

THE INSTRUMENTED SUPPLY CHAIN: BEST PRACTICES IN YARD TRANSPORTATION MANAGEMENT

EXECUTIVE SUMMARY

The yard is key to the daily movement of goods — all incoming and outgoing shipments to customers must pass through this portal to and from the warehouse. This critical link in the supply chain is a virtual outdoor extension of the warehouse.

While inventory and order management in the warehouse often enjoy some level of automation, the management of the yard is frequently dependent upon completely manual processes.

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 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 organizations 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 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 handheld mobile computing, 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, as well as all the vehicles entering and exiting 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

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 shipments or 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 and outbound truck. 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

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.

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.

Other areas of concern: carrier and fleet-related issues

New hours of service laws include time spent idling and waiting as part of a shift. Drivers are 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 are a third party logistics provider (3PL) or have your own fleet, non-driving time needs to be minimized in order to avoid carrier penalties or unnecessary high labor costs.

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 the supply chain.

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.

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 the 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:

- 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.

MAXIMIZING EFFICIENCY IN THE YARD WITH MOBILITY

Mobility 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 the supply chain.

Mobile solutions enable 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.

Mobility in the yard delivers excellent returns

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

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:

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- 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.

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. Plus, 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.

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 BEYOND THE YARD

When the yard management system is tightly integrated into the tangential areas of the 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.

THE MOBILE YARD — A STRATEGIC BUSINESS INITIATIVE

The many tactical efficiencies that mobility affords in the yard and in the 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.
- 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

In today's ultra-competitive marketplace, your organization needs to innovate in order to cut costs, streamline efficiencies, cater to increasingly complex customer demands, and increase profitability — but you've got fewer and fewer resources to do so. Thought leadership from Motorola Next-Generation Enterprise Mobility can help get you there, and position you as a leader in transportation and logistics excellence. Visit <http://ngem.motorola.com> and www.motorolasolutions.com/transportationandlogistics to learn more. Access our global contact directory at motorola.com/enterprise/contactus.

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About Motorola's Mobile Supply Chain Solutions

Every day, companies all over the world count on Motorola's mobile 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 mobile 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's mobile solutions can streamline the supply chain, visit <http://ngem.motorola.com> and www.motorolasolutions.com/transportationandlogistics, or access our global contact directory at motorola.com/enterprise/contactus.

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