FIORANO CUSTOMER SOLUTION

POSCO

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POSCO optimizes manufacturing processes and achieves real-time competencies with the Fiorano Business Integration Solution

Steel manufacturing is one of the most complex processes. POSCO wanted to leverage the power of technology to simplify its Steel manufacturing processes and business related tasks such as connecting the manufacturing systems to its digital management system called POSPIA. POSPIA consists of POSCO's e-Sales and e-Purchasing and across the company's value chain over the Web. To help make this happen, the company selected Fiorano Business Integration Suite, built on top of Fiorano ESB as its Integration Platform for flexible integration and Business Process Automation. Fiorano's Business Integration solution powers POSCO's mission critical enterprise backbone, allowing manufacturing processes to be monitored, modified and optimized in real-time. Deployed across 400 systems running over 40 different operating systems on a variety of existing and legacy hardware, over multiple software protocols,–the Fiorano solution has resulted in significantly improved profitability through reduced product reject rates, decreased time-to-delivery and lower costs of production.

Company Overview

Established in 1968, POSCO is not only the world's largest but also the most profitable steel manufacturer. A Global 500 company, POSCO has an annual crude steel production capacity of 28 million tons and annual revenues of US$ 10.6 Bn. Considered by Morgan Stanley to be the most sustainable company in the steel industry, POSCO boasts a Return on Equity of 16.4% which is 75% higher than the Industry Average. A corporate philosophy of adopting leading edge technologies has allowed this steel maker to keep its Net Margins (12.2%) at more than 3 times that of the industry average (3.9%). The company makes hot- and cold-rolled steel products, which it sells to the auto and ship building industries.

Problem Analysis

Inefficient Manufacturing Processes

Currently the latency between the generation of process data and its availability for analysis is so high that by the time the result of analysis could be put to use that product would have already moved out of the shop floor. All the status information pertaining to the different steps within the process and business chain like the manufacturing progress, the delays or updated schedules for rolling out of products form a mill, mills with minimum pending orders, etc was all segregated. The information

Solution Overview

Profile

Established in 1968, Korea-based POSCO is the world's largest steel manufacturer. With an annual crude steel production capacity of 28 million tons and annual revenues of $US 10.6b, POSCO is considered by Morgan Stanley to be the most sustainable company in the steel industry. The company makes hot- and cold-rolled steel products, which it sells to the auto and ship building industries. Subsidiaries also include POSCO Engineering & Construction and POSDATA.

Scenario

- EAI
- Messaging Infrastructure
- Business Process Automation
- Legacy Integration

Fiorano Products Used

- Fiorano Business Integration Suite
- Fiorano ESB
- FioranoMQ

Industry

Manufacturing

available to different departments was not accurate and current as the overall data aggregation took time and was done in batches.
POSCO wanted to develop a system where process data could be exchanged in real time for analysis and feedback to reduce product reject rates and improve time to market.

Islands of Information Systems
Currently POSCO's IT infrastructure consists of 600 computers with heterogeneous hardware, Operating Systems and variable support for programming languages. Some of these PCs communicate over BSC/ SDLC protocols while others over the TCP/IP protocol, resulting in setting up of two parallel networks with little scope of communication between these PCs.
Process requirements entailed development of a unified infrastructure: concurrent availability of a messaging infrastructure that enables direct communication between different machines and the availability of centralized communication for process data distribution.

Integrate disparate systems ranging from Legacy to Best-of-breed New Applications
The existing systems consist of an IBM host Business Computer at Kwangyang and Fujitsu FACOM mainframe at Pohang. The Process Computers at the shop floor include wide variety of systems ranging from legacy systems like Mitsubishi-Melco and Hitachi machines etc to today's most modern computers.
Integration was required across co-existing machines having multi OR single threaded environments, having no support for JVMS, having 32 and 64 bit operating systems and lot more.

Automate Business Processes Spanning Geographical Boundaries and a Geographically Spread Infrastructure
POSCO has multiple Mill locations and offices in Pohang, Kwangyang and Seoul for steel production, process management and overall business management. Additionally, these computers are spread across various geographical locations in South Korea - at Seoul, Pohang and Kwangyang. The existing point-to-point interfaces between various applications at the various Steel Works make monitoring, maintenance and new application development extremely difficult and time consuming.
POSCO wanted to simplify management of these distributed applications by having a single comprehensive view of the entire process manageable from a central location. A new system infrastructure was required to exchange data in real-time from one geographical location to another across firewalls, WANs and over the Internet and in a reliable and secure manner.

Rigid IT Infrastructure
The current IT infrastructure is a very closed system that is resistant to any changes in hardware or software configuration. This results in extremely high maintenance and upgrade costs.
POSCO wanted to develop an open systems architecture to be able to realize full benefits of new technologies and ensure adaptability to future needs.

System Uptime Maintenance
Currently, POSCO manually monitors all the Process Computer's at its various Steel Mills. POSCO currently needs a team of 15 engineers at each of its sites, manually monitoring all Process Computers for faults. Average time between problem occurrence and its detection is quite high (approximately 4 hours).
The required system should provide full support for remotely monitoring and troubleshooting Applications in Real Time.

"POSCO was looking for a highly scalable solution that could provide seamless data and process integration. We conducted extensive performance, scalability and reliability tests before selecting Fiorano as the preferred vendor. Fiorano's solution is an end-to-end infrastructure that integrates back-end systems and includes customers, suppliers and business partners as well. This solution has the potential to provide increased efficiencies and significant cost savings. Fiorano ESB's built-in extensibility and standards-based interoperability provides a significant ROI. Fiorano's top-notch technical support made Fiorano ESB a logical choice."

J. M. Lee
Head EAI Team
POSCO

Different Data Formats
The POSPIA and POSCO's Shop Floor Systems consist of approximately 20 types of system platforms. Currently, there are about 110 servers with various Operating Systems and Databases. Business Information is stored in various formats. For instance, Casting know-how standards and logic are managed in file formats at Pohang and in database tables at Kwangyang. Cold Rolling inspection standards and logic reside in files at Pohang and in database tables at Cold Rolling Processes at Kwangyang.
The new system needed to facilitate information sharing in a seamless manner across multiple file and data formats.

Data exchange
Data exchange between a Process Computer (P/C) and a Business Computer (B/C) is not over a reliable link. Moreover, the only Backup and Recovery System (BRS) is a complex process of analyzing logs at each of the PC's and comparing with that of a B/C to manually detect differences. All logs are stored at network endpoints and at times these could be more than 200 miles from the place of detection of problem. The current system provides almost no support for remote access of logs and events for remote debugging.
The required system should provide full support for remote access of logs and events for remote debugging In Real Time.

No Disaster Recovery Process
POSCO currently has no disaster recovery system implemented across the all Steel Works. In case the Business Computer at Kwangyang goes down, there is no process in place to ensure that the Business Computer at Pohang takes control of all the PC's. This switch has to be made manually at each of the 200 P/Cs that are distributed at different geographical locations across South Korea.
Implement a Disaster Recovery System, as a part of the new architecture to ensure 24x7 continuity of the manufacturing process.

Error Notifications
POSCO wanted process failure discovery and notification to be automated and work in real time.
Alarms and notifications were required to be raised in the form of E-mails and SMS for immediate discovery.

Integrate Third Party Processes
Various third parties, such as partners, raw material suppliers, transportation providers and others across the supply chain associated with POSCO were using different applications, systems and processes and sharing information was extremely difficult.
POSCO wanted to share information and automate their processes seamlessly with their partners and suppliers across the business chain.

The Solution

After an intensive evaluation of leading edge technologies to address the complex challenges listed above, the POSCO Architecture Group selected Fiorano Business Integration Suite. Fiorano was the only solution that was architecturally capable of providing a cohesive, flexible, reliable and secure enterprise infrastructure to power POSCO’s Enterprise Nervous System and real-time enable the entire organization. Fiorano Business Integration Suite is built on a standards based Enterprise Service Bus, Fiorano ESB and marks the move from monolithic hub-and-spoke systems to standards-based distributed messaging and integration solutions for the real time enterprise.

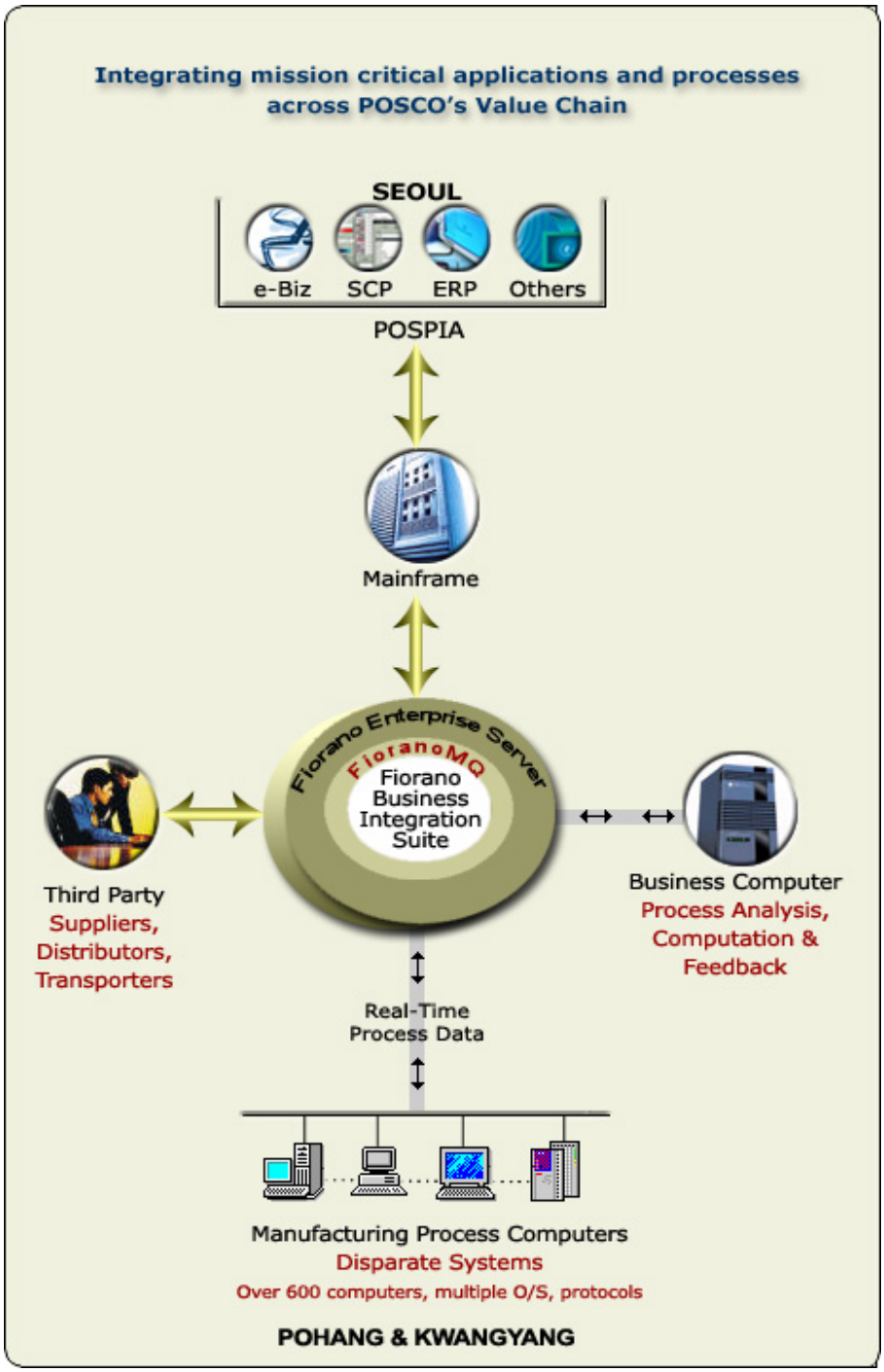

Figure 1: Integrating Mission Critical Applications and Processes across POSCO's Value Chain

Unlike solutions patched together with several point-products, Fiorano provided a distributed platform based on super peer technology with a layered architecture comprising:

- Fiorano ESB, Enterprise Service Bus
- FioranoMQ - JMS Messaging Layer
- Fiorano Enterprise Server
- Fiorano Peer Servers
- Fiorano Business Service Composer
- Fiorano Deployment Manager
- Fiorano Monitoring and Management Tools
- Fiorano Adapters

Fiorano solution handles Legacy Systems Integration with ease

First and foremost, to tackle the problem of integrating Legacy Systems (with non-TCP/IP) protocol) with the new breed of PC's, a Gateway server was designed to do the conversion from TCP/IP to the B/C protocol that is understood by legacy systems. All the legacy systems were connected with the gateway server that can be connected to any other system such as HP-UX or Windows that understand TCP/IP. Multiple DCP Adapters were installed on the gateway server and each of these have BSC protocol program downloaded in them. These adapters can then talk with the legacy systems.

Fiorano ESB can run on both AIX and Windows machines and the data are sent across to legacy systems through BSC cards. Integration of these legacy systems with the new PC's was the biggest bottleneck that existing infrastructure products (IBM MQSeries, WebSphere Integrator) were not able to provide.

Fiorano solution for real time processes analysis

The business computer running Oracle 9i Application Server was integrated with the various process computers running on disparate platforms and operating systems (including Windows, Solaris, Linux and other Legacy platforms like VAX/ VMS). This integration enabled process data analysis and feedback in real time. Using Fiorano Solution any manufacturing inefficiency could now be reported to the process computers in real time after computation and analysis by the business computers. The reported data was further used to analyze and optimize the process and remove identified bottlenecks. All the status information pertaining to the different steps within the process like the manufacturing progress, the delays or updated schedules, minimum pending orders, etc was now available in Oracle for real time analysis by various departments.

Fiorano's Open-ended enterprise integration infrastructure for heterogeneous IT environments

Fiorano defines a new breed of open-ended enterprise integration infrastructure. Fiorano Solution successfully integrated various applications and business processes across POSCO's value chain. Its open ended and standards based architecture allowed integration of the latest and best of breed e-business systems with home grown and legacy systems and applications running on Mainframes (IBM OS/390 and Fujitsu FACOM), Windows, Linux, Solaris, VAX/ VMS operating systems,. even systems and applications used by various third party vendors and partners. Being a pure java based implementation along with runtime libraries for other languages such as C, C++, Visual Basic makes it run with almost all the systems.

Management and Monitoring Capabilities

Fiorano Business Integration solution also provided POSCO with a comprehensive set of Management and Monitoring Tools. With the Fiorano Business Service Composer's Business Process Management Capabilities, POSCO's Business and Technical Analysts can now quickly compose, develop, test and deploy Business Processes. In addition, it's Monitoring and Event Handling Capabilities provided POSCO with Graphical Tools to investigate the origin of the problem and then take corrective action. This not only helped in minimizing the errors but also reduced the delays in problem resolutions. Fiorano Business Integration Suite provided a centralized system for Real Time monitoring, debugging and administration for the whole enterprise from a remote location.

Data Mapping and Transformation

The Fiorano Mapper provides multiple File (File Reader, File Writer Adapters) and Database Adapters (Oracle, DB2, SQL Server etc.) to handle a wide range of data and file formats. The Fiorano Pre-Built Adapters extract the Meta Data information from the Source and send the data to the Target Data Source after applying various Business Rules, transformations and validations. Fiorano's monitoring and management tools comes along with a visual drag and drop tool called the Fiorano Mapper that can be used to map different XML formats.

Coarse Grained Component Model extends Component Re-usability

The use of Fiorano Adapters and the Fiorano Mapper helped POSCO save precious time and resources, which would otherwise be required for programming these different complex Business Rules and validations for automating the Manufacturing Business Processes.

Business Objectives Met

Deploying Fiorano's Business Integration solution across its Enterprise Nervous System enabled POSCO to significantly drive profitability and effectively utilize technology to maintain its competitive edge. These benefits were enabled by:

- Improved Production Time and reduced downtime;
- Faster time to market;
- Superior product quality;
- Minimal rejections of finished product resulting in optimal raw material utilization;
- Reduced Inventory Levels & Cost;
- Massive Incremental increase in profits over time ;
- Quick and Efficient Response to Business Changes ;
- Identification and elimination of bottlenecks in the manufacturing process;
- Scalable Business Operations.

Increased Profitability with optimized Manufacturing processes – Integration of the business computers with the enabled process computers enabled real time process data analysis and feedback optimizing the manufacturing process.

Accuracy of Information – Availability of most recent and accurate information to various departments, enabling better progress management, superior process planning and order management (like faster order allocation/mill allotment), reduced time to market, etc.

Faster Troubleshooting – Central monitoring and debugging of remote processes and Automated error notification leading to quicker response times, problem isolation and consequent resolution resulting in Faster Recovery, Increased Productivity, Reduced Downtimes and simplified IT Management.

Superior Predictability and Control– Integration of diverse applications across disparate platforms, operating systems, multiple protocols, legacy systems and external partner applications across their business chain into a Unified Infrastructure leading to simplified management, better predictability and control.

Simplified process management - POSCO could simply management of their distributed applications by having a single comprehensive view of the entire process could be manageable from a central location.

Scalability & Flexibility – Single messaging infrastructure for both direct and centralized communication, providing flexibility and desired scalability to meet future process expansions and up-gradations.

Disaster Recovery – Integration across manufacturing plants to enable mutual back up in case of disaster leading to continuous production round the year due to high availability (24 x 7) of the system.