HYSTER

STRONG PARTNERS.
TOUGH TRUCKS.™

Intermodal Africa – Mombasa, 18.11.2016

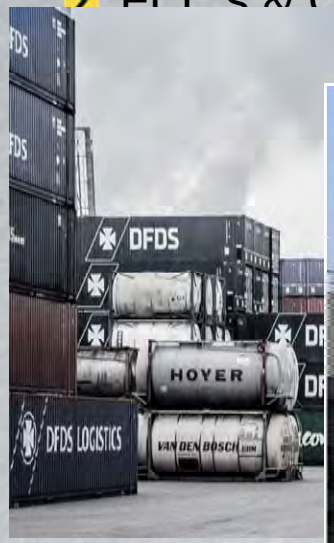
TELEMETRY TOOLS TO IMPROVE PERFORMANCE AND LATEST TRENDS IN FORKLIFT TRUCKS

AGENDA

- Today‘ s demands on Forklift Trucks in ports operation?
- Tracking of equipment: Check productivity and costs
- Clean technology / reduction of emissions
- New requirements: SOLAS
- Safety: Camera and radar assisted systems
- Ease of maintenance: Automated greasing systems (Best practice to reduce TCO)
- Demand for flexibility and SPED solutions

TODAY‘ S DEMANDS ON FORKLIFT TRUCKS?

- Skilled operators essential
  - How to make sure only trained and authorized drivers are driving?
  - How to trace / improve performance?
  - How to increase safety?
  - How to ensure proper service / maintenance?
- FLT‘ s & Container Handlers need to be flexible for c



TELEMETRY: TRACKING SYSTEMS

- Why Telemetry systems?

- Supervision of Truck Fleet and drivers
  - Who is driving
  - Where is the truck
  - Performance of operation
  - Daily checks and accident prevention

- Automated diagnostic functions
  - Truck conditions
  - Service
  - Hrs / consumption
  - Pro active maintenance

TRACKING SYSTEM

Monitoring

- Truck monitoring via web portal
- Remote Hour Meter / Usage tracking
- Cost of Operations
- PM Tracker
- Impact Sensing
- Fault code tracking

Fleet Management Module inside truck

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Access

- Truck monitoring via web portal
- Remote Hour Meter / Usage tracking
- Fault code tracking
- Impact Sensing
- Cost of Operation
- PM Tracker
- Access control by operator (swipe card)
- Unattended and/or No Operation Truck Shutdown

Card Reader

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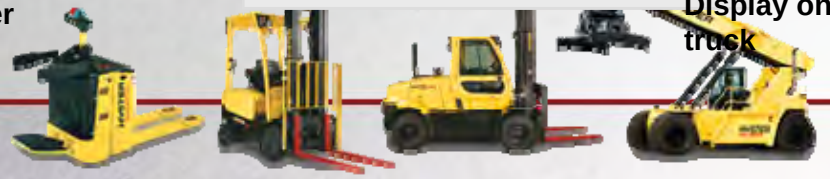
Verification

- Truck monitoring via web portal
- Remote Hour Meter / Usage tracking
- Fault code tracking
- Impact Sensing
- Cost of Operation
- PM Tracker
- Access control by operator
- Unattended and/or No Operation Truck Shutdown
- Operator pre-shift checklist

Operator Display on truck



REACHSTACKER OPERATOR PERFORMANCE

Operator	Fuel consumption	Idle	Container per hour	Fuel per container
Driver 1	14,9	49%	13,0	1,14
Driver 2	15,3	55%	13,0	1,18
Driver 3	20,0	32%	18,1	1,11
Driver 4	19,6	34%	16,2	1,21
Driver 5	18,7	27%	15,9	1,17
Driver 6	18,0	32%	15,4	1,17

Drive History Details

Selected Equipment (Total Number of Equipment : 1)

Design Center	Factory	Equipment Range	Site	Department	Product ID	Serial Number	Asset ID	Service ID	Class
BigTruck	All	All	Nijmegen	[redacted] Department and Projects	1063	C222E01681L	Asset 1063	Hyster 1	Big Truck

Session Drive Summary Period

30 SEP 2013 20:08:51 - 30 SEP 2013 22:48:37

Measurement Unit

Metric

Operator (Card Number)

[redacted] (37485)

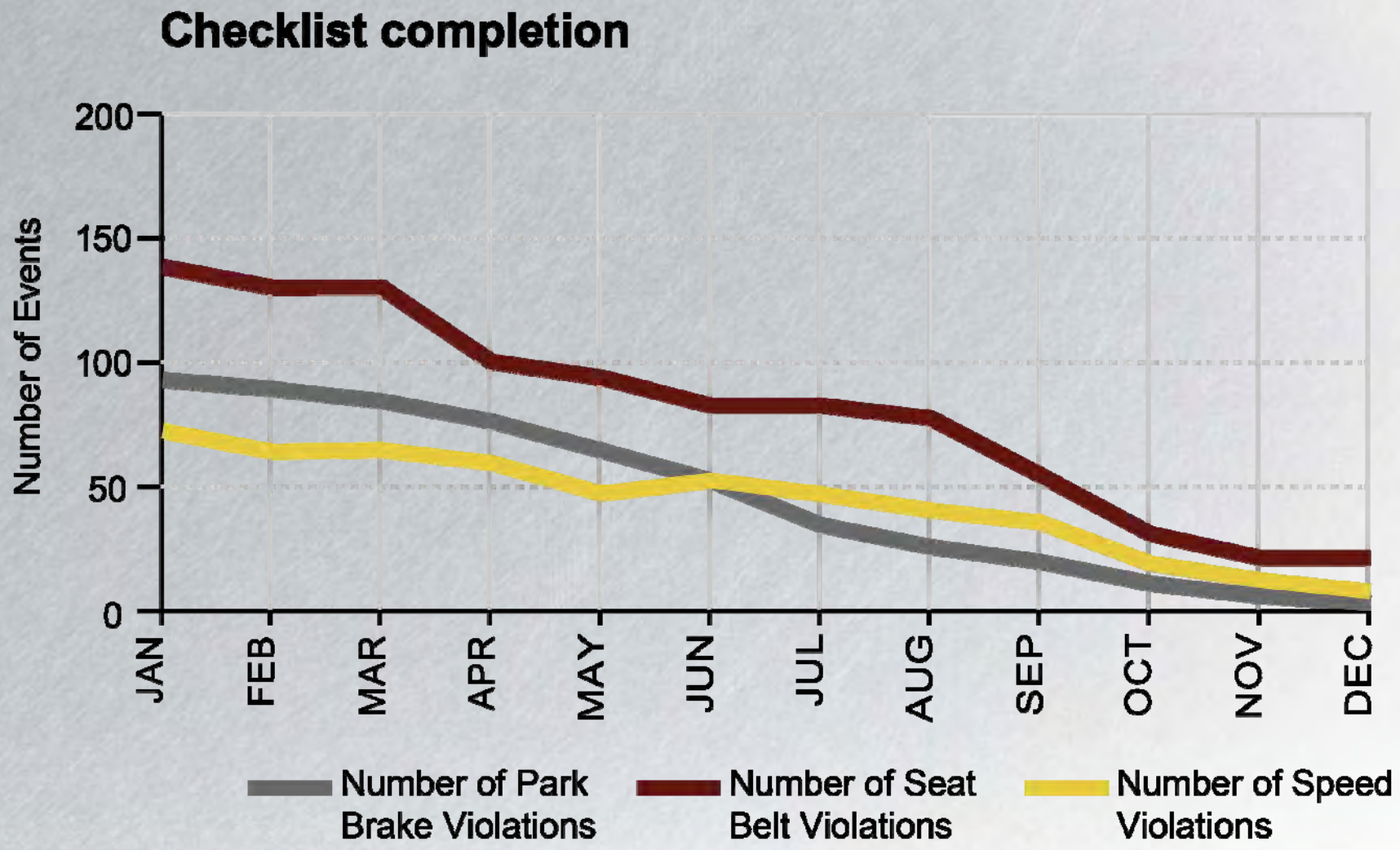
Session Details

Service Meters	Start	End	Elapsed
Main Service Meter (hours)	2254.1	2256.7	2.6
Drive Motor / Engine Runtime Meter (hours)	2254.1	2256.7	2.6
Hydraulic Operation Meter (hours)	528.5	529.1	0.6
Transmission/Traction Operation Meter (hours)	1551.6	1553.2	1.6
Odometer (km)	10154.5	10166.1	11.6

Drive History Details

Statistical Meters	Values	Notes
Key Switch 'On' Duration (HH:mm:ss)	02:39:33	
Operator Presence Duration (HH:mm:ss)	02:37:37	
Moving Duration (HH:mm:ss)	01:08:03	
Hydraulic Function Duration (HH:mm:ss)	00:37:28	
Working Duration (HH:mm:ss)	01:45:31	
Distance Driven (km)	11.6	
Lift Duration (HH:mm:ss)	00:00:00	
Lower Duration (HH:mm:ss)	00:00:00	
Auxillary Hydraulic Duration (HH:mm:ss)	00:00:00	
Average Speed (kph)	8.5	
Peak Speed (kph)	20	
Low Speed Operation Duration (HH:mm:ss)	00:35:27	* Equipment's speed is below 10 (kph)
Medium Speed Operation Duration (HH:mm:ss)	00:32:36	* Equipment's speed is between 10 (kph) and 20 (kph)
High Speed Operation Duration (HH:mm:ss)	00:00:00	* Equipment's speed is above 20 (kph)
Low Level Over-speed Count (count)	0	* Equipment's speed is between 25 (kph) and 35 (kph)
High Level Over-speed Count (count)	0	* Equipment's speed is above 35 (kph)
Low Level Over-speed Duration (HH:mm:ss)	00:00:00	
High Level Over-speed Duration (HH:mm:ss)	00:00:00	
Reverse Gear Operation Duration (HH:mm:ss)	00:07:37	
Forward Gear Operation Duration (HH:mm:ss)	00:59:01	

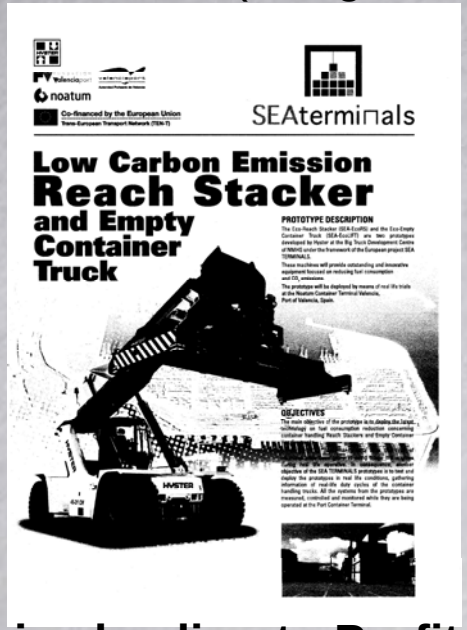
PROACTIVELY REDUCE DOWNTIME



SEA TERMINAL PROJECT: USING TELEMETRY FOR DEVELOPMENT

Target / Description:

- Reducing fuel consumption and CO2 emissions
- Prototype tested under real life trials (using telemetry system to get feedback needed)



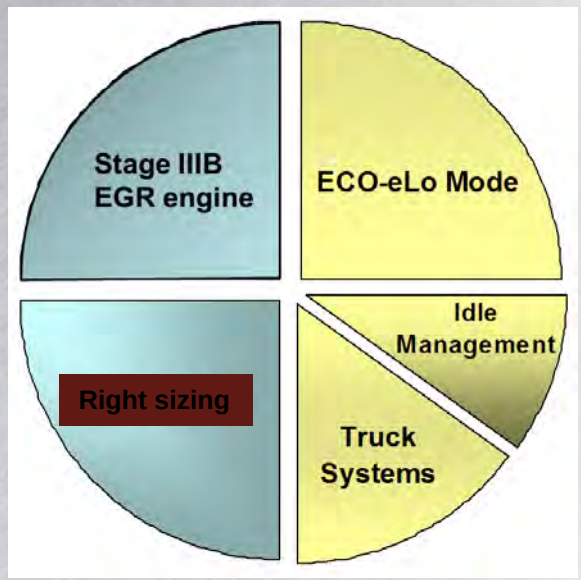
ENGINEERING PROCESS:
Connected Efficient Dynamics leading to Profitable Low Emissions

- **Connected**
- **Efficient Dynamics**
- **Profitable Low Emissions**

RESULT: STAGE IIIB / IV LOW EMISSIONS

Fuel savings achieved through

- Intelligent design
  - Exhaust Gas Recirculation (EGR)
  - Engine Right Sizing
- ECO – eLo performance mode
  - RPM management
  - Throttle Response
  - Shift point selection
- Idle Management
  - Hibernate idle
  - Optional Empty Seat Engine Shutdown
- Truck Systems
  - Cooling on Demand
  - Variable fan speed on engine, charge air cooler and transmission
  - Matched Hydraulics



Up to 20% fuel saving

SAFETY OF LIFE AT SEA (SOLAS)

Safety at Sea and in the Port

The intention is to reduce the number of accidents at sea which are caused by wrongly declared container weights.

SOLAS is an international maritime safety treaty designed to ensure that ships comply with minimum safety standards in construction, equipment and operation.

The International Maritime Organization (IMO) has announced that this new container weighing legislation will come into force from July 1, 2016.

SAFETY OF LIFE AT SEA (SOLAS)

Weighing solutions

Two methods are officially allowed - Either way the objective is to increase port safety:

Method 1

The shipper (or third party) weighs the complete packed container

Method 2

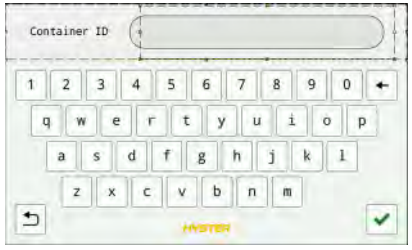
The shipper (or third party) weighs all individual items of the container

The weighing equipment used must meet the applicable accuracy standards and requirements of the State in which the equipment is being used.

1. STATIC

- Based on existing load moment system = Hydraulic pressure sensors (standard LLMI system)
  - No maintenance
  - OIML R51 class Y (b) [pending approval]
- **Standard kit:**
  - LLMI based weighing system with touchscreen operator interface
  - Data storage
  - CAN data output
- **Options:**
  - Printer
  - WIFI module
  - USB output
- **Weighting procedure:**
  - 1. Pick container (boom fully retracted)
  - 2. Raise boom up from 25 to 30 degrees angle
  - 3. Verify and send weight

Container ID entry



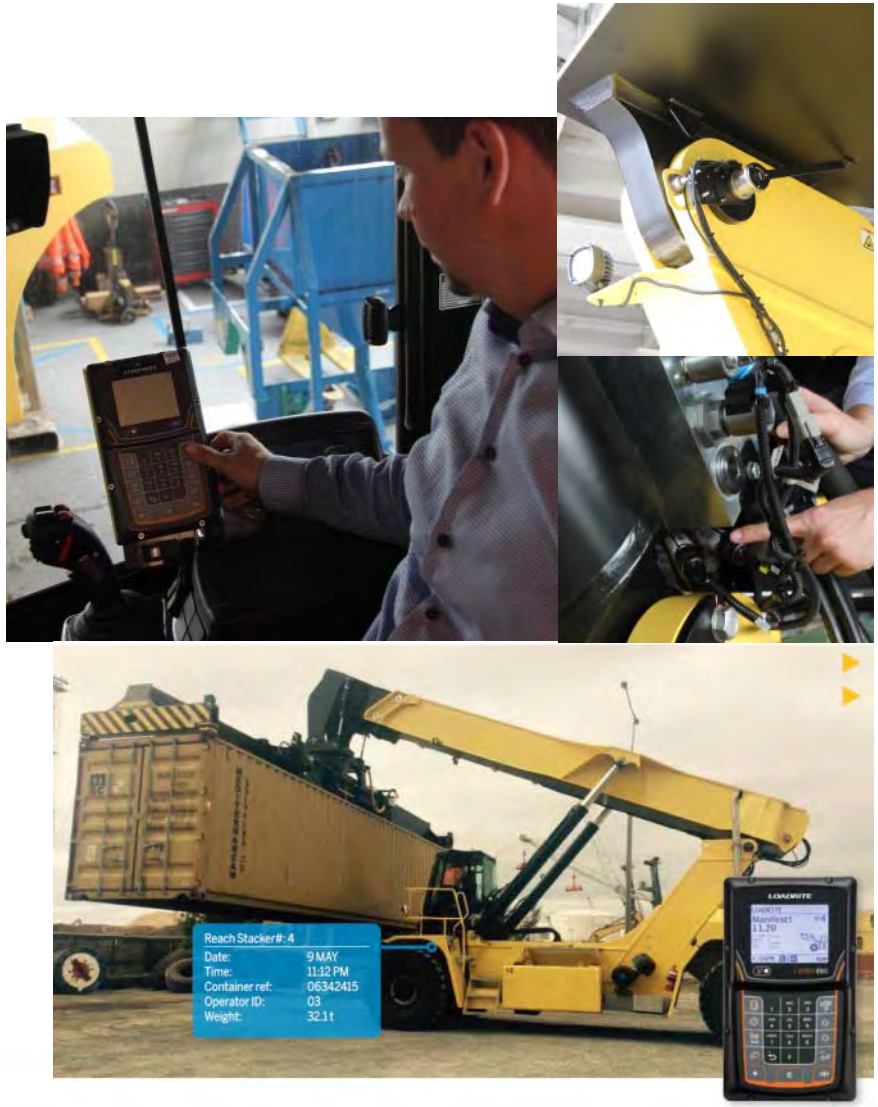
Home screen

2. STATIC+

- The extensive solution regarding compliance to SOLAS regulations in most stringent regions
  - R51 approvals for Loadrite system for most important regions globally
  - Extendable to meet Legal for Trade requirements
- Accuracy within +/- 1%
- Available for all laden container handlers

- Mesuring trough pressure sensors:
  - 1. Pick container (boom fully retracted)
  - 2. Lift load for 5 seconds on flat/even surface (Minimal manoevering allowed)
  - 3. Verify and send weight

- **Based on the Trimble Loadrite L2180 system**
  10.000 units already existing on machines (wheel loaders etc)



INCREASING SAFETY: RADAR AND VIDEO SYSTEMS

- To increase safety during operation
- Reduction of accidents
- Audible & visible alarms in cabin
- Available for all Trucks

- Other common option to improve operations: Front facing cameras (on Forks or spreader)

INCREASING SAFETY: AUTOMATED FIRE SUPPRESSION SYSTEMS

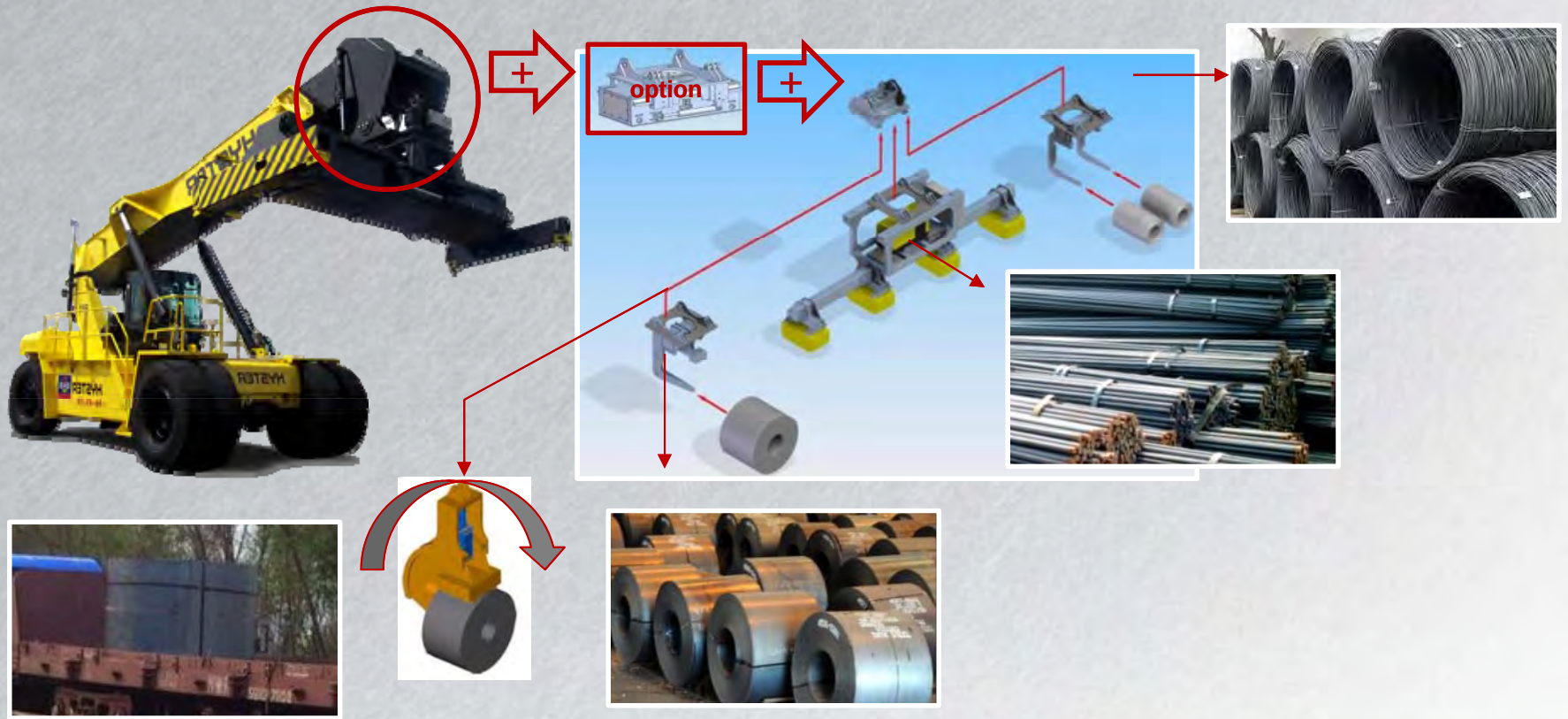
BEST PRACTICE: REDUCTION TOTAL COST OF OWNERSHIP

Example: Automatic Central Greasing system on ReachStacker

al (all points under 1000 hours
on the basic truck and boom, 35 on

PROVIDING FLEXIBLE TRUCKS: EXAMPLE STEEL APPLICATION CAPABILITIES

- One truck
- Quick Disconnect tool changer & interchangeable attachments
- The most versatile solution for multi-product stock yard operation

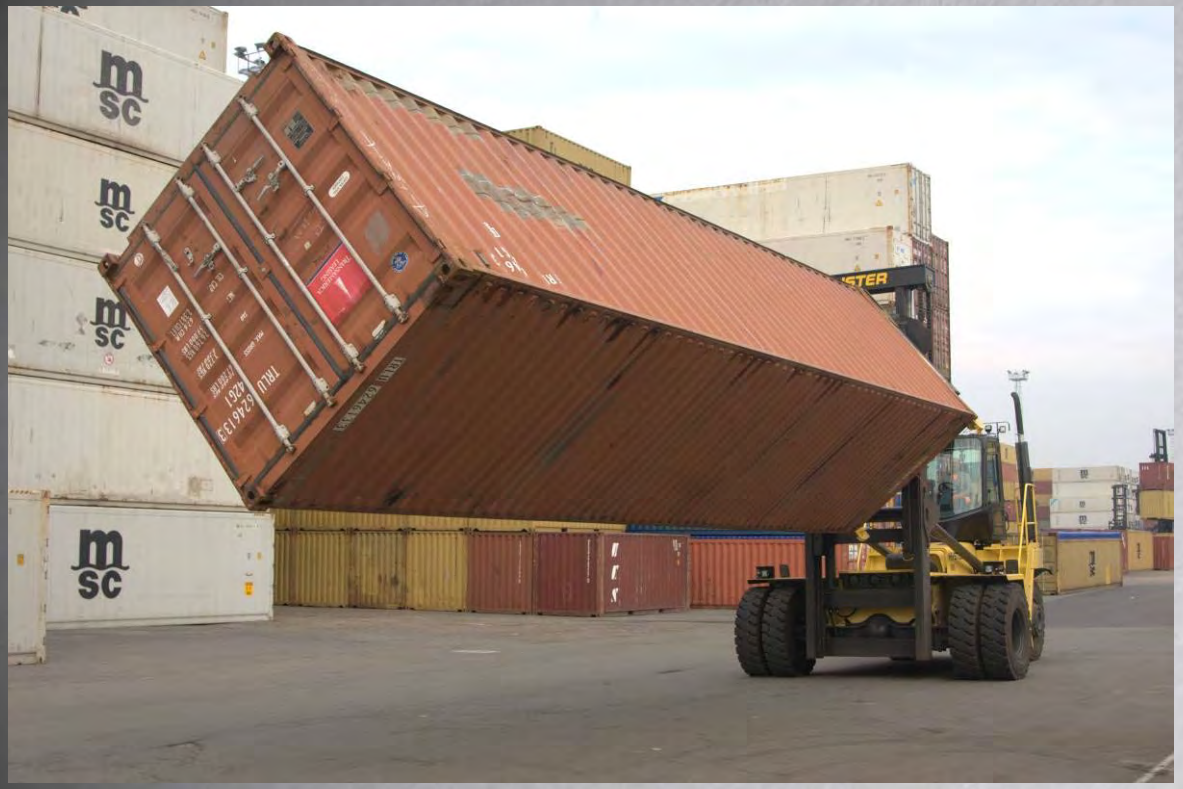


SPED SOLUTIONS

Other special solutions – Full layback tilt

SPED SOLUTIONS

- Other special solutions – End handling



BIG TRUCKS MANUFACTURING

- NMHG – Nijmegen The Netherlands
- Opened in 1952 as first overseas site for Hyster - Hyster building FLT’s since 1929
- Global BT Engineering & Development Centre
- New Product Testing Centre - Weeze Germany

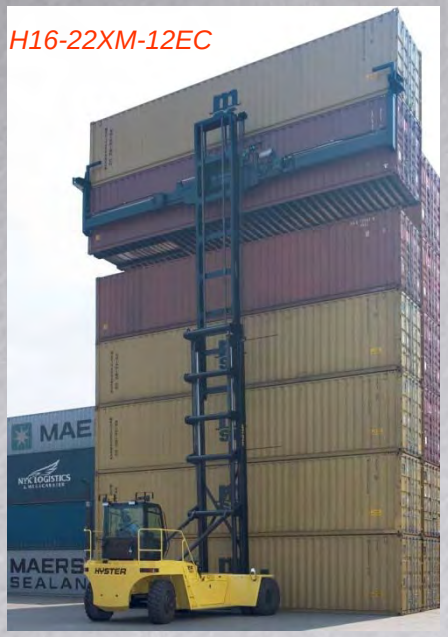
FULL LINE - BIG TRUCKS

H8-16XM6

H16-18-7.5-12

H16-18XM(S)-12

H16-22XM-12EC



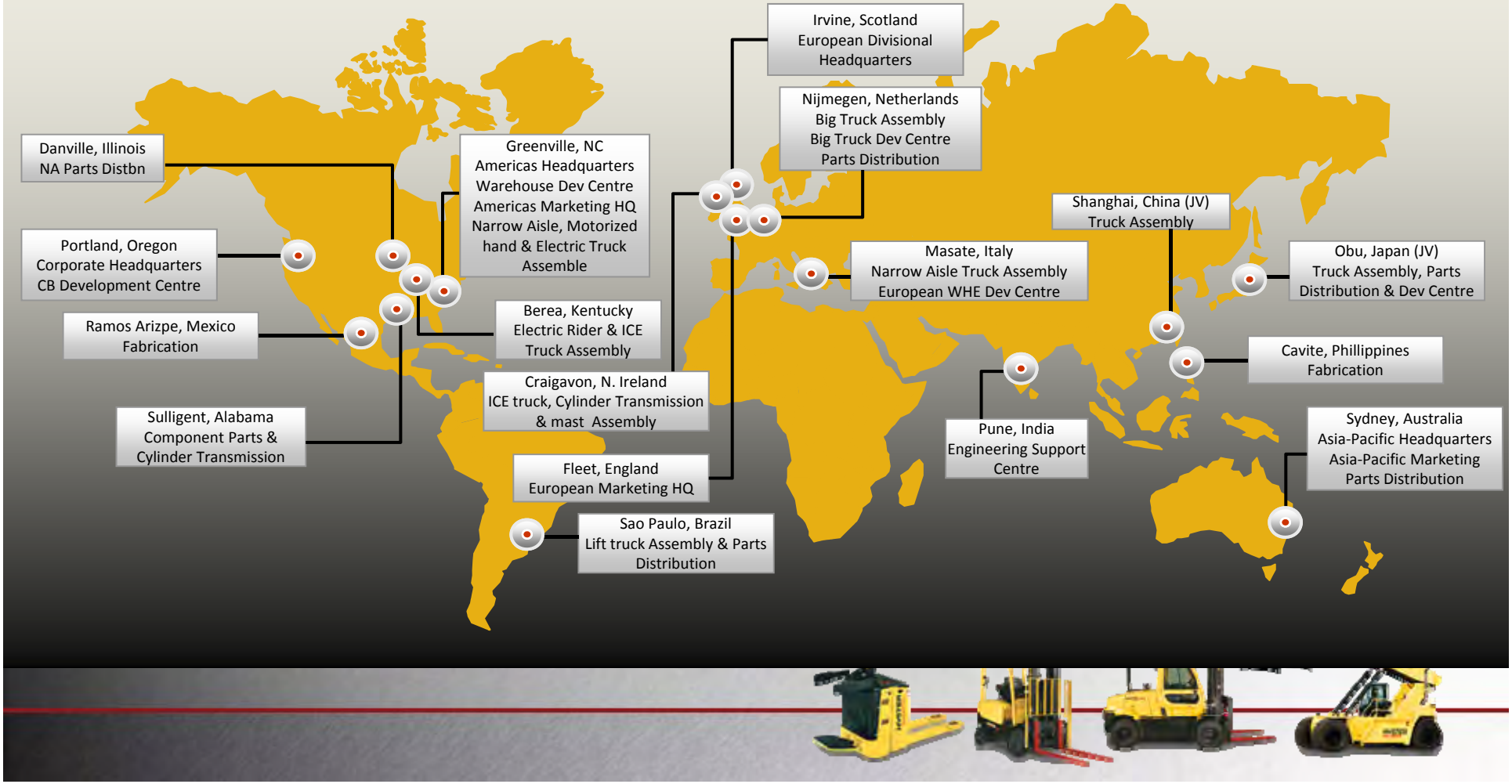
H25-32XM

H40-50XM-16CH

H36-48XM(S)-12

RS45-46

GLOBAL MANUFACTURING & INDEPENDENT DEALER NETWORK



Thank you

One solution meeting all global requirements