



**STRONG PARTNERS.
TOUGH TRUCKS.™**



SEA TERMINALS PROJECT

➤ David Bunting – EMEA Director of Big Trucks

AGENDA



- Project Overview
- Key Components
 - Integrated port equipment management
 - Dynamic lighting management
 - Low carbon/zero emission port machinery
- Hyster Project Content
 - Reachstacker & Empty Container Handler
 - Results



PROJECT OVERVIEW



Develop a series of eco-efficient alternatives in terminal operations

- Equipment prototypes propelled by low carbon emission, electricity, & LNG.
 - terminal tractors, reachstackers, empty container handlers, & RTG cranes
- Real-time operational management model (SEAMS)
 - Minimise existing bottlenecks in the operations by assigning different operational modes (eco, turbo, standby)
 - Calculate the best mode of operation for each type of equipment
- Real-time dynamic lighting system in terminal (SEA-Lighting)

Project code: 2013-EU-92058-S TEN-T Annual Call 2013



Co-financed by the European Union
Trans-European Transport Network (TEN-T)

PROJECT OVERVIEW



Terminal Operation System (TOS)

Operation Order



Machine Assignment

SEA TERMINALS CONCEPT

Smart, Energy- Efficient and Adaptive Management System (SEAMS)

Operational Mode



Machine Status

BLACK BOX Concept



SEA STS Crane



SEA Hybrid RTG



SEA Electrical Tractor



SEA Eco Reach Stacker



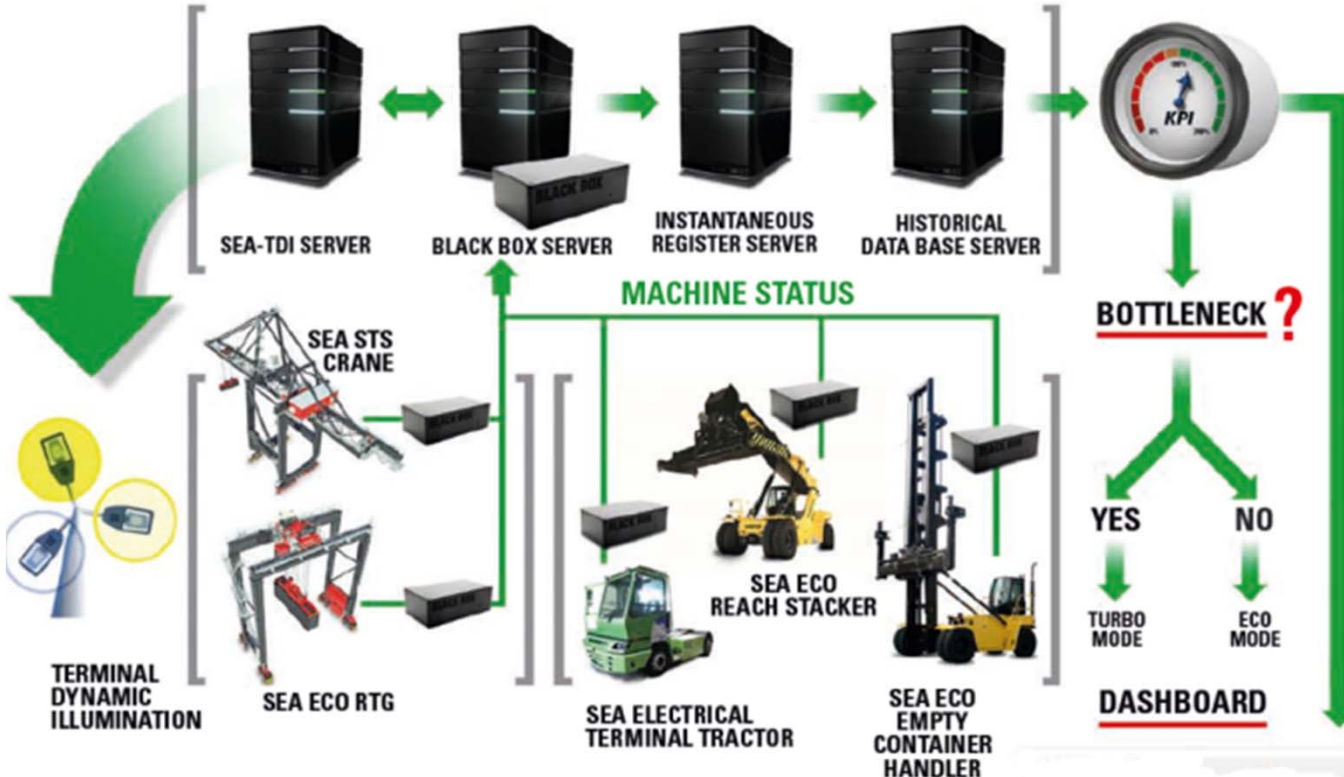
SEA Eco Front Lift



SEA Dynamic Lighting



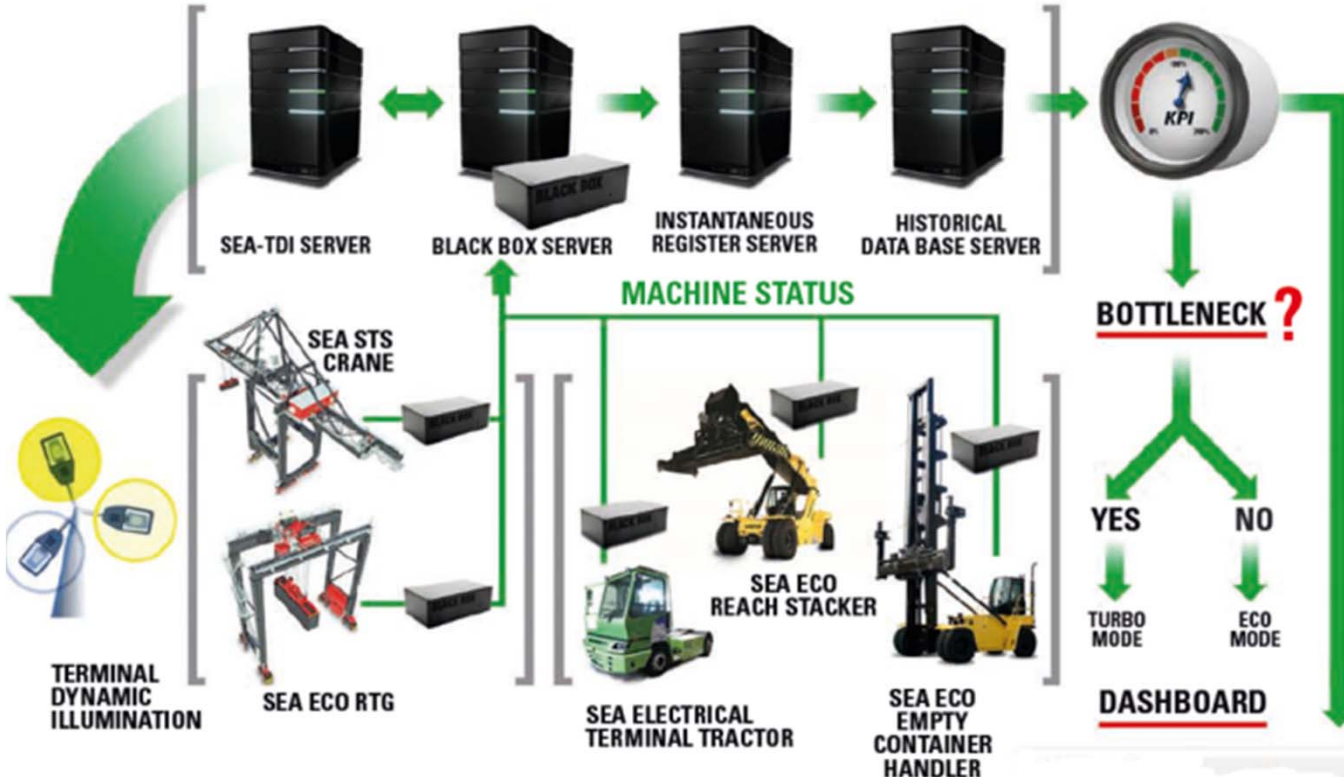
INTEGRATED PORT EQUIPMENT MANAGEMENT



Objectives

- > Monitor equipment giving a better understanding & planning of terminal operations in real time
- > Generate KPIs in real time for planning & execution of operations
- > Detect bottlenecks in the Port Container Terminal
- > Quantify emissions & energy savings when operating in Turbo or Eco mode

INTEGRATED PORT EQUIPMENT MANAGEMENT



Benefits

- ▶ Analysis & optimisation of the Terminals operational performance
- ▶ Accurately Forecast and plan for required equipment & manpower resources
- ▶ Increase safety & port efficiency by reducing human errors
- ▶ Reductions in fuel & energy consumption

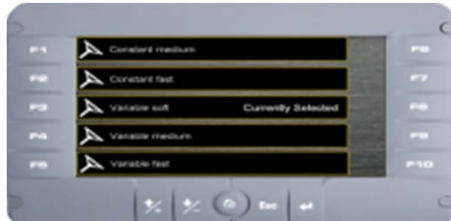
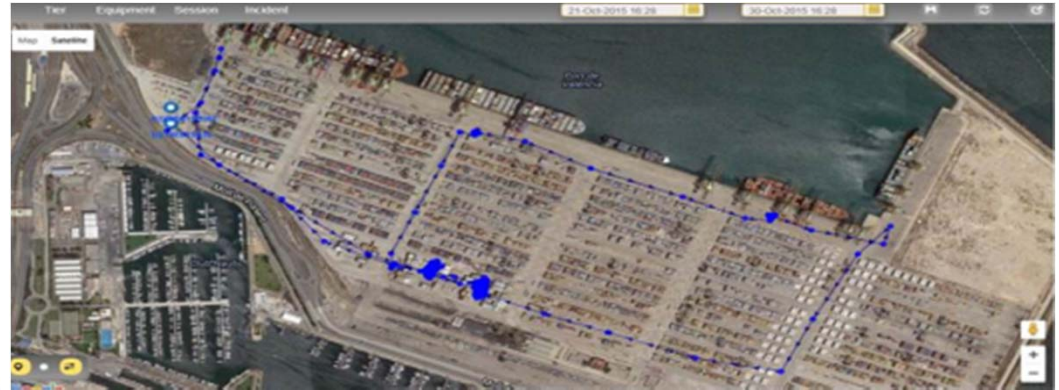
INTEGRATED PORT EQUIPMENT MANAGEMENT



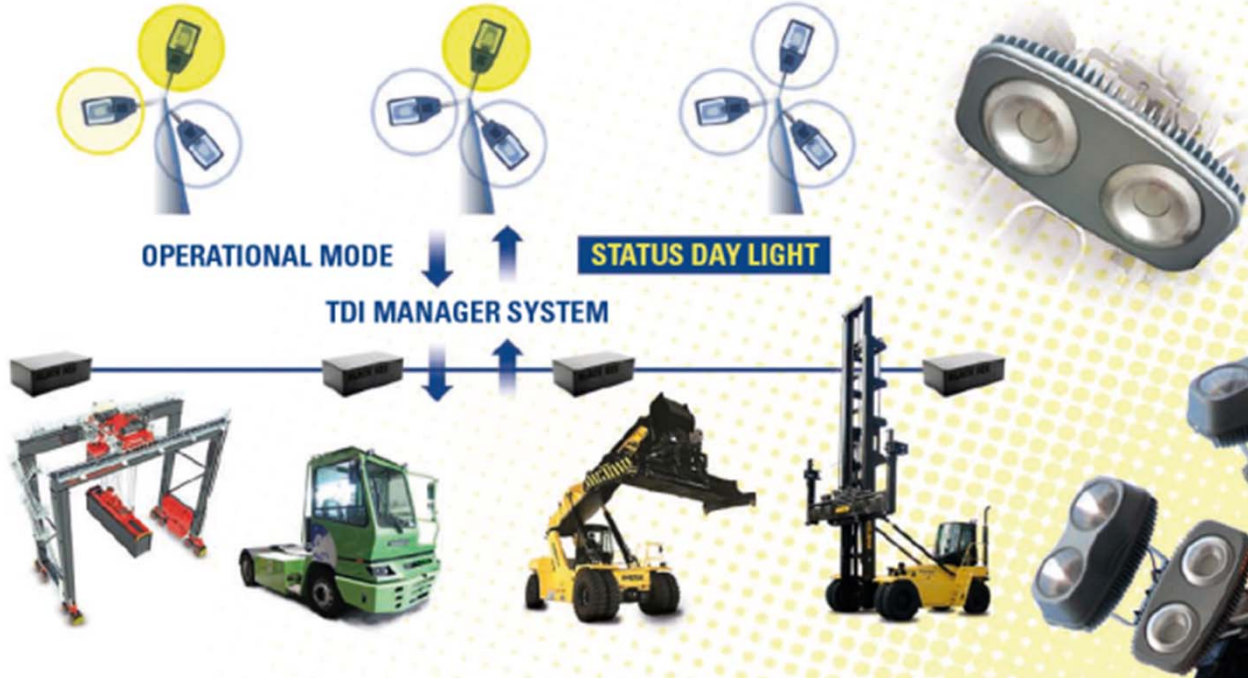
Intelligent Telemetry (SEA – Black Box)

SEA-Black Box is an **data gathering, registry, and real-time communication system** between the terminal machinery and the SEAMS Module. The system provides real time information such as:

- Operational & maintenance machine status
- Incidents and accidents
- Energy performance
- Remote operation



INTEGRATED PORT EQUIPMENT MANAGEMENT



Objectives

- ▶ Better energy management of the terminal illumination system
- ▶ Intelligent operation of lighting needs through a user friendly interface

Benefits

- ▶ Better quality of light during night operations
- ▶ Maintain minimum energy consumption supplying maximum light levels only when required
- ▶ Optimised lighting levels for sunrise & sunset conditions

HYSTER EQUIPMENT CONTENT



Low carbon emission Empty Container Truck (SEA-EcoLIFT)

Low-carbon emission Reachstacker (SEA-EcoRS)

SEA TERMINALS

Smart, Energy efficient, & Adaptive Port Terminals

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OBJECTIVES



*“Utilising Reachstackers and Empty Container Handlers implementing the latest technologies to reduce overall fuel consumption by 25% relative to existing machines**”.*

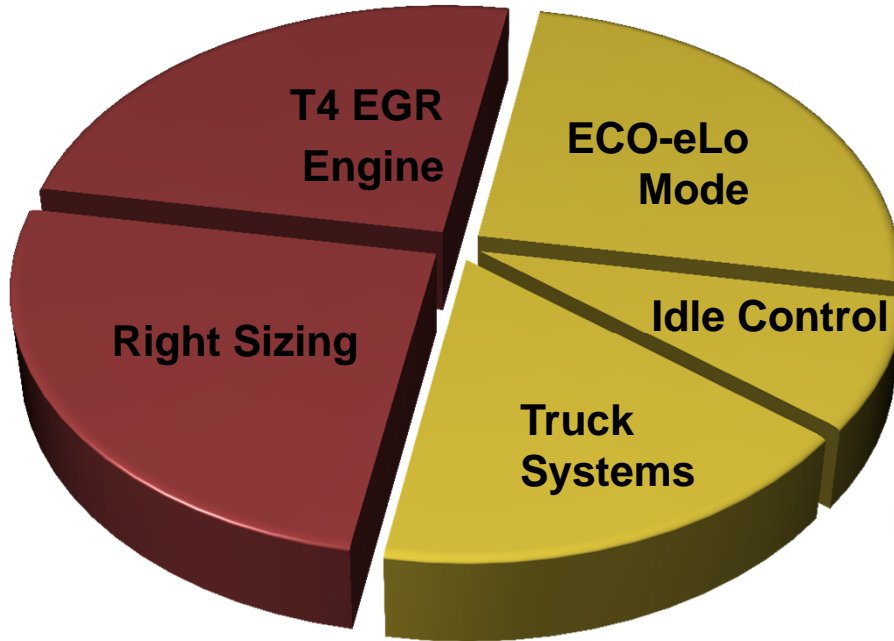
Connected Efficient Dynamics Leading to Profitable Low Emissions

- **Connected:** Telemetry for Duty Cycle knowledge to adapt and improve truck systems
- **Efficient Dynamics:** Right sized Engines, smart Transmissions, on demand Hydraulics, & auxiliary systems which benefit fuel consumption and container handling efficiency
- **Profitable Low Emissions:** Optimise and reduce Total Cost of Ownership while complying to the latest emission standards

* *Stage IIIA Trucks*



OBJECTIVES



20+% FUEL SAVINGS

Intelligent Design

- RPM management
- Throttle Response
- Shift point selection



- Hibernate idle
- Empty Seat Engine Shutdown



- Cooling on Demand
- Matched Hydraulics
- Auto throttle-up

EQUIPMENT DETAIL



Empty Container Handler & Laden Container Reachstacker

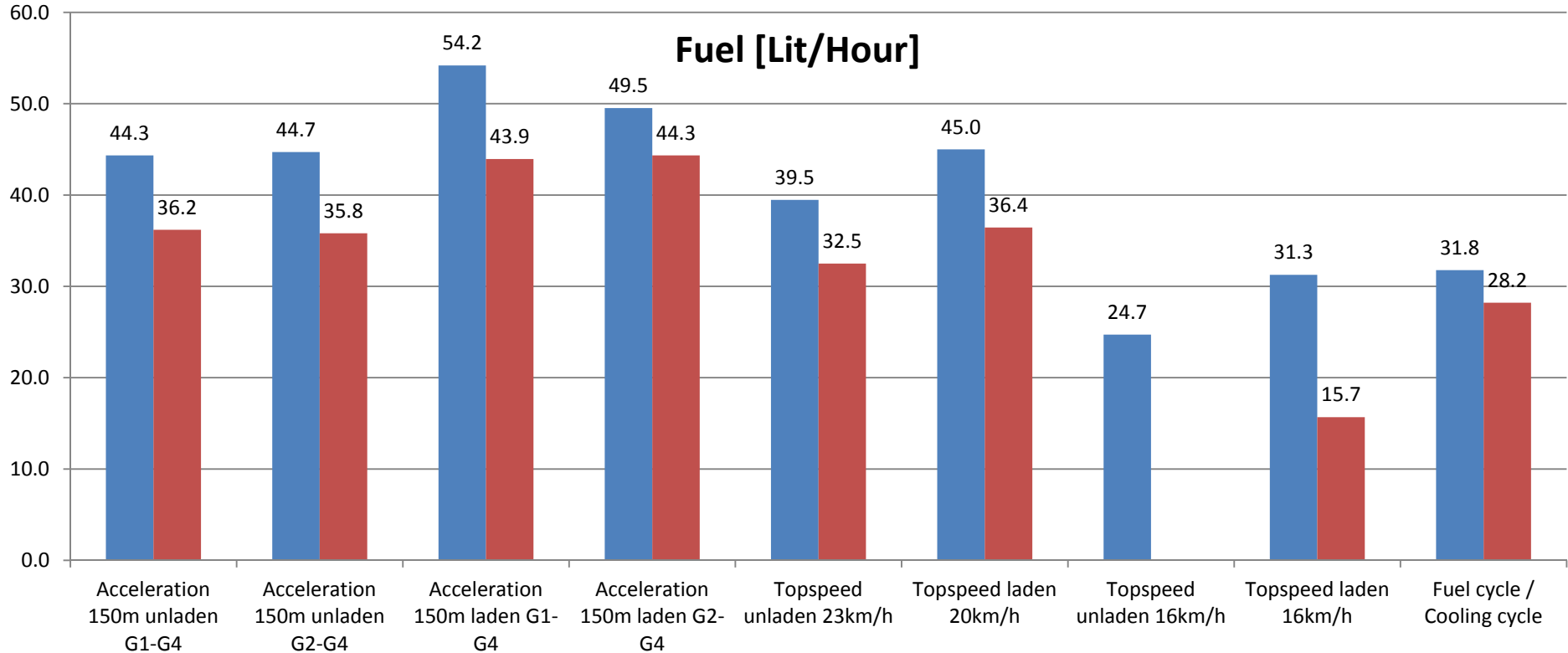
- Engine
 - High performance & Eco E-low engine modus (remotely switchable by port operator)
 - Stop –Start system, Hibernate idle
- Transmission
 - Free wheel stator & shift point optimisation
 - Reduced engine revs at full power
- On demand hydraulic and cooling system
- Tire pressure monitoring & steer load warning
- Full LED lighting
- Intelligent Telemetry System
 - Fuel consumption, container movements, vehicle position, & status
 - Container size and stacking height detection for productivity calculation



INITIAL RESULTS



Fuel [Lit/Hour]



TELEMETRY CONFIGURATIONS



Monitoring

Remote Hour Meter

Fault Code Tracking

Impact Sensing

Cost of Operation

Preventative Maintenance Tracker

RAPID MESSENGER

Access

Access Control

Automatic Shutdown

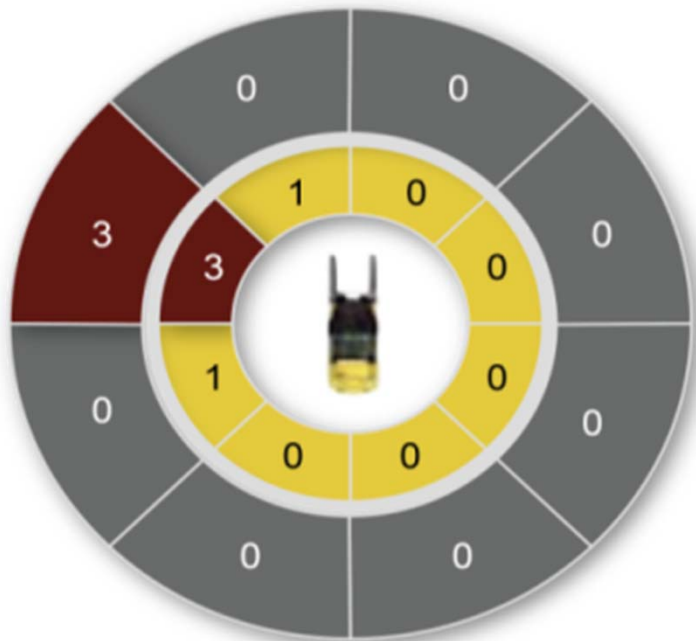
RAPID MESSENGER

Verification

Operator Checklist

RAPID MESSENGER

IMPACT DETECTION



- Lower Level Impacts
- Upper Level Impacts

Create New Email Alert

Email Type:

Target Equipment List

Show entries

Search:

<input type="checkbox"/>	Product ID	Equipment Name	Asset ID	Service ID	Class	Master	Global Corp	Domestic Corp	Division	Site	Depe
<input type="checkbox"/>	9	E009	123456	202222	Class V	Speedster	Bakers	Bakers US	Bakers Power	Popeville	Ware
<input type="checkbox"/>	25	E025	123	456	Class V	Speedster	Bakers	Bakers US	Bakers Power	Popeville	Ware
<input type="checkbox"/>	40	E040	67890	12345	Class I	Speedster	Bakers	Bakers US	Bakers Power	Popeville	Ware
<input type="checkbox"/>	54	Demo truck 54	12345	67890	Class V	Speedster	Bakers	Bakers US	Bakers Power	Popeville	Ware
<input type="checkbox"/>	89	Demo truck 89	12345	67890	Class I	Speedster	Bakers	Bakers US	Bakers Power	Popeville	Ware

Showing 1 to 5 of 64 entries

First Previous 1 2 3 4 5 Next Last

Email Recurring Settings

#Event status is Open, recur email every hours

#Event status is In Progress, recur email every hours

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



FOR MORE INFORMATION



www.seaterminals.eu www.hyster.com



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SEA TERMINALS PROJECT WITH HYSTER

▶ David Bunting – EMEA Director of Big Trucks