

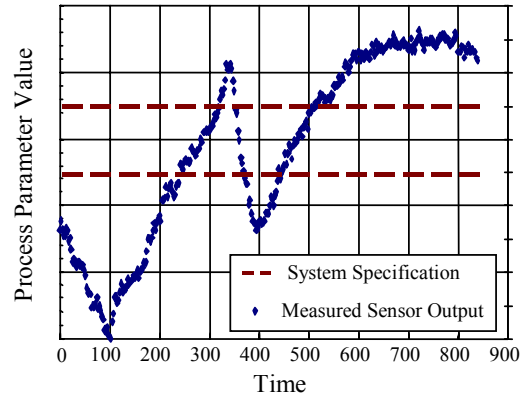
# Process Measurement Instrumentation

**Problem:** The accuracy and stability of a new model of precision process instruments was affected by installation variability and in-service changes in ambient conditions.

A critical performance specification for a process instrument is its stability and insensitivity to installation variability and ambient environment changes. A major US manufacturer of process instrumentation developed a new instrument model to address a large market opportunity. Early prototype testing revealed the sensor's drift caused by ambient condition changes far exceeded design specifications. SDL worked cooperatively with the company's development team to identify and understand the root cause of the sensitivity of the instrument to installation variability and in-service perturbation to the mounting structure. SDL conducted experimental test-

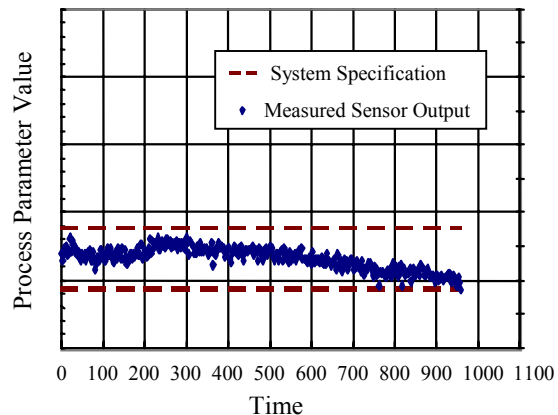


ing of a similar sensor to develop a meaningful computer model. This model was exercised in computer simulations which predicted a high sensitivity to ambient environment changes. The computer predictions were validated with further experiments which quantitatively measured the sensitivity of the sensor to perturbations to the mounting structure. The specific physical mechanism which allowed this interaction was not yet completely understood. Further testing identified the manner in which the sen-



**Process Parameter Drift in Original Sensor Design**

sor operation interacted with the external environment. The company development team utilized this understanding to guide finite element modeling and optimization of the instrument design. The drift of the redesigned sensor was within design specifications allowing production prototyping to proceed.



**Process Parameter Drift in Redesigned Sensor**

**Solution:** Experimental testing and computer modeling was conducted to obtain a fundamental understanding of the mechanism causing the sensitivity to external effects. This understanding guided redesign of the sensor. The drift of the redesigned sensor was within design specifications.

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## SDL

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