

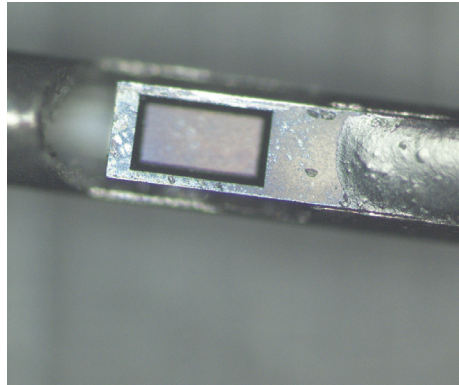
PRECISION PRESSURE SENSOR TESTING FOR MEDICAL APPLICATIONS



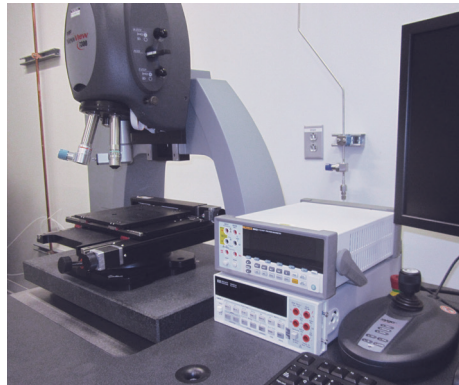
In the ever expanding pressure sensor market, MEMS-based sensors are driving the market to higher levels of precision and accuracy with faster response times at lower cost. Medical applications for both diagnostics and treatment benefit from these technical advances. When measuring pressure of fluids in the body (eg., blood) with minimally invasive techniques, precision and accuracy at relatively low pressures (<3 psi) are critical. With these sensor market forces, SMART Microsystems has responded with pressure sensor testing capability to meet the demand.

Empirical data is always needed to validate any theoretical model, and MEMS sensor devices are no exception. The function, scale, and form factor of MEMS sensors continues to evolve. As the functionalities of MEMS sensors are expanding, the scale and form factors are shrinking. The continual miniaturization of MEMS sensors creates competing requirements for package design and process development, which make it more challenging to collect empirical test data. This presents a unique challenge for testing, where cutting edge, state-of-the-art test capabilities are increasingly essential to the development process.

We use high precision Fluke pressure controllers to perform rapid sensor characterization and testing. Interferometry is used to characterize the actual MEMS sense element diaphragm movement response to pressure. Our team designs and fabricates the fixtures required for testing. The entire set up can be integrated with a data acquisition system. Bare die and packaged die can be tested under a variety of conditions to validate performance requirements. SMART Microsystems' capabilities provide early learning in product development that can be used as design inputs so that our customers can meet the demands of their market.



Cardiovascular Guidewire Sensor



Zygo NewView 7300



Fluke 7250Sys

PRESSURE CONTROLLER

- Fully integrated multi-range pressure test and calibration system
- 12 range system for maximum performance and coverage
- Pressure ranges to 2,500 psi (170 bar)
- Internal vacuum pump for absolute mode and negative gauge mode operation
- Control stability:
 - 0.0015 psi from 0.15 psia to 14.3 psia
 - 0.0001 psi from 0 psig to 10 psig
 - 0.0015 psi from 10 psig to 150 psig
 - 0.25 psi from 150 psig to 2,500 psig
- Automatic range switching
- High speed pressure control provides increased throughput
- Datalogging and automated calibration sequences

INTERFEROMETER

- Characterizes and quantifies topographical features:
 - Surface Roughness
 - Step Height
 - Critical Dimensions
- Non-Destructive Tests
- Profile heights ranging from < 1 nm up to 20000 μm
- Vertical Scan Range 150 μm
- Max Scan Area 20 μm
- Maximum Sample Size 89 x 203 x 203 mm
- RMS Repeatability < 0.01 nm (0.0004 μin) $\text{RMS}\sigma$
- Step Height Accuracy $\leq 0.75\%$ Repeatability $\leq 0.1\%$ @ 1σ
- 5x Objective, 20x Objective, 10x Glass
 - Compensated Objective