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Achieving 100% Connection Capability Today ...for a better tomorrow

The solution to the fixed shore power outlet "Connection Dilemma"

Overview and Definition of Shore Power for Ocean Going Vessels



Shore power is the

method of **supplying**

electricity to a vessel at

berth so that the onboard

diesel generators can be

turned off



Not only saving GHG and PM emissions, but also noise pollution above and below water

Systems designed to IEC Standard 80005-1, Annex D for container vessels implemented since 2004 in California

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Lessons Learned: The Creation of "The Connection Dilemma"



There are **3 factors** identified through research that **create limitations with the fixed SPO pit/vault methodology**



- 1. Limitations of the Usable Cable Length from Vessel
- 2. Variation of Possible Locations for Cable Deployment
- 3. Compromised Optimal Berthing Locations



Challenge #1: Limitations of the Usable Cable Length from Vessel



The IEC standard **only requires that 10m of extra cable** is available on the shore. This provides +/-10m of length from the drop point for a total of 20m of connection range.

Vertical motions for **tidal range** and **loading** can vary by 20m/66ft



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Challenge #2: Variation of Possible Locations for Cable Deployment



- Different vessel sizes and configurations create many locations for the onboard cable reel
- The on-board cable reel can be installed in a container or at the bridge
- Starboard vs port berthing creates even more needed connection points





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Challenge #3: Compromised Optimal Berthing Locations



• Maximizing vessel density with various vessel LOA's on long quays creates many needed points



Moving/shifting a vessel from the desired berthing position to be able to reach a fixed SPO pit can compromise
maximum loading and unloading efficiency



Designing a Terminal with Fixed SPOs: The Numbers Don't Add Up



Study: Cable reel deployment with 10m extra cable per IEC Standard Document = only **<u>40% Coverage</u>**



Illustration to scale: 400m/1312ft Quay Length with Typical Layout (8) SPO every 50m/164ft

Attention!: (2) x 10m/33ft cable = 200kg/440lbs



Green Zone: good alignment and easier connections

> Yellow Zone: misalignment handling long cables and cables exposed on the deck



Red Zone: dead zone connection is not possible due to cable length



The 3 Main Goals Behind the Philosophy of igus Mobile Shore Power

- 1. **Provide 100% connection** capability today AND tomorrow with a single investment
 - Connect any vessel at any point along the terminal in any configuration
- 2. Fully comply with the IEC 80005-1 standards and machinery safety directives
 - All systems have been tested and certified per all applicable standards and the machinery directive
- 3. Integrate seamlessly into your core business of moving containers not connecting shore power!
 - Connecting to Shore Power no longer drives berthing and operational planning! Easy and faster than mooring a vessel!



iMSPO[®] Mounted on Quay Face – How it Works





- Video
- Control of the iMSPO with a simple wired control pendant
- Connection with only 2 people in less than 10-15 min including strain relief



HD Roller Energy Chains with 400m/1300ft+ range



• **Opposed e-chain configuration** to minimize profile



Special continuous flex-rated Chainflex MV cables

igus [©] chainflex [®] CFCRANE	

Save Material, Equipment & Construction Costs & Time to Implement



iMSPO will work with green and brownfield sites with less construction and cost



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Summary of Benefits for Container Terminals

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100% Connection Capability Today and Tomorrow

- No dead zones... One-time investment, no future additions/modifications needed
- Less real estate needed, less equipment needed in the lineup
- Flexibility = 100% connectivity = comply with future regulations
- Faster connection and disconnection

Fully compliant with IEC 8005-1 Standards

- Complete system and type-tested components certified per IEC standards
- No "cable extensions" per chapter 7.1
- Arc-flash tested and certified at ABB high voltage laboratory
- Eliminate handling up to 10m/33ft of cable (200kg/440lbs) → minimize strain on workers

Terminal Operation and Maintenance benefits

- Predictable, set working crews to perform connections in 10-15 minutes with only 2 people
- One iMSPO instead of multiple vaults, outlets, and switchgear to inspect, test and maintain
- Modular and accessible design easy to service and maintain by onsite mechanics
- 20 years service life planned with inspections and maintenance plan



Thank you!

igus mobile solutions are also available for RoRo, Car Carrier, Cruise, LNG, Charging...