Data Acquisition and Analysis for Cu CMP

[Use of opsEnvironmental software for analysis of chemical, energy, and water consumption in fabs]

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Transition to 300 mm

The transition to 300 mm wafers now underway affords the most significant opportunity in the history of the semiconductor industry to collectively and systematically control and lower manufacturing costs*.

*1999 International Technology Roadmap for Semiconductors

NSF/SRC Engineering Research Center for Environmentally Benign Semiconductor Manufacturing
Factory Connectivity

Central MIES
- Links to business systems
- Site planning, scheduling and automation control

Design and Product Control
- Links to business systems
- Site planning, scheduling and automation control

Individual Tool Control
- Fault Detection
- Internal Metrology
- Internet Based Protocol for Communication

Source: Dataquest/Gartner Group
Individual Tool Control

Production Tool
- Consumables and Waste
- Trend Analysis
- R2R Control
- Defect Detection
- Overall Equipment Effectiveness

Factory Facilities
- Consumables
- Waste Treatment
- Overall Facilities Efficiency
ESP opsEnvironmental Software

• Customers include
  American Airlines       Boeing
  Lockheed Martin        Marathon Ashland
  Lafarge Cement         New Century Energy

• Object-based enterprise software
• Combination client-server and web deployment
• Key functionality: live data linking, calculations, ticklers, and reporting
ESP opsEnvironmental Software

• Example: Airline paint booth operations
  – Live Data Linking: Signal read from sensors on paint booth dry filters
  – Calculations: Pressure drop calculated and compared against regulatory set points
  – Ticklers: Maintenance notified via email, pager, visible signs when set point exceeded
  – Reporting: Number of excursions recorded and reported, across multiple booths and facilities
Trial Project

- SEMATECH sponsored study on post-copper CMP
- Goal: Chemical, water, and/or energy use data acquisition to enable trend analysis and process optimization
- Subject: Applied Materials CMP tool operating in Texas Instruments Fab
Trial Project (cont.)

• Unknowns:
  – Existing data availability from tool
  – Ease of collecting additional parameters
  – Transferability to other fab processes
  – CMP tool optimization opportunities