Twin-40 Container Operations ...
The Landside Part of the Equation

AAPA Facilities Engineering Seminar
San Diego, CA  November 2007
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Overview

- Quay planning issues with Twin-40 cranes
  • Quay crane configuration, wheel loads & rail gage
  • Transporter type, aisles, and alignment
  • IBC operations

- Container yard planning issues
  • Alternative transporter configurations
  • Twin-40 yard cranes?
  • Aisle configurations
Bigger Ships, More Capacity
Quay Crane Design Evolution

- Single hoist - one container per cycle
- Twin-20 spreaders - 2 TEU per cycle
- Dual hoist cranes to break the cycle into semi-independent segments and increase productivity with two separate sets of controls and operators – dual cycles w/ 2 TEU/cycle
- Twin-40 cranes - 4 TEU per cycle with single set of controls and operator
Conventional Twin-20 Spreader
Twin-40 / Quad-20 Spreaders

- Multi-box handling – increased productivity!
Advantages of Twin-40 Cranes

– Theoretically twice as many moves per cycle
– Maybe 25% of a ship’s stow can be handled as tandem lifts
– Accommodates containers of differing heights
– Accommodates many different load combinations
Challenges with Twin-40 Cranes

- Heavier crane and transport wheel loads
- Greatly increased requirement for yard transport vehicles to maintain uninterrupted productivity
  - Sequencing of transporters
  - Alignment of multiple transporters under crane
- IBC handling, especially for quad 20’ operation
- Impact on yard handling equipment
Twin-40 Cranes - Dubai
Alignment of Transport Vehicles

Transport Vehicle alignment is critical for efficient operation.
Alignment under the quay crane
Quay Operating Alternatives

- IBC Operations
  - IBC operations in lanes beneath crane
  - IBC operations on elevated platform
  - IBC operations upstream/downstream of cranes

- Hatch cover operations
  - In the back reach
  - Between the legs

- Transport vehicles have different operational implications
  - Yard chassis operations
  - Shuttle carrier operations
  - AGV operations
Tandem-40/Quad-20 IBC Handling

Labor Access and Safety Issues

IBC Storage Boxes
**OPTION 1: SINGLE LIFT - TRUCKS - CONING IN LANES**

- 30.5M GAGE CRANE
- 6 WORKING LANES
- 1ST AND 7TH CRANES SHARE

IBC's handled adjacent to the travel lanes
3: Twin / Chassis / IBC Platform

OPTION 3: TANDEM LIFT - TRUCKS - CONING ON PLATFORM

- 33.5M GAGE CRANE
- 8 WORKING LANES
- 1ST AND 5TH CRANES SHARE

IBCs handled on a crane mounted platform
OPTION 4: TANDEM LIFT - TRUCKS - CONING OFF QUAY

- 33.5M GAGE CRANE
- 8 WORKING LANES
- 1ST AND 5TH CRANES SHARE

IBCs handled in designated zones in the backland
REMOTE CONING STATION LOCATION

1:2000

DONE MEN REMOVE OR HANDLE CONES THROUGH Voids IN THE BOMB CART CORNERS

FORKLIFT TO MOVE CONE BOXES BETWEEN IMPORT AND EXPORT STATIONS

CON BOX, TYP

STATION COUNT TO MATCH DemAND

IBCs handled in designated zones in the backland
OPTION 7: TANDEM LIFT - SHUTTLE CARRIER - CONING IN QUAY BUFFER

- 42.7M GAGE CRANE
- 6 WORKING LANES
- 1ST AND 4TH CRANES SHARE
- SHUTTLE CARRIERS SHARE LEG SPACE

IBC(s) handled in buffer zone adjacent to the travel lanes
8: Twin / Shuttle / WS Platform

OPTION 8: TANDEM LIFT - SHUTTLE CARRIER - CONING ON PLATFORM
- 45.7M GAGE CRANES
- 6 WORKING LANES
- 1ST AND 4TH CRANE SHARE
- SHUTTLE CARRIERS IN INDEPENDENT LANES

Implication is wider crane gage

IBC handled on a crane mounted platform
Summary – IBC Operations

– On-crane IBC platforms have a lot of appeal
  • Safety
  • Space efficiency
  • Overhead protection for vessel service lanes
– Downstream IBC operations for tandem trucks is an option
– Downstream IBC operations may be the only option for Quad-20 operations
– Wider than 100’ gage cranes have a lot of appeal with Twin-40 Operations
On-crane IBC Operations

- Elevated IBC Platform
- Overhead protection for wharf traffic
- Safety Barrier
Transport Options for Twin-40 Cranes

- Two single yard chassis/AGVs
- Twin-40 yard chassis/AGVs
- Straddle or Shuttle Carriers
Twin-40 Yard Chassis

- **Pros**
  - Only one unit is required for the quay crane to execute a move
  - Less expensive than strads
  - Fewer drivers than with multiple single trailers

- **Cons**
  - Will not fit under a standard RTG
  - More dangerous to drive – poor rear visibility; labor acceptance risk
  - Quad 20s with four CY locations causes long cycle times
  - IBC operations must occur on the crane
Paceco Twin BufferStation

- Used to convert standard twin-40 lift crane to a dual hoist crane
- IBC operations on the BufferStation
- Separates tandem containers and spots them to single transporters
What is the actual productivity?

- Simulation modeling is a great analysis tool
  - Spread Sheet Modeling
  - Discrete Event Modeling
  - Comparative data sets
- Decisions supported by statistical data
Results

Max possible quay crane productivity (moves/hour)

Pick/set times as % of base case

Single hoist crane 30 mph

Two single hoist cranes 60 mph

Twin-40 hoist crane 50± mph
Planning for Twin-40 Cranes

- Understand crane gage and wheel load implications
- Understand IBC operational options
- Understand yard transport system options
- Understand yard handling options
- Analyze the terminal as an overall system
- Analyze sensitivity to various storage strategies and equipment mixes
- Analyze expected productivity and cost per move
Is Twin-40 operations for you?