Samsung Heavy Industries, Korea

Gold Award 2005, Pacific Rim; nominated by HandySoft Global, Korea

EXECUTIVE SUMMARY/ABSTRACT
Due to a dramatic increase in the quantity of orders received since 2000, Samsung Heavy Industries (SHI) realized the necessity of implementing business process management (BPM) technology for more efficient management and monitoring of our international shipbuilding operations. Today, the implemented BPM system has improved and efficiently manages not only processes such as order placement management, contractor process management, production management, and quantity management related to shipbuilding outsourcing, but has also improved the business processes related to the materials supplied to subcontractors of the various shipyards. Using this system, the e-outTEr Assembly Management System (e-TEAMS) processes were visualized. This visualization allowed us to optimize the fabrication management process, enable employees to manage and monitor the priority and status of various business processes in real-time, and provide an alarm notification function for process delays. e-TEAMS was the first instance of the application of BPM technology supporting business processes in the Korean shipbuilding industry.

CORPORATE OVERVIEW
Established in 1974, Samsung Heavy Industries (SHI) currently has 8,572 employees worldwide. SHI maintains four business units comprised Shipbuilding, Offshore, Digital Business, and Engineering & Construction, and puts its main focus on the shipbuilding and offshore business. In Korea, SHI operations include the Geoje Shipyard, the Suwon Plant, and the Daeduk R&D Center. SHI operates eight overseas facilities including a ship block factory, SHI Ningbo factory in China, and has an extensive global network comprising of a number of successful overseas branches. In response to a rapid growth in the shipbuilding industry since 2000, we adopted a strategy for industry dominance and continuous gross revenue increase through 2006. At present, the company is processing three years’ worth of orders for 127 ships, for a total of $9.6 billion in revenue by 2007.

In order to achieve our goal of becoming the world’s leading shipbuilding company, we formulated a strategy for maintaining global competitiveness, developing an improved business model, and cultivating a new corporate culture. To these ends, we are now dedicated to becoming a Digital & Shipbuilding industry leader, striving for flexible sales and marketing, simultaneous collaborative design, collaborative production management, customer-centered quality service, and innovative business management. In addition, we are implementing collaborative support using personalized portal technology, improved process management using BPM, and effective knowledge management.

After careful consideration of various commercially available BPM solutions, we selected HandySoft’s BizFlow BPM platform and began implementation between October 2003 and April 2004.

We use a 16-step business process for any given job, from the selection of the partner company to the settlement of the account after the delivery. With the previous system, users were able to locate jobs; but the current BPM system is more
efficient because jobs are given to the users with predefined rules. In the past, the data was provided in text-only format; but the new BPM system displays the entire 16-step process at a glance, as well as the priority and status of each process, whether it is on-time, earlier than scheduled, or delayed. This has significantly improved business productivity.

Outer-assembly management of ship blocks is a complex process and, frequently, there are changes, corrections and adjustments made during the process. With the introduction of the BPM system, our process management became more efficient, and the on-time completion ratio of outsourced production has improved. Also, the development of an Improvement Request System using BizFlow is nearing completion at SHI; this system will address the problems and challenges that arise in design processes at production facilities. We are further planning to apply this system to other business processes, in order to fully utilize the advantages of BPM technology.

**KEY MOTIVATIONS FOR INSTALLING A BPM PLATFORM**

The shipbuilding business is capital-intensive, involving many processes and requiring cutting-edge production technologies. Among these technologies, information management is more important than anything else. As the global economy recovers and strengthens, it is reasonable to expect increased international trade volumes, increased marine oil exploration and use of natural gas, and, as a result, increased demand for shipbuilding. As the Japanese shipbuilding industry has declined amid increasing Chinese competition, Korea is expected to lead the world in shipbuilding for the foreseeable future.

Following our strategy of industry dominance and accommodating the increased production capacity required by favorable market conditions, we developed large block fabrication methods and expanded the outsourcing of block fabrication. However, we recognized that industry leadership also entailed strengthening the company's core competencies in sales, design, and production technologies—as well as internal information management, communications, and collaboration with our global industry partners.

**Why did we implement the BPM technology?**

SHI's Geoje Shipyard has a production capacity of 40-50 ships per year, and Geoje enjoys an excellent internal production management system. However, with an expanded production schedule of 52 ships for 2006, Geoje's collaboration with outsourcing companies has recently become a production management priority. The single most important factor calling for improvements in our work environment was the sudden increase in outsourced fabrication volume. SHI recorded an outsourced fabrication volume of 150,000 tons in 2002, but this volume more than doubled to 320,000 tons in 2004, placing a substantially heavier load on the outsourced contractors.

In addition, our decision to implement a large block fabrication system increased the number of work items to be managed. This increase in the number of work items and the order volume significantly strained the systematic management of the production schedule, creating schedule conflicts between internal and outsourced production. The resulting delay and confusion only exacerbated problems that arose in material supply and outsourced production delivery.

The lack of calculation and verification of special order volume, delays and failure in delivering designs, and unclear assignment of internal and outsourcing production tasks created situations in which orders were not issued in a timely fash-
ion. The increase of in-yard shipping and management costs, production delays stemming from delays in material supply for the outsourced contractors, and the lack of systematic management of the materials called for a new internal control system.

We wanted to streamline communications with outsourced contractors and create an internal control system for easy management of our business processes. With these considerations in-hand, we turned to BPM technology to standardize and visualize the entire business process from order placement to account settlement.

**What is SHI’s goal with BPM technology?**

SHI planned to standardize the business process related to outsourced production through the implementation of a BPM platform. The processes – ranging from contract signing to account settlement – will be shared internally and with outsourcing contractors. Using the visual step-by-step management system, total collaboration with outsourced contractors will be established.

The goals of implementing the BPM system are management of the business processes, management of outsourcing and designs generated through the network, management of the segmented production process, and transparent contract and account settlement processes.

- **Business Process Management (BPM)**
  - Standardized business processes and graphical step-by-step progress status
  - New task notification (provide portal site for process management for individuals)
  - Improved process management using task-start notification and delay alarm
  - Problem prevention through the registration and sharing of prior problems and solutions
- **Material and Network Design Documents Management**
  - Material supply system and supporting IT system management (including VMI)
  - Supply management of raw materials, subsidiary materials, and rigging and finishing materials (management of on-time delivery and part shortage records for each pallet)
  - Online design drawings management
- **Segmented Production Process Management**
  - Process commencement and completion records management
  - Daily progress management per WBS
  - Work transfer records management using e-TEAMS
- **Transparent Contract Terms and Account Settlement Management**
  - Pre-assignment of outsourcing contractors based on work volume
  - Build-to-order order system
  - Online management of delivery confirmation and account settlement based on inspection records and work transfer documents
  - Electronic tax documents integrated with e-certification based on the received inventory amount

**Why did we choose BizFlow?**

To achieve our goal of becoming a Digital & Shipbuilding industry leader, we carefully reviewed several BPM products for their ease-of-use and seamless system integration. Our BPM project team (consisting of seven staff members) reviewed and assessed likely BPM platforms over a period of six months, from October 2003 to April 2004.
HandySoft’s BizFlow Business Process Management platform received the highest rating in its potential to satisfy our business requirements and deliver a fully integrated BPM technology platform.

The following were the selection criteria for SHI’s BPM technology initiative:

- Server performance and the structures proven at a reference site for a large number of users and the given system environment.
- Reference sites for similar implementations.
- Does it satisfy the detailed requirements for the workflow of Samsung Heavy Industries?
- Does it meet the business environment and corporate culture in Korea and does it provide user-friendly interface for visual process monitoring?
- Does it provide template modification functionality that enables changes to the processes on the fly?
- Does it provide various search functions for completed processes and does it provide detail view functions for search results?
- The capability of the vendor to successfully complete with skilled technical staffs and implementation experiences.
- The possibility of consistent technical support for system upgrades, optimization, and expansion of the functions in terms of financial stability and the technological capability.
- Integration and interface with the current and planned infrastructure.
- Does it provide refined and easy API for the expansion of processes in the future?

THE OVERALL BUSINESS INNOVATION

Prior to implementation of the BizFlow BPM system, an analysis of problems and possible improvements for SHI’s business processes was performed. We interviewed 28 outsourcing contractors in September 2003, and identified problems related to the outsourcing contractors. Starting in October 2003, our BPM project team conducted five workshops with a total of 80 employees over a period of a month and a half, defining likely business process improvement targets. The project began on October 24, 2003, and took six months to develop and test applications and train end users.

The quantitative and qualitative achievements of SHI’s business innovation using BPM are as follows:

**Quantitative Effects**

The quantitative effects can be summarized by looking at process improvements:

- Increased Reputation and Credibility (with Collaboration System):
  - Automatic generation and transfer of the POR data in each process
  - Increased reliability between the companies because of the automatic generation of the delivery confirmation based on the actual results
  - Transparent management of the account settlement process using electronic delivery documents
- Process Synchronization
  - Real-time management of work processes among various departments
  - Task and problem management for each staff member
  - Management of the workloads, bottlenecks, and problem types
- Minimization of Paperwork
  - Electronic data processing of the work schedule, order requests, work transfer documents, delivery documents, account settlement agreements, and material check-out documents
Qualitative Effects

The qualitative effects can be summarized by looking at the increase in productivity:

- Business Process Improvement
  - Efforts and Time reduction in order placement, POR, delivery documentation, and daily progress management
- Decrease in production cost
  - Increased productivity with increased outsourcing volume
  - Reduction in management time
  - Increase in the outsourced production
  - Reduction in the material selection and searching

The Overall Technological Innovation

SHI achieved three major technological innovations with the new BPM solution:

- Work processes were centralized with the work portal. User convenience was significantly improved by introducing easy-to-use, one-point access to the various current systems. SHI can now provide the optimum work environment, the Work Portal, with the implementation of integrated work environment, where file attachment and various electronic communication exchanges are available.
- Development productivity was improved and repair and maintenance was made easier with the separation of business processes from application logic, which simplifies necessary application developments. Furthermore, the simplified application logic made modular application components possible.
- Future expansion was made possible by the selection of the standardized integration method between existing systems and the database.

Other technological achievements can be summarized as follows:

- Progress monitoring and user interface enables tracking of various processes and histories.
- Graphic map of progress monitoring shows each process progress using graphs and statistical data.
- The “change” function can dynamically change processes on the fly.
- Team members can design processes by themselves.
- Document management was automated using routing function.
- Work request and results management processes were completely automated.
- Business process bottlenecks were eliminated.

The System Users and What Their Jobs Now Entail Compared to Pre-Installation

The status of the BPM system can be summarized as follows:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total users</td>
<td>600</td>
</tr>
<tr>
<td>Concurrent users</td>
<td>50 (average), 200 (Peak Time)</td>
</tr>
<tr>
<td>Installation location</td>
<td>Samsung Heavy Industries : HQ, Geoje shipyard Outsourcing contractors</td>
</tr>
<tr>
<td>Outsourcing block fabrication process</td>
<td>Annual total completed transactions : 23000 cases Average monthly pending transactions: 2000 cases</td>
</tr>
</tbody>
</table>
Compared with the previous system, the current BPM system is more complete, systematic, and automated. It provides a simplified workflow as well as management of all processes related to the outsourcing through the integration of existing systems including materials, production, and design systems.

Previously, users had to rely on their best judgment when navigating through the system; but the current system actively displays data to the user with predefined rules, making navigation much easier. The integration of various interdepartmental processes shows all processes in a single screen, preventing delays and reducing time required for corrective actions.

The Geoje Shipyard staff and outsourcing contractors employ user IDs and passwords to access the process portal, mySingle. The big difference between the old system and the new one is that users had to “find their way” to their processes in the past, whereas the new system automatically presents processes to the users on-screen.

With the prior systems, users logged in and “found their way” by clicking through menus. For other tasks, the user had to go back to the main menu, starting from the beginning. Now, with the login to the mySingle system, integrated with the BPM system, the tasks are presented with the tasks for the day and to-do items presented clearly in advance.

In addition, data integrated with each system is presented on the screen with a single click. The data used to be presented in text only, but the new system shows all 16 processes in a single screen. Each process is shown as on-time, early, or delayed using numbers. The system uses client-server architecture for internal users, and outsourcing contractors can access the system through the Web.

The major functions of new application are as follows:

- Electronic Management of Outsourcing Contractors & e-TEAMS Quantity Assignment
  - Early assignment of contractors based on standardized contractor information (production jobs, factor, manufacturing method, etc.).
  - Automatic calculation of e-TEAMS volume using the interface with the legacy system.
- Material Supply System Management (Creating N/W Design Document)
  - Carrying out of function according to the material supply system.
  - Issuing electronic transfer documents using barcodes and e-TEAMS information.
  - Transfer function using barcodes on the carrying-out documents.
  - Creation of design documents through the network drawing.
- Segmented Process Management for Each Business Process Unit
  - Segmented process management function, integrating the material receipt information.
  - Real-time progress management function integrated with the inspection records.
- Transparent Account Settlement Using Electronic Delivery Documents
  - Electronic delivery (delivery details) document request/receipt/authorization function.
  - Real-time shipping and receiving, and account settlement management function.
  - Electronic tax documents.
  - Correction request function for additional tasks or mistakes.
  - Correction request and account settlement agreement.
The following screen captures are provided for easier understanding of the BPM system:

**Process Management**
- Graphic presentation of the outsourcing process and real-time management of process progress.
- Maximized productivity through sharing of the status information among staffs and departments.

**Individual Staff Task Management:**
- *mySingle* automatically recognizes the tasks to be processed.
- Portal function for processing individual’s tasks.
- *mySingle* shows that there are tasks to be processed in real-time.
- Clicking on the task list brings the user to the system screen where tasks can be processed.
Alarm System Management
- Block fabrication process management is reinforced using work commencement notifications and delay warnings.

Problem Registration and Sharing Management
- Notes and problems for each business process step can be registered and managed so that staff members can share the information and prevent/solve problems early on.

Result Analysis Management
Processed task result information can be used to analyze the work load, bottlenecks, and problem types for each work unit to achieve optimized business process.
Obstacles and solutions of implementing the BPM system are categorized as follows:

<table>
<thead>
<tr>
<th>OBSTACLES</th>
<th>SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vague fear of using new technology</td>
<td>Continuous PR efforts and education for the change of user perception</td>
</tr>
<tr>
<td>Resistance over job security due to the real-time monitoring with BPM</td>
<td>Strong determination from top management and company-wide campaign on process improvement</td>
</tr>
<tr>
<td>Difficulty in reaching consensus among users and departments</td>
<td>Unify communication channel and execute arbitration between department representatives and CoreMan</td>
</tr>
<tr>
<td>Template instability resulting from process change requests that have not been carefully reviewed</td>
<td>Require prior approval of department heads and CoreMan for all modification requests</td>
</tr>
</tbody>
</table>
Explanations of initial and ongoing efforts to address obstacles encountered before, during, and after BPM implementation are outlined below:

First, the central considerations prior to application of the BPM system:
- Management of the process progress using monitoring functions with an easy-to-use user interface.
- Providing graphic statistical data related to the process progress history.
- Flexibility for changes to the process in progress.
- Integration with the existing systems, resulting in easier work and reduction of labor costs.

Next, the obstacles addressed during implementation of the BPM system:
- Preparation of the usable process through effective analysis of the business process.
- Tight interface with the existing system.
- Drawing a user-friendly interface system.
- Prevention of system speed reduction due to the addition of many functions.

Finally, the items to be managed continuously:
- Continuous improvement of the process by monitoring its progress history.
- Increase in the process management capability of the actual users.
- Examination of the possibility of connecting processes of subsidiaries and outsourcing contractors.

THE NEW SYSTEM CONFIGURATION

The following is the network and hardware diagram of the BPM system:

BPM Server Specifications (including DB Server)

<table>
<thead>
<tr>
<th>Category</th>
<th>System Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPM Server</td>
<td>• IBM RS6000</td>
</tr>
<tr>
<td></td>
<td>• 12 CPU</td>
</tr>
<tr>
<td></td>
<td>• 28 GB Main Memory</td>
</tr>
<tr>
<td></td>
<td>• ESS SHARK DISK 1 TB</td>
</tr>
</tbody>
</table>

BPM System Software and Application Interface Components

<table>
<thead>
<tr>
<th>Category</th>
<th>Model</th>
<th>Version</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>AIX</td>
<td>4.3.3.11</td>
<td>System operation</td>
</tr>
<tr>
<td>DB</td>
<td>Oracle</td>
<td>8.1.7.4</td>
<td>BPM data repository</td>
</tr>
<tr>
<td>BPM System</td>
<td>HandySoft’s BizFlow</td>
<td>8.7.1.4</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>Java, JSP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COST SAVINGS, INCREASED REVENUES, AND PRODUCTIVITY IMPROVEMENTS

The results obtained by Samsung Heavy Industries using the BizFlow BPM platform are summarized in the table below:
<table>
<thead>
<tr>
<th>Category</th>
<th>Improvement Details</th>
</tr>
</thead>
</table>
| Cost Savings Shown in USD per year | • Process improvement  
  • Order- and POR-related time reduction: $163,000  
  • Product delivery doc management time reduction: $196,000  
  • Cost reduction  
  • Management time reduction: $845,000  
  • Increase in the outsourcing production volume: $2,520,000  
  • Material selection/search time reduction: $338,000  
  • Total cost reduction of US $4.4 million a year |
| Increased Revenues | • Currently, there are three years’ worth of orders. To meet the increase in order volume and to solve the problems related to increased volume such as production space, facilities, and labor, integrated outsourcing block fabrication can be used to implement continuous collaboration with contractors. The market share is expected to increase continuously, contributing to an increase in net profits. |
| Productivity Improvement | • POR generation time reduction  
  • **Before** Data gathering: seven days; POR generation: 10 days  
  • **After** Data gathering: one day (automatic generation); POR generation: one day  
  • Daily operation time reduction  
  • **Before** Operation info gathering: four hours; paperwork: one hour  
  • **After** Operation info gathering time: one hour; No paperwork  
  • Reduction of time in delivery document & account settlement  
  • **Before** Delivery document issue seven days; settlement: four days  
  • **After** Delivery document issue: one day; settlement: one day  
  • Segmented process management  
  • **Before** Results were managed manually  
  • **After** Results are managed electronically  
  • Transparent account settlement process based on inspection results  
  • **Before** Account settlement based on manual result compilations  
  • **After** Transparent account settlement based on inspection results (electronic delivery records and tax documents) |

**COMPETITIVE ADVANTAGES GAINED**

The outsourcing production process was complex, entailing frequent changes that made management difficult. The competitive advantages we achieved resulted from efficient management of the process, and improved ratio of on-time out-
sourcing production process completion. The *e-ouTER Assembly Management System* (e-TEAMS) was the first application of BPM technology in the Korean shipbuilding industry, and we expect our market share to make gains through differentiation from the competitors and increased customer satisfaction.

The competitive advantages obtained through the integration of the BPM system, our existing system and the Web interface are as follows:

First, the improvement of the corporate image:
- Improved corporate competitiveness
- Maximization of the PR effects
- Becoming the leader in the industry for IT system implementation
- Streamlined communication channel and collaboration system with contractors

Next, the creation of the new business relationships:
- To achieve a competitive advantage with low-cost labor, the company is strategically restructuring the e-TEAMS to suit the needs of SHI Ningbo in China, in order to accommodate its expansion of production capacity.
- Outsourcing contractors are planning a collaborative implementation of ERP system with us, through integration with SHI’s e-TEAMS.

**IMMEDIATE AND LONG-TERM PLANS TO SUSTAIN COMPETITIVE ADVANTAGE**

By expanding the application of our BPM system as outlined below, we will strengthen our leadership in the industry and improve our competitiveness.

Our short-term plan for application expansion is as follows:
- Integration of disconnected business processes between existing systems using the BizFlow BPM system.
- Project-wide systematic management using a portal site based on the BPM system.
- Integration of personal tasks with portal functions using *mySingle* and legacy system.

Our long-term plans for application expansion are:
- Extend BPM technology to affiliated companies.
- Develop application of outdoors process management for shipyard.

In the future, we plan to apply the BizFlow BPM system to all business processes at Samsung Heavy Industries for process visualization, making the BizFlow BPM system an even more valuable asset. We will not only expand our application of the BPM system to various business processes among partners, but will also make the BPM technology a framework for our IT system.