

DOC Dublin Offshore

LOAD REDUCTION DEVICE PRELIMINARY SPECIFICATION



LRD BENEFITS



REDUCED RISK



LONG TERM PERFORMANCE



BESPOKE RESPONSE



LOW TECHNICAL NOVELTY



ESTABLISHED MARINE MATERIALS



ROBUST & SIMPLE DESIGN

The primary goal of the LRD is to reduce the overall risk profile and cost of energy on FOW projects however there are some additional environmental and design benefits which can be considered important by the customer. The LRD can be integrated into a wide range of site conditions, platforms and mooring systems which can result in CAPEX reductions in the mooring system. The LRD benefits across cost, environmental and design performance are summarised as follows:

- CAPEX and LCOE reduction
- Cost Optimised mooring system
- Risk reduction
- Reduced logistics with moorings BOM
- Increased local content
- Removal of supply bottlenecks

Cost



- Reduced anchor footprint
- Removal of chain thrashing and seabed impact
- Noise reduction
- Reduced site boundaries and permitting requirements
- Improved stakeholder engagement

Environment



- Increased use of synthetic rope
- Reduced design driving loads
- Remove line replacement operations
- Bespoke mooring response
- No novel materials
- Full life maintenance free mooring system

Design



By using a simple gravity-based mechanism constructed from well-established and mature materials (steel & concrete) the LRD based mooring will deliver high performance over the full life of the mooring system. The certification process is based on extensive engagement with DNV and is fully defined within existing codes and standards. Early engagement in the FOW project allows for the maximum benefits to be made, such as:

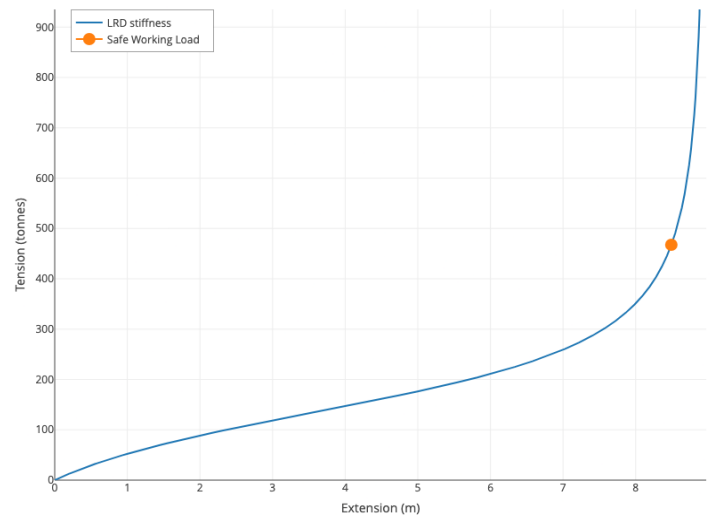
- Mooring system optimisation such as move from a catenary to an inclined taut
- Reduced footprint and minimised seabed interference
- Reduced mooring line quantity
- Smaller chain and anchor
- Removal of chain, clump weights & buoyancy modules from the system
- Smaller installation vessels
- Platform mass reduction
- Increased Mean Time Between Failure & improved Annual Energy Production.

LRD SPECIFICATION

LRD SIZING & PERFORMANCE



not to scale



LRD General Arrangement & Force / Response Curve

PRELIMINARY SPECIFICATION

MBL	820 tonnes
SWL	470 tonnes
Height	17.5m
Elongation at SWL	8.49m
Water Depth Rating (MSL to LRD centre)	100m
Mooring line declination	70deg
Material	Structural Steel, Concrete Ballast, Bearings
Temperature Range	Operation -5° to 40°C, Storage: -20° to 55°C
Mooring Line Interface	D-Shackle or H-link (LTM)
Certification	DNVGL-OS-E301 : Position Mooring, DNV-ST-0119 Floating wind turbine structures
Testing	DNVGL-OS-C401
Lifespan	30yrs Subsea Exposure
O&M Inspection Interval	5yrs, following initial development and inspection
Bio Foul Protection	Optional Anti-Foul Protection on Steelwork
Corrosion Protection	Isolated – 30yrs DNVGL-RP-B401

INTEGRATION



Fully Certifiable
System



Simplified Bill of
Materials



LOCALISED SUPPLY
CHAIN



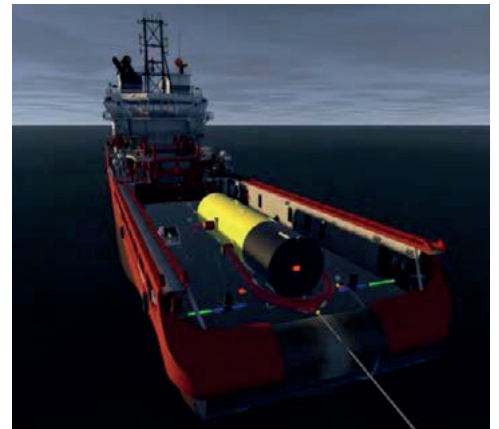
LIFE CYCLE TECHNICAL
SUPPORT

MOORING SYSTEM

- LRDs are compatible with all platforms, mooring configurations, chain & rope and anchor types.
- Integration of the LRD can deliver cost reduction not just by reducing loads but by enabling full system optimisation. The compliance delivered provides design choices for the mooring designer enabling the use of low-cost, certified mooring equipment and addressing potential supply chain bottlenecks for heavy mooring equipment. The result is a low-risk, low-cost, locally produced mooring system.
- Cost reduction should consider optimisation of the full system Bill of Materials versus the baseline station-keeping system (i.e. reduction in line qty, overall line length, anchor qty and spacing).

MARINE OPERATIONS

- Installation of the LRD utilises the same Anchor Handler Tugs that are used for mooring and floater installation. Specialist vessels or equipment are not required.
- The LRD is over boarded from the deck via the stern roller in an operation that is commonly used for anchors.
- Inclusion of the LRD can result in the reduction of marine operations / installation cost for the mooring system due to the reduced equipment size and as a result of the significant quantity of chain and rope removed during the optimisation phase.



DELIVERY MODEL



WANT TO KNOW MORE? GET IN TOUCH

This LRD technology overview assumes a working knowledge of LRDs / FOW but please get in touch for our whitepaper, case studies or access to explanatory videos. Read our Frequently Asked Questions at:

www.dublinoffshore.ie/faqs



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LRD SELECTION

- The output analysis from the LRD sizing tool on the Dublin Offshore website is for information only and should not be relied upon other than as an initial guideline.
- The LRD is designed on a site-specific basis in order to optimise the system for the given project location and platform. Dublin Offshore work with mooring designers and project developers to optimise the mooring system with respect to cost and risk.
- Adjustment of the LRD is straightforward owing to simplicity of its design
o therefore dimensions, arm positions and mass are easily adjusted.

LRD DELIVERY MODEL

- Our delivery model is to work with developers to optimise their mooring systems with the integration of the LRD at the concept phase of the project through early feasibility studies. This concept can be brought through detailed engineering by the mooring designer.
- Dublin Offshore will take responsibility for the design, procurement and delivery of the certified LRD to an agreed handover location with the installation contractor.
- The LRD is fabricated from standard structural steel and concrete ballast delivered to industry-standard tolerances and specification (e.g. DNV-OS-C401). Existing offshore / marine steel fabricators are well placed using existing capabilities – and local supply chain is prioritised.
- Get in touch with the Dublin Offshore team to optimise your mooring system and reduce costs with the inclusion of our technology.

