

# Lynx Bend Stiffener Connector



Oil States Industries (UK) Ltd is a world leader in the design and manufacture of advanced connection systems for offshore use. As the industry moves to ever deeper waters, the company has applied its expertise to the development of connector technology for applications such as floating production, storage and offloading systems (FPSOs), tension leg platforms (TLPs) and pipelines.

One of the new generation of connections available from Oil States is the Lynx Bend Stiffener Connector (BSC).

This Lynx BSC is a cost-effective method of joining the Bend Stiffener to the turret sections of an FPSO, FPS, TLP or Spar. The Lynx connector, which is at the heart of the system, has already been proven in conductor and casing applications worldwide. The challenge for Oil States engineers was to incorporate the basic connector into a system that enabled risers /bend stiffener assemblies to be pulled into an I-tube and connect the bend stiffener to the bottom of the I-tube. The riser is then released and can be tied into the topside manifold. The bend stiffener connection and release of the riser is achieved without the use of divers or ROV intervention.

The complete system is made-up of a number of the following components, which are designed and manufactured by Oil States Industries (UK) Ltd:

## Bend Stiffener Connector

- Lynx box
- Lock-ring
- Hydraulic release mechanism

## Pull-In Assembly

- Lynx pin
- Upper centraliser
- Lower centraliser
- Bend stiffener interface
- Pull in head and master-link

# Lynx Bend Stiffener Connector

## Lynx Bend Stiffener Connector Benefits

- Diverless operation
- Remote hydraulic quick-release option for fast emergency response
- Prevents costly damage to flexible riser during pull in
- No special tooling or personnel required
- Single wire pull in minimises rigging and vessel requirement
- Automatic make-up during riser pull-in enables dramatically reduced riser installation time in comparison with alternative systems
- Confirmation of make-up
- Suitable for a range of riser and I-tube configurations

TRACK RECORD		
Riser Size	No of Risers	I-Tube Size (m)
<b>1997 Texaco, Galley</b>		
6" Riser	4	0.838 ID
7.63" Riser	1	0.838 ID
9.75" Riser	1	0.838 ID
<b>1998 - 2009 BP, Schiehallion</b>		
7.4" Gas Injection riser	2	0.914 ID
7.4" Production & Gas Lift Riser	4	0.914 ID
9.5" Oil Production	5	0.914 ID
9.5" Water Injection Riser	2	0.914 ID
10" Umbilical	2	0.914 ID
11" Water Injection	1	0.914 ID
Dynamic Umbilical	4	0.914 ID
<b>2011 BP, Skarv</b>		
8" Oil Production	2	1.04 ID
10" Production	5	1.04 ID
10" Gas Injection Riser	2	1.04 ID
12" Export Riser	2	1.04 ID
Dynamic Umbilical	2	1.04 ID
Direct Electrical Heating	1	1.04 ID

## Riser Stiffener Sequence

The Lynx BSC is rapidly assembled using the riser pull in winch to set the connector. No external tools are required.

The three main components of the Lynx connector, ie the pin, box and locking are contoured to ensure easy stab-in and the fact that alignment occurs prior to connector engagement enables high initial misalignment to be overcome.

1. The riser has been pulled up from the seabed and is now poised for alignment with the funnel. The guide nose, followed by the upper centraliser, then enters the funnel.
2. The riser is then fully centralised and the Lynx connector engaged by a 5MT overpull
3. The riser pull-in head is then released using overpull.
4. On remote release the pull-in head is re-latched into the riser hang-off unit the complete assembly then released hydraulically from the I-tube by activating the locking release mechanism.

## Test Programme

Extensive testing programmes, including assembly and pull-in trials to simulate the pull-in of the riser into the hull of the FPSO, have been undertaken by Oil States.



Stage 1



Stage 2

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