

# Automated Straddle and Shuttle Carrier in Terminal Operations



## Florida Automated Vehicles 2014 Summit

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# Trends in Market

- Ships becoming bigger and time spent in ports should be shorter
- Safety – even more focus
- Reduction of costs
- Optimum efficiency & space utilization
- Lack of trained & qualified personnel in some areas
- Ports and terminals interest towards automation

# Drivers of automation

- Improving safety of personnel, cargo and equipment
- Reducing cost of operation and variability in operation
- Improving productivity and capital utilization
- Delivering complete cargo management solutions
- Improving business processes - integrated IT systems improving visibility and information sharing
- Enabling future growth



# Automated straddle carrier terminal



# Ease of Automation

- Automated self-loading container carrier
- 2 variants...1 over 2 and 1 over 3
- Flexible
  - Single mode of operation
  - Production control that is simple to use
  - Interface directly to TOS
- Optimal
  - Integrated optimisation across all modules
- Safe
  - High level of safety and security
- Great for business
  - Efficient use of CAPEX
  - Very competitive cost of production
  - Flexible for future growth
  - Ready for deployment for **green field** and **brown-field** projects



# AutoStrad™

1 Radar : through triangulation relative to beacons absolute vehicle positioning is obtained.

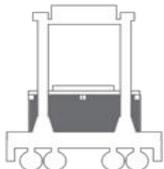
2 Hoisting Speed: 30m/min (empty) to 20m/min and 15m/min for a 40 and 50 tonne load respectively.

3 Automated pick and place: sensors on the spreader and the side frames ensure automated handling of containers

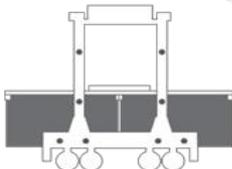
4  
LIFTING CAPACITY

40,000 kg

50,000 kg



Single container



Twin lift

5 IMU: the Inertial Measurement Unit provides three dimensional acceleration as well as vehicle roll, pitch and yaw.

6 Communication: enabled through a secure WiFi network, with Tele-Op achieved through the RF 470Mhz network.

7 Speed: acceleration to full speed (30kph) in 18 to 24 seconds depending on load.

8 Encoders: measure steering angle and wheel rotation to calculate the vehicle position.

9 Obstacle detection sensors: through laser distance measurement sensors any obstacle on the driving path is detected.

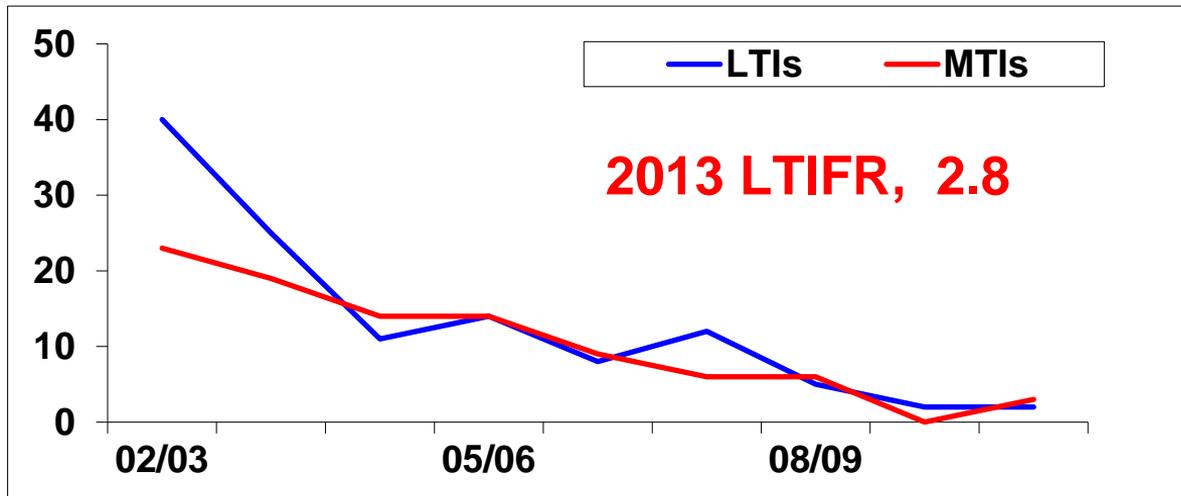
# Operational considerations

- Straddle carriers are efficient when:
  - Driving distances in the terminal are relatively short
  - Flexibility is important
  - The terminal area is complicated
  - High stack densities are not required
- Difference in productivity between 3- and 4-high containers high stacking straddle carriers



# Safety performance

- “In the first year of automation at our Brisbane AutoStrad™ Terminal, we achieved a 75% reduction in safety incidents, increasing to a reduction of 90% in following years. It is only logical that we look to replicate this success at our biggest container terminal at Port Botany.” (John Mullen, MD & CEO Asciano Ltd, 22/8/2012)



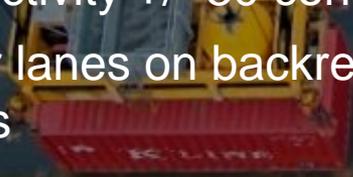
Lost time injury frequency rates (LTIFR)

15 January 2015

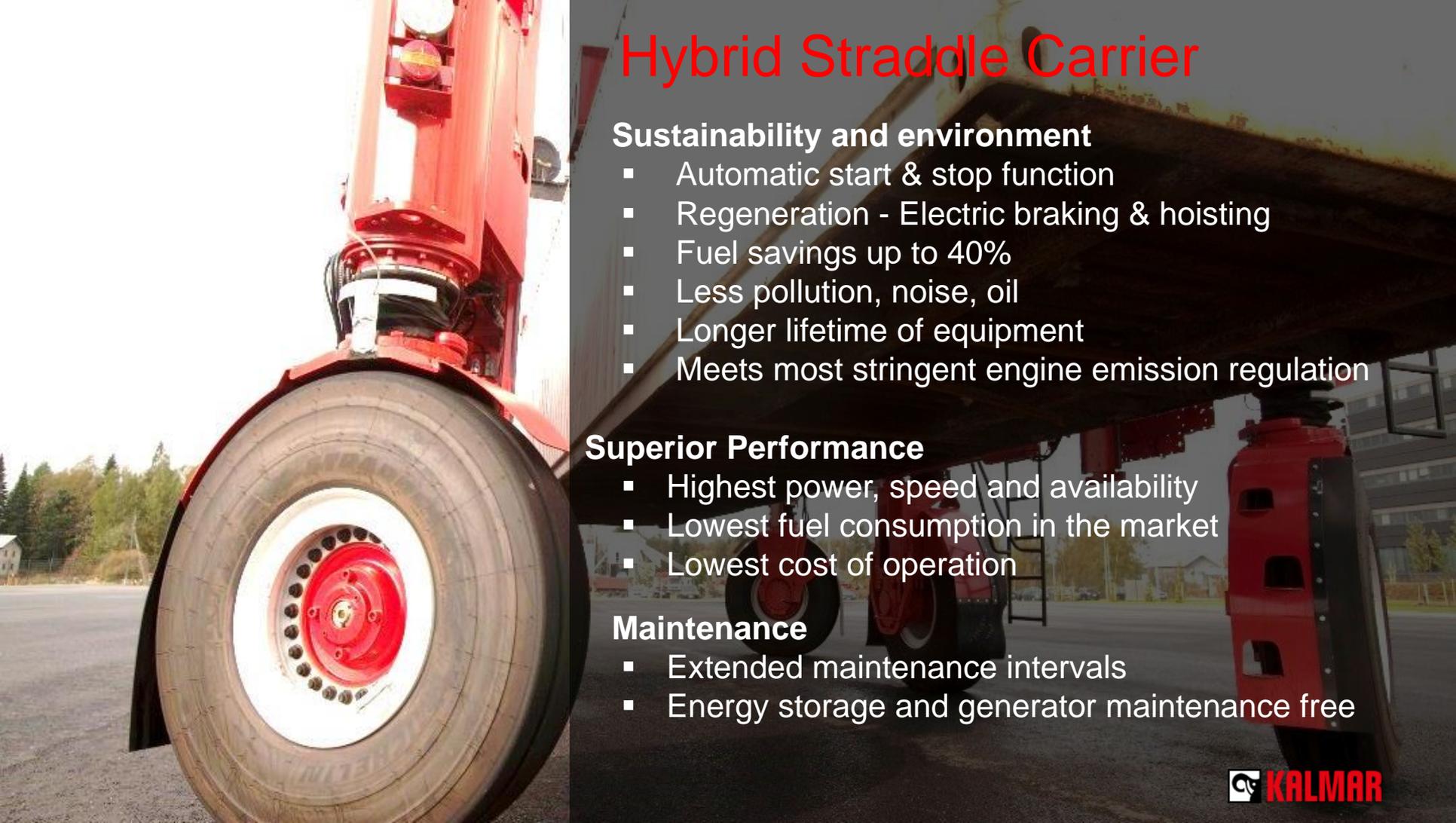
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# Patricks Brisbane, Australia

- Open since 2007
- Quay length 930 m
- Capacity 800 000 TEU
- 27 Kalmar AutoStrads™ – 3-high
- Twinlift operation
- Decoupled process
- STS productivity +/- 30 cont/hr
- 2+ transfer lanes on backreach –  
4 highways
- 3 highways
- 26 truck grids



# VIDEO



# Hybrid Straddle Carrier

## Sustainability and environment

- Automatic start & stop function
- Regeneration - Electric braking & hoisting
- Fuel savings up to 40%
- Less pollution, noise, oil
- Longer lifetime of equipment
- Meets most stringent engine emission regulation

## Superior Performance

- Highest power, speed and availability
- Lowest fuel consumption in the market
- Lowest cost of operation

## Maintenance

- Extended maintenance intervals
- Energy storage and generator maintenance free

# Automated straddle carrier terminal

- Modular solution and fast deployment
- Productivity, efficiency and safety
- Low incremental cost of automation
- Low unit cost of production
- Attractive financial measures
  - Return on assets
  - Labour to revenue ratio
  - Gross margins
- Compatible with future growth

# Making Your Every Move Count.