PDF SOLUTIONS®

Exensio™ Test Operations

Test Data Connectivity, Control and Analytics for IDM and Fabless Semiconductor Companies

Overview

Exensio™ Test Operations is designed to capture test data, implement test process control and test quality rules, store test data for analysis and post-processing, support edge computing, automate data transport, and provide extensive data analysis capabilities. These features enable Test Engineers, Product Engineers, and Operations Management to ramp product yield, improve outgoing quality, implement data-feed-forward, effectively deploy machine learning to the edge, better utilize test time and capital equipment, and to interactively analyze test data collected in near-real-time across a geographically diverse manufacturing supply chain.

Data Collection and Management

Exensio™ Test Operations typically collects data directly at the test equipment in real-time and comprehensively represents all test insertions, retest operations, and tester operation activity to provide customers with enriched time sequenced data.

Test Process Control and Quality Control

Test Operations rules are configured by the customer to target specific products, test operations and test programs.

Process control rules continuously monitor the health of production in real-time in terms of yield, bin, site-to-site, statistical performance (SYL, SBL), parametric measurement statistics, and WECO SPC limits.

Quality rules allow customers to catch test escapes due to illogical device binning, measurement exceptions, under-tested devices, invalid ECID, consecutive binning, and stuck unit scenarios.

Rules may be executed directly at the tester in real-time or server-side on aggregated data sets.

(continued on over-side)

Module Highlights

Test Operations Core

- Low latency data transport between tester and customer
- Test process control and quality rule management
- Offline rule execution
- Post-process outlier detection
- Rule simulation and distribution to test facility
- Wafer map management and editing
- Scalable test data storage and retention

Guided Analytics

- Operational Equipment Efficiency (OEE)
- Advanced analytics and reporting

Dynamic Test Controller (DTC)

- Direct from source real-time data collection
- Test time optimization through adaptive test
- Online real-time test process and quality rule execution
- In-line outlier detection for package test

Dynamic Cell Controller (DCC)

- Advanced prober control
- Test cell and prober setup automation
- Wafer test specific rules

Test Probe Optimization (TPO)

- Probe card layout and route optimization

Cell Configuration Tracking (CCT)

- Tester configuration discovery and reporting

Exensio™ Test Operations

Quality and Reliability

Test Operations enables customers to achieve greater outgoing quality through post-process outlier detection for wafer sort and inline outlier detection for package test. Mechanisms include typical statistical and spatial algorithms (e.g., DPAT, ZPAT, GDBN, NNR, …), as well as more advanced machine learning based univariate and multi-variate mechanisms. Advanced prober control enforces adherence to test process flow, equipment setup, die touch limits and optimized retest scenarios.

Test Efficiency

Customers may improve their test efficiency through a combination of analytics, adaptive test and advanced prober control. Exensio™ analytics enable customers to understand failure modes, optimize retest plans, improve equipment utilization (OEE), and define adaptive test plans to dynamically alter test program flow to test-more / test-less based on actual test results and/or predicted die quality. Real-time visibility allows operations staff to optimize production efficiency. Advanced prober control enables inline map merge, optimized probe routes and intelligent probe needle cleaning.

Test Operations Analytics

Test Operations shares the same powerful backend data store options and user interface of the Manufacturing Analytics module. The standard test and operational analytics are just the start. Customers can freely modify, enhance and/or develop their own analytic content and reports.

Deployment Worldwide

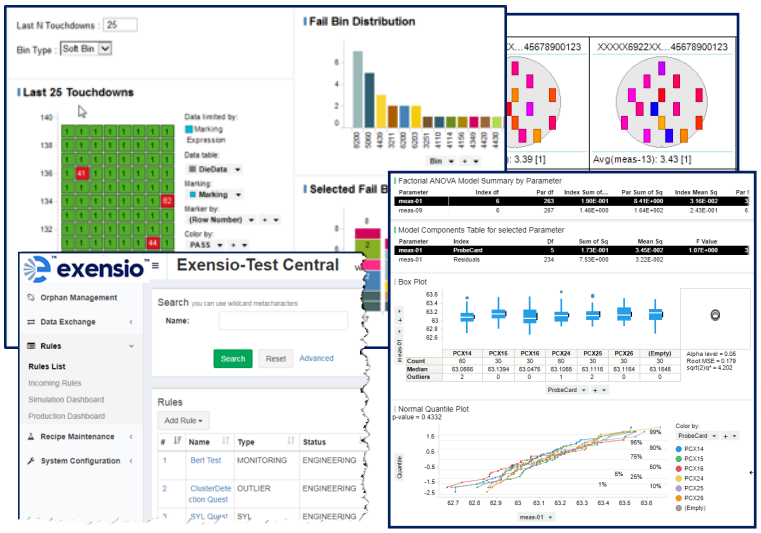
Test Operations supports a broad range of current and legacy tester platforms and can be deployed to customers' internal and outsourced test facilities. PDF Solutions' Data Exchange Network (DEX) facilitates low latency data collection and transfer from tester to customer's Exensio™ Test system. PDF Solutions offers a fully-managed cloud deployment of Test Operations as-a-service (SaaS). Alternatively, customers may choose self-hosting of their Exensio™ Test instance either in-cloud or on-premises.

Exensio™ Analytics Platform

Test Operations is one of four complementary modules in the Exensio™ Analytics Platform.

Customer Value — Cost, Quality, Delivery

Capability	Cost	Qual	Del
Test Process Control Rules Yield, Bin, Site-to-Site, SBL, SYL, SPC	✓		✓
Test Quality and Escape Prevention Rules Stuck unit, Meas. exception, Mis-binning, ECID	✓	✓	
Adaptive Test Flow control, Test-more / Test-less, TTR	✓		✓
Outlier Detection DPAT, ZPAT, GDBN, NNR, Freq. dispersion, Spatial		✓	✓
Equipment Efficiency (OEE) Tester utilization, Rate efficiency, Operational efficiency	✓		✓
Advanced Prober Control Setup validation, Touchdown rules, Retest optimization	✓	✓	
Yield Optimization and Loss Avoidance Identify fail mode, Prevent false yield loss, Optimize retest	✓		✓
Real-time Data Collection at Tool Single source of truth, Granular data capture, Time sequence		✓	



PDF SOLUTIONS®

Founded **1991**

> 400 Employees

> 400 Customers worldwide

HQ Santa Clara, CA USA

PDFS Nasdaq Exchange / Ticker

>160 Patents Issued and 200+ patents pending

> $60M Annual Engineering Investment

Offices and Support Centers Worldwide

Largest independent public company focused on manufacturing analytics, data, & control

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