

## CUSTOMER SUCCESS STORY

### Rudolph Improves Equipment Reliability

A high percentage of semiconductor equipment startup and reliability problems have software as the root cause, so improving software quality must be a key component of any reliability improvement program. Most equipment manufacturers agree, however, that developing high-quality software is one of their biggest challenges. Semiconductor manufacturing equipment is very complex, but two additional factors make it extremely difficult to produce reliable software. First, equipment manufacturers are under constant pressure to release new equipment features in order to keep up with market demands. In addition, each IC manufacturer requires variations in the equipment to meet specific needs for tool operation, automation, safety, and data management. These customer-specific software variations are the source of most software-related problems in the field.

*“We wanted to take a leap forward and do regression testing that includes customer variations so that our software will behave as expected for each fab.”*

Rowland Friebely  
Platform Development Group  
Manager  
Rudolph Technologies

### Rudolph Focuses on Software Reliability

Already known for building high quality metrology and inspection equipment, Rudolph Technologies Metrology Business Unit (MBU) recognized that improving software quality, and therefore equipment reliability, could simultaneously improve customer satisfaction and lower costs. So in 2008, the Rudolph MBU embarked upon a software reliability improvement program. “During industry downturns, we focus on improving software reliability and quality so that when shipments increase, we should be able to achieve faster fab acceptance” says Rowland Friebely, MBU Platform Development Group Manager for Rudolph. “More importantly our customers should be able to place their tool into production earlier. It’s a win-win.”

The cornerstone of all reliability improvement programs is good data. However, obtaining field data is a challenge because many problems occur infrequently and fabs have different priorities for problem data collection. A good internal testing program is critical to any reliability program. The key is to accurately simulate fab operational scenarios in the engineering laboratory. “Like all equipment manufacturers, we regression test our software releases,” says Friebely. “However, we wanted to take a leap forward and do regression testing that includes customer variations so that our software would behave as expected for each fab. But the task of creating, managing, and executing hundreds of test cases was too large with existing SECS simulation products.”



## PEER Factory Acceptance Tester

Rudolph turned to PEER Group for the solution. Having tested more than 300 tool types, PEER Group emerged as the leader in equipment automation test services during the most recent industry expansion. “Our semiconductor business focuses on helping equipment manufacturers develop high-quality automation and equipment control software, while helping the fabs and assembly plants integrate those new tools into production as quickly as possible,” says Mike Kropp, COO of PEER Group. “In both cases, good QA testing prior to installation has proven to reduce start-up costs for both the equipment supplier and IC manufacturer.”

*“PFAT allows us to build an entirely new automated test strategy.”*

In 2007, PEER Group recognized that in order to deliver better test services to its customers, more advanced test products would be required. So the company started the development of a dynamic test product, PEER Factory Acceptance Tester (PFAT™). Released in 2008, PFAT gives engineers the ability to create complex test cases rapidly that mimic any fab-specific operational scenario, tests that are very difficult with today’s simulation products. Together with the recently acquired CCS Envoy™, PEER Group now offers the most comprehensive and advanced automation test solutions in the semiconductor industry.

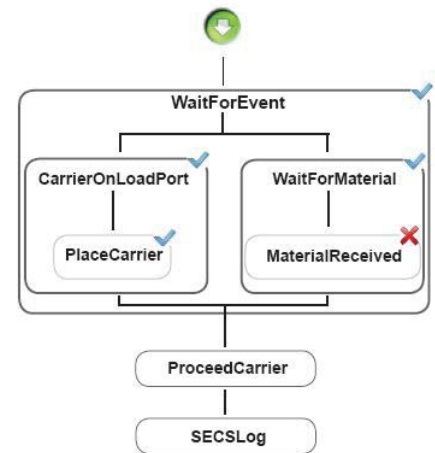
“PFAT allows us to build an entirely new automated test strategy,” remarks Friebely. “Regression tests can be combined with customer-specific tests to cover variations in tool configuration, software changes and fab scenarios.”

## New Release Adds ECS Software Testing

Rudolph acknowledged PFAT’s robust features for automation testing but saw its potential for broader use as a general-purpose software tester. Rudolph asked PEER Group to add a feature that enables a direct connection to software running on the equipment control system (ECS) at the same time as through the SECS/GEM interface. Each fab’s automation scenarios may generate unique timing, sequencing, and error recovery methods that stress a tool’s internal software, so this parallel testing reveals hidden problems.

*“... we see the opportunity to uncover significantly more software bugs earlier in development ...”*

Friebely explains, “Triggering new tool states via the SECS/GEM interface while simultaneously testing internal software behavior used to be a painstaking process that was only performed for problems with serious consequences or for solving known field problems. With PFAT, we can quickly generate complex scenarios that test for abnormal conditions that may occur only occasionally in production.”



The new software reliability program at Rudolph’s MBU is just getting started. “With PFAT’s intuitive interface we’re able to develop test cases quickly,” says Friebely. “More importantly, we see the opportunity to uncover significantly more software bugs earlier in development, including the ones most difficult to find because they occur so infrequently. We look forward to monitoring the results from the field.”

PFAT has become an integral part of the Rudolph MBU quality assurance program to improve equipment reliability. As one of PFAT’s early adopters, the Rudolph MBU plans to work together with PEER Group to develop new features and methods for tool testing in order to improve overall equipment reliability.

## About Rudolph Technologies, Inc.

Rudolph Technologies is a worldwide leader in the design, development, manufacture and support of high-performance process control metrology, defect inspection and data analysis systems used by semiconductor device manufacturers. Rudolph provides a full-fab solution through its families of proprietary products that provide critical yield-enhancing information, enabling microelectronic device manufacturers to drive down costs and time to market. The company has enhanced the competitiveness of its products in the marketplace by anticipating and addressing many emerging trends driving the semiconductor industry's growth. Rudolph's strategy for continued technological and market leadership includes aggressive research and development of complementary metrology and inspection solutions. Headquartered in Flanders, New Jersey, Rudolph supports its customers with a worldwide sales and service organization. Additional information can be found on the company's web site at [www.rudolphtech.com](http://www.rudolphtech.com).

## About The PEER Group Inc.

PEER Group provides leading-edge factory automation software solutions and consulting services to advanced manufacturers and OEMs in the semiconductor, electronics, life sciences, automotive and solar industries. Many of the world's best manufacturing companies turn to PEER Group to solve their most challenging equipment automation, data management and custom application development problems. PEER Group partners with leading software and automation companies to ensure the most efficient delivery of highly functional, reliable and scalable solutions. Learn more about PEER Group at [www.peergroup.com](http://www.peergroup.com).

The PEER Group Inc.  
72 Victoria St. S., Suite 400  
Kitchener, ON Canada  
N2G 4Y9  
Phone: +1 519-749-9554  
Email: [sales@peergroup.com](mailto:sales@peergroup.com)  
[www.peergroup.com](http://www.peergroup.com)

Rudolph Technologies  
One Rudolph Road P.O. Box 1000  
Flanders, New Jersey, USA  
07836  
Phone: +1 952-259-1647  
Email: [virginia.becker@rudolphtech.com](mailto:virginia.becker@rudolphtech.com)  
[www.rudolphtech.com](http://www.rudolphtech.com)