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# Global IC Design Fault Detection ? Classification (FDC) Software Market Growth (Status and Outlook) 2026-2032

https://marketpublishers.com/r/G978DFFCFAB5EN.html
Date: October 2026
Pages: 85
Price: US$ 3,660.00 (Single User License)
ID: G978DFFCFAB5EN

## Abstracts

The global IC Design Fault Detection ? Classification (FDC) Software market size is predicted to grow from US$ 518 million in 2025 to US$ 1073 million in 2032; it is expected to grow at a CAGR of 10.9% from 2026 to 2032.

IC Design Fault Detection ? Classification (FDC) Software is a category of equipment engineering and process control industrial software for semiconductor manufacturing, assembly and test, and other high-precision manufacturing environments. Its core objective is to continuously collect equipment sensor data, process parameters, event logs, recipe context, and lot information during wafer, chip, package, or test production, and to cleanse, align, model, monitor, and alarm high-frequency data such as temperature, pressure, gas flow, RF power, vacuum status, motor status, chamber status, process time, and equipment events. By doing so, it provides early warning before equipment drift, process excursions, component degradation, recipe abnormalities, sensor anomalies, or batch-level yield losses occur. This type of software is typically delivered as an FDC module, equipment engineering system, advanced process control platform, CIM/MES extension module, or smart manufacturing analytics platform. Key technologies include real-time trace data acquisition, univariate and multivariate statistical modeling, SPC rules, dimensionality reduction methods such as PCA and PLS, machine learning anomaly detection, automatic feature extraction, fault model libraries, alarm prioritization, root cause localization, OCAP linkage, MES and EAP integration, and cross-fab data management. Typical customers include foundries, IDMs, memory manufacturers, power semiconductor manufacturers, compound semiconductor fabs, advanced packaging facilities, outsourced assembly and test providers, and semiconductor equipment makers. Primary users include equipment engineers, process engineers, yield engineers, automation engineers, and

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manufacturing operations teams. Commercial delivery commonly includes software licenses, site subscriptions, modular deployment, project implementation, interface adaptation, model tuning, annual maintenance, and multi-fab replication. Its value is concentrated in reducing unplanned downtime, lowering scrap and rework, improving overall equipment effectiveness, shortening excursion response cycles, enhancing process stability, and supporting AI-driven yield improvement.

The industrial value of IC design Fault Detection ? Classification (FDC) Software is expanding from standalone anomaly alarming to a foundational control capability for semiconductor manufacturing quality, equipment efficiency, and yield security. As AI chips, advanced logic, memory, power semiconductors, compound semiconductors, and advanced packaging lines continue to expand, process tools generate rapidly growing volumes of temperature, pressure, flow, vacuum, RF power, chamber status, motion component, recipe context, lot information, and event log data during production. Traditional manual inspection and after-the-fact statistics are no longer sufficient to identify subtle drift in time. By collecting equipment trace data in real time and combining rule thresholds, statistical process control, multivariate modeling, machine learning anomaly detection, and fault classification mechanisms, this type of software can generate early warnings before equipment failure, process excursions, sensor miscalibration, component degradation, and batch-level yield losses expand. Its core value is not limited to detecting abnormalities, but lies in integrating equipment status, process stability, excursion response, maintenance planning, and yield improvement into a unified data closed loop, helping foundries, assembly and test facilities, and semiconductor equipment makers reduce unplanned downtime, lower scrap and rework, improve overall equipment effectiveness, and support more stable production ramp-up.

The competitive landscape of IC design Fault Detection ? Classification (FDC) Software will shift from standalone FDC functionality toward platform, intelligence, and system integration capabilities. Semiconductor manufacturing sites usually operate equipment from different brands, generations, and interface protocols, so software suppliers must not only collect data and build alarm models, but also support SECS/GEM, EDA Interface A, MES, EAP, SCADA, SPC, APC, YMS, and database systems, while connecting data from front-end manufacturing, assembly and test, metrology and inspection, equipment maintenance, and yield analysis. Suppliers with capabilities in real-time trace management, historical data traceability, low-false-alarm detection, root cause assistance, model version management, cross-tool migration, and multi-fab replication will be better positioned to enter the core manufacturing systems of large fabs and assembly and test facilities. As AI and machine learning capabilities mature,

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FDC software will further converge with predictive maintenance, virtual metrology, run-to-run control, energy optimization, digital twins, and large-model-assisted root cause analysis, evolving from an equipment engineering tool into an important component of the semiconductor smart manufacturing data platform. Long-term supplier barriers will come from the combined accumulation of algorithmic capability, semiconductor process knowledge, field implementation experience, interface adaptation capability, and continuous operational support.

The market outlook for IC design Fault Detection ? Classification (FDC) Software is broadly positive, driven mainly by global wafer fab equipment investment growth, advanced packaging expansion, mature-node upgrades, localization substitution, and the transformation of manufacturing data into strategic assets. New fabs typically build CIM, MES, EAP, SPC, APC, and FDC manufacturing software systems in parallel, while legacy lines improve equipment transparency through equipment engineering system upgrades, SECS/GEM modernization, EDA Interface A access, and FDC module enhancement. The assembly and test segment, characterized by large equipment fleets, fast cycle times, and long chains of abnormality impact, will also become an important incremental scenario for equipment health monitoring software. Regionally, suppliers in the United States, Europe, Japan, and China each have accumulated capabilities in manufacturing analytics, equipment interfaces, industrial automation, and semiconductor CIM, while demand is mainly concentrated in semiconductor manufacturing bases such as mainland China, Taiwan, South Korea, Japan, the United States, Singapore, Malaysia, and Europe. Over the medium to long term, as AI chips and advanced packaging drive the construction of more complex production lines, FDC software is expected to shift from an optional efficiency improvement tool to a necessary system for ensuring production stability, yield security, and equipment asset utilization, with growth potential above that of traditional equipment management software.

Report Scope

LPI (LP Information)' newest research report, the “IC Design Fault Detection ? Classification (FDC) Software Industry Forecast” looks at past sales and reviews total world IC Design Fault Detection ? Classification (FDC) Software sales in 2025, providing a comprehensive analysis by region and market sector of projected IC Design Fault Detection ? Classification (FDC) Software sales for 2026 through 2032. With IC Design Fault Detection ? Classification (FDC) Software sales broken down by region, market sector and sub-sector, this report provides a detailed analysis in US$ millions of the world IC Design Fault Detection ? Classification (FDC) Software industry.

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This Insight Report provides a comprehensive analysis of the global IC Design Fault Detection ? Classification (FDC) Software landscape and highlights key trends related to product segmentation, company formation, revenue, and market share, latest development, and M&A activity. This report also analyses the strategies of leading global companies with a focus on IC Design Fault Detection ? Classification (FDC) Software portfolios and capabilities, market entry strategies, market positions, and geographic footprints, to better understand these firms' unique position in an accelerating global IC Design Fault Detection ? Classification (FDC) Software market.

This Insight Report evaluates the key market trends, drivers, and affecting factors shaping the global outlook for IC Design Fault Detection ? Classification (FDC) Software and breaks down the forecast by Monitoring Object, by Application, geography, and market size to highlight emerging pockets of opportunity. With a transparent methodology based on hundreds of bottom-up qualitative and quantitative market inputs, this study forecast offers a highly nuanced view of the current state and future trajectory in the global IC Design Fault Detection ? Classification (FDC) Software.

This report presents a comprehensive overview, market shares, and growth opportunities of IC Design Fault Detection ? Classification (FDC) Software market by product type, application, key players and key regions and countries.

## Segmentation by Monitoring Object:

Front-End Process Equipment Monitoring Software

Assembly and Test Equipment Monitoring Software

Facility Auxiliary Equipment Monitoring Software

Equipment Communication Interface Monitoring Software

Cross-Line Equipment Fleet Monitoring Software

Equipment Engineering Data Platform Software

Other

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## Segmentation by Analysis Method:

Rule and Threshold Monitoring Software

Univariate Statistical Monitoring Software

Multivariate Statistical Modeling Software

Machine Learning Anomaly Detection Software

Deep Learning Fault Classification Software

Hybrid Physics and Data Modeling Software

Adaptive Online Learning Software

Other

## Segmentation by Integration Interface:

SECS/GEM Interface Software

EDA Interface A Interface Software

MES Integration Software

EAP Integration Software

SCADA Integration Software

APC Integration Software

SPC Integration Software

YMS Integration Software

Database Integration Software

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## Segmentation by Application:

Equipment Fault Early Warning

Process Drift Identification

Abnormal Lot Interception

Equipment Maintenance Optimization

Root Cause Analysis Assistance

Yield Loss Prevention

Other

## This report also splits the market by region:

Americas

United States

Canada

Mexico

Brazil

APAC

China

Japan

Korea

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Southeast Asia

India

Australia

Europe

Germany

France

UK

Italy

Russia

Middle East & Africa

Egypt

South Africa

Israel

Turkey

GCC Countries

The below companies that are profiled have been selected based on inputs gathered from primary experts and analyzing the company's coverage, product portfolio, its market penetration.

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PDF Solutions, Inc.

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Applied Materials, Inc.

camLine GmbH

Yokogawa Electric Corporation

eInnoSys, Inc.

Semitronix Corporation

GETECH

FA Software Co., Ltd.

Synopsys, Inc.

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