

Leader in moving energy supplies for Zero-Emission

Presented by:



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Shore power products include:

igus Mobile Shore Power Outlet (iMSPO[®]), e-chain Reel[®], Triflex Dispenser[®] Systems, e-loop[®]

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Prepared for:



Why plan for Shore Power?

Health concerns

May 1, 2023

Support for California Ocean-Going Vessels At Berth Waiver
 Re: Docket ID No. EPA-HQ-OAR-2023-0152
 Comment from the American Lung Association
 Via email: a-and-r-dock@americanlung.org

The American Lung Association (ALA) is urging the U.S. Environmental Protection Agency (EPA) to approve California's updated policy to increase the use of shore power at California's ports. The policy addresses neighborhood-level diesel emissions from ships.

California's air quality is a major concern for Californians. The American Lung Association's "State of the Air" report shows that California is the most ozone-polluted state in the country. Progress in reducing air pollution, including asthma attacks, is slow. Impacts, including ports, ships and other ocean-going vessels, are a major concern.

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Solutions are needed...

Internal company directives...

01/15/2022

APM Terminals commits to industry-leading greenhouse gas emissions

APM Terminals will bring forward its Net Zero greenhouse gas emission target to 2040, a reduction in absolute (total) emissions has been set as an interim milestone for the period by any terminal operator to date.

This commitment builds upon the company's existing strategic approach to decarbonisation to reduce its carbon footprint. It will also contribute to a broader target set by parent company to reduce greenhouse gas emissions in 2040 across all business entities.

Zero-Emission Shore Power
 We will support the decarbonisation of the broader shipping industry in collaboration with our partners and port authorities e.g. through providing shore power.

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There is a wave coming...

Local and Global emissions reduction goals

NEWS • News

Lowenthal calls for end to ocean shipping pollution during Long Beach town hall
 The congressman said his proposed Clean Shipping Act would eliminate in-port carbon emissions by 2030.

By KRISTY HUTCHINGS | khutchings@csng.com
 PUBLISHED: September 3, 2022 at 6:00 a.m. | UPDATED: September 5, 2022 at 9:13 a.m.

ABS REGULATORY NEWS
 14/05/2023

CALIFORNIA AT-BERTH REQUIREMENTS
 The California Air Resource Board (CARB) 2020 At-Berth Regulation for vessels has begun phasing in emission controls as of 01 January 2023.

ENFORCEMENT NOTICE
 CARB issued an Enforcement Notice on 30 March 2023 regarding...
 * An extension to reporting requirements.

KEY NOTES
 * Applies to vessel types. All vessel types which...

Published: 22 May 2023

The EU agrees on well-to-wake GHG limits to energy used on board ships from 2025

For ships trading in the EU, the EU's legislative bodies have reached an agreement on the FuelEU Maritime regulation setting well-to-wake GHG emission intensity requirements on energy used on board from 2025. From 2030, the regulation also mandates the use of shore power for container and passenger ships in certain EU ports.

* Source DNV.com

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Are you **READY!**

Developments and tools to help reach the goals



Alternative fuels and engine technologies



Exhaust treatment and capture and control systems



OGV at berth electrification known by many different names...

Shore power is known by many names in different areas

Shore Power

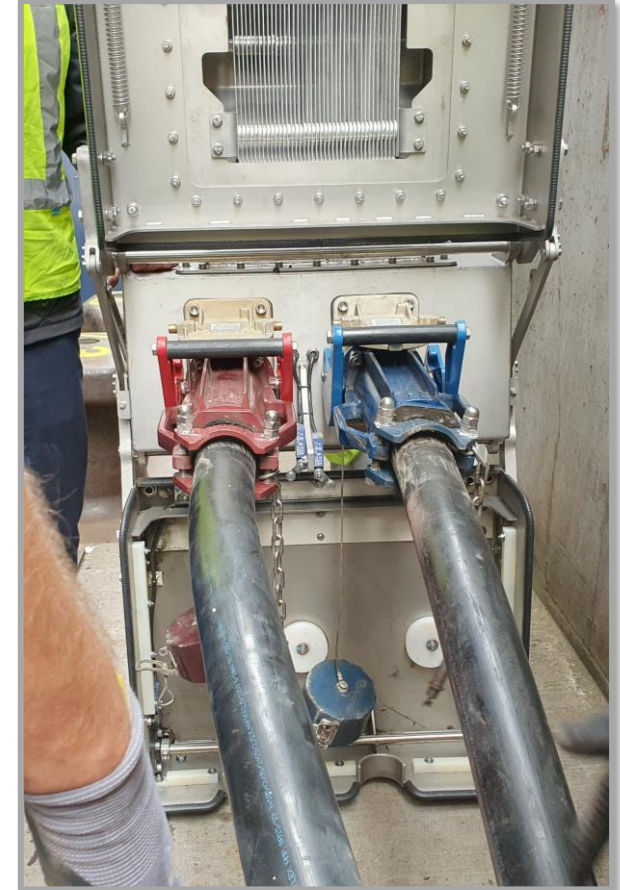
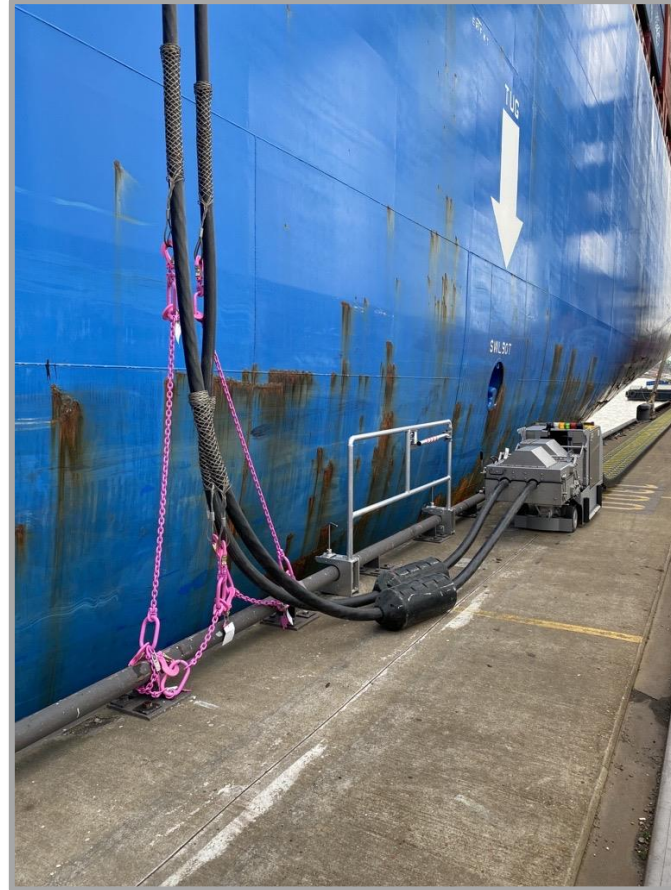
Shore Connections

O.P.S.
(Onshore Power Supply)

A.M.P. (Alternative
Maritime Power)

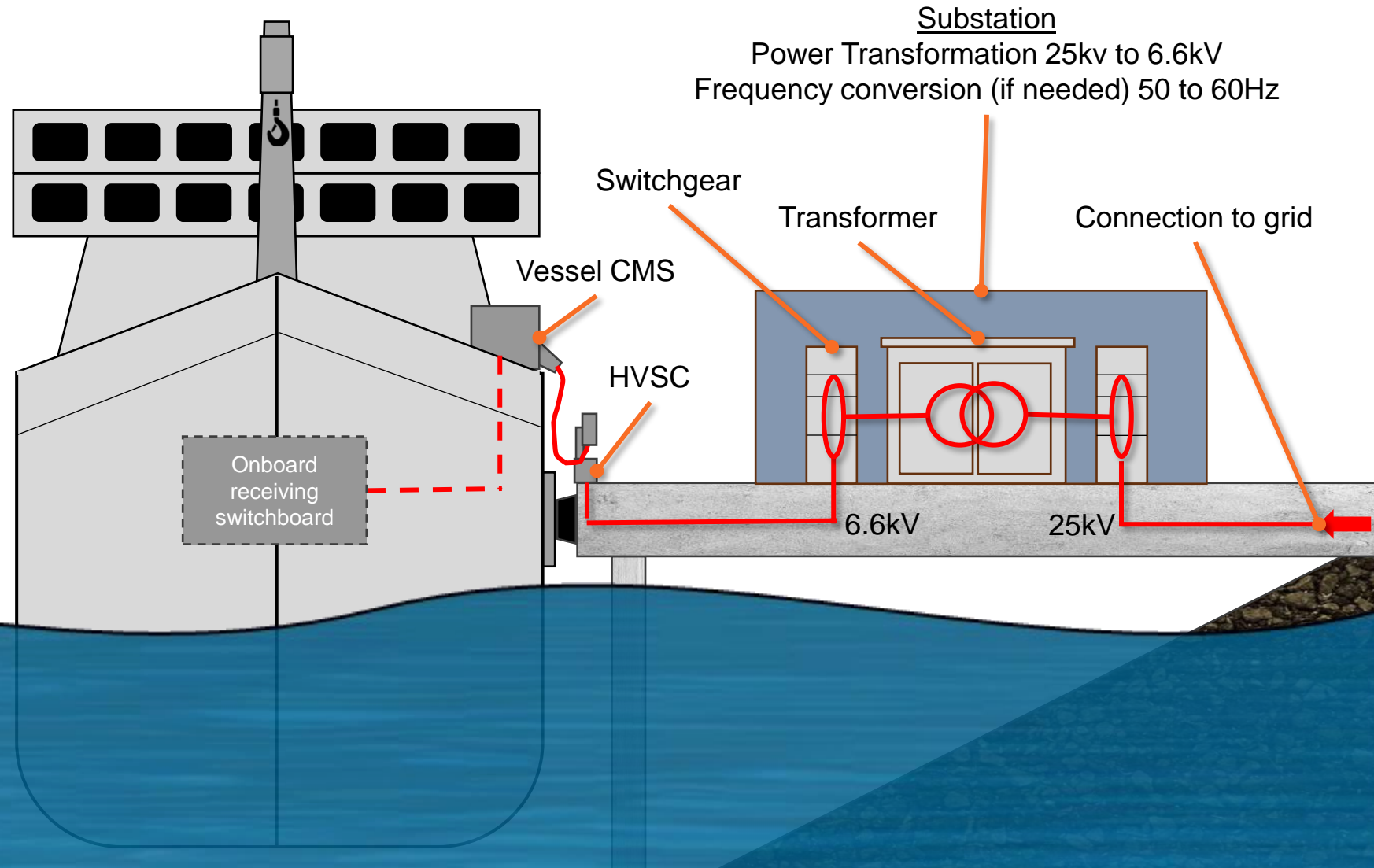
Shore to ship power

Cold Ironing



Shore power basics

Shore power is a way to connect land-based power to a vessel to supply power while a vessel is at berth so that the onboard diesel generators can be powered down.

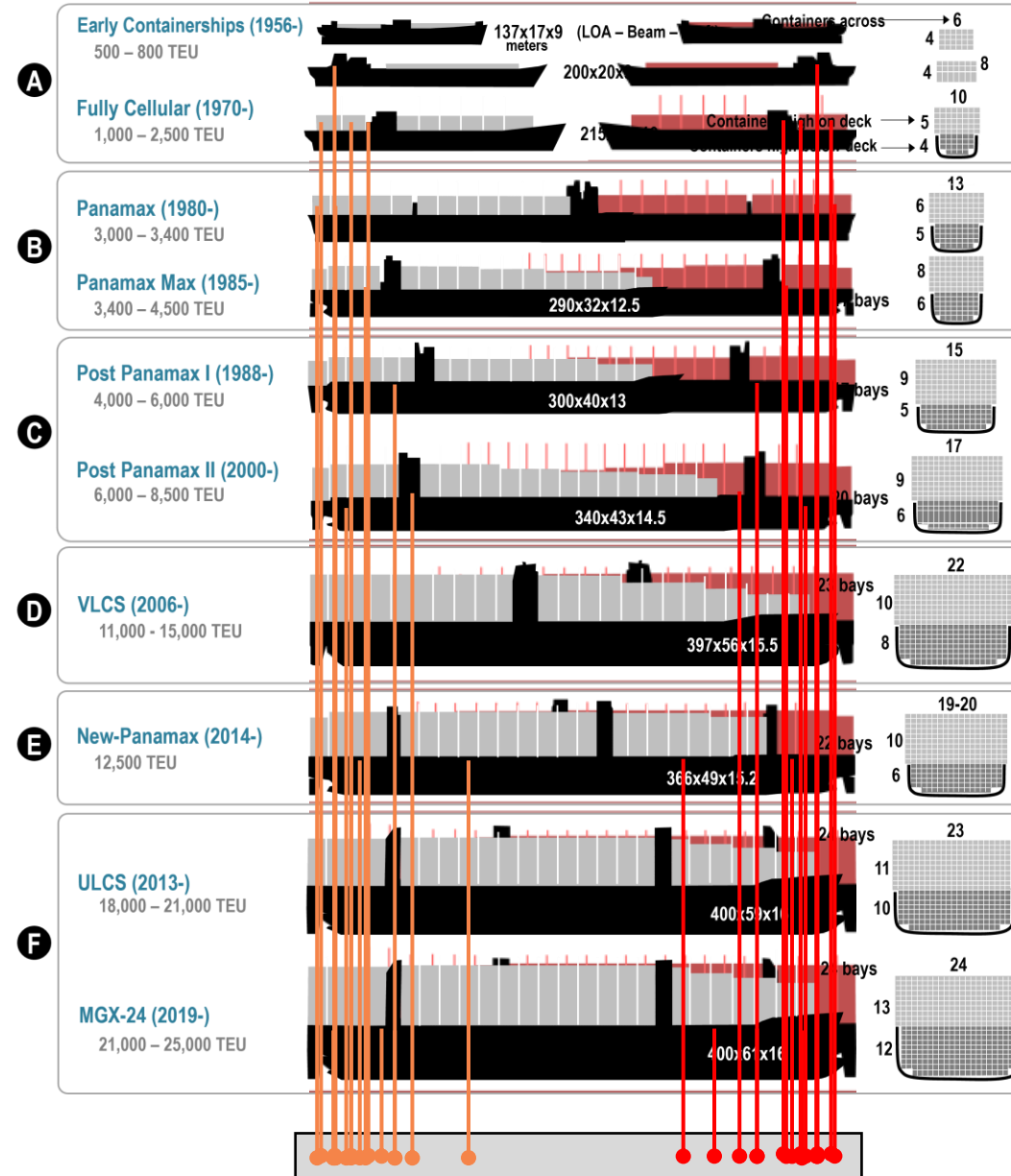


Onboard CMS locations

Different LOA's create different alignments for the onboard Cable Management Systems (CMS)

Port and starboard berthing create additional alignments

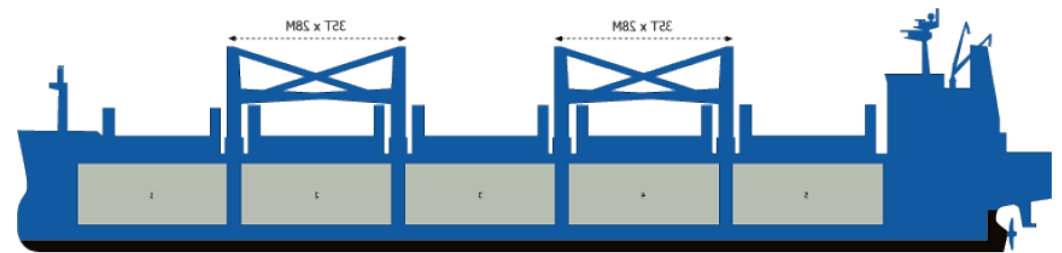
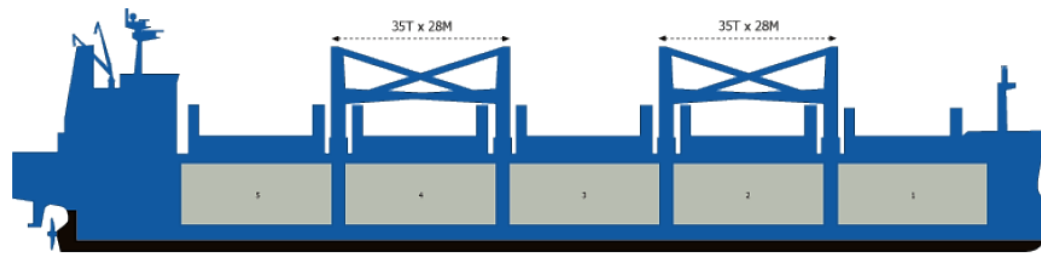
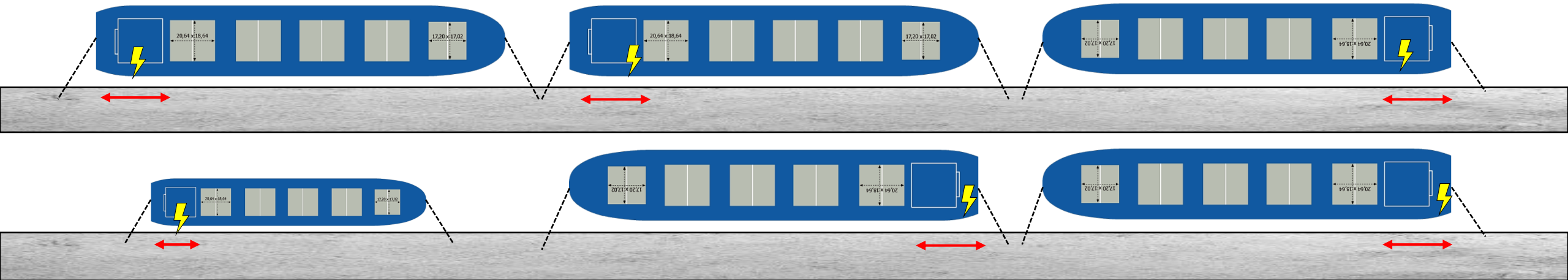
CMS locations can vary in between the stern and bridge



Starboard berthing

Port berthing (mirrored)

Berthing arrangement impact on connection points



CMS Possible Positions
Starboard side 30m

CMS Possible Positions
Port side 30m

Changing positions of onboard cable management systems...

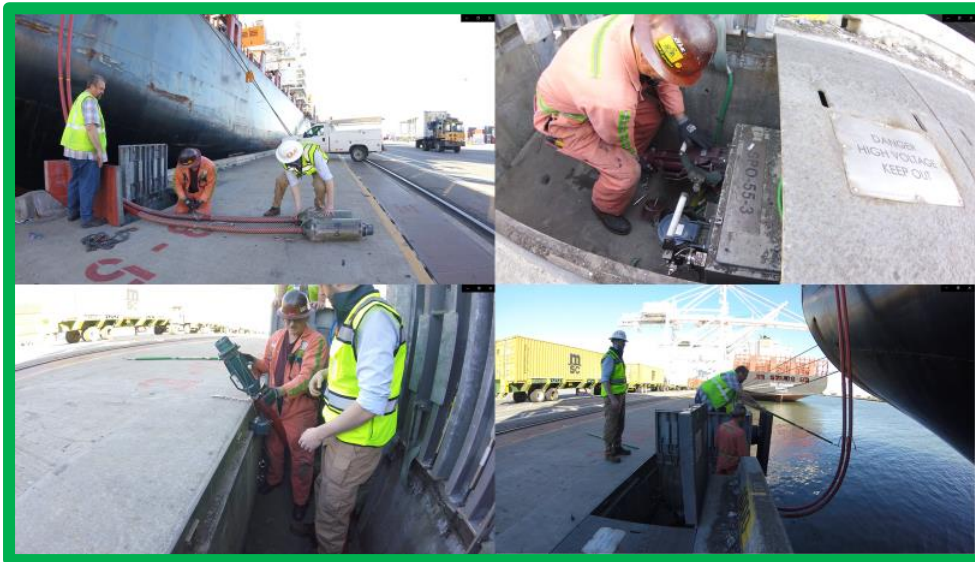
Vessel cable management system limits

Vertical motions for **tidal range**
and **loading** can vary 20m+

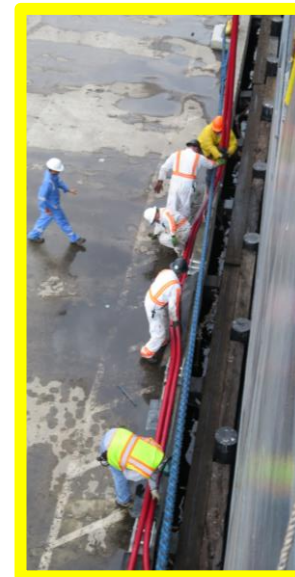


Fixed outlet layouts do not provide sufficient coverage

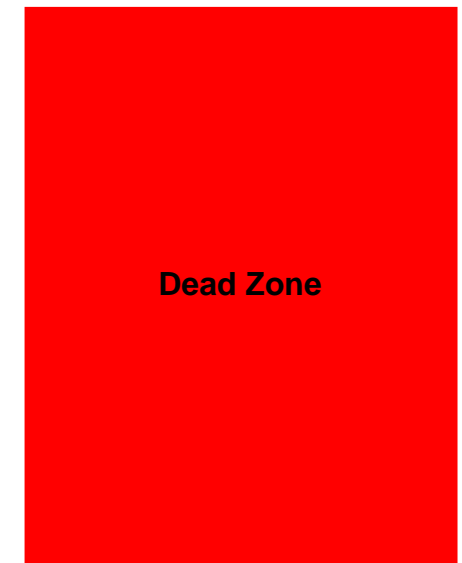
6 vaults, 1 every 50m



Green area = close alignment
acceptable connection



Yellow area > 7m misalignment
Difficult connection



Red area = No connection
"Dead Zones"

The best cost per meter and most connection flexibility

- Fixed outlets require more equipment, more maintenance, and dangerous cable extenders
- Fixed outlets have the highest cost per meter of linear coverage and construction costs
- Installing an outlet every 50m will not future-proof your operation and construction is very expensive

(6) FIXED shore power outlets = 120m total coverage based on theory = max. 40% linear coverage on quay



(6) FIXED shore power outlets = 12m total coverage based on real experience = max. 4% linear coverage on quay

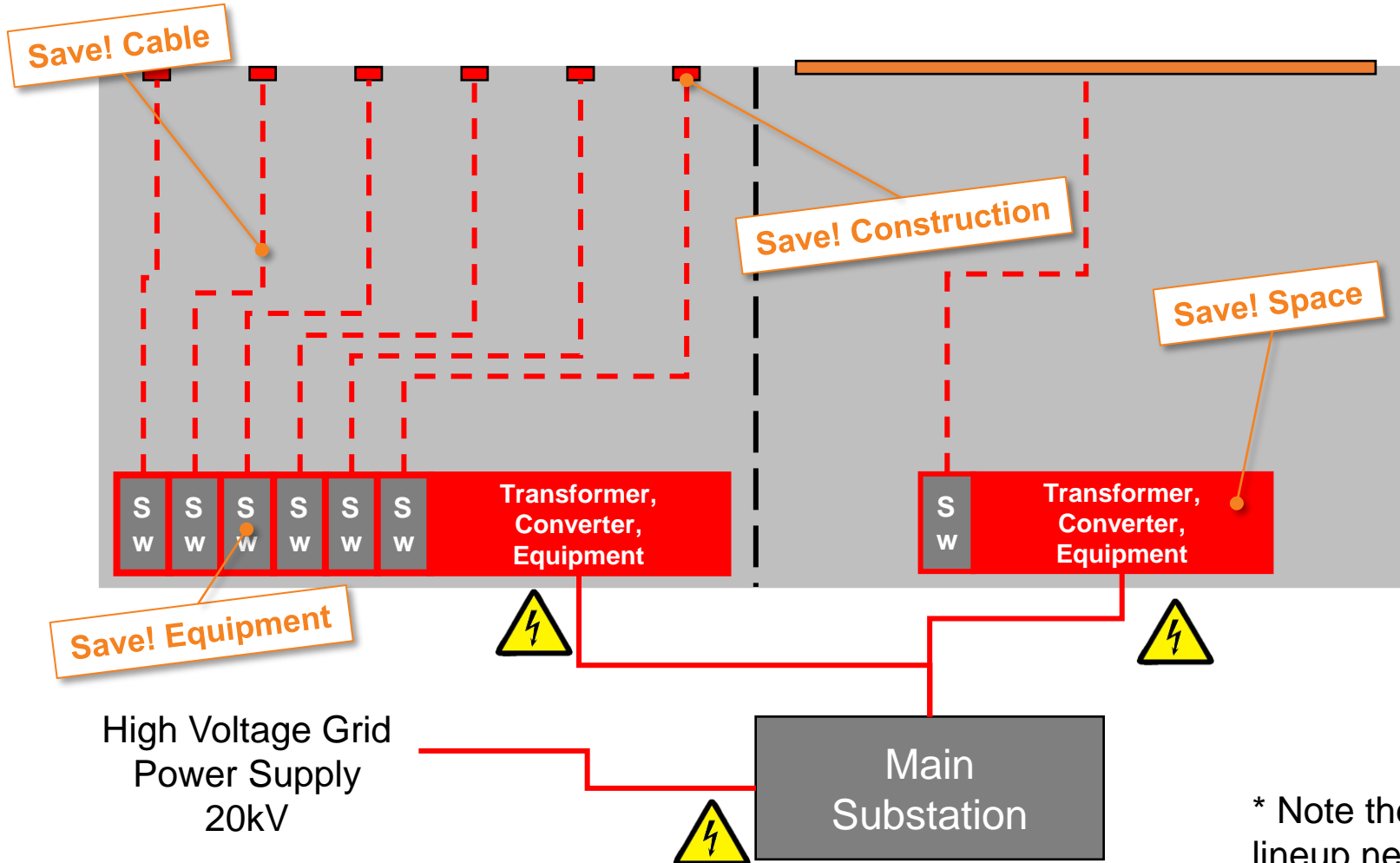


(1) igus Mobile Shore Power Outlet (iMSPO®) system = 300m complete coverage = 100% linear coverage on quay









* Berth to scale 300m

Shore Power planning: fixed outlet vs. mobile outlet costs

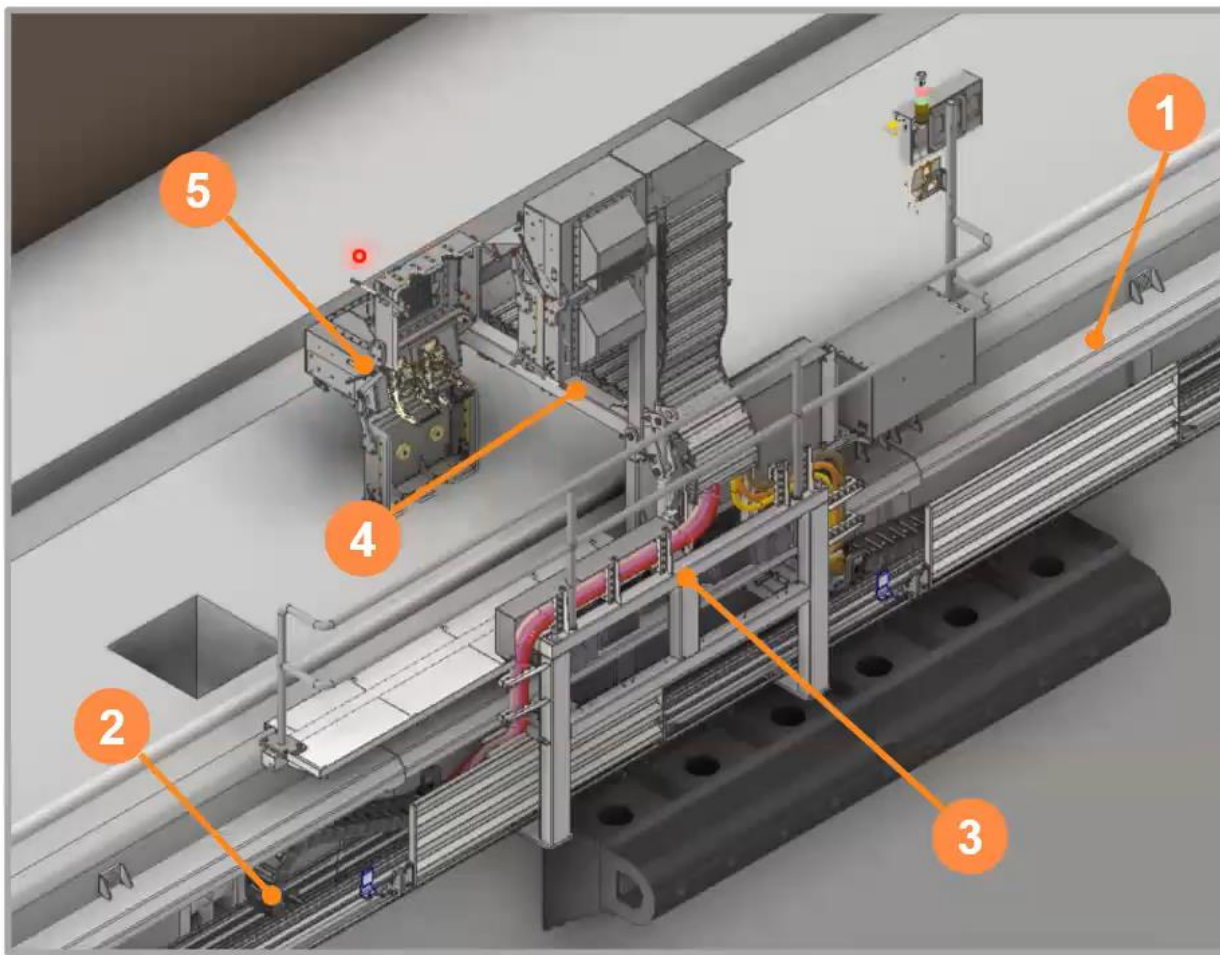


Project interfaces:

-  High voltage grid power supply
-  Construction of electric house
-  Equipment:
Frequency conversion 50Hz->60Hz
Transformation 20kV->6.6kV
-  Fixed cabling for high voltage shore power supply 6.6kV including construction
-  6 x fixed outlets per berth (or more)
-  or 1 x iMSPO per berth

* Note the size of the real estate and equipment lineup needed for e-house between the two layouts

iMSPO general description



Core components

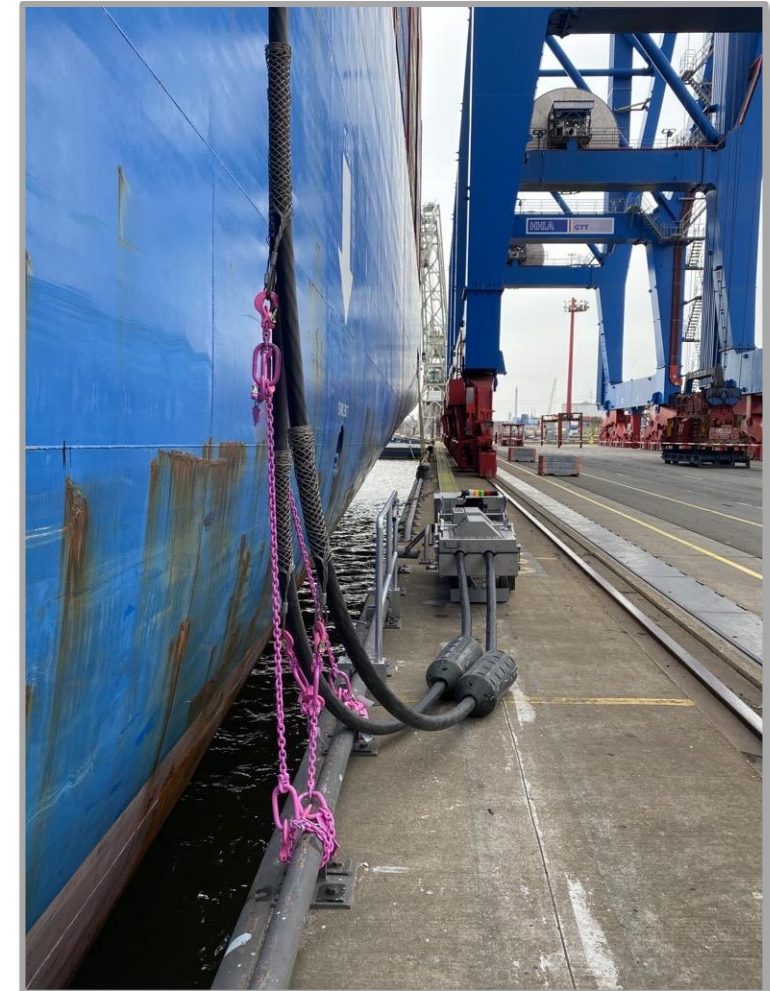
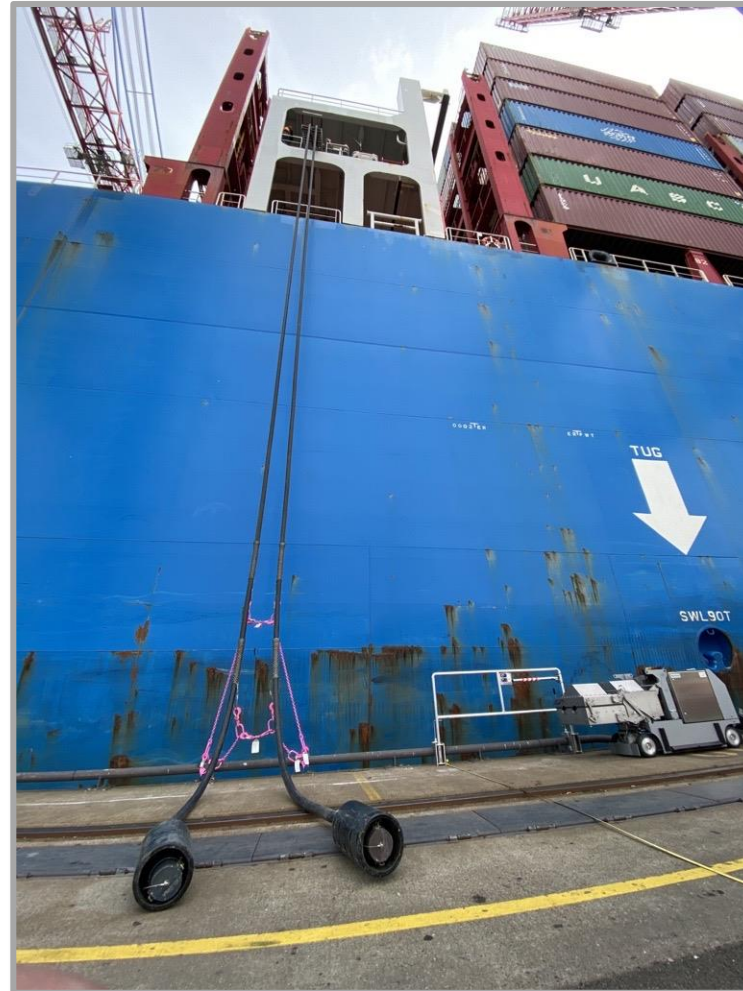
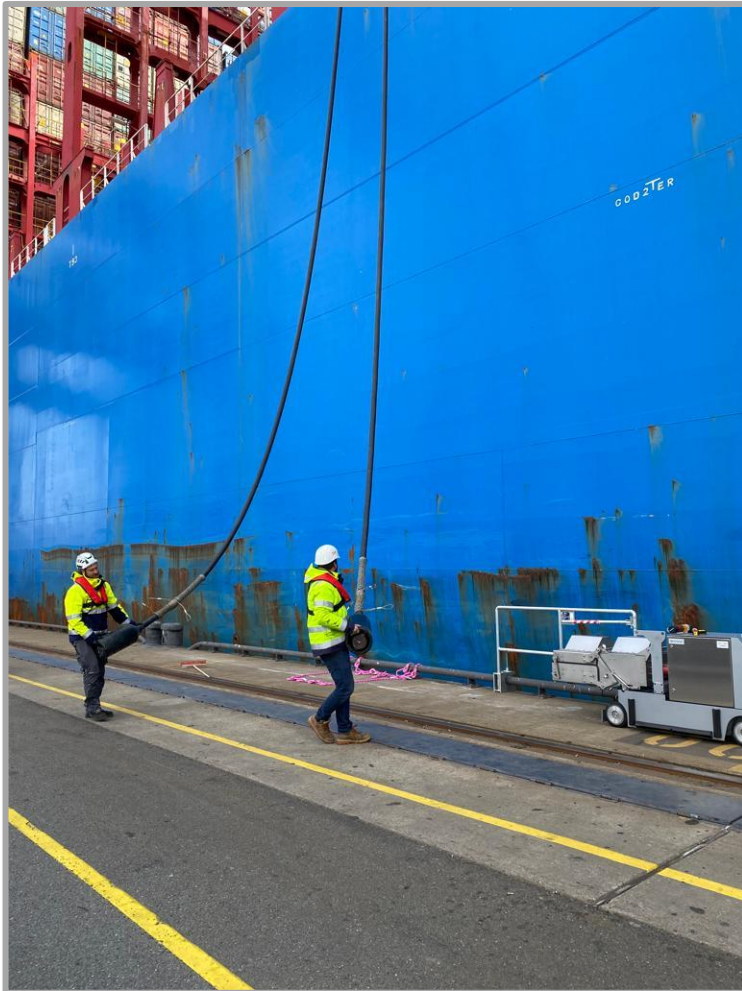
1. Track Element (TE) guides carriage and protects e-chain system
2. E-Chain System (ECS) Guides and protects cables while in motion
3. Traveling Carriage (TC) contains propulsion system and transports arm and socket box
4. Delivery Arm (DA) positions the socket box for plugging and power supply
5. Socket Box (SB) Type approved box with sockets and protection for plugs

Products: Shore Power e-chain[®] Reel



- Minimal construction and very little berth outage time required for installation
- Up to 150m of flexibility from the end of the terminal
- Very small runway space needed (less than 1m) between bollards and crane

Deployment of cables from vessel and strain relieving

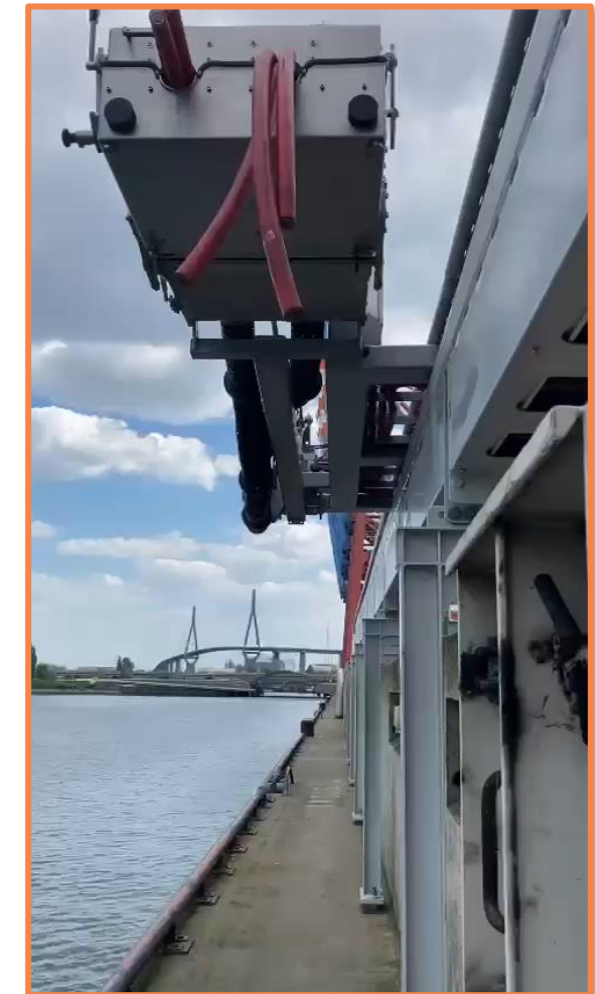


Product: igus[®] Mobile Shore Power Outlet (iMSPO[®])



300m capability = coverage of an entire berth with 1 system

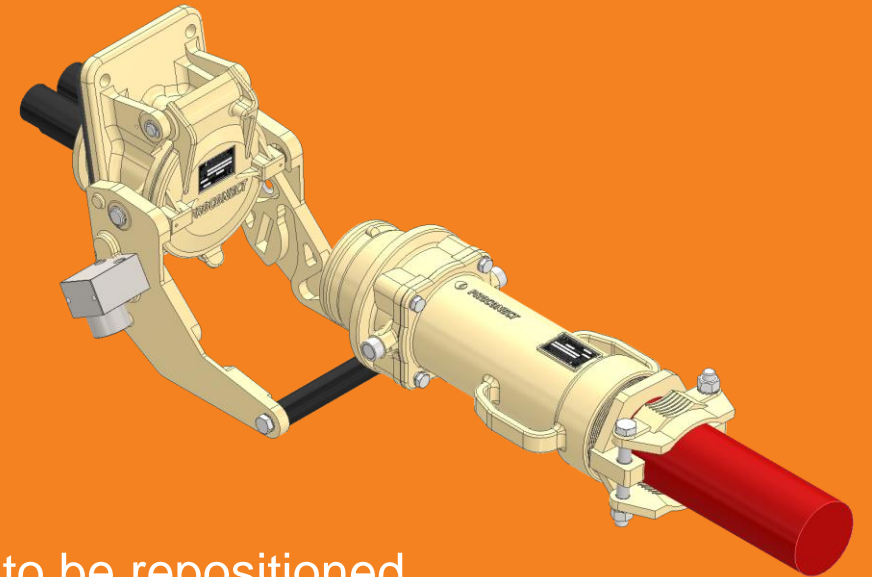
Product: iMSPO[®] Special design to fit space requirements



Mounting above flood wall = utilization of space available

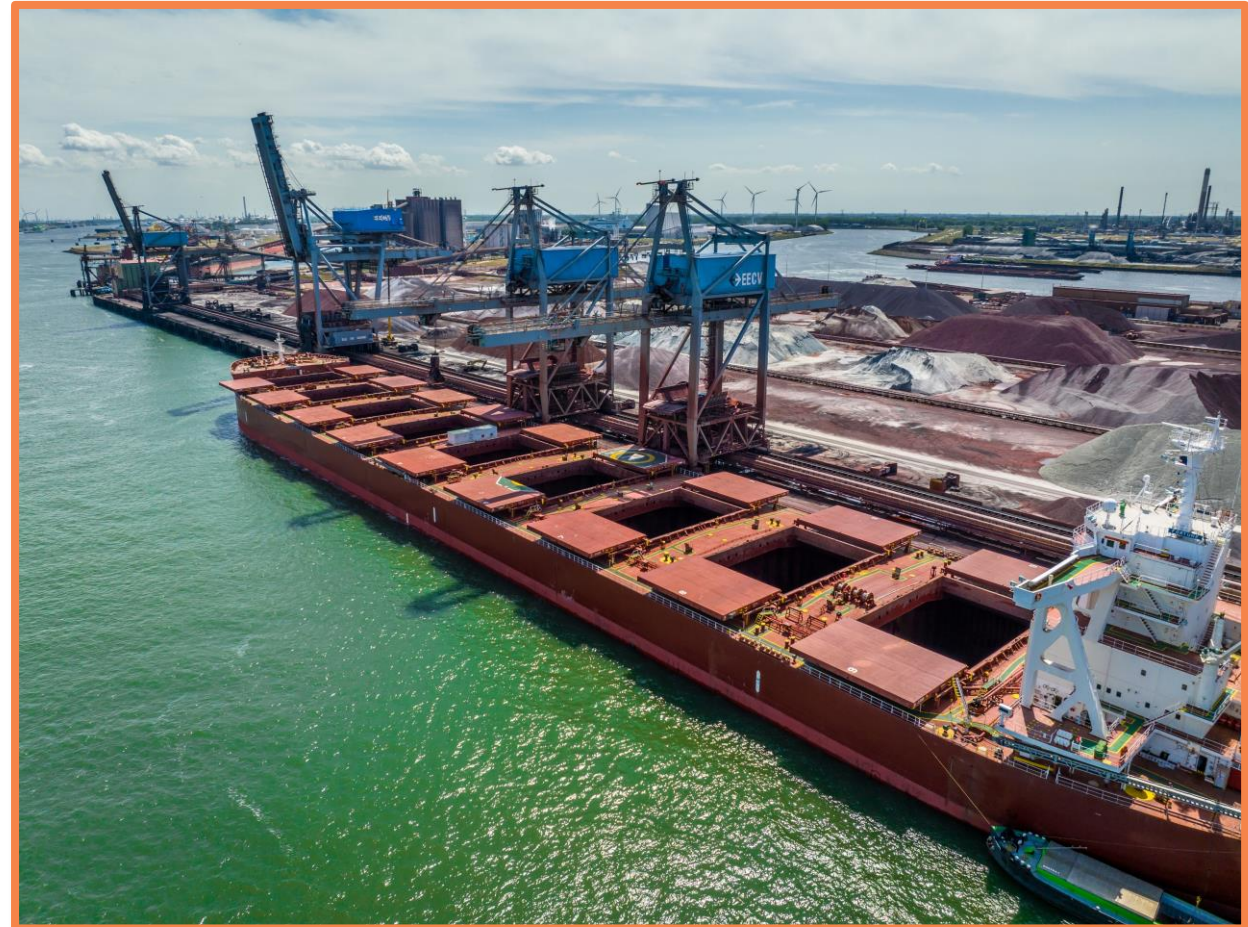
Special Considerations for Dry Bulk Terminals

1. Aggressive environment for machinery
 - Products designed for this environment must be used
2. EX areas shore and vessel side
 - Shore power connections must be carefully considered
3. For smaller terminals and finger piers the vessel may need to be repositioned
 - It may be necessary to move the vessel to reach all hatches
4. Space needed to install a solution
 - Crane rails, loading equipment, bollards and bull rails must all be considered



Challenge 1: Aggressive environment...

- Environmental conditions must be considered when planning for shore power.
- Mobile Shore Power machines must use components that have good resistance to corrosion, abrasion and must be suitable for use in a marine environment.

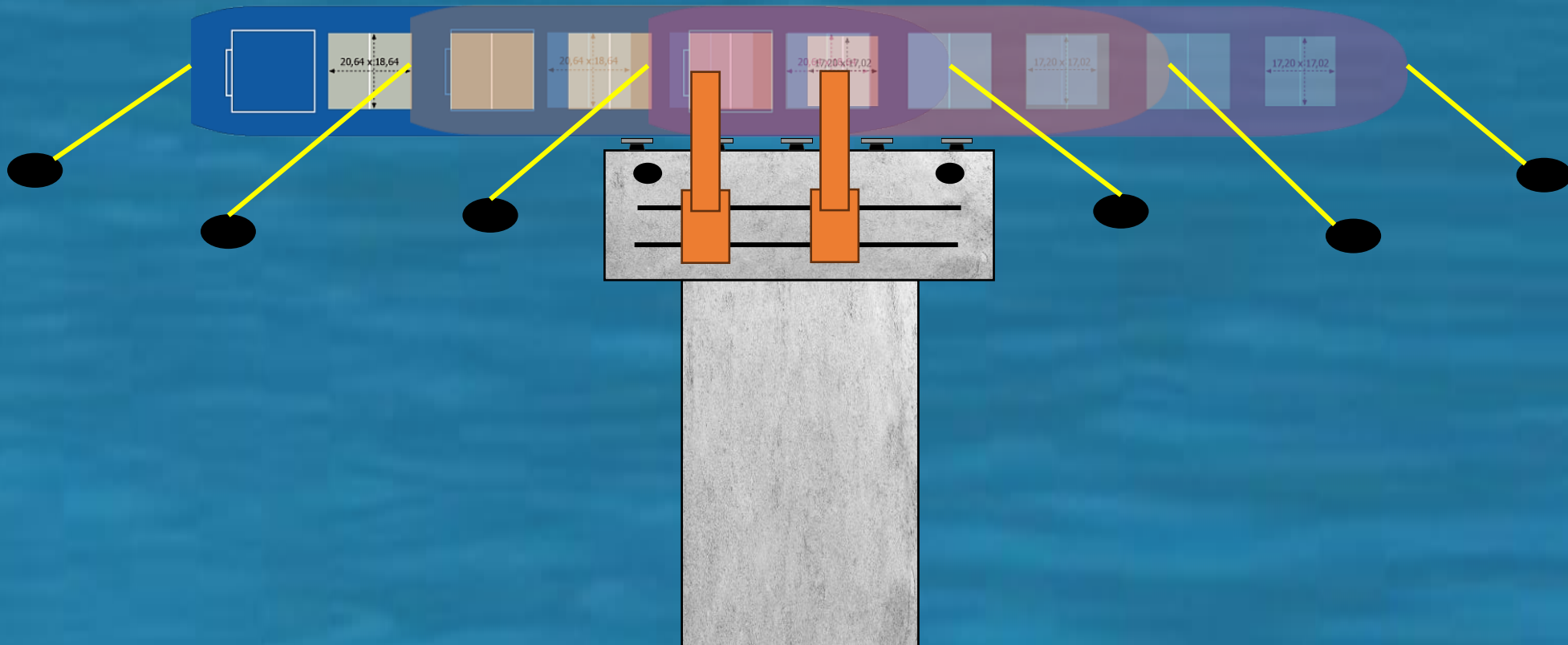


Challenge 2: EX area considerations

- Connections should be made in areas away from classified areas.
- Be careful of cable reel solutions that have slip rings in them.
- The best location is from the bridge to the aft of the vessel.
- Land side considerations should be made as well.



Challenge 3: Movement of vessel during loading



Challenge 4: Space considerations

1. Quay face mounted on the face of the quay wall above the fenders
2. Deck mounted on the terminal surface in front of or behind the bollards
3. Trench installation where the e-chain system is installed in a trench
4. Custom solutions are possible for challenges with space or position



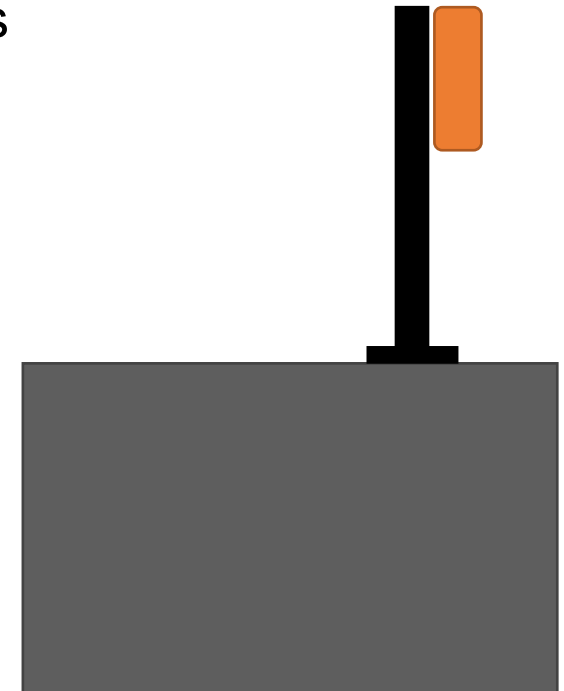
1. Best location to minimize interference with operations



2. If there is not enough clearance above fenders



3. The socket box carriage is the only external component



4. Space or equipment requires special attention

Thank you for your time and attention!



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Thank you to ABTO for the invitation to present



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