



Is Fully Automatic Bond Testing Possible?

Abstract

Advances in bond testing have progressively improved accuracy and reduced operator input but can the process be truly automated? We examine what is possible with a modern bond testing system.

Introduction

In its infancy bond testing was wire pull, followed by die and ball shear. It evolved to satisfy the ever increasing diverse range of semiconductor and electronic applications. This requirement continued to evolve requiring ever more advanced test methods to keep pace with new technology. This became the first priority and kept bond tester designers busy. If bond testing needed to test all the bonds being made, full automation would have been developed from the very beginning. But as only a relatively small number of bonds required testing, the development and capital cost equations of bond testing differed from that of production machines. Attempts were made to add automation but most cases lacked the resources and ultimate commitment from both equipment suppliers and end users to provide what the industry might expect. Being involved from the beginning, always wanting to achieve full automation and born of experience rather than capital investment, a few very experienced bond tester designers started to see how it might be achieved.

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Bond testers

- Condor *Sigma*
- Condor *Sigma Lite*
- Condor *Sigma W12*
- Condor *150HF*

This is page 1/3
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Fig 1 A modern bond tester

There was never any doubt about the benefits of automation. Apart from the obvious saving in operating costs it should be faster, but perhaps most importantly it could test more consistently and accurately. The only justification for bond testing at all is to measure the quality of your bonds and in so doing maintain and improve, production yield and product reliability. This being the only reason for a bond tester's existence should make accuracy the highest priority for any bond tester designer.

Continue to read:

1. Introduction
2. What is Required for Automation?
3. What is Possible with Modern Automation?
 - Multiple test heads
 - Accurate tool positioning
 - Automatic load and unload
 - Machine Vision
 - Measurement of gross sample position (fiducial camera alignment)
 - Accurate automatic alignment for variations in bond position
 - Automatic failure mode analysis (auto grading)

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- Test debris management

4. Non-Destruct Testing
5. Conclusion

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