
Designing Test Strategies for Modern PCB Assembly Web Seminar (November 20, 2002)

Questions and Answers

Is Strategist a predictive tool? How can I measure what test coverage is actually delivered to the production floor?

Strategist can perform BOTH predicted and actual test coverage analysis.

Predictive coverage is an advantage when one is doing an analysis early in the design or test development process. It gives you insight into the coverage of your test & inspection process without the need to have actual test programs developed or actual machines on your production floor.

You can analyze the coverage of different machines and strategies very quickly and influence your customers/partners test strategy decisions.

Predictive analysis is also helpful so that you can consult with design engineers regarding DFT issues like coping with limited ICT access and deciding which are the most critical nodes to provide access.

Once programs have been created for the test & inspection equipment you can feed coverage reports from your machines into Strategist to reflect the true coverage being achieved on the line. You may then generate new coverage reports and also generate reports that identify the differences between predicted and actual coverage, which helps to identify gaps in your test development process.

You also have the option of redistributing tests based on the updated coverage information to ensure that you fill any coverage gaps that may exist in your test plan.

How configurable is Strategist in terms of modeling new test tools that are not currently supported in the software?

Strategist supports AOI, AXI, Flying Probe and ICT test and inspection platforms. Strategist supports mixed vendor test platforms; unlike competitive solutions, which operate only on their own proprietary solutions. For new platforms introduced from Teradyne, Strategist will support these platforms as they are introduced to market. For competitive new platforms, Teradyne would support these new platforms within Strategist, if warranted by market demand.

When Strategist “supports” a piece of test equipment, this means that users can perform fault coverage modeling, generate reports of test effectiveness, test coverage, yield and DPMO and generate output files that contain the embedded test strategy for machine programming purposes. These features are available for all supported test equipment.

In addition, with Teradyne test equipment, users can read back actual machine programs from the production floor and compare actual fault coverage to predicted fault coverage and identify discrepancies. This feature is only available for Teradyne test equipment.

Even if Strategist does not support a specific piece of test equipment, users can simulate the coverage they can achieve with non-supported test equipment. Users can modify an existing machine template to generate coverage reports, test effectiveness, yield and DPMO for non-supported machines even though they cannot generate machine-programming files for the target system that contain the embedded test strategy.

It was not clear if the DPMO calculation was solder joint based or component based, could you clarify?

Strategist has the capability to utilize both solder joint and component DPMO information. Strategist allows users to input both their component and solder joint DPMO data for test coverage and yield calculations (defaults are also available if users do not have their own data). Component DPMO is used for defects like "missing device" and "wrong device", whereas joint DPMO is used for defects like "shorts" and "opens". Strategist uses the DPMO information to generate customized test & inspection strategies that are reflective of the process in question.

Is there a way to model the benefits of process control in Strategist?

Yes. Strategist could model the impact of process control on a test strategy by changing the DPMO rates before vs. after implementing process control. One could model a test flow with a given set of DPMO data, then repeat the analysis with reduced DPMO rates to determine the impact of process control. It would be up to the user to define what kind of DPMO improvement (reduction) is achieved with the process control methods used.

Can Strategist accept all types of CAD data as input?

Yes, CAD data can be translated from all commonly used design systems.

What inputs are needed for quoting using Strategist?

Strategist enables manufacturers to run multiple "what if" test & inspection scenarios so they can compare and select the appropriate test and inspection strategy that provides the right amount of test coverage at the targeted throughput and cost objectives at time of quoting. Input needed to run an effective Strategist analysis at time of quotation would be:

1. CAD data
2. BOM data
3. PCB schematics (optional)
4. Existing process DPMO values (optional)
5. In-circuit component libraries (optional)

Items 1 and 2 would be required at a minimum. Items 3, 4 and 5 are optional but their inclusion would provide more accurate results.

How does Strategist determine the ICT coverage of complex devices like ICs, ASICs and techniques like Boundary Scan?

Strategist uses the ICT device libraries (Analog, Digital and BScan) to gather additional information about more complex devices. The user can import analog, digital and boundary scan libraries from GenRad, Teradyne and Agilent testers into a Strategist generic library.

Strategist also uses the board CAD data to determine physical access constraints and their impact on ICT coverage.

Strategist uses all this information to determine how these devices may be tested, what kind of access is required to test them and what kind of coverage may be achieved with each technique. This information is critical when trying to determine how access requirements affect test coverage and to intelligently remove access if desired.

Please clarify why persons are not effective at inspecting lead free solder joints?

Persons can inspect lead free joints with reduced effectiveness since they look much different than eutectic solder joints; the appearance and shape are different. Since human inspectors have been "calibrated" to see eutectic joints using IPC610 standards for many years, they will not be as effective when looking at new lead free solder joints. Manufacturers are motivated to use AOI and AXI inspection methods to deliver more consistent inspection results on lead free solder joints. AOI and AXI will also deliver process measurement data for DPMO reduction activities when lead free solder processes are introduced.

What is the cost of Strategist?

Strategist is a module of a software suite called Design-to-Build. If you do not have any other modules in the suite, the approximate total cost to “get going” with Strategist is near \$50,000 USD. Existing Teradyne customers usually have several elements of the suite, which would reduce the cost. Please contact your Teradyne sales engineer for additional pricing details. 1-800-Teradyne.

Does Teradyne have case studies where predicted fault coverage is compared to actual fault coverage?

Yes, Amit Verma presented one such study in a paper at the SEMI 2002 conference in San Jose. For a copy of this paper, contact amit.verma@teradyne.com. Note that when this case study was performed, DPMO capability was not available within Strategist. When accurate DPMO information is used, test coverage predictions are more reliable. In the absence of accurate DPMO data, faults are modeled theoretically and their true probability in the manufacturing process can be much different than what is predicted (some types of faults occur can occur 10 times more frequently than another for example) – hence causing a discrepancy between predicted vs. actual results.

Teradyne is continually working on more customer proofs. If you would like more detailed information on Strategist and the case studies available, please contact your Teradyne sales engineer. 1-800-Teradyne.

Can Strategist model the coverage of ICT “cluster” testing?

Strategist only models coverage by individual components, joints and nodes (signals). Descriptions of cluster tests are not possible.