

Bruce Technologies Inc.

APEX is a multi-user Diffusion Cell Management System developed by Bruce Technologies Inc. It is a powerful process management tool for both the engineer and the fab manager. **APEX** has been recognized as the industry's model for cell management for the hot wall process area in modern wafer fabrication.

The system incorporates equipment monitoring, recipe editing, a detailed reporting system, preventative maintenance scheduling, an SPC module, and an interface to a host CAM system. **APEX** is designed using computer industry standard networking, and graphical interfaces to provide an "open system" computing environment conforming with the requirements of the state-of-the-art CIM facilities.

APEX has a worldwide installed base without parallel in the semiconductor equipment industry. Over 150 fab installations worldwide rely on Bruce's process management systems on a daily basis for real-time management of atmospheric and LPCVD process requirements. **APEX** provides a central link for individual hot wall processes operated by Bruce's control systems. The system provides operators with a consistent interface for both vertical and horizontal reactors in a mixed system environment.

Graphical User Interface

APEX provides the users with a consistent and easy to use graphical user interface. The system is organized as a series of hierarchical menus which provide the user with a quick access to system functions.

System Administration

APEX provides multiple levels of account privileges. This feature enables the system to be configured to provide only the access level required to complete a particular job responsibility. Privileging can range from a view only mode for operators to full system access for the system manager.

Real Time Data Monitoring

APEX provides real time access to furnace data which is displayed in both graphical and tabular formats. The data is organized hierarchically starting with system overview, continuing with subsequent levels that show more detailed process data.

Recipe Editing, Storage and Downloading

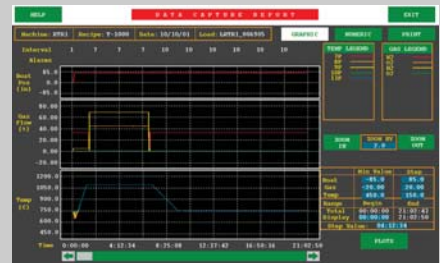
APEX contains a recipe editor which is used to create or modify recipes for Bruce's family of real-time process control systems, enabling customers to generate process recipes off line from the process tool. Recipes include all process variables and the associated wafer loading parameters required for automated diffusion equipment. They are stored in access-controlled libraries within **APEX** and are downloaded to the process equipment for execution.



Recipe Creation & Editing



Maintenance Schedules



Statistical Process Control

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Report System

The **APEX** report system allows the process engineer to interactively review process data associated with past process runs. The integrated relational database system gives **APEX** reports a high level of flexibility. **APEX** provides the following reports for screen presentation or in hard copy form:

Event Report - Track events including cycle start and stop events, manual operator interaction and system alarm conditions.

Data Capture Reports - View reactor temperature, gas flows, pressures and the related automation operation.

Production Reports - Track which wafer lots were batched and processed, which reactor the wafers were processed in, and which operator was responsible for the process run.

Preventative Maintenance Scheduling

The preventative maintenance system provides the ability to schedule and track maintenance actions for the diffusion equipment. Maintenance activities can be established on either a time or a cycle based schedule. The on-line maintenance log tracks both scheduled and unscheduled activities with the option of keeping the maintenance reports on-line as a paperless log.



Statistical Process Control (SPC)

An optional SPC tool kit is available with **APEX** which can be used to manage the processes run in each furnace system. The option provides the ability to log both process results and the related furnace parameters. The tool kit provides the user with the ability to generate control charts, histograms, scatter plots and various statistical reports. **APEX** offers a unique "soft rule checking" feature to automatically perform a trend analysis on each process variable to determine if the process is in statistical control. In addition, an automatic reporting system provides an overview list of all process violations meeting specified criteria. Additionally, violations can be programmed to automatically inhibit tool usage until the deviation is corrected.

SECS Host Link

An optional SECS Host Link kit is available with **APEX** which can be used to interface to the factory's CIM system.

Host Link Capabilities:

SECS-I, II compliant
Supports GEM, HSMS applications