Temperature Sensitivity Compensation

Using and Understanding Span Compensation Methods for Testing at Non-ambient Temperatures

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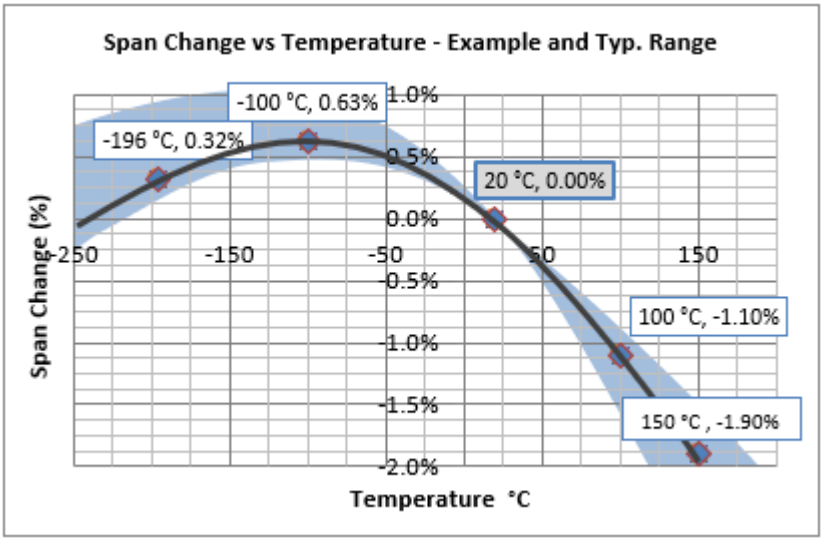
Testing at a steady non-ambient temperature

Like load cells, all extensometers are susceptible to measurement changes when testing in non-ambient *isothermal* conditions. The primary effects are shifts in zero point (offset) and sensitivity (gain/span). *Offset* with temperature can be addressed by simply zeroing the measurement at the beginning of the test.

> Offset that varies over time due to varying temperature conditions is often referred to as '*drift*'; dynamic temperature conditions require additional considerations not covered in this technical note. (See Technical Notes on *Thermal Drift* and *Dynamic Temperature Conditions*)

Changes in extensometer ***sensitivity*** with temperature are typically <2% and can be compensated for. A common approach is to apply a correction to measurement data using a *Span Vs Temperature* correction curve provided by Epsilon (example at right). It is assumed that the test system has been calibrated to read the extensometer at room temperature.



This generic example is typical for strain-gaged devices. A specific curve for any extensometer can be generated by Epsilon during production or calibration service.

Example

In this example, for a test at -196°C, the graph indicates a +0.32% change from ambient. For a true elongation of 10.00mm, the indicated value would be 10.032 mm; a correction factor of ×0.9968 should be applied.

Applying span correction factors

A recommended method to apply a span correction factor is to use an explicit correction in software. Initial calibration is performed at room temperature, and the indicated value is reported. Multiplication by a correction factor yields the compensated value which may be used for testing and control. For testing at ambient, a factor of 1.0 is used. This method has the advantages that the correction factor is applied explicitly, and does not affect the ambient electrical calibration of the test system.

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