TECHtips

aci

Electronics Manufacturing Insights from ACI Technologies, Inc.

Design for Test

Design for Test or Design for Testability (DFT) can best be described as the techniques utilized to add testability features to an electronic hardware product design. These added features make it easier to develop and apply manufacturing tests to assure that the product functions correctly.

No product can be manufactured without an efficient test strategy. As one of the final stages in the production cycle, testing helps guarantee that the percentage of defective products passing undetected is so low as to be acceptable. Defining the test strategy must start early in the design stage since simplifying the production test phase will normally lead to lower cost and more reliable products. Over the years, DFT has taken a very prominent role in the overall design and test cycle and is an important stage in terms of influencing customer satisfaction. In general, a product that cannot be readily tested is not really manufacturable.

Benefits of DFT [1]

The indirect costs of non-testability include unpredictable production schedules, piles of suspect boards, a very high cost of test, and an uncertain level of product quality delivered to the customer. Add the time spent trying to diagnose, and you quickly see that non-testability can be very expensive.

DFT, on the other hand, is introduced at the design stage, where it dramatically lowers the cost and the time spent at test. Properly managed, testability heightens your assurance of product quality and eases production scheduling. The time and money saved by DFT are the obvious major advantages. The more efficiently and accurately you test, the more profitable the product.

Other benefits include:

- Reducing the time required to pass the design to manufacturing.
- Lowering the cost of manufacturing.
- Minimizing the design engineer's involvement in production set up.
- Improving cross-functional communication and cooperation between design, engineering, and manufacturing.
- Lowering both initial and life cycle costs.
- Decreasing test times and virtually eliminating harrowing production delays (Figure 1).
- Guaranteeing more efficient diagnosis and repair in the field.
- Providing more accurate diagnostics to the part and pin level.

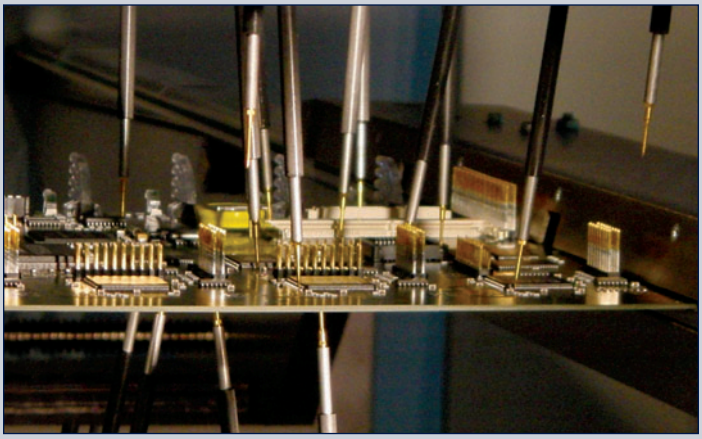

Figure 1: Flying probe testing.

Combinational Testability [1]

In order to design for testability, it is necessary to have a basic understanding of the capability of the combinational tester to provide test and diagnostics. This is best accomplished by examining the hardware, software, and fixturing technologies that support combinational test. Automatic Test Generation (ATG) has greatly

continued on next page

enhanced the acceptance of combinational testing technology as a viable, cost-effective test approach. The ATG paradigm requires that information be available describing the components on the board (test models), their interconnects (circuit description), and their physical location (assembly).

New Test Approaches [1]

Many innovative testing strategies are being introduced that will enhance the likelihood of testability. These include the adoption of boundary scan designs, automated test model development, and analog testing of digital opens.

Among other manufacturing and production support services, ACI Technologies has the expert technical staff and state-of-the-art facilities to provide Design for Manufacturability and Testability (DFM, DFT) services including parametric testing, functional, optical testing, boundary scan, and integrated on-board programming (OBP). For more information, please contact the Helpline at 610.362.1320 or via email at helpline@aciusa.org.

Reference

[1] "Thomas J. Coughlin." Designing for Testability... The Technology, the Technique, and the Economics. 1996. GenRad. <http://www.prpca.com/designof.html>

Yinhao Wu
Senior Design Engineer
ACI Technologies, Inc.