Tremendous Cost Savings in Electrical Testing

The current impression in the PCB industry is that flying probe testers (or probers) are good for low volume production. The test speed was the limiting factor for a wider use of probers.

The advantages of probers as compared to universal testers are well known. There are no limits on the following areas:

- Number of test points
- Density of test points
- Pitch of test points
- Shrinkage of board
- Offset or Shift of board
- Stock of fixtures
- Retest of boards
- Buried Resistance measurements
- Buried Capacitance measurements

The wish of many bare board manufacturers is to use probers not only for small batches – they want to use probers for mass production quantities. Existing universal testers do have a throughput in between 150 to 600 boards/hour. The limitations are pitch, density and size of the boards. The “real” throughput, which means after retest, in many cases will be much lower. A figure of 100 boards/hour is not abnormal.

Probers do not have the above problem – whatever test results are reported, the user can highly rely on them. No retest is necessary!

Now, how can a prober compete with a universal tester? The answer is “Speed”. Or even more simplified: How much does it cost to test a board?

Today in a medium complicate fixture (about 8,000 test points, average 20 mil pitch) for an universal tester costs about € 800.00 in Asia.

For an dedicated fixture with 20 mil pitch, you may assume easily € 2.50 per test pins on average – which means € 20,000!

If 100 boards has to be tested just the fixture cost per board will be about € 8.00 (for universal tester).

Now the cost for labour, test machine, re-test, …, etc. has to be added. So the test cost per board for a lot of 100 pieces will be about

€ 9.00

Let us assume that a prober can test at 100 test points /sec. That means for a 5,000 test point product, it needs 50 sec. To make the calculation simple lets assume that the total test time will be 1 minute. That means this prober can test 60 boards / hour.

If the overall cost for a prober is € 20 /hour, the cost to test one board will be about

€ 0.40
(totally independent of quantity, complexity, size and shrinkage.)

So one may conclude the above calculations in the following statement:

Any lot-number which is less than a few thousand pieces the cost savings of the super-fast prober comparing to any other method or tester is significant.

**Comparison: Prober Vs Fixture Tester**

<table>
<thead>
<tr>
<th>Test points on board (piece)</th>
<th>8000</th>
<th>25</th>
<th>250</th>
<th>1000</th>
<th>5000</th>
<th>7000</th>
<th>15000</th>
<th>30000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boards (pieces) to be tested</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIXTURE cost/pt (€)</td>
<td>0.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throughput boards/hour</td>
<td>220</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIXTURE test cost per board (€)</td>
<td>126.66</td>
<td>12.88</td>
<td>3.40</td>
<td>0.87</td>
<td>0.69</td>
<td>0.45</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>FIXTURE total job test time</td>
<td>3.11</td>
<td>4.54</td>
<td>7.95</td>
<td>25.73</td>
<td>34.82</td>
<td>71.18</td>
<td>158.30</td>
<td></td>
</tr>
<tr>
<td>Number of PROBERS A6</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Points/second</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROBER test cost per board (€)</td>
<td>2.46</td>
<td>0.88</td>
<td>0.75</td>
<td>0.71</td>
<td>0.71</td>
<td>0.71</td>
<td>0.71</td>
<td></td>
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<tr>
<td>PROBER total job test time</td>
<td>0.47</td>
<td>1.68</td>
<td>5.70</td>
<td>27.19</td>
<td>37.93</td>
<td>80.89</td>
<td>161.44</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Typical example on Costs Comparison between Prober and Fixture Tester

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