The Future of Optimization & Automation in Intermodal Terminal Operations

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Agenda

• External pressure on intermodal rail operations
• Opportunities in terminal operations
• Smart Intermodal Management System (SIMS)
• Where it’s going: Automation
Some headlines from the JOC

Chicago intermodal rail delays ‘unprecedented’ since January  Feb 22, 2018 4:06PM EST

Chicago rail backlog forces UP to restrict draymen  Mar 05, 2018 8:03PM EST

CSX suspends Chicago 59th Street Yard inbound traffic  Mar 08, 2018 6:56PM EST

Analysis: Domino effect grips US intermodal industry  Mar 13, 2018 10:18AM EDT

US intermodal rail fluidity improves, but larger questions remain  Apr 12, 2018 6:52PM EDT

US rail service delays spark frustration from shippers, lawmakers  Apr 17, 2018 4:21PM EDT

The capacity of rail and trucking to keep up with intermodal demand is being pushed to its limit.
Pressure on terminals: Surging volumes

Intermodal terminals did not see sustained relief from 2017 peaks.

Q1 2018 was the best quarter for intermodal in over four years.

Canadian National saw a 16% increase in intermodal in 2017.

Bullish outlook for intermodal volumes in 2018.
Pressure on terminals: Priority freight

With e-commerce people have come to expect rapid shipments.

Rail terminals must quickly process high priority freight even at the expense of efficiency.
Pressure on terminals: Chassis shortages

Chassis supply has big swings throughout the week.

To deal with chassis shortages

- TRAC and DCLI plans to reposition ~2000 chassis to the Chicago area
- Rail terminals enforce chassis in / chassis out restrictions

Chassis are used by hostlers and trucks to transport containers.

Without chassis rail terminals are forced to ground or stack containers to unload railcars, which results in equipment re-handling.
Pressure on terminals: Trucking capacity

**Lack of manpower**
- The ATA estimates a shortage of 50,000 drivers in 2017 and anticipates the gap to widen.

**Electronic logging device (ELD) mandate**
- Tighter enforcement of hours of service (HOS) regulations limits productivity

**Drivers shifting away from dray**
- Long waiting times at intermodal terminals with tighter HOS restrictions further hit drayage capacity
Many terminals see intense gate activity early in the week and very little demand during the weekend.

A terminal might stack containers over the weekend to deal with growing volume and devote its lifting equipment to serving outside drivers during the weekday.
Opportunities in terminal operations
Opportunities in terminal operations

Elimination of non-productive movement

Better planning of inventory

Direct service to outside drivers

Many of these opportunities are difficult to realize in the current operation because of the scale and pace of the operation

Workflow that eliminates unneeded driver and crane movement
Container planning and grooming

**Challenges in stack planning**

**Outbound:** Stacked containers may be distant from their assigned railcar

**Inbound:** Drivers may need a container that has been buried in the stacks

**Grooming opportunities**

**Wheeled:** Reposition units closer or farther from the track instead of bobtailing

**Stacked:** Surface and pre-mount containers during evening hours

Misplaced units in stacks introduces additional handling and imbalanced crane workloads
Loading off the gate

Loading a container directly from an outside driver eliminates equipment re-handling.

The wide span crane operation creates many opportunities for direct-to-car and direct-to-stack moves.

During peak hours, coordinators struggle to keep up with gate activity. Automated load planning can help the terminal capitalize on direct-to-car moves and balance crane workloads.
Smart Intermodal Management System (SIMS)
Smart Intermodal Management System (SIMS)

- Automated smart algorithm decisions to optimize terminal operations in real time
- Inbound/outbound rail operations management with optimized loading/unloading planning
- Advanced gate process to reduce the traffic congestion and integration with Trucker’s smart phone App (DMA)
- Enable network visibility and resource planning using big data from all terminals in network
- Smart work order mgmt. & unit location assignment to improve the productivity and reduce the operation cost
- GE Cloud/On-Prem platform and User Experience design provide both high usability and reliability to operations and Customer IT
### The smarts in SIMS

<table>
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<tr>
<th>SCL capabilities</th>
<th>SLP capabilities</th>
<th>SWO capabilities</th>
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<tr>
<td>Determines where to store incoming units in the yard.</td>
<td>Assign loads from inventory and in-gate to railcars.</td>
<td>Optimizes the assignment and scheduling of tasks for yard resources.</td>
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| Key output  
  • Assignment of wheeled parking slots  
  • Assignment of stack locations | Key output  
  • Assign loads to railcars from inventory and the gate | Key output  
  • Assignment of work to resources  
  • Sequencing of tasks for a resource |
| Opportunity:  
  *Inventory planning and grooming* | Opportunity:  
  *Load directly from the gate* | Opportunity:  
  *Eliminate non-productive movement* |
Smart Container Location

**Wheeled parking assignment**

- Minimize laden travel distance for hostler loading and unloading operations
- Maximize hostler cycle moves
- Maximize outside driver compliance

**Stack planning**

- Minimize loaded spreader movements
- Minimize digging operations for IB and OB activities
- Distribute crane workload for loading and stacking operations
Smart Load Planner

Optimize rail asset utilization

- Maximize slot utilization
- Minimize priority left-behinds
- Improve train aerodynamics
- Avoid train speed restrictions

Yard operations

- Minimize laden hostler and crane movement
- Minimize equipment re-handling
- Evenly distribute crane workload
- Maximize utilization of trackside real-estate

Smart load planner promotes automatic loading off the gate and improves asset utilization and operational efficiency.
Smart Work Order

**Hostler optimization**
- Minimize unproductive movement between tasks
- Minimize congestion within the terminal
- Synchronize with cranes to minimize crane idle time

**RTG/WSC optimization**
- Maximize compliance with train release times
- Maximize compliance with de-ramp target times
- Minimize crane gantry movement

Smart work order eliminates non-productive activity by sequencing work in the yard
Where it’s going: Automation
Pressure on intermodal terminals

External conditions
- High demand
- Priority shipments
- Chassis supply
- Dray shortage
- Variable gate activity

Operational need
- More stacking
- Less dependence on chassis supply
- Less re-handling
The hardware is there

**Straddle carriers**
Eliminates chassis dependence

**Stacking cranes**
Creates more capacity in the yard

**Wide span cranes**
Reduced footprint for loading and unloading
The next generation of TOS

“You can buy as much fancy equipment as you want, but without a good TOS, it’s not going to work.”

Wilby Whitt, General Manager of Intermodal CSX
US intermodal rail automation faces steep challenges, JOC

Market forces will continue to push continue intermodal terminals to run a better, more consistent stacked operation.

Automation will be the answer to this challenge and the next generation of TOS will be the enabler for automation.
Thank you!

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