Future ATE: Perspectives & Requirements

Panel Position Paper

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For over two years, the ATE industry has been suffering from one of the worst downturns on record. The industry faces many daunting technical and economic challenges. To prepare for how the industry may evolve, we need perspective on the current state of industry and on trends that impact the industry. My thoughts and perspectives on various trends and their impact on the industry are captured in this position paper.

The paradox of increasing device complexity and lowering device ASP will continue. The semiconductor industry driven by the consumer market will continue to demand complex devices with higher gate counts, high speed IOs, and greater levels of mixed signal integration, resulting in higher functionality for end users. At the same time, competition within the industry will continue to limit the pricing power of semiconductor companies. This paradox has made cost of test the dominant issue for the industry. It has increased the prominence of using DFT in device designs, spurred debate on the functional tester vs. DFT tester topic, and recently spawned discussion on an open architecture standard for ATE. The increased emphasis on cost of test by semiconductor companies will continue to drive the trend of outsourcing test to lower cost regional subcontractors as fewer companies have the resources to operate a captive production test facility. For many semiconductor companies, the key issue will shift from purchased capital cost of a tester to hourly tester cost charged by their subcontractors.

Given this background, what should the ATE industry do? How should it change? One of the fundamental questions that one must answer before we can begin to address this issue was posed by Alex d’Arbeloff in his keynote address at ITC 2002. He asked the question “has something fundamentally changed the rules of the game. Is ATE no longer a cyclical growth industry, but a cyclical mature industry?” If the answer is yes, the ATE industry must compete only on price, putting many ATE companies under severe stress to remain viable. If the answer is that the current downturn is fundamentally the same as all previous downturns, then the industry will recover driven by ever increasing semiconductor content in just about everything, giving the ATE industry a secure outlook. Unfortunately, the answer may not be that simple. I believe that neither option holds the complete answer. ATE customers will continue to demand increasing technical requirements for their testers as they face ever difficult challenges ranging from high speed digital IO testing to high performance mixed signal/analog testing. Although DFT will solve a number of difficult challenges and it will be required in most devices, it will not be a panacea for many current and emerging test problems. Additionally, some DFT techniques will create new requirement for future testers.

Semiconductor companies will continue to innovate and create interesting new products. Semiconductor content will continue to increase, driving a recovery in the industry. However, the cost of test pressure will remain, the outsourcing trend will continue, and some customers may continue to demand ‘open architecture’ compliance. The future of many ATE companies may not be secure even as the industry recovers from this downturn.

Although the future seems murky, there are some ATE trends that are clearly in motion already. It is reasonable to expect that the number of new tester platforms will be far fewer than in the past. With the increasing importance of test subcontractors in tester purchase decisions, the key features of tester platforms will be flexibility and scalability. It will be increasingly difficult for semiconductor companies to predict their test requirements due to fast rate changes in the industry. Successful future ATE companies must develop tester platform with built-in flexibility and scalability so that the platform has a longer asset life even in light of unpredictable and increasing test requirements. Focused testers that are very narrowly defined may have a very limited customer base. Many recently introduced DFT-only testers could experience difficulty finding wide acceptance in the marketplace because of this. A successful tester platform must have the capability to reconfigure itself as customers’ test requirements evolve. For example, a customer may purchase a low cost digital tester initially and expect later reconfiguration to a high performance mixed signal tester with minimal transition cost. Such a tester requires an investment by the manufacturer and presents both economic and technical challenges to ATE companies.

Some in the industry have claimed that the open architecture standard will be a solution to this problem. Open architecture advocates claim that the promised flexibility and scalability of an open architecture platform can be delivered, and risks inherent in building such a platform can be distributed among its participants. This reasoning seems flawed. The key challenge, and therefore the key innovation required in creating successful open architecture is to provide the modularity necessary for flexibility and scalability. This must be done without sacrificing throughput, efficiency and cost while minimizing the integration burden as future instruments are added to the platform. An adept architecture must comprehend the integration requirements for not just hardware, but also software, applications, and service. It is my opinion that successful future ATE will be offered by those who accept the risk and make the investment in creating the right platform.