

PEER Factory Acceptance Tester

For new equipment orders, both fabs and OEMs have the same goal: get the equipment into production quickly and running at the highest possible performance. However, as automation standards evolve, equipment designs become more complex and fab-specific implementations diversify; automation conformance has become increasingly difficult and costly for both fabs and OEMs. As a result, the industry is demanding additional testing capabilities to complement established methods.

Configurable Test Capability

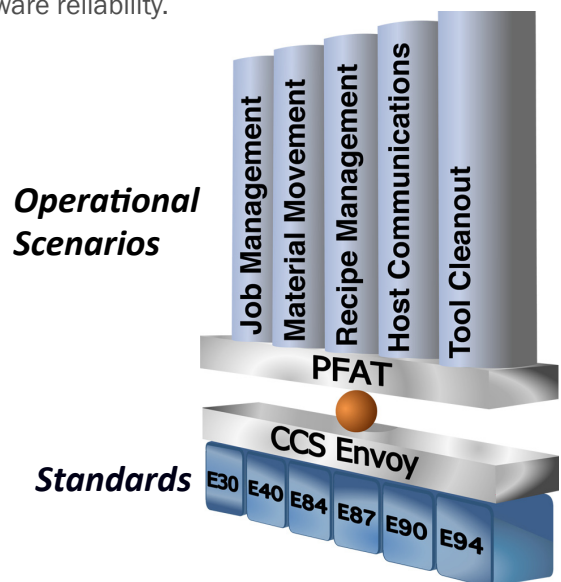
Automation testing is a two-step process: standards testing and scenario testing. The first step, done primarily by the OEMs using CCS Envoy™, assures fabs that their equipment is meeting the SEMI automation standards. Many fabs will run their own CCS Envoy tests, particularly for equipment entering the fab for the first time, while some fabs even maintain Automation Capabilities Management (ACM) programs where they work closely with the OEM to ensure compliance. Although testing with CCS Envoy has become a routine part of most OEMs' quality assurance programs, it alone doesn't ensure that the equipment will run successfully in production. Discovering these problems after the equipment has shipped results in costly field support calls and software updates for OEMs as well as a delayed ramp into production for the fab.

As a result, a second QA step—testing against the fab specific operational scenarios—is more frequently being performed by fabs or required of OEMs. Previously automation engineers at both the fabs and OEMs have created their own testing tools using standard programming languages or SECS-based scripting products such as PEER Group's SECSIM Pro@+.

These approaches can be effective for testing basic communications, but lack the ability to create and execute production-equivalent scenario tests that account for complex and parallel equipment software interactions, timing differences, data validation, as well as hardware

and software failures that are necessary to assure software reliability. These methods also make it difficult to re-use, adapt and manage test libraries from tool-to-tool (for a fab) or fab-to-fab (for an OEM).

Both fabs and OEMs desire an easily configurable test product designed specifically for equipment automation software quality assurance to complement CCS Envoy. Having a common approach to automated software testing that can be used from controls development through quality assurance and through to factory acceptance reduces the effort and investment required for increased software reliability.



PFAT's dynamic testing capability complements CCS Envoy's popular standards testing application.

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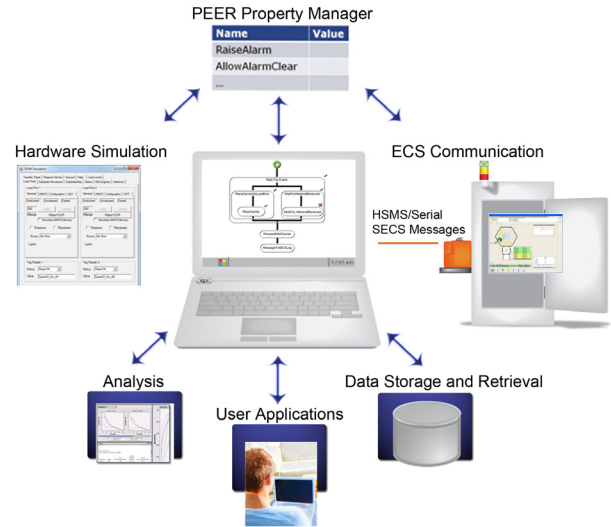
PEER® Factory Acceptance Tester (PFAT™) is a highly configurable host simulation product.

With its graphical test designer and real-time results tracker, users can quickly design tests that simulate the fab's exact tool operational scenarios and pinpoint test failures.

Fabs can accelerate test development across their entire equipment list. Likewise, OEMs can re-use operational scenarios across several fabs.

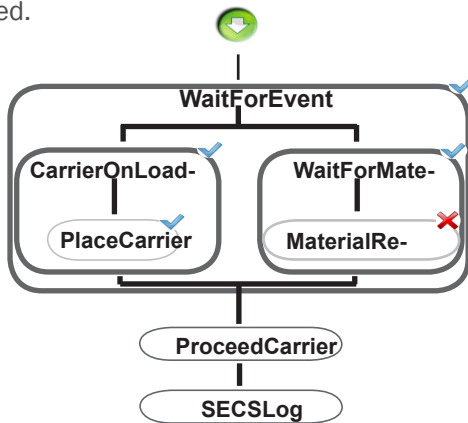
PFAT's integrated testing environment incorporates user-developed or third-party software applications into PFAT test scenarios, combining SECS communication testing with data analysis, dynamic data selection, hardware simulation, triggering timing differences and error scenarios, and any other SQA process.

PFAT enables an automated, unified approach to equipment software testing, giving the user the ability to test the equipment much closer to real factory conditions within the context of a single automated test.



PFAT Reduces Testing Time

Quickly create test sequences with PFAT's easy-to-use drag-and-drop user interface; no programming experience is needed.



PFAT's workflow design editor and run-time environment saves time developing complex, event-driven test sequences.

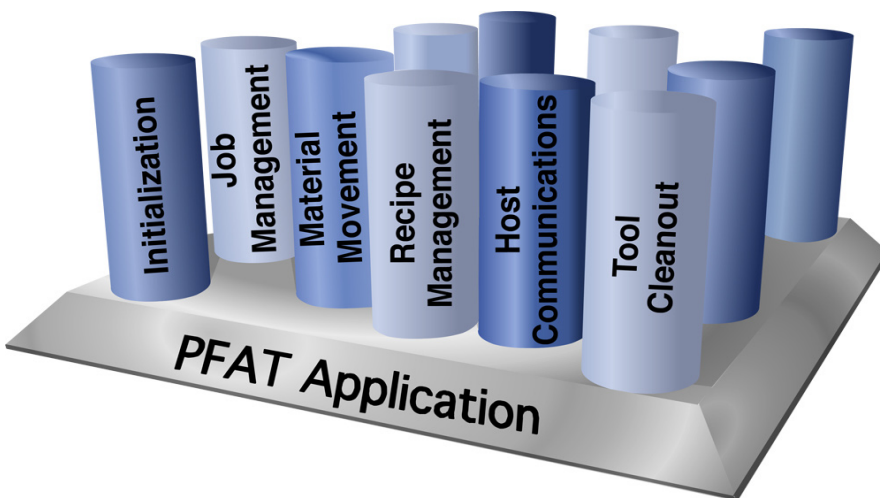
Design simple tests in just a few minutes and a normal lot processing test in less than an hour. Easily create a variety of complex tests, such as marathon production runs containing repetitive, nested, or parallel test execution paths, conditional execution based on the results of other tests, or advanced error detection.

Executing tests is faster too. Execute tests as a group in the background for long-running tests or view the test sequences in real time, providing quick feedback that is especially useful for test prototyping. Generate comprehensive reports that provide visibility into tool quality, pinpoint equipment errors, and also easily collaborate and share test plans between users or between a fab and OEM.

PEER Group® is the industry leader in semiconductor equipment automation. We have tested and integrated almost 300 equipment models for fabs and assembly. Using our award-winning PEER® Tool Orchestrator (PTO™) product, we have implemented full tool automation for more than 35 OEMs who have shipped equipment to fabs worldwide. Our experience makes us uniquely qualified to develop an equipment automation testing product that satisfies the needs of both suppliers and users.

Faster Fab Acceptance

With 50-75 equipment models arriving at a new fab, automation engineers need an expedient way to ensure that incoming equipment will pass all automation tests and move into production quickly.



Users can build reusable system tests, then choose and modify the appropriate tests to form a full test suite.

Likewise, OEMs must test and adjust their equipment to meet the automation specifications of 50-75 fabs over the typical lifespan of an equipment platform. PFAT allows users to build a library of system tests that can later be linked or embedded within other tests to form an entire equipment test suite. PFAT's flexible test structure lets you encapsulate common functionality in reusable test sequences that can then be integrated with customized

tests to capture non-standard, fab-specific or tool-specific differences.

A fab test engineer, for example, can rapidly develop a test suite for a new incoming equipment model based on existing system tests in the test library. OEM engineers can do the same when faced with a new fab customer. With most of the system tests having already run successfully, engineers on both sides are confident that the new equipment model will move into production with few automation problems.

In addition, PFAT's collaboration mechanisms help fabs and OEMs resolve integration issues quickly. Engineers responsible for test design and execution can share test scenario files, annotated images and log file packages that describe tool behavior and communicate failure points to help troubleshoot key issues that occur during tool testing and deployment. Similarly, management can use results reports to review quality statistics for a tool that are critical for quickly understanding tool shipment readiness or production readiness for the fab. These collaboration utilities make it much easier for fabs and OEMs to align quality assurance programs and conduct effective troubleshooting.

Increased Tool Quality

Obtaining the highest possible equipment reliability requires testing all the permutations of the equipment. Since variations for equipment configurations are unlimited—varying process types, wafer flows, processing and loading positions, and third-party components from different manufacturers—fully testing equipment reliability is a complex challenge. Testing “normal” operation using a SECS interface reveals only a small percentage of failure rates and does not fully exercise the equipment software. With PFAT, you can build a side communications channel with the equipment control software (ECS) or hardware simulators to expand your test scope and generate alternate scenarios that impact the automation interface, such as



triggering hardware failures, introducing alternate timing sequences, or analyzing equipment data. Results or data from these other applications can be reintroduced into PFAT and used to alter the execution flow of the test.

PFAT is the only product on the market today which is specifically designed to do comprehensive production testing of SECS-based equipment for production readiness. Both high-volume manufacturers and their suppliers use PFAT to find and solve problems on their equipment in order to accelerate installation, increase equipment reliability and avoid costly repairs in the field.

“PFAT enables us to quickly build and execute fab-specific tests that mimic our customers’ production environments, and to run such tests repeatedly and automatically to evaluate the robustness of our equipment controller. PFAT can help us improve our overall equipment performance and reliability.”

***John Hartwell
Senior R&D and Software Director
Nanometrics Inc.***

About PEER Group

PEER Group provides innovative factory automation software solutions and consulting services to the semiconductor, photovoltaic, and electronics industries. The world’s best manufacturing companies turn to PEER Group to solve their most challenging equipment automation, data management, and process control problems. With more than 100,000 licenses shipped, we are the world’s leading supplier of equipment connectivity and testing products to automated factories around the globe. Our innovative and reliable products and services help lower the cost of automation for high-volume manufacturers and their equipment suppliers.

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