INFICON

FabGuard® Analysis Server

Enhance Existing Fault Detection and Classification Systems

ADVANCED MODELING, DATA ANALYSIS AND VISUALIZATION CAPABILITIES MADE SIMPLE

INCREASE YIELD BY EXPANDING PROCESS DATA ANALYSIS

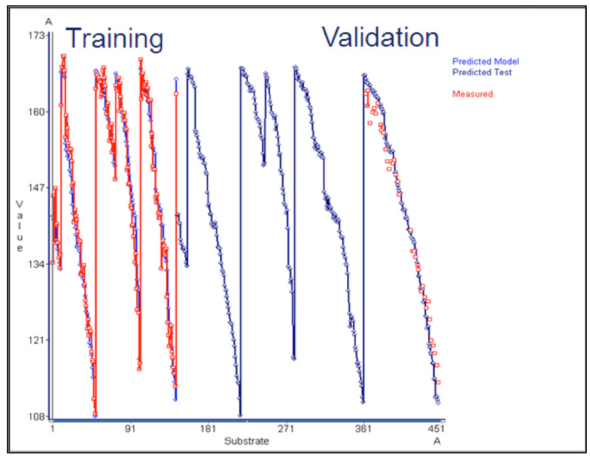
FabGuard Analysis Server (AS) makes it possible to analyze every variable in the factory to apply advanced multivariate SPC and modeling. Detecting faults caused by the interactions of multiple process variables is accomplished with the many advanced multivariate analysis tools in FabGuard AS. FabGuard Analysis Server can easily expand the capabilities of existing FDC systems by enabling engineers to detect faults not typically monitored by univariate SPC. Many faults are caused by the complex interaction of multiple equipment and process parameters. FabGuard AS provides multiple advanced techniques to perform Fault Detection, Fault Classification and Metrology Prediction. These tools highlight excursions that simple univariate FDC systems will never detect. FabGuard AS provides engineers a powerful toolbox to uncover hard to detect faults.

Advanced techniques available with FabGuard Analysis Server

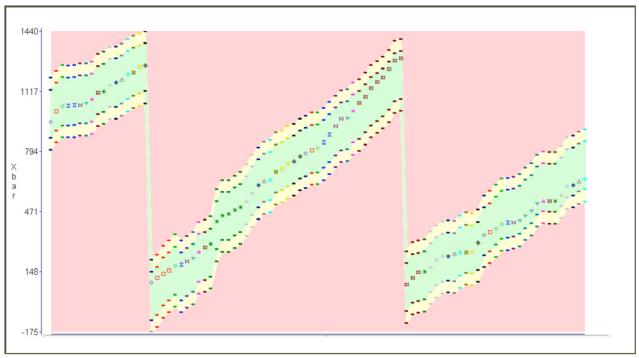
MODEL TYPE	USE
SPC CONTROL (E.G., X-BAR S, EWMA, ETC.) PRINCIPAL COMPONENTS ANALYSIS (PCA) TIME SERIES UNIVARIATE ENVELOPE TIME SERIES PCA ENVELOPE (MULTI-WAY PCA) TIME SERIES PLS ENVELOPE (MULTI-WAY PLS) STEPWISE OPTIMAL HIERARCHICAL CLUSTERING RULE-BASED EXPERT SYSTEM (LOGIC)	FAULT DETECTION
FISHER DISCRIMINANT ANALYSIS SUPPORT VECTOR MACHINES	FAULT CLASSIFICATION
PARTIAL LEAST SQUARES REGRESSION (PLS) ORDINARY LEAST SQUARES REGRESSION (OLS)	METROLOGY PREDICTION
ORDINARY LEAST SQUARES REGRESSION (OLS)	ROOT CAUSE ANALYSIS

PREDICTIVE METROLOGY FOR BETTER PROCESS CONTROL

To obtain the best run-by-run process control quality at a reduced cost, factories typically develop complex sampling strategies. FabGuard AS provides increased run-by-run control accuracy and precision by providing virtual metrology. Predictive metrology models can be used to complement sampled in-line metrology by calculating values for every process, such as transistor gate critical dimensions or film thickness and stress. Using FabGuard Analysis Server, Process Control Engineers create virtual metrology measurements to predict outcomes and optimize run-by-run process control. The use of predictive metrology models enables engineers to obtain higher quality process control at a fraction of the cost of traditional techniques. Predictive metrology models have the additional benefit of then being used to notify sampling plans when additional in-line measurements are necessary to react to unexpected process shifts.



Metrology Prediction example showing training and validation of Cu Deposition Rate.



Process Kit Life with Dynamic SPC Limits

SIMPLE AND EFFECTIVE RUN-BY-RUN PROCESS CONTROLLER

Creating run-by-run process controllers for multivariate systems is costly and time consuming. Simple single variable process controllers are typically not capable of controlling outputs to the required tolerances. FabGuard Analysis Server employs a unique model inversion technique to provide a simple and inexpensive framework for determining multiple process recipe set points. FabGuard AS makes it possible to perform multi-input process changes that can optimize yields, lot-to-lot or wafer-to-wafer.

COST REDUCTION AND THROUGHPUT INCREASE FROM REDUCED IN-LINE METROLOGY

In-line metrology increases the overall process cycle time and is typically considered a non-value added process step. With the use of predictive metrology, factories can reduce the number of physical in-line measurements, which significantly reduces cost and overall cycle time. FabGuard Analysis Server helps engineers realize greater tool throughput by predicting the metrology for every run in a process and periodically measuring actual values to verify the accuracy of the prediction model.

REDUCE TIME TO RECOVERY BY USING FAULT CLASSIFICATION

Using fault classification techniques available in FabGuard Analysis Server, engineers reduce fault recovery time by determining the root cause of the fault more quickly. Classification models such as Fisher Discriminant Analysis, Expert System, and Support Vector Machines provide process and equipment engineers with the tools to identify the root cause of an excursion. With these fault classification techniques, engineers can quickly implement a solution and avoid the time normally spent troubleshooting.

OUR EXPERTISE IS YOUR COMPETITIVE ADVANTAGE

The worldwide INFICON team of expert applications development engineers are your resource for installation, evaluation and support. Our semiconductor applications engineers are highly trained in sensor installation & control, integration & data analysis, and have a wealth of process experience. We provide you a complete diagnostic solution so you can focus on managing your process & equipment.

GETTING EVEN MORE OUT OF FABGUARD

FabGuard Analysis Server is part of the FabGuard Suite of products that provides a simple multivariate SPC and modeling add-on package for any existing FDC system. With advanced data analysis, FabGuard AS enables active inline metrology prediction, as well as fault detection and classification. As data gathering and sensor integration needs grow, FabGuard Data Server can easily be added to the FDC infrastructure for data streaming from advanced sensors. If the factory's needs include advanced real-time fault detection and tool based expert systems, then FabGuard AS can be easily upgraded to FabGuard IPM. With the addition of a SQL or Oracle Database and INFICON's sensor integration expertise, FabGuard IPM greatly increases process understanding and fault detection capabilities. When upgrading to any of the FabGuard Suite of products, users benefit from a familiar interface which allows for rapid deployment with minimal additional training.

FabGuard Suite

For more information, visit www.FabGuard.com.

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