



MARINE
Safety Forum

Development and safety benefits of releasable moorings

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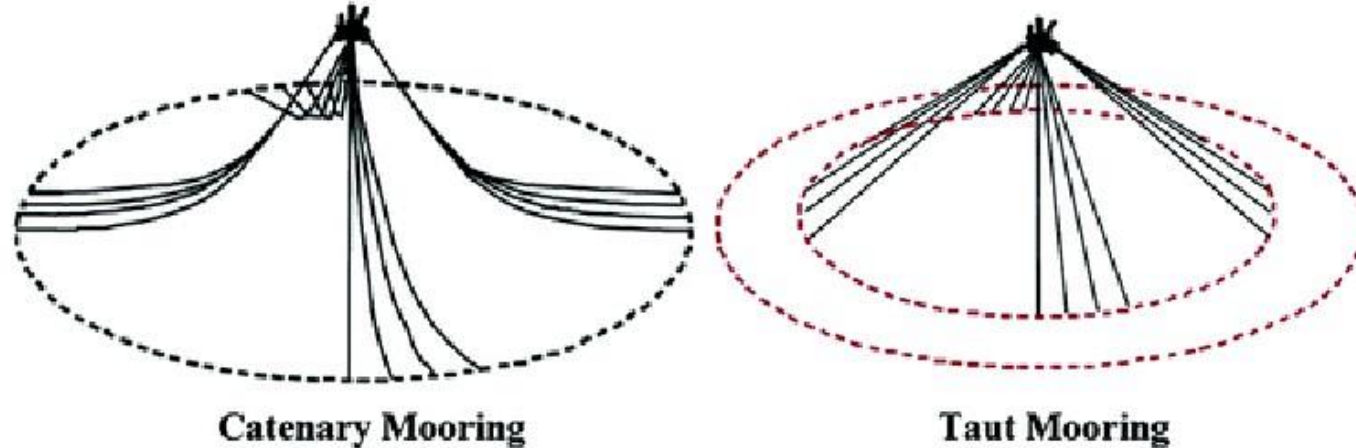
Background

Delmar Systems was founded in Louisiana and was initially focused on Gulf of Mexico operations.

There were two turret-moored drill ships in operation in the GoM at the time which faced the problem of responding to a shallow gas event.



Shallow gas response



A shallow gas event is the uncontrolled release of gas during the very early stages of drilling, before well control infrastructure has been installed. This gas release carries an ignition risk and can affect buoyancy / stability.

The most effective MOU response is to skid upwind / across the wind.

A taut leg mooring spread [far more common in the GoM] limits an MOU's skidding capability, hence the requirement for an alternative response.



The first acoustically-activated release unit, the Rig Anchor Release [RAR], was introduced in 1980.

It allowed the drill ships to respond to a shallow gas emergency by releasing all lines to move clear of the danger zone.

Safety applications

The new technology rapidly caught on as an added safety measure for floating offshore structures as it allows the rapid release of mooring lines in all weather conditions, without external assistance [AHVs] or planning.

The acoustic systems also allows remote release from a safe location - i.e. after evacuation of the installation.

Polar ice

Around this time, operators were looking to move into Alaskan and Canadian waters. One of the main obstacles was how to mitigate for ice floes.

Gravity Base Structures with reinforced concrete skirts solved [to some extent] the ice problem for permanent structures, but that solution isn't transferrable to mobile units.



There are some ice class MOUs

Frontier Discoverer



Stena Icemax



Limited availability

NOT CHEAP!

Some ice class MOUs in operation

Kulluk on a heavy lift vessel.

The Kulluk came to a sticky end, but it was a towing problem not an ice problem.



Arctic drilling

Using a standard rig to drill in polar areas requires extra layers of safety

Plan A

Disconnect and tow away when an ice floe gave cause for concern.

But it is no small task to disconnect a mooring spread consisting of thousands of metres of chain, wire and [more recently] fibre, whether it is chaser-laid or pre-laid. That also pre-supposes a favourable weather window [definitely not a given in high latitudes] and for the entire mooring spread footprint to be sufficiently clear of ice to allow conventional AH ops to proceed.

Plan B

Tow the icebergs clear.

This relies on favourable weather and the icebergs arriving one at a time.

A releasable mooring spread solves these issues.

Iceberg Avoidance

What would you rather tow - an oil rig or an iceberg?



Hurricanes

Back in the Gulf of Mexico, where hurricanes are an annual event, operators continued to seek ways to improve safety.



Hurricanes

The deep water of the GoM necessitates a large, complex spread for any moored asset. Relying on a favourable weather window to present itself in the teeth of an advancing tropical revolving storm is not a realistic strategy, so the accepted response if you saw a hurricane coming was to slacken the lines, evacuate and hope for the best.

Omni-directional anchors designed to drive themselves ever deeper into the soft GoM seabed were the best solution to the hurricane problem - but it was rare to return and find all lines still intact.

Hurricanes

Giving MOUs the option to release all moorings and head for shelter offers the twin benefits of removing the asset from the worst of the conditions and allowing a [skeleton] crew to remain onboard to monitor the situation.

Further developments

Next for the nerds was the development of a mechanically-activated back up release system.

The Delmar Quick Release [DQR] mechanical mooring release was introduced in 2015. This mechanically-activated in-line release system was designed to be deployed alone or coupled with the acoustically-activated RAR to provide a fully-redundant system.

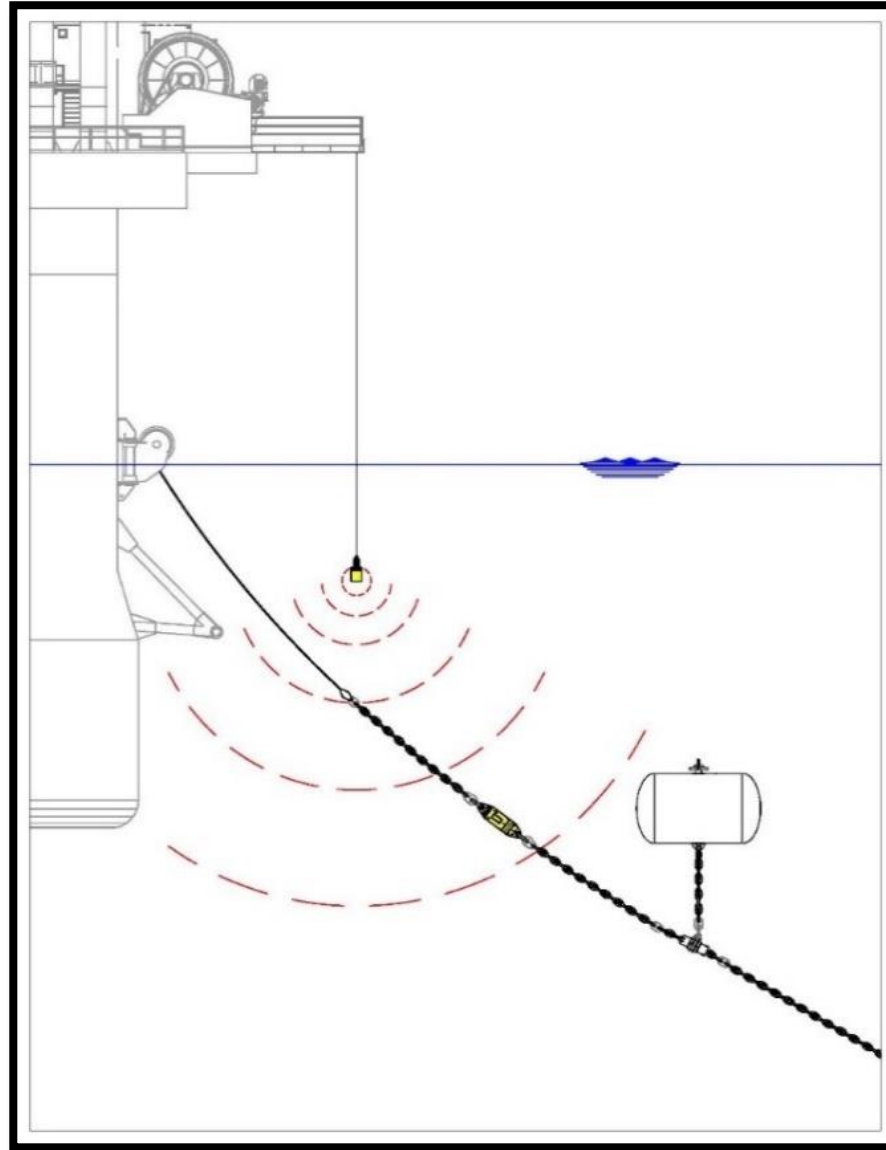


RAR+

Both of these functions were combined into the RAR+, an acoustic quick release system with a mechanical back up release function.



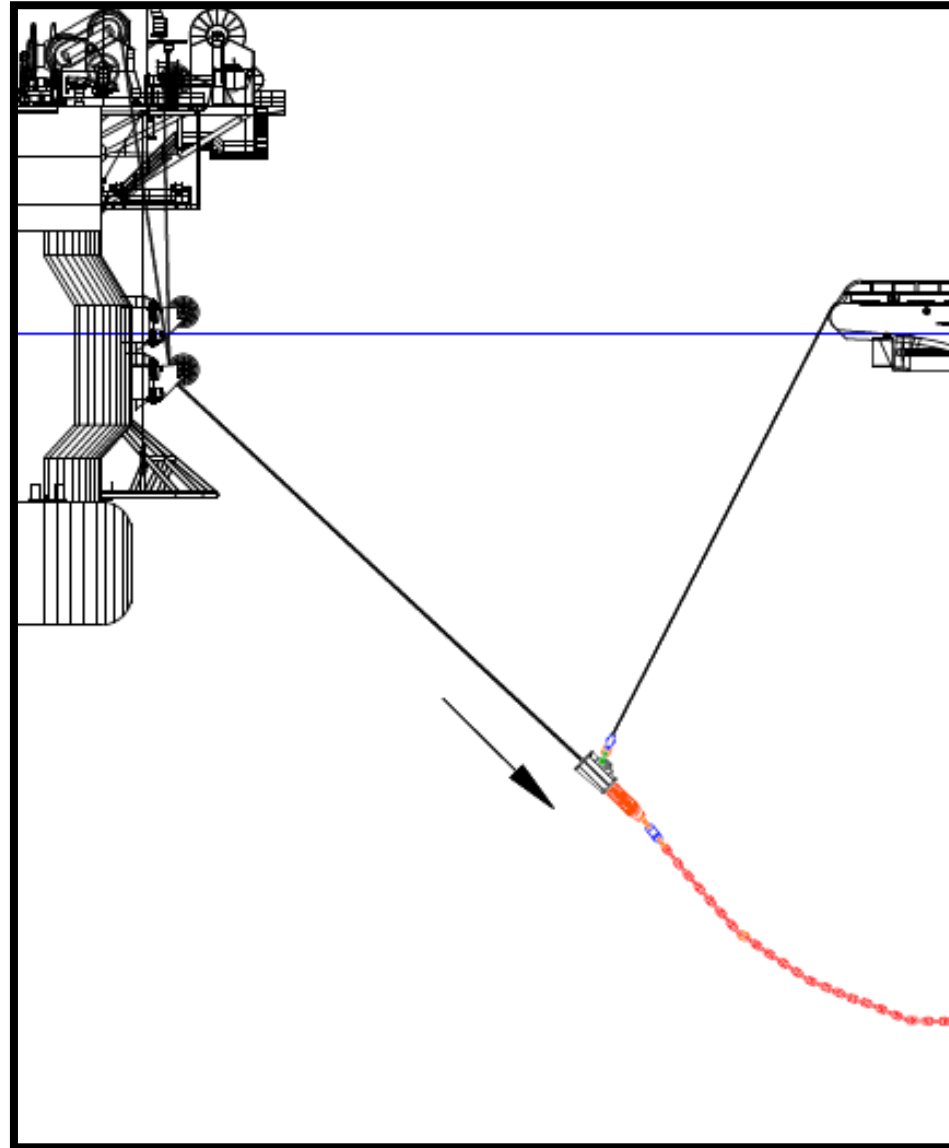
Acoustic release



Acoustic release



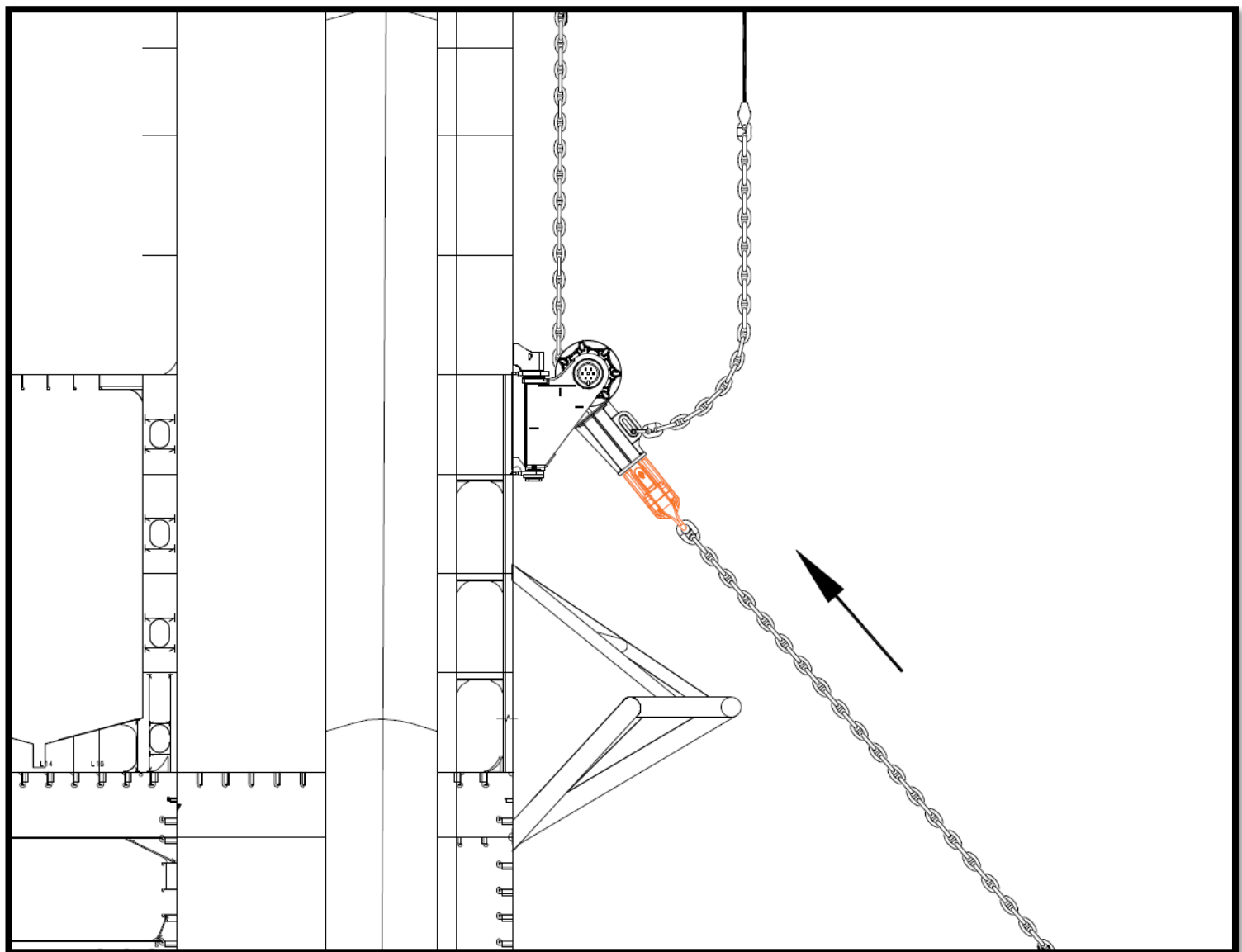
Trigger sleeve release via AHV



Trigger sleeve release via AHV



Trigger sleeve release via skidding

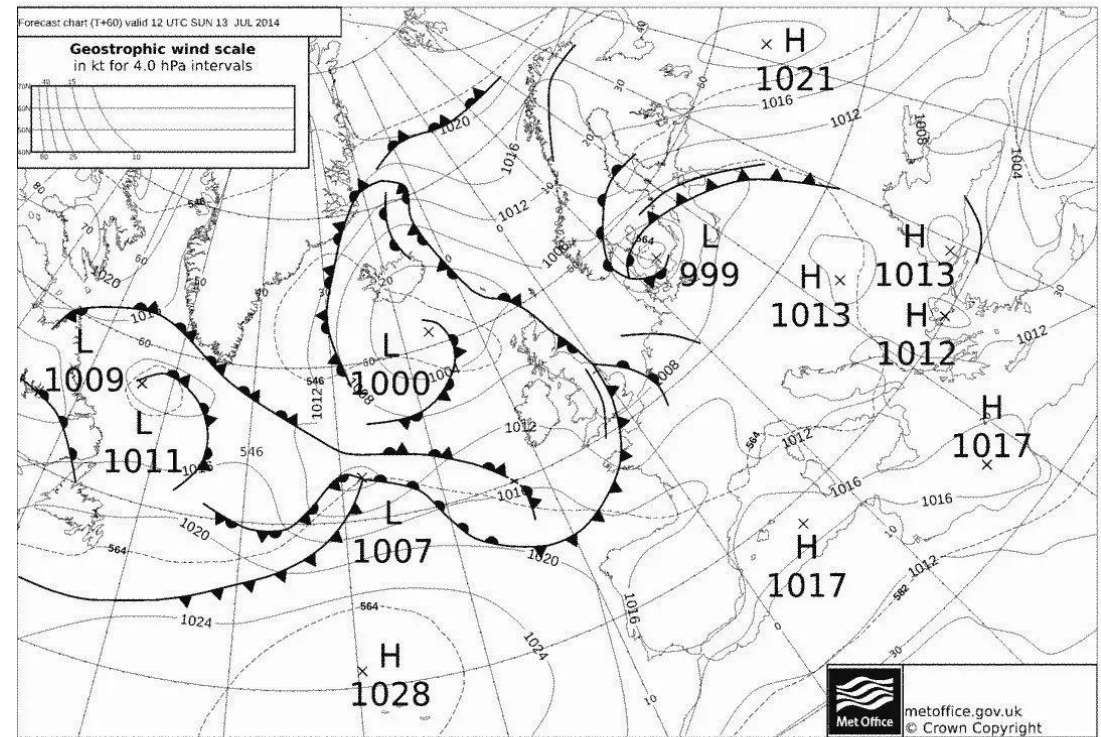
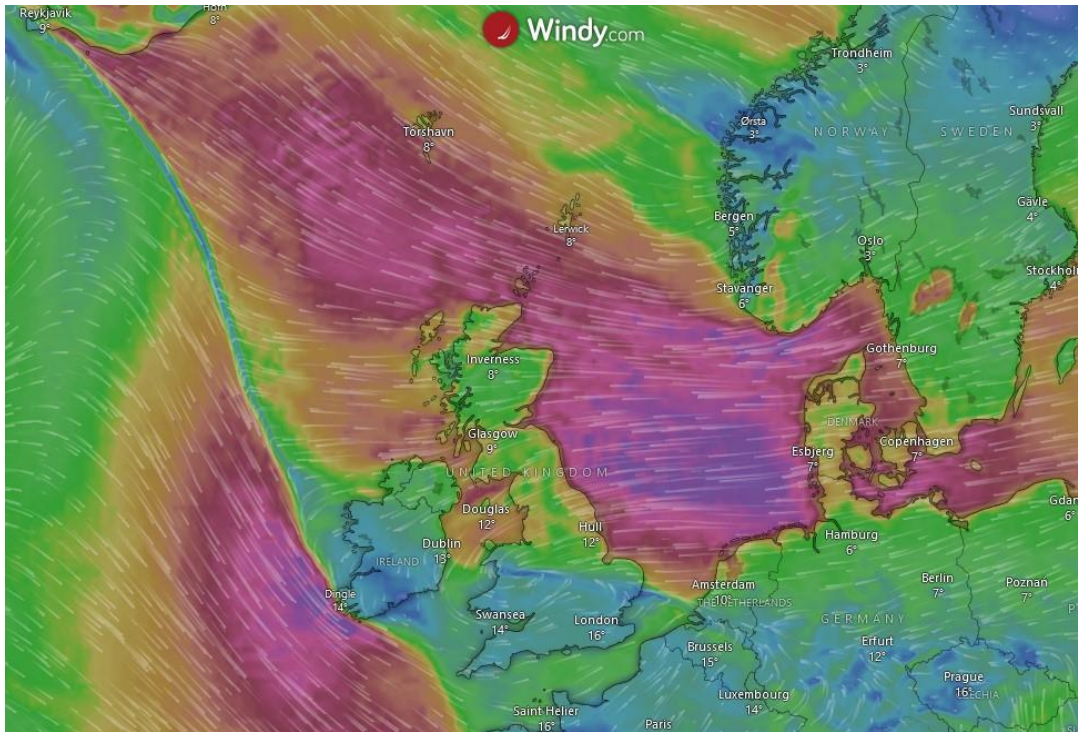


Trigger sleeve release via skidding



North Sea

This will be a familiar picture for most of you:



Around this time of year, a seemingly endless procession of low-pressure systems heads across the north Atlantic, ruining the plans of rig movers in all sectors of the North Sea.

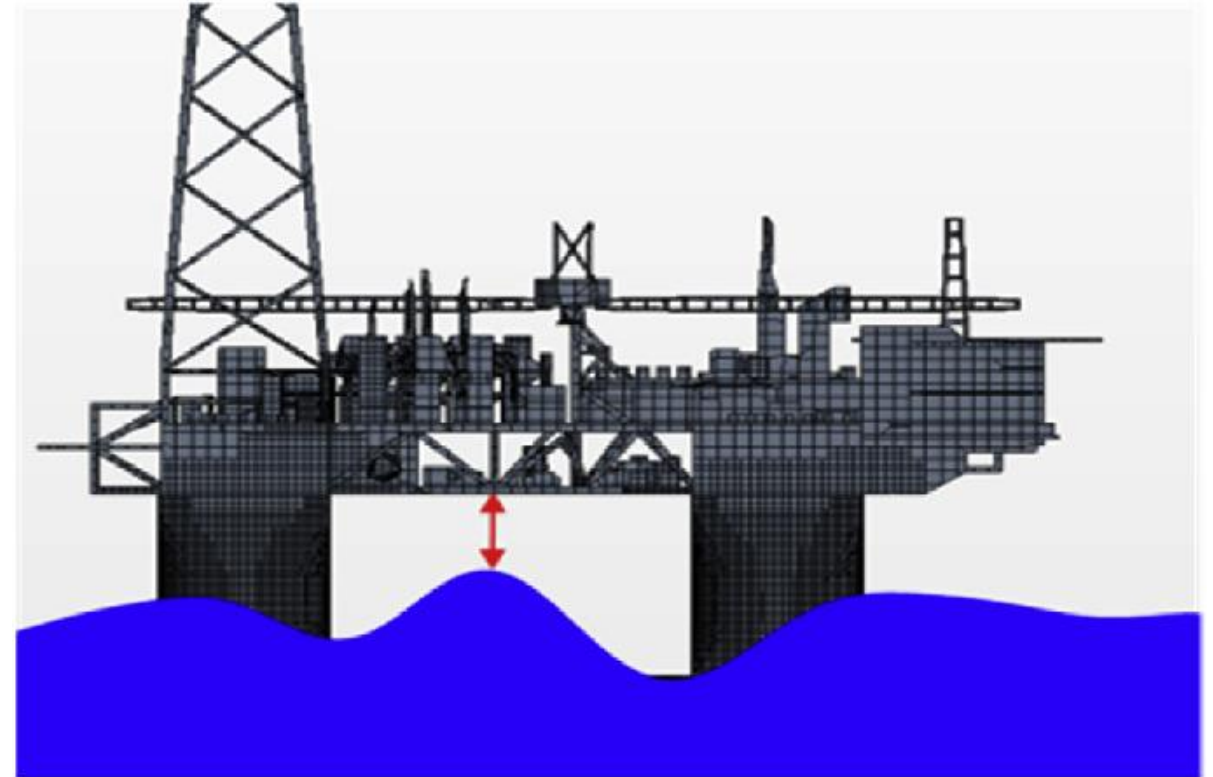
North Sea safety applications

In recent years, the RAR+ has been used increasingly in the North Sea for two main safety applications:

Air gap concerns

When the swell gets sufficiently large to cause concern over the exposure of certain sectors of the rig, it is already too late to consider unhooking a mooring spread by conventional means.

The option to release the moorings and allow the rig to adopt a more favourable heading and safely ride out the storm is a major advancement in rig safety.



North Sea safety applications

Seasonal mooring analysis contingency

When a rig is operating on a seasonal mooring analysis, there is a cut-off date by which the rig must be off location. If the run up to that date is beset by foul weather, the rig might find itself on location and uninsured, yet unable to safely unhook via conventional means.

A releasable mooring spread can be disconnected in any conditions, providing an extra layer of confidence for the OIM and shore team.

Thank you

Any questions?