Board Test Is *Not* Mature

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1 Position Statement

The question is whether "Board Testing has become stagnant" as an ITC topic. The implication is that the board test community has nothing new to invent, report or say that would be of use to the ITC community at large, and board test engineers in particular. This leads to the charge that ITC is really only an IC testing conference.

While I must accept the fact that the IC content of ITC is much larger than the Board Test content (measured in sessions and papers), I reject this thesis, simply because board testing is so terribly difficult and more so as every day passes. We can marvel at the technology that goes into testing an IC with 50,000,000 transistors, but yawn at the prospect of testing a board containing hundreds of these ICs, along with hundreds of analog components sprinkled in. (At least those not charged with doing this job may yawn. Those who are should be petrified!)

The board testing community is also very conservative. Quite simply, as a board test engineer, you are expected to move mountains every day, stay on schedule, produce high-yield product and not blink an eye as Moore's law exponentially increases your problems. (If you do blink, you're fired!) In this environment, you tend to stick with what works and avoid "risky" new adventures into topics like Boundary-Scan, until there are no other options. And yet, market forces produce new risks every day.

The conservative nature of the board test community does produce some conundrums. Take the issue of "test coverage". There is ample evidence that we do not know how to measure test effectiveness. Fifteen years ago a study [Schl87] showed that tests that might be rated a good (claims of "98.5% coverage") might have significant defect escape rates. Then there is "tester myopia" that we indulge in – where classes of defects are simply ignored [Tege96] because our favored tester can't test for them. The inexorable increases in board density give us test access limitations, and yet we still use test coverage concepts that assume full access [HPF02]. It's what we're familiar with, and rocking that boat could get you some "unwanted management attention".

I do not denigrate the problems of the IC testing community, they are huge; but it appears that the IC community has done a better job of getting the spotlight. This may simply be due to the price tags on their purchase orders for test equipment. Someone up the management chain is saying, "Why is this so expensive? Go find a better way!" and so you come to ITC, to find that better way. Board tester systems are stable-to-declining in price, even as the difficulty of creating and maintaining tests increase. This apparently does not justify plane tickets to conferences. And besides, you've got a schedule to hit and can't afford a few days at ITC.

I claim that board testing is *not* a mature technology. Some would argue that standards like IEEE 1149.1 and 1149.4 "prove" it is mature. They say, "We've standardized away your problems, now simply execute well!" Then a new technology like AC-coupled ICs comes along and your standards suddenly no longer work. This can be seen at this year's ITC, where new board test problems are being addressed [EPB02] and new standards are being implemented. This particular change came quite precipitously and the board test community responded quickly. Note that they chose ITC as a place to rally.

2 References

[EPB02] "IEEE P1149.6: A Boundary-scan Standard for Advanced Digital Networks", W. Eklow, K. P. Parker, C. F. Barnhart, Proceedings, International Test Conference, 2002

[HPF02] "Test Coverage: What Does It Mean When a Board Test Passes?", K. Hird, K. P. Parker, B. Follis, Proceedings, International Test Conference, 2002

[Schl87] "Real-World Board Test Effectiveness: What Does It Mean When a Board Test Passes", E. O. Schlotzhauer and R. J. Balzer, Proceedings, International Test Conference, 1987, pages 792-797.

[Tege96] "Opens Board Test Coverage: When is 99% Really 40%", M. V. Tegethoff, K. P. Parker, K. Lee, Proceedings, International Test Conference, 1996, pages 333-339.

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