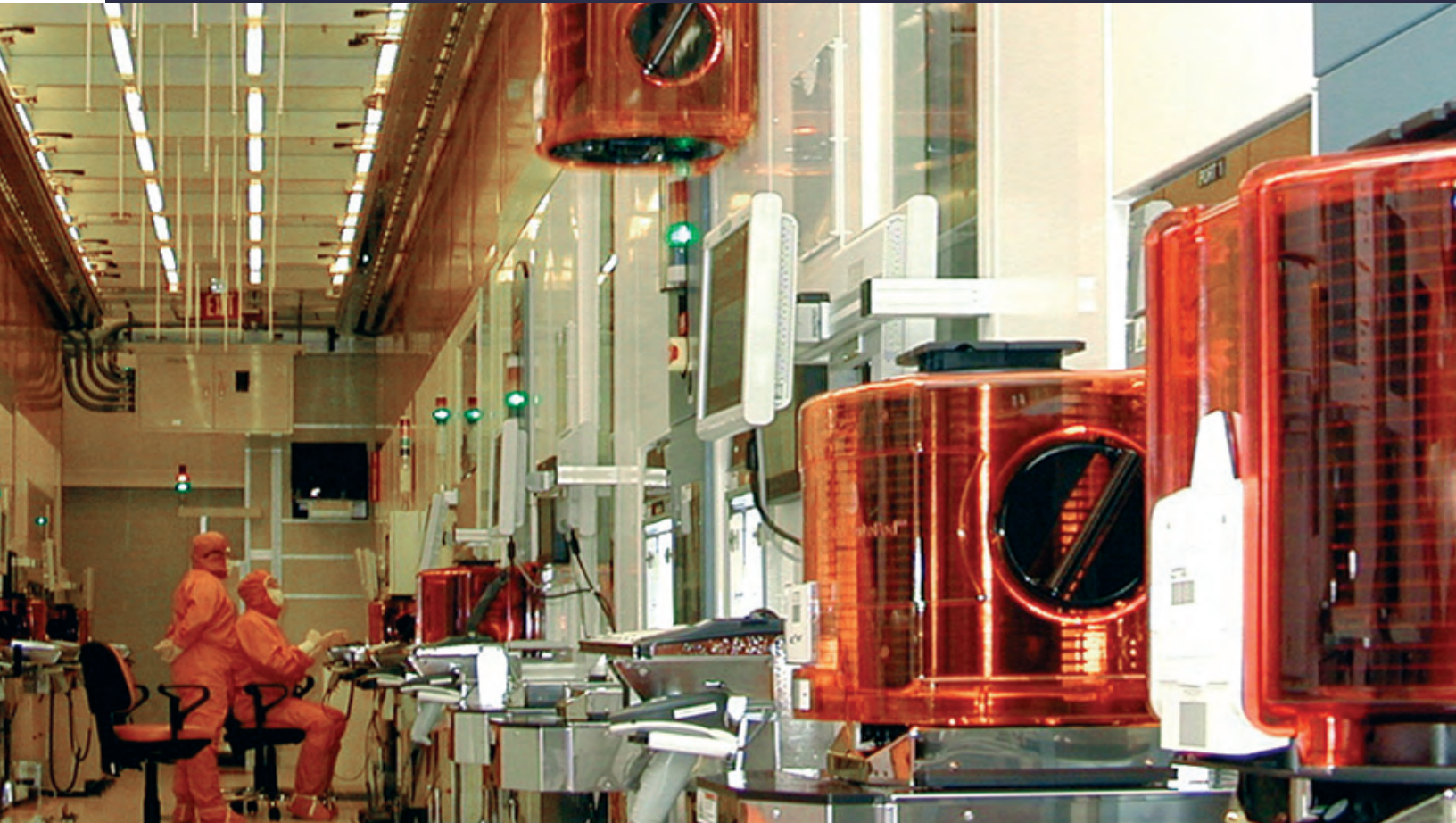


THE POWER OF MOBILITY IN MANUFACTURING

A WHITE PAPER FROM SYMBOL AND INTEL



symbol[®]
The Enterprise Mobility Company™

ELIMINATING THE EIGHTH HIDDEN WASTE OF LEAN MANUFACTURING

Manufacturers are finding it harder everyday to drive top line growth — without sacrificing quality, service or production. The industry is faced with increased global competition in an environment where customers are demanding faster delivery, better service and more customized products to meet their individual needs. With shorter product life cycles and little room for error, managers must make decisions faster than ever before and often without sufficient information and higher penalty costs.

Enterprise mobility combines wireless networking, new technologies (such as RFID), critical business applications and handheld devices into a service oriented platform that can capture, move and manage information at the point of work — in the warehouse, on the assembly line, on the loading dock or at a customer site. Employees who spend little time at their desks are able to leverage computing power right where the work is performed. Manual processes are automated, dramatically boosting productivity. Time spent capturing information with pen and paper, entering that information at a later time into a computer, and the associated errors are eliminated. And the real-time access of business critical information dramatically increases productivity in every area of your business — translating into more profits and reduced costs.

ISSUES IN MANUFACTURING

Both process and discrete manufacturers face many challenges within their operations and typically look at ways to alter existing or deploy new processes to reduce costs and increase productivity in areas involving personnel, materials and assets.

The Process Manufacturer

Traditional process manufacturers are in the business of making basic products that will be utilized further down the supply chain, so margins are thin — resulting in constant pressure to reduce costs. A highly automated industry, these companies are more dependent upon large expensive capital assets (equipment) in the manufacturing process itself, rather than people — unlike discrete manufacturers. But manufacturers in the pharmaceutical and consumer packaged goods sectors share the challenges of both process and discrete manufacturing: highly automated and machinery-focused on the production line, but very labor intensive in the warehouse and distribution operations.

Asset Maintenance Concerns

Asset availability is critical, particularly in large plants where equipment runs 24 hours a day, 7 days a week, 365 days a year. As production processes are generally linked together, if one

piece of equipment fails, the entire production line may be impacted. The result of this downtime could be financially catastrophic, easily amounting to tens or hundreds of thousands of dollars a day in lost production, which can translate into millions dollars a day in lost revenue. For the process manufacturer, asset maintenance is the most important function in the business, the only line of protection against the disastrous effect of a broken or impaired machine.

Regulatory Concerns

Regulatory compliance is another area of concern as costs rise with each new regulation or requirement. Health and safety regulations from the Occupational Safety and Health Association (OSHA) require that your Material Safety Data Sheets (MSDS) list all the materials utilized in the manufacturing of a specific product, along with the hazards and what to do if you are exposed to the substance. The MSDS must be available at the point of activity — wherever people are handling the substance and risk possible exposure — on the assembly line, warehouse personnel, or delivery drivers. In addition, mandates also require the capture of other employee-related information, such as the time each employee spends in the plant for tracking exposure, and so on.

Environmental Protection Agency (EPA) regulations require stack emissions to be measured and reported to the EPA, and any exceedances (emission of pollutants in excess of the defined standards) must be fully documented. Other regulations require reporting of the disposition of some types of waste — whether it was recycled back into the manufacturing process, or how it was disposed.

The Discrete Manufacturer

Today's discrete manufacturer faces a number of challenges, including outsourcing, an unstable economy and fierce global competition. A trend toward customized products is compacting product life cycles and adding complexity to the manufacturing process— translating into smaller, more frequent orders. And in some sectors, such as high-tech, the commoditization of technology has driven consumer prices to an all time low.

To respond to these challenges, discrete manufacturers are heavily focused on the critical function of inventory management. The efficiency of inventory management processes ultimately drives the entire cost structure of products. Inefficiencies result in a very costly increase in inventory stocking levels, which in turn increases: capital requirements and finance costs associated with inventory, labor costs to handle the inventory, and the cost of warehouse space to store the inventory. Lean manufacturing, a major industry initiative, is another key area of focus. Developed in the automotive industry and now taking hold in other discrete industries, lean manufacturing reduces waste by continuously improving processes throughout entire organizations, creating flexible operations that are focused on better serving the needs of the customer and are therefore more profitable.

Inventory Management

Inventory management is critical — the effects of maintaining and managing too much inventory ripple through your entire value chain. Working capital that might be better spent elsewhere in the business is tied up in inventory; labor costs are increased since additional labor is required to manage the inventory; and valuable floor space is required to house the inventory — floor space that might be better utilized, for example, re-engineering your production line or implementing cells for leaner manufacturing.



Lean Manufacturing

Lean manufacturing (the practice of systematically and continually identifying and eliminating inefficiencies in seven specific areas of waste) has now been adopted as a core manufacturing policy by automotive and high-tech manufacturers, and is in the initial stages of adoption in the aerospace industry. Some of the world's largest manufacturers are successfully leveraging the power of enterprise mobility to achieve even greater returns and reduce waste in all seven areas, resulting in a reduction in labor and material costs as well as an increase in asset utilization. And the leaner, more agile organizations are much better positioned to compete in today's global marketplace.

IT Concerns

IT is tasked with creating a technology infrastructure that is more flexible, responsive and adaptable to the company's growing and changing needs, more efficient, and with tighter management controls — all at a lower cost. Yet there are many factors to balance in addressing the computing requirements for the manufacturing enterprise. Standards-based technology is critical to reducing cost and ensuring expandability. Scalability is crucial to ensuring the ability to meet the company's needs in the future, and to protect the return on investment. Uptime and reliability are key to manufacturers, where even a brief unscheduled shutdown of the manufacturing line can translate into millions of dollars in lost revenue. The system must be easy to manage and monitor to ensure potential problems are discovered and corrected before they threaten the ability to do business. And flexibility is a prime concern. The IT infrastructure

CRITERIA FOR SELECTION OF A SERVICE ORIENTED ARCHITECTURE (SOA)

Not all SOA solutions are created equal. For example, Intel has recently announced Active Management Technology (iAMT), which offers the latest in innovative capabilities, including the ability to:

- **Discover** all of your computing assets

- Asset information should be stored in FLASH memory, which can be read anytime, even if computing devices are off.

- Provide protection against accidental data loss.

- **Heal** systems remotely regardless of system state

- Out-of-band access enables remote diagnosis and repair of computers after software, hardware and operating system failures.

- Alerting and event logging assist in the rapid detection and diagnosis of issues to effectively reduce end-user downtime.

- **Protect** against malicious attacks

- Packet filtering provides network protection against virus attacks.

- The ability to easily keep software versions and virus protection up-to-date ensures timely protection against new threats.

must support the development and re-use of applications and use of all available enterprise data sources to enable maximum streamlining of day-to-day business processes throughout the entire enterprise — from the manufacturing line and the warehouse floor to sales, service and executive management.

ENTERPRISE MOBILITY DEFINED

Enterprise mobility solutions significantly impact areas where waste typically occurs, enabling companies to take the next step towards the ultimate lean enterprise. So, just what is enterprise mobility? It is the bi-directional flow of information between devices in the hands of your workers, and your core business applications and information systems. It is not just a wireless LAN, enabling portable devices such as laptops and handhelds to maintain connectivity to the corporate network. Enterprise mobility is a system, a single platform that effectively creates a living network of the people throughout your organization that either collect information for and/or require information from your pool of business intelligence. The “parts” of an enterprise mobility system are:

- Applications specific to your business processes that connect the mobile devices with the enterprise.
- Mobile devices that enable the capture of information, including RFID systems that increase visibility into capital assets and the movement of inventory, maximize bar code technology and provide supply chain compliance.
- A wireless network that provides the backbone for real-time communications, enabling the movement of information throughout your enterprise wireless LAN (WLAN)— and extended connectivity through wireless wide area networks (WWANs) for communication beyond your four walls.
- A comprehensive systems management solution that allows your IT department to manage the entire enterprise mobility solution, from the wireless LAN to handheld scanners and mobile computers.

Capture, Move, Manage

At the core of every mobility solution is the ability to capture and move data from the point of activity to the point of most impact, and the ability to manage the entire solution.

Capturing Information

Enterprise mobility enables the instant capture and communication of data at the point of activity. For example, eKanBan (a mobile version of KanBan) enables assembly line workers to remain in place while flagging the need for inventory replenishment, eliminating the need to leave the line and suspend production. Pickers on the warehouse floor can scan items as they are picked, eliminating the need to manually enter data onto a form, and then later key the same information into a computer. Technicians performing maintenance on production machinery can enter information on the tasks performed as well as other pertinent data about the machine, instead of writing that information down on a form that will need to be entered later into a computer. As you can see from the examples, manual data capture processes often require the information to be 'touched' multiple times — when someone writes the information down initially and again when entered into a computer. Automatic capture of information delivers maximum worker productivity by eliminating not only the need to touch the data more than once, but eliminating the need to touch it at all.

Moving Information

Once data is captured, enterprise mobility enables the movement of that information instantaneously to and from the point of impact. To continue with the examples above, when the production line worker presses the eKanBan button to signal the need for parts, that information is instantly moved via your warehouse management system and instantly available to the forklift operator who has the exact location of and fastest route to the parts — enabling your assembly line to be replenished in the most efficient manner. When the forklift operator scans the parts as they are picked, that information is sent directly to your inventory system, enabling simultaneous updating of your enterprise systems — and a real-time window into what is on the shelf in the warehouse at any time. The business intelligence from the immediate movement of that information provides the necessary support for business decisions that can dramatically drive costs down — in this case, a reduction of required inventory levels for parts. The instantaneous movement of information to and from the greatest point of impact not only drives efficiency into your business processes, but also facilitates smarter business strategies that can have a major impact on a company's profitability.

Managing Information

A critical aspect of enterprise mobility is management of the entire infrastructure — the network (including servers and storage) and the mobile devices connected to the network. Your enterprise management system should provide a central point for remote management, monitoring and control of:

- The entire wireless LAN for peak performance, from uncovering potential network failures before they occur to upgrading the wireless LAN with new features and functionality, as well as visibility into all the systems and devices in the network, including access points, wireless switches and access ports.
- All connected mobile devices — laptops, mobile computers, bar code scanners, and RFID readers — from provisioning and troubleshooting to uploading updates and new applications. Without this key functionality, management of enterprise mobility solutions becomes time consuming and expensive. The task of updating thousands of mobile computers and remote systems with new software becomes daunting.

Without a remote management system, each device must be physically located and a technician must perform the update. With a remote centralized management system, all devices can be automatically updated when they are powered on. With a comprehensive centralized management system, you can be assured that the costs associated with management do not erode the financial gains delivered by the enterprise mobility solution.

Addressing the Seven Wastes in Manufacturing

Many manufacturers are taking advantage of Enterprise mobility solutions to address the concerns inherent to manufacturing as well as those created by a newly mobile workforce. With strategic investments in mobility, manufactures have been able to harness the power of a mobile workforce armed with highly reliable, accurate and rugged devices that collect and report date, and keep employees connected to back end systems and applications. Enterprise mobility can be applied to address all of the areas where waste typically occurs as illustrated by Figure 1 on the following page.

Figure 1:

Waste	Issue	Effect	Enterprise Mobility Solutions
1. Over Production	<ul style="list-style-type: none"> Inequities between demand and supply due to poor information flow and lag between when data is collected and viewed Improperly sized KanBan 	<ul style="list-style-type: none"> High inventory costs High storage costs 	<ul style="list-style-type: none"> Enterprise-wide real-time communications throughout the supply chain to enable true visibility into production requirements and real-time demand information eKanBan for real-time KanBan sizing
2. Waiting	<ul style="list-style-type: none"> Poor plant scheduling Plant shortages Machine maintenance issues 	<ul style="list-style-type: none"> Low production yields Increase in labor costs High asset costs 	<ul style="list-style-type: none"> Real-time inventory capability Enterprise asset management to ensure machinery is properly maintained
3. Transportation	<ul style="list-style-type: none"> Improper plant layout and design Time wasted locating materials and tools 	<ul style="list-style-type: none"> Lost orders Increase in labor costs Decrease in worker productivity 	<ul style="list-style-type: none"> Real-time business intelligence for improved facility management
4. Inappropriate Processing	<ul style="list-style-type: none"> Manually generated reports, poor communications between facilities 	<ul style="list-style-type: none"> Incorrect parts ordered Lack of appropriate data for more strategic decision-making 	<ul style="list-style-type: none"> Management dashboard Automated reporting Real-time communications throughout the supply chain
5. Unnecessary Motion	<ul style="list-style-type: none"> Redundant data maintenance Recalculations Reports 	<ul style="list-style-type: none"> Reduced worker productivity Error propagation 	<ul style="list-style-type: none"> Automation of tasks Integration with data systems
6. Defects/Poor Quality	<ul style="list-style-type: none"> Errors in the production line Missing parts Late shipments/excessive lead times 	<ul style="list-style-type: none"> Excessive rework and associated costs Negative brand perception 	<ul style="list-style-type: none"> Error proofing Line sequencing Increased KanBan sophistication More rigorous production scheduling
7. Unnecessary Inventory	<ul style="list-style-type: none"> Incorrect KanBan size Excess ordering due to poor information flow and lag between when data is collected and viewed 	<ul style="list-style-type: none"> High costs of carrying unnecessary inventory Low margins and increased capital investment 	<ul style="list-style-type: none"> Enterprise-wide real-time communications throughout the supply chain to enable true visibility into production requirements and associated inventory requirements Real-time KanBan sizing

The Eighth Hidden Waste: Disparate IT Systems and Applications

The health and wealth of the business is heavily dependent upon the agility and flexibility of the company's entire IT infrastructure, usually held in a variety of systems and applications in back-end and front-end systems. Productivity of workers in any given functional area of the business depends upon the ability to deliver the information needed to perform the task in the most expedient fashion, right to the point of work.

The eighth waste of manufacturing is often hidden in the inflexible, disparate systems and applications utilized to support the entire manufacturing enterprise. First, there is the significant time and capital expense to purchase, develop, manage and upgrade the various silo systems and applications. The cost of this waste is then exacerbated by its limitations — by the manual processes — including allocation and provisioning — that must take place to link data together from separate applications, or by the productivity gain that is not realized when business processes cannot be optimized due to IT limitations. For example, a manager might need to download data from two systems into a spreadsheet to enable a specific trend analysis. Or the company may wish to implement Vendor Managed Inventory (VMI) to reduce capital outlay for inventory as well as the forecast-to-cash cycle, which requires sharing of data between the warehouse management system, shop floor data capture applications and back-end accounting and ERP systems.

As long as your data is housed in isolated systems and applications, the manufacturing enterprise is static to a degree, and that lack of flexibility translates into higher IT application development costs, lower worker productivity levels and inefficient business processes. A services oriented architecture (SOA) completely eliminates this particular waste by enabling the creation of reusable services for all the data in all your databases. The result is a single virtual repository that enables easy access to all of your business data, regardless of where it may reside. This service orientation provides complete flexibility in application design and integration — without the high cost of hard-coding applications that require sharing of data from different sources, and without the high cost of updating those applications whenever a change in process is needed or new technologies are added.

Many organizations are looking to a new architecture to meet these challenges, an architecture which replaces dedicated “one application, one server” stovepipes with a virtualized server, storage and networking infrastructure. Known as a Service Oriented Infrastructure (SOI), this new architecture optimizes IT efficiency by allowing for dynamic allocation and provisioning and providing the flexibility to meet changing needs and deploy new technologies, while preserving legacy investments.

With a service oriented architecture, the IT infrastructure provides maximum flexibility in application design and deployment at a lower cost due to reuse. Now, the enterprise technology infrastructure is truly dynamic, able to utilize business data when and where required to achieve maximum productivity in any business process. No longer do managers need to find the data — regardless of what they need or when they need it, a web service can be quickly and easily designed to place that information literally at their fingertips.

The SOA also paves the way for mobility, now a key IT initiative. With the benefits now fully recognized, IT is also being tasked with developing a plan to support mobility throughout the enterprise. The SOA is the ideal architecture for mobility, providing the flexibility to cost-effectively deploy web services that maximize worker efficiency by delivering whatever information is needed to perform the task quickly and accurately, right to the point of work — regardless of how many different databases may be involved. For example, quality engineers manage hundreds of forms, including forms required to meet regulatory requirements. With a SOA, these forms can be easily extended electronically to a handheld mobile device, ensuring timely and more accurate on-the-spot completion — and increased worker productivity.

The benefits of the leaning of the IT infrastructure reach far across the extended enterprise. Processes no longer need to be modified to adapt to the IT infrastructure, ensuring the ability to create applications that truly maximize worker productivity. Application design is much more flexible, yet application development costs are dramatically reduced. IT management time required to manage the system and application development is reduced. And finally, in the highly competitive world of manufacturing, it is the SOA that can deliver a dynamic technology infrastructure that can enable a more dynamic, agile enterprise, capable of responding quickly and cost-effectively to meet changing business needs — real business advantage.

Enterprise Mobility Solutions

In the preceding pages, we have examined what enterprise mobility is, how it can be applied in the manufacturing environment and the many business advantages it delivers. The following charts list the many applications by functional areas, complete with a brief description and specific benefits for all manufacturers.

Shop Floor

APPLICATION	DESCRIPTION
Mobile SCADA	Visual Supervisory Control and Data Acquisition (SCADA) is traditionally only available for viewing in a central control room, requiring an area to be closed down for health and safety reasons whenever work is required line side. Mobile SCADA expands control and monitoring capabilities beyond the control room. Alarm assessment, repair, and random inspection of equipment can be placed at line side without closing an area, as personnel can continue to remotely view visual SCADA data when away from the control room.
Machine Monitoring	The Manufacturing Execution System (MES) system is used to plan and monitor plant usage, throughputs and efficiency to highlight bottlenecks, under-utilization and variances from pre-defined standards. However, any MES data captured by paper on the shop floor and then entered into data systems results in a time delay that inhibits corrective action and can provide incorrect reporting — which in turn can have a major effect on yield. Automating the capture of data that cannot be acquired through machine technology ensures that accurate real-time key performance indicators (KPIs) are produced.
Mobile Automation	Applying mobility to enable remote monitoring and maintenance of automation systems, such as Programmable Logic Controllers (PLC), enables remote diagnostics, trouble shooting and more efficient use of expensive technicians.
Error Proofing	Error proofing solutions utilize mobile technology and wireless data collection systems at each assembly station to ensure that operators use the correct parts, and have completed a manufacturing step correctly. Defects in the assembly process are eliminated, as well as the associated costly re-work.
Shop Floor/Line Sequencing	Mobile data collection technology enables and automates the validation of sequence and the production count, ensuring that the correct parts are in the correct order and enabling faster assembly times.
Mobile Lean (eKanBan)	A key concept in lean manufacturing, this line side application enables operators to press a call button located at their workstation, sending a wireless signal directly to a forklift operator in the warehouse when more material is required. The forklift operator in turn receives the request on a mobile device, along with the exact location of the parts needed. Parts are then replenished as efficiently as possible since demand for those specific parts is automatically generated. The time, expense and errors of a paper-based system are eliminated. The drop in productivity experienced in systems where the call buttons are centrally located throughout the factory (requiring operators to leave their station to press the call button) is also eliminated. In addition, eKanBan does not require expensive wiring, can be implemented easily and inexpensively — and can be easily relocated whenever the line is re-worked. This single application can cut response time by 90% and eliminate 30% of line side inventory.
Batch Traceability	Mobile data collection technology, in conjunction with batch record software, enables efficient and error-proof tracking of batches of raw material through the capture of accurate batch serial numbers. This electronic batch record provides visibility into all the products that contain a given batch of raw material, enabling rapid reaction time to product quality issues. At any point in the assembly process or after products are completed, products containing a specific batch can be easily identified and quickly recalled.

Enterprise Asset Management

APPLICATION	DESCRIPTION
Mobile Asset Management	Replacing a paper based system with a wireless handheld device to manage and track mobile assets (such as the number and location of expensive pumps or electric motors) eliminates the costs and errors associated with manual data collection; increases the productivity of those involved in the data collection and entry process; and ensures error-free information in real-time for compliance with financial governance, which states that companies must employ a robust, repeatable process to prove an asset is counted and in working order to avoid single full year depreciation.
Mobile Asset Maintenance	Your machinery is your most important asset — proper maintenance is critical in order to achieve maximum uptime. Mobile asset maintenance ensures proper and timely scheduling of maintenance, provides maintenance history and trending for machines to ensure the right maintenance routines are performed, and assigns the right tools and parts required for daily scheduled maintenance. Machinery is always serviced at the right time, and your maintenance department is cost-efficient and effective. This capability is already providing the data for predictive maintenance to some early adopters and can increase factory uptime dramatically.
Mobile Pipeline Maintenance	Real-time data capture for pipeline management located outside the plant provides up-to-date information and records for regulatory compliance, reduces pipeline downtime and increases productivity (technicians can now handle more orders per day).

Industrial CRM

APPLICATION	DESCRIPTION
Mobile Field Sales (SFA, DSD and pre-sales)	When sales people and delivery drivers are armed with a handheld computing device, a wealth of information is available to ensure the highest quality interaction with one of your most valuable assets — your customer. This valuable enterprise mobility application provides a wealth of benefits, including accurate and efficient scheduling, the ability to check order inventory and fulfill orders on the spot, and a complete customer history to take advantage of cross-sell and up-sell opportunities.
Mobile Field Service	Your field service technicians often visit customers more than salespeople. This valuable enterprise mobility application allows that ‘face time’ with the customer to be maximized by providing a wealth of information to the technician on a handheld computer — such as appropriate after market products to promote, and service agreement and warranty information to ensure the right level of service is provided — and that services not covered under contract are billed. In addition, the ability to enter information enables the real-time capture of critical customer and competitive information. Benefits include increased sales (through after market products), better customer service (through better informed technicians), increased revenue (through the capture of out-of-warranty/service contract services) and more robust customer and competitive information to support marketing efforts.
Mobile Field Merchandising	Merchandisers in the Consumer Packaged Goods industry are responsible for regular visits to retail stores to record inventory levels, verify that product positioning on the shelf is according to the plan-a-gram, manage the execution of promotions and collect information on competitive products — from pricing to shelf space and inventory levels. This enterprise mobility handheld solution enables merchandisers to collect that information faster and more accurately, right at the point of activity — and transfer that information to your business systems immediately. The increase in productivity allows merchandisers to increase the value of the visit by collecting additional competitive information and spending more time with the store manager. The many benefits for the manufacturer include improved inventory management, better promotional campaign management, more competitive intelligence, a more streamlined supply chain and stronger brand management.

Mobile Manager

APPLICATION	DESCRIPTION
Mobile Manufacturing Manager	This solution allows access to critical business intelligence on a laptop or handheld computer, enabling executives and other management to leave the desk and go into the field while still keeping the information required to make the best business decisions right at their fingertips.
Mobile Manager Productivity	Anywhere, anytime access to productivity applications, such as email, forecasting and scheduling, helps management remain efficient, regardless of where the workday may take them.

Quality

APPLICATION	DESCRIPTION
Mobile Forms	Quality engineers manage up to 200 different forms, including forms for submission for government regulations, such as ISO 9000, or to comply with customer demands. Forms are often backfilled at the end of a shift rather than in real-time as required. Mobility greatly reduces the overhead of managing and entering the information in these forms, ensuring timely completion, providing time/date/operator stamps if desired, and dramatically increasing the productivity of your quality engineers.
Real-Time SPC (statistical process control)	SPC programs are critical in determining the root cause of an increase or decline in yield, and how to address it. There are several key issues with today's SPC programs. The first is the 'data gap' created by the small amount of data (typically 20% to 30%) that cannot be collected automatically. This forces the need for manual collection of this data, and introduces the possibility of errors as well as a time lag between when the data is collected and when it is available to view. In addition, data used for final analysis is often up to three weeks old (and in some cases, up to one full quarter old). Mobility enables the real-time automated capture and instant transmission of this data into the SPC system, ensuring that your business decisions are based on an accurate real-time view of your global processes.
Six Sigma Data Capture	Six Sigma requires timely and accurate collection of data. Manual data collection processes (such as pen and paper or computer keyboard data entry) achieve approximately Two Sigma. Bar code scanning at the point of activity and RFID technology can practically eliminate those manual processes, often delivering better than Six Sigma — increasing worker productivity and overall operational efficiency.
Track and Trace	Mobile technology enables fast and cost-efficient tracking of all activities relating to the assembly of a product. The resulting product 'genealogy' contains accurate real serial numbers for all parts, enabling all products containing a specific batch of parts to be recalled quickly, efficiently and quietly — without broad and highly visible media assistance. Brand equity is protected, the risk of recalling too much product is eliminated, and the threat of lost sales is reduced.
Environmental Compliance and Waste Management	Manufacturers must document efforts to reduce waste or pay recycling subsidies. The impact of not being able to produce documents to prove compliance can easily add up to millions of dollars. But the impact on productivity and overhead associated with the data collection to prove compliance is also significant. Deploying mobility at the point of waste creation to track waste not only provides the information required to prove compliance, but also significantly minimizes the effect on productivity and overhead.

Materials Management

APPLICATION	DESCRIPTION
Warehouse Mobility	Warehouse mobility provides a real-time view of your inventory through the capture and availability of real-time data associated with your warehouse processes. In addition to enabling dynamic scheduling of picking, cross-docking and packing, knowing exactly what is in stock at any time significantly reduces stocking inventory requirements.
Material Tracking (raw materials, manufacturing buffer stocks, finished goods warehouse)	Material tracking applications enable complete traceability of batch parts at any point in the manufacturing process, or after delivery to the customer. In the event that a particular batch of parts is found to be faulty, material tracking ensures fast and efficient recalls — without potentially brand-damaging media coverage. Brand equity is protected, the recall is handled in the most time and cost-efficient manner possible, and the risk of recalling too much product and leaving shelves potentially empty is eliminated.
Raw Material Sequencing	Raw material sequencing utilizes mobile data collection to automate and error-proof the process of bringing materials to the production line in the correct order. This enterprise mobility application is especially valuable in today's manufacturing environment, where a single line is utilized to assemble different products. Ensuring that materials arrive line side in the correct sequence increases the speed of assembly, and protects against expensive re-work for products that were assembled incorrectly.
Vendor Managed Inventory (VMI)	This enterprise mobility solution supports the cost-effective implementation of VMI, a major cost-cutting initiative that requires vendors to maintain ownership of their material until the final point of assembly, as well as responsibility for placing the order, quality and availability. Parts are scanned and identified as they are used at every assembly station, providing the ability to verify that material was received, utilized, inspected and charged at the point of use. Supporting VMI reduces inventory requirements and can increase the cash-to-cash cycle.

SUMMARY

Enterprise mobility is the missing link between your real-time manufacturing operations and your business information systems. A service oriented architecture combines with mobility to give you the power to move any information in real-time wherever it will drive productivity and efficiency into your business processes. Out in the field, your salespeople can check order status, inventory and pricing, and place orders while meeting with a customer, increasing sales and providing a real-time view into inventory requirements. In your warehouse, receipt of raw materials or other goods are noted in your systems immediately, along with any error in shipment or damaged goods, again providing support for a real-time view of inventory. Forklift operators are directed in the most efficient path through the warehouse for put-away and picking tasks — from placing raw materials into inventory to picking raw materials to replenish assembly lines to picking finished goods for shipment — increasing overall warehouse productivity. On the manufacturing shop floor, materials are easily tracked as they move through the manufacturing process, ensuring traceability for regulatory compliance as well as quality control through verification that the right materials are utilized at the right time. And technicians efficiently and effectively maintain one of your most critical assets — your equipment — with schedule, records, manuals, engineering work orders and more always at their fingertips, ensuring maximum uptime for your operations.

Enterprise mobility allows you to effectively drive the costs of people, assets and materials down — and profitability up. Enterprise mobility does for the mobile worker what the network did for the desk-bound office employee. Just as the network connects employees at their desks to critical business systems and information, enterprise mobility extends that connection to wherever employees perform work. The need to spend time manually transferring information to and from your computer systems is eliminated, productivity is increased, and your workforce accomplishes more in less time.

The full value of enterprise mobility is realized through the ability to more fully utilize all your business information sources. Faster and more accurate data moves through your supply chain, connecting salespeople and customers with shipping and receiving, the warehouse, the factory floor, vendors and partners. The lag time between when data is collected and when it is available for use is

eliminated. Real-time inventory becomes visible, ultimately enabling the reduction of inventory levels — a tremendous savings for all manufacturers. Complete maintenance history for a specific piece of machinery can be delivered to a technician performing routine maintenance or an emergency repair, increasing asset uptime — a major cost savings in an industry where an unscheduled stop in a production line can cost up to \$40,000 per minute.

A significant drop in cost and increase in functionality is fueling rapid adoption of enterprise mobility solutions based on a Service Oriented Architecture framework. Major manufacturers all around the globe are effectively leveraging the power of these solutions to drive inefficiencies out — and profitability in. Workforce productivity is increased. Inventory requirements are reduced. Inventory turns are increased. Product quality and customer service are improved. Cost-effective regulatory compliance is established. And your forecast-to-cash cycle is ultimately reduced.

Enterprise mobility effectively extends the edge of your network beyond the worker at a desk into the literal pocket of your mobile employee and the virtual pocket of the stockholder, creating the real-time enterprise for the ultimate competitive edge... and eliminating the Eighth Hidden Waste in manufacturing.

For more information on how Symbol can help you reap the benefits of mobility in your warehouse, contact us at +1.800.722.6234 or +1.631.738.2400 or visit www.symbol.com

For more information on how Intel can help you design and leverage the benefits of mobility to create a more efficient, scalable and responsive environment, visit www.intel.com/go/manufacturing



About Intel

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About Symbol Technologies

Symbol Technologies, Inc., The Enterprise Mobility Company™, is a recognized worldwide leader in enterprise mobility, delivering products and solutions that capture, move and manage information in real time to and from the point of business activity. Symbol enterprise mobility solutions integrate advanced data capture technology, mobile computing platforms, wireless infrastructure, mobility software and world-class services programs. Symbol enterprise mobility products and solutions are proven to increase workforce productivity, reduce operating costs, drive operational efficiencies and realize competitive advantages for the world's leading retailers, transportation and logistics companies, manufacturers, wholesale and distribution centers, government agencies and healthcare facilities. More information is available at www.symbol.com

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