

Brainstorm: Sensors and Testing

In the development cycle, where does test play the most important role?



Philippe Desaulniers, Avera, [www. averna.com](http://www.avera.com)

Product testing must be an integral part the design process, from the onset of a project. This goes beyond designing PCBs with boundary scan capabilities: integrating functional test, self-calibration and field diagnostic capabilities into your product needs to be an essential consideration of your design.

Testing is a significant cost factor in any product, even though it has no intrinsic added value (after all, testing a perfect product is essentially a waste of time). This offers a significant opportunity for cost reduction, one that a good design will help you benefit from.

With the advent of cheaper components with larger memory, there is more space for firmware that is ancillary to the product's actual function. An unrelenting trend in recent years has been to increase focus on BISTs (Built-In Self Tests), which require minimal expertise and equipment in production, thus providing order-of-magnitude savings in testing and non-quality costs. Self-calibration and self-diagnostics can also provide major savings both in production and in service.

This is a proven, effective strategy that can offer very compelling ROI. It requires involving test considerations at the very beginning of the design cycle, and it makes collaboration between design and test engineering teams closer than ever.



James Sterling, Infineon Technologies North America, www.infineon.com [1]

Designers of sensing applications expect that environmental stress will lead to a loss of sensitivity over lifetime; the ability of the sensor to accurately measure its target may be affected by the effects of humidity, temperature, and other package related stress acting on the sensor silicon. For this reason we have found that module level Concept Validation (CV) and Design Validation (DV) testing are the most important test points in the design cycle. In many cases stress influences can be simulated and tested out of production intent module designs.

At the IC level, manufacturers specify exactly how the device will behave over life and temperature. Module manufacturers factor these specifications into their designs, but when repackaged and exposed to a lifetime of environmental influences most sensors will have sensitivity hindrances. Though module level DV testing can identify attributes affecting the die, chip level integration of additional tools can improve lifetime sensitivity and thus the reliability of a sensing application. For example, our TLE4998 Linear Hall sensors utilize integrated pressure and temperature sensing elements to feed data to algorithms. In trials, this stress-sensor and compensation algorithm approach achieved a 4X improvement in sensitivity drift. This can have considerable impact on system performance in the typically harsh environments of Hall Sensor applications.



Steve Wolf, VIA Embedded, www.viaembedded.com [2]

Brainstorm: Sensors and Testing

Published on Electronic Component News (<http://www.ecnmag.com>)

When discussing the various stages of testing development, the question of which stage is most crucial is, for me, a simple one. The EVT (Engineering Verification Test) is where the real design genius lies, especially when it comes to system design. Making the right decisions at this stage in the development cycle is absolutely key to keeping the project on schedule and within budget. What's more, decisions made during EVT have a way of snow-balling, so minor inconspicuous or design flaws can cause massive issues later on in the development cycle.

System design can be very expensive once we get to the design verification stage, so the testing done at EVT is essentially the basis upon which the project is built, forming the foundation for the project in terms of form, shape, power requirements, the components used, etc. Basically, every element of the system will be influenced directly by the decisions made on the basis of these tests. In fact, only very minor changes or modifications can be implemented after the initial EVT stage.

Hence the adage that changes cost a few pence in engineering, but can cost thousands in production. To quote Barry Boehm, the evaluation stage is where we ask ourselves, "Are we building the product right?" (Boehm, 1979)

Source URL (retrieved on 07/28/2014 - 7:31pm):

<http://www.ecnmag.com/articles/2009/07/brainstorm-sensors-and-testing>

Links:

[1] <http://www.infineon.com/>

[2] <http://www.viaembedded.com/>