

Latin America: Pushing the Boundaries of Test

Perhaps to our columnist's surprise, Mexico and Brazil are ahead of some Asian nations.

HAVING COVERED THE Asian test and inspection markets for over a decade, I recently made my maiden voyage to Latin America to visit in-circuit test customers for a series of users group meetings. I was most interested in understanding how the environment of these companies compared to the hustle and bustle of the other giant electronic manufacturing region, namely China.

Frankly, to this point, my primary exposure to Latin America had been the lush tropical rain forests shown on the National Geographic cable channel. I suspect the tropical rain forests are out there, but my two-week excursion through the electronics manufacturing regions of Mexico and Brazil was quite surprising.

After a 15-year hiatus from the ICT industry, I have come full circle. Upon my return, my first questions were: How has the demand in ICT changed? What are the new ICT challenges customers are facing? Do the different regions of the world have differing needs and challenges? And exactly what role does ICT play in today's manufacturing test strategy?

In the late 1980s, the benchmarks in the ICT arena were a good automated test development interface, the ability to generate fixture files to vendors and writing digital test codes; these were basically the "in" things. To test digital devices and even ASICs, test engineers needed to read IC data sheets to figure out the test vectors, the disabling information, and they often had to validate signal integrity with oscilloscopes.

The first step in ICT development is to understand the schematic, board topology and the node accessibility in order to decide the test strategy. In today's environment, a host of new tools are available to help manufacturers with this aspect, an area of growing importance. These tools assist with automated CAD translation, test coverage analysis, ECO impact analysis and test coverage improvement. Good test coverage begins here, right at the development stage, and it decides how effective the test will be in the manufacturing lifecycle.

EMS sites in Latin America may differ outwardly from the compacted, high-density industrial parks we witness in places like Shenzhen and Suzhou in China. But the EMS industry in Brazil and Mexico is very much in sync with global electronics manufacturing developments.

Improving cycle times. Often in Latin America, manufacturing sites are clustered into regions, sometimes to align with regional or local government incentives, or to fit in the supply management eco-chain. In Brazil, the two main regions of PCB manufacturing are in Manaus and Sao Paulo; in Mexico, they are spread out in various

cities such as Guadalajara, Monterrey, Nogales, Juarez and Reynosa. Regardless of region, a common thread runs through all these sites: the emphasis on cycle time. At every manufacturing site, customers say ensuring that ICT test times keep pace with the line beat rate is a priority.

Production line rates in Latin America are no different from the rest of the world, especially in Asia, which continues to maintain among the fastest beat rates in the world. The manufacturers I talked to employ many different ways to optimize ICT test times – for example, using dual-well fixtures to reduce handling time and throughput multiplier for parallel testing. Other means include upgrading pin cards (for more memory or faster clock rates) or simply selecting newer, faster types of testers.

Another interesting discussion involved using complementary test strategies to optimize ICT test time. This concept is not new, and it involves looking at the entire manufacturing fault spectrum, which includes other test and inspection stations such as AOI, AXI and functional test stations. To do this, one needs to know the right test coverage and have the right data collection tools. Many Latin American manufacturing companies are already well set up for this with their in-house shop floor infrastructure.

Increasing test coverage. One of the hot topics during my road trip was, What can be done to improve ICT coverage, given today's test challenges? In Latin America, vectorless testing is widely used for quick turnaround without the need for detailed study on the functionality of the ICs. Almost everyone uses some form of it.

Technology never sits still, and it is amazing how new ICT techniques have spread across the world. One good example is boundary scan, and many customers here use it in some form. We did not conduct an actual survey, but a quick show of hands during one of the users group meetings showed that over half the audience employ boundary scan. Although unscientific, I believe this to be higher than in China.

Almost every type of assembly today has some kind of programming built in, such as flash A recurring discussion was the tradeoff between programming at ICT versus a dedicated offline programming station. Although there isn't a "one-size-fits-all" solution, the equation always consists of equipment costs and test/programming time when weighing the two options. Most companies I met with are prepared to incorporate both strategies, depending on circumstances.

Like all manufacturing sites, test yields are constantly scrutinized. At one stop, a customer gave an interesting

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perspective of test coverage versus test yield. Their take: The higher the test yield, the more important the test coverage should be. In essence, when looking for faults that simple coverage cannot address, a good ICT strategy will make the difference. Perhaps this mindset, to deploy the most suitable solution for longer-term cost benefits, continues to drive Latin American manufacturers to deliver outstanding test engineering solutions.

On automation and automotive. Another observation was that a small group of users, notably from the automotive industry, are incorporating automation at ICT. A drive for less handling and test automation is accelerating in Latin America. While this trend is barely present in China, many European companies have automatic board handlers at ICT. Many European electronics manufacturers have even developed best practices to improve this automation. For example, all new projects are debugged in a separate offline tester before being commissioned to the production testers, which are fitted with the handlers. Hence, this requires more stringent fine-tuning of the program thresholds at the offline tester to meet manufacturing variance. I foresee Latin American manufacturers will be investing in more automation. The industry as a whole will likely need some initial assistance, as engineers and operators incorporate more automation. This is an area where vendors with established methodologies can help players succeed over the medium to longer term.

On the automotive front, it is also interesting to note that the market is still growing. For instance, Brazil probably is the fourth or fifth largest car maker in the world. With more electronics going into tracking systems, ABS and air bag technology, it is likely manufacturers will also need to step up their investment in electronics tests in this arena.

It amazed me how things have evolved over the years. Just like Latin America, which is thriving with ever-growing manufacturing activities, ICT has also evolved from a simple bed-of-nails tester to one with many diverse technologies. Users in Latin America will continue to push for improved vectorless technique to address quick turnaround and adopt different boundary scan techniques to address limited node access issues. **CA**

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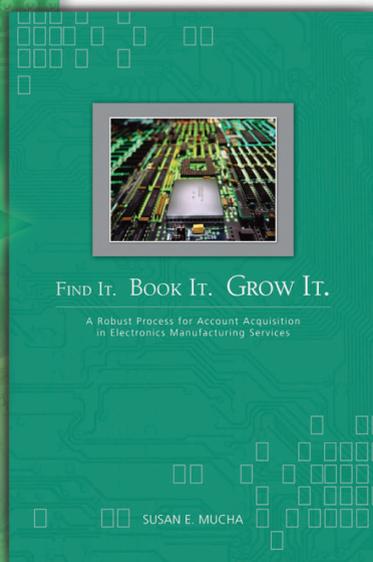
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