Agile Optimization in Inland Terminals

Dr. Ingo Marko
Senior Consultant | Logistics Division
Facts and Figures

- established in 1969
- organically growing, no external investors
- since 1985 always profitable
- internal ownership (directors, staff)
- today more than 500 employees
- principal corporate objective: long-term sustainability
## Business Divisions

<table>
<thead>
<tr>
<th>General Logistics</th>
<th>Manufacturing Logistics</th>
<th>Aviation Logistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Truck Fleet Dispatch</td>
<td>• In-plant Materials Handling</td>
<td>• Airport Ground Handling</td>
</tr>
<tr>
<td>• Distribution &amp; Parcel Centers</td>
<td>• Supply / Inbound Scheduling</td>
<td>• Airline Hub Operations</td>
</tr>
<tr>
<td>• Container Logistics</td>
<td>• Automotive Logistics</td>
<td></td>
</tr>
<tr>
<td>• Mobile Asset Logistics</td>
<td>• Healthcare Logistic</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inventory &amp; Supply Chain</th>
<th>Production Scheduling</th>
<th>Risk &amp; Fraud</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Inventory Optimization</td>
<td>• Production Scheduling (APS)</td>
<td>Fraud Prevention</td>
</tr>
<tr>
<td>• Advanced Demand Planning</td>
<td>• Intelligent Capacity Planning</td>
<td>• Banking Sector</td>
</tr>
<tr>
<td>• Sample Inventory Counting</td>
<td></td>
<td>• Insurance Sector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Telecoms</td>
</tr>
</tbody>
</table>
Selected Customer References

> 1,000

© 2016 - INFORM GmbH
INFORM – Core Competence

INFORM specializes in agile optimization based on Operations Research and Fuzzy Logic.

Agile Optimization
→ inspiring action

BI / Analytics
→ creating knowledge

Administrative IT
(e.g. ERP-Systems)
→ managing data

First company ever to receive Enterprise Award by German Operations Research Society (GOR).
What is “Big Data”? 
Global Data Volume by 2020

44 ZB
44 800 000 000 000 000 000 000

350 000 000 000
128 GB
The Challenge

How to hear the signal from the noise
From Big Data to Agile Decisions

Big Data → Information → Knowledge → Decision Support → Agile Optimization
Agile Optimization Software

Applying **smart optimization technologies**
- Mathematical algorithms / OR, Fuzzy Logic
- Application specific best-of-breed solutions

**Delivering rapid results**
- Very short runtimes
- Quickly adaptable to new / unexpected external factors

**Plus interactive user experience**
- Easy parameter setting & results visualization
- Users may overrule proposals at any time

Supplementing existing IT systems (ERP, etc.) for better productivity & **operational resilience**

© 2016 - INFORM GmbH
Operations Research (OR)

Powered by algorithms, there are many techniques for greatly speeding up the search for good solutions.

Yard
- Slot suitability
- Slot restrictions
- Retrieval distance
- Operational areas

Equipment
- Last/current position
- Job suitability
- Availability/time windows
- Driving times/distances

Load Unit
- Size, type, content, restrictions
- Departure time & destination
Algorithms: A Powerful Tool

Progress
1990 vs. 2010

55,000 x
1,200 x

Σ 66,000,000 x

Time to solve a planning model*

1990 2 Years
2010 1 Sec.

*using linear programming
The Daily Challenge
The Daily “Ironman” Challenge
Battle of Materiel

Head up display

Integrated lactate measurement

Electronic shifting system

“On course” goggles

Power meter
Potential for Digital Doping
6 Steps to Achieve Optimized Terminal-Fitness
Step 1: Truck Scheduler

Reduced Turnaround Times

- Optimized selection and sequence of transfer points
- Consideration of potential congestions along its route
- The integration of gate automation technology is also possible (OCR-Gate)
- Standardized gate processes provide yard managers with the necessary information in real-time
Step 2: Yard Optimizer

Tap the Full Potential

- Efficient utilization of storage areas
- Higher stacking possible
- Minimized re-handlers & distances
- Scattered stacking terminal wide or within target areas
- Real-time knowledge of all containers in the yard
- Swift decision making when container arrives or needs re-handling
Step 3: Vehicle Optimizer

Minimized Driving Distances and Times

- Increased productivity thanks to simultaneous, real-time optimization of container moves
- Reduced time for idle equipment
- Vehicle Pooling
- Integration of positioning systems
- For different resource types (Straddle Carrier, Yard Truck, Reach Stacker, Front-Row Stacker, Empty Handler)
Step 4: Crane Optimizer

Minimized Driving Distances and Times

- Increased productivity thanks to simultaneous, real-time optimization of container moves
- Minimization of additional handling equipment changes (e.g. OHF, J-Hooks)
- Minimization of spreader changes
- Proposes double-cycling when reasonable
- Dynamic crane split
- Integration of positioning systems & (semi-) automation possible
Step 5: Train Load Planning

Improved On-Schedule Performance

- Maximized wagon/slot utilization
- Minimized yard re-handling, loading distance & (pin) configuration changes
- Load plan is re-optimized in real-time when data changes
- Keeping wagon weight and height restrictions as well as axle and trailing load restrictions
- Ensuring hazardous containers are separated as per segregation rules
Step 6: Rail Scheduler

Optimizing Container Handover

- Optimization of processes between the yard and the rail area
- Aims at keeping train’s ETDs
- Highest rail productivity via look-ahead (next few hours) and real-time optimization of executable jobs and rail transfer zone utilization
- Monitors and adjusts according to the progress of jobs in the chain
Optimization of Rail Processes

Rail Crane Moves
- Optimizes job sequencing of all rail cranes
- Combines jobs where possible

Container Handover
- Optimizes each transfer between yard & rail
- Proposes handover times & transfer points

Train Load Planning
- Automatically creates optimized train load plans
- Pre-planning & Real-time
Do more with and for less

- Intelligent job assignment
- Peaks avoided
- Better space utilization
- Intelligent utilization of train capacity
- Rehandling reduced
- Reduced turnaround times
- Better space utilization

© 2016 - INFORM GmbH
Agile Optimization in Action
Container Terminal Altenwerden (CTA) – Hamburg

“Handling 500,000 boxes by rail – this is a great success for us. [...] At CTA, efficient handling processes go hand-in-hand with a high performing hinterland system”.

Oliver Dux, Managing Director, CTA

Germany’s largest Container Rail Terminal

Hinterland Steering & Optimization

- > 3 M TEU/a
- 500,000 boxes (813,000 TEU) by rail in 2013
- 9 rail tracks of 720 m with 4 RMG (30 trains/d)
- 12 tractors, 200 chassis
- 2,500 trucks/d (gate)

Photo: HHLA / Michael Zapf
KTL Kombi-Terminal Ludwigshafen

Administration & Optimization

- Up to 500,000 load units/a
- 11 tracks
- Yard optimization
- Train load planning
- Rail cranes (RMG), reach stackers & terminal tractors
- Container handover
- Multiple-step jobs
- Truck scheduling
Administration & Optimization

- 9 tracks of 740 m
- Yard optimization
- Train load planning
- Rail cranes (RMG) & reach stackers
- Container handover
- Multiple-step jobs
- Automated gate
Stay on Top!

www.inform-software.com/logistics/containerterminals
ingo.marko@inform-software.com