

Increasing Quayside Productivity

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Topics

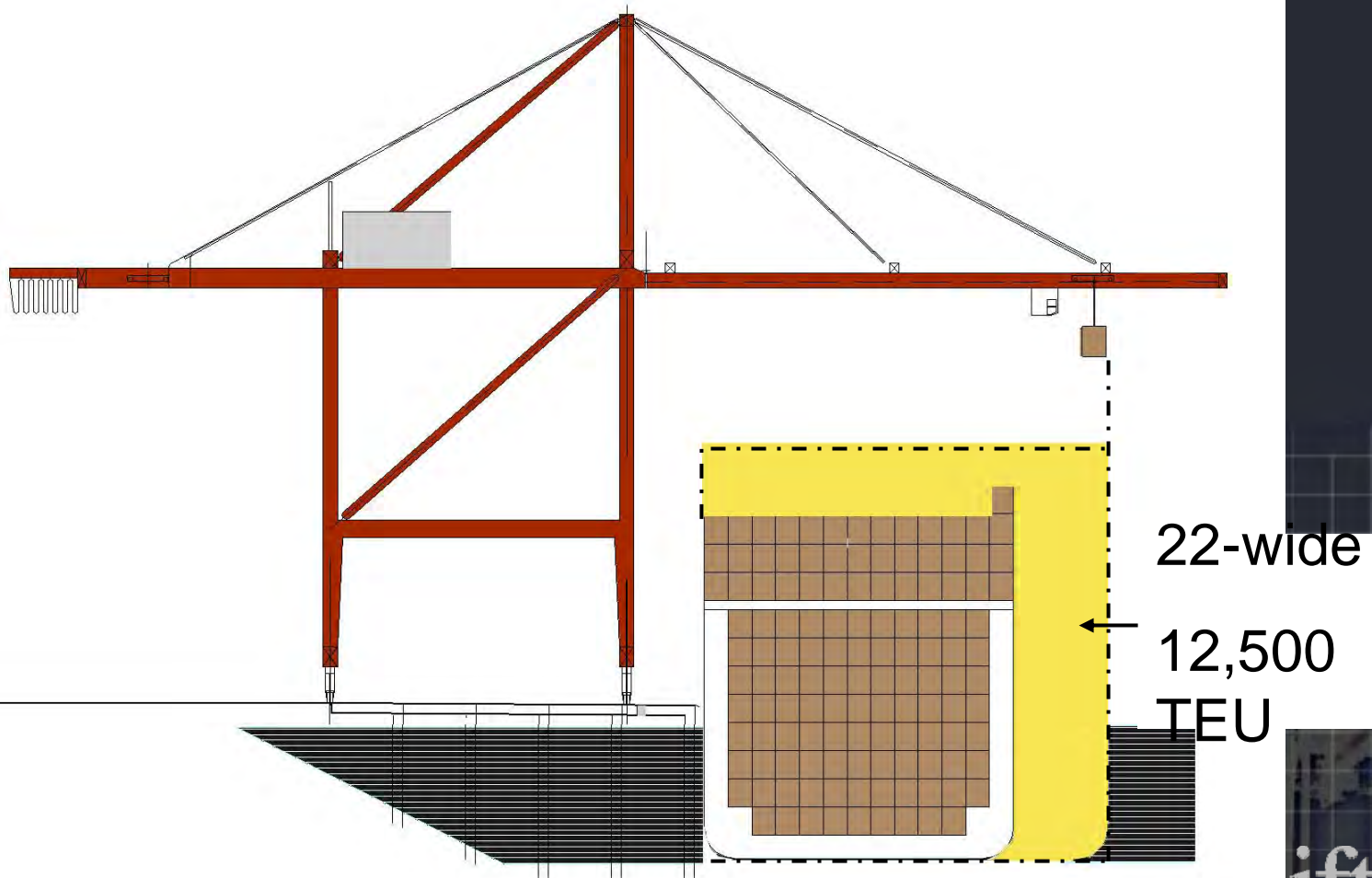
Background

Vessel turn around time

Increasing quay crane performance



Background



Increasing pressure on ports to provide
higher quayside performance levels
Growing environmental pressure to
optimize terminal facility



Vessel Turn Around Time

Depends on:

- Vessel and crane parameters

- Operating parameters

- Container yard performance



Parameters

Vessel

6,000 TEU Vessel

TEU Per Lift 1.75

Turnover 75%

Quay Crane Assignment

5 Quay Cranes

Two 8-Hour Shifts Per Day

Vessel Turn Around Time

Crane Productivity (moves per hour)	Vessel Turn Around Time; Hrs			
	6,000 TEU	8,000 TEU	10,000 TEU	12,000 TEU
25-30	60	64	72	85
35-40	45	48	52	66
50	35	38	44	51
60	30	32	36	45

Vessel Turn Around Time

Crane Productivity (moves per hour)	Vessel Turn Around Time; Hrs			
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25-30	60	64	72	85
35-40	45	48	52	66
50	35	38	44	51
60	30	32	36	45

Means to Increase Quayside Productivity

Conventional Technology

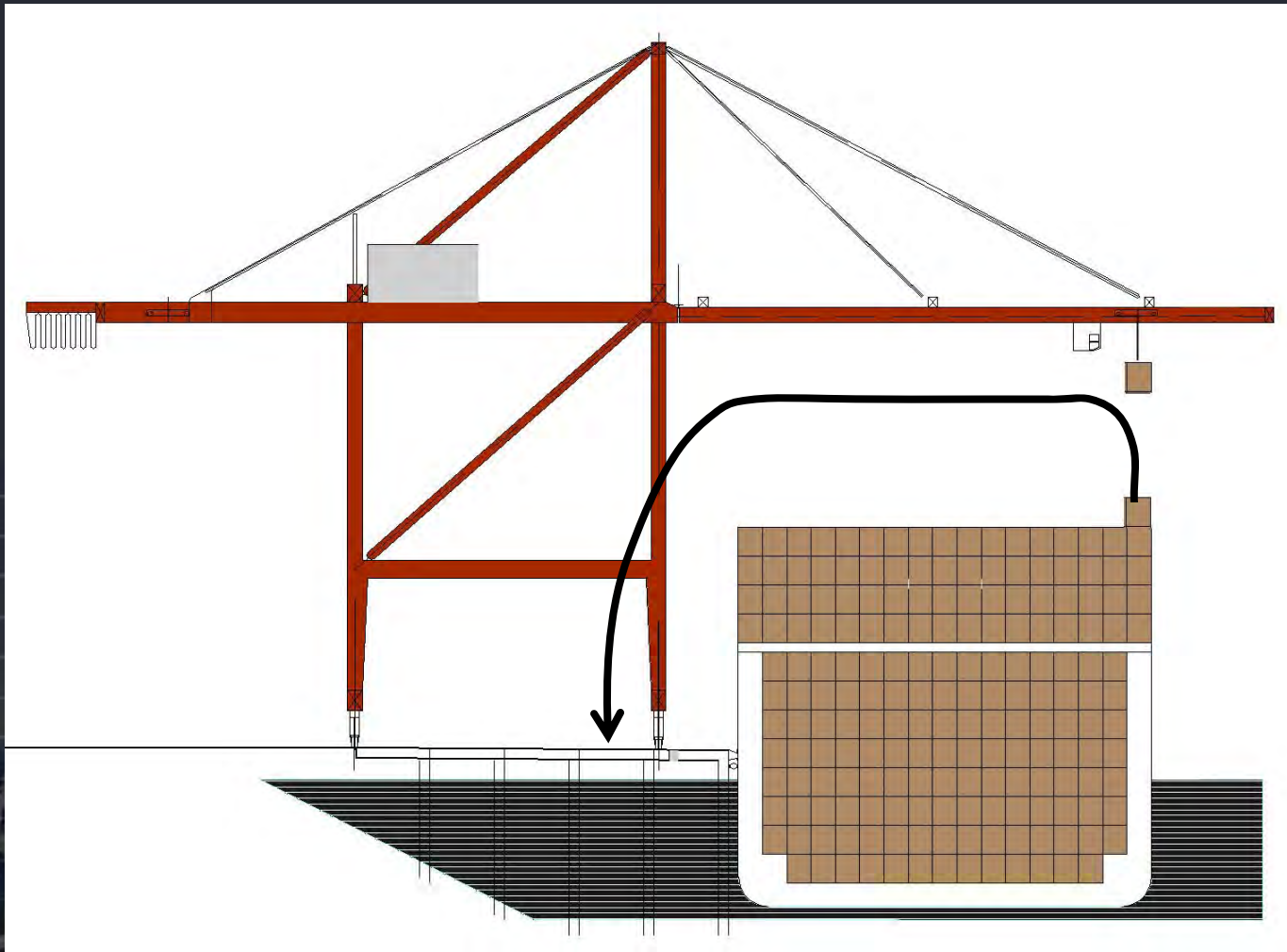
Conventional Technology Extended

Super Cranes



Conventional Technology

One Trolley



Curvi-linear
cycle

25-30 net
moves
per hour

One
operator

Higher Speeds, Same Productivity

Crane	Outreach	Lift Ht.	Hoist Speed		Trolley Speed	
	meters	meters	mpm	Ratio	mpm	Ratio
Panamax	35 m	24 m	48	1	150	1
Post-Pan	44 m	29 m	55	1.15	180	1.2
Super PP	50 m	33 m	61	1.14	245	1.35
22-Wide	65 m	40 m	90	1.88	300	2

25-30 moves per hour

Multi-Container Picks



Twin 20s are common
65 t Rated Crane
Capacity

Tandem 40s may be next
75 t Rated Crane
Capacity



Conventional Technology Extended

Two-sided operation to put more cranes
against a vessel

Elevating girder crane

Dual hoist cranes

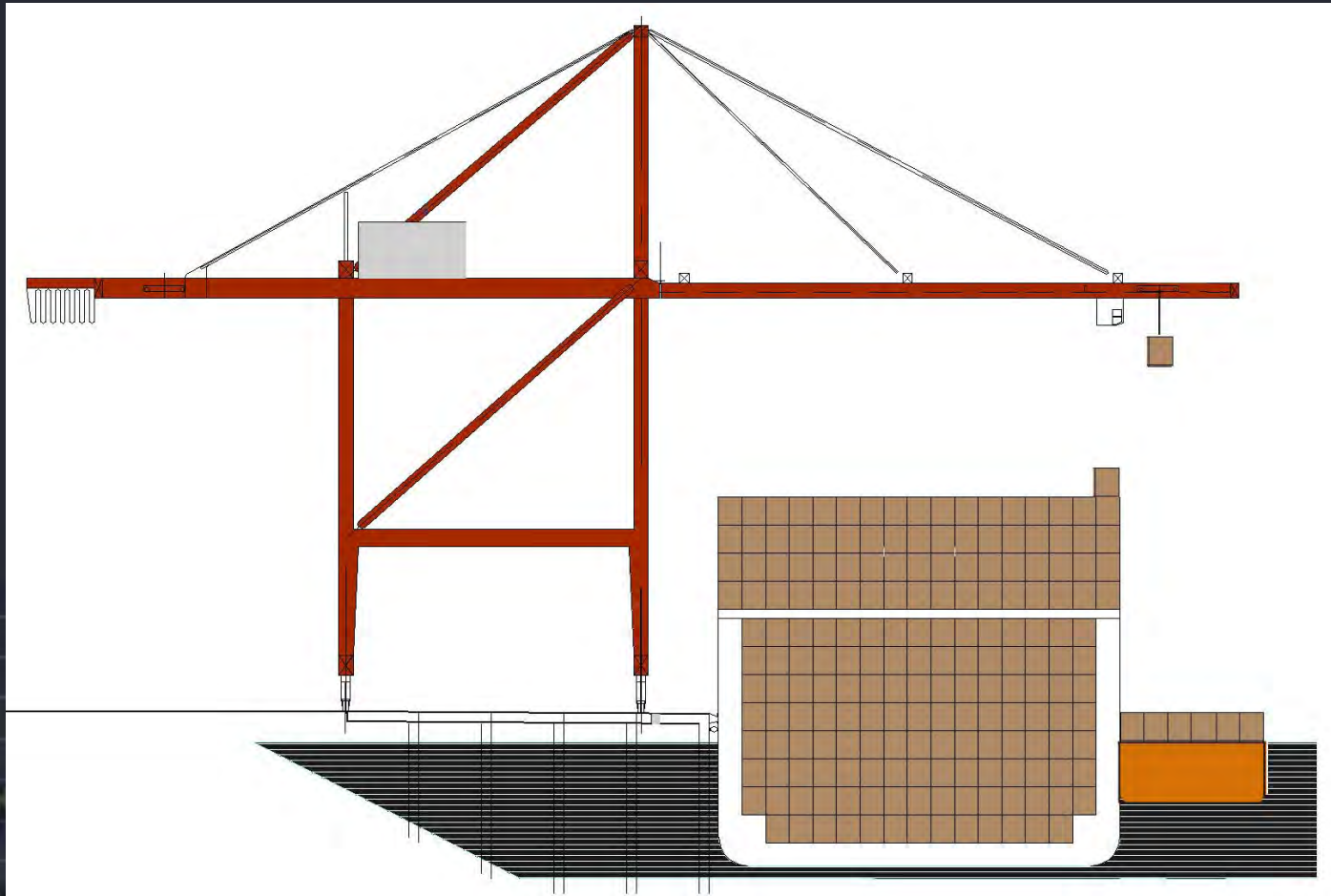


Two-Sided Operation



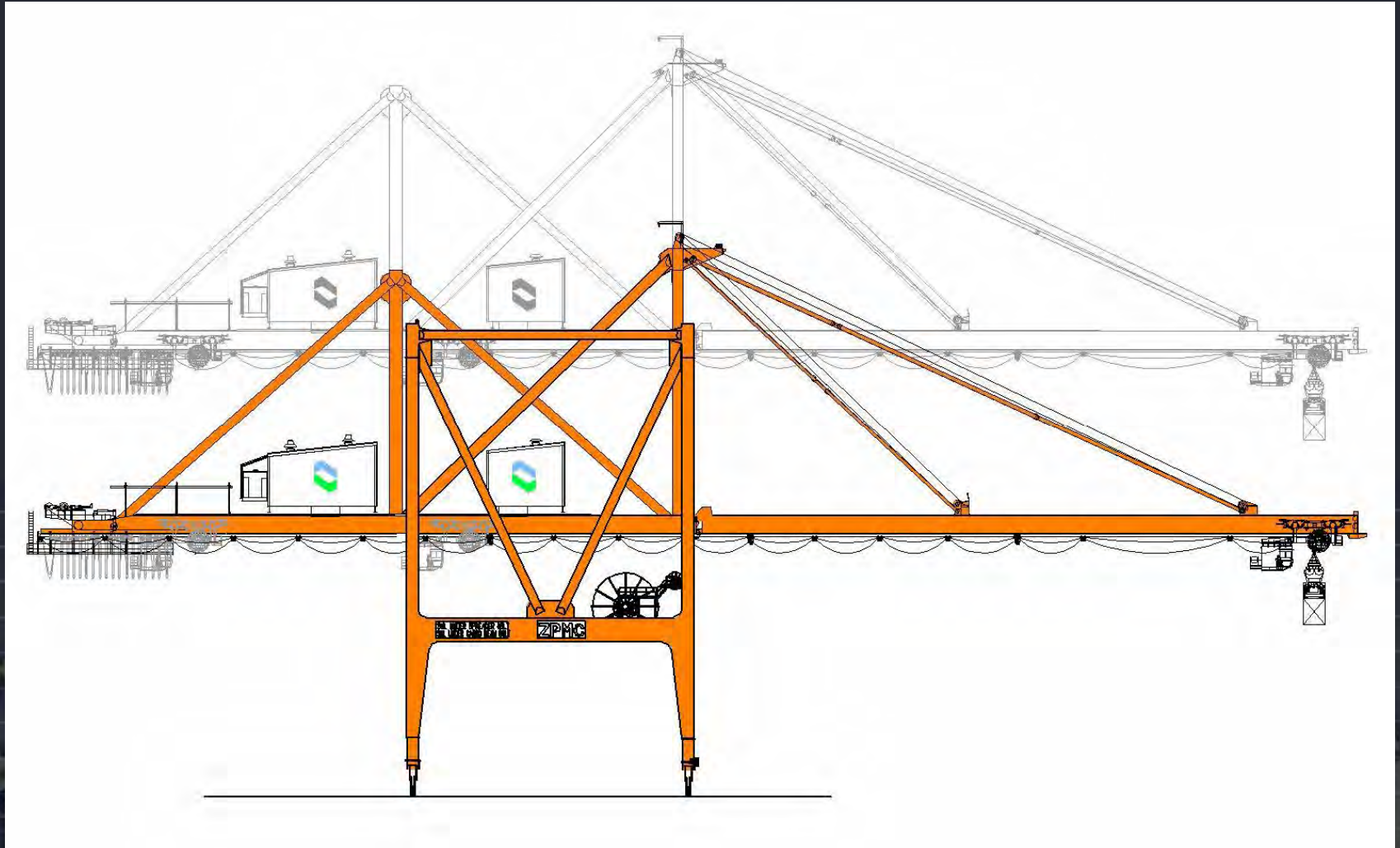
Ceres Terminal with nine cranes designed for 300 vessel moves per hour

Two-Sided Operation



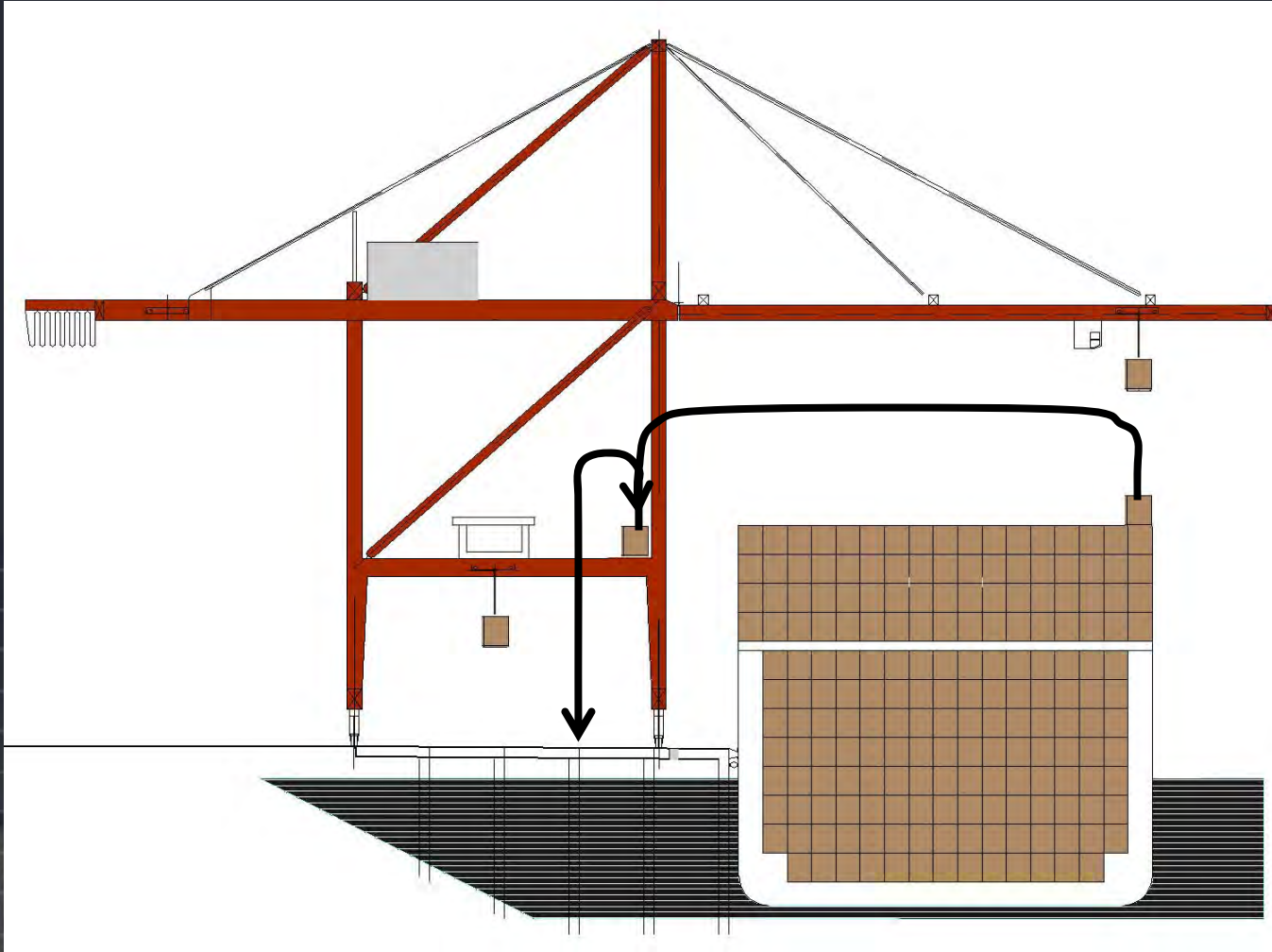
Potential for two-sided operations on conventional wharves with outboard barge operations

Elevating Girder Crane



30 to 36 containers per hour

Dual Hoist System



Curvi-linear
cycle

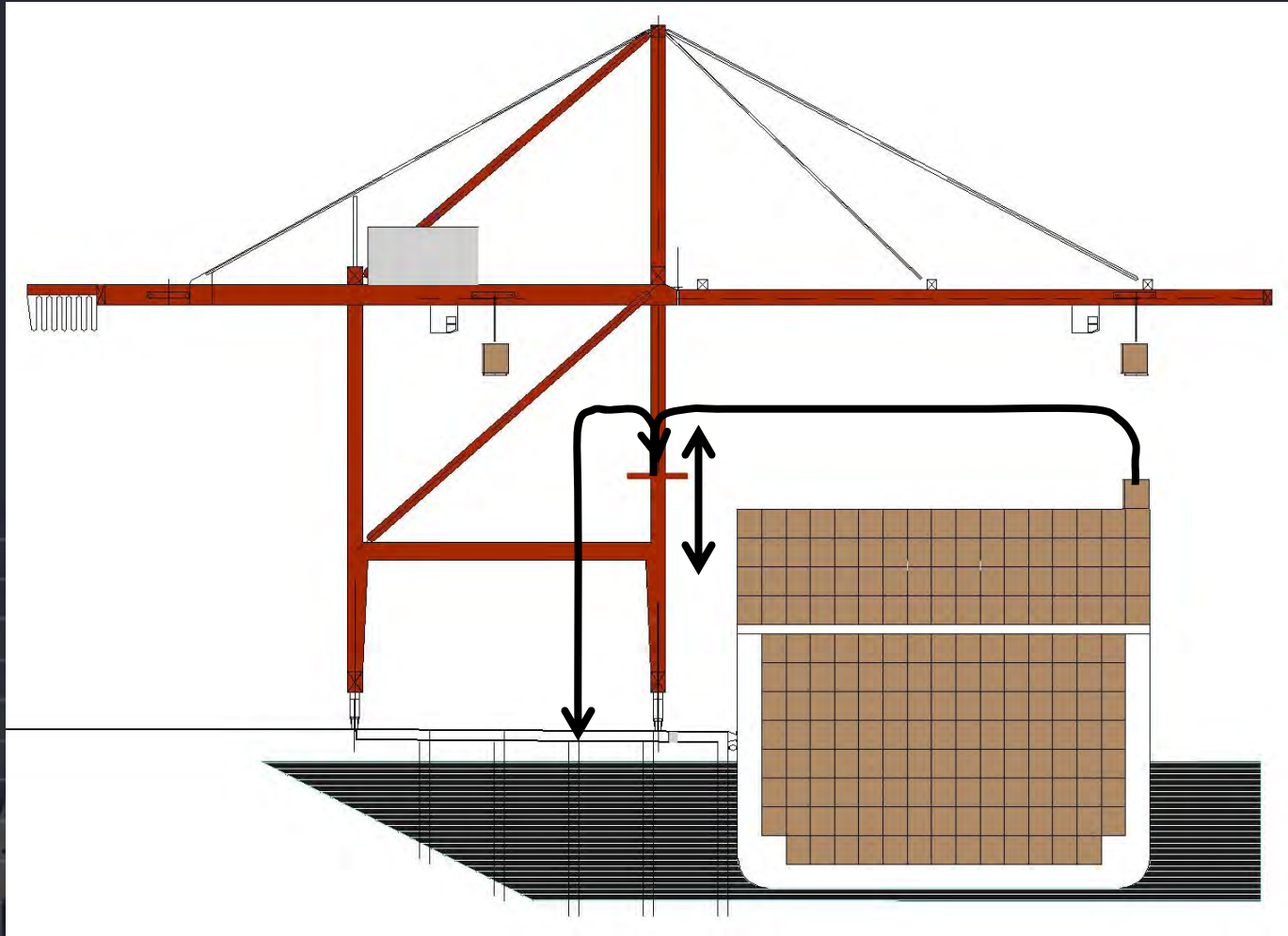
35-40 net
moves
per hour

Two
operators

Dual Hoist Cranes



Two Trolleys on One Runway



Curvi-linear
cycle

35-40 net
moves
per hour

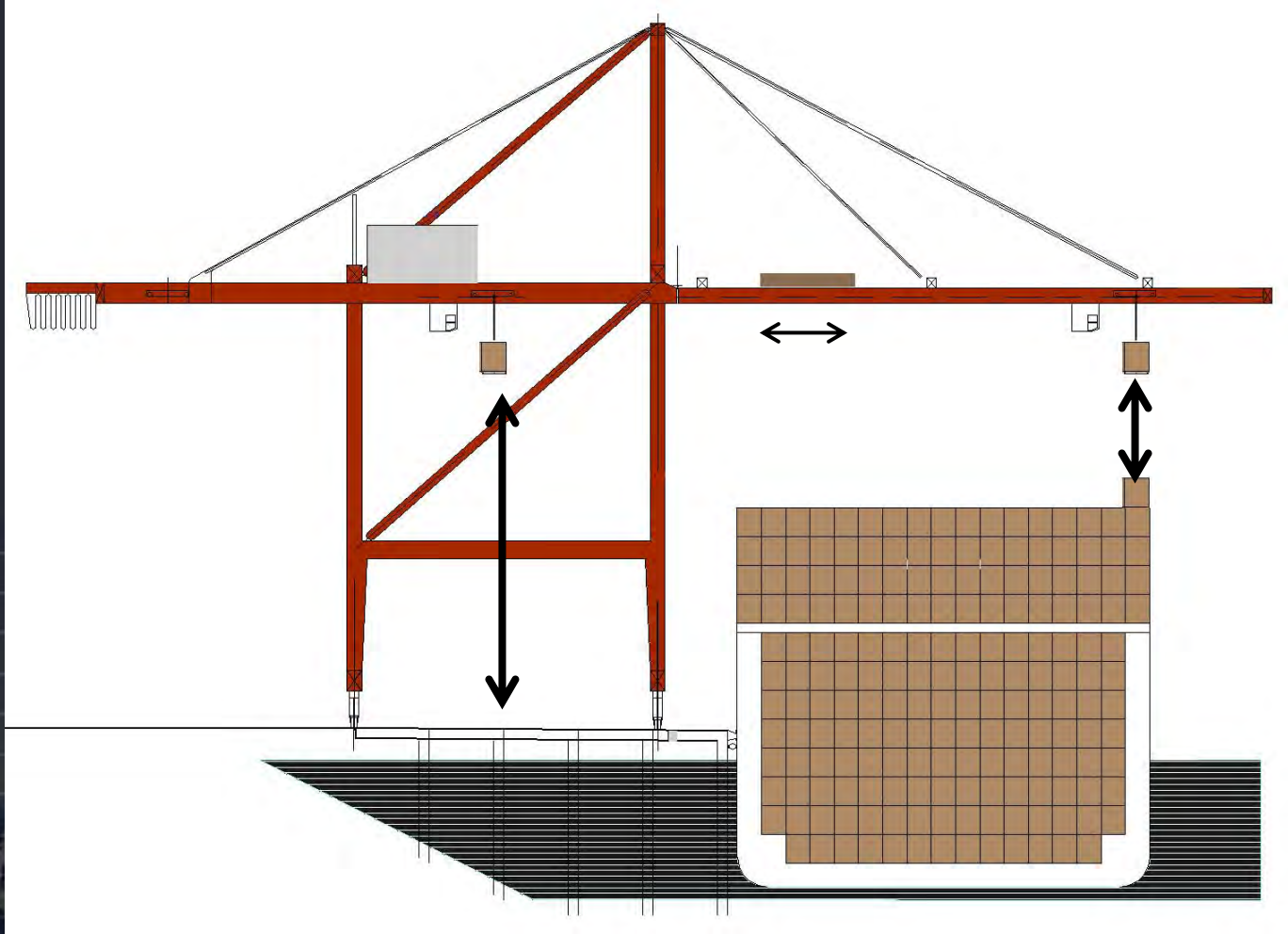
Two
operators

Super Crane Concepts

Separate waterside and landside
functionality with buffer



Schematic



Square
cycle

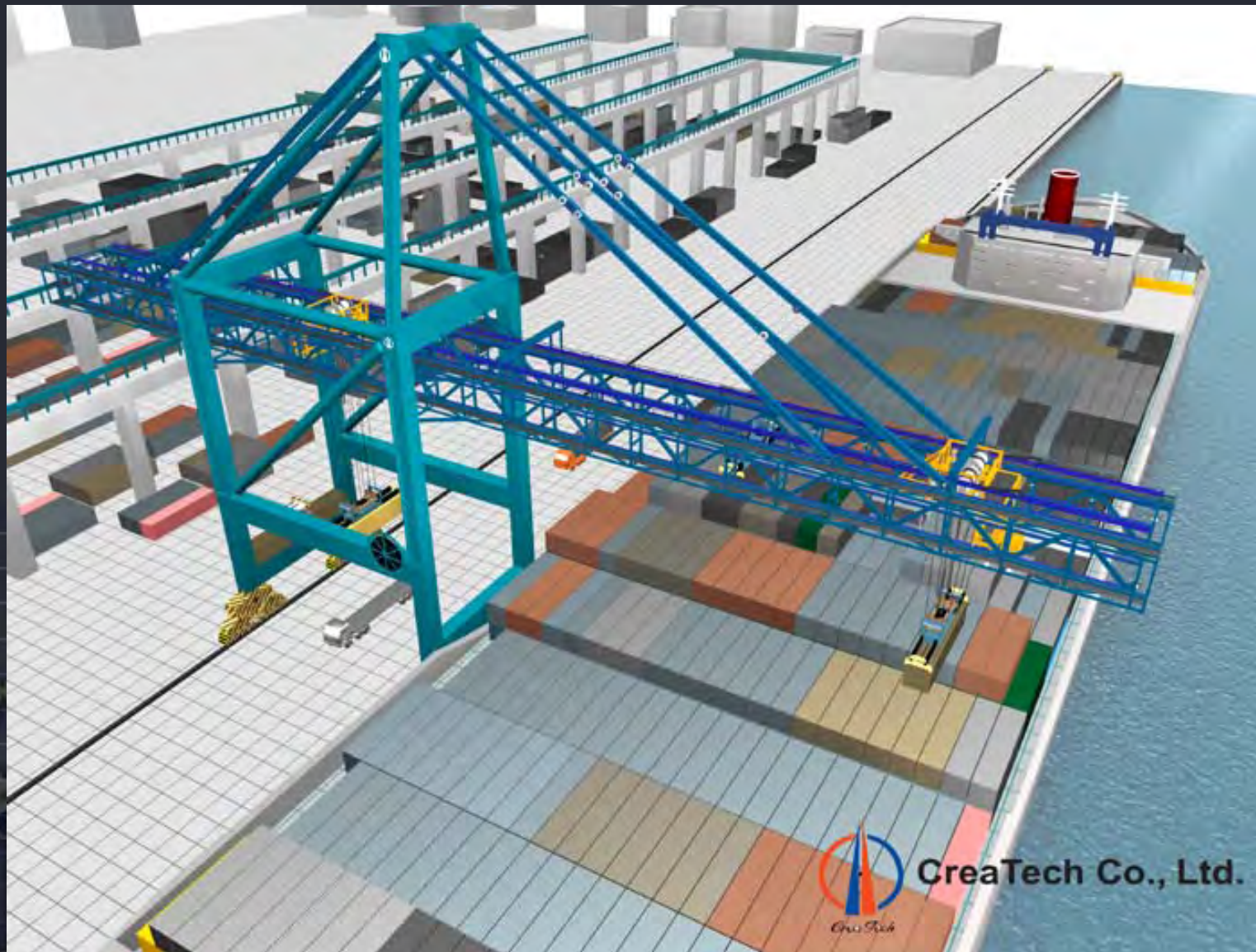
50-60 net
moves
per hour

Two
operators

Paceco Supertainer



CreaTech Technotainer

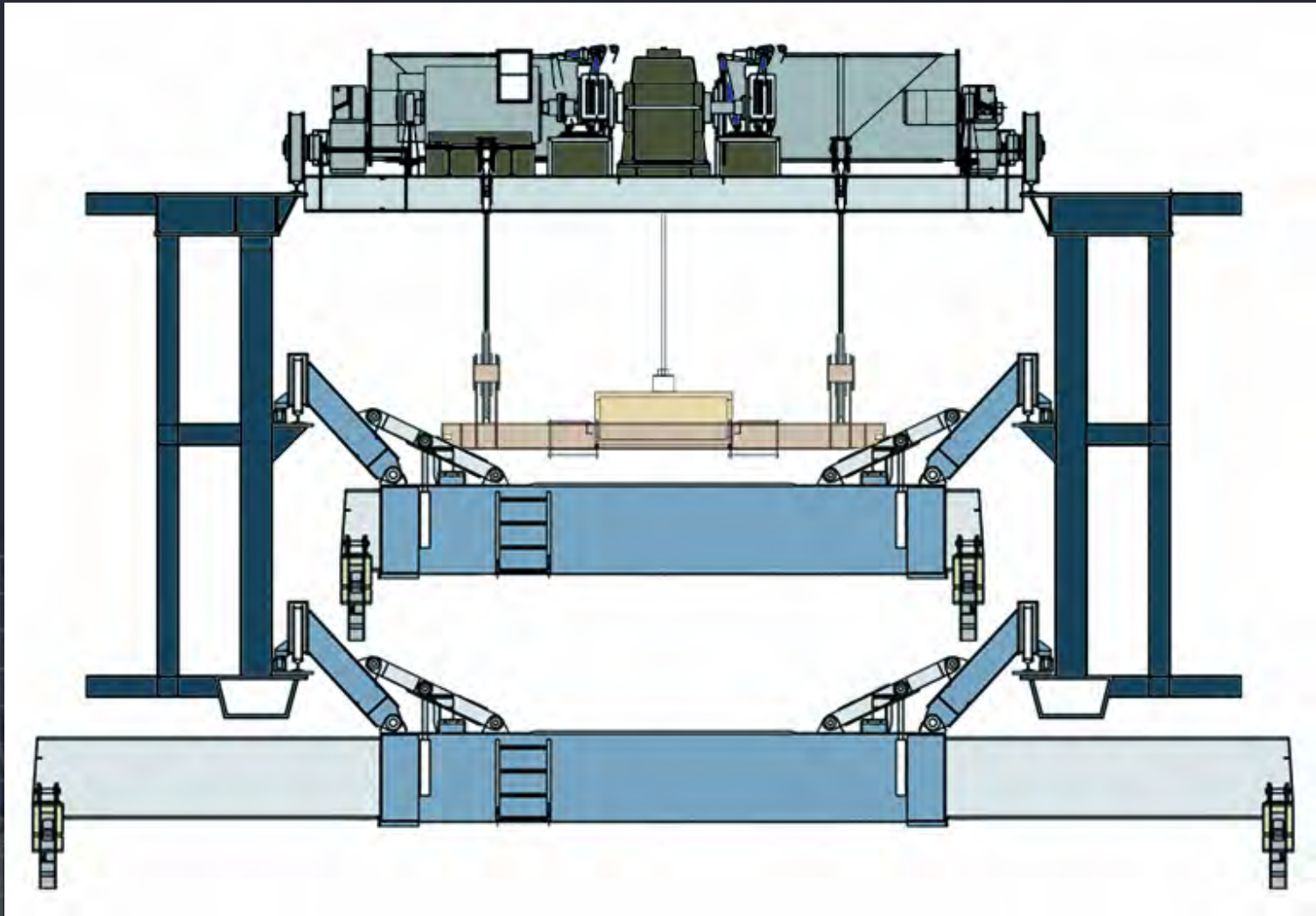


CreaTech Co., Ltd.

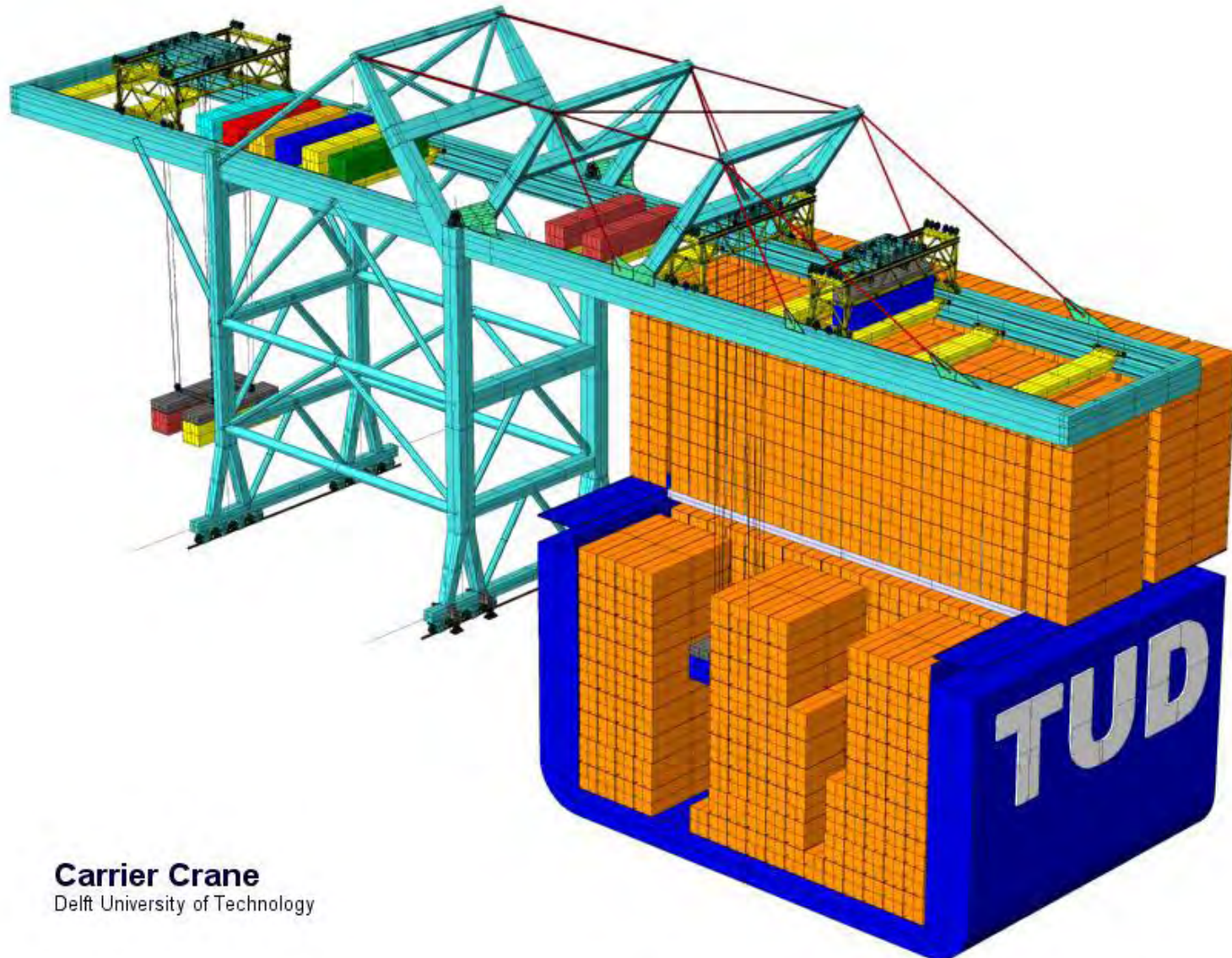
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CreaTech Technotainer

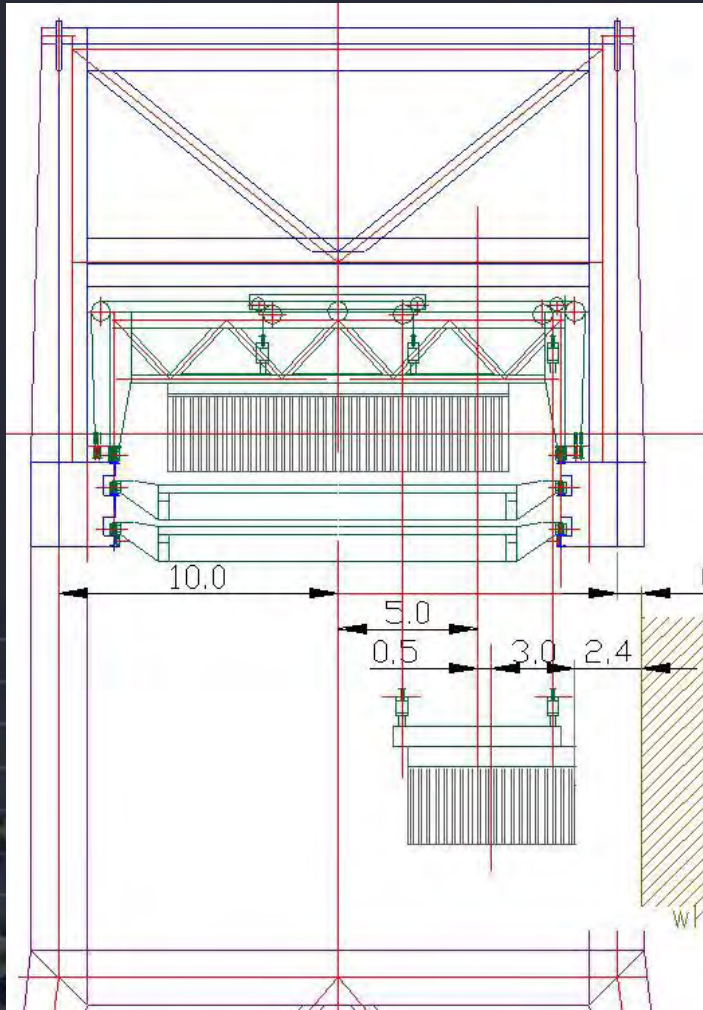


Delft University Carrier Crane

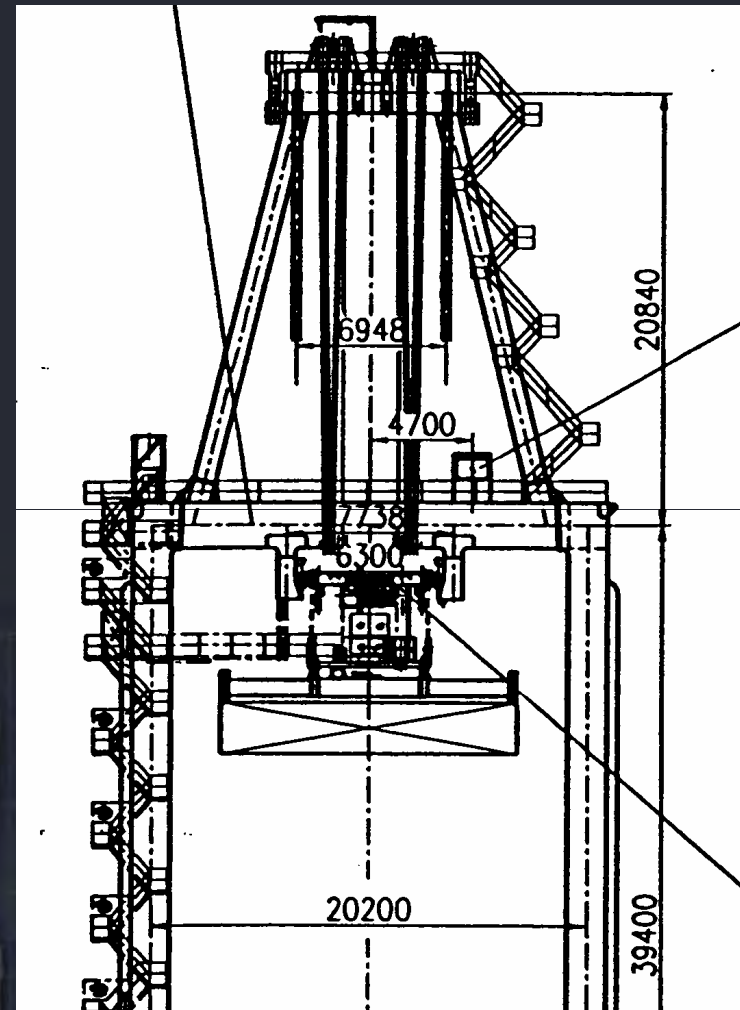


Carrier Crane
Delft University of Technology

Boom Width

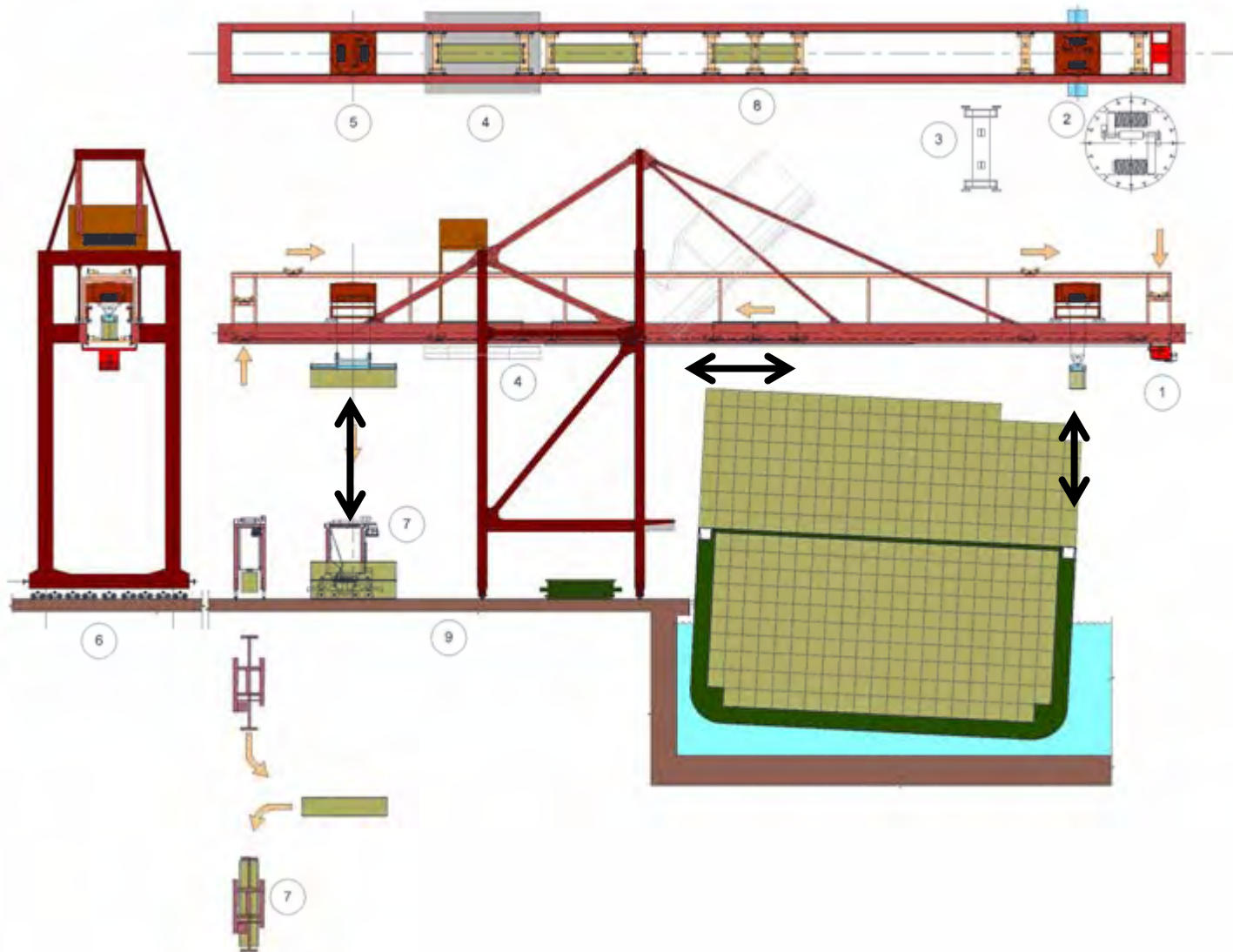


Delft Boom Section



Conventional Crane
Boom Section

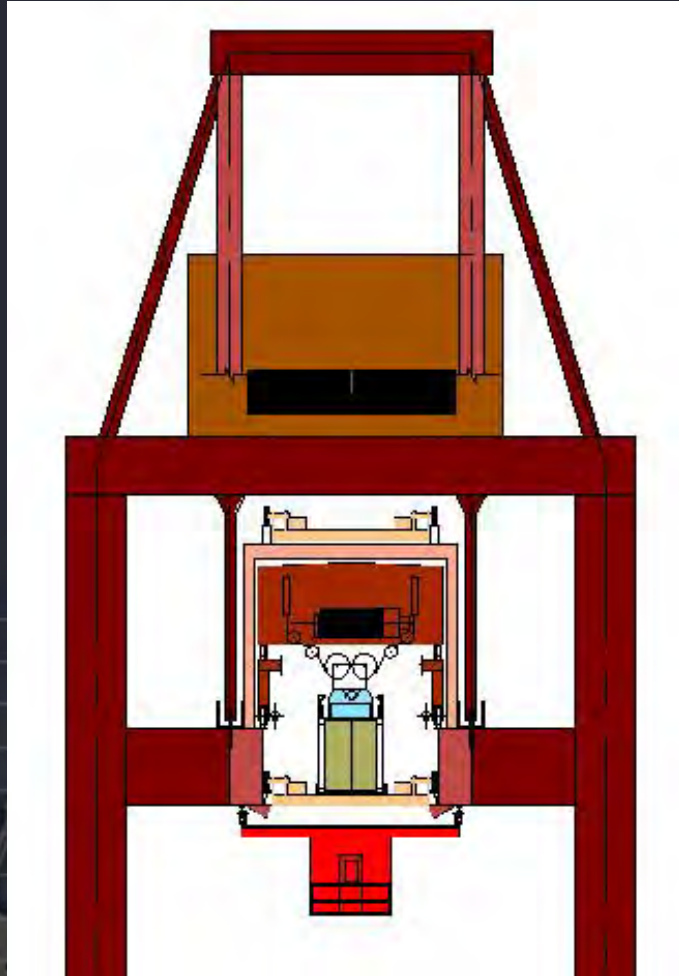
Liftech Super Crane



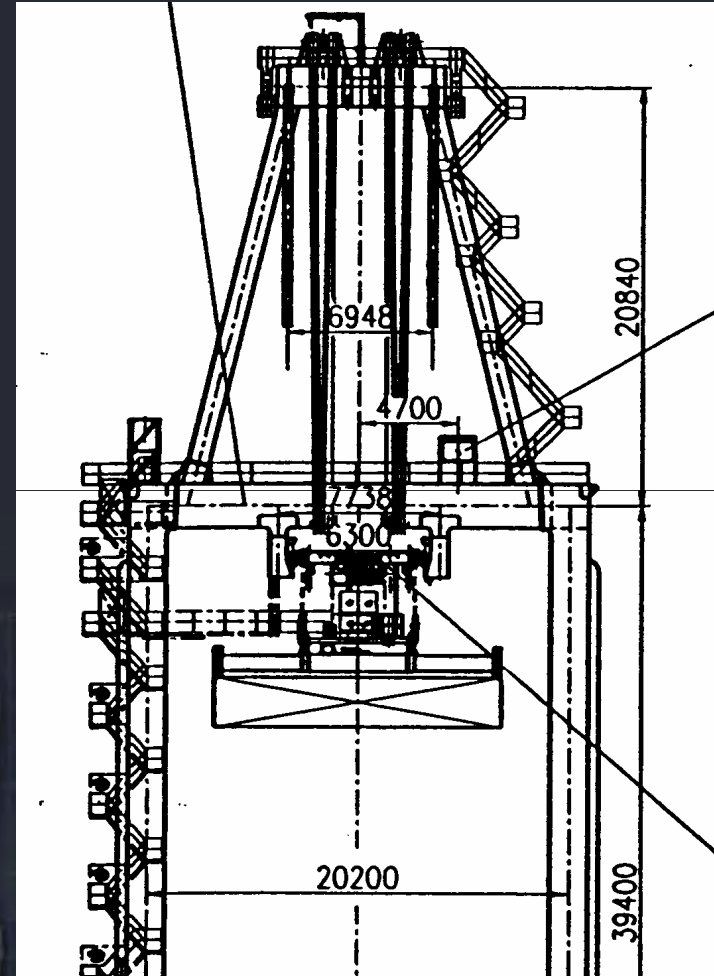
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Boom Section



Liftech Super Crane



Conventional Crane

Why Not High Performance Cranes?

Need high performance container yard

High cost per move

High capital cost

High operational cost

High maintenance cost

Insecurity with new technology

Near Term Outlook – Ten Years

Single hoist cranes

Dual hoist with one operator

Twin 20 and tandem 40

Increased load control

35-40 moves per crane per hour

200 vessel moves per hour





Thank You

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