

Test Outsourcing – A Subcontract Manufacturer’s Perspective

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The growing test outsourcing business is characterized by a number of challenges. Production loading is non-linear primarily due to market conditions, but also due to yield and wafer availability. This creates periods of high demand where there is a shortage of capacity and operations cycle times increase, or limited loading where the Subcontract Manufacturer (SCM) has difficulty maintaining profitability. Test operations are faced with a myriad of test requirements--from supporting multiple customers and products, maintaining and operating numerous types of testers, handlers and probers, as well as managing different tester configuration requirements based on product test needs, test strategy or simply load board layout. When test setup is protracted due to long test program load times, calibration, correlation or retest, the SCM’s effective loading decreases and cycle time increases. Moreover, all this activity must be managed within an environment of constant price pressure from the market and effective capital cost growth.

While there has been much fanfare over the price per pin cost reduction of ATE, the cost of owning and operating a tester has significantly increased, primarily as a result of higher levels of product test complexity due to integration and to higher product test performance requirements. SCMs generally must invest in highly configured, full-featured tester solutions to prepare for a wide variety of test applications. This can be problematic, however, if the SCM customer does not need all the extra options to test their product. Pay per use schemes can help for mostly digital applications, but this costing solution must be extended to mixed signal test options, as well.

There are a number of possible opportunities to minimize cost and risk to the SCM and end customers.

- 1) Involve the SCM earlier in the product development process. The SCM can provide input with regard to tester selection, configuration, availability and cost early in the design process when decisions on DFT can be made before the design is finalized. Additionally, an SCM can provide inputs that can help the customer decide whether an SOC or module-based (System-in-Package) solution works best.
- 2) DFT has potential for reducing test cost and improving throughput. Because there are tradeoffs that must be considered regarding die size, performance impact and design cycle time, the SCM must be involved early.
- 3) In general, the SCM takes all of the capital investment risk today. While this is the nature of the business, the model cannot be sustained without creative solutions between ATE suppliers and SCMs.
- 4) ATE suppliers need to consider the SCMs when creating new services and products. The old model in which the SCM simply buys the equipment and tests the parts is quickly growing obsolete.
- 5) Increasingly, customers are asking the SCM to make the most effective ATE choice possible from a cost of test perspective. In this case, the relationship between customer, supplier and SCM changes significantly, but in a way that benefits all parties.

What will the future bring to test outsourcing? Designs will increasingly use a system-in-package (SIP) approach in which mixed process technologies are integrated and performance, cost and time to market surpass SOC solutions. In many cases, the SCM will manage the supply chain, select the tester and create the test program. The SCM’s product and test engineers must be closely involved with customers to maximize test transfers and product ramp effectiveness. Some SCMs may offer expanded services throughout the product development value chain, including DFT consultation, new product test and product engineering and enhanced production sustaining activities. SCMs can continue to add value to product development and sustaining activities based on their broad range of experiences with different products and equipment. DFT and the Open Architecture Initiative (OAI) can solve some of the test complexity and cost challenges. However, these techniques need to be implemented judiciously in an SCM environment. DFT-focused testers can offer a good low cost option for some products, but not all. The SCM environment is one where many customers and test solutions must be considered and sufficient tester loading and test longevity are key to a sustainable business. While OAI offers many possibilities, without slot standards, configuration management could well be a nightmare within the SCM operations environment.