

The Synchronized Distribution Supply Chain

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Synchronizing the Distribution Supply Chain with Mobility



Preface

This white paper focuses on how mobility can improve the efficiency of business processes across the supply chain. In addition, Motorola has also published a family of white papers that focus on each of the distribution supply chain areas — warehouse, transportation, yard and labor management functions — providing in-depth information on how mobility can be applied to address today's business issues in each of these areas. To obtain these white papers as well as more information on how Motorola mobility solutions can streamline your supply chain, please visit motorola.com/supplychainmobility or access our global contact directory at motorola.com/enterprise/contactus



Background: today's supply chain issues

In the massive \$2.9 trillion distribution industry, the roles of the manufacturer, distributor, wholesaler and retailer are beginning to blur, driven by heightened competition, the new global economy and increasing customer demands for the right product, the right price and the right service.

Offshore manufacturing pressures manufacturers and distributors alike. Says Greg Aimi, Director of Supply Chain Research for AMR Research, "As product comes off an Asian production line costing only cents on the dollar, wholesalers are under increasing pressure to lower prices accordingly — while sitting on inventory longer." Large retailers continue to become stronger and more powerful, encroaching further into the traditional role of the distributor. And retailers are responding to pricing pressures by bypassing the wholesaler and distributor to gain additional savings.

No matter where you are in the distribution supply chain — manufacturer, distributor, wholesaler or retailer — you face thinning margins, faster product lifecycles and increased customer expectations. To thrive in this environment, you need to be able to improve the velocity at which your business moves — without sacrificing quality or service levels. You need mobility.

The role of mobility: the leaning of the supply chain

Mobility eliminates wasted time hidden in your business processes — time that slows your entire chain of operations. Without mobility, processes are tied to an application that can only be accessed on a desktop computer, leaving businesses dependent upon paper to disseminate information (such as work orders) to employees as well as to collect needed information throughout business processes. But paper-driven processes require time to handwrite data and time to enter that information into the computer — a process that requires the data to be handled twice. And this 'double touch' of business data leads to an inefficient use of time, high labor costs and a larger opportunity for error.

Through mobility, computing power is moved from a stationary desktop computer to a mobile computer — the tools workers need to automate business processes are always in hand. Workers can now access and capture data in real time — right at the point of work. Manual processes are replaced with real-time computing. Instead of issuing paper work orders to employees, an electronic work order can be issued instantly and automatically by your business systems. Instead of collecting data on paper-based forms that must then be entered into the computer at a later time, workers can enter the information directly into your business systems.



The ability to incorporate any information in any business application into any business process enables enterprises to maximize the value of existing business systems. For example, at the receiving dock, a quick scan of the bar codes on pallets can automatically reconcile the shipment with the purchase order, and then check the orders system to determine if the shipment should be placed on the warehouse shelves — or cross docked for immediate shipment.

Regardless of whether you are managing goods in a warehouse, transporting goods or managing the pickup and/or delivery of goods, mobility will compress your business processes, squeezing inefficiencies out to increase productivity. In addition, errors are significantly reduced — the ability to automatically capture data via bar code scanning, RFID and more eliminates the many errors inherent in handwritten forms and in the subsequent data entry of those forms into a computer. The speed of business is increased and customer service levels are improved — without impacting quality and without increasing costs. And the ability to instantly move information to the business systems that can best utilize the data enables the benefits of mobility to ripple throughout your organization — and beyond your walls to other areas of your supply chain.

Lean principles are a best practice in manufacturing, utilized to eliminate wasted time and errors in manufacturing processes to enable the building of a higher quality product in less time with less cost — and when the customer demands it. With the power of mobility, enterprises can apply the lean principles of manufacturing, enabling tighter

coordination between sales, manufacturing and logistics operations. As a result, wasted time and errors can be driven out of virtually any business process, effectively leaning the supply chain. In the following pages, we'll take a look at the process improvements mobility can enable within typical distribution supply chain operations — the warehouse, the yard, transportation of goods and labor management — and how the benefits can ripple into other areas of your business, as well as up and downstream in your supply chain.

The warehouse

For manufacturers and distributors alike, the warehouse is the critical hub of the business, the central depot through which everything must pass — from raw materials waiting to be manufactured into finished goods to product waiting for shipment downstream to a distribution center, retailer or end-customer. Mobility can be applied throughout all core warehouse processes, transforming the warehouse into a competitive advantage.

Receiving

With mobility, enterprises can enable workers at the receiving dock with real-time access to the purchase order database along with automated data capture — either bar code scanning or the ability to read RFID labels. Paperwork is eliminated and data collection is automated, improving the velocity of the receiving function:

- Incoming shipments are automatically identified and instantly reconciled.

- Proper processing orders for the shipment are immediately delivered right to the worker's handheld computer — from where to stage accurate shipments for put-away or cross docking to how to handle any errors in the shipment.
- Productivity is improved through process automation, enabling the same workforce to process more shipments per day.
- Dock-to-stock cycle times are reduced.
- Real-time inventory visibility allows you to intelligently direct put-away or conveyance for items that are low in stock first, reducing the opportunity for costly out-of-stocks to impact the order fulfillment process.
- The instant visibility into the order system enables cross docking to effectively reduce handling time and costs for incoming shipments.

Put-away

Real-time access to the warehouse management inventory system and automated data collection capabilities can greatly improve the put-away function:

- Electronic put-away orders are delivered right to the mobile device, including the exact location for put-away as well as most efficient route to that location.
- When workers arrive at the put-away location, a quick scan of the bar code on the shelf tag (or read of an RFID shelf tag) not only ensures the item is put in the correct place, but also provides a record of the location of that exact receipt.
- Throughput is improved, since items reach the shelves in the shortest amount of time.
- Productivity is improved — the same number of workers can process more put-away orders each day.
- Increased inventory visibility reduces stocking inventory levels and related warehouse space requirements.
- Out-of-stocks are reduced — inventory reaches the shelves more rapidly, preventing a false out-of-stock that can result in a lost order.
- The information is available to implement first-in first-out (FIFO), last-in first-out (LIFO), or first-expire first-out (FEFO) inventory management

— all of which can have a significant positive impact on the company's profitability analysis and tax liabilities.

- Asset utilization of material handling equipment (MHE) such as forklifts and clamp trucks is improved —travel time in the warehouse aisles is reduced, which in turn reduces wear and tear and maintenance requirements for the vehicles.

Cross docking

Mobility enables on-the-spot visibility into the order database, providing the real-time information required to reach a new level of efficiency in the cross dock function. Workers can scan the bar codes or read the RFID tags to identify incoming shipments. In the event the shipment fulfills an open order, cross docking information is immediately delivered to the worker's mobile computer, delivering a number of benefits in this warehouse function:

- Productivity is improved through process automation — the same number of workers can process more shipments per day, driving labor costs down.
- Labor time and costs are reduced — shipments are handled once instead of multiple times, since the need for shipments to be staged for put-away, placed on the warehouse shelves, picked, packed and re-staged for shipment is eliminated.
- Errors are reduced — real-time information ensures that the right shipment is delivered to the right dock and loaded onto the right truck.
- Visibility into all the shipments slated for cross docking allows for increased efficiencies in movement between docks — instead of moving each shipment individually, shipments bound for the same dock can be aggregated.
- Usage times and wear and tear for forklifts and other material handling equipment are reduced through more efficient use of material handling equipment (MHE).

Sorting

When workers in the sorting function are armed with a comfortable wearable mobile computer and access to the orders database and shipping application, workers can scan a package and automatically receive instructions for most efficient action (staging, put-away or shipment) — in just seconds. Now:

- Productivity is improved — the same number of workers can sort more packages per hour, improving labor costs.
- Errors are reduced — bar code scanning eliminates the possibility of data entry errors, which in turn eliminates sorting errors.
- Order accuracy and shipping times are increased, improving order fill rates and customer satisfaction.

Returns

Through mobility, enterprises can provide workers in the returns area with instant access to inventory, accounting and order systems as well as advanced data capture capabilities such as bar code scanning and image capture. The wealth of paperwork so common in this function can be virtually eliminated:

- A quick scan of an item bar code or RMA label can instantly validate the return and update business systems with the disposition of the return.
- Workers can snap a picture to provide proof of condition for returns records, eliminating potential customer disputes.
- Customer credit, if due, can be issued immediately along with instant customer notification.
- Items returned to inventory are automatically noted in the inventory systems, instantly available for fulfillment of new orders.
- Overall processing time is reduced, improving worker productivity and ensuring prompt returns processing to protect customer satisfaction levels.

Cycle counts

When cycle counters are armed with real-time on-the-move access to the inventory database and advanced mobile data collection capabilities, efficiency and accuracy in this function are dramatically improved. Workers with a mobile RFID reader mounted on a cart can take a full and error-free cycle count in the time it takes to push a cart through the warehouse aisles. Counts that may have taken three or four weeks in the past can be completed in hours. The new level of cost-efficiency allows enterprises to easily and quickly take daily cycle counts, resulting in unprecedented inventory visibility that enables:

- Better trend analysis for improved buying practices
- Reduced inventory stocking levels
- Reduced capital expenditures for holding inventory
- Reduced space requirements for inventory

Picking

With mobility farther upstream in the put-away function, you already know what products are on your warehouse shelves and where they are located. When you add real-time access to your order and inventory business systems, you can automatically deliver electronic picking orders to a mobile device that includes a pick list along with the fastest route to the items. A quick scan of a shelf tag, bar code or RFID tag provides instant verification that the right item has been picked, and the item is instantly deducted from inventory. Now:

- Productivity is increased — the same number of workers can process more orders per day, driving the cost of doing business down.
- Errors are significantly reduced through the automated capture of data and instant double check for picking accuracy.
- Out-of-stocks are eliminated through the ability to instantly deduct items from your inventory as they are picked.
- The ability to deliver granular picking information enables LIFO/FIFO/FEFO picking for better inventory management.
- The ability to instantly store serialized product information with customer orders enables enterprises to expeditiously locate any product or parts that have been recalled, reducing liability as well as the high costs associated with tracking products that have already been delivered to your distribution channel or end customer. And product warranties can be accurately registered to the customer with the correct effective date, ensuring that customers receive the support to which they are entitled.
- Product information can be leveraged to prevent damage during picking operations. For example, prior to picking up an item, a scan of a bar code or RFID tag can provide clamp truck operators with the appropriate pressure setting for the clamps. This valuable mobility application helps

reduce the high cost associated with the delivery of damaged equipment — from the cost of the return and re-shipment to the cost of an unsatisfied customer.

Packing, staging and shipping

Mobility can streamline these final stages of order fulfillment, ensuring that the right order contains the right products, and is shipped to the right customer at the right time via the right method of shipment:

Packing

- Improved order accuracy — a quick scan of items during the packing process serves as a crucial cross-check of order accuracy.
- Improved order fulfillment — real-time inventory visibility enables packers to easily see any if any backordered items are now in stock, enabling completion of the shipment prior to leaving your facility. Order handling time and costs are reduced, and customers receive product more rapidly and with less shipping and handling costs, improving customer satisfaction.
- Packing material costs are reduced — based on the items in an order, your business system can automatically determine the right size carton for the shipment, removing guesswork and eliminating the use of excess amounts of filling materials.
- Labeling compliance for transportation of hazardous materials and exported goods is ensured.

Staging and shipping

- Improved shipping accuracy:
 - A quick scan of the bar code or RFID tags on cartons or pallets provides a valuable cross-check to ensure that the order is correct, properly addressed and scheduled for the proper shipment method, complete with on-the-spot printing of all necessary paperwork.
 - Integration of dispatch data ensures that the shipment is properly staged for loading on the right truck in the right order.
 - Costly mis-ships are eliminated.

- Productivity is increased — the same staff can now ship more orders per day.
- Shipping and delivery times are improved.
- Customer service and satisfaction are improved — customers are more likely to receive orders when promised, with the right items, promoting higher customer retention levels.
- Vehicle utilization is improved — trucks are fully loaded with the right shipments.
- Driver productivity is increased — staging in the correct order enables drivers to spend less time at each stop.

Asset tracking

Mobility can completely automate the asset tracking process through the use of RFID. When permanent hardened RFID tags are placed on all assets that are critical to order fulfillment, such as totes and pallets, RFID readers automatically capture tag information as the assets move through the warehouse:

- Superior tracking of assets is enabled without any manpower — and assets such as totes and pallets can easily be associated with a specific customer order.
- Real-time asset visibility greatly reduces loss and theft, and enables better management of assets — the right asset is always available at the right time, eliminating any delay in order processing.
- Lower stocking levels are possible due to the reduction in loss, reducing capital expenses.
- Since assets now remain in your inventory longer, asset lifecycles are increased, reducing the total cost of ownership (TCO) and improving the return on investment (ROI) for these often high-dollar items.

Warehouse manager

Mobility can get your warehouse managers out of the office and back on the warehouse floor by enabling the extension of all the necessary desktop tools right to the palm of their hands. With a rugged integrated voice and data mobile device built to endure the harsh environment of the warehouse:

- Managers can keep their desk phone, email, and access to all business systems in their literal pockets.

- Managers and supervisors can remain out on the warehouse floor instead of at the desk, where they can better protect overall productivity and throughput.
- Efficiency and effectiveness of managers is maximized.

Transportation

Transportation is a highly mobile function — drivers are out on the road and moving nearly 100 percent of the time, making tight management of vehicles and drivers a challenge. In addition, this function is burdened with the need to collect a lot of data to meet government regulations, translating into large volumes of forms and other paperwork. Mobility outside your four walls can connect all the people and assets in this function directly to your business systems regardless of where they may be, eliminating paperwork and providing the visibility required to improve overall management. Mobility in the transportation function enables:

More effective load schedules

The ability to see and best match available loads with available trucks maximizes asset use and minimizes mileage and fuel costs, while ensuring timely arrival at the end destination. And maximum asset utilization enables more deliveries with the same fleet, also providing a path for cost-effective growth.

Dynamic route changes

All throughout the day, situations occur that require immediate response — for example, a top tier customer may have an emergency pickup, or another delivery truck may have broken down on the road. When drivers carry a mobile voice and data device with integrated GPS technology, dispatchers can see the location of all vehicles, enabling the instant re-routing of the closest vehicle to maintain service levels and minimize costs.

Maximum asset utilization

Mobility can provide the real-time data required to automatically calculate the utilization of each vehicle in the fleet. Fleets that are under-burdened can be reduced — reducing capital expenditures for vehicles as well as reducing the labor and parts costs associated with vehicle maintenance. In addition, the ability to marry maintenance records with each

truck ensures proactive scheduling of maintenance to ensure trucks are kept in top running condition, reducing the high cost of downtime.

Better container management

Containers with RFID tags can be automatically tracked without any human intervention. Granular information allows you to see the whereabouts of your containers — including which customer has which container. Opportunities for theft and loss are greatly reduced, protecting revenues — and profitability.

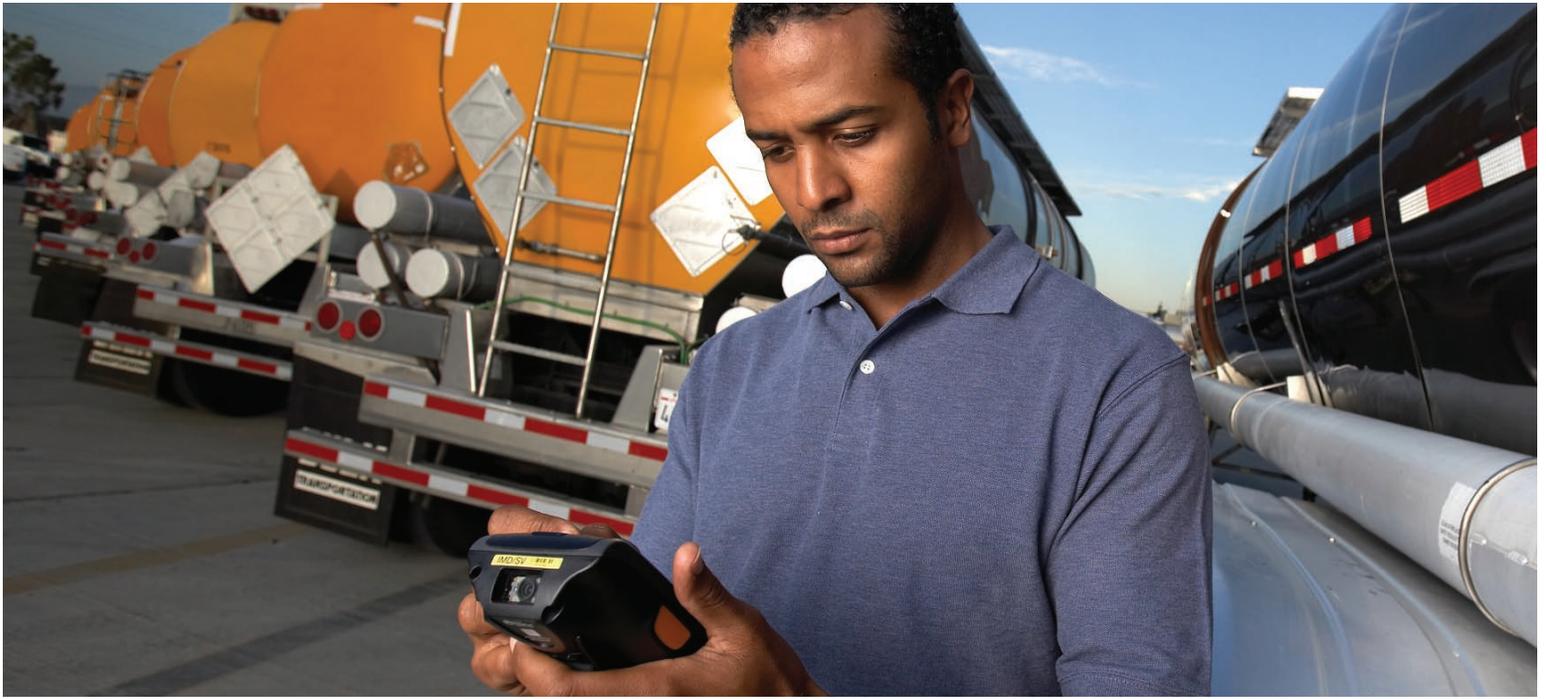
Real-time exception management

With mobility, you have the performance metrics right at your fingertips to see exceptions in real time. Whenever a load is in danger of late delivery, an alarm can be triggered and sent to appropriate personnel. Proactive steps can then be taken to either avoid the late delivery or minimally to alert the customer to the situation, protecting customer service and satisfaction levels.

Improved driver productivity

A mobile computer can significantly improve driver productivity by eliminating much of the need to perform manual paperwork, and placing all the information needed throughout the workday right at the fingertips of the driver:

- Electronic Department of Transportation (DOT) logs and trip sheets eliminate paperwork and possible errors. In addition, GPS/locationing can be used in conjunction with remote engine monitoring capabilities to automatically calculate and enter hours of service and mileage on the appropriate electronic forms. Since time in the truck is now considered active driving time, the elimination of the need to manually prepare paperwork means more miles and stops per day per driver — increasing throughput with the same workforce. And since all the information needed to calculate fuel tax (mileage and fuel information) is now in your business systems, fuel tax calculations can be performed automatically, again reducing the need for drivers to spend time completing fuel tax forms.
- The ability to electronically download the day's manifests and routes to a driver's handheld computer eliminates the need for dispatch to create paperwork — and for drivers to wait in line to retrieve paperwork.



- Expedited recording of OS&D (overages, shortages and damage) keeps drivers on the road and productive instead of completing paperwork and making calls to process those exceptions.
- Mileage is minimized — on-demand address-to-address directions and up-to-the-minute traffic information ensure that drivers can always locate the fastest possible route to any given location.

Reduced fuel consumption

Mobility assists in reducing fuel consumption in several ways:

- Real-time visibility into waiting loads ensures optimal aggregation of loads, improving efficiency in routing and reducing mileage and the associated additional fuel costs.
- Real-time monitoring of engine performance enables the collection of a wide range of metrics that can drive fuel consumption down. Data can include truck speed, RPMs, idling time, torque band compliance and more. This information can then be used to provide instant feedback to a mobile computer in the vehicle to request that drivers modify their driving behavior to conserve fuel. A complete audit trail enables you to see which drivers are complying with the computer-driven orders and which are not — enabling better management of your driver workforce.
- On board navigation systems eliminate extra mileage incurred when drivers are lost.

Reduction of data errors

Completion of forms via paper and pen and subsequent entry into a computer at a later date is replaced by electronic forms that are automatically populated with available data whenever possible. The result is a dramatic improvement in data integrity and a reduction in error rates, preventing errors in mileage or fuel purchases from translating into erroneous calculations of taxes due, errors in the day's manifests from rippling into costly mis-ships, and more.

Real-time proof-of-delivery (PoD)

When proof-of-delivery moves from paper to mobile computer, proof of delivery information, including time of delivery and the recipient's name, can be transmitted to the office instantly. If the mobile device is equipped with imaging capabilities, drivers can capture signatures electronically and snap a quick picture to document the condition of the shipment. This information can then be transmitted instantly to the home office, shaving weeks off of the cash-to-cash cycle time.

Cost-effective regulatory compliance

As government regulations increase in volume as well as complexity, mobile computing keeps compliance simple and cost-effective. A mobile computer eliminates the need for drivers to complete paperwork and process logs. And on-board GPS equipment enables a paperless and automated collection and reporting of required data for U.S. State Fuel Tax forms and Department of Transportation (DOT) logs.

Pro-active safety management

Mobile computing can be applied to record and transmit engine statistics and on-board events, including sudden acceleration or deceleration, speeds and diagnostic warnings to enable proactive management of driving habits as well as the reconstruction of an accident or other event based on historical data. This capability enables transportation organizations to identify and remove drivers who perpetually practice unsafe driving habits:

- Improve driver safety records
- Reduce the potential for accidents
- Reduce insurance and liability

The yard

In distribution, the yard is key to the daily movement of goods — all incoming inventory and outgoing customer orders must pass through this portal to and from the warehouse. This critical link in your supply chain is a virtual outdoor extension of the warehouse — serving as outdoor storage for incoming inventory, and providing the final step in order processing for all outbound shipments.

Through the automation afforded by mobility, enterprises can reduce errors and increase throughput in the yard — without adding staff or assets. A new level of information visibility is achieved — and the sharing of this information with your other business systems forms a bridge that enables new levels of efficiency in the travel of supplies and goods throughout your supply chain.

Improved gate throughput

When guards at the gate are outfitted with real-time mobile computing devices, the check in process for arriving vehicles can be highly automated. Trucks can be immediately identified and loads reconciled with purchase orders, eliminating long delays at the gate and gate congestion — without adding guard stations or guards.

Improved load sequencing at the dock

Mobility ensures that the right trailer is scheduled for the right dock at the right time. Dispatchers no longer need to wait for paper to trickle down from the guard station to obtain the information needed to best schedule dock appointments — the information is transmitted wirelessly the moment it is collected. Now, all the critical information dispatchers need to

create the most effective dock schedules is instantly available, including: trailer type, trailer content (down to the SKU level), load type (perishable, dry or hazardous), length of time trailer can be on the lot before penalty charges are issued by the carrier, purchase order associated with the load, and any errors or exceptions to the purchase order.

Improved employee productivity

The automation of many tasks can result in significant improvement of worker productivity throughout the yard, enabling the same staff to handle an increase in volume in the yard — without affecting service levels. For example, at the guardhouse, the reduction in paperwork enables guards to handle more transactions. When a yard dog is outfitted with a mobile RFID reader, a worker can take a complete inventory in a typical warehouse yard that is approximately 350k to 500k square feet in just twenty minutes — a task that can often take up to half a day. And instead of searching for the right trailer, workers on yard dogs are now provided with the exact location of the right trailer — and a quick scan of the RFID tag with a handheld or vehicle mount mobile computer provides a valuable double check to ensure the trailer is correct.

Better labor management

Typically, task assignments are verbal only, received via a two-way radio. Verbal communications do not allow for any type of audit trail to analyze worker performance, from either an error or task volume perspective — and can be easily misunderstood in the noisy yard environment. When yard workers are armed with a mobile computer, the ability to issue text-based task lists to a worker can greatly eliminate errors. Workers can acknowledge when the task is complete, and your system can show the error rate and volume of tasks for all of your workers. Two-way radios can be eliminated — in the event you wish to maintain voice communications with your yard jockeys, you can select an integrated voice and data device that will allow you to place a call to one or all yard jockeys (via one-to-one and one-to-many walkie-talkie style voice communications). And Voice-over-WLAN (VoWLAN) capability delivers cost-effective voice as well as data communications for yard workers.

Asset management

Since mobility provides yard-wide real-time visibility of your assets, utilization can be significantly improved. The right trailer can be matched with the



right load, improving load aggregation and trailer utilization. The availability of a wealth of asset utilization data enables the enterprise to assess the productive use of the entire fleet — information that might reveal that the fleet could be reduced, rippling into a significant reduction in capital expense as well as maintenance costs. In addition, the ability to quickly locate and better schedule yard dogs improves general productivity and reduces miles traveled. Fuel costs are reduced, maintenance requirements are reduced and yard dog lifecycle is extended, improving the total cost of ownership (TCO) for this critical piece of yard equipment.

New capabilities: cross docking and interleaving

The new expanded view of the entire yard enables the implementation of two functions that can further enhance the productivity in the yard: cross docking and interleaving. The moment a shipment arrives at the guard station, dispatchers can see exactly what is in the shipment and the entire dock schedule, allowing appropriate shipments to be cross-docked to reduce shipment handling time and inventory handling cost.

That same visibility also enables very judicious movement of trailers, known as interleaving. A trailer parked at an inbound dock for unloading might be identified as the right type of trailer for an outbound load that is ready on a nearby dock. Instead of returning the trailer to the yard, the trailer can be delivered immediately to the outbound dock for loading — rather than taking an interim trip to the yard.

Labor management

The mobile labor management system is an additional layer that wraps around your mobile warehouse, yard and transportation systems, leveraging the information already in those systems to enable unprecedented visibility and control over the productivity of one of the largest supply chain costs — the workforce. The mobile labor management system draws on the granular information afforded through mobility in your other supply chain management systems to unlock the maximum potential of your workforce. Where mobilizing your warehouse, transportation and yard management systems improves productivity in your business processes, it is the mobile labor management system that enables managers to improve the productivity levels of individual workers. Mobilizing labor management enabling enterprises to maximize the value of the mobility solutions in the warehouse, transportation and yard to create a significant competitive differentiator — a 'lean workforce machine' that enables the day-in and day-out delivery of superior customer service.

Automation of time and attendance systems

By enabling employees to scan a bar code on their security badge at the start and stop of each shift, time and attendance can be completed automated — the trip to the time clock is eliminated. Administrators no longer need to collect, calculate and enter punch card data into a computer system. And the automation of the data collection virtually eliminates the possibility of error, eradicating time that might have been spent resolving employee

disputes over time worked or correcting paychecks due to an error in data entry. The automation of what might seem on the surface to be a simple and efficient system (such as a punch clock) can deliver big benefits. According to the American Payroll Association, automating time and attendance processes typically saves \$1000/ per employee/per year* — delivering an annual savings of a half a million dollars in a facility with 500 workers.

Visibility into productivity...and performance metrics

A mobilized labor management system enables enterprises to efficiently determine who is doing what and how long it takes by providing the granular data required for an accurate comparison of productivity metrics. For example, to compare pickers in a warehouse, you need to reach well beyond the number of orders picked to factor in the type of equipment in use (such as a forklift or hand cart), item location (within reach or high on a top shelf), item size and any special handling requirements (for example, for highly fragile items) to fairly assess employee performance. With a mobile labor management system in place, enterprises can easily integrate information from the warehouse, yard and transportation mobility solutions with core business systems, (such as the warehouse management system) to easily and automatically monitor, track and analyze the time each employee spends on each task — and push the results to the manager's own mobile device. Now, managers have the data required to get and keep the workforce operating at peak productivity. Managers can:

- Determine achievable realistic and task specific key performance metrics to enable a meaningful measurement of individual employee productivity levels.
- Track individual worker performance against those metrics.
- Identify all non-productive time, including where it is spent, how much it is costing the enterprise — and how that time can be eliminated.
- Identify the most productive employees to ensure those workers receive recognition and incentive to continue their excellent performance.

- Identify underperformers — and develop a plan for improvement tailored specifically to help each employee achieve key performance metrics. For example, one employee may need additional training on a specific task — while another simply needs to spend more time working and less time on breaks.
- Understand the true capacity of the workforce to ensure the bar for departmental metrics is properly set.

Continuous and automated performance feedback

A key aspect of labor management is clear communication of achievable goals that are linked to the company's strategies. While goal setting to achieve specific objectives is standard in the ranks of upper management, line employees are rarely given goals that are aligned with corporate objectives. Robert S. Kaplan and David P. Norton noted that only 7 percent of U.S. line employees are given goals that are rooted in top level corporate strategy — the remaining 93 percent do not have visibility into what the company is trying to achieve or improve, and without that knowledge, cannot actively assist the enterprise in achieving those goals.

In order to achieve peak workforce productivity, workers need to understand clearly what it takes to achieve or exceed expectations — and what the reward will be for doing so. Through mobility, enterprises can automatically calculate and distribute personal performance goals and metrics to workers, providing a vehicle for continuous everyday improvement in workforce productivity levels. Instead of presenting employees with a piece of paper that outlines goals each quarter or at the half year mark, employees can access their personal daily goals right on their mobile computers at the start of each work day. And at the end of the day (or other preferred interval), employees can view their performance improvement and how close they are to achieving their personal goals — as well as departmental goals.

Better resource planning

When information from your mobile warehouse and other supply chain management solutions is integrated into your labor management system, managers have visibility into the true capacity of the

* Trends in Time and Attendance, presentation at the 22nd Annual Congress of the American Payroll Association, April 27, 2004.

workforce for improved resource planning. Armed with this information, managers can anticipate the peak and valleys that may occur throughout the year and better plan staffing requirements to address fluctuating demand. For example, during holidays when orders are at an all-time high with high customer expectations for shipment turnaround times and order accuracy, managers can better determine when and how many additional workers will be required to ensure service levels are preserved in spite of the increased volume. With proper manpower planning, the value of this large cost center can be maximized, allowing managers to ensure that:

- The right workers are on staff at the right time and assigned to the right tasks — reducing errors and increasing customer service levels.
- The need for temporary help is reduced, improving control and reducing staffing costs.

Better management...with less management time

Managers can better manage workers in less time through two key capabilities: the automatic collection and analysis of information from your mobile warehouse or other supply chain management solution, and the two-way communication that allows the delivery of pertinent information to the mobile devices of managers as well as their staff. The result is:

- The elimination of many manual administrative tasks — such as the compilation of data to obtain key metrics or regular meetings with employees to discuss goals and progress towards goals.
- The ability to provide a continuous feedback loop to the workforce with virtually no effort significantly incents employee self-direction. Real-time on-the-job performance monitoring, clear communication of job expectations — from how long tasks should take to how many tasks should be completed in a day and what is an acceptable amount of break time — and real-time communication of current performance metrics promotes a self-driven workforce.

And when the workforce strives to better manage itself, managers are free to focus on higher level management initiatives.

Summary

Mobility can help the distribution supply chain address some of today's most challenging issues: thin margins, rapid product lifecycles and increased customer expectations. By moving computing power from the desktop to the point of work via a mobile computer, enterprises can provide workers with the tools needed to shave wasted time and errors out of business processes throughout the distribution supply chain. The time savings enables the same amount of workers to handle more tasks, while automated data capture tools (such as bar code scanning and RFID) reduce the errors inherent on handwritten forms, and tighter collaboration across the supply chain further improves the velocity of business. The result is a streamlining of the distribution supply chain — a leaner supply chain capable of improving quality, reducing the cost of doing business and improving customer service and satisfaction levels for real competitive advantage.

For more information

For more information on how you can reap the benefits of mobility in your supply chain, please visit us on the web at:

motorola.com/supplychainmobility

or access our global contact directory at

motorola.com/enterprise/contactus

The incremental benefits of mobility — tighter synchronization across the supply chain

When mobility is deployed in one functional area of the supply chain, the resulting process automation and instant availability of data delivers benefits to the other tangential functional business areas inside the enterprise as well as upstream and downstream in the supply chain. The following chart describes the incremental benefits associated with deploying mobility in the various areas of the distribution supply chain.

| Warehouse | |
|---|--|
| Yard/ Transportation | <p>Mobility enables tighter integration between your yard and warehouse workers, yielding greater efficiencies in both functions. When shipments are ready to go, electronic work orders are immediately sent to the yard workers' mobile devices, complete with the exact location of the next trailer or container scheduled for conveyance. The result? Trailers are delivered to the dock in minimal time.</p> <p>Since warehouse workers can see the dock schedule, orders can be staged in a timely fashion and warehouse workers can be available for loading the moment the trailer arrives. Dock turnaround times are reduced and drivers are back on the road as fast as possible, eliminating fines for excessive wait times.</p> <p>Real-time inventory visibility enables yard workers to determine instantly if an arriving truck contains items that are currently out of stock. In this instant, a dynamic change in the dock schedule can be executed to ensure the immediate delivery of the shipment to the receiving dock, minimizing the loss or delay in processing of orders as well as the possible impact on the production line.</p> |
| Shipping/ Delivery: Dispatch | <p>When the dispatch function can see shipments in progress in the warehouse in real-time, load plans can be prepared that take into account all shipments that will be ready to load in the morning — not just shipments completed at a specific point in time. The creation of real-time load plans allows the best utilization of your delivery vehicles and your drivers. Load aggregation is easily optimized, and trucks are more fully loaded with shipments that have been aggregated to enable the most efficient delivery route possible.</p> |
| Shipping/ Delivery: Route accounting and proof of delivery | <p>The collaboration of data between shipping and dispatch enables a new level of efficiency in your delivery function. Shipping information is utilized to create electronic manifests and invoices that can be sent directly to the driver's mobile device:</p> <ul style="list-style-type: none"> • The elimination of paperwork improves driver productivity, enabling more stops per day per driver. • Since drivers can now make more stops, there is an increased opportunity to sell more product throughout the day, increasing sales. • Since electronic transfer of information eliminates the paperwork, accounting and administrative staff no longer needs to enter paperwork into the computer, further increasing employee productivity. • Drivers can complete the electronic invoice cycle by obtaining an electronic signature upon delivery, which is then instantly transmitted into the enterprise billing system. The improved velocity of the movement of information reduces the days sales outstanding (DSO), which in turn improves the cash-to-cash cycle and overall profitability. |
| Manufacturing/ Production Line | <ul style="list-style-type: none"> • The ability to track and trace for consumer safety and to meet regulatory compliance is simpler and less cost-intensive. • Granular information about the parts and/or ingredients stored in your warehouse for later manufacturing into finished products or consumer packaged goods is captured in receiving and put-away in the warehouse, creating a very detailed genealogy that follows the arrival of the raw goods at your facility through to shipping of finished product. • Sales and operation planning is improved thanks to better demand information from the sales team, which leads to better manufacturing planning and lower stocking inventory requirements. |

| | |
|--------------------------|---|
| Sales | <p>When the sales function has a real-time window into the inventory and order database in the warehouse management system:</p> <ul style="list-style-type: none"> • Sales personnel can check inventory, obtain pricing and place orders — right from a customer’s location. • An electronic computer-based sales form improves productivity by eliminating paper-based order forms that also require later data entry into the computer. • Time previously spent on paperwork can now be spent on sales, enabling salespeople to make more calls per day, increasing sales potential. • Improved customer service — orders, pricing and delivery times can be confirmed on the spot. And if a customer calls requesting the status of a present order, the information is never more than seconds away from the salesperson’s fingertips. |
| Field Service | <p>When your warehouse and field service functions are integrated via real-time mobility solutions, the efficiency and customer service levels in field service operations are improved:</p> <ul style="list-style-type: none"> • The warehouse has visibility into upcoming schedules for repair and service. • Parts and tools can be ordered and reserved in advance. • Technicians have what is required to complete the job on hand, improving customer service and satisfaction. |
| Transportation | |
| Warehouse | <p>In the warehouse, orders filter down for fulfillment and are transferred to dispatch to schedule the right truck to the right dock at the right time. The integration of the transportation and warehouse systems provides simultaneous visibility into both order and truck status, allowing the synchronization necessary to:</p> <ul style="list-style-type: none"> • Properly aggregate loads • Develop route plans that maximize efficiency in terms of mileage, driver time and fuel costs |
| Yard | <p>Integration with the yard system ensures that yard workers are expecting and are prepared for your vehicles. The results are:</p> <ul style="list-style-type: none"> • Minimal wait times at the dock • On-the-road drive time is maximized during shifts — key in a workforce with a major shortage in drivers • Vehicle utilization is increased — a critical metric given the high cost of trucks and trailers |
| Yard | |
| Warehouse | <p>When the yard management system is connected to the warehouse management system, workers in the receiving department of the warehouse already know what products are in an arriving shipment as well as the suggested location for put-away, and are ready to act the moment the shipment is removed from the truck:</p> <ul style="list-style-type: none"> • Time spent identifying shipments to obtain proper processing directions is reduced • Warehouse throughput is improved • Errors in the warehouse receiving process are reduced |
| Fleet Management | <p>The sharing of information between yard, transportation and warehouse functions enables a new level of synchronization in these business areas:</p> <ul style="list-style-type: none"> • Load aggregation is further improved • Scheduling is optimized • Truck utilization is improved • Fewer miles are driven, translating into less maintenance and a reduction in fuel costs • Overall shipping costs are reduced |
| Labor | |
| Global Management | <p>Mobility provides a rich enterprise-wide data library to enable easy and real-time comparison of similar workforces and operational areas around the world. For example, you can quickly and easily:</p> <ul style="list-style-type: none"> • Compare global warehouse performance. • Provide regional goals and performance-to-goal metrics for tighter global management of facilities. • Obtain information required for better strategic facilities management. For example, spotting two warehouses with declining volumes could enable a proactive decision to combine the facilities, providing a substantial savings on capital and operational expenses. |



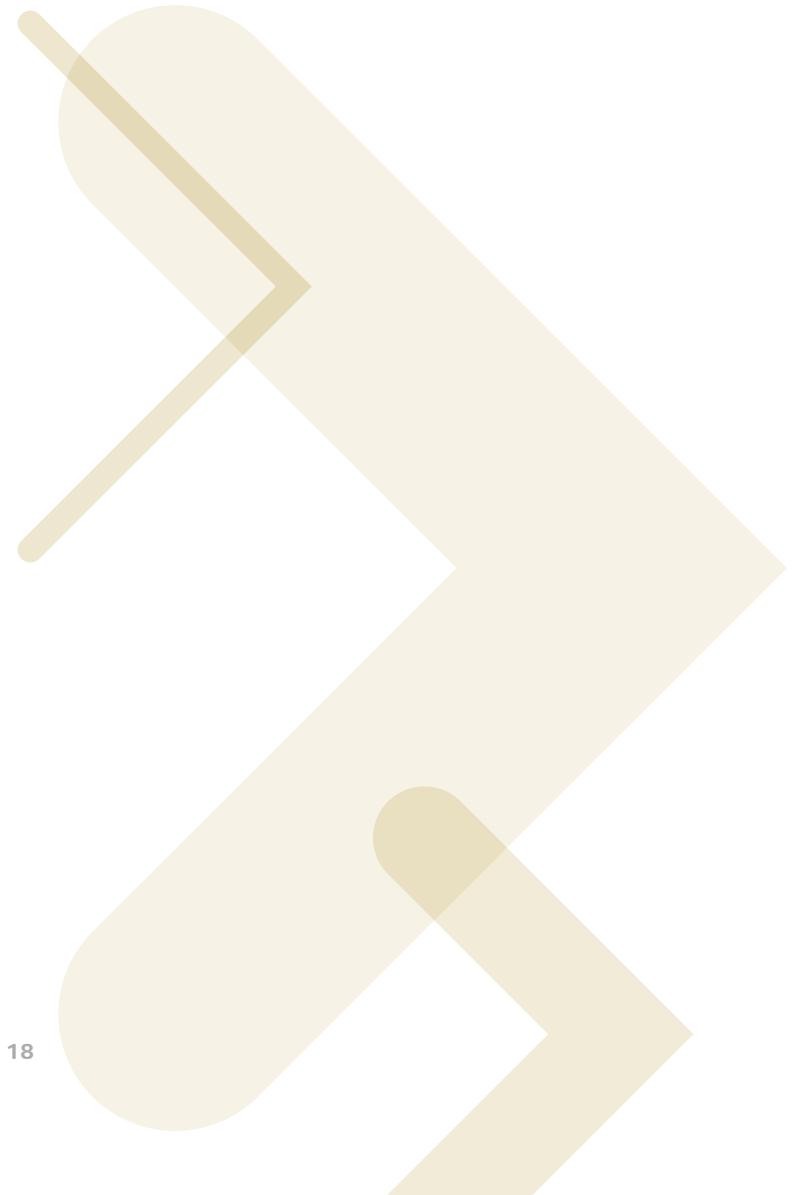
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The Synchronized Distribution Supply Chain: Best Practices in Truck Transportation Management



About Motorola's Mobile Supply Chain Solutions

Every day, companies all over the world count on Motorola mobility solutions to keep their supply chain operations at peak productivity and profitability. When it comes to supply chain optimization, Motorola's end-to-end supply chain mobility solutions offer the expertise gained through successful proven deployments in many of the world's largest enterprises, a comprehensive and proven enterprises class product portfolio — including wireless infrastructure for seamless 'inside outside' mobility, integrated voice and data devices and best-in-class applications through a world-class partner network — and a complete portfolio of services designed to help you get and keep your mobility solution up and running to ensure peak performance and maximum value.

For more information on how Motorola mobility solutions can streamline your supply chain, please visit motorola.com/supplychainmobility or access our global contact directory at motorola.com/enterprise/contactus



Executive summary

Regardless of whether you utilize your own trucking fleet or contract the services of a third party logistics provider to move product from the warehouse to your customer, many of the pressures are the same. The end goal is to move product through the supply chain as efficiently as possible – the less efficient the product moves, the more it costs — reducing profitability and the ability to offer competitive transportation services. In addition to the many details of organizing the logistics function, today's transportation organizations face a myriad of additional issues that further threaten profitability, from rising fuel costs and a labor shortage to increasing regulatory requirements.

To better manage this function, you need a wealth of information. You need to know where your trucks are, what is in the trucks, which routes are most profitable, when and where shipments need to be delivered, which shipments are running late — and much more. You also need to dramatically reduce the volume of paperwork required in this function to streamline processes for increased productivity.

Mobility enables the application of the lean principles of manufacturing in the transportation function, providing the high levels of automation and visibility required to achieve peak operational efficiencies. This white paper will examine the pain points in this industry, how mobility can become the cornerstone of a comprehensive transportation management

system that addresses these issues — and the many benefits realized in the transportation function as well as throughout the supply chain.

Background

While the transportation function is a critical link in the supply chain, today it remains heavily fraught with manual paper-and-pen based processes. A 2002 survey conducted by The Logistics Institute (TLI) at Georgia Institute of Technology revealed that over 50 percent of the respondents were still using manual processes for key transportation functions, including route planning, load building, dispatching and tracking. Where the warehouse is often automated and connected to other enterprise business systems, transportation frequently remains in a silo, separated from the systems inside the four walls of the enterprise. And this separation translates into inefficiencies within the transportation function, as well as the upstream and downstream areas in the supply chain.

The result is a lack of agility — the inability to rapidly respond to industry pressures and changes. Issues today include heated competition, driven by simultaneous globalization and consolidation. Larger providers need to reduce costs and improve service levels — and smaller organizations are finding it difficult to compete. Other issues include a rapid rise in fuel costs, and increase in government regulations and labor shortages — all amid customer demands for better, faster, less expensive service.

Mobility is the ideal enabler for the transportation industry. Drivers are out on the road nearly 100 percent of the time — but mobility can deliver a level of visibility greater than if the workers were on site.

Mobility is in use in the transportation sector, though in a limited capacity — few transportation organizations have embraced the full capabilities and benefits of mobility. For example, even though this function is heavily burdened with paperwork and forms, the February 2006 Consumer Insight Report reveals that less than 20 percent of the organizations surveyed are utilizing mobile computing for records and document management. The same study also reveals that just over half of all respondents are using some form of mobility in asset management — even visibility into the whereabouts of high dollar assets such as trucks and trailers as well as a wide variety of containers, from small totes to large roll cages and more, is crucial to improving operational efficiencies and controlling costs.

Mobility is the ideal enabler for the transportation industry. Drivers are out on the road nearly 100 percent of the time — but mobility can deliver a level of visibility greater than if the workers were on site. For those involved in the transportation of goods, it is mobility that is the key enabling technology capable of re-inventing the way the transportation business operates. It is mobility that can position the transportation business to manage the challenges of today as well as tomorrow. And it is mobility that can enable transportation to achieve full potential in the synchronization of the supply chain.

Pain points in transportation

In today's transportation operations, there are a number of issues which can be translated into the seven areas of waste in transportation:

1) Lack of real-time visibility of freight and assets

Efficiency is heavily dependent upon real-time visibility of trucks, trailers and containers in transportation. Lack of real-time visibility hinders a wide variety of functions, including:

- **Efficient scheduling of loads:** The inability to schedule loads in the most efficient manner affects the entire transportation operation, translating into excessive mileage, which in turn translates into reduced driver productivity, slower customer service and poor asset utilization.
- **The ability to execute dynamic schedule changes:** Orders continue to arrive throughout the workday, well after work orders have been distributed. The inability to view the location of all trailers seriously hampers the ability to quickly locate the truck that can best accommodate the new order and meet customer expectations — without incurring undue costs.

- **The ability to see asset utilization levels:** An underutilized fleet rapidly translates into a large sum of wasted capital and operational dollars spent on the purchase and maintenance of trucks and trailers that, in reality, are not needed. Given proper levels of information, the enterprise would be able to see that the fleet is larger than necessary, and take the appropriate measures to reduce the fleet to the appropriate size.
- **The ability to control container costs:** Lost containers can translate into tens or hundreds of thousands of dollars in needless expenditures.
- **The ability to note exceptions in a timely manner:** While monitoring a heavily mobile workforce is not an easy task, the inability to note instantly at any point in the day, whenever a driver is in danger of missing the scheduled delivery day and time threatens customer service and retention levels.

2) Labor issues

With a critical shortage in labor in this industry, there is no room for waste: the American Trucking Association (ATA) reports a current shortage of 20,000 truckers today, with an expected increase to 110,000 by 2014 – a 550 percent increase. Yet drivers are forced to spend a great deal of time managing and completing paperwork before leaving the dock, while on the road and upon returning — leading to low productivity and job satisfaction issues that also negatively impact hours of service regulations. In addition, extraordinarily high turnover rates further erode productivity, as new drivers become familiar with everything from paperwork to the actual routes.

3) Rising fuel costs

While the increase in fuel costs cannot be controlled, unnecessary fuel consumption is a waste that directly drives the cost of sales up — and profitability down. Areas of concern are out-of-route mileage, route efficiency, and driving habits which can increase fuel consumption.

4) Costly mis-ships

In highly manual processes, the integrity of the data can easily become a very real concern. Forms completed by paper and pen must ultimately be entered into the computer, most often by administrative staff. This ‘double-touch’ of the data (where ‘person one’ writes the data down and ‘person two’ interprets and enters the data into the computer) significantly increases the likelihood and frequency of errors. And errors in this industry can be very costly, such as the delivery of the right shipment to the wrong person. This results in additional waste in the form of the time and costs associated with shipment back to the depot, and then re-shipping to the right party.

5) Cash-to-cash cycles times

The many inefficiencies in manual processes translate into delays in billing and collection. Time spent processing forms and waiting for data to be entered into the computer ultimately translates into the addition of many days to the already strained cash-to-cash cycle.

6) New compliance regulations

For an organization already overburdened with manual processes, new government regulations often mean additional processes, additional time — and additional cost. And since changing regulations are a constant in the transportation industry, the ability to meet new compliance regulations without adding ‘waste’ is crucial.

7) Safety

Waste in the management of safety issues can translate directly into a major increase in costs for the transportation provider. While speeding tickets and accidents can result in a significant rise in insurance rates, accidents can also lead to major liability. And the ability to monitor driver safety records and habits is key in managing to achieve stellar safety records throughout the fleet.

Beyond transportation: pain points in the supply chain

The transportation management system (TMS) sits in between the yard management system (YMS) and the warehouse management system (WMS). Anything less than full integration between the three systems results in some level of reduced efficiency throughout your supply chain. This domino effect can be seen up and down the supply chain, robbing the enterprise of the benefits of synchronization across these core business functions.

In the warehouse

When transportation operates as a silo, dispatch does not have the visibility required to prepare and schedule loads in the most expeditious manner possible, increasing miles traveled and driver time as well as asset wear and tear.

In the yard

Lack of integration in the yard can translate into an ill-prepared workforce, loads that are not ready when the truck arrives and extended driver wait times. And for enterprises that are using third party logistics providers instead of their own fleet, extended driver wait times can trigger penalty fees from carriers.

The end result from lack of integration of these three business systems is increased labor costs, increased fleet-related costs, and slower service.

Maximizing efficiency in the transportation operations with mobility

Mobility eloquently applies the latest in technology to address the unique pain points in transportation — reducing or eliminating the associated wastes with each through a number of applications.

1) Real-time visibility of freight and assets — complete with performance metrics

Today's transportation providers can leverage GPS and RFID technologies to achieve real-time visibility of the entire transportation operation. This ability to track and trace any asset at any time enables:

- **The creation of the most effective load schedules.** The ability to see and best match available loads with available trucks maximizes asset use and minimizes mileage and fuel costs while ensuring timely arrival at the end destination. And maximum asset utilization enables the more deliveries with the same fleet, providing a path for cost-effective growth.
- **The cost-effective management of dynamic schedule changes.** The ability to locate and direct the right truck to the right location enables the transportation organization to optimize business opportunities without adding expense.
- **Maximum asset utilization.** The ability to see utilization of each vehicle enables significant cost savings. Fleets that are under-burdened can be reduced — reducing capital expenditures for vehicles as well as reducing the labor and parts costs associated with vehicle maintenance. In addition, the ability to marry maintenance records with each truck ensures proactive scheduling of maintenance to ensure trucks are kept in top running condition, eliminating the high cost of downtime.
- **Improved container management.** With RFID, your containers are automatically tracked without human intervention. Granular information allows you to see the whereabouts of your containers — including which customer has which container. Opportunities for theft and loss are greatly reduced, protecting revenues — and profitability.
- **Real-time exception management.** With mobility, you have the performance metrics right at your fingertips to see exceptions in real time. Whenever a load is in danger of late delivery, an alarm can be triggered and sent to appropriate personnel to enable the proper proactive steps to be taken to either avoid the late delivery or to minimally alert the customer to the situation to help minimize the effect on service level perception.

2) Improved driver productivity

There are a number of applications that can significantly improve driver productivity by eliminating much of the need to perform manual

Mobility provides visibility into key performance metrics, improving the ability to monitor and manage the transportation function, and enabling you to easily answer the question: How is your transportation function measuring up?

paperwork, and putting all the information needed throughout the workday right at the fingertips of the driver:

- Electronic Department of Transportation (DOT) logs and trip sheets eliminate paperwork and possible errors. In addition, GPS/locationing can be used in conjunction with remote engine monitoring capabilities to automatically calculate and enter hours of service and mileage on the appropriate electronic forms. Since time in the truck is now considered active driving time, the elimination of the need to manually prepare paperwork means more miles and stops per day per driver — increased throughput with the same workforce. And since all the information needed to calculate fuel tax (mileage and fuel information) is now in your business systems, fuel tax calculations can be performed automatically, again reducing the need for drivers to spend time completing fuel tax forms.
- The ability to electronically download the day's manifests and routes to a driver's handheld computer eliminates the need for dispatch to create paperwork and for drivers to wait in line to retrieve paperwork.
- Expedited recording of OS&D (overages, shortages and damage) keeps drivers on the road and productive instead of completing paperwork and making calls to process those exceptions.

- On-demand address-to-address directions ensure that drivers can always locate the best possible route. Mileage is minimized, and excess miles driven when drivers become lost are eliminated.

3) Reduction in fuel consumption

Mobility assists in reducing fuel consumption in two ways:

- When loads are optimized, the improved efficiency in routing reduces mileage and the associated additional fuel costs.
- Real-time monitoring of engine performance enables the collection of a wide range of metrics that can drive fuel consumption down. Data can include truck speed, RPMs, idling time, torque band compliance and more. This information can then be used to provide instant feedback to a mobile computer in the vehicle to request that drivers monitor their real-time driving behavior to conserve fuel. And a complete audit trail enables you to see which drivers are complying with the computer-driven orders and which are not — enabling better management of your driver workforce.
- On board navigation systems eliminate extra mileage incurred when drivers are lost.

When your transportation function is empowered with mobility, your labor force will be able to accomplish more in a day with less effort — maximizing the strained labor pool, improving overall productivity and performance metrics, and improving customer service and retention.

4) Improved data integrity and reduction in errors

Completion of forms via paper and pen and subsequent entry into a computer at a later date is replaced by electronic forms that are automatically populated with available data whenever possible. The result is a dramatic improvement in data integrity and a reduction in error rates. Errors in mileage or fuel purchase that might have translated into erroneous calculation of taxes due — and errors in the day's manifests could ripple into costly mis-ships.

5) Proof-of-delivery (PoD) for faster cash-to-cash cycles times

When proof-of-delivery moves from paper to mobile computer, proof of delivery information can be transmitted to the office instantly, including time of delivery and the recipient's name — and if the mobile device is equipped with imaging capabilities, drivers can even capture signatures electronically and snap a quick picture to document the condition of the shipment. This information can then be transmitted instantly to the home office, shaving weeks off of the cash-to-cash cycle time.

6) Cost-effective compliance

As government regulations increase in volume as well as complexity, mobile computing keeps compliance simple and cost-effective. With mobile computing, drivers no longer

need to complete paperwork and process logs. On-board GPS equipment enables a paperless and automated recording and reporting of data through the ability to automatically collect data for State Fuel Tax forms and DOT logs in the U.S.

7) Pro-active safety management

Mobile computing can be applied to record and transmit engine statistics and on-board events, including sudden acceleration or deceleration, speeds and diagnostic warnings to enable:

- Proactive management of driving habits.
- Reconstruction of an accident or other event based on historical data.

This capability enables transportation organizations to identify and remove drivers who perpetually practice unsafe driving habits, and improve driver safety records to potentially eliminate accidents and reduce insurance and liability.

The enabling technology

There are a number of technologies that enable mobility in transportation functions:

Wireless connectivity

Three types of wireless connections ensure that vehicles and drivers are able to cost-effectively communicate at all times — while on the road and when at the depot.

- WWAN connectivity enables mobile voice and data for drivers on the road.
- WLAN connectivity enables cost-effective voice and data communications via the company's wireless LAN when drivers are in the depot, eliminating the need for high-cost cellular services while at 'home'.
- GPS functionality ensures continual tracking of truck and trailers, continuous collection of a wide range of performance characteristics from the truck's engine (such as speed, RPMs, sudden stops and more) and from the trailer (including tire pressure, reefer temperature and more).

Automated and advanced data capture

Transportation processes require the use of a number of types of data capture, including:

- Permanent hardened RFID tags placed on your assets (trucks and trailers), enabling automated rapid inventory takes, instant identification at the gate, and easy location of a specific trailer or truck or items in a specific shipment.
- Ability to capture images, RFID tags and bar codes to ensure continuity of workflow regardless of the type of data capture that is required.

Rugged mobile devices

Since mobile computing devices utilized in the transportation industry will be utilized beyond the four walls, they must be designed to withstand the elements. These handheld or fixed/vehicle mount devices should offer:

- A full range of wireless connectivity options (VoWWAN/VoWLAN, WWAN/WLAN/WPAN and GPS) to enable flexible and cost-effective voice and data communications inside and outside the enterprise as well as location-based services.
- Comprehensive data capture options for maximum application flexibility, including bar code scanning, image capture and RFID.

Benefits in transportation

When your transportation function is empowered with mobility, your labor force will be able to accomplish more in a day with less effort – maximizing the strained labor pool, improving overall productivity and performance metrics, and improving customer service and retention.

Mobility enables improved monitoring and management of the transportation function through visibility to key performance metrics, enabling you to easily answer the question: How is your transportation function measuring up? Armed with the many data points along the supply chain path from inside and outside of the four walls, issues are easily revealed, enabling prompt action to prevent erosion of customer service — and customer retention rates. And since data can be segmented in just about any fashion, the costs associated with a specific route or even a specific customer are easily analyzed, enabling better strategic decision making in the enterprise — from the location of a planned distribution center to the identification of unprofitable customers. And the ability to gather these metrics into a meaningful report enables the continuous improvement in the transportation function so common in the warehouse and other areas of the enterprise — but typically absent in this function.

The benefits of mobility in the transportation function are many — the following averages were compiled from Motorola's own mobility deployments in transportation:

- Labor costs reduced 20 to 30 percent
- Labor productivity up 10 to 20 percent
- Operating costs 10-15 percent reduction
- Accuracy of shipments – 100 percent
- Completed shipments 100 percent
- Order to cash – days instead of weeks

Benefits beyond transportation

The transportation management system sits in between the yard and the warehouse systems. Anything less than full integration between the three systems results in some level of reduced efficiency throughout your supply chain. This domino effect can be seen up and down the supply chain, robbing the enterprise of the benefits of synchronization across these critical functions.

The effect in the warehouse

In the warehouse, orders filter down for fulfillment and are transferred to dispatch to schedule the right truck to the right dock at the right time. And it is the simultaneous visibility into both order and truck status that allows the synchronization necessary to:

- Properly aggregate loads.
- Develop route plans that maximize efficiency in terms of mileage, driver time and fuel costs.

The effect in the yard

Integration with the yard system ensures that yard workers are expecting and prepared for your vehicles. The result in minimal wait times at the dock — maximizing on-the-road time during shifts. Driver productivity is maximized — key in a workforce with a major shortage. And vehicle utilization is increased — a critical metric given the cost of trucks and trailers.

The mobile transportation operation — a strategic business initiative

Mobility enables the deployment of a content rich Transportation Management System that is capable of streamlining the processes within the transportation function — and maximizing synchronization at the points of contact with other areas in the supply chain. The result is a system that is capable of not only addressing the issues that plague today's transportation companies, but

is also able to adapt to the needs of tomorrow.

Today, the mobility-enabled TMS is not a standalone system, but a strategic supply chain initiative that enables enterprises to:

- Achieve maximum productivity and cost-efficiencies in the transportation function.
- Provide the tight integration with upstream and downstream supply chain contact points (the Warehouse and Yard Management Systems) necessary for further improvements in the timely orchestration of load preparation and pickup.

In addition, this synchronization also enables a new level of service for customers. The improved visibility combines with real-time tracking and tracing data to enable the creation of a real-time self-service portal for customers. Customers enjoy an expansion of service, and the ability to obtain information on the fly simultaneously eliminates the majority of customer calls related to status of shipments. And the enterprise is poised to implement new functionalities that can further increase efficiency and profitability, such as cross-docking and zone skipping.

For more information

For more information on how you can reap the benefits of mobility in your transportation operations, replace all copy after the 'comma' with: please visit us on the web at:

motorola.com/supplychainmobility

or access our global contact directory at:

motorola.com/enterprise/contactus



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The Synchronized Distribution Supply Chain: Best Practices in Warehouse Management



About Motorola's Mobile Supply Chain Solutions

Every day, companies all over the world count on Motorola mobility solutions to keep their supply chain operations at peak productivity and profitability. When it comes to supply chain optimization, Motorola's end-to-end supply chain mobility solutions offer the expertise gained through successful proven deployments in many of the world's largest enterprises, a comprehensive and proven enterprises class product portfolio — including wireless infrastructure for seamless 'inside outside' mobility, integrated voice and data devices and best-in-class applications through a world-class partner network — and a complete portfolio of services designed to help you get and keep your mobility solution up and running to ensure peak performance and maximum value.

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Executive summary

The warehouse is at the center of your business, a key area through which nearly everything in your business must pass — from packages in a parcel post environment to raw materials and finished goods in a manufacturing plant to a wealth of products in a distribution center. When mobility is extended throughout your warehouse, a new level of efficiency, accuracy and visibility can be achieved. Paper processes are replaced by real-time computerized forms on mobile computers; bar code scanning enables checks and double checks that the right item is being picked, packed and shipped; and RFID provides automatic tracking of materials without human intervention.

With warehouse mobility also comes the collection of a richer data set in real time, providing a real-time view of inventory in the warehouse, order status, and more. And when availability of this information is extended to other areas of your business, the full value of warehouse mobility is realized. The data collected in this key focal point of your business has the power to enable significant cost and operational efficiencies throughout the enterprise — in the yard and on the production line as well as in dispatch, sales and service.

This white paper will examine how warehouse mobility can serve as the foundation of an enterprise-wide mobility, creating a more collaborative information architecture that not only enables a leaner warehouse operation — but a leaner, more profitable enterprise as well.

The negative business impact of the manual warehouse

Regardless of whether you are a manufacturer or distributor, the warehouse is a critical hub in your business. Through this central depot, everything must pass — from raw materials waiting to be manufactured into finished goods to product waiting for shipment downstream to a distribution center, retailer or end-customer. When the many warehouse processes are paper-based and workers are not connected in real-time to your warehouse management system (WMS), information is manually collected with pen and paper, and entered into the computer at a later date. These manually-driven procedures in the warehouse cause a number of higher level operational issues in the warehouse, including:

- High levels of errors in information due to the double-touch of data (handwritten followed by data entry).

Receiving

When workers at the receiving dock are enabled with real-time access to your purchase order database, along with either bar code scanning or the ability to read RFID labels, incoming shipments can be automatically identified and reconciled.



- Slower movement of information in and out of your business systems, resulting in reduced visibility throughout the warehouse operations.
- Reduced employee productivity due to time wasted completing paperwork and locating information on labels.
- Reduced customer service levels due to the impact on velocity in the warehouse.
- Increased cash-to-cash cycle due to the slow movement of information.
- Increased capital expenditures due to the lack of visibility into real-time inventory, which ripples into the need to maintain higher levels of stock to prevent against out-of-stock conditions.

The positive impact of mobilizing key warehouse processes

Without mobility to enable real-time processing throughout the warehouse, each and every warehouse function is impacted. Following is an in-depth look at each of the critical warehouse process areas — the issues each function faces, how mobility addresses those pain points, and the advantages the enterprise can expect to reap.

Receiving

Process pain points

When shipments arrive at your facility, manual procedures in the receiving function present a number of issues:

Manual reading of labels and reconciliation on a paper form takes time and can translate into a wide variety of inventory errors. Inventory may show in stock when in actuality there is an out-of-stock condition, and vice versa.

Labels on shipments may be damaged or illegible, causing a long delay in processing, and resulting in congestion at the receiving dock.

There is a major lag between when shipments arrive and when they are visible in your inventory system.

Business pain points

The process pain points in the put-away function ripple into significant business disadvantage in the form of:

- Slow processes in receiving that translate into long dock-to-stock cycle times.
- Lower employee productivity.
- Poor inventory visibility and accuracy that translate into erroneous out-of-stock conditions and lost sales.
- Lack of visibility into orders that prevents the ability to further streamline and reduce costs in the receiving process via cross-docking.

Solution: mobility

When workers at the receiving dock are enabled with real-time access to your purchase order database along with either bar code scanning or the ability to read RFID labels, incoming shipments can be automatically identified and reconciled. Proper

processing orders are delivered right to the worker — from where to stage accurate shipments for put-away or cross-docking to how to handle any errors in the shipment. Velocity in the receiving function is increased as the same workforce can process more shipments. Dock-to-stock cycle times are reduced. The increased inventory visibility allows you to intelligently direct put-away or conveyance for items that are low in stock first, reducing the opportunity for costly out-of-stocks to impact the order fulfillment process. And the instant visibility into the order system enables cross docking to effectively reduce handling time and costs for incoming shipments.

Put-away

Process pain points

Manual processes produce a variety of issues in the put-away function:

- Congestion in the aisles due to limited throughput.
- Product sitting on the warehouse dock waiting for processing is not yet visible in your inventory — and that lack of visibility can translate into a false 'out-of-stock' situation that ultimately results in unnecessary lost sales.
- Errors in the put-away process can result in misplaced inventory that can result in: false out-of-stocks; lost sales; and needless additional expense associated with the purchase and storage of additional product to replace 'lost' inventory that is actually sitting on the warehouse shelves.

Business pain points

The process pain points affect warehouse operations in a number of areas:

- Poor utilization of costly warehouse space.
- Low employee productivity and put-away throughput.
- Poor inventory visibility and accuracy
 - Poor utilization of material handling equipment (MHE) such as forklifts.

Solution: mobility

With real-time access to inventory systems in the put-away function, you can automatically deliver the right storage area as well as most efficient

route to that location right to a worker's mobile handheld or hands-free computer. A quick scan of the bar code on the shelf tag (or read of an RFID shelf tag) not only ensures the item is put in the correct place, but also provides a record of the location of that exact shipment. Items reach the shelves in the shortest amount of time, warehouse workers can increase throughput — and you know the exact location of all inventory at a highly detailed level.

As a result:

- The same number of workers can process more put-away orders each day.
- Improved inventory visibility:
 - Reduces out-of-stocks.
 - Reduces stocking inventory levels and related warehouse space requirements.
 - Provides the information required to implement first-in first out (FIFO) or last-in first out (LIFO) inventory management, which can have a significant positive impact on the company's profitability analysis and tax liabilities.
- MHE asset utilization is improved through reduced travel time in the warehouse aisle, which reduces wear and tear and maintenance requirements for the vehicles.

Cross docking

Process pain points

When paper-based processes are utilized in the cross docking function:

- Lack of real-time processing translates into shipments that often wait on the dock for appropriate paperwork to enable shipping.
- Manual reading of labels adds to processing time and increased errors that can result in the delivery of a shipment to the wrong dock.
- Lack of visibility into other shipments on the receiving dock eliminates the ability to coordinate the movement of materials bound for the same dock.
- Lag time between time of shipment and update of order system.

Business pain points

Manual procedures in cross-docking negatively impact warehouse operations in a number of areas:

- Inability to provide updated order status information to customers.
- Low employee productivity that translates into higher labor costs.
- Poor utilization of material handling equipment (MHE) such as forklift.
- Mis-ships and other shipment delays that ultimately impact customer service satisfaction and retention.

Solution: mobility

When real-time information is available in the cross dock function, shipments are handled once instead of multiple times. Instant access to the order database provides the on-the-spot visibility needed to cross dock the incoming material for immediate shipping to fulfill customer orders — eliminating the need for the products to be staged for put-away, placed on the warehouse shelves, picked, packed and re-staged for shipment. Access to real time information ensures that the right shipment is delivered to the right dock and loaded onto the right truck. Visibility into all the shipments slated for cross docking allows for increased efficiencies in movement between docks — instead of moving each shipment individually, shipments bound for the same dock can be aggregated. That aggregation reduces usage times and wear and tear for forklifts and other material handling equipment. And the combined efficiencies allow the same number of workers to process more shipments on any given day, driving labor costs down.

Sorting

Process pain points

Manual sorting processes result in the following issues:

- The need to manually identify materials to determine the proper put-away staging location reduces productivity and throughput.
- Errors can result in improper staging, which can result in the misplacement of materials on the warehouse shelves.

Business pain points

The overall impact on warehouse operations includes:

- Slower dock-to-stock times.
- Reduced employee productivity.
- ‘Lost’ inventory that can affect order fulfillment times and ability to meet customer shipping requirements.

Solution: mobility

Real-time access to the orders database allows instant identification of materials and automatic delivery of the proper staging location for put-away or shipment in package handling applications. And the rapid and accurate staging of shipments and packages helps ensure that orders are shipped in a timely fashion, improving order fill rates and customer satisfaction.

Returns

Process pain points

In the returns function, workers need access to a great deal of information in order to efficiently and properly process returns. Without real-time information in the returns function:

- Major processing delays occur while workers:
 - Validate that the return is valid through the existence of an RMA or other returns document.
 - Identify the returned item — a challenge if the item is no longer in its original packaging.
 - Document the condition of the returned material.
 - Determine how to process the return — return to stock, return to the manufacturer, recondition, scrap, or return to the customer.
 - Process any required customer credits.

Business pain points

The process-related issues can affect not only the efficiency of the returns function, but also customer service levels:

- Productivity is reduced due to time consuming processing.

Returns

With real-time access to inventory, accounting and order systems, a quick scan of an item bar code, RFID tag or RMA label instantly validates and updates the status of the return, along with immediate issue of any customer credit due.



- The resulting backlog of returns and the associated delays translates into:
 - Slower processing of customer credits, reducing customer satisfaction — and retention.
 - Slower return of product to warehouse shelves, impacting the velocity of availability for new order fulfillment.

Solution: mobility

With mobility, workers in the returns area have instant access to inventory, accounting and order systems. Advanced data capture capabilities, such as imaging, can provide proof of condition for returns records, eliminating potential customer disputes. A quick scan of an item bar code or RMA label can instantly validate the return and quickly update business systems with the disposition of the return. Customer credit, if due, can be issued immediately along with instant customer notification. In the event the item is returned to inventory, it is automatically noted in the inventory systems, instantly available for fulfillment of new orders. And as overall processing time is reduced, worker productivity improves, enabling prompt returns processing to protect customer satisfaction levels.

Cycle counts

Process pain points

In order to meet operational and financial requirements, as well as government regulations, companies must keep accurate inventories. To do so, they conduct

regularly inventory counts. When these counts are conducted manually, they are extremely time consuming and often fraught with errors.

Business pain points

Manual cycle counts traditionally translate into:

- High labor costs.
- Lack of real-time data — by the time the cycle count is completed (often days or weeks), picks and put-aways will likely have been completed, affecting the inventory valuation and the company's balance sheet, as well as inventory accuracy to protect against the high cost of out-of-stocks.
- High cost of shutting down the facility if required — a very expensive and disruptive action.

Solution: mobility

When cycle counters are armed with real-time access to the inventory database and advanced mobile data collection capabilities, efficiency and accuracy in this function are dramatically improved. For example, in a warehouse utilizing RFID technology, workers with a mobile RFID mounted on a cart can take a full and error-free cycle count in the time it takes to push a cart through the aisles. Counts that may have taken three or four weeks in the past can be completed in less than half a day. The new level of cost-efficiency in cycle counting activities enables enterprises to take

Picking

With mobility in picking operations, the same number of workers can process more orders per day with fewer errors, improving customer service and reducing the cost of doing business.



cycle counts routinely. And the resulting new level of visibility into inventory data delivers a number of benefits:

- Better trend analysis for improved buying practices.
- Reduced inventory stocking levels.
- Reduced capital expenditures for holding inventory.
- Reduced space requirements for inventory.

Picking

Process pain points

Paper and pen procedures in the picking function are extremely inefficient:

- Pickers must walk the warehouse aisles to locate product.
- Picks cannot be easily aggregated, either within an order (due to the inability to identify that multiple items on a pick list are located in the same area) or across orders (due to the linear nature of manual picking, which is processed one order at a time).
- Product cannot be automatically verified as accurate when picked.

- Inventory systems are not updated to reflect the pick until the picking form has been entered into a computer at a later time.

Business pain points

The business impact of manual picking is great:

- Labor costs are higher.
- Shipment error rates can exceed acceptable levels or company defined metrics.
- Lack of real-time inventory visibility results in costly out-of-stocks, lost orders, lost customers and lost profitability.

Solution: mobility

With mobility farther upstream in the warehouse supply chain in the put-away function, you already know what products are on your warehouse shelves and where specifically they are located. When you add real-time access to your order and inventory business systems, you can automatically deliver electronic picking orders to a mobile device that includes a pick list along with the fastest route to the items. A quick scan of a shelf tag, bar code or RFID tag provides instant verification that the right item has been picked, and the item is instantly deducted from inventory. Now:

- Productivity is increased — the same number of workers can process more orders per day, driving the cost of doing business down.

- Errors are significantly reduced through the automated capture of data and instant double-check for picking accuracy.
- Out-of-stocks are eliminated through the ability to instantly deduct items from your inventory as they are picked.
- The ability to deliver granular picking information enables LIFO/FIFO picking for better inventory management.
- The ability to instantly store serialized product information with customer orders enables enterprises to expeditiously locate any product or parts that have been recalled, reducing liability as well as the high costs associated with tracking products that have already left your facility and have been delivered to your distribution channel or end customer.

In addition, when mobile access to product databases is added, companies can leverage detailed information about the specific items in your warehouse. For example, information on consumer appliances can be leveraged to control clamp trucks, prevent operators from inadvertently applying too much pressure during put-away and picking. This valuable mobility application helps reduce the high cost associated with the delivery of damaged equipment — from the cost of the return and re-shipment to the cost of an unsatisfied customer.

Packing, staging and shipping

Process pain points

Shipping and staging are the equivalent of the 'last mile' in the warehouse, where the orders effectively 'meet the road' en route to the customer. Inefficiencies in these areas include:

- Quality control: time consuming manual cross check that the right items are in the shipment.
- Delays in processing while paperwork is entered to enable the creation of manifests and staging instructions.
- Processing delays in shipping that ripple into carrier detention charges.

- Inability to dynamically modify shipping orders to accommodate emergency orders from customers.
- Excess use of filler materials in packing operations.

Business pain points

Lack of real-time information in these crucial last stops in the order fulfillment process translate into:

- Delays in shipping and increased shipping costs.
- Reduced customer service satisfaction.
- Increased shipping costs.
- Poor truck utilization.

Solution: mobility

Mobility can streamline these final stages of order fulfillment, ensuring that the right order contains the right products, and is shipped to the right customer at the right time via the right method of shipment.

In the packing function, mobility serves as a crucial cross-check to ensure the accuracy of an order prior to packing. In addition, in the event that any items that were backordered have now arrived in the warehouse, the packer can receive notification, enabling completion of the shipment prior to leaving your facility.

Packing material costs can also be controlled. Your business system can automatically determine the right size carton for the shipment, removing guesswork, and eliminating the use of excess amounts of filling materials.

In shipping, mobility provides a final cross-check to ensure that the order is correct, properly addressed and scheduled for the proper shipment method, complete with on-the-spot printing of all necessary paperwork.

And coordination with the dispatch function ensures that the shipment is properly staged for loading on the right truck in the right order.

With mobility in your packing, shipping and staging operations:

- Productivity is increased — the same staff can now ship more orders per day.
- Shipping times are improved — the same staff can now ship more orders per day.
- Delivery times are improved.
- Customer service and satisfaction are improved — customers are more likely to receive orders when promised, promoting higher customer retention levels.
- Vehicle utilization is improved — trucks are fully loaded with the right shipments.
- Driver productivity is increased — staging in the correct order enables drivers to spend less time at each stop.

Asset tracking

Process pain points

In the warehouse, there are often many re-usable assets, such as totes, pallets and carts. Without the ability to automatically track and locate these valuable assets, companies must incur the high cost of labor involved in allocating employees to walk the warehouse and adjacent areas, such as the yard, to find these assets — or reach out to customers to determine if assets are still in their possession. Due to the major effort required, companies either do not track these valuable assets that are so crucial to various warehouse functions — or rely on manual logs that are usually well out of date. And without accurate tracking, assets disappear on a regular basis.

Business pain points

The routine loss of warehouse assets results in:

- Lack of asset availability can impact the ability to ship on time.
- Additional capital expenses due to the need to regularly purchase additional assets to avoid order processing delays.
- Inaccurate asset inventories can affect asset valuations and the company's balance sheet.
- Lack of granular asset inventory information such as asset age can impact budgets due to

difficulties in accurately predicting the end of the asset lifespan — and the need to purchase replacements.

Solution: mobility

Mobility can completely automate the asset tracking process and provide up-to-the-minute information on the whereabouts of totes, pallets and more through advanced data capture. When RFID tags are placed on all assets, assets are automatically tracked as they move through the warehouse and onto the truck, and can easily be associated with a specific customer order.

In addition, the use of permanent hardened RFID tags eliminates any recurring tag costs for either the tags themselves or the labor to place the tags on the assets.

The result is fully automated accurate and cost-effective tracking of your assets with virtually no manpower required. And the assets remain in your inventory for an extended period of time, reducing your total cost of ownership (TCO) and improving your return on investment (ROI).

Mobile warehouse manager

Process pain points

In order to effectively manage the warehouse, managers and supervisors need access to business systems such as purchasing and inventory, and business communications, including voicemail and email. With a lack of mobile access to these tools, managers are forced to spend a large part of their day tethered to the desk instead of out on the floor supervising employees.

Business pain points

When managers are not out on the warehouse floor, they are not available to resolve issues in real time, or to spot productivity issues, such as a backlog in one or more functions. Warehouse efficiency is often reduced, customer service is impacted, and warehouse personnel job satisfaction is often impacted leading to increased employee turnover rates.

Solution: mobility

Mobility can get your warehouse managers out of the office and back on the warehouse floor by enabling the extension of all the necessary desktop tools right to the palm of their hands.

With a rugged integrated voice and data mobile device built to endure the harsh environment of the warehouse, managers can keep their desk phone, email, and access to all business systems in their literal pockets. Now, managers and supervisors can remain on the warehouse floor to protect productivity and throughput, yet maintain the real-time connection to co-workers, vendors, associates and business information needed to achieve maximum on-the-job efficiency and effectiveness.

Beyond the warehouse walls: unlocking the real value of warehouse mobility

The value of mobility in the warehouse function is easily recognized:

- Processes across the warehouse are streamlined, reducing cycle times.
- Worker productivity is increased, reducing the cost of labor in the warehouse.
- Orders are fulfilled more accurately, improving customer service and satisfaction levels.
- The cost of sales attributed to movement through the warehouse is reduced.

While these are significant business benefits, when the data collected through mobility in the warehouse is tightly integrated into the rest of your business systems and functions, the value increases dramatically.

The yard

With warehouse mobility, the exact location of shipments and materials in the yard are noted in your warehouse management system (WMS) upon delivery, expanding inventory visibility beyond the warehouse to include the trailers, containers and other materials in the yard. Even if containers or materials are moved from their original storage spot, they are easily tracked. Armed with this information, shipments in the yard can be prioritized and scheduled for prompt conveyance based on items in the warehouse that are either low or out of stock.

Mobility enables tighter integration between your yard and warehouse workers — yielding greater efficiencies in both functions. Based on the information already in your system, a dynamic, single information-packed schedule can be created and delivered to your workers' mobile devices. Workers in the yard can be directed to the exact location of the next trailer or container scheduled for conveyance, ensuring delivery to the dock on time. Warehouse workers already know which shipment is slated to arrive at which dock, and are ready to promptly unload. Once containers and trailers have been unloaded and returned to the yard, the location of these critical assets remains visible in your system.

And the tighter collaboration between the warehouse and yard functions enables the rapid schedule changes that can prevent an out-of-stock situation in the warehouse. Should a shipment arrive containing items that are currently out-of-stock, that information is visible the moment the truck arrives in the yard. In seconds, a dynamic change in schedule can be implemented that ensures that shipment is delivered immediately to the dock, effectively reducing the impact on either the production line or your order fulfillment process.

Shipping and delivery

When real-time information in the warehouse packing function is integrated tightly into your delivery function, major benefits are realized in your shipping and delivery operations.

Dispatch

When the dispatch function can see shipments in progress in the warehouse in real-time, load plans can be prepared that take into account all shipments that will be ready to load in the morning — not just shipments completed at a specific point in time. The creation of real-time load plans allows the best utilization of your delivery vehicles and your drivers. Load aggregation is easily optimized, and trucks are more fully loaded with shipments that have been aggregated to enable the most efficient delivery route possible. Tight integration with your shipping function in the warehouse makes this possible — based on the real-time load plans, staging information is sent to your shipping function, ensuring that shipments are loaded on the right truck and in the right order.

Route accounting and proof-of-delivery

The collaboration of data between shipping and dispatch enables major efficiencies in your delivery function. At this point, you have effectively tracked materials from the time they were received; for manufacturers, through the manufacturing process; to the warehouse shelves; through the order fulfillment process to shipping. Shipments have been aggregated into loads that enable delivery of the shipments in the least amount of miles traveled, reducing fuel costs. And the ability to load the shipments in the order of delivery further improves driver productivity.

When your pool of business data is extended in real time to your drivers, significant additional benefits are again realized — regardless of whether your drivers simply need proof-of-delivery for parcel post operations, or sophisticated route accounting and direct store delivery functions. With mobility extended to your drivers in the field, electronic signatures can be easily captured. Instant proof-of-delivery noted in your business systems, enabling expedited billing — and payment.

And in route accounting and direct store delivery functions, when you enable your drivers with real-time mobile computing, they have the information they need to verify shipments against the original customer order, as well as deduct any damaged items and reflect customer additions or changes made at the time of delivery. The result is an accurate on-the-spot invoice. The typical time associated with processing standard paperwork on deliveries at the end of the day as well as exceptions is eliminated. And the benefits can be significant:

- Significant reduction in days sales outstanding (DSO) — which in turn improves your cash-to-cash cycle — and your overall profitability.
- Increased driver productivity — The elimination of paperwork enables more stops per day per driver.
- Increased sales — Since drivers can now make more stops, they have more opportunity to sell more product throughout the day.
- Increased accounting staff productivity — The real-time automated interaction between the drivers and your business system eliminates the need for your accounting and administrative staff to process paper and enter information into the computer.

- Cost effective regulatory compliance — Your mobility solution enables the collection of granular information on the products that were delivered to a specific customer — from bar codes and lot numbers to serialized information. And this information can help enable rapid yet cost-efficient product traceability in the event of a product recall.

Manufacturing — the production line

With mobility, granular information about the parts and/or ingredients stored in your warehouse that are slated for later manufacturing into finished products or consumer packaged goods can be collected and compiled automatically, with little or no human intervention. When it comes to your inventory, you already know the supplier, when a specific item was delivered to your warehouse, and even the batch number. Now, as materials are delivered to and move through your production line, you have a very detailed history that begins with the arrival at your facility. The ability to track and trace for consumer safety and to meet regulatory compliance is simpler and less cost-intensive.

Sales

When real-time inventory information from your warehouse is tightly integrated into your outbound sales function, mobility can enable your salesforce to check inventory, obtain pricing and place orders — right from a customer's location. This real-time window into the warehouse from the field delivers major benefits in the sales function:

- Improved productivity — Electronic computer-based forms replace paper-based forms that often also require later data entry into the computer.
- Increased sales — Time previously spent on paperwork can now be spent on sales, enabling salespeople to make more calls per day.
- Improved customer service — Orders, pricing and delivery times can be confirmed on the spot. And if a customer calls requesting the status of a present order, the information is never more than seconds away from the salesperson's fingertips.

Field service

When your warehouse and field service functions are integrated via real-time mobility solutions, the efficiency and customer service levels in field

service operations are improved. Based on the day's schedule and the equipment slated for repair or service, a list of required parts and supplies are identified and sent to the warehouse for fulfillment and loaded onto the truck. Since service personnel have what is required to do the job on hand, repairs can often be completed in a single visit, improving customer service.

Other benefits of mobility in this function include the ability to enable service personnel to access your business systems in real-time from the field including repair history records and product manuals — information that increases the ability to accurately diagnose and correct problems on the first visit. The ability to access real-time warranty information and to simply scan parts as they are utilized on site reduces paperwork and ensures all costs are accurately captured and passed on to the customer, protecting profitability. And information on warranty and service contract expiration can be used to prompt field service personnel to up-sell or cross-sell appropriate services and other after-market products, turning a traditional cost-center into a potential revenue center as well.

Lastly, real-time repair information from all field service personnel can be automatically analyzed on an ongoing basis — and the trends may uncover issues related to specific parts or a specific product lot. The timeliness of this information enables you to take proactive action to control and reduce the business ramifications of the situation — from preventing future stock from being manufactured with possibly defective parts to preventing existing stock that was already manufactured with a defective part from being shipped to customers, again protecting the customer experience.

Summary: warehouse mobility — a foundation for a leaner warehouse and a leaner, more collaborative and profitable supply chain

The warehouse is at the very heart of your business operations. The poorly managed warehouse can actually become cost prohibitive, significantly impacting the cost of doing business — and general profitability. Through mobility, real-time warehouse information can be leveraged to enable a new

level of information collaboration throughout the enterprise. The right set of data is available in the right place at the right time to enable the most efficient next action — and the most effective business decisions.

Not only does efficiency in the yard, manufacturing, dispatch, delivery, sales and service functions improve, but the collaboration between functions provides a real-time enterprise wide view of business information that enables key strategic business objectives to be achieved. For example, real-time inventory visibility can lead to tighter inventory management — including a reduction in stocking inventory levels and an increase in inventory turns. And reduced stocking levels can free valuable space for re-allocation to other areas that will better serve business profitability — for example, enabling an expansion of the assembly line to increase capacity, or extend shipping and staging areas to enable more orders to be fulfilled per day.

Leveraging warehouse mobility in the warehouse and beyond can yield highly beneficial results, including reduced costs, improved quality, better customer service, higher margins and greater profitability — delivering real business advantage.

Complete enterprise mobility solutions from Motorola

When it comes to enterprise mobility, Motorola delivers. Our complete array of rugged industrial mobile devices is designed for the rigors of everyday warehouse use, including bar code scanners in addition to handheld, vehicle mount and wearable mobile computers that are capable of voice-directed and text-based applications. Our award-winning next generation wireless LANS are built to manage the unique challenges of mobility, delivering outstanding dependable wireless connectivity as well as high-quality voice — and can meet the needs of the largest enterprise to the small and midsize business. Our solutions also offer cost-efficient manageability by providing a centralized command center that significantly reduces the time and effort required to provision, monitor, troubleshoot and update your mobile devices and infrastructure — regardless of where in the world they may be. Support for all the latest security protocols and an end-to-end layered strategy enables you to deploy the right level of security for various applications throughout your

enterprise. And if you are looking to enable next generation technologies, such as RFID and mesh networking, Motorola is uniquely positioned to transform your enterprise with the broad spectrum of mobile products and technologies to further automate your entire supply chain — and take efficiency and cost-reduction to the next level.

Motorola also offers the right experience, the right partners and the right services. As a manufacturer of wireless infrastructure, bar code scanners, RFID tags and readers and mobile devices, we offer a depth of product knowledge. Through countless enterprise mobility deployments in some of the world's largest enterprises, including our own warehouse and manufacturing operations, we offer a wealth of understanding of the needs in the warehouse — and beyond. And robust global partner channel brings the development and integration services you need right to your door, as well as leading applications and complementary products. For example, together with Zebra, Motorola is able to offer mobile solutions that incorporate industry label printers that deliver reliable on the spot printing of a wide variety of bar code and RFID labels.

And Motorola enterprise mobility solutions make smart business sense. Robust benefits offer a rapid return on investment, and the combination of superior manageability, proven rugged high-performance products and industry leading support services ensures a low total cost of ownership.

For more information

For more information on how Motorola mobility solutions can help you reap the benefits of mobility in the warehouse and beyond, please visit us on the web at:

motorola.com/supplychainmobility

or access our global contact directory at:

motorola.com/enterprise/contactus

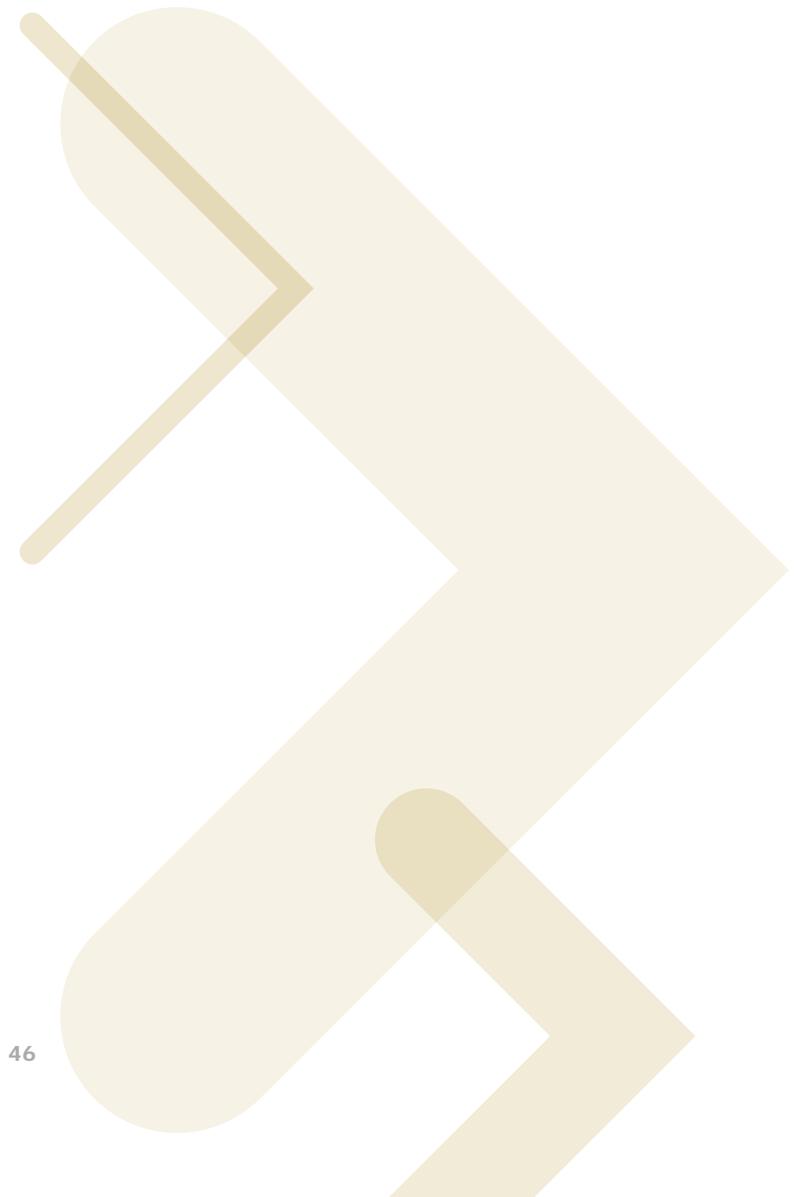


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The Synchronized Distribution Supply Chain: Best Practices in Yard Management



About Motorola's Mobile Supply Chain Solutions

Every day, companies all over the world count on Motorola mobility solutions to keep their supply chain operations at peak productivity and profitability. When it comes to supply chain optimization, Motorola's end-to-end supply chain mobility solutions offer the expertise gained through successful proven deployments in many of the world's largest enterprises, a comprehensive and proven enterprises class product portfolio — including wireless infrastructure for seamless 'inside outside' mobility, integrated voice and data devices and best-in-class applications through a world-class partner network — and a complete portfolio of services designed to help you get and keep your mobility solution up and running to ensure peak performance and maximum value.

For more information on how Motorola mobility solutions can streamline your supply chain, please visit motorola.com/supplychainmobility or access our global contact directory at motorola.com/enterprise/contactus



Executive summary

In distribution, the yard is key to the daily movement of goods — all incoming inventory and outgoing orders (shipments) to customers must pass through this portal to and from the warehouse. This critical link in your supply chain is a virtual outdoor extension of the warehouse — serving as outdoor storage positions for incoming inventory, and providing the final step in order processing for all outgoing shipments.

While inventory and order management in the warehouse often enjoy some level of automation, the management of the yard is usually dependent upon a completely manual processes. Yet as today's distributors search for ways to improve efficiencies in the business to address ever-shrinking margins, increasing competitive pressures and rising costs, the yard often continues to be overlooked.

Automation of the yard can yield many benefits to the business. But those benefits are exponentially magnified when the yard processes are interconnected to the upstream and downstream links in your supply chain — the critical business areas that interface with your yard. This white paper will examine:

- How and which procedures in the yard can be automated.
- Why the yard is so frequently managed by pen and paper despite the movement to automate as many business processes as possible.
- The many benefits of automation.
- The major impact on the business when the yard function is synchronized with its associated supply chain links.

Background

While the warehouse often enjoys a significant level of automation, the yard is typically managed via paper and pen — even though the yard is a literal extension of the warehouse and still on the enterprise grounds. While today's distributors frequently assess the business for areas of inefficiency that can be improved, the yard is typically passed over for several reasons. Improving efficiency throughout the various yard processes would require real-time visibility into a wide range of yard-related information — from the trailers in the yard and their exact contents to the length of

Mobility in the yard helps enterprises maximize automation, reduce errors and increase throughput in the yard — without adding staff or assets. A new level of information visibility is achieved — and the sharing of this information with your other business systems forms a bridge that enables new levels of efficiency in the travel of supplies and goods throughout your supply chain.

time the trailers have been in the yard, the location of equipment such as yard dogs (also known as shunt trucks, hostlers and switchers), and more — as well as the ability to issue real-time instructions to workers in the yard. In order to accomplish this, real-time wireless technology would be required: workers in the various areas of the yard, from the gate to the dock to the yard itself, would need to be able to access, collect and transmit data in real-time.

But the yard is outside, exposed to the elements 24x7x365. Establishing a wireless connection to the corporate network out in the yard requires a cost-effective wireless networking infrastructure designed to withstand the elements throughout the seasons — which until recently, did not exist. But today, heavy duty access points designed to withstand heat, cold, rain, snow, dust, wind and more are available, minimizing the environmental concerns. And mesh technology enables the peer-to-peer connectivity between access points, eliminating the need and cost associated with hard-wiring each device into the corporate network — effectively addressing the financial aspect of extending the network out into the yard.

Wireless networking in combination with bar code scanning, RFID and GPS functionality enables two key functions required to achieve maximum efficiency in the yard function:

- Instant yard-wide visibility of all assets that are in the yard at any point in time.
- The ability to dynamically dispatch tasks in real-time to workers throughout the yard to achieve maximum productivity from the yard labor force.

Through mobility — the wireless extension of computing power and automated data collection — the many pain points in today's yards are easily addressed. In addition, it is through mobility that an invaluable event occurs — the tight integration of the yard into the supply chain. In the following pages, we will examine the specific pain points, how mobility addresses those pain points, and how mobility enables a new level of synchronization in your supply chain — providing benefits that reach well beyond the yard to your bottom line.

Pain points in the yard

At first glance, yard management may appear simplistic in nature, primarily consisting of the direction of trucks as they arrive to either pick-up outbound loads or unload incoming product. But yard management is no small feat, significantly complicated by sheer volume, pace, and the large amount of data necessary for efficient management. Every day, yard staff must manage the arrival, departure, loading and unloading of numerous trucks at many dock doors — often located in

multiple buildings on campus-style environments — as quickly as possible and without error. And efficiency is heavily dependent upon visibility into a wide range of information. — from the location of trailers and what is in the trailers to the location of yard dogs and inventory status in the warehouse.

Gate, dock, asset and labor management are key areas in the yard where inefficiency can occur.

Gate management

The gate is the point of entry into the yard for every inbound truck, regardless of whether it is carrying inventory to be delivered, or arriving to pick up an outbound shipment. For inbound loads, drivers present appropriate paperwork (such as bills of lading) to the guard at the gate, who then matches the load with the appropriate purchase orders for inbound shipments. The guard then notifies yard dispatch of the arrival of the shipment, and drivers wait for dispatchers to respond with the instructions to either proceed to a specific dock for immediate unloading or for a location to drop off the trailer.

For drivers arriving to pick up an outbound load, the guard again reviews the appropriate paperwork and notifies dispatch of the truck's arrival. Dispatch then determines which load is most appropriate for this particular truck, and provides instructions to either proceed to a specific dock for loading, or to a specific drop off location for the trailer to be filled at a later date.

When gate management is performed primarily with pen, paper and clipboard, the cumbersome error-prone process can result in gate congestion — and even the direction of the wrong trailer to the wrong dock at the wrong time.

Dock and scheduling optimization

In the manually managed yard, as trucks arrive, supervisors sift through paperwork to create a schedule that dictates which trailer should be brought to which dock at what time. Achieving peak efficiency in this function requires visibility into many metrics associated with trailers — what type of trailer, freight characteristics (for example, cold vs. dry storage), load urgency (a specific trailer may contain product that is out-of-stock in the warehouse) and more. Not

only is this information not readily available in a manual management system, but the inability to see the big picture changing as trucks continue to arrive and depart throughout the day significantly hampers the ability for supervisors to create a schedule that truly maximizes efficiency at the dock.

Labor and asset optimization

Another key aspect of yard management is to create a schedule that enables the most efficient use of workers and yard dogs. Managers need visibility into where workers are located in the yard to ensure that the next task takes advantage of the worker's existing location, and does not require unnecessary travel to other parts of the yard — wasting laborer time, reducing asset utilization, and increasing maintenance and fuel costs.

In addition, task lists are usually communicated via two-way radio. In the noisy environment of the yard, instructions can be easily misunderstood, which can result in the delivery of the wrong trailer to the wrong dock at the wrong time — a costly mistake.

Other areas of concern: carrier and fleet-related issues

New hours of service laws now include time spent idling and waiting as part of a shift. Drivers are now considered on the clock, regardless of whether they are actually driving on the road, sitting in the yard waiting for a dock assignment, or waiting at the dock for the truck to be unloaded. Whether you have your own fleet or utilize the services of a third party logistics provider (3PL), non-driving time needs to be minimized in order to avoid carrier penalties or unnecessary high labor costs.

Summary: the negative impact of the manual yard

Manual management of the yard has a significant impact on the efficiency of the yard — and the cost of running the yard from an operational standpoint. Issues arising from congestion at the gate and dock and inefficient use of space, assets and your labor force include:

- Out-of-stocks in the warehouse and inability to fulfill orders — when the needed inventory is sitting in the yard in a trailer.
- Spoiled product from vehicles carrying perishables loads.
- Poor utilization of trailers.
- Poor utilization of yard workers.
- Lost trailers.
- Data entry errors that result in the delivery of the wrong trailer to the dock.
- Increased trailer detention fees (demurrage).
- Increased penalties for idling and late return of trailers.
- Late deliveries.
- Reduced customer service levels through the inability to consistently meet customer delivery timeframe requirements – and possible lost customers.
- Higher labor costs: The inability to see exactly what is on the truck down to the SKU level can result in inefficiencies in the put-away process in the warehouse, as workers must wait for the identification of the items in the shipment and proper instructions for where to place the incoming inventory.
- Out-of-stocks and lost sales: When trucks are not efficiently routed to the receiving dock, the undue delays can ripple into the late arrival of incoming inventory to the warehouse shelves, which can cause costly out-of-stocks (OOS). The effect continues to ripple through the business — out of stocks can result in the inability to fulfill orders, lost sales, reduced levels of customer satisfaction — and customer retention.

In the warehouse: shipping

Lack of synchronization between the yard and the shipping function in the warehouse can lead to:

- Reduced customer service levels: A truck that is loaded later than expected can result in the deterioration of service levels to customers — and their end customers. For example, late delivery of a shipment to a customer, such as a retail outlet, might affect the retailer's ability to deliver product as promised, which can lead to lost sales and lost customers.
- Increased costs: The inability to see what trailers are in the yard at any point in time makes it difficult for dispatchers to match loads with the best trailers. The result is poor utilization of trailers and excessive mileage, translating into higher freight costs and higher maintenance costs.

Beyond the yard: pain points in the supply chain

You may decide to mobilize your yard and gain significant efficiencies, but if the yard is not connected to your other business processes, the yard operates as a silo. And this 'silo' effect can significantly deteriorate the benefits gained from automating the yard.

The yard touches your supply chain in two critical points in the distribution process, both in the warehouse: upstream in receiving, and downstream in shipping. Lack of synchronization between the yard management system (YMS) and the warehouse management system (WMS) restricts the visibility of yard information to the boundaries of the yard system, impacting overall profitability and service levels in the enterprise in a number of areas.

In the warehouse: receiving

Lack of synchronization between the yard and the receiving function in the warehouse can lead to:

Maximizing efficiency in the yard with mobility

Mobility in the yard helps enterprises maximize automation, reduce errors and increase throughput in the yard — without adding staff or assets. A new level of information visibility is achieved — and the sharing of this information with your other business systems forms a bridge that enables new levels of efficiency in the travel of supplies and goods throughout your supply chain.

Mobility in the yard delivers excellent returns for two market leaders

A leading food and agricultural products and services provider to customers in over 50 countries around the world achieved:

- An annual return on investment of 18% on a \$400,000 yard management system
- Savings of over \$1.5 million on planned building modifications to support expansion

A leading supermarket and drug store chain achieved:

- Expansion of distribution facility by 33% without increasing yard size
- A five year benefit of over \$5.5 million
- Discovery of 20% underutilization of fleet, leading to fleet size reduction

Source: ARC Advisory Group

Mobility enables many new capabilities in the yard, including:

- Instant identification and reconciliation of vehicles and loads as they arrive at the gate.
- Verification that yard jockeys are picking up the right trailer at the right time.
- A yard-wide view of all assets — from trailers awaiting unloading to the location of yard dogs and more — enabling dispatchers to create the most effective dock schedule possible.

The enabling technology in the mobile yard

A yard mobility solution enables the wireless collection, access and dissemination of information throughout the yard, wherever and whenever needed. This is accomplished through the addition of enabling technology, including:

- A wireless LAN, enabling real-time communications from anywhere in the yard.
- Permanent hardened RFID tags placed on your yard assets from your trailers to your yard dogs, enabling automated rapid inventory takes, instant identification at the gate, and easy location of a specific trailer.
- Temporary RFID tags issued for non-owned assets to enable easy tracking of all non-owned assets.

- Fixed RFID readers at the gate to enable automatic load identification for shipments that are tagged with RFID tags.
- Mobile RFID readers to enable a number of capabilities, from allowing workers on a yard dogs to: take inventory in the yard in minutes, identify a specific trailer, or verify the contents of a specific trailer.
- Handheld or fixed/vehicle mount mobile computers with any combination of voice, bar code scanning, RFID and GPS capabilities to enable:
 - On-the-spot capture of bar codes to identify shipments that are not tagged with RFID labels or for exceptions of RFID-tagged shipments.
 - A quick scan of an RFID tag on a trailer to ensure workers pick up the right trailer.
 - Mobile access to productivity enhancing applications.
 - Transmission of information collected in real time to any and all other critical business systems that can leverage the data.
 - Individual and walkie-talkie style voice communications.

The automation of many tasks can result in significant improvement of worker productivity throughout the yard, enabling the same staff to handle an increase in volume in the yard — without affecting service levels. For example, when a yard dog is outfitted with a mobile RFID reader, a worker can take a complete inventory in a typical warehouse yard that is approximately 350k to 500k square feet in just twenty minutes — a task that, performed manually, can often take up to half a day.

Benefits in the yard

Following is a summary of the how and where mobility benefits the various functions in the yard.

Improved gate throughput

Without mobility, companies can resolve gate congestion by adding guard stations and guards — a significant expense. But when guards are outfitted with real-time mobile computing devices, the check in process for arriving vehicles can be highly automated — trucks can be immediately identified and loads reconciled with purchase orders, eliminating long delays at the gate.

Improved load sequencing at the dock

With mobility, you are assured that the right trailer is scheduled for the right dock at the right time. Dispatchers no longer need to wait for paper to trickle down from the guard station to obtain the information needed to best schedule dock appointments — the information is transmitted wirelessly the moment it is collected. Now, all the critical information dispatchers need to create the most effective dock schedules is instantly available, including:

- Trailer type
- Trailer content — down to the SKU level

- Load type — such as perishable, dry or hazardous
- Length of time trailer can be on the lot before penalty charges are issued by the carrier
- Purchase order(s) associated with the load — and if there are any errors or exceptions

Improved employee productivity

The automation of many tasks can result in significant improvement of worker productivity throughout the yard, enabling the same staff to handle an increase in volume in the yard — without affecting service levels. For example, at the guardhouse, the reduction in paperwork enables one guard to handle more transactions. When a yard dog is outfitted with a mobile RFID reader, a worker can take a complete inventory in a typical warehouse yard that is approximately 350k to 500k square feet in just twenty minutes — a task that can often take up to half a day. And instead of searching for the right trailer, workers on yard dogs are now provided with the exact location of the right trailer — and a quick scan of the RFID tag with a handheld or vehicle mount mobile computer provides a valuable double check to ensure the trailer is correct.

Improved labor management

The highly mobile nature of the yard workforce presents a number of issues. Yard workers are on the move, on the way from the dock to the yard to

pick up a trailer, out in the yard taking inventory, or towing a trailer from the yard to the dock. Typically, task assignments are verbal only, received via a two-way radio. Verbal communications in the noisy yard environment can be easily misunderstood, leading to errors in the delivery of trailers — and verbal communication of tasks did not allow for any type of audit trail to analyze worker performance, from either an error or task volume perspective.

When yard workers are armed with a mobile computing device, the ability to issue a written task to a worker can greatly eliminate errors. Workers can acknowledge when the task is complete, and your system can show the error rate and volume of tasks for all of your workers. Two-way radios can be eliminated — in the event you wish to maintain voice communications with your yard jockeys, you can select an integrated voice and data device that will allow you to place a call to one or all yard jockeys (via one-to-one and one-to-many walkie-talkie style voice communications). And Voice-over-WLAN (VoWLAN) capability delivers cost-effective voice as well as data communications for yard workers.

Improved asset management

With yard-wide visibility of your assets, utilization can be significantly improved. The ability to select the right trailer for the right load improves load aggregation and trailer utilization. The availability of a wealth of asset utilization data enables the enterprise to assess the productive use of the entire fleet — the information might reveal that the fleet could be reduced, which would ripple into a significant reduction in capital expense as well as maintenance costs.

In addition, the ability to better schedule the use of yard dogs results in less miles traveled (fuel savings), again saving on maintenance and extending the lifecycle, improving the total cost of ownership (TCO) for this critical piece of yard equipment.

New capabilities

The new expanded view of the entire yard enables the implementation of two functions that can further enhance the productivity in the yard: cross-

docking and interleaving. Since dispatchers can now see that a shipment has arrived, exactly what is in the shipment, and the entire dock schedule, appropriate shipments can be cross-docked, significantly reducing shipment handling time and inventory handling cost.

That same visibility also enables very judicious movement of trailers, known as interleaving. A trailer parked at an inbound dock for unloading might be identified as the right type of trailer for an outbound load that is ready on a nearby dock. Instead of returning the trailer to the yard, the trailer can be delivered immediately to the outbound dock for loading — rather than taking an interim trip to the yard.

Benefits beyond the yard

When the yard management system is tightly integrated into the tangential areas of your supply chain, incremental benefits can extend across the enterprise to:

Increase employee productivity in the warehouse

When the yard management system is connected to the warehouse management system, workers in the warehouse's receiving department already know what products are in an arriving shipment as well as the suggested location for put-away, and can be ready to act the moment the shipment is removed from the truck. Time spent identifying the shipment to obtain that information is eliminated, expediting and reducing errors in the receiving process in the warehouse.

Improve fleet utilization in the transportation function

When the yard management system is connected to the warehouse and transportation management systems, load aggregation is improved and scheduling is optimized which in turn improves truck utilization. Fewer miles are driven, translating into less maintenance and a reduction in fuel costs — all ultimately leading to a reduction in shipping costs.

The mobile yard — a strategic business initiative

The many tactical efficiencies that mobility affords in the yard and in the distribution supply chain combine to deliver a number of strategic business benefits that improve competitive positioning and profitability, as well as position the enterprise for cost-effective growth:

- Real-time data allows the streamlining and automation of processes, helping to maximize productivity and throughput in the yard.
- The integration of real-time yard information into other related business systems enables a new level of supply chain synchronization — and efficiency.
- Operational costs are reduced:
 - The same number of workers can now handle more tasks.
 - Detention charges are reduced since idling and wait times are significantly reduced.
 - Additional detention charges are minimized through visibility into the length of time each trailer has been in the yard — and the date by which it must be returned.
 - More efficient load aggregation can reduce mileage, driver time, truck maintenance and fuel costs.

- Increased yard capacity with your current level of assets and labor enables an expansion of the distribution center — without requiring the same investment in an expansion of the yard.
- Customer service levels are enhanced — shipments leave the yard on time and arrive at the customer location on time.
- Granular visibility into performance metrics enables continuous improvement — A complete audit trail and history file for all transactions in the yard enables better analysis of yard performance. Enterprises are now equipped with the information to ensure that key performance metrics are met — from labor standards to gate check-in times and turnaround times for trailer pickup.

For more information

For more information on how you can reap the benefits of mobility in your yard operations, please visit us on the web at:

motorola.com/supplychainmobility

or access our global contact directory at:

motorola.com/enterprise/contactus



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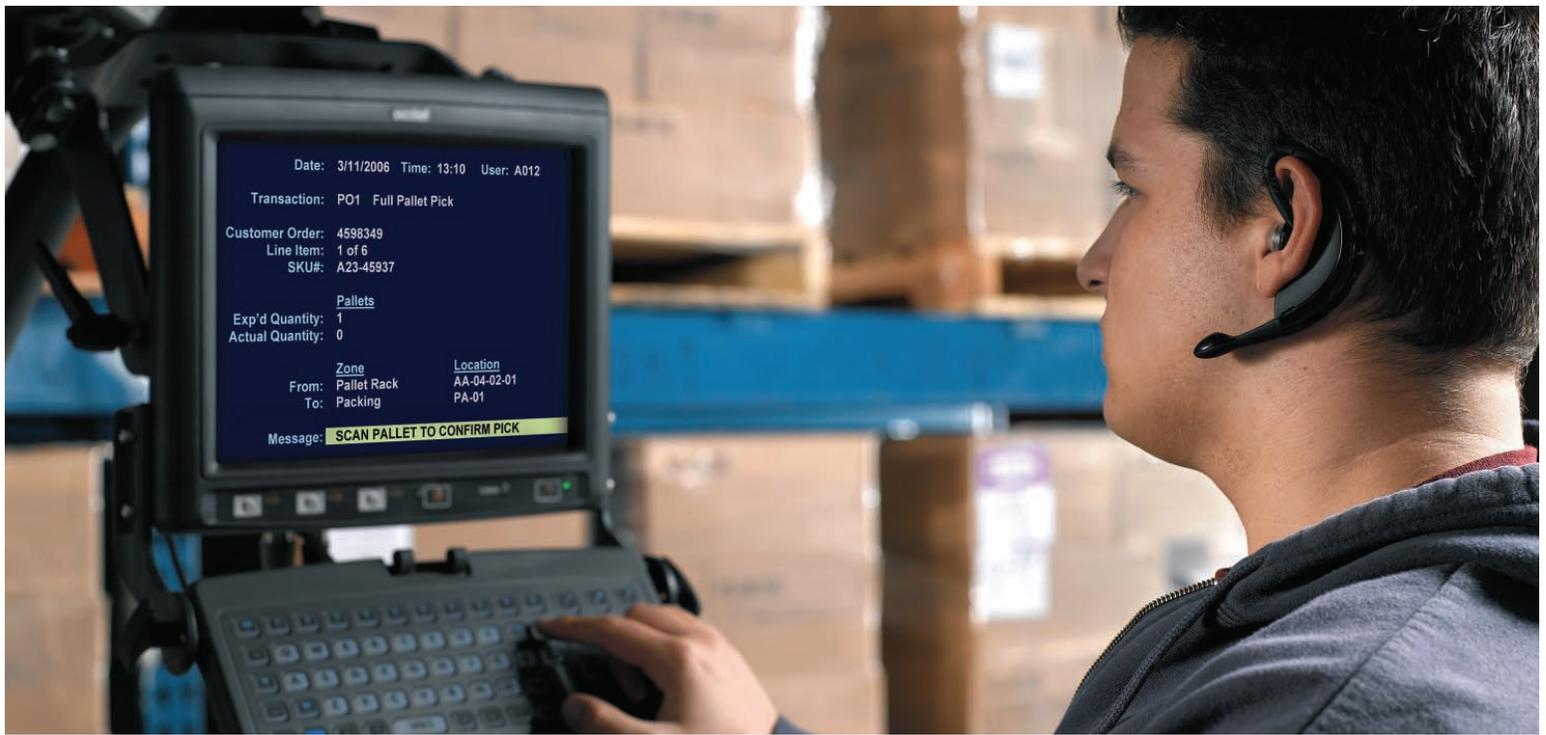
The Synchronized Distribution Supply Chain: Best Practices in Labor Management



About Motorola's Mobile Supply Chain Solutions

Every day, companies all over the world count on Motorola mobility solutions to keep their supply chain operations at peak productivity and profitability. When it comes to supply chain optimization, Motorola's end-to-end supply chain mobility solutions offer the expertise gained through successful proven deployments in many of the world's largest enterprises, a comprehensive and proven enterprises class product portfolio — including wireless infrastructure for seamless 'inside outside' mobility, integrated voice and data devices and best-in-class applications through a world-class partner network — and a complete portfolio of services designed to help you get and keep your mobility solution up and running to ensure peak performance and maximum value.

For more information on how Motorola mobility solutions can streamline your supply chain, please visit motorola.com/supplychainmobility or access our global contact directory at motorola.com/enterprise/contactus



Executive summary

The prior issues in this series have examined how mobility in key areas of the supply chain — the warehouse, yard and transportation — can deliver significant process efficiencies for improved overall productivity and service levels. In this final issue, we examine the remaining aspect of supply chain optimization — labor management. The mobile labor management system is an additional layer that wraps around your mobile warehouse, yard and transportation systems, leveraging the information already in those systems to enable unprecedented visibility and control over the productivity of one of the largest supply chain costs — the workforce. The mobile labor management system draws on the granular information afforded through mobility in your other supply chain management systems to unlock the maximum potential of your workforce. Where mobilizing your warehouse, transportation and yard management systems improves productivity in your business processes, it is the mobile labor management system that enables managers to improve the productivity levels of individual workers. In the following pages, this white paper examines how the mobilizing the labor management system can enable enterprises to

maximize the value of warehouse and other mobility solutions as well as create a significant competitive differentiator — a 'lean workforce machine' that enables the day-in and day-out delivery of superior customer service.

Background: do you really know where your workforce is...and what they are doing?

Throughout the supply chain, the workforce often represents one of the largest costs. While the mobile extension of key business applications offers major productivity improvements across business processes — from the manufacturing line to the warehouse and the yard to delivery drivers out on the road — better management of this labor pool can further improve productivity, reduce the cost of doing business and increase profitability.

In addition, these typical cost centers can become one of your largest differentiators with proper management. When employees understand expectations, the metrics they need to achieve and how their job affects the success of the company, the workforce will strive to perform to the best

Adding mobility to your labor management system drives efficiency into the management of your workforce, providing the right-now visibility needed for the real-time management agility that can turn your workforce into one of your most important competitive advantages.

of their ability — delivering a superior customer experience. Customer service, satisfaction and retention levels will be improved, providing real competitive advantage.

Best workforce management practices require the ability to monitor and measure the productivity of workers. Are tasks being performed quickly, or are they taking longer than necessary? Are workers taking too many breaks? Who are your top performers from a productivity standpoint? How much time during the workday is unproductive — and how is that unproductive time spent?

A labor management system (LMS) can automatically collect, analyze and manage this information. But without mobilizing your LMS, managers are assessing past performance. Regardless of whether management data is reviewed daily, weekly or monthly, it is historical data that can only allow the manager to determine how to better manage in the future — it does not allow the manager to affect productivity levels in real time.

But when you add mobility to your LMS, the enterprise enjoys maximum visibility and control of the workforce. Your workers already have a mobile device in hand, for example in the warehouse in

your receiving or picking operations. Adding mobility to your LMS not only enables you to leverage the mobile solution you have implemented in the warehouse, it provides the real-time information managers need to proactively respond and direct labor throughout the day to maintain or increase worker productivity. Without mobility in the LMS, managers must spend time at a desk reviewing historical data to determine how long a specific task should take, who is the most productive and who needs improvement in order to develop a plan to increase future productivity. But mobility delivers crucial information in real time right to a manager's mobile device. Managers can remain on the floor, where they are most effective, yet maintain a constant window into workforce performance — and what actions can be taken right now to maintain or increase productivity.

You may already be enjoying the process efficiency improvements associated with mobilizing the warehouse, transportation and/or yard management systems. But by adding mobility to your labor management system, you enjoy a new layer of information — real-time workforce performance data. And with this information in the literal palms of your managers, each and every individual in your workforce can achieve and maintain desired productivity levels.

The mobile Labor Management System (LMS) — opening a new mine of valuable real-time management data

Mobility drives efficiency into your operations by enabling point-of-activity processing throughout the supply chain management. For example, mobilizing the warehouse management system (WMS) enables enterprises to achieve a new level of productivity from receiving to shipping. Mobility in the yard management system (YMS) streamlines gate and dock management and more. And mobility in the transportation management system (TMS) enables real-time proof-of-delivery and automated regulatory compliance for delivery drivers.

Adding mobility to your labor management system drives efficiency into the management of your workforce, providing the right-now visibility needed for the real-time management agility that can turn your workforce into one of your most important competitive advantages. Now, an amazing wealth of information is at the literal fingertips of your managers, always visible on the manager's mobile device. For example, when mobile computers are utilized in warehouse put-away operations, your warehouse management system is automatically collecting information on each task that is performed — the time the task was started, what was put away and in what location, and the time the task was completed. When that information is supplied to a mobilized labor management system, the data can be automatically analyzed and the results delivered to a manager's mobile device. Now, managers have the data needed to monitor and affect employee performance in real-time — without ever leaving the warehouse floor.

Instantly and with very little effort and error, managers can see how employees are measuring up — from the time it takes all workers to complete the same tasks to the ability to easily spot your top achievers and underperformers. Managers can even be notified when a specific worker or

workgroup falls below pre-set performance metrics, enabling real-time protection of productivity levels. Armed with this information, the enterprise can see specifically where workforce inefficiencies are located (from which department to specific individuals within the department), and more importantly, the steps to take to eradicate those inefficiencies and achieve continuous improvement throughout supply chain operations.

Following is a discussion of each of the key pain points associated with labor management, how mobile labor management addresses these areas, and the strategic benefits for the enterprise.

*[Note – see previous papers in this series for a complete discussion of how mobility in each of these systems contributes to the leaning of the supply chain.]

Achieving best-in-class labor management

Best-in-class labor management deployments enable a number of key capabilities:

Automation of time and attendance systems

With a mobile labor management system, the time and attendance function can be completely automated. For example, warehouse employees can use the same mobile device used to process tasks throughout the day (such as put-away, picking or shipping) to quickly scan the worker's own security badge, automatically collecting 'time in' and 'time out'. Employees are free to start work immediately — the trip to the time clock is eliminated. The elimination of the punching of time cards eliminates the need for an administrator to collect, calculate and enter the information into a computer system. And the automation of the data collection virtually eliminates the possibility of error, eradicating time that might have been spent resolving employee disputes over time worked or correcting paychecks due to an error in data entry.

The automation of what might seem on the surface to be a simple and efficient system (such as a punch clock) can deliver big benefits. According to the American Payroll Association, automating time and attendance processes typically saves \$1000/ per employee/per year* — delivering an annual savings of a half a million dollars in a facility with 500 workers.

(* Trends in Time and Attendance, presentation at the 22nd Annual Congress of the American Payroll Association, April 27, 2004.)

Visibility into productivity... and performance metrics

A mobilized labor management system enables enterprises to determine how efficiently each employee performs a given task. When integrated into your entire supply chain management system, labor management data can provide a powerful look at who is doing what and how long it takes. And the availability of granular data ensures an ‘apples to apples’ comparison of productivity measures. For example, to support the accurate comparison of performance metrics of pickers in a warehouse, you need to know much more than the number of orders each employee picked. Integration with the WMS provides this information, allowing you to factor in the type of equipment in use (such as a forklift or hand cart), item location (within reach or high on a top shelf), item size and any special handling requirements (for example, for highly fragile items) for meaningful metrics that provide a fair assessment of employee performance.

With a mobile labor management system in place, enterprises can further leverage the information collected through the mobile devices carried by individual workers in the warehouse, in the yard or the drivers in your trucks. The aggregation of information from the warehouse, yard and transportation mobility solutions into the mobile labor management system allows enterprises to easily and automatically monitor, track and analyze the time each employee spends on each task — and push the results to the manager’s own mobile device. The resulting rich repository and

availability of real-time data allows granular real-time management of your supply chain workforce. When a mobile labor management system is layered on top of mobility in the warehouse, yard and/or transportation functions, managers can:

- Determine achievable realistic and task-specific key performance metrics to enable a meaningful measurement of individual employee productivity levels.
- Track individual worker performance against those metrics.
- Identify all non-productive time, including where it is spent, how much it is costing the enterprise — and how that time can be eliminated.
- Identify the most productive employees to ensure those workers receive recognition and incentive to continue their excellent performance.
- Identify underperformers — and develop a plan for improvement tailored specifically to help that employee achieve key performance metrics. For example, maybe the employee needs additional training on a specific task — or simply needs to spend more time working and less time on breaks.
- Understand the true capacity of the workforce to ensure the bar for departmental metrics is properly set.

The result? Managers now have the visibility needed to get and keep the workforce operating at peak productivity. The same workforce can do more in the same amount of time, maximizing the dollars spent on labor and improving the velocity and throughput throughout supply chain operations.

Continuous and automated performance feedback

A key aspect of labor management is clear communication of achievable goals that are linked to the company’s strategies. While goal setting to achieve specific objectives is standard in the ranks of upper management, line employees are

The relationship between real-time labor management and your profitability

Do you need to implement a real-time labor management system? Consider the potential financial impact:

- Do you realize that the automation the time and attendance function typically yields a return of \$1000 per year per employee?
- Do you know how much time your employees are wasting on non-critical tasks — and how much that inefficiency is costing you?
- Do you know the potential capacity increase that would be possible if your workers were to achieve maximum productivity levels — and how that would impact your staffing costs?
- If employee turnover was significantly reduced, what might the financial impact be from the ability to maintain a more experienced workforce that reduces training needs, requires less management — and made fewer errors?

rarely given goals that are aligned with corporate objectives. Robert S. Kaplan and David P. Norton noted that only 7 percent of U.S. line employees are given goals that are rooted in top level corporate strategy — the remaining 93 percent do not have visibility into what the company is trying to achieve or improve, and without that knowledge, cannot actively assist the enterprise in achieving those goals.

For example, too often, workers in the warehouse are given goals based on averages that do not reflect the actual time required to complete a specific task in the warehouse. These averages can result in metrics that are simply not achievable. And workers that know they are unable to meet metrics set for a specific task will often 'cherry pick' the easiest tasks to meet their defined performance goals. The unrealistic averages fail to incent workers to complete the right tasks at the right time, and as a result, crucial tasks may not be performed on a timely basis.

The real-time labor management system changes that. With mobility in your warehouse function, you are already collecting a great deal of task-related information through the mobile devices your warehouse workers use to perform those tasks. When that information, initially collected by your

warehouse management system, is integrated into your labor management system, realistic and achievable goals can be set for the many types and varieties of tasks your workers perform throughout the day.

Workers now can be given a work standard that matches the specific task. Once the workers realize that the standards are fair, the incentive to cherry pick tasks is eliminated and overall operational efficiency is improved. In addition, performance feedback can be sent in real-time to a worker's mobile device. The same mobile devices your workers are using throughout the day to increase task efficiency can also provide the two-way communication needed to dramatically improve management capabilities and techniques. Now, instead of presenting employees with a piece of paper that outlines goals, enterprises can enable daily and ongoing communication of goals and performance compared to goals. For example, at the beginning of the workday, when a worker logs on to their mobile device, a screen can present the employee's personal goals — a daily reminder to help keep workers focused in the right direction. At the end of each workday or weekly, the system can automatically calculate the performance improvement the employee achieved, and present a chart that shows the employee how much

When a labor management system is integrated with other key supply chain systems — such as the warehouse, transportation and yard — and the crucial element of mobility is added, the true potential of the labor management system is unlocked. The real-time monitoring and reporting capabilities provide real-time visibility into productivity levels throughout the supply chain, enabling proactive ‘right-now’ management of the workforce — a continuous improvement loop that allows the enterprise to strive for and achieve maximum labor productivity potential.

performance has improved and how close they are to achieving their personal goals — as well as departmental goals.

In addition, the enterprise can dynamically refine and update goals in real time based on the continued compilation of data from the warehouse mobility solution, ensuring that goals remain realistic despite changes that may take place in the work environment.

In order to achieve peak workforce productivity, workers need to understand clearly what it takes to achieve or exceed expectations — and what the reward will be for doing so. The combined data collection and communication capabilities of your mobile warehouse and labor management solutions enables the delivery of real-time management information right to the fingertips of employees as well as managers, providing a vehicle for continuous improvement in workforce productivity levels.

Better resource planning

When information from your mobile warehouse and other supply chain management solutions is integrated into your labor management system, managers have visibility into the true capacity of the workforce for improved resource planning. Armed with this information, managers can anticipate

the peak and valleys that may occur throughout the year and better plan staffing requirements to address fluctuating demand. For example, during holidays when orders are at an all-time high with high customer expectations for shipment turnaround times and order accuracy, managers can better determine when and how many additional workers will be required to ensure service levels are preserved during this critical business period. With proper manpower planning, the value of this large cost center can be maximized, allowing managers to ensure that:

- The right workers are on staff at the right time and assigned to the right tasks — reducing errors and increasing customer service levels.
- The need for temporary help is reduced, improving control and reducing staffing costs.

Better management... with less management time

Just as your mobile warehouse, transportation and yard solutions leverage mobile computing to eliminate paperwork and administrative tasks, the mobile labor management system does the same. Managers can better manage workers in less time through two key capabilities: the automatic collection and analysis of information

from your mobile warehouse or other supply chain management solution, and the two-way communication that allows the delivery of pertinent information to the mobile devices of managers as well as their staff. The result is:

- The elimination of many manual administrative tasks — such as the compilation of data to obtain key metrics or regular meetings with employees to discuss goals and progress towards goals.
- The ability to provide a continuous feedback loop to the workforce with virtually no effort, significantly promoting employee self-direction. Real-time on-the-job performance monitoring, clear communication of job expectations — from how long tasks should take to how many tasks should be completed in a day and what is an acceptable amount of break time — and real-time communication of current performance metrics promotes a self-driven workforce.

And when the workforce strives to better manage itself, managers are free to focus on higher level management initiatives.

Beyond labor management: better enterprise-wide management

While mobility in your labor management system provides the capabilities required to better manage by department as well as by individual, it can also provide a rich enterprise-wide data library to enable comparison of the same department (for example receiving) in all your warehouses around the world — or a comparison of overall supply chain management at each of your facilities.

This information provides the support needed to improve labor management as well as general management across the enterprise. For example, the ability to spot which of your facilities — perhaps a manufacturing plant or warehouse — are least productive enables a proactive response that will best benefit the business. Perhaps the facility simply needs the specific metrics achieved in your most productive office as a goal. Or perhaps you might identify that a plant or warehouse could be merged with another to improve overall company profitability.

Summary: real-time labor management — a crucial layer in supply chain optimization

A labor management system is the crucial final layer in a supply chain business system. The warehouse, transportation and yard management systems allow you to indirectly manage your workers by streamlining various business processes — while the labor management system enables you to directly manage the productivity of each worker.

When this system is integrated with the other supply chain systems — such as the warehouse, transportation and yard — and the crucial element of mobility is added, the true potential of the labor management system is unlocked. Now enterprises can achieve full value from this strategic investment through real-time monitoring, reporting and communication capabilities. Real-time monitoring and reporting result in real-time visibility into productivity levels throughout the supply chain, enabling proactive 'right-now' management of the workforce — a continuous improvement loop that allows the enterprise to strive for and achieve maximum labor productivity potential. And real-time communication capabilities enable the cost-effective dissemination of the information needed to enable employees to proactively help meet high level company objectives — from individual goals to a day-to-day report of employee and departmental performance to goals.

Leveraging mobility to maximizing the potential of the LMS delivers many tactical and strategic benefits to the enterprise, including:

- Higher productivity levels: The real-time ability to see how and where each employee is spending his or her time enables proactive steps to help individuals achieve maximum productivity — for example, by providing training for an employee who is taking too long to perform certain tasks or eliminating time wasted on too many breaks.
- Increased service and quality levels: The ability to monitor the speed and accuracy of task execution for each worker ultimately helps

error-proof and improve the velocity of business. And the increase in processing speed and order accuracy leads to higher customer satisfaction and retention levels.

- **Reduced labor costs:** The increase in productivity increases workforce capacity — the current workforce can now accomplish more in a day, reducing the need to hire permanent and temporary employees to meet throughput requirements.
- **Better employee morale:** Employees understand what is expected, as well as the value they add to the company, often improving the self-respect, confidence and drive of task workers.
- **Less turnover:** Higher levels of employee satisfaction help reduce turnover, and less turnover yields a more experienced and productive workforce.
- **Higher levels of self-managed workers:** The automated and regular communication of goals versus performance levels enables employees to become more self-directed. As a result, the direct management efforts required by managers are reduced, yet the workforce is more highly motivated.

And finally a real-time labor management system delivers benefits that reach beyond the labor management function, enabling you to track the

success of other mobility solutions as well as spot hidden inefficiencies throughout the enterprise. For example, this additional layer of visibility can enable the enterprise to quantify productivity improvements in mobile warehouse applications to support return on investment calculations. It can also reveal where and how you can refine existing mobility solutions. For example, mobility in your warehouse management system might reveal that employee travel time in picking and put-away operations in one warehouse is significantly higher than warehouses in other locations. And analysis might show that a minor modification of the warehouse layout could correct the situation— and significantly improve warehouse productivity for that location. Or you might discover that workers in an expansive yard spend a lot of time roaming a campus environment to reach the break room and other needed facilities, enabling re-location to a more convenient location.

For more information

For more information on how Motorola can help you maximize the productivity in your supply chain operations, please visit us on the web at:

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