

Cluster Industrial Complex with Megahost (CICM) System

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Background

- New concept of an industrial complex
- 100% container movement done through electric hoists
- Hoists installed in atrium that splits complex into two blocks

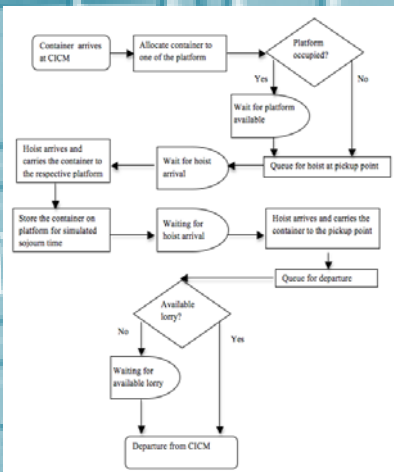


Problem Definition

- Test if current design is optimal
- Performance measures
 - Platform utilization
 - Hoist utilization
 - Queuing time
 - Queue size
- Parametric Modelling
 - Change in levels
 - Reduction in footprint

Methodology

1. Workflow Analysis



2. Basic Model



Basic Model

a) Parameters:

Peak Hour Parameters					
Arrival (Containers/hr)	Parallel Platform Dwell Time (hrs)	V Platform Dwell Time (hrs)	Arrival (Containers/hr)	Parallel Platform Dwell Time (hrs)	V Platform Dwell Time (hrs)
3	2	1	6	12	1
3	2	6	6	2	3
3	24	1	6	12	3
3	24	6	12	2	1
6	2	1	12	6	1

Non-peak Arrival Rate: 0.5 Containers/hr

b) Verification and validation:

Verification: Basic model is comparable to JTC's model.

Validation: Sought approval from JTC.

3. New Models

a) Increase in levels:



8 Levels

10 Levels

Rationale: Test if utilization increases when number of levels are increased. Model designs tested: 8 and 10 levels.

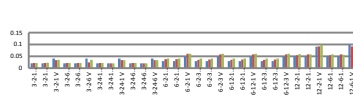
b) Reduction in footprint:

Rationale: Land scarcity issues so basic model may be too large for practical use; test for utilization changes if footprint reduces. Model designs tested: 10%, 20% and 40% reduction in footprint.

Result Analysis

a) Increase in levels

Crane Utilization for change in levels

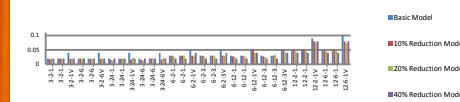


Results:

- Increase in hoist utilization
- Decrease in platform utilization
- No appreciable differences in queuing time and queue size

b) Reduction in footprint

Crane Utilization for change in footprint



Results:

- Increase in hoist utilization
- No appreciable differences in platform utilization, queuing time and queue size

Conclusion

Compared to basic design, 8 level design with footprint reduced to the minimum amount of space required by the tenants is recommended.