Test Issue

Changing Roles, not only Prototyping - Flying Probe Testers in Production
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Introduction

On top of the all important time-to-market concerns, manufacturers also have to deal with components that get ever smaller, lower in power and with limitation on test access. So how is the manufacturer expected to come up with a test strategy that will rapidly see a design progress through prototype and into full production? Mark Harding, Digitaltest Inc. sees the flying probe test platform as a potential solution.

When flying probe test systems were introduced, it was to address the need for an in-circuit prototype test system. Prototype testing requires detection of shorts and opens, as well as the verification of the presence and value verification of all analogue components. Previously, whenever electronics manufacturers wanted to test new revisions of a pre-launch design, they had to either modify an existing fixture or buy a new one.

Flying probe test systems are now the platform of choice for prototype testing. The most obvious and appealing attribute of the flying probe tester is the fixtureless design, eliminating the expense and time lag of ICT fixture changes. Next, and perhaps an equally important attribute, is the flexibility that the flying probe tester gives the test engineer. With a flying probe tester, engineers can take CAD system data and quickly incorporate design changes into a test program, measuring the results instantaneously. This capability allows test engineers to keep pace with the ever-increasing stream of new products and product revisions.

New Generation

When flying probe testers were first introduced, many of them did not have a test program generator. Test program generation on the earlier models would take an average of 3-6 days to generate and debug a new program. Today, flying probe test systems have evolved into much more sophisticated systems with extended facilities for program generation and debug, along with an extensive test portfolio.

To be an effective tool for today's electronics manufacturers, a flying probe tester should be capable of generating a complete test program for a 1000 net board in less than an hour and finish test program debugging in less than a day.

The best flying probe test systems have software that offers a variety of debugging tools, including validation of the test location, a graphical interface to change test locations, board layout and intelligent schematics tools, and menus that will show all the measurement parameters and the current measurement results. All of the board information, net information, component information and component data sheets should be available to the user.
At the end of the test program debugging, the user can compile his test program in an .exe file and protect it against change. After test program compilation, the programmer can release the test program for use by the operator.

**Changing roles**

As test and manufacturing engineers look for ways to efficiently and cost-effectively build new products, they have discovered that the flying probe tester can play a significant role in a production environment. Whether the producer is an OEM or contract manufacturer, the cost pressures are the same, and the need to employ the best test strategy is essential. Just as fixture costs have made the flying probe tester a logical choice in prototype testing, this has also become the case on the production floor. Significant throughput improvements have made flying probe testers fast enough to become an integral part of a successful test strategy.

There are many fixture-related reasons why a flying probe tester is a more logical choice than a bed of nails ICT tester. First, the space needed for test locations for a bed of nails tester has become smaller and smaller, leading to test fixtures that are more expensive and less reliable. Flying probe testers can contact pads as small as 6mils, vs. 25mils for a fixture. More importantly, the available locations for test points on a fixture are diminishing, forcing the use of either an expensive double-sided fixture or a compromise in test coverage. The loss of test coverage is of critical concern and is a key motivator behind the use of flying probe test systems in production.

Today's testers however should allow simple fixtures to be able to power up the boards. Fixed pins connected to nets with high pin count can be extremely useful to reduce test time while increasing fault coverage. Boundary scan and on-board programming can only be performed if simple fixtures are used.

In the early stages, flying probe testers provided only simple MDA capabilities testing for shorts and opens on passive components such as diodes and transistor junctions. Now, equipped with an array of new features such as on-board memory module programming and boundary scan testing, they provide the performance of an in-circuit tester.

Despite all of the advancements, flying probe testers cannot operate as a single solution that satisfies all test requirements. The major factor of why flying probe testers cannot be used in production is the lengthy test time. Test time is often longer than the cycle time of the product.

The usage of fixed pins can reduce the test time dramatically by eliminating many head movements. Also the concept of test program translation protects the test program from change and at the same time uses the pipelining concept to increase test speed and increase tester throughput.

**Conclusion**

Flying probe test systems have come a long way in a short space of time. Their
inherent flexibility has been enhanced by advanced programming tools, which have significantly improved programming time and therefore cemented its role as an ideal platform for prototype and small batch testing. But the days of the flying probe being classified only as a prototype tool are over. Improvement in test speed combined with a more complex mix of test strategies now mean that the flying probe is an essential component in any manufacturer’s test solution, irrespective of the volumes or product mix that the manufacturer is producing.

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