



## Growing Green at the UP's ICTF

Faster Freight Cleaner Air  
Feb 26, 2008

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### Overview

- UP Railroad operates the Intermodal Container Transfer Facility (ICTF) in LA
- ICTF is the main off-dock railyard serving POLA/POLB
- At current volume of 715,000 lifts per year, the facility is approaching capacity
- UP is examining a number of innovative future options to increase capacity and reduce environmental impact

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### Current Operation at ICTF

- Small gage RTGs serving one track each
- Wheeled buffer storage
- Fleet of terminal tractors required to service RTGs
- All equipment manually operated and diesel powered



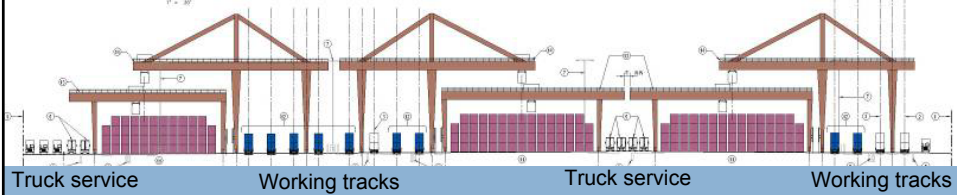
# Future Options with Rail Mounted Gantry (RMG) Cranes

neither option requires terminal tractors

## Unified RMGs



## Nested RMGs

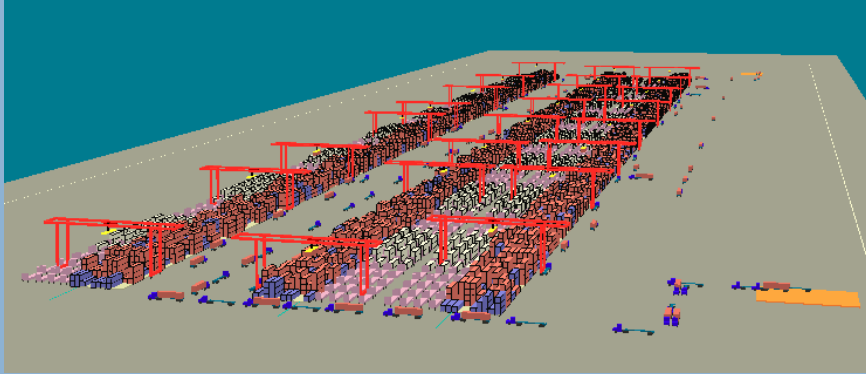


## Example RMG Photo



## Unified Crane Layout

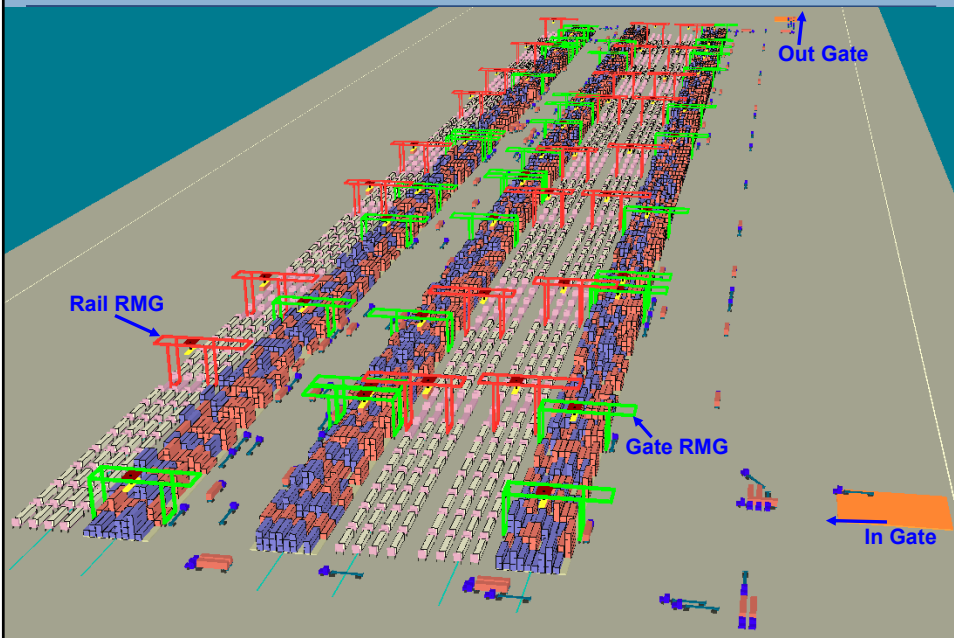
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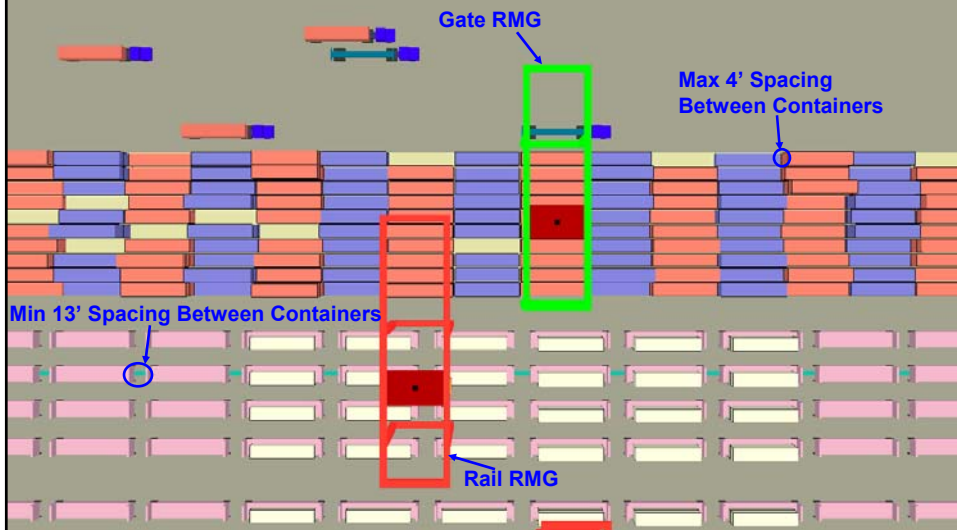
## Nested Crane Layout

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## Train RMGs will Gantry with Every Move

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9 RMGs must gantry after picking from/setting to a railcar because buffer stack and railcar containers have different spacing

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### Key Analysis Issues

- RMG productivity to/from trains in each case
- Overall facility capacity
- Cost per move
- Emissions per move vs current operation
- Sensitivity to:
  - Truck arrival pattern
  - Time to work IBCs “coning delay”

## Gate Arrival Pattern vs Terminal Performance

### – Unified Case

- RMGs must give preference to truck service
- If daily pattern has a high peak, RMG productivity to/from train will be low during peak hours
- UP set minimum acceptable levels of RMG productivity

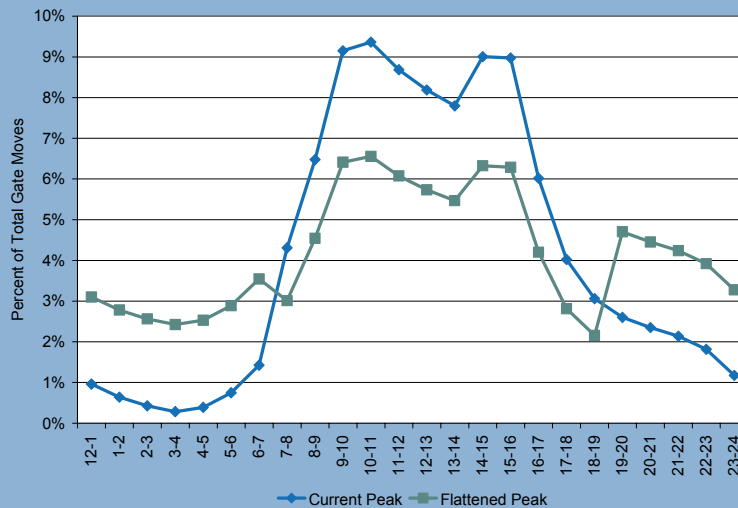
### – Nested case

- RMG productivity to/from train is unaffected because train RMGs do not serve gate trucks
- Sufficient gate RMGs must be purchased to serve peak gate hours
- If the ratio of peak hour gate arrivals to mean hour arrivals is very high, gate RMGs will be lightly utilized and capital cost will be high

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## Fraction of Daily Arrivals per Hour

Current and Future Best Case Patterns



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## DH's GMTS Simulation Model was Used to Analyze Each Option

### Input:

- Terminal Geometry
- Rail Loading and Discharge Sequence
- Operating Assumptions
- Equipment Cycle Time
- Peak Rail Load
- Peak Gate Load

### Output:

- Equipment Utilization
- Equipment Productivity
- Container Stack Population
- Street Truck Turn Time
- Other Terminal Performance Measures

## RMG Productivity to/from Trains

- Unified case:
  - 13-17 moves per RMG per hour during peak gate hours
  - 25-30 moves per RMG per hour during off-peak hours
- Nested case – 34 container moves per RMG per hr regardless of gate arrivals

## Deriving Annual Capacity from Hourly Productivity

- Maximum practical RMGs in use (minimum spacing between RMGs)
- Delay for switching railcars between working and storage tracks
- Delay for rehandling (if applicable)
- Downtime for maintenance and repair
- Seasonal peaking factors
- 1.5 million rail moves/year are achievable with either RMG system

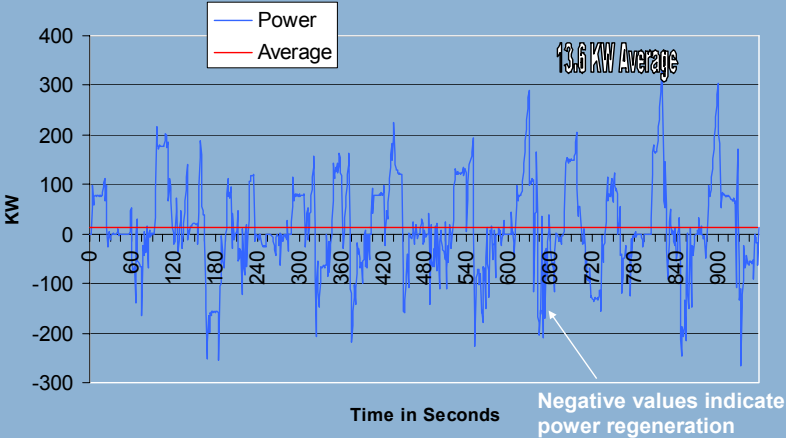
## Costs Considered for Comparison

(6% Annual Interest Rate Used Where Applicable)

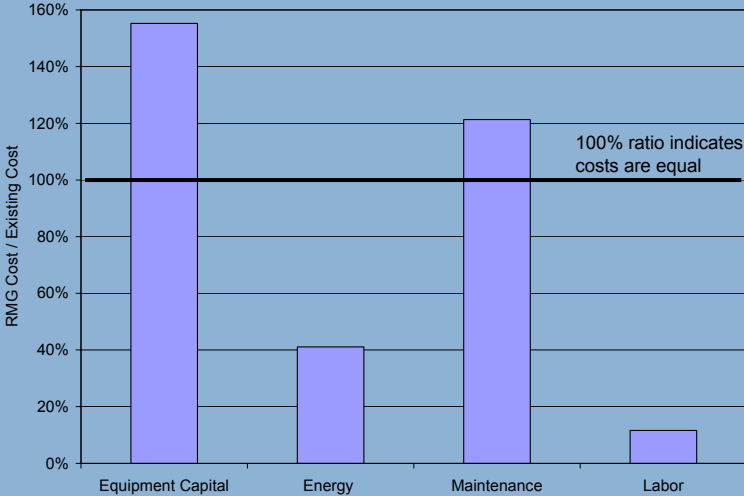
- Common Costs
  - Includes grading, paving, lighting, rail tracks, striping, electrical infrastructure
- Infrastructure
- Equipment Capital
- Energy
- Maintenance
- Labor
- Automation IT

### Example RMG Power Usage

- Regeneration Allows for very low mean power requirements in RMGs
- 13.6 KW mean usage in this example



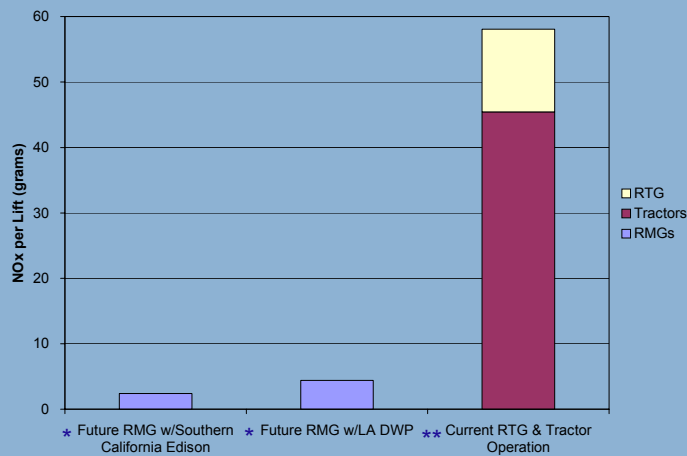
### Operating Cost per Move Nested RMG Option / Existing RTG+Tractor Cost



## Typical NOx per Move for RMGs vs RTGs+Tractors

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Note: data is not specific to ICTF



\* Data calculated from the EPA's Emissions & Generation Resource Integrated Database (EGrids) – 2006

\*\* Based on simulation studies of similar facilities using Tier 3 Diesels  
19 [3 g/(bhp-hr) NOx]

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### Summary: Advantages of RMGs vs Current Operation

- Electrically powered: no local emissions
- Wide-span design allows more tracks on same sized facility
- Highly automatable: lower operating cost
- Safer: truck/crane collisions can be prevented through physical barriers
- Less noise
- Less light required

*Thank You*



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