



John Balas
Senior Engineer
Systems and Technology Group
IBM

IBM'S 'FAB' OF THE FUTURE – TODAY!

SAS® helps improve manufacturing processes at legendary semiconductor plant

Industry

Manufacturing

Business Issue

Analyze process manufacturing data to improve yields, detect problems quickly and optimize performance.

Solution

SAS® offers DB2® connectivity, data extraction capabilities, scalability, advanced analytics and a user-friendly front end, all in one package.

Benefits

Shortened problem detection cycles and improved solution times.

Exacting and complex, the manufacturing process for semiconductors includes hundreds of sequential steps and countless opportunities for error. But with an automated production process and an engineering intelligence system that leverages information in near-real time, IBM has constructed one of the most advanced, error-free chip fabrication factories, or “fabs,” in the world in Fishkill, NY.

Just 20 years ago, semiconductor chip components were measured in microns, or thousands of nanometers. Today, IBM builds chip components on 300mm wafers, using a 90-nanometer process for even greater performance. The chip components are built on a single layer of silicon that sits on top of an insulator. Microscopic transistors on the chip are connected by copper wire that measures a mere one-thousandth the width of a strand of hair or smaller.

The Fishkill factory produces some of the most advanced and powerful chips in the world, used in the most compute-intensive and power-hungry businesses. IBM's 300mm wafer plant provides the chips for many products, including IBM's POWER5™ processors packaged in multi-chip modules that power the IBM eServer® i5, p5 and OpenPower™ servers, and the IBM TotalStorage® DS8000 disk storage system.

With a comprehensive combination of IBM DB2® data warehousing technologies and SAS analytic intelligence software, engineers at the Fishkill 300mm wafer plant and a 200mm wafer

fabrication plant in Burlington, VT, are able to access and understand every stage of the manufacturing process. Using SAS, they can apply diagnostic techniques that detect and address problems quickly and ultimately improve yields across every step of the fabrication process.

SAS® plays key role in engineering analysis

Data from all aspects of the manufacturing process – including logistics, process, electrical test and defect data – are collected from each production and test location and consolidated in a centralized DB2 Universal Database™. IBM engineers throughout the world use SAS to continuously access and analyze the terabytes of data contained within the database.

“SAS has been a key component of our yield learning and engineering analysis program for many years,” says John Balas, Senior Engineer for IBM's Systems and Technology Group.



Balas leads a team of developers at IBM who deliver engineering analysis software tools that support production management and optimization efforts. His team's primary goal is to empower engineers to capitalize on yield learning opportunities during development, as well as shorten problem detection and solution times in manufacturing.

“SAS has been a key component of our yield learning and engineering analysis program for many years.”

John Balas
Senior Engineer
Systems and Technology Group
IBM

To meet these key business objectives, Balas' team designed a unique SAS application called DataView. The system's benefits include:

- A user-friendly interface that provides easy, real-time access to the multiterabyte DB2 information warehouse. To ease usability, this interface uses engineering terminology instead of database or programming terms.
- Complex data translation capabilities that facilitate comparisons across different data areas. These data correlations are a critical component of engineering analysis.
- A custom point-and-click front end for exploratory analysis. This component provides access to a powerful set of visualization tools built with SAS.
- A set of standard applications that run innovative, complex statistical algorithms against many different types of data. These powerful algorithms can detect a wide range of design and manufacturing problems and identify root causes.

The complete DataView system is supported on IBM eServer® p5 and pSeries® systems and AIX 5L™ 64-bit IBM POWER5™ and POWER4+™ platforms, as well as Windows platforms.

Keeping pace with the semiconductor market

Balas credits DataView's application of SAS with playing a key role in improving engineering analysis activities across the division. “SAS is being applied to many business-critical aspects of our development and manufacturing operations around the world,” he says, “including yield learning, statistical process control, ad hoc engineering reporting and management line performance monitoring.” Balas says the use of DataView has helped IBM retain an edge in a very competitive marketplace through the early detection of potential design and manufacturing issues.

“As we ramped up our 300mm fabricator, we observed a dramatic increase in both data volumes and data complexities that forced us to rethink the types of analytical methodologies that we apply to understand our business,” explains Balas. “Traditional methods of ‘eyeballing’ data to make critical decisions were no longer viable. Instead, we needed to implement smarter ways to reduce and analyze volumes of data and turn it into information we could use to better run our processes.”

IBM capitalizes on process intelligence expertise

SAS brought a breadth of statistical analysis capabilities to IBM's efforts. In particular, SAS provides software developers with a toolkit of

statistical methodologies that can be pieced together to form world-class applications. With analytic methods that are readily accessible through a procedure-based language, software development teams across IBM can concentrate on the engineering aspects of a project, rather than on fundamental coding tasks.

SAS has powerful data access and manipulation capabilities, and it is fully scalable to process large data volumes. SAS/ACCESS® software, coupled with IBM DB2, bridged the gap between IBM's distributed data locations and platform database differences, making the DataView solution highly scalable and able to easily handle the analysis of multi-million-row data sets.

Recognizing the power and commercial appeal of its solution set, coupled with the proven experience in technology development and advancement within the high-tech industry sector, IBM is packaging the intellectual property developed internally and deploying solutions to customers, leveraging the powerful combined capabilities of IBM and SAS software and hardware offerings.

“This effort to make DataView commercially available is evidence of the value we've instilled within this solution, providing great competitive advantages to our IBM customers,” says Balas.



THE
POWER
TO KNOW.

SAS INSTITUTE INC. WORLD HEADQUARTERS 919 677 8000 WWW.SAS.COM
U.S. & CANADA SALES 800 727 0025 SAS INTERNATIONAL +49 6221 416-0

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration. Other brand and product names are trademarks of their respective companies. Copyright © 2006, SAS Institute Inc. All rights reserved. 101994_413403.1006