different tests having their own pros and cons.

What can happen if the customer does not calibrate to ISO standards?

The customer can calibrate to the AMSE standard. One of the most common problems is measurement uncertainty where the customer does not meet the OEM environment specification and we cannot get the machine to pass based on that problem. With B89 we can de-rate the machine to meet the environment.

The question should be, “What happened if the customer does not calibrate the machine?” Most third parties come to a customer’s facility to certify the machine and because they do not have access to the compensation file they have no way to correct what is wrong to bring the machine back to OEM specification. We have the tools to correctly analyze and make correction to the compensation files.

What can make a machine go out of calibration or certification?

- Environment is the biggest culprit...
 - Temperature
 - As the machine expands and contracts over time within an environment that continuously changes, the machine geometry is continuously moving. The machine can develop pitch and yaw, straightness, linear, and squariness error when this happens. Many of the third parties can only correct minor error such as squares and they may do this by mechanically correcting the machine through bearing adjustments. This is where we differ, we as the OEM, can machine electronic adjustments to correct all the errors of the machine. We verify the machine is running correctly and then check the errors using the tools we are provided. Then we use the Hexagon Service Utilities to correct and calibrate the machine.
 - Vibration
 - This is the most difficult to resolve and usually at an expense to the customer. This usually causes bolts to loosen and repeat measurements are difficult. The only way to fix this is to change the environment or construct an isolation system.

Why is an interim check important?

If the machine is in constant flux, then you will not know when the machine will fall out of specification, which, in turn, you will not know when the machine was out of specification. Interim checks allow the customer to feel confident about the measurements they are doing. It allows the customer to know how the environment affects the machine.

For example, let’s say the air conditioner failed over a weekend and was fixed Sunday night. The temperature of the machine raised 10 degrees within that time. This means the bearing, rails, and scales expanded (some of the machines are made of aluminum which expands at a rate of 22.5 um/M per degree). Now

let's say customer was not aware that this happened, what happened to the machine? If there was an interim check done then the customer could verify there are no problems with that machine. The customer would continue measuring the machine not aware there were any problems and consequently reject parts when there was something wrong with the machine.

What is Hexagon's advantage over the competition?

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