eFDC
Real-time Fault Detection and Classification

Real-time Equipment Fault Detection and Classification Improves Engineering Productivity and Yield

For semiconductor and flat panel display manufacturers, a key to increasing engineering productivity and wafer yield is to maximize the performance of their equipment by better monitoring and controlling changes in equipment performance to guard against faults that impact productivity and yield. To achieve this goal, BISTel deploys its equipment Fault Detection and Classification system (eFDC) together with its Statistical Process Control (eSPC) solution to quickly enable engineers to monitor equipment data then identify and diagnose faults in real-time, classifying them for future reference.

Real-time eFDC Maximizes Equipment Performance, Reduce Scrap

Faults occurring in equipment are mostly found during post-process inspections and in some cases, the source of the fault cannot be found at all. With BISTel eFDC, faults are detected in real-time, which helps to reduce scrap wafers and increase yield. Real-time, fault-tolerant data collection also supports single variable and multivariate analysis methods for fault detection and classification, and provides seamless integration to the Equipment Engineering Systems (EES) framework. eFDC also enables customers to add customized business logic and custom analysis methods without incurring system downtime. Although detecting problems is important, creating effective data for the control action is also important. With BISTel eSPC solution, the organized data is used as the reference data for fast problem solving. When similar problems occur, eFDC works with eSPC to focus on the post-mortem analysis and classification of problems. eSPC is important since analyzed and classified data serve as a reference to future problems and their solutions.

Intelligent Manufacturing

BISTel's intelligent manufacturing solutions are shaping the factory of the future, improving costs, operational efficiencies, and quality across factories by connecting the manufacturing ecosystem to better detect, analyze, predict, and adapt real-time to changing manufacturing conditions. BISTel solutions collect, manage, and analyze data, monitor the health of machines and equipment, optimize process flows, and identify root cause failures to mitigate risk in manufacturing. The release of BISTel's intelligent manufacturing solution includes advanced machine learning, industry leading analytics, predictive, and continuous improvement applications that accelerate the road to smart manufacturing.

Markets Served

Semiconductor Manufacturing
Semiconductor Equipment Manufacturers
Flat Panel Display Manufacturing
LED Manufacturing
PCB/SMT

Key Benefits

- Real-time fault detection
- Powerful data collection
- Maximizes equipment productivity
- Reduces materials scraps
- Increases quality
- Reduces overall costs

Key Features

- Real-time, fault-tolerant without any loss of data
- Single variable and multivariate analysis
- Equipment fingerprinting reduces variabilities between equipment or processes modules
- Interdict Manager lets you apply your own business logic in combination with eFDC

Tracing the Substrate Process Abnormality

Problems found during post-process inspection must be traced to the original source or sources. Without proper data management, finding the source of the problem is near impossible or extremely time consuming.

Event/Alarm
Trace Data
Sensor Data

Inputs → Processes → Outputs

Real EQP Data Monitoring
Historical Data Viewing
Real-time and Offline Analysis

Univariate SPC/Multivariate SPC (Hotelling T^2, PCA…)

Data Collection & Planning

Data Quality (Sampling, Rate, Accuracy…)

Fault Detection and Classification Built on BISTel's Proven PeakPerformance™ Framework

- Supports single variable and multivariate analysis methods
- Fault detection in real-time and in batch process mode
- Automatically adjusts to changing equipment conditions, i.e. slow drift effects
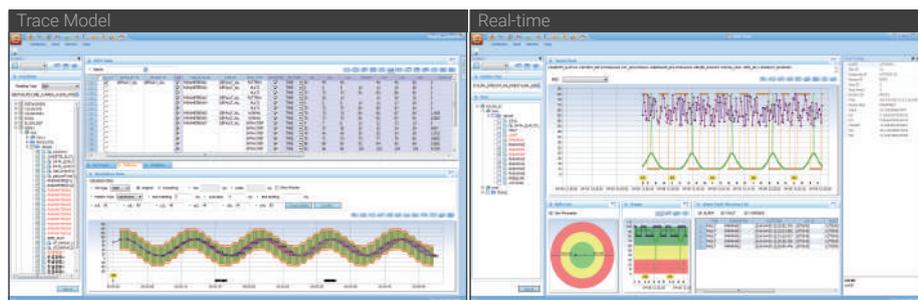
Comprehensive Reporting & Archiving

- LOT recipe, substrate, step level, summary data available
- Summarization of total fault counts, tool alarms, and SPC spec over
- Min, max, standard deviation, average, count, range, median, cumulative sum, max frequency, time integral, and slope data values
- Automatic shift, daily, weekly, and monthly summary data reporting
- Supports mixed data archiving schemes using database, file format, and compressed file format for raw data
- All types of summary data stored in the database for easy access
- Flexible Data Visualization
  › Trend/summary chart with LOT/recipe/module/wafer/parameter combination
  › Overlay chart for LOT/wafer/step level
  › Easy drill down and drill up between EES data
  › LOT and wafer level tracking

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