

POWERFUL PROFIT SOLUTIONS



FabGuard® APC
ADVANCED PROCESS CONTROL

Maximizing Flexibility and Profitability through Enhanced Control

Timely information is essential for increasing fab productivity and remaining competitive in the market place. The pressure to enhance profitability makes it critical that a factory is productive and flexible, while increasing yield and throughput. FabGuard APC saves both time and money in factory operations by executing run-by-run (RbR) control strategies that drive process results to achieve target regardless of day-to-day equipment or process drift.

APC systems collect product measurements and recipe set points which are used to calculate new recipe set points that optimize wafer processing. The use of an APC System maximizes overall product yields and increases profit by making sure that each wafer performs as close to end of line metrics as possible.

BENEFITS

FabGuard APC increases yields, reduces costs and enhances manufacturing by providing optimal process set points to compensate for equipment and environmental variations.

- **Tailoring your yields:** Whether customers demand faster computation speed, lower power consumption or other specific device requirements, FabGuard APC adjusts process recipes to drive product distributions toward the products consumers want and need. (Figure 1) Better yields result in fewer wafer starts for the same number of die, resulting in higher capacity and lower wafer costs.

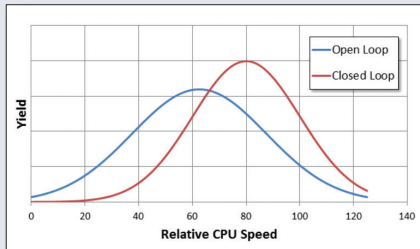


Figure 1: Shift the yield distribution to get the products that customers want.

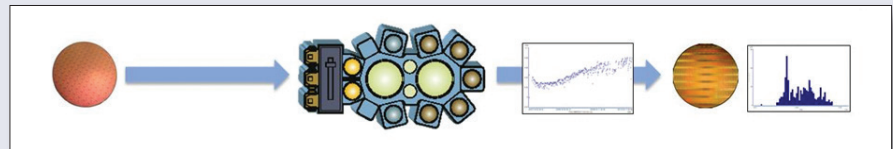


Figure 2: The current system running in Open Loop where 1) The tool performance drifts over a PM cycle. 2) Different chambers running the same process provide different results. 3) Tool and processing states are only measured by daily quals.

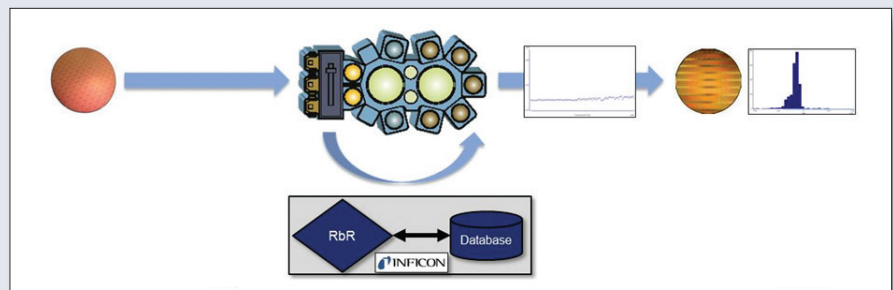


Figure 3: The current system with Closed Loop recipe adjustment where 1) APC compensates for tool drift over a PM cycle. 2) APC compensates for differences in chamber performance. 3) Tool performance is evaluated using continuous product measurements.

- **Drop the reworks:** Reworking wafers is expensive and wastes valuable consumables and processing time. Use FabGuard APC to apply the best possible recipe settings the first time and reduce rework rates.
- **Get more from your tools:** Extend the life of existing equipment

by compensating for tool drift and performance inadequacies. FabGuard APC increases the capability of your tools and allows them to have wider processing ranges and eliminates the need for costly equipment dedication. Move to Closed Loop control and get control over your tools. (Figures 2 and 3)

STRATEGY AND FLOW

FabGuard APC provides you with tools to create both custom logic and business rules. Tailor the process control logic to meet your local manufacturing needs. APC logic can be easily configured to handle special needs such as send-ahead lots, new product introduction, as well as parameter and data relaxation to deal with low running parts or special situations.

Control strategies are designed to promote ease of use, utilizing a drag-and-drop ladder diagram interface. Components are dropped into the logic flow, connected to other blocks, and configured in place to allow for quick development and visualization of the logic flow. (Figure 4)

Developers can also extend the capability of the APC system by adding custom Java blocks

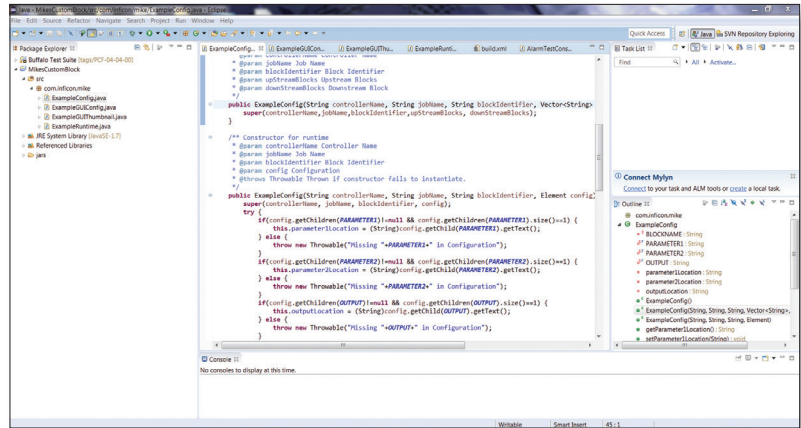


Figure 5: Add custom logic to meet your specific manufacturing needs.

to enable integration of third party data sources, custom mathematics, or specific and proprietary logic. (Figure 5) These blocks are added to the existing system and extend capability without impacting core functionality.

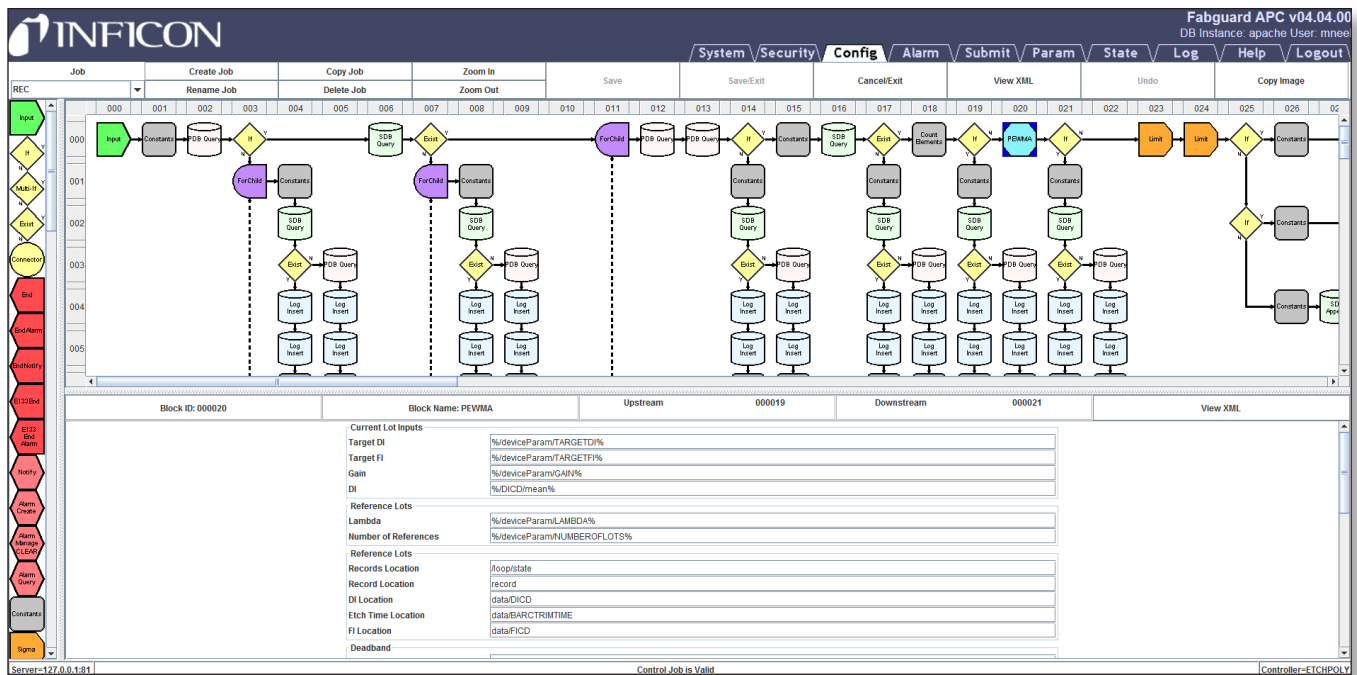


Figure 4: Easy to use drag-and-drop GUI enables rapid development and deployment of mission critical solutions.

FEATURES AT A GLANCE

- Easy to use web-based Graphical User Interface (GUI)
- Integration with FabGuard FDC and eOCAP
- Comprehensive logging and control move history viewing
- Hierarchical parameters, limits, and constants
- SEMI E133.1 communication support
- Supports custom Java blocks for user-specific logic and integration

■ **Factory Automation:** Using an XML protocol (E133.1 and legacy XML via HTTP) for control requests and data collection provides a simple method for integrating the controller into existing factory environments.

■ **Factory Systems (SPC, MES, etc):** Integration to factory systems can be easily added using the custom block logic or via Factory Automation using SEMI E133.1.

INTEGRATION

The FabGuard APC system provides upstream and downstream communication that allows bi-directional messages to be sent between the APC framework, multiple fab tools and other automation systems. For example, a factory automation system can send metrology data to the APC framework, receive results from the prediction calculations, and send updated recipe parameters down to the process tool.

(Figure 6)

■ **FabGuard FDC:** Bi-directional communication with FabGuard Fault Detection and Classification Systems allows engineers to merge FDC and control data for better understanding of processes and control moves. Alarms from FabGuard can be used to disqualify data in the APC system and alarms from APC can be tracked in FabGuard.

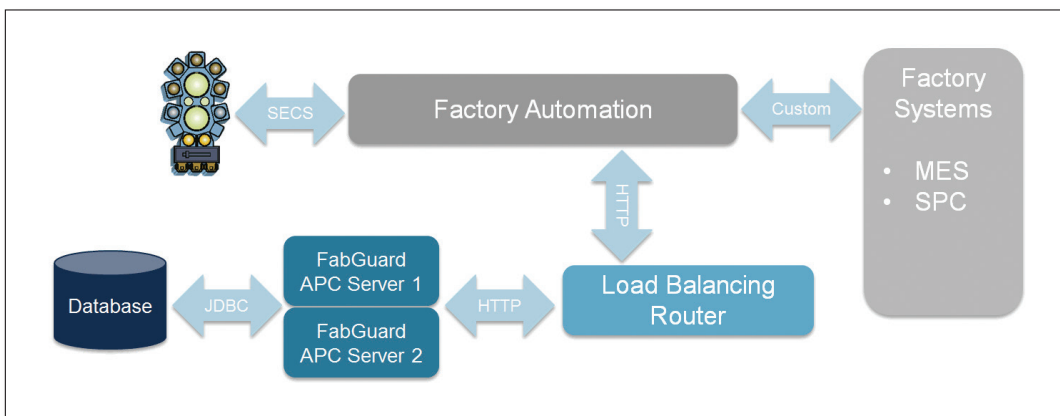


Figure 6: FabGuard APC fits easily into existing architecture to provide fault-tolerant operation.