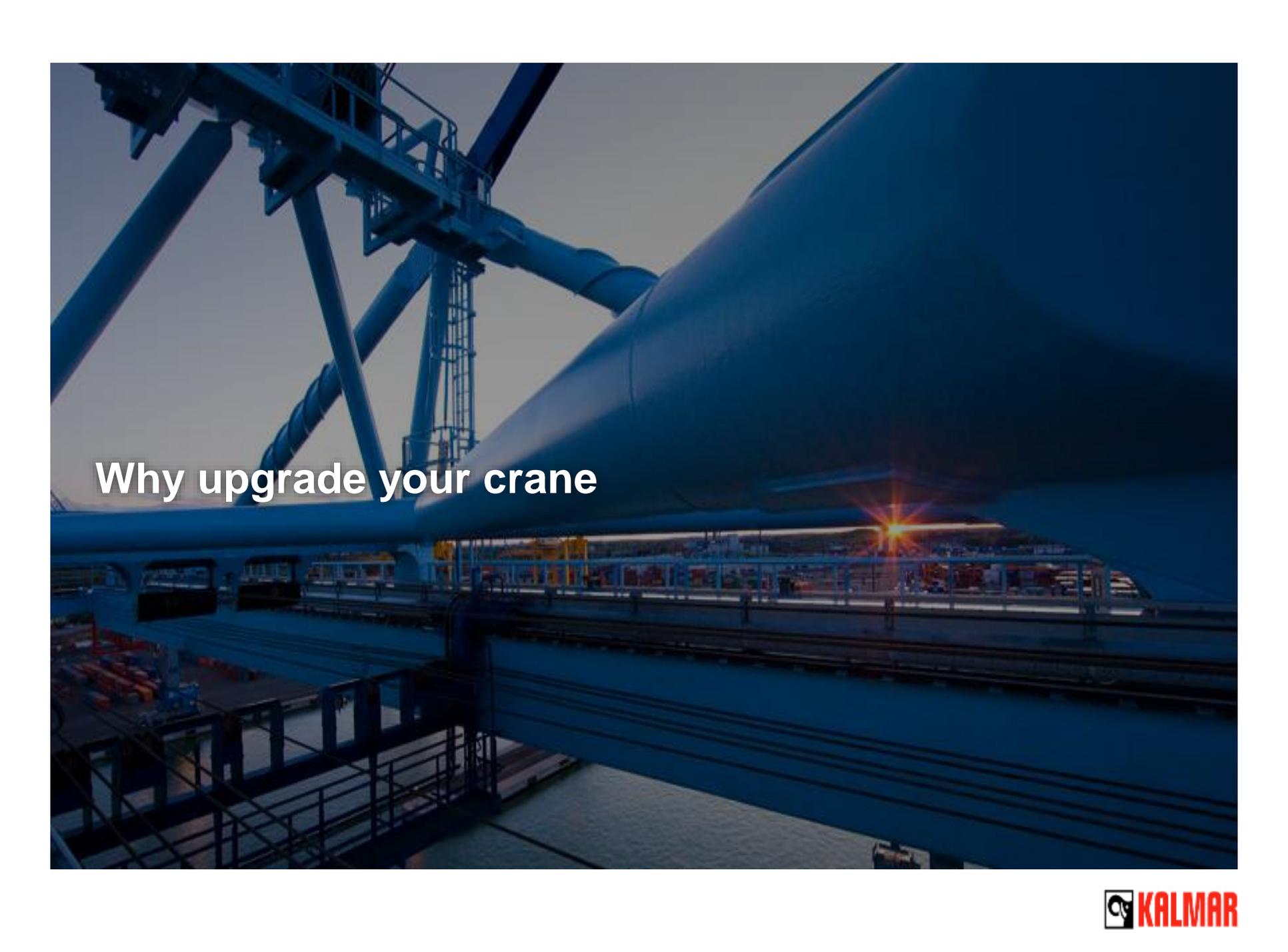


## Enhancing the performance of existing cranes

Jeff Rosenberg, Manager, Marketing and Business Development, Kalmar Services  
22<sup>nd</sup> April 2015, Port and Terminal Technology 2015, Miami

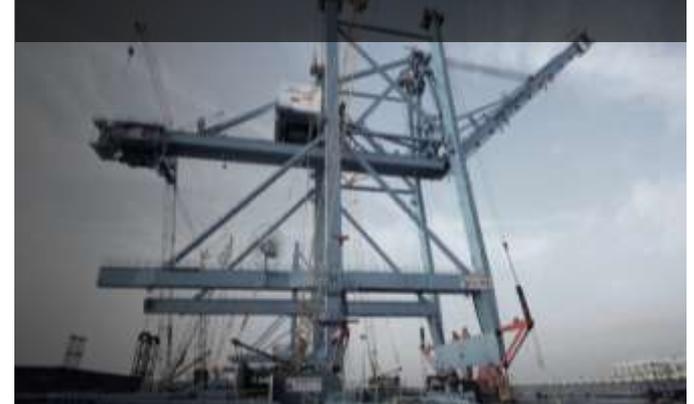


Why upgrade your crane

# Pressures to do something for the cranes

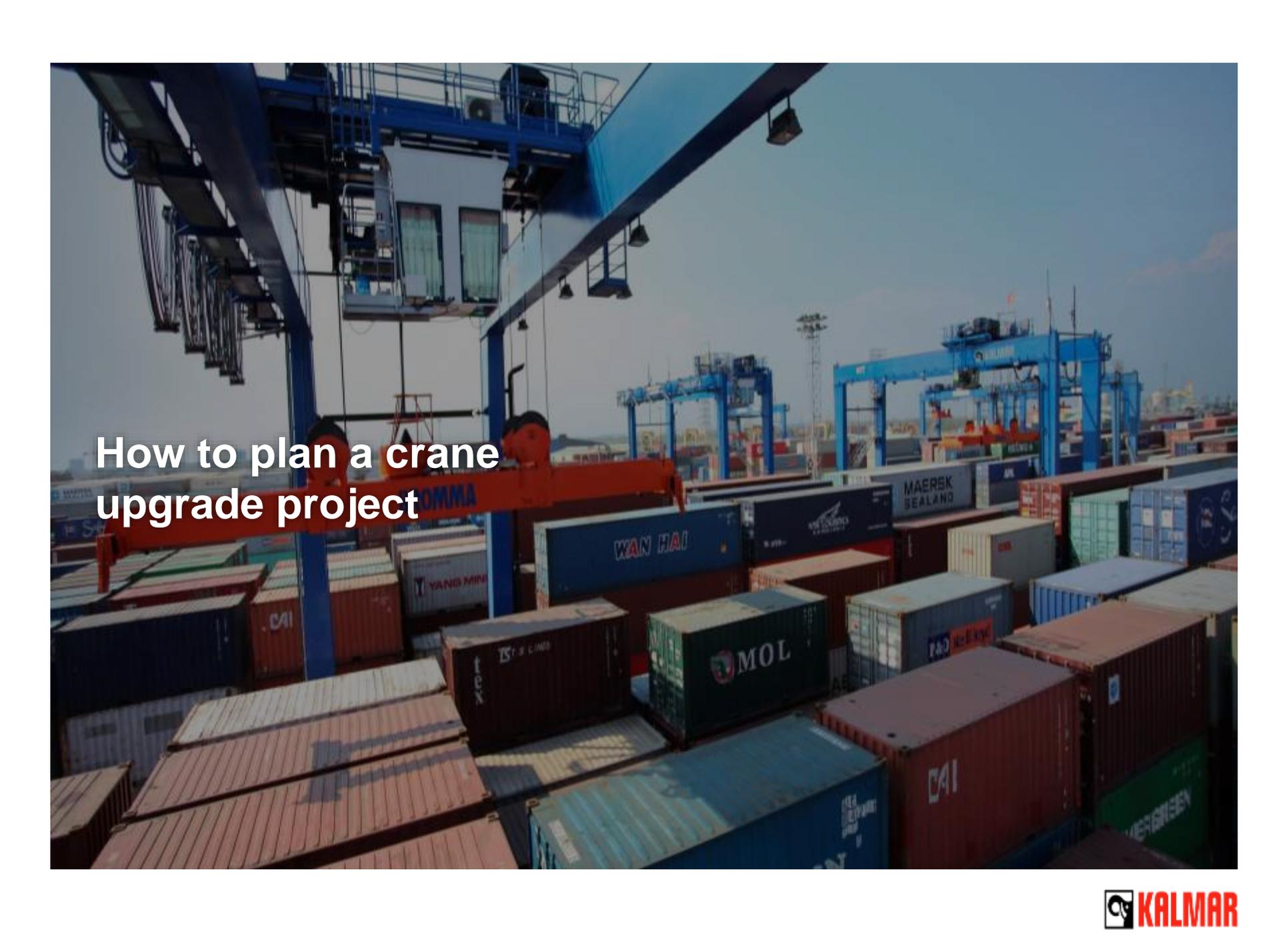
- Ships are getting bigger – STS crane height and performance requirements change
- Technology is evolving – new ways to enhance performance and safety
- Container volumes are increasing and terminal competition is growing – crane performance is even more critical
- Environmental regulations becoming tighter – lowering diesel emissions gives more than direct payback
- spare parts may become obsolete

Expected structural lifetime: about **25 years**



Expected structural lifetime: about **20 years**

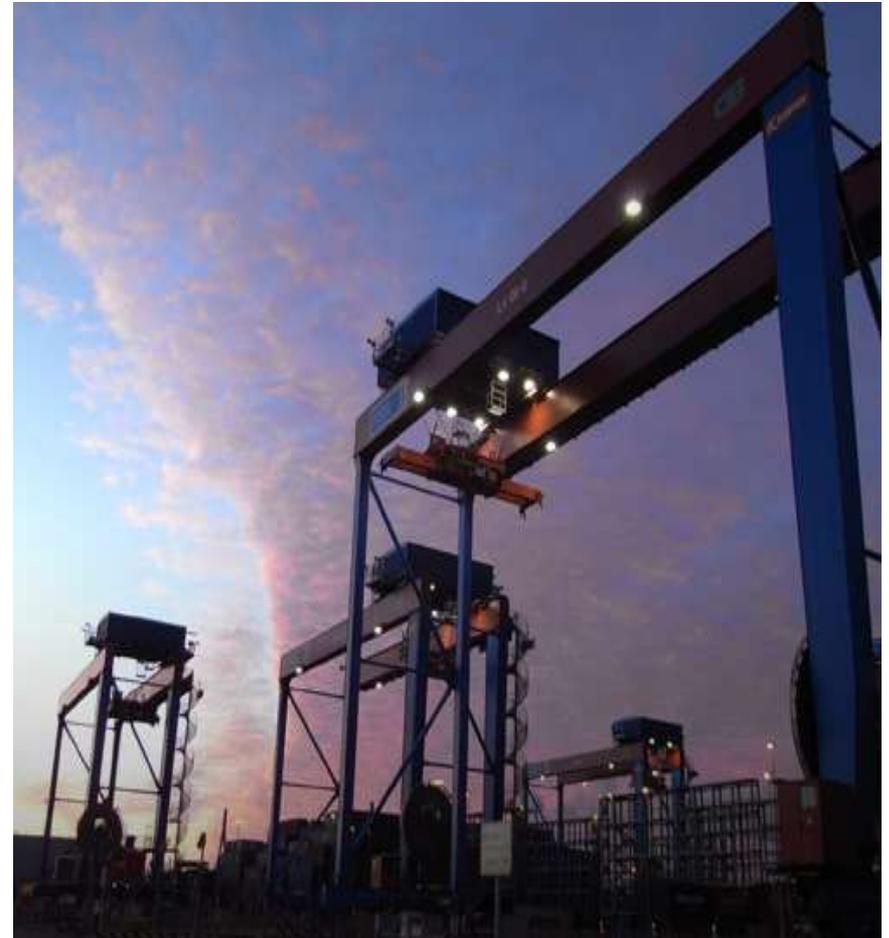




# How to plan a crane upgrade project

# Phases of an upgrade project

- Perform a feasibility study
- Develop a scope of work
- Planning stage
  - To optimize OOS time and minimize disruptions
- Evaluate what can be done internally and what needs to be done with outside help considering:
  - Complexity of the upgrade
  - Labor availability
  - Expertise required
  - Time available for execution



# Feasibility Study

- What are we trying to accomplish?
  - Extending the working life of crane?
  - Increasing the cranes productivity?
  - Increasing the cranes capacity to handle bigger ships?
- What size of ships do you expect to need to service?
- What are the performance requirements expected?
  - For example, crane wheel loads....

## Feasibility Study Conclusions

- The structural and mechanical condition of the cranes and their ability to be upgraded.
- What the wharf can handle
- An estimate of the cost projections and the crane out of service time
- If there are any new technologies that will enhance productivity

# Develop the scope of work

## Crane heightening

How high?

## Boom extension

How much?

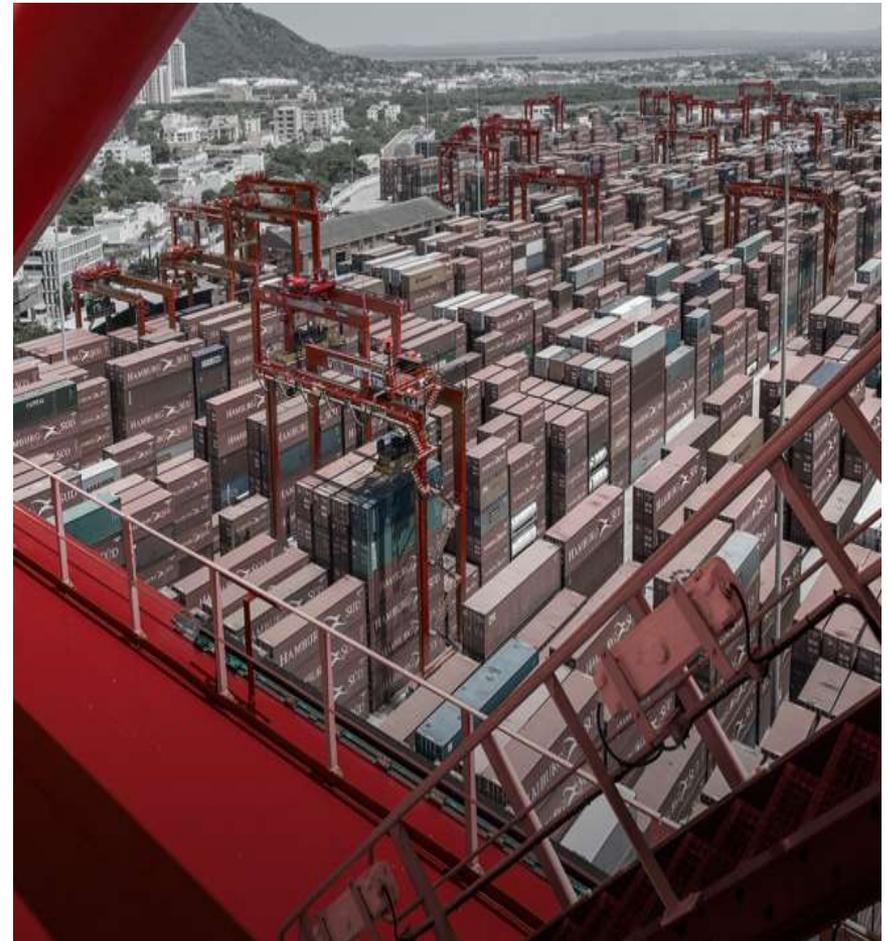
## What else is affected by the crane raise and boom extension

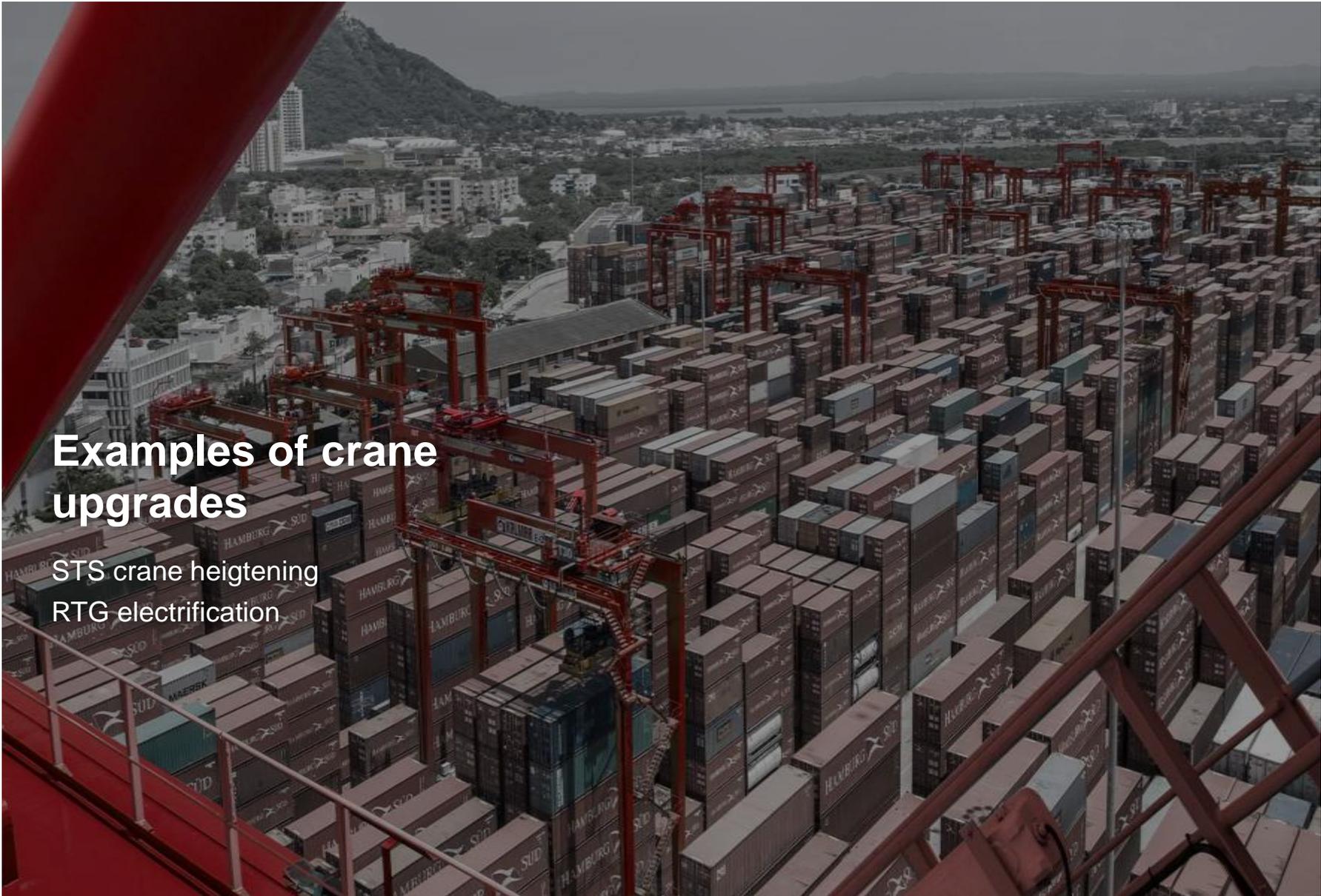
Main hoist drum for the extended ropes?

Any additional stiffening required?

Any additional counter balance?

Gearbox and machinery upgrades necessary?





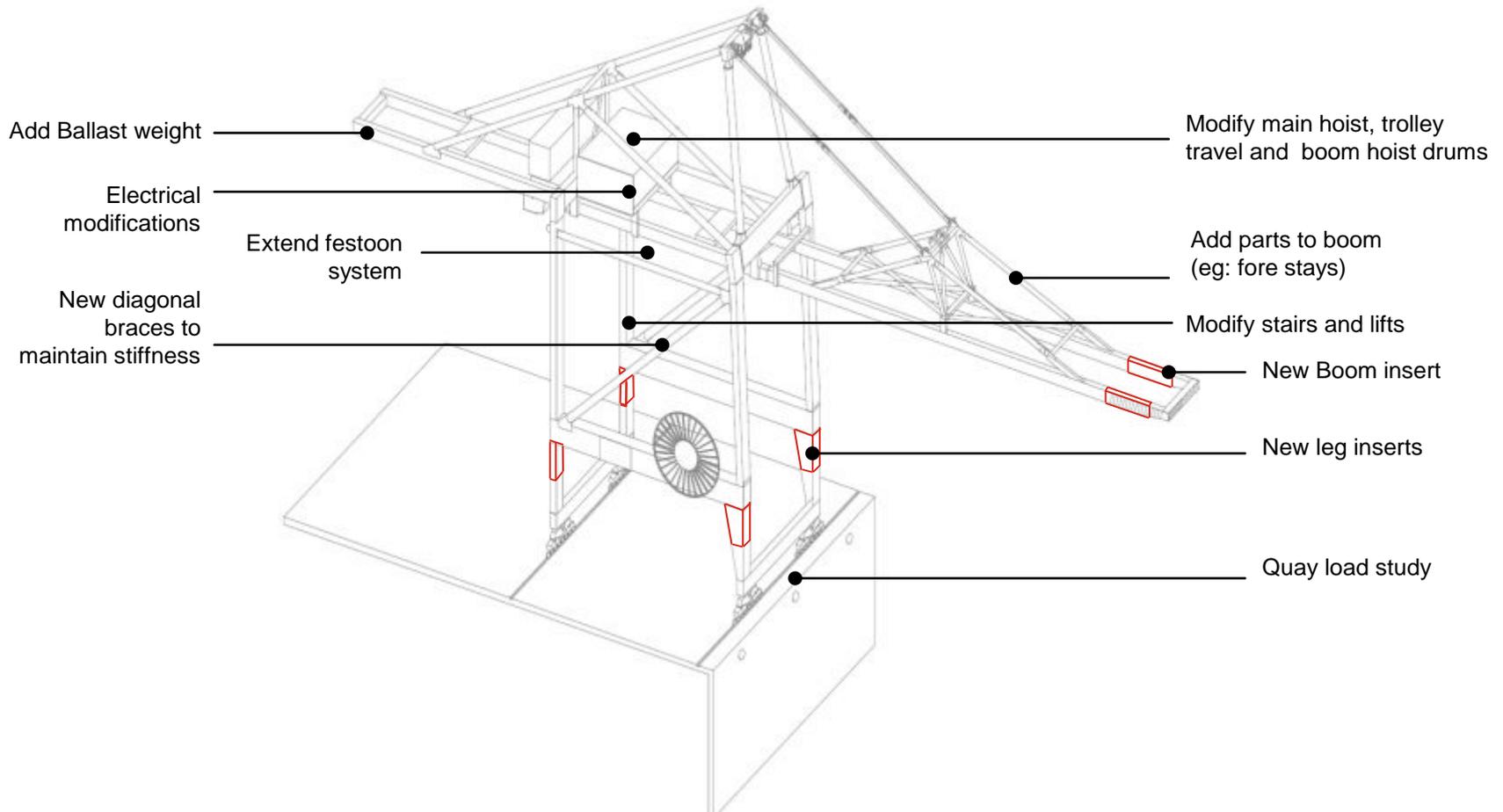
# Examples of crane upgrades

- STS crane heightening
- RTG electrification

# Crane heightening projects



# What's involved with an STS-crane heightening and boom extension project?



# Important points to consider in crane heightening

- How long will the crane be out of service?

Crane out of service time will be dependent on the scope of work developed.

Planning is the key.

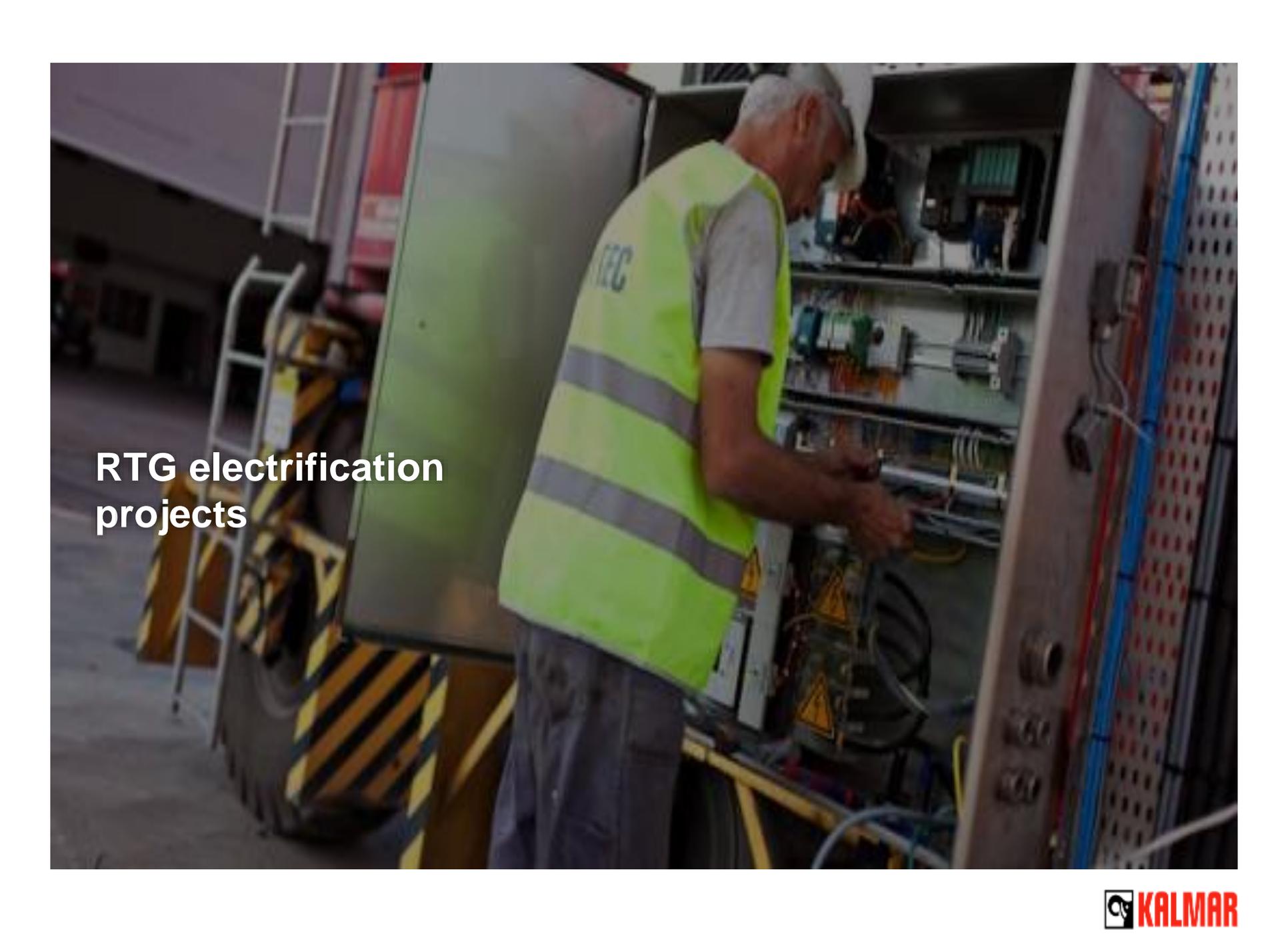
Many upgrades projects can be run simultaneously to keep downtime to a minimum.

- Disruptions to terminal operations

- Does the crane need to be relocated during construction

Typical crane heightening of 20ft runs between \$1M-\$1.2M

Boom extension runs between \$300k-\$1M, depending on need to re-balance the crane

A photograph of a worker in a high-visibility yellow vest and white hard hat working on an open electrical cabinet. The worker is focused on the internal wiring and components. The cabinet is filled with various electrical parts, including switches and cables. In the background, there are yellow and black striped safety barriers and a white ladder. The scene is outdoors, possibly at a construction or industrial site.

**RTG electrification  
projects**

# Two basic ways to electrify RTG-cranes – similar results

Cable reel



Conductor bar system



Saving of about 35,000 liters of diesel fuel per year / crane, based on 2500 operating hours per year

Zero emissions, no engine noise

Less maintenance; increased availability

Readiness for future automation

# Cable reel pros & cons

## Advantages

## Disadvantages

+ Reliable data transfer for future automation needs

- Not easy to add new RTGs on same block

+ Less yard area needed; easier to do yard planning

+ Limited need for fixed structures on yard

+ Long stack lengths can be accommodated with middle feed

+ Tolerable for changing and challenging weather conditions

# Conductor bar pros & cons

## Advantages

- + Container block changes are easier to execute
- + Easy to add new RTGs on same block, or to lengthen the container block

## Disadvantages

- Exposure to high voltage on ground level
- Limited data transfer possibilities with current technology
- Need permanent ground structures; more yard area needed and more difficult to do yard planning
- Maintenance monitoring required in challenging weather situations

Maintenance requirement about equal

## Other Important points to consider in RTG electrification

- Perform an engineering study to determine if electrifying your RTG cranes make sense
- Decide which is best for your application
  - Cable reel versus Conductor bar
- Re-confirm your yard layout
  - Changes after RTG electrification costly
- How dependable is the electric supply to the terminal and what is the distribution within the terminal
- Typical crane electrification runs between \$250k-\$300k per RTG, excluding ground infrastructure



## In summary....

Upgrading existing cranes

Protects your current investments

Keeps in step with current technology as well as environmental and safety regulatory developments

Faster and more cost-efficient than acquiring new cranes



## Kalmar in brief

- Kalmar is the market leader in container handling equipment, port automation and services.
- Our customers include port and terminal operators, distribution centers and industry.
- Kalmar's sales totaled EUR 1.5 billion in 2014 and we employ 5,200 people globally.
- Kalmar is part of Cargotec. Cargotec's sales in 2014 were EUR 3.4 billion and it had approximately 11,000 employees.



Thank you



Read more at:  
[www.kalmarglobal.com/craneupgrades](http://www.kalmarglobal.com/craneupgrades)