



## Cost of Test is Not the Only Factor to Consider

By Dennis Wagner, Guest Contributing Editor, Johnstech International [dlwagner@johnstech.com]

**F**rom Bangkok, Thailand to Portland, Maine, Cost of Test (CoT) has been the buzz phrase these past couple of years, with everyone touting how they will LOWER your Cost of Test. And it is an important topic. But what is probably more important—and continually overlooked—is how you can actually bring profits to your bottom line on the test floor. Manufacturers continue to challenge the test community to reduce costs—specifically acquisition costs, and they have good reason to focus in on them. Acquisition costs are easy to measure, competitively compare and negotiate over; they don't require sophisticated test floor analysis or budget haggling with other departments. However, the real "Cost of Test" savings are typically not in what test equipment costs you, it's in what it does for you.

Of course there are many factors that figure into the CoT issue, like the increasing complexity of semiconductor devices, the demand for higher levels of speed, noise immunity, dropping voltages, performance and integration. And if that wasn't enough, the lead-free initiatives and hazardous materials legislation being implemented worldwide have also pushed the Test Phase into more complex, expensive Test Cells. So much has changed so rapidly in the world of test that it is to the test community's credit that test costs have remained as consistent as they have.

### Profits From Test

We know many manufacturers see final test as strictly a cost center, where 98% of the devices tested have to bear the cost of the 2% that fail. While it would seem that the test cell is where manufacturers would be happy to spend their money on the most sophisticated and capable equipment to test their devices so they deliver a better product, in reality it is the area they are most concerned with cutting costs. So, many manufacturers tend to look for the lowest acquisition and spares prices, thinking this will reduce CoT. But there are many of the Industry's leading IDMs and test houses who have a different perspective and look at this in another way: Can a test cell contribute to profits? And the answer they find is YES!

For test cell efficiency, or the actual up, productive and billable time of a test cell, the old adage "Time is Money" could not be truer. Anything that can be done to decrease set-up time or provide easier, faster and less frequent maintenance, will directly affect the efficiency of the test cell and therefore, the bottom line. But there are a couple of test cell areas that can actually generate profits: first-pass yields and upbinning capability.

### Profits From Test Example:

	Test Cell A	Test Cell B
<b>Device Information</b>		
Devices Tested	2,000,000	
Bin 1 —	Sell Price \$1.00 (\$0.35 Premium)	
Bin 2 —	Sell Price \$0.65 (GM = 30% / \$0.195)	
<b>Test Socket Comparison</b>		
First-Pass Yield	98%	97%
Bin 1 Yield	10%	5%
Bin 2 Yield	88%	92%
Bin 1 Device Revenues	\$200,000	\$100,000
Bin 2 Device Revenues	\$1,144,000	\$1,196,000
<b>Total Revenue</b>	<b>\$1,344,000</b>	<b>\$1,296,000</b>
<b>Total Margin</b>	<b>\$452,200</b>	<b>\$413,300</b>
<b>Profit From Test</b>	<b>\$38,900</b>	

This example only shows Revenue from a 2-million insertion Test, which typically takes 2 weeks. If you extrapolate this over the course of a calendar year, Test Cell A's Additional Revenue grows to \$1,011,400!

### Yields & Upbinning

Any enhancement to either first-pass yield or upbinning can have a significant impact in bottom line profit for a test floor manager. (Please see Inset example.) In the no-nonsense world of numbers, a 2-million device lot with an increase in yield of 1% can provide 20,000 devices that do not need to be scrapped or retested. Additionally, coupling yield improvement with an increase in up-binned parts of 5% on an amplifier with high dB gain can contribute \$38,900. Extrapolate that 2-million, 2-week test (assuming a half second combined test and index time) to a year and that is more than a \$1,000,000 difference!

As the simple inset example displays, when choosing a final test solution it is important to look at more than what has traditionally been seen as cost of test. A \$100 savings in acquisition costs could actually be dropping the test floor manager's profitability by thousands. 