Executive Summary

Achieving optimal results in today’s pulp, paper and flat sheet industries is more difficult than ever. Companies are seeking to transform their enterprises through greater collaboration and access to timely information. In this way, they can achieve a competitive advantage in order to become more profitable.

Key to meeting goals for improved economic performance, including optimization at every stage of the order-to-invoice cycle, is the implementation of advanced business logic software and manufacturing execution system (MES) technology. These solutions enable mill performance to transcend industry benchmarks by optimizing manpower, assets, materials, logistics and capital to respond to a challenging business environment.

By applying a cost-based approach to business functions, optimization models and logical algorithms, the latest technology developments drive improvements at every stage of production and order fulfillment. They reduce operational costs by integrating advanced quality, scheduling, shipping, tracking and order management capabilities.

As a result, manufacturers can control the entire opportunity-to-cash cycle using a single, unified platform for manufacturing excellence.
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Background

Production facilities in the pulp, paper and flat sheet industries produce products from large quantities of ground wood, pulp, and recycled paper together with water, chemicals and additives. The products range from lightweight tissue to heavy cardboard, which are subject to high quality requirements regarding properties such as basis weight, caliper, brightness, and printability.

In pulp and paper mills, control and visualization of material flows as well as continuous and comprehensive quality monitoring and traceability are crucial tasks. These facilities depend on efficient logistical and technological processes throughout the entire production chain (See Fig. 1).

For manufacturers, the objective is to increase total plant efficiency (OEE) by reducing inventory levels of raw material, intermediate and finished goods, and by optimized use of energy.

Figure 1. In pulp and paper mills, control and visualization of material flows as well as continuous and comprehensive quality monitoring and traceability are crucial tasks.

Paper industry operations typically consist of multiple manufacturing steps between which material is stored and transported. Thus, inventory management plays an important part. The character of production operations is hybrid, starting with initial continuous processes such as pulping, followed by batch or campaign processes.

Production is often executed in campaigns/batches in order to minimize costly changeover times for the paper machine, as well as optimize productivity. A particular grade or quality is produced within a campaign. Individual products appear only in subsequent phases; for example, in the cutting process in paper production. Only at this phase are the desired products such as rolls or sheets in different dimensions and possibly with special coatings finally produced.

Challenges Facing Manufacturers

Expanding productivity, improving efficiency, reacting quickly to customers’ changing needs, and increasing profitability are constant battles for mill production planners. Finding the optimal balance between these interconnected, yet sometimes conflicting goals has become part of the daily routine.
Paper is a complex product and the business of making paper is a very rigorous one. Sophisticated controls are needed from start to finish to ensure final product quality matches the end user requirement. The current economic climate requires this be done in the most efficient manner and that production matches the market's demands (See Fig. 2).

Figure 2. In papermaking, sophisticated controls are needed from start to finish to ensure final product quality matches the end user requirement.

Some of the challenges papermakers encounter in their daily work include:

- Profitability pressures
- Impact of globalization
- Industry consolidations due to mergers and acquisitions
- Rising raw material costs with depleting natural resources
- Increased energy costs
- Market segments volatility
- Environmental regulations

Pulp, paper and flat sheet enterprises may have many small customers and small orders. In this environment, planning and scheduling customers and orders is related to optimization of the production plan and trimming. Cutting optimization provides these enterprises with an optimal solution to reduce paper waste and improve recheck efficiency.

For instance, some paper mills use 10-meter paper machines. When cutting the paper into smaller sizes, they need to carefully calculate cutting to save money and time.

All paper and flat sheet manufacturers have key clients, and if these clients give temporary orders, it is usually difficult to change the original schedule and plan.

Development of MES Technology

Many manufacturers are now recognizing that the fastest way to improve the overall supply chain is to focus on where and how products are made. This starts with providing better visibility into the production process as a first step, and then pursuing local optimization of the process.

Reaction to changes in the manufacturing environment on a timely basis can greatly impact the overall profitability of an organization. The ability to tie manufacturing asset information to the real-time decision-making process, for instance, can allow the corporate planning system to determine the optimal place to manufacture a product—not just based on planned maintenance—but on the current health of the asset. Access to real-time asset status information adds a degree of flexibility to the supply chain.
In pulp & paper mills and flat sheet production operations, the scope of business processes often extends to actual production processes. In fact, it is not uncommon for business processes to integrate directly with production units (See Fig. 3). The production-related stages of the processes commonly use special software products known as manufacturing execution systems (MES).

![Image](image_url)

**Figure 3.** In paper industry operations, it is not uncommon for business processes to integrate directly with production units.

Modern MES solutions deliver information enabling the optimization of production activities from order launch to finished goods. Using current and accurate data, they guide, initiate, respond to, and report on plant or mill activities in real time. The resulting rapid response to changing conditions, coupled with a focus on reducing non-value-added activities, supports operational excellence.

Effective MES tools improve the return on operational assets while enhancing on-time delivery, inventory turns, gross margin and cash flow performance. These tools utilize bi-directional communication to provide mission-critical information about production activities across the enterprise and the supply chain.

The typical MES connects decision-based functions under a single, common repository for current data exchange:

- Manufacturing floor
- Accounting
- Production control
- Purchasing
- Configuration management
- Quality
- Manufacturing engineering
- Process engineering
- Warehouse Management & Logistics
- Research and development
- Testing

With access to the latest information about production activities across the business and supply chain, all enterprise systems stay on the same page—and remain focused on meeting common business objectives.
Latest Software Solutions

Numerous company or industry-specific software products have been developed to manage administration and organization of manufacturing processes. Although they are generally presented as MES, the scope of these solutions ranges from personal spreadsheets to comprehensive applications for management, organization and automated processing of all production-related processes.

In the late 1990s, the industrial automation and control industry broke new ground with the introduction of OptiVision, an MES specifically developed for pulp & paper producers. This system has evolved from its initial focus on trim optimization to a full order-to-cash solution encompassing applications for customer and order management, production planning and scheduling, production and quality tracking, inventory and warehouse management, load and shipment, invoicing and credit handling, and enterprise resource planning (ERP) integration.

Today, the OptiVision suite of business logic software is focused on the primary business concerns in the pulp, paper and flat sheet industries, like being able to make the best decisions to minimize costs, being agile enough to respond to customer demands profitably, and earning customer loyalty by consistently meeting commitments (See Fig. 4).

OptiVision serves as a single source for all order fulfillment, production management and cost-based business analytics requirements in paper- and flat sheet-related enterprises. The software tools offer scalability for enterprise-wide, multi-mill, multi-currency and multi-system implementation. They are also suited to a wide range of applications for pulp, tissue, plastics and films.

Enterprise collaboration is at the heart of the OptiVision solution; the system’s integrated architecture fosters improved communication across systems, functions and silos of information to improve operational efficiency.

As the OptiVision system has developed, its purpose has expanded to one of helping customers realize lower costs, accurate resource allocation, optimized selling prices and efficient scheduling through near real-time business performance visibility for improved decision making. The software enables an in-depth understanding and control of the entire supply cycle through three core modules:

- **Production Cost Monitoring**: Provides real-time visibility into production costs based on actual consumption, allowing users to drill down to examine profitability and root cause analysis, and support manual and automatic consumption entries. The module also includes user-configurable graphical key performance indicators (KPIs) and displays to increase visibility.
- **Quality OptiMiser**: Provides comprehensive quality management with certificates of analysis, efficient issues resolution and root-cause correlation. The module features definable quality measurement processes, support for online or offline collection and analysis of results, and automatic pattern alignment and disposition.
- **Web Order Services**: Provides order management for remote users via a Web browser or even on a mobile device. Users can view and manage customer orders and delivery information on the move, track order status, call-off orders, check stock and print order documents.
From the moment an order is registered, the software maps out the most efficient path to produce and deliver (See Fig 5). This includes raw material management, production planning, scheduling, warehouse management and logistics. Users are able to calculate accurate profitable-to-promise measures to ensure they take the right orders, at the right time, at the right price, thus maximizing the profitability for each market, customer and order. Raw material sourcing, production, scheduling and delivery become more efficient.

Figure 5. With OptiVision, mill managers can use graphical displays to gain real-time visibility into production costs.

The OptiVision solution is also intended to safeguard quality, allowing manufacturers to record, retain, analyze and manage all aspects of quality control to ensure higher customer satisfaction.

Recent updates to the OptiVision software provide an integrated, end-to-end platform, which transcends traditional MES to cover everything from production-related tasks to full order-to-cash management. Additional modules for quality management increase the scope of the solution.

While OptiVision is tightly integrated, each module provides its own functionality. The MES module can run independently from quality and vice-versa, making the system ideal for interfacing with legacy systems and allowing flexible upgrade strategies for a company’s IT systems.

For example, the OptiVision software now supports mobility-enabled web order services. It also provides order completion status for enterprise systems and a unified pricing module. In addition, users can re-plan for caliper variations and apply actual calipers in quantity calculations, as well as achieve improvements in rewinder functionality (See Fig. 6).

Figure 6. Web order services provide order management for remote users via a Web browser or even mobile devices.
In terms of inventory and warehouse management, the OptiVision solution allows mill planners to track and monitor work-in-process inventory, along with finished goods inventory and movement. Furthermore, the system manages electronic data interchange for shipping and invoicing. And its real-time interface enables connectivity to automatic wrap lines, scales and footage counters along with automated storage.

Unlike older proprietary MES offerings, OptiVision is an open, Windows™-based system that fully integrates with Honeywell and third-party distributed control systems (DCS), quality control systems (QCS), data historians and other plant/enterprise applications. It even allows for Application Programming Interface (API)-based ERP integration. Additionally, the software is hardware and database agnostic (MS SQL® or Oracle®).

If needed, Honeywell consultants and domain engineers can deliver an outcome-based consulting approach to customize an MES or order-to-cash solution based on the unique requirements of individual users.

Benefits To End Users

By employing sophisticated business logic software such as OptiVision, pulp, paper and flat sheet operations can achieve lower costs, accurate resource allocation, optimized selling prices and efficient scheduling through near real-time business performance visibility. They can also safeguard quality, with the means to record, retain, analyze and manage all aspects of quality control to ensure customer satisfaction. With a robust production management solution, paper industry users benefit from accurate and profitable measures at each step of the business process. The specific benefits of this approach include:

- Better supplier and customer relationships
- Optimal sourcing of orders
- Effective recipe management and reductions in raw material consumption
- Better operational planning through optimized sales demand forecasting
- Lower cost per ton through improved asset efficiency
- Reduced work-in-process and finished goods cycle times
- Better visibility on energy, raw material, logistics and freight costs
- Efficient issues resolution
- Improved root-cause correlation
- Fewer losses at each stage of production
- Real-time cost-to-manufacture measures through all stages of production
- Intelligent decision-making on informed deviations
- Losses and claims reduction through improved quality management and optimization
- Reduced bottlenecks in production assets
- Optimized inventory and warehouse management
- On-time delivery by optimizing load, vehicle, route and carrier planning

Honeywell’s experience at paper industry sites around the world has shown that an MES system like OptiVision, on average, enables significant savings at each stage of order fulfillment:

- 2% savings in raw materials
- 1.5-3% lower trim losses
- 10% lower finishing losses
- 10% fewer quality issues
- 1-6% throughput improvement
- 10% inventory reduction
- 25% reduction in total cost of ownership (TCO)
Honeywell supports the OptiVision solution with its Benefits Guardianship Program (BGP), which helps customers improve and extend the use of their software applications and the benefits they deliver, ultimately maintaining and safeguarding their technology investment.

Conclusion

Rising raw material and energy costs, increasing competition, tighter margins, stringent regulation: there is no let-up in the pressures on paper industry manufacturers. They must focus on efficiency to cut waste, ensure consistent quality and do more with less.

The latest advancements in MES technology and business logic software bring a cost-based approach to business functions. Solutions like Honeywell’s OptiVision system boost profitability at every stage in the order-to-invoice cycle to transform pulp, paper and flat sheet operations for better business results. Optimizing manpower, assets, materials, logistics and capital, it helps users achieve a competitive edge to succeed.

For More Information
Learn more about how Honeywell’s Advanced Business Logic Software Improves Economic Performance, visit our website www.honeywellprocess.com/software or contact your Honeywell account manager.

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