Automated Container Tracking and Equipment Monitoring

John Scott, VP Location & Telematics Solutions
The world has changed

Then

Now
Ships
Bringing it all together

Inventory

Automated Gate

Fleet Management

Automated CHEs

Video Surveillance

Business Intelligence

©2008 ZIH Corp. Navis, WhereNet, Multispectral Solutions, proveo, Zebra Enterprise Solutions, and all product names and numbers are Zebra trademarks, and Zebra, and the Zebra head graphic are registered trademarks of ZIH Corp. All rights reserved. All other trademarks are the property of their respective owners.
An Integrated Approach to Terminal Management

- Business Process & Automation
  - Actionable Maps

- Control & Optimization
  - Centralized Billing

- Real-Time Visibility
  - Performance Monitoring

- Facility Planning & Control
  - Analytics

- Terminal Operating System

©2008 ZIH Corp. Navis, WhereNet, Multispectral Solutions, proveo, Zebra Enterprise Solutions, and all product names and numbers are Zebra trademarks, and Zebra, and the Zebra head graphic are registered trademarks of ZIH Corp. All rights reserved. All other trademarks are the property of their respective owners.
Stack the Odds in Your Favor

- **Operations - involve early in the project**
  - The business process will change
  - Exception cases must be part of the process

- **Deliverables - break the project into phases**
  - Big bang leads to big chaos
  - Early wins build confidence

- **Deadlines - must be realistic & achievable**
  - Business process re-engineering takes time
  - You can’t blow the dependencies and hit the end date

- **Synergy – requires a coordinated effort**
  - Multiple departments must work together to win
  - Multiple vendors must exchange data and synchronize deliverables
Automated Container Tracking

- Gate – Street Truck – Handling Equipment - Stack
- Quay - Yard Truck – Handling Equipment - Stack
Positive ID on Entry/Exit

- RFID automates validation of trucker data for registered truckers
- Facilitates administration of the Clean Truck Program
At Least Seven Players

1. **Pier Pass /Port Check**
   » Administrator and fee collection

2. **Emodal**
   » Port Community System

3. **Port Authorities**
   » Trucker Concessions

4. **Natomas**
   » Truck emissions database

5. **Zebra**
   » RFID tags, infrastructure and tracking software

6. **Truckers**
   » Register, data entry, apply tags

7. **Terminals**
   » IT & Operations
Monitor Street Truck Location in The Yard

**Locate Accuracy Example**: Blue dots indicate “locate” blinks from tagged Over The Road trucks (OTR). Tags increase their blink rate when onsite to provide real time location tracking.
Confirm OTR/CHE Container Transition

- Tag “Exciter” on leg of RTG
- Identifies the truck to be serviced and assists in matching the correct container
The Container Handling Equipment is outfitted to enable Precise container tracking without tagging the container.

1. PLC data provides lock/unlock
2. Draw wire provides height (z) for the lock/unlock
3. Position Detection System (PDS) integrates location and sensor data
4. Software provides a container position update to the Terminal Operating System (TOS)
Equipment Efficiency Manager

Equipment Monitoring

• Collect key sensor and status data from machines
• Automate key yard processes
Fleet Management

- **Machine Telemetry**
  - Collect key usage & status data from machines
  - Identify faults or alerts before damage results

- **Equipment Tracking**
  - Where is the equipment now?
  - Where has the equipment been?

- **Maintenance Management**
  - Manage maintenance alerts
  - Manage maintenance based upon usage

- **Access Control Management**
  - Limit use to authorized operators
  - Link operators to equipment (type, size, application)
**Optimized fuel process**

- Identify and reduce equipment idle time
- Increase fleet availability
- Avoid re-fueling all equipment at shift start/stop
- Avoid un-expected outages

### Fuel Status

- **Fuel Status:** below 90%
  - Since: 21 Oct 08 18:45:54
  - Time: 017:48:25

### Equipment Details

- **Name:** LM06-07
- **Group:** Aircraft Tractor
- **Area:** 25 (25)
  - Since: 22 Oct 08 12:22:12
  - Time: 000:10:07
- **GPS:** 47° 58.3139' E, 29° 14.2713' N
- **Speed:** 1 km/h
- **Moving Direction:** 24° degree (North/East)
- **Online Status:** online
  - Since: 22 Oct 08 12:20:49
  - Time: 000:11:30
- **Operation Status:** work mode
  - Since: 22 Oct 08 12:22:12
  - Time: 000:10:07
- **Engine Status:** runs necessarily
  - Since: 22 Oct 08 11:58:56
  - Time: 000:32:23
- **Service Status:** in operation
  - Since: 07 Oct 08 15:35:24
  - Time: 020:56:55
- **Assigned Status:** assigned
  - Since: 18 Oct 08 08:15:58
  - Time: 040:16:21
- **Push/Tow:** push
  - Since: 22 Oct 08 10:21:37
  - Time: 002:10:42
Equipment Utilization Charts

In Use

- Drive Mode
- Work Mode

Not in Use

- Out of Operation
- Available

and the Zebra head graphic are registered trademarks of ZIH Corp. All rights reserved. All other trademarks are the property of their respective owners.
Driver Accountability

- Savings on repairs due to vandalism or accidents
- Accountability of the driver linked to a CHE
- Role assignment
- XY impact with shock sensor

<table>
<thead>
<tr>
<th>Name</th>
<th>GSE Operator</th>
<th>Start Area</th>
<th>Start Time</th>
<th>End Time</th>
<th>End Area</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>T32</td>
<td>Lewis R.</td>
<td>B23</td>
<td>21.02.08 07:03:09</td>
<td>21.02.08 07:04:35</td>
<td>B23</td>
<td>00:01:26</td>
</tr>
<tr>
<td>T32</td>
<td>Lewis R.</td>
<td>B23</td>
<td>21.02.08 07:13:54</td>
<td>21.02.08 07:22:14</td>
<td>A15</td>
<td>00:08:19</td>
</tr>
<tr>
<td>T32</td>
<td>Lewis R.</td>
<td>A15</td>
<td>21.02.08 07:24:37</td>
<td>21.02.08 07:27:37</td>
<td>B30</td>
<td>00:03:00</td>
</tr>
<tr>
<td>T32</td>
<td>Lewis R.</td>
<td>B30</td>
<td>21.02.08 07:47:25</td>
<td>21.02.08 07:49:00</td>
<td>B30</td>
<td>00:01:35</td>
</tr>
<tr>
<td>T16</td>
<td>Lewis R.</td>
<td>A13</td>
<td>21.02.08 21:08:56</td>
<td>21.02.08 21:30:07</td>
<td>A13</td>
<td>00:21:10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>GSE Operator</th>
<th>Start Area</th>
<th>Start Time</th>
<th>End Time</th>
<th>End Area</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>T16</td>
<td>Wood M.</td>
<td>A13</td>
<td>21.02.08 07:27:51</td>
<td>21.02.08 07:31:01</td>
<td>A11</td>
<td>00:03:10</td>
</tr>
<tr>
<td>T16</td>
<td>Thomson O.</td>
<td>A11</td>
<td>21.02.08 07:44:24</td>
<td>21.02.08 07:51:06</td>
<td>A13</td>
<td>00:06:42</td>
</tr>
<tr>
<td>T16</td>
<td>Meath U.</td>
<td>A13</td>
<td>21.02.08 16:28:02</td>
<td>21.02.08 16:28:04</td>
<td>A13</td>
<td>00:00:01</td>
</tr>
<tr>
<td>T16</td>
<td>Roberts I.</td>
<td>A13</td>
<td>21.02.08 16:28:13</td>
<td>21.02.08 16:33:48</td>
<td>E</td>
<td>00:05:34</td>
</tr>
<tr>
<td>T16</td>
<td>Roberts I.</td>
<td>E</td>
<td>21.02.08 16:37:41</td>
<td>21.02.08 16:39:27</td>
<td>E</td>
<td>00:01:46</td>
</tr>
<tr>
<td>T16</td>
<td>Roberts I.</td>
<td>E</td>
<td>21.02.08 16:51:53</td>
<td>21.02.08 16:54:00</td>
<td>B21</td>
<td>00:02:07</td>
</tr>
<tr>
<td>T16</td>
<td>Kinlan K.</td>
<td>B21</td>
<td>21.02.08 17:12:27</td>
<td>21.02.08 17:13:56</td>
<td>A13</td>
<td>00:01:28</td>
</tr>
<tr>
<td>T16</td>
<td>Lewis R.</td>
<td>A13</td>
<td>21.02.08 21:08:56</td>
<td>21.02.08 21:30:07</td>
<td>A13</td>
<td>00:21:10</td>
</tr>
</tbody>
</table>
### Safety & Compliance Check list

![Asset Viewer and Manage Safety Checklist](image)

<table>
<thead>
<tr>
<th>Name</th>
<th>GSE Type</th>
<th>Body No</th>
<th>SCL Status</th>
<th># Concerns</th>
<th>Usable</th>
<th>Operation Status</th>
<th>Op Status Date</th>
<th>Duration</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>205</td>
<td>Forklift</td>
<td>10097</td>
<td>Red</td>
<td>2</td>
<td>No</td>
<td>In Service</td>
<td>10/11/07 9:14 AM</td>
<td>17:30:04:27</td>
<td></td>
</tr>
<tr>
<td>308</td>
<td>Forklift</td>
<td>74012</td>
<td>Yellow</td>
<td>1</td>
<td>Yes</td>
<td>Out of Service</td>
<td>10/10/07 3:10 PM</td>
<td>19:00:12:12</td>
<td></td>
</tr>
<tr>
<td>302</td>
<td>Forklift</td>
<td>95828</td>
<td>Yellow</td>
<td>3</td>
<td>Yes</td>
<td>Out of Service</td>
<td>11/01/08 9:30 AM</td>
<td>20:00:01:01</td>
<td></td>
</tr>
<tr>
<td>719</td>
<td>Forklift</td>
<td>13129</td>
<td>Green</td>
<td>1</td>
<td>Yes</td>
<td>In Service</td>
<td>11/01/08 7:45 PM</td>
<td>23:00:39:01</td>
<td></td>
</tr>
</tbody>
</table>

**Available Safety Questions (15):**
- Safety Question 4
- Safety Question 5
- Safety Question 6
- Safety Question 7
- Safety Question 8
- Safety Question 9
- Safety Question 10
- Safety Question 11
- Safety Question 12
- Safety Question 13
- Safety Question 14
- Safety Question 15
- Safety Question 16

**Selected Safety Questions (7):**
- Safety Question 1
- Safety Question 2
- Safety Question 3
- Safety Question 4
- Safety Question 5
- Safety Question 6
- Safety Question 7

©2008 ZIH Corp. Navis, WhereNet, Multispectral Solutions, proveo, Zebra Enterprise Solutions, and all product names and numbers are Zebra trademarks, and Zebra, and the Zebra head graphic are registered trademarks of ZIH Corp. All rights reserved. All other trademarks are the property of their respective owners.
# Performance

## Operation Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Begin Date†</th>
<th>End Date</th>
<th>Duration</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>14.04.08 00:00:00</td>
<td>14.04.08 01:45:04</td>
<td>01:45:04</td>
<td></td>
</tr>
<tr>
<td>Drive Mode</td>
<td>14.04.08 01:45:04</td>
<td>14.04.08 01:50:32</td>
<td>00:05:28</td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td>14.04.08 01:50:32</td>
<td>14.04.08 01:52:16</td>
<td>00:01:43</td>
<td></td>
</tr>
<tr>
<td>Drive Mode</td>
<td>14.04.08 01:52:16</td>
<td>14.04.08 01:58:36</td>
<td>00:06:20</td>
<td></td>
</tr>
<tr>
<td>Standby</td>
<td>14.04.08 01:58:36</td>
<td>14.04.08 02:23:28</td>
<td>00:24:51</td>
<td></td>
</tr>
<tr>
<td>Work Mode</td>
<td>14.04.08 02:23:28</td>
<td>14.04.08 02:27:24</td>
<td>00:03:55</td>
<td></td>
</tr>
<tr>
<td>Drive Mode</td>
<td>14.04.08 02:27:24</td>
<td>14.04.08 02:31:14</td>
<td>00:03:50</td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td>14.04.08 02:31:14</td>
<td>14.04.08 02:31:39</td>
<td>00:00:24</td>
<td></td>
</tr>
<tr>
<td>Drive Mode</td>
<td>14.04.08 02:31:39</td>
<td>14.04.08 02:40:26</td>
<td>00:08:47</td>
<td></td>
</tr>
<tr>
<td>Available</td>
<td>14.04.08 02:40:26</td>
<td>14.04.08 04:32:22</td>
<td>01:51:56</td>
<td></td>
</tr>
</tbody>
</table>

## Engine Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Begin Date†</th>
<th>End Date</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Off</td>
<td>14.04.08 00:00:00</td>
<td>14.04.08 01:45:04</td>
<td>01:45:04</td>
</tr>
<tr>
<td>Runs Necessarily</td>
<td>14.04.08 01:45:04</td>
<td>14.04.08 02:40:26</td>
<td>00:55:22</td>
</tr>
</tbody>
</table>
Contship Italia

**Value**

- Equipment Efficiency
- Take F1 away from driver
- Consistent data for Prime Route
- Reduce idle time when combining with RTG position information
At Least Six Players

1. **Operations**
   - Business process changes for equipment maintenance, re-fueling,

2. **IT**
   - Server setup and wireless connectivity

3. **LXE**
   - Wireless provider

4. **Zebra**
   - Location and Telematics hardware/software

5. **Mechanics**
   - Hardware install

6. **Customs**
   - Hardware approvals for Tangiers
Set Yourself Up to Win

- **Operations** - involve early in the project
- **Deliverables** - break the project into phases
- **Deadlines** - must be realistic & achievable
- **Synergy** - requires a coordinated effort