

RFID in Manufacturing

*A practical guide on extracting measurable
value from RFID implementations in plant
and warehousing operations*

Executive Summary

Wal-Mart, the world's largest retailer, will require its top 100 suppliers to put Radio-Frequency Identification (RFID) tags on cases and palettes of consumer good shipped to its distribution centers and stores by January 2005. This mandate is giving the RFID sensor technology its first broad, real-world test, and is also prompting Wal-Mart suppliers and competitors to learn about the wireless technology, which enables companies to identify and track items in the supply chain automatically.

Although the Wal-Mart mandate is the most visible line in the sand, RFID is really a global phenomenon. Several global companies like Tesco, Marks and Spencer, Nokia amongst others have already implemented certain aspects of RFID. Outside of retail, several industry groups are driving their own requirements which impact manufacturers and suppliers alike. The Department of Defense (DOD) recently held a meeting with over 200 of their suppliers to explain their RFID strategy. The potential impact of such requirements on manufacturers could be even bigger than that of Wal-Mart initiatives. The U.S. Department of Homeland Security recently showed how RFID technology can speed the movement of people across borders while reducing the threat of terrorism. In addition to these entities, software suppliers such as Oracle, SAP, Microsoft and IBM are all gearing up to meet the RFID challenge.

The potential benefits to large suppliers of deploying EPC on a wide scale across the supply network are well documented. For example, Procter and Gamble hopes to avoid \$3.5B of costs in goods sold alone due to increased inventory visibility and reduction in out of stocks at the retailer sites.

Several vendor organizations have geared up to help manufacturers and retailers comply with the challenge of meeting Wal-Mart mandates. Business consulting services firms are helping customers with business performance issues related to supply chain network integration and changes in customer management or front and back office business processes impacted by RFID. On the other hand, IT Services organizations in particular are creating specialized packages to develop the custom software its clients will need to link their RFID networks to existing enterprise systems. IT specialists are focusing on addressing the applications, event management, product directory services, networks, and RFID equipment.

But what about the impact of RFID on the plant floor?

RFID efforts aimed at inventory visibility across the supply chain are closely tied to the execution processes driving production. These execution processes will also be dramatically impacted. Retooling assets, execution strategies, plant-level information systems, and integrating new RFID enabled manufacturing data to enterprise systems will be critical for synchronizing the plant floor with the RFID-enabled supply chain. Since most manufacturers have no other choice but to bear the cost of compliance, what value can be derived out of such compliance efforts from plant and warehousing activity?

Our contention is that the plant floor presents a vast untapped opportunity for large manufacturers, suppliers and contract manufacturers for value creation as RFID moves upstream from the supply chain and into the heart of manufacturing operations. In particular, as deployment is scaled up from slap and ship warehousing activity and pulled deeper into the plant floor, Rockwell Automation's value proposition is significantly amplified.

As RFID deployment proliferates across the plant floor, the new information captured by RFID can be seamlessly integrated into Rockwell's proven, industrially hardened control, visualization, and information infrastructure, reducing the need for purchasing new infrastructure, or investing in expensive, time-consuming, and unproven IT integration projects. Existing Rockwell Automation's MES and information solutions can be easily updated to deliver robust and reliable information flow in real-time to drive manufacturing execution, as well as to ERP and out to the supply chain.

Rockwell Automation offers a unique 4 step methodology that takes manufacturers from piloting to full scale implementation of RFID in their plants. The methodology integrates, customizes and synthesizes existing investments in plant hardware, software, and information services. By incrementally leveraging existing investments in Rockwell automation control systems, plant management and execution software and information solutions, manufacturers can extract value from RFID more quickly and cost-effectively than any other competing alternative.

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RFID Adoption Lifecycle and Deployment Strategies:

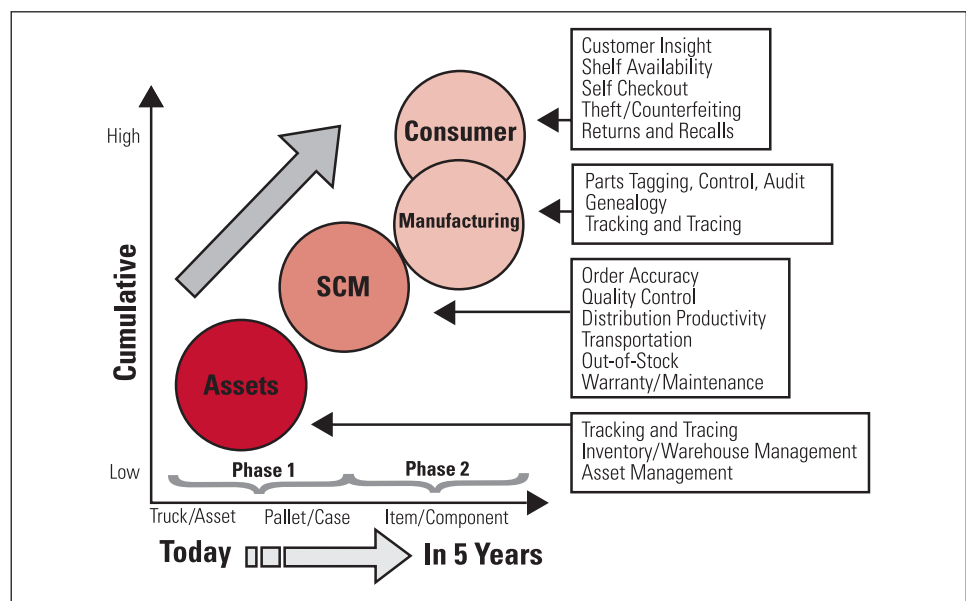
Even though significant business value can be gained by deploying RFID technology, a supplier can't simply slap a smart label – one with an RFID tag embedded in it – on 60 cases of coffee cans, stack the cases randomly on a pallet, and read every tag as a forklift carries the pallet through a dock door at five miles per hour.

There are many questions to be answered by both retailers and suppliers. For example, retailers must figure out sensible solutions for hundreds of products with high water content or that are made of metal. And suppliers may have to follow different compliance requirements for different retailers. Solutions might include using a specific type of tag, placing the tag in a precise location on the case and arrange the cases in a special configuration on a pallet.

Clearly, the ability to know where every item is in the supply chain and store could save retailers billions of dollars per year. But companies deploying RFID technology must be prepared, because the changes will affect virtually everyone in the organization – from the forklift operator to the head of logistics – but perhaps none more than those in the IT department.

Procter & Gamble, for instance, expects to reduce its \$3 billion in inventory to \$2 billion by combining real-time information about its own operations with more timely data about sales from its retailer partners. If it can achieve this, P&G will free up \$1 billion in working capital and cut inventory carrying costs by \$200 million per year. That will offset most of the cost of the infrastructure and tags, and all the other savings will help bolster P&G's bottom line.

According to several industry analyst groups, the EPC adoption lifecycle for manufactures progresses from pallet level tagging to potentially tagging individual products. Full scale EPC deployment and its impact on manufacturers, suppliers, and consumers can potentially take several years depending upon technology, and return on investment projections in its early adoption stage.



Leading manufacturers are quickly investigating and adopting RFID initiatives from both a short-term and a long-term strategic perspective. This is being accomplished in a two-phased approach, summarized as follows:

Phase I: “Slap and Ship” (By January 2005)

This phase predominantly consists of closed loop piloting activity that is internally managed through pilot teams consisting of engineering, warehousing, and plant managers. The goals are to:

- Meet Retailer (Wal-Mart) mandate, which impacts post-production, repackaging processes, and out to supply chain.
- Identify integration components into Supply Chain resulting in minimal impact on current production operations.
- Selection of a few products SKU's for piloting purposes.
- Building a broad business case and strategy for broader RFID integration across the enterprise.

Examples include devising solutions that tracing products at the pallet level and matching the information to a production order. The main issues being surveyed in this phase revolve around tag validation, error checking, and reliability standards superior to bar code technology.

Phase II: EPC/RFID Deployed As an Integral Part of Operations (Post Jan 2005)

This phase includes tactical and execution plans surrounding increasing levels of integration of EPC deployment into mainstream business operations are being developed. As part of this phase, manufacturers are asking key questions such as:

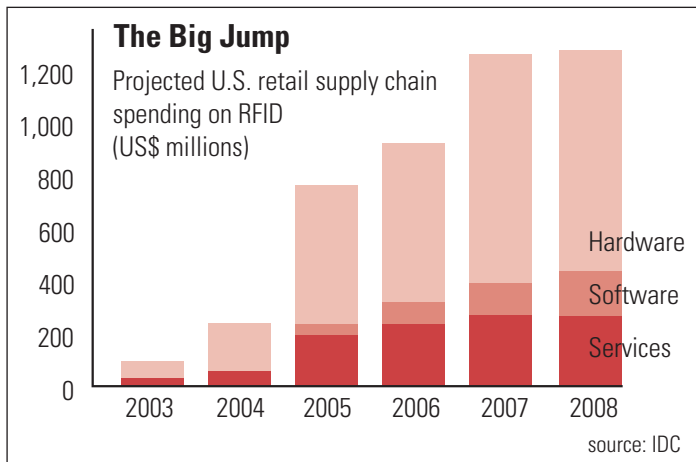
- How far downstream into manufacturing and out into the supply chain should EPC be implemented?
- How far upstream and at what level of granularity and into the production process should EPC be?
- What types of standards, software, and integration should be deployed?

The Wal-Mart RFID mandate is significant to *all* manufacturers because it means its top suppliers not only have to put tags on pallets and cases, but they must also install RFID readers in their manufacturing facilities, warehouses, and distribution centers. They, in turn, can require their suppliers to tag shipments, and so on throughout the supply chain.

As more and more suppliers adopt RFID, it will make more sense for other companies to take advantage of the technology, which will eventually drive down the cost of tags and readers and encourage still more companies to comply.

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This assertion is supported by leading industry analysts, who now predict that RFID's use at the pallet and case level will increase rapidly due to what economists call the "network effect," which means that the more people use a physical network (say, the Internet) or shared service (like eBay), the more valuable it becomes. That encourages even more people to use the network, creating exponential growth.



A recent report from IDC, entitled, "U.S. RFID for the Retail Supply Chain Spending Forecast and Analysis, 2003-2008," focuses only on the retail supply chain and tries to quantify the impact of Wal-Mart's mandate – and to a lesser degree, the U.S. Department of Defense's – on RFID sales within the CPG industry. It also covers retailers that will follow in Wal-Mart's footsteps and issue their own tagging requirements for manufacturers, wholesalers and logistics providers.

The bulk of the \$1.3 billion will comprise sales of hardware, including RFID tags, readers and antennas, plus spending

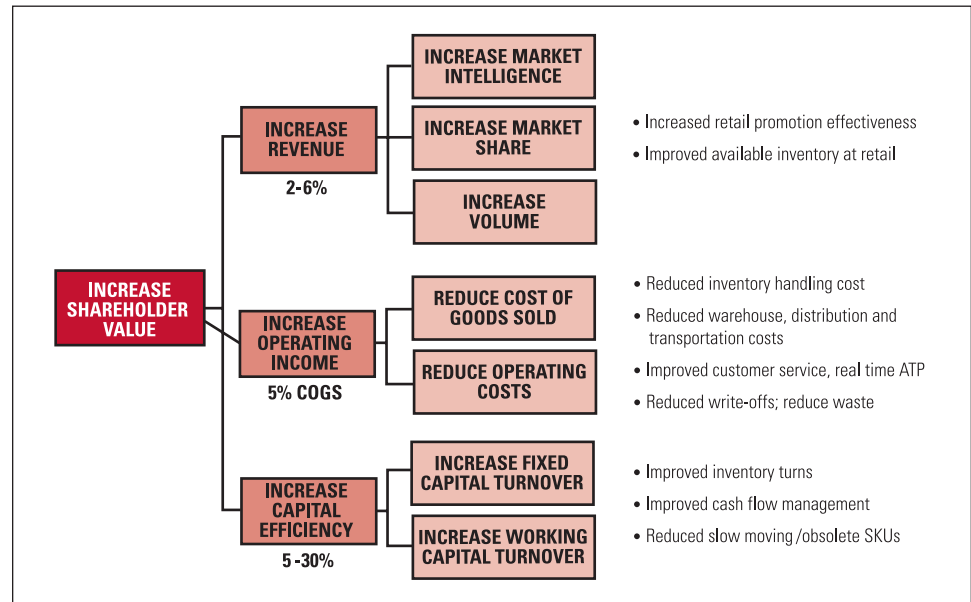
on servers to run those readers and network equipment to handle the data. The remainder will come from spending on middleware and services related to business consulting, systems integration and maintenance and support.

In February 2004, ABI, a technology market research firm based in Oyster Bay, N.Y., announced a study that predicted that the amount of spending on RFID integration services worldwide will exceed spending on RFID hardware by 2007. In fact, the study shows that RFID integration services spending will rise to approximately \$580M in the year 2005 from about \$135M in 2004. Most of these services revolve around ensuring that information captured by RFID tags and readers would be transformed into action both at the ERP level as well as at the manufacturing level.

Given such predictions, it is no surprise that the RFID hardware, software, and services market is becoming better defined and on a strong growth track.

The Business Value of EPC

According to an IBM Business Consulting Services analysis, the following flowchart outlines the business value that EPC will bring to corporations:



While many questions remain unanswered regarding how RFID technology will be deployed – such as what information will be shared between Wal-Mart and its many suppliers, and how companies will track goods with both bar codes and RFID tags during the transition period – Wal-Mart is moving to deploy it at the pallet and case level.

Why? Because the technology has the capability to improve efficiency, cut costs, and boost sales. Below are the significant benefits and initial savings estimates to Wal-Mart:

- \$6.7 Billion in reduced labor costs (no bar-code scanning required)
- \$600 Million in out-of-stock supply chain cost reduction
- \$575 Million in theft reduction
- \$300 Million in improved tracking through warehousing and distribution centers
- \$180 Million in reduced inventory holding and carrying costs

This represents an \$8.4 Billion in annual savings, which is greater than the total revenue of half of Fortune 500 companies combined.

“Speaking of sleeping well, Wal-Mart’s top suppliers will likely be investing some sleepless nights – and painful dollars – to comply with Wal-Mart’s RFID push. The spending should drive increased R&D and innovation, making RFID a better ROI prospect for companies not pressured by Wal-Mart for accelerated adoption.”

– *ROI Watch, Nucleus Research; December 30, 2003 edition.*

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The Impact of RFID on Manufacturing:

For years, manufacturers have made investments in providing production with supply chain information that it depends on to optimize inventory but at the same time improving production efficiency, flexibility, and responsiveness. Accurate, detailed and timely information delivered by new generation MES systems is being viewed as critical in getting the highest out of existing investments in automation.

For manufacturers that have not made substantial investments in MES, RFID provides an automation to close some functional gaps particularly related to tracking and genealogy and compliance management. For such manufacturers, a combination of RFID investments and incremental, but functionally focused MES applications such as scheduling, can quickly and cost-effectively deliver functionality that parallels comprehensive MES solutions.

In this section, we discuss the broad scale impact of RFID in manufacturing operations – including information management, manufacturing execution, quality control, compliance, tracking and genealogy, asset management, inventory visibility and labor productivity.

In a recent Accenture white paper entitled “*Auto-ID on the line: The value of Auto-ID Technology in Manufacturing*”, the Auto-ID center has described in detail the potential opportunities to leverage RFID on the plant floor. The key areas that will be immediately impacted as a result of RFID initiatives are:

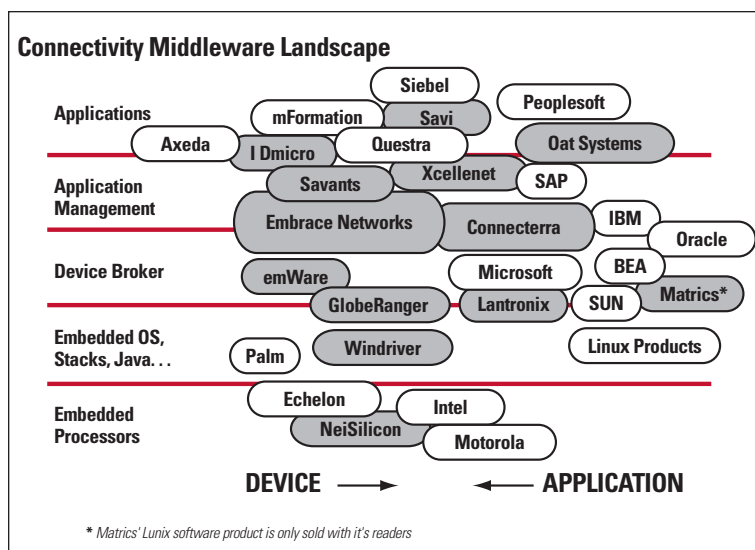
Information Management

By combining RFID with existing information systems investments that drive both MES and ERP, a much more potent information supply can be created that can drive production efficiencies, asset utilization, quality and other production measures to much higher levels.

RFID readers will capture data, but companies need middleware to process the data and feed it to enterprise systems in a way they can use it. Completely new middle-ware software and technologies are evolving to provide for dynamic near-real-time communication between readers

and software using the Internet or other networked platforms. A recent article from *RFID Journal* categorized Middleware technologies to include:

Software Applications that solve specific vertical market connectivity and monitoring requirements. The most powerful of these applications will allow for rapid development and interaction with other specific applications with the goal of solving problems in particular verticals or processes across verticals.

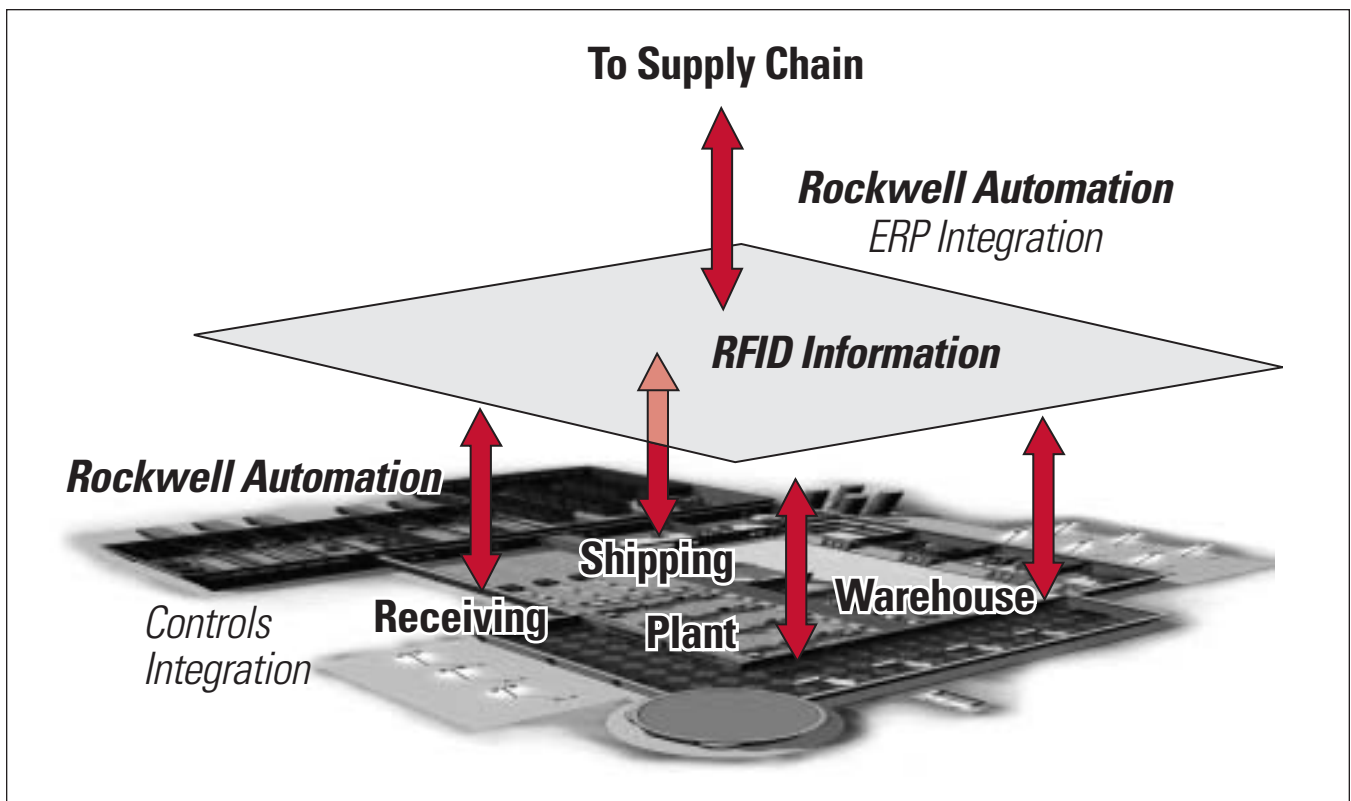


Application Management are focused on taking full advantage of the open data standards and protocols to connect disparate applications within the enterprise. This is place where devices and databases come together. At is highest level this is where transparency and near-real-time information is available to the enterprise, often being provided autonomously. These are features that will be seen in the third phase of connectivity where function is maximized and user interface is standardized around the browser.

Device Brokers allow for open data protocols but tend to be more segmented in solving specific areas of the enterprise such as ERP, CRM or IDM.

In order to deliver information from EPC downstream out to the supply chain (ERP) and upstream into production (MES), existing information infrastructure must be converted to co-exist with emerging EPC standards and IT that includes software, application management such as savants, and device brokers.

Once this information is shared across the enterprise and plant floor, receiving, manufacturing, warehousing, and shipping operations must be coordinated and executed in the context of orders and customers. Regardless of how much effort and dollars are spent on EPC on the enterprise level, poor management and execution of RFID efforts at the plant could drive down any potential benefits.



For manufacturers, it is becoming increasingly important to design and integrate RFID information and solve connectivity issues related to plant floor and warehousing execution in such a way that the new information is integrated into plant floor reliably and through industrially hardened conduits. In addition, deploying an RFID network for a manufacturer is of little or no value unless the information it provides can be accessed and managed using an array of hardware and software that has to be brought together and tied back into the plant for execution and action.

For the most part, manufacturers have to take raw data from RFID readers and figure out how to get it into MES and control systems that drive manufacturing. In addition to delivering the right information at the right time to an MES and control systems, the rules concerning manufacturing execution such as control, scheduling, routing, tracking, and monitoring must all be modified to collect as well as respond to new RFID-information.

In addition to managing operations on the plant floor, warehousing operations must also be supported from an information perspective to ensure that the right products are released to the supply chain at the right time.

Manufacturing Execution, Quality Control and Compliance:

RFID has the potential of complementing MES in terms of providing new streams of real-time data that can support existing lean and six-sigma programs. RFID information can be used to ensure that the correct labor, machine, tooling, and components are available and ready to use at each processing step, thereby eliminating paperwork, and reducing downtime. Furthermore process steps could be controlled, modified, and even reconfigured in real-time as inbound materials, parts and assemblies move through manufacturing.

As raw-materials are consumed, and assemblies created, triggers could be set off either controlling inbound materials thereby impacting work-in-process inventory, or post-process inventory.

By tagging raw materials with detailed specification information for instance, alerts could be automatically triggered at mixing operations if an incorrect formulation is imminent. This can help reduce scrap rates and increase yield assuring a high degree of reliability and quality in processing.

For manufacturing operations that require a high degree of compliance with governmental standards and regulations in particular, RFID can provide additional information streams to support existing MES activities enabling tighter tracking, verification and validation of processes including those involving 21 CFR compliance.

Product Tracking and Genealogy

Increasingly demanding FDA quality requirements are forcing consumer packaged goods, food, and beverage companies to manage product information, lot tracking, and related quality standards across their entire supply chain network. If there is ever a need for a product recall, it must be done as quickly and as precisely as possible. Reliable, Accurate and up-to-date information is absolutely critical to achieve those objectives. In addition, as contract manufacturing increases, suppliers are more and more dependant upon information from their trading partners.

RFID can complement existing MES efforts in genealogy tracking. MES for the most part is already collecting information such as product ID, time stamp, physical attributes, machine, order numbers and lot number at each step of the processing. This information can be encoded onto an RFID tag and then passed downstream into the warehouse at a pallet level, and then out into the supply chain, greatly enabling the ability for a manufacturer to re-trace their steps in the case of a product recall.

Asset Management:

Tagging of reusable assets such as machines, fork trucks, tools, fixtures and material handling devices is one of the easiest ways for companies to test RFID in a closed loop environment. Tagging assets provides information about its location, usability status, maintenance requirements, contents, inventory levels and so on. Devising production steps, maintenance, labor schedules based on this information can help increase asset costs, optimize asset performance, and maximize asset utilization.

By helping reduce downtime, and managing scheduled, as well as unscheduled maintenance more effectively, manufacturing performance parameters such as Overall Equipment Effectiveness (OEE) can be positively impacted.

Inventory Tracking and Visibility:

As contract manufacturing becomes increasingly important, visibility into supplier as well as customer activity becomes critical in order to achieve supply chain synchronization. Inventory Tracking and Visibility is directly related to Information Management described earlier. The better a manufacturer is able to collect, manage, and use information to drive production assets as well as processes, the more visibility it can provide to its trading partners.

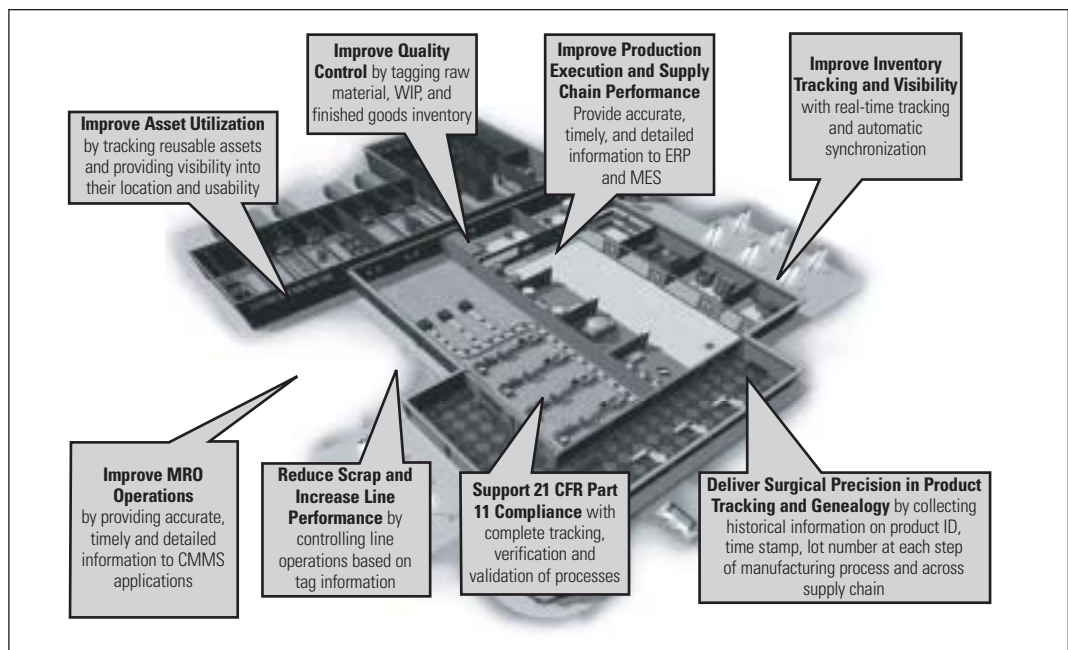
Depending upon investments in automation and MES, RFID could be used in varying scales, either locally or across the entire facility to provide visibility into incoming raw materials, WIP, production sequencing, packaging, palletizing, and warehousing operations as well as final shipping to the next destination in the supply chain.

Labor Usage

Bar coding is very common in today's manufacturing environment. However in many bar coding activities, manual intervention is required for capturing data. An immediate impact of RFID is to eliminate those requirements, thereby freeing up labor to perform other, more value-added tasks. Effective deployment of RFID also has the potential to quickly provide accurate and reliable data that exceeds the bar coding or manual capabilities available today. This can have major impact, particularly in high volume and high speed manufacturing operations, where speed, accuracy, and timeliness are critical for throughput and performance.

As discussed earlier, information management is critical in how RFID enabled information can be used to link man-machine tasks, gain visibility into labor usage and productivity, setting the stage for redistribution of related tasks and processes.

As we can see in the chart below, RFID can dramatically impact how critical performance issues for all manufacturers including machine performance, line performance, plant performance and ultimately supply chain performance.



In the next section, we drive down into how Rockwell Automation can help manufacturers address the issues discussed above and help extract sustainable value out of RFID implementation today and into the future.

Rockwell Automation Value in RFID Deployment

RFID Deployment aims to provide accurate, real-time information about consumer demand and about what goods are in the supply chain and where. If retailers share real-time, or near real-time, data about what's happening in the store and what's available in the back room of the store, manufacturers can better match supply to demand.

As we have discussed earlier, how manufacturers filter, use, and share that data will directly impact the end benefits that can be derived. To get all of the potential benefits, manufacturers will need to enhance their IT systems to enable them to react to the real-time data, whether it's a sudden spike in demand or a glitch on the assembly line. They will also need to change their business processes and train people to use the data that will be at their disposal. It's a difficult task, but its one that manufacturers will have to undertake to remain competitive.

As RFID deployment proliferates across the plant floor, the new information captured by RFID can be seamlessly integrated into Rockwell's proven, industrially hardened control, visualization, and information infrastructure, reducing the need for purchasing new infrastructure, or investing in expensive, time-consuming, and unproven IT integration projects.

Existing Rockwell Automation's control, MES and information solutions (hardware and software) can be easily updated to deliver robust and reliable information flow in real-time to drive manufacturing execution, as well as to ERP and out to the supply chain.

By incrementally leveraging existing investments in Rockwell automation control systems, plant management and execution software and information solutions, manufacturers can extract value from RFID more quickly and cost-effectively than competing alternatives.

Rockwell Automation is a strategic partner that will help companies answer all of these critical questions, and develop long-term EPC strategies, tactical plans, operations integration, and execution across manufacturing, warehousing, and out to the supply network.

Below are just a few of the business issues that Rockwell Automation helps manufacturers address in the successful deployment of RFID technology in both Phase 1 and Phase 2 operations described in earlier sections.

Support Internal Pilots and effect selective changes to help meet the Wal-Mart mandate of Jan 2005

- Support internal pilot activity impacting post-production, repackaging processes, and warehousing processes from a tracking and order matching perspective.
- Determine Information Solutions strategy required for full scale roll-out at the MES level.

Develop a business case and supporting information to identify costs and anticipated return on investment

- Return on Investment (ROI) analysis – Where will the production and service disruption be minimal, but the returns the fastest?
- What incremental investments will be needed as part of a long term strategy, and during what time-frame?

Develop Scalable Tactical plans and impact Production and Warehousing Execution surrounding EPC deployment at each node of the supply network

- **Receiving Operations, Asset Management and Item Tracking:**
Which assets to tag (tools, trucks, machines, and robots) to help synchronize manufacturing operations and processing steps and cost-effectively track components, sub-assemblies and final assemblies to minimize lost production time, and labor consumption?
- **Production Control and Process Changes:**
How to modify control system behavior, MES data collection, and manufacturing process routing to automatically and efficiently match production to specific customer orders
How can IT investments such as existing real-time data management and MES be leveraged in individual plants and across multiple plants?
- **End of Line Operations/Warehousing Operations:**
How to increase warehouse throughput by productively utilizing warehouse resources with wireless warehouse phased technologies (Wireless LAN, Bar Codes, EPC)
How to integrate EPC technology into existing labor operations, palletizing, conveyor lines, material handling, storage, and robots that facilitate the movement of goods from production (EOL) to the warehouse with new EPC data and mobile readers such that information accuracy and reliability is assured.
What changes can be made to control systems in the plant floor and warehouses for tag reading and writing to ensure the capture of accurate and reliable information?
How to coordinate dock door shipping with yard management software so that pallets ready for delivery show up at a shipping dock door?

In particular in phase 1 Pilot implementation efforts, Rockwell's combination of process simulation services and optimization technologies provide a quick and cost-effective way to identify the *real* impact of proposed improvements by deploying RFID technology, reduce the risks associated with this capital investment decision, and ultimately improve business performance across the entire organization. With simulation, the effectiveness of deploying RFID technology is "test-driven" within your organization in a controlled (simulated) environment under varying conditions and decision criteria *before* it is implemented on "live" operations or customers.

Rockwell Automation Methodology to support RFID Initiatives:

Rockwell Automation provides a compelling four step methodology to assist manufacturers not only in achieving compliance with retailer mandates, but also ensuring that they are able to generate sustainable value from their RFID deployment from a tactical and strategic perspective.

The methodology includes the following components:

1. Business Case Justification and ROI Analysis

This step includes developing a complete ROI analysis to support budgetary needs and investment outlays across the entire supply chain.

Various components of Rockwell Automation offerings including simulation, custom EPC ROI assessment tools and knowledge sharing from partners and organizations such as EPCGlobal and University of Wisconsin Consortium are included as part of the offering

Simulation of as-is and “to-be” scenario for experimentation with RFID implementation strategy
RFID Relevance Tool
Business Case and ROI Templates and Building Blocks based on SCOR model
Lab Visits – Existing implementations
Share ROI results from other engagements
Share tools and knowledge from Business alliances and third parties
Custom RFID ROI assessment Tool
MES related Manufacturing Assessment Planning (MAP) Services
One Day RFID Training Course/Workshop

2. Tag and Reader Selection:

This step involves assisting manufacturers in selecting tags and readers that are most suited to their environment. It includes piloting assistance related to RFID laboratories, setting up mobile labs for testing in their own environments and arranging lab tours at existing internal or customer sites if possible.

Share Tag/Reader usability results from other engagements
Facilitate Lab design and commissioning
Arrange Lab Tours for quick learning

3. Design and Architecture:

This step includes both design and architecture for complying with the Wal-Mart Mandate at the case and pallet level, as well as setting the strategy and foundation for future expansion of RFID into the plant. Components include designing an integration strategy with existing bar-code implementations, designing methodology of integrating RFID information into ERP, as well as case to pallet validation at end-of-line operations. Another important aspect of this step includes synchronizing RFID information with control systems in the most reliable and cost-effective fashion, identifying how to coordinate RFID with existing MES implementations and designing process and automation capability to facilitate item level tracking and tracing functionality.

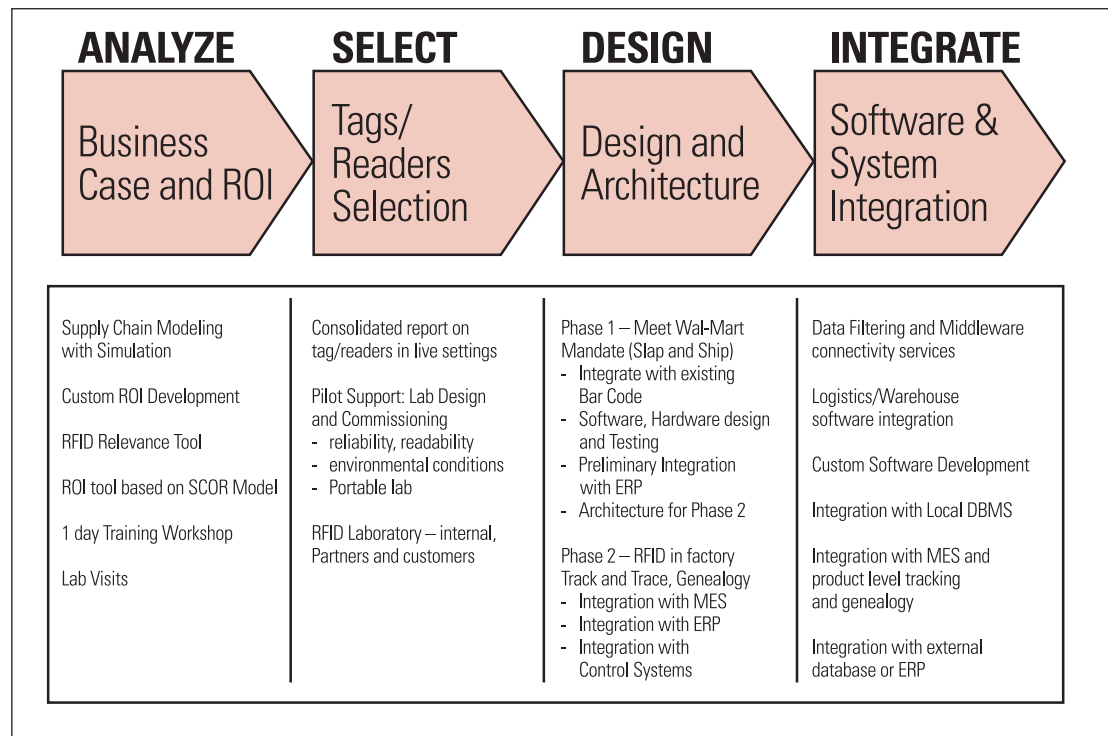
Slap and Ship – Phase 1 – Meet Compliance
Design Integration strategy with existing Bar Codes
Design, Software/Hardware Integration and Testing
Integrate EPC information with ERP
Case to Pallet Verification at end of line operation
Foundation for Future Integration Plans – Phase 2
Synchronize EPC data with Control System
Process Data Association – leverage process and product information for tracking and genealogy (MES)
RFID upstream – integrate with warehouse and factory Automation

4. Software and Systems Integration:

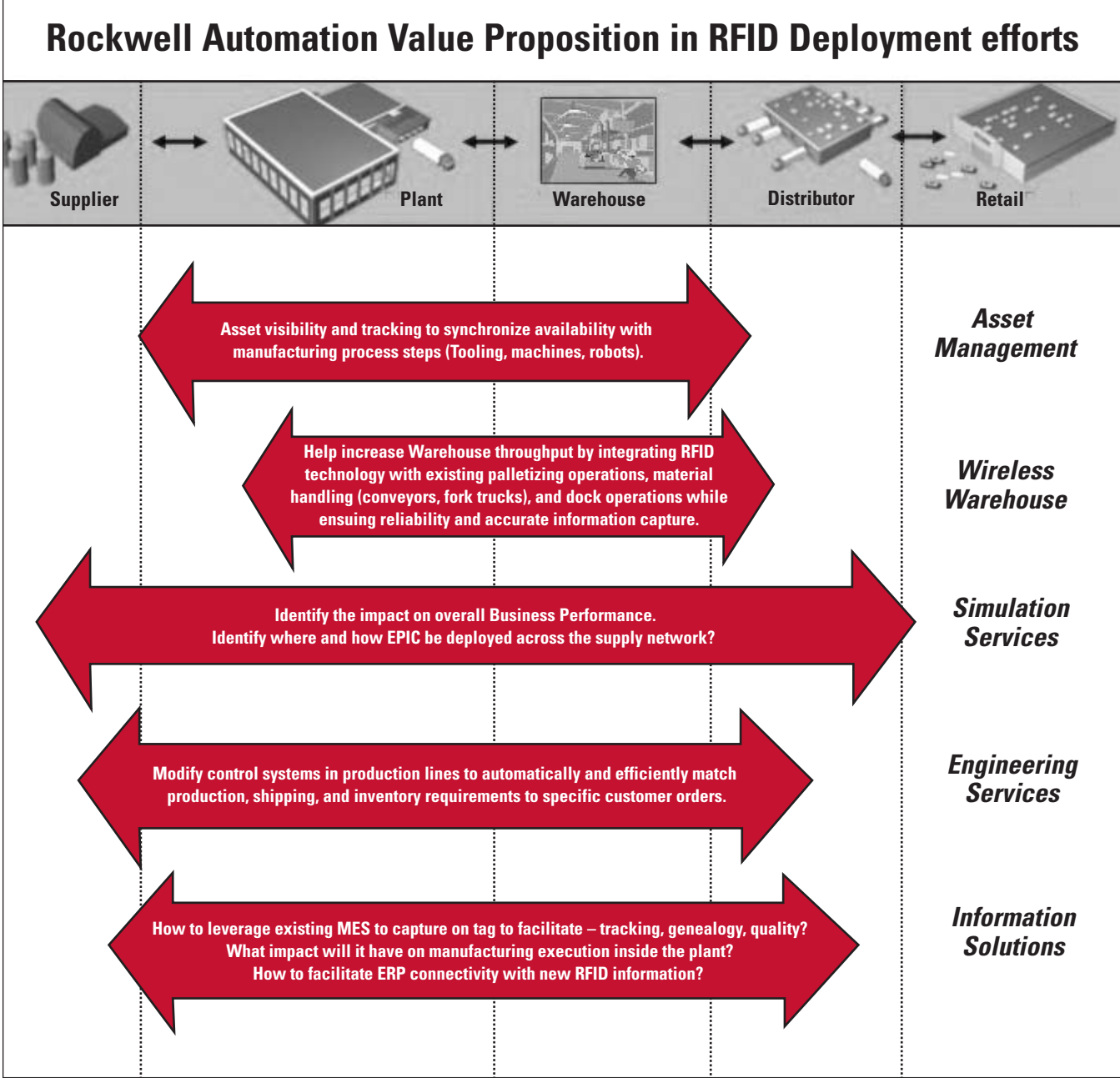
This step includes comprehensive integration of RFID implementations into mainstream manufacturing and warehousing operations – from the ERP to the control level. It includes custom services that include software and engineering services that facilitate integration with middleware to integration with local database management systems, ERP systems, control systems and MES.

Data filtering from RFID readers, middleware integration
Control System integration services
Custom software design and development
MES/ERP integration services

In summary, Rockwell Automations four step methodology offers a wide array of services to support immediate compliance needs as well as position customers for future value extraction. A summary of capabilities is shown below.



As we can see in the following chart, Rockwell Automation offers a broad spectrum of experience and a deep expertise in several areas impacted by RFID adoption.



Conclusion

Corporations are likely to increase their requirements to deploy RFID technology because the benefits are so significant. Financial analysts agree. Sanford C. Bernstein & Co., a New York investment research firm, estimates that Wal-Mart alone will save nearly \$8.4 Billion per year when RFID is fully deployed throughout its supply chain and in stores.

With those kinds of benefits in sight, it's not hard to understand why retailers are forging ahead so aggressively. Companies who are just beginning to look at this technology have a huge task in front of them if they want to be fast followers behind the leaders.

RFID is not a simple plug-and-play technology. Given the complexity of implementing RFID, companies that don't move quickly – and choose the right strategic partner to deploy the technology correctly throughout its operations – will finish at a severe competitive disadvantage.

In particular, End of Line operations in Manufacturing, as well as Warehousing operations will be the central and significant points of leverage in the initial phases of EPC/RFID deployment. Manufacturers who are seeking a long-term competitive advantage will likely gauge their long term returns based upon several internal or closed loop pilots in these areas as they continue their drive towards full scale EPC deployment.

Rockwell Automation offers a comprehensive four step methodology that helps manufacturers not only achieve compliance, but at the same time design and execute a sound strategy that provides for sustainable value extraction from RFID over the long term. The methodology includes business case development, component (tag and reader) selection, piloting laboratories, system design and architecture services, and comprehensive systems integration services to the plant level as well as to the enterprise level.

In particular, as deployment is scaled up from slap and ship warehousing activity and pulled deeper into the plant floor, Rockwell Automation's value proposition is significantly amplified.

As RFID deployment proliferates across the plant floor, the new information captured by RFID can be seamlessly integrated into Rockwell's proven, industrially hardened control, visualization, and information infrastructure, reducing the need for purchasing new infrastructure, or investing in expensive, time-consuming, and unproven IT integration projects. Existing Rockwell Automation's MES and information solutions can be easily updated to deliver robust and reliable information flow in real-time to drive manufacturing execution, as well as to ERP and out to the supply chain.

By incrementally leveraging existing investments in Rockwell Automation Control Systems, plant management and execution software and information solutions, manufacturers can extract value from RFID more quickly and cost-effectively than any other competing alternative.

Key References/Sources: Rfidjournal, Accenture, IBM

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