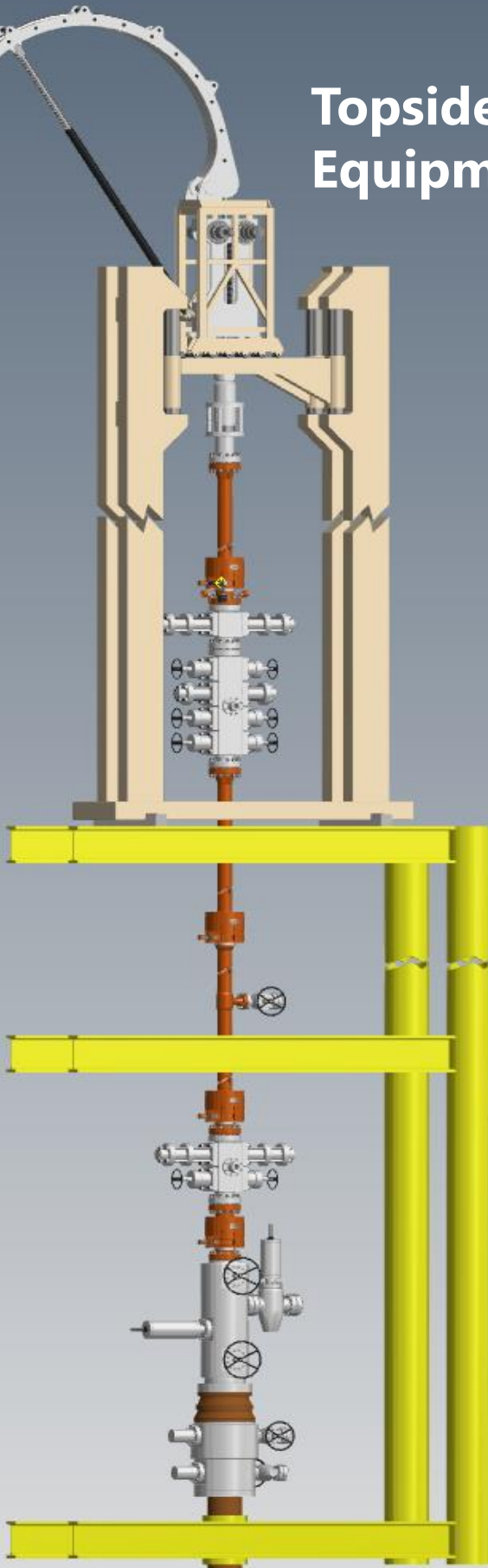


Topside Well Intervention Equipment

Derived from subsea technology, the SubSeaLink Connection System enhances safety and reduces cost of topside and land based well interventions



SubSeaLink

www.subsealink.com

The SubSeaLink pipe connection system enables safer and much faster installation of topside well intervention spreads

TS-LINK

A rugged connector eliminating offshore pipe flanging operations

- Eliminates strength and fatigue limitations typical of API flanges, providing a connection stronger than the pipe
- Eliminates dropped objects risk as no handling of bolts, seals and torque wrenches is required
- Reliable metal to metal sealing system
- Fast and safe riser assembly assisted by self-aligning of downfacing Pin end in to upfacing Box end
- Fast actuation by means of hand carried torque tool
- Ideal Topside Treecap solution, as std API Treecaps are not approved for CT intervention and shall be removed and eventually flanged back at every CT campaign.



(Treecap configuration)



(Riser configuration)

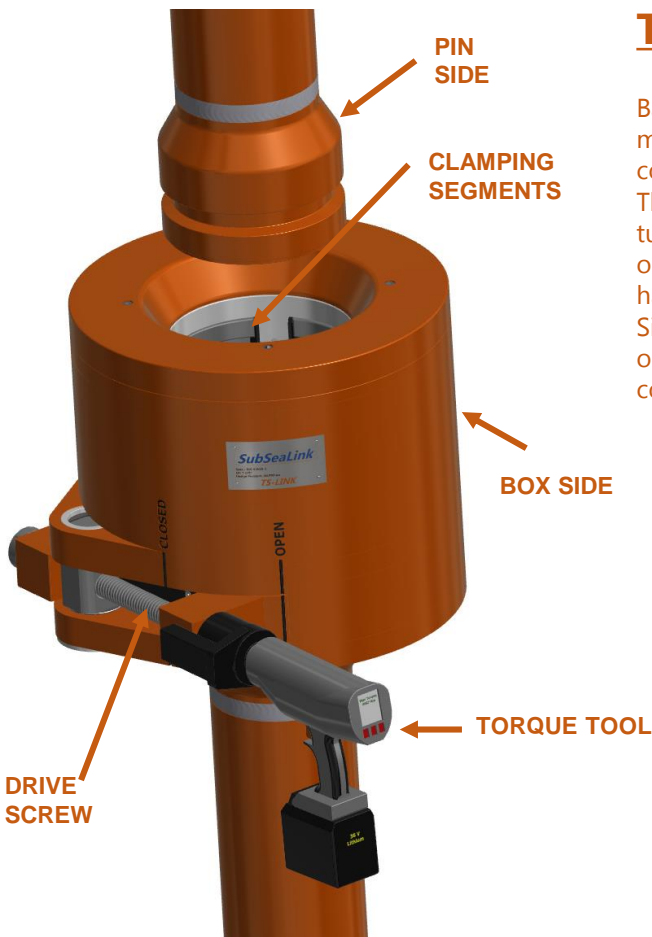
CT-LINK

A rugged connector allowing quick coupling of Coiled Tubing Injector Heads

- Same tough mechanical design as the TS-LINK connector
- Redundant elastomeric seal barrier
- Eliminates flooding the riser at every CT run as the sealing system can be externally tested to full pressure rating
- Easy stabbing and self alignment of the two mating ends
- Fast actuation by hand carried torque tool
- Eliminates risk of hydraulic failures, as the device is fully mechanical



Further details

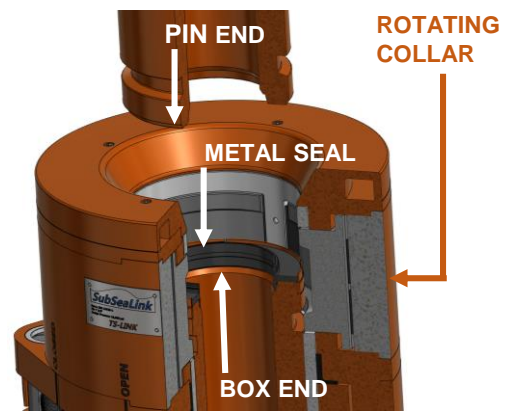


TS-LINK

Based on the SubSeaLink's patented locking mechanism, provides an extremely robust pipe connection.

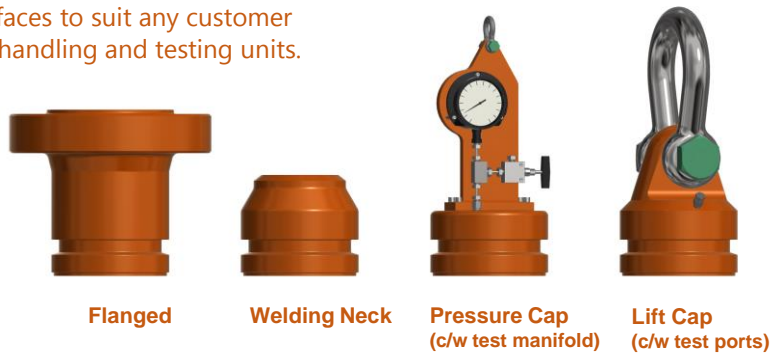
The internal clamping segments are operated by turning a single drive screw. No special equipment or pipe guiding provisions are needed, just a std hand carried torque tool.

Simply stab the Pin end in to the Box receptacle; operating the connector directly aligns and couples together the two pipe ends.

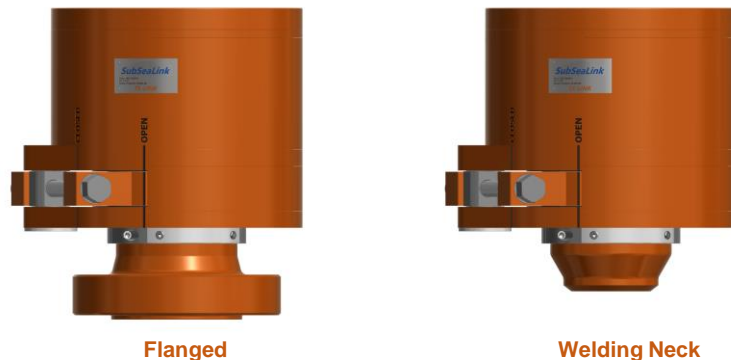


Available with different interfaces to suit any customer requirement. Equipped with handling and testing units.

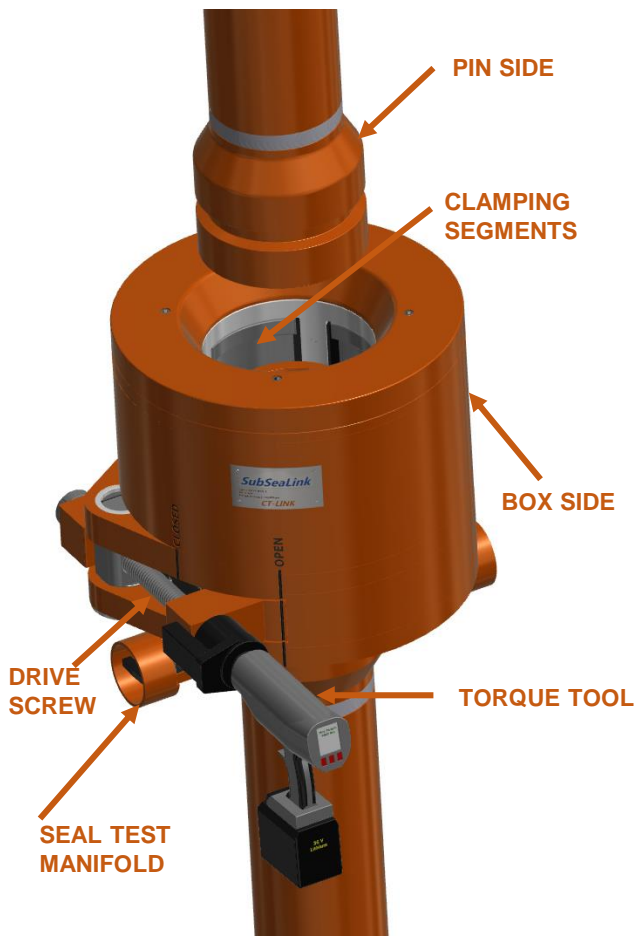
PIN OPTIONS



BOX OPTIONS

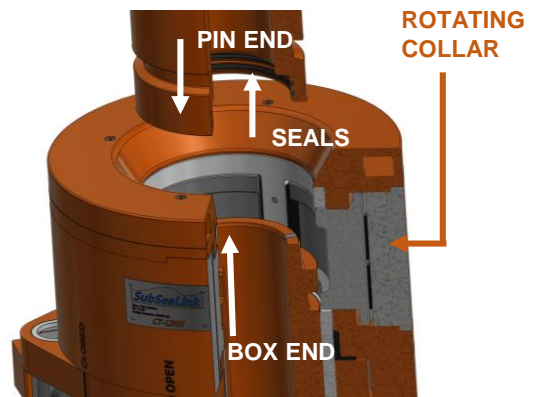


Further details



CT-LINK

Same design and sizing as the TS-LINK but featuring a double elastomeric seal arrangement c/w external leak test manifold. The CT-LINK is specifically designed for connections that are frequently made and broken and have to be re-pressured tested every time. This is typically the case when reconnecting the Topside Injector Head at any new downhole intervention run. By means of the CT-LINK, dis-assembly and re-assembly are carried out very fast and in a controlled manner. The sealing system can be externally tested to full pressure rating, thus eliminating time consuming water filling operations



Available with different interfaces to suit any customer requirement. Equipped with handling and testing units.

PIN OPTIONS



Flanged



Welding Neck



Lift Cap
(c/w test ports)

BOX OPTIONS



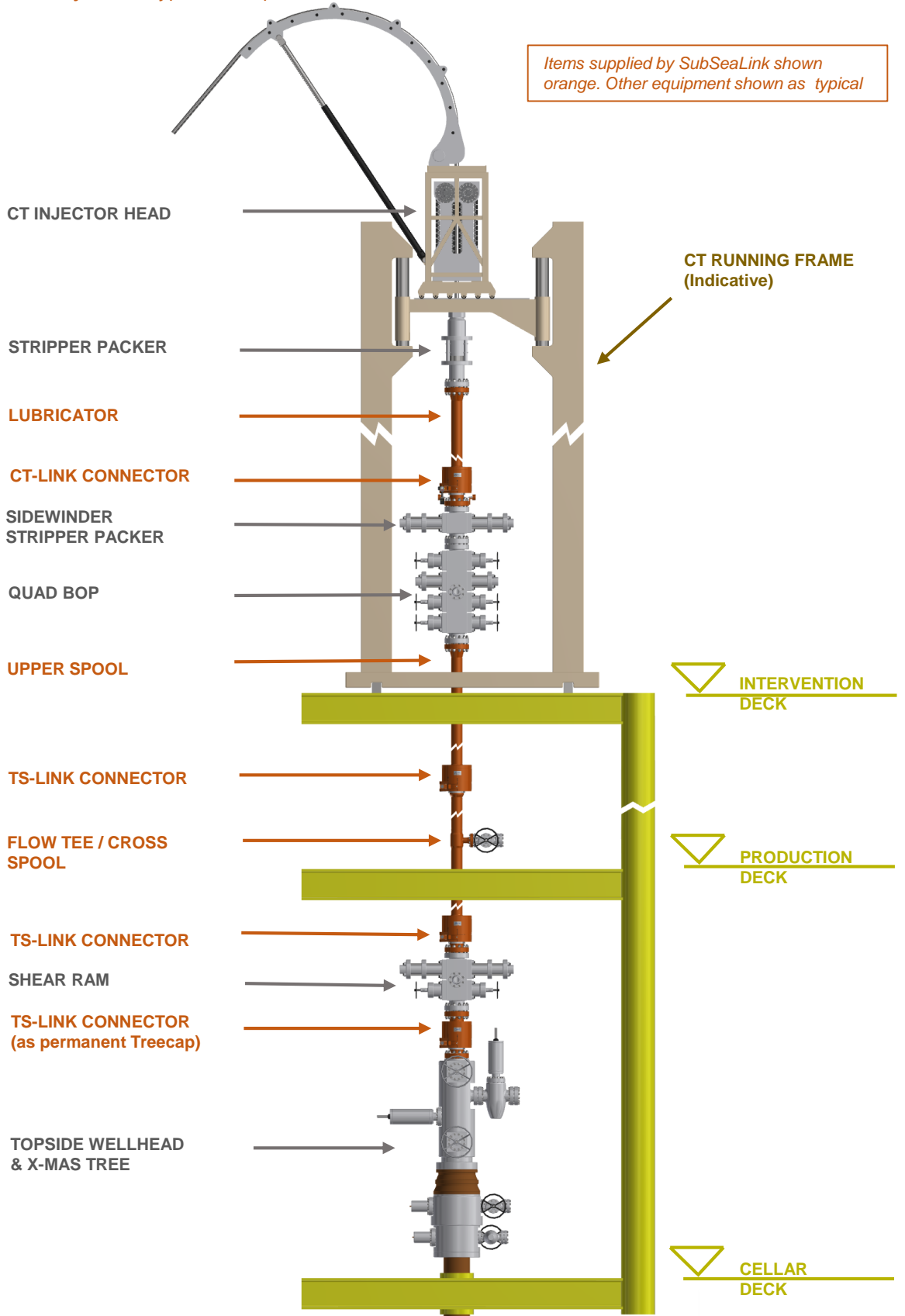
Flanged



Welding Neck

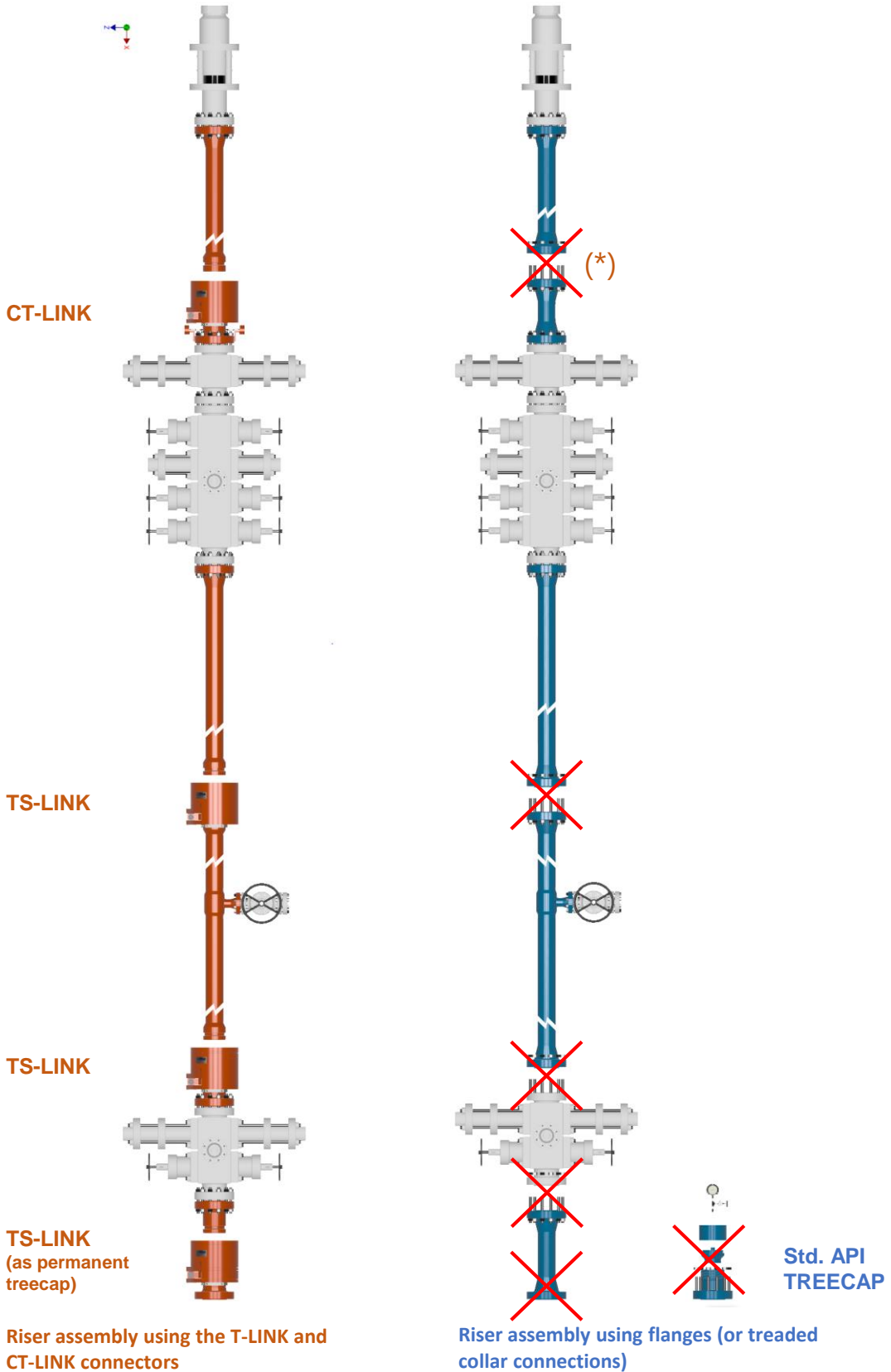
Optimizing installation improves performance

The SubSeaLink system makes it simpler, safer and faster to handle, align and connect together all the sections of a topside riser stack. As the connection is stronger than the riser pipe, bending moment and fatigue limitations of flanges and threads are eliminated. The system fits any riser configuration, the figure below shows just one typical example.



Optimizing installation saves time and improves safety

Operators can save several in situ flange make-ups at every riser assembly, as well as an additional flange make & break (*) every time a new tool is introduced in to the riser. Avoiding in situ flange operations also mean to eliminate extra scaffolding and the risk of dropping bolts and tensioning tools over congested living well areas.



Optimizing installation reduces well intervention costs

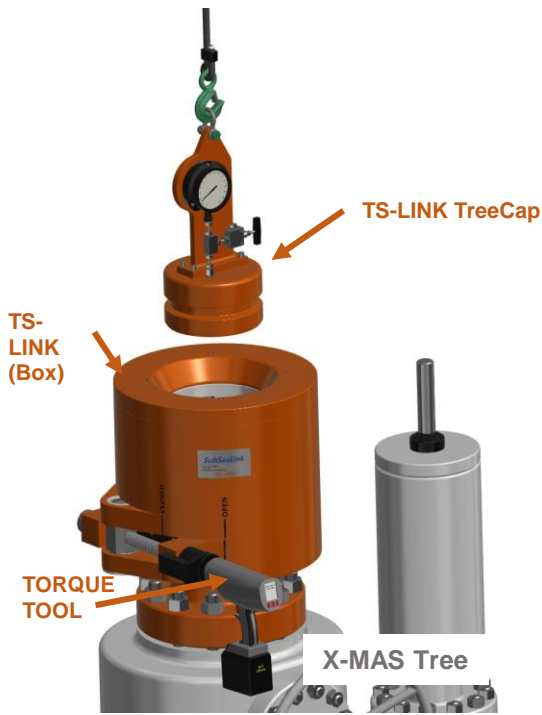
As operational cost savings offset hardware investment, the SubSeaLink quick connectors may pay back even from the first well intervention campaign.

The advantages provided by the SubSeaLink connection system are evident when looking at a step by step riser installation sequence (see following figures):

- Figure a illustrates an exemple of using our connectors to assemble and operate a riser well intervention over a typical offshore topside wellhead
- By comparison, Figure b shows a traditional assembly sequence, involving several in situ flange make & break operations.

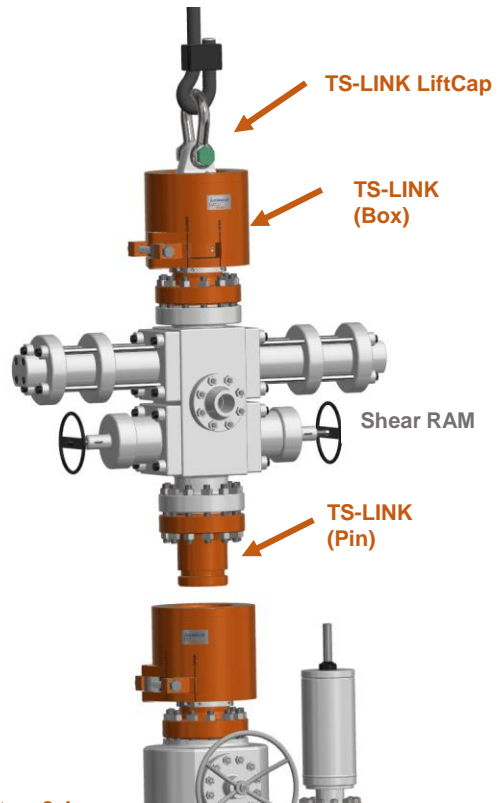
The table below gives an overview of the offshore time saving potential (for 1 off complete topside work over operation)

	PIPE CONNECTION METHOD	
INSTALLATION SEQUENCE	TS-LINK + CT-LINK (see Fig. a)	FLANGES (see Fig. b)
Step 1: Accessing the Xmas tree top connector	5 min The TS-LINK is compatible for wireline and coiled tubing ops., low and high pressure. Just open the connector and remove the pressure cap	1.5 hours Std API treecap contains soft O-Ring seals and shall be fully dismantled and replaced by a temporary flanged pipe adaptor spool.
Step 2: Installing the Shear RAM	15 min Shear RAM pre-outfitted with: <ul style="list-style-type: none"> • lower end: TS-LINK Pin • upper end: TS-LINK Box c/w TS-LINK Pin Lifting Cap Stab in Pin, close lower connector, open upper connector, remove lift cap	1.5 hours Shear RAM pre-outfitted with lift cap bolted to topside flange Lower the assembly and align mating ends. Place and tighten lower flange bolts. Lose and remove top flange bolts. Remove lift cap
Step 3: Installing the Tee / Cross Spool	15 min Same as step 2	2 hours Same as step 2, but the heavier lift complicates handling and alignment
Step 4: Installing the BOP Spool	15 min Same as step 2	2 hours Same as step 3
Step 5 (N times) Connecting and disconnecting the Injector Head at every new well intervention run	N x 15 min <ul style="list-style-type: none"> • Lubricator pre-outfitted with CT-LINK Pin. • Topside of BOP pre-outfitted with CT-LINK Box Stab in Pin and close connector. Perform leak test from external test port	N x 1.5 hours Lower the Injector Head – Lubricator assembly and align mating ends. Place and tighten flange bolts. Flood the riser pipe and perform hydrotest
Full disassembly	1 hour	4 hours
Reinstalling the Treecap	5 min	1 hour
Total (assuming re-entering the well N=4 times)	3 hours	18 hours



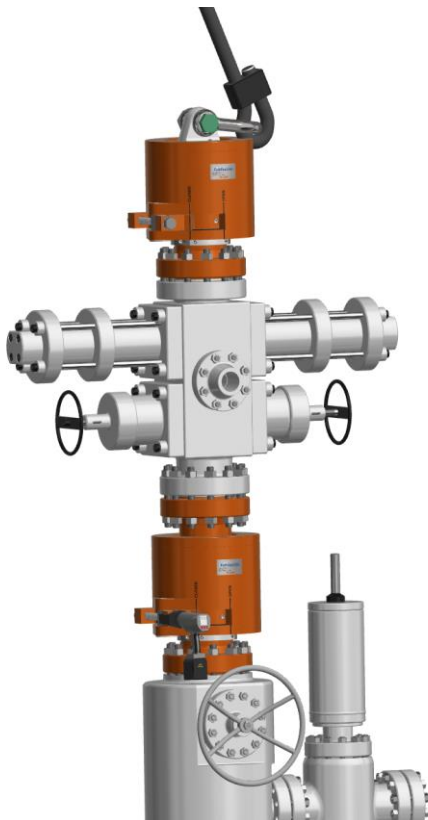
Step 1

- Vent treecap possible cavity overpressure
- Open the TS-LINK connector by hand op. torque tool (weight 7 kg approx.)
- Lift off TS-Link Treecap



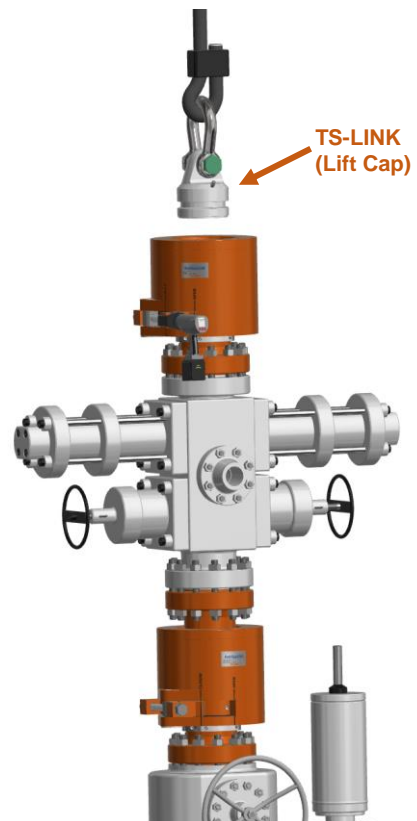
Step 2.1

- Deploy Shear RAM using the lift cap fitted to the upper TS-LINK connector
- Stab in and deploy the Shear Ram assembly



Step 2.2

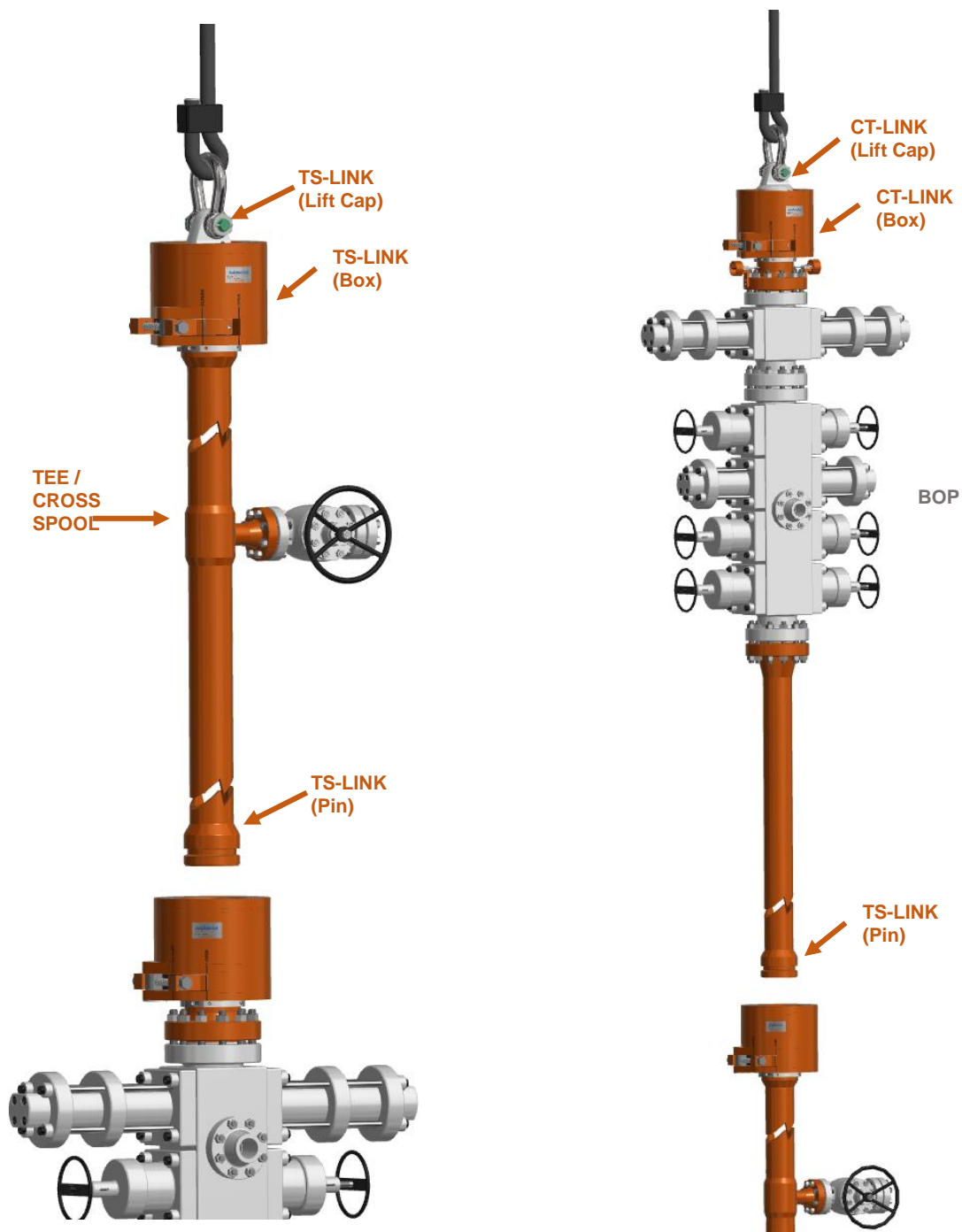
Close the lower connector by hand op. Torque Tool



Step 2.3

- Open upper connector by hand op. torque tool
- Lift off TS-LINK Lift Cap

Fig. a: Riser assembly using the T-LINK and CT-LINK connectors



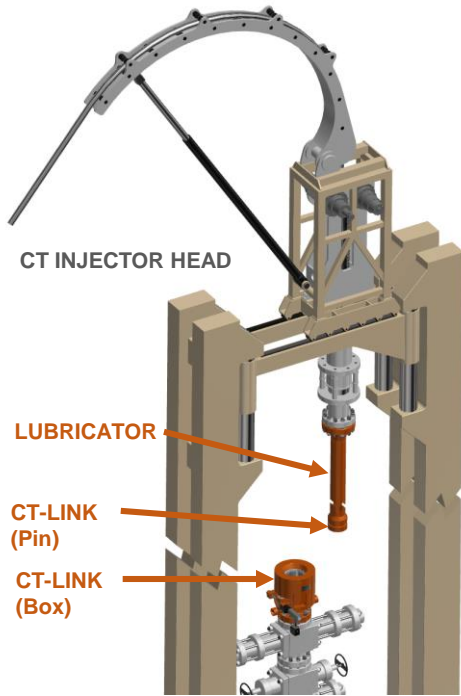
Step 3

- Deploy the Tee / Cross spool using the TS-LINK Lift Cap
- Stab in and deploy the assembly in to the lower connector
- Close the lower connector by hand op. torque tool
- Open the upper connector by hand op. torque tool
- Lift off and remove TS-LINK Lift Cap

Step 4

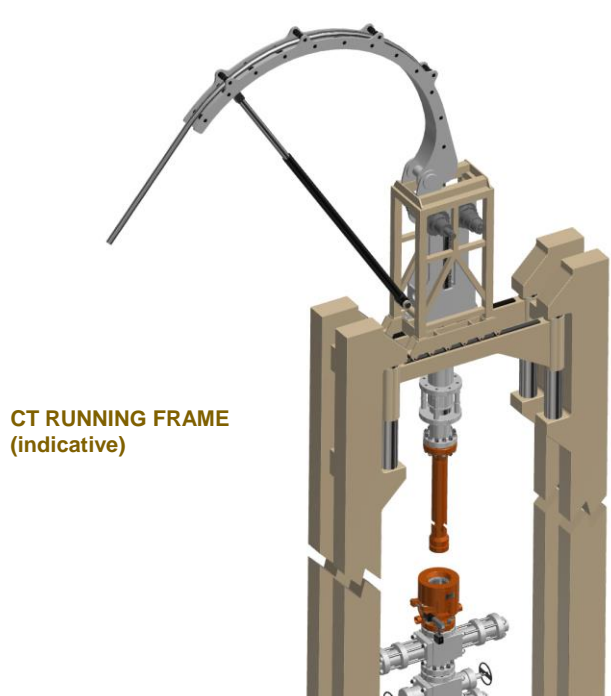
- Deploy the BOP spool assembly using the CT-LINK Lift Cap
- Stab in and deploy the assembly in to the lower connector
- Close the lower connector by hand op. torque tool
- Open the upper connector by hand op. torque tool
- Lift off and remove CT-LINK Lift Cap

Fig. a (continued): Riser assembly using the T-LINK and CT-LINK connectors



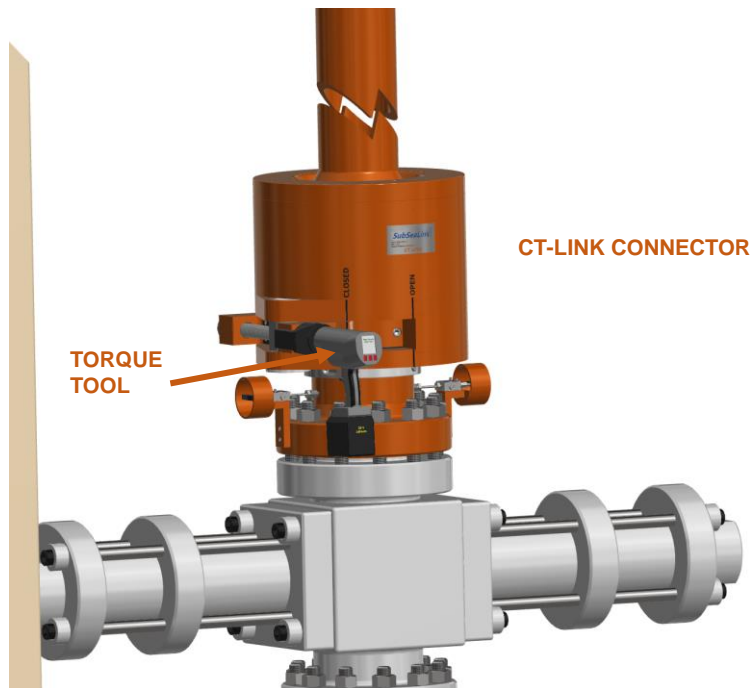
Step 5.1

- Connect a well intervention tool (not shown) to the coiled tubing string
- Retract the well intervention tool inside the Lubricator



Step 5.2

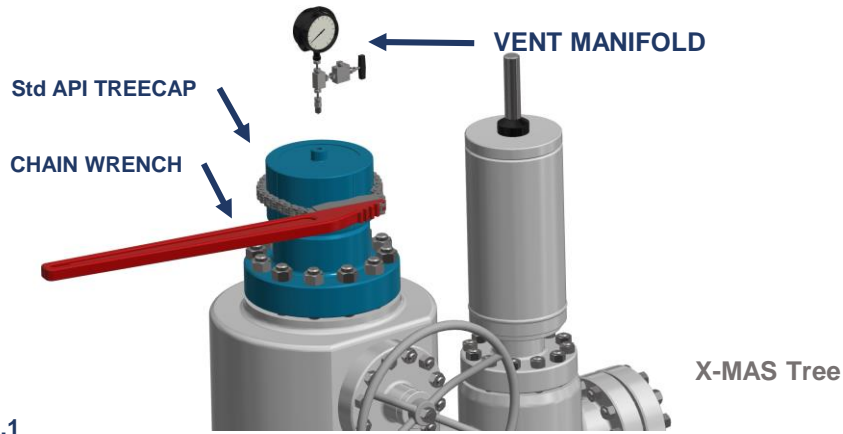
- Operate the horizontal carriage inside the Running Frame and position the Injector Head - Lubricator assembly over the riser connection point



Step 5.3

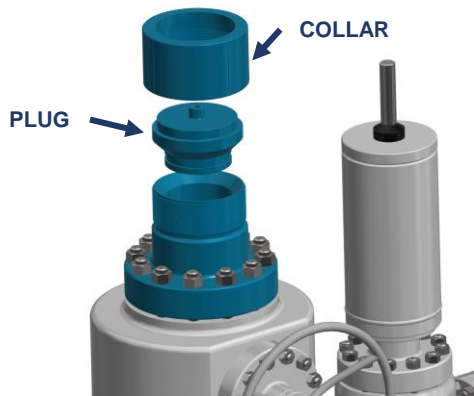
- Operate the vertical jacking system inside the Running Frame and stab the Injector Head - Lubricator Assembly in to the CT-Link connector
- Close the CT-LINK connector by the hand op. Torque tool

Fig. a (continued): Riser assembly using the T-LINK and CT-LINK connectors



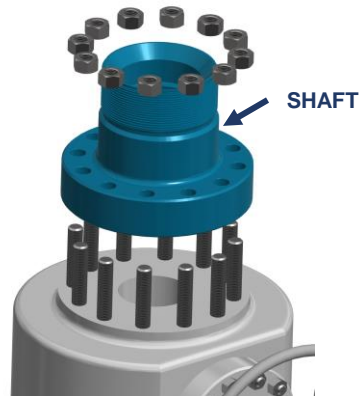
Step 1.1

- Vent internal pressure and remove vent manifold
- Unlock threaded collar by hand op. chain wrench (weight approx. 40 kg)



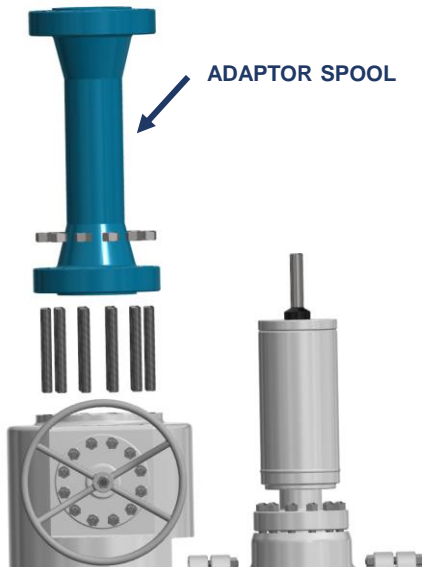
Step 1.2

- Unscrew and remove threaded collar
- Push up and lift off pressure plug



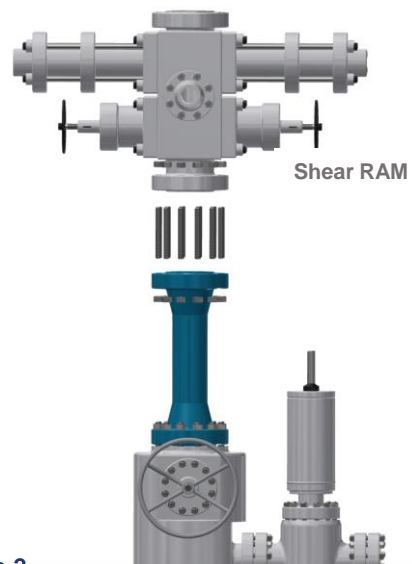
Step 1.3

- Unbolt base flange and remove Treecap shaft
- Inspect and possibly remove studs



Step 1.4

- Screw in new stud bolts (if required)
- Deploy flanged adaptor by soft slings
- Place ring joint gasket, align mating ends and bring flange faces to contact
- Tighten 12 off bolts



Step 2

- Deploy Shear Ram by soft slings wrapped around top flange or by bolted on lift cap
- Place ring joint gasket, align mating ends and bring flange faces to contact
- Install and tighten 12 off bolts

Fig. b: Riser assembly using flanges



Step 3

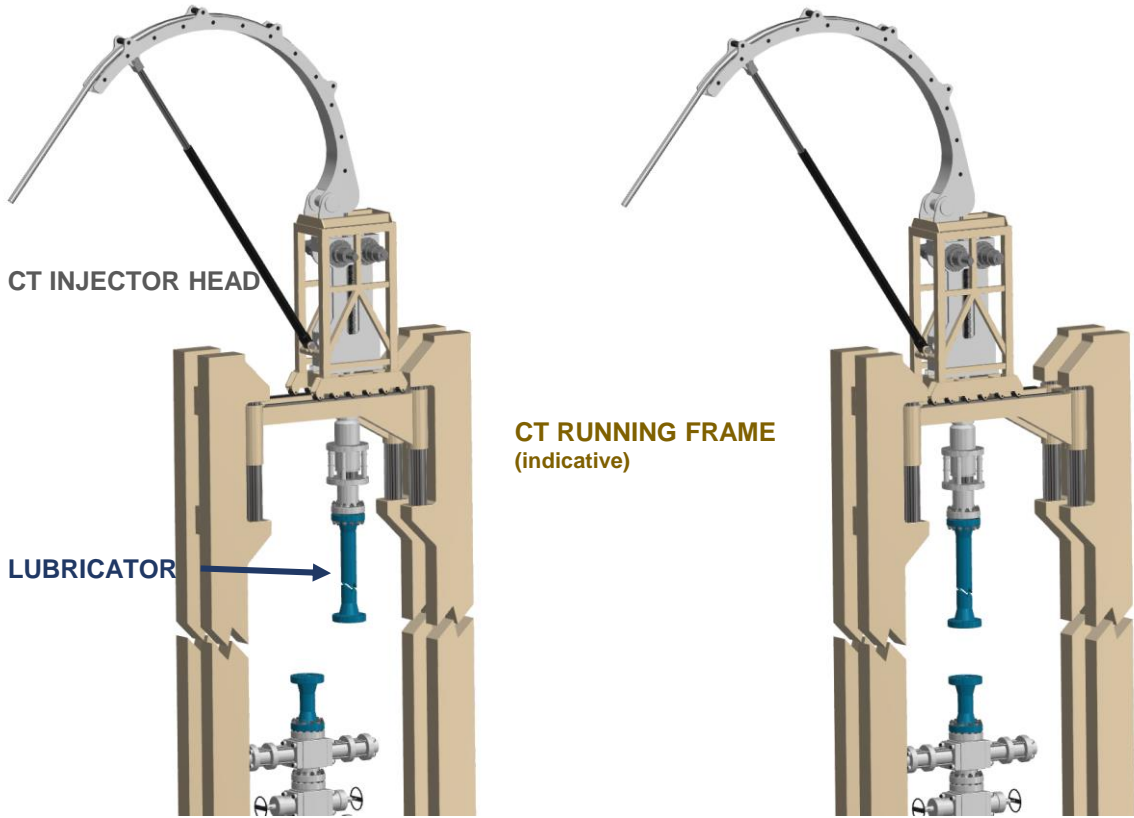
- Deploy Tee / Cross spool by soft slings wrapped around top flange or by bolted on lift cap
- Place ring joint gasket, align mating ends and bring flange faces to contact
- Install and tighten 12 off bolts
- Dismount lifting rigging



Step 4

- Deploy BOP spool by soft slings wrapped around top flange or by bolted on lift cap
- Place ring joint gasket, align mating ends and bring flange faces to contact
- Install and tighten 12 off bolts
- Dismount lifting rigging

Fig. b (continued): Riser assembly using flanges

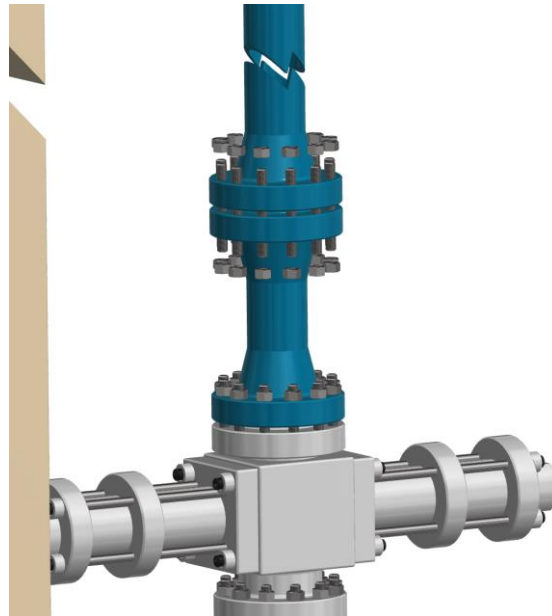


Step 5-1

- Connect well intervention tool to coiled tubing
- Retract well intervention tool inside the Lubricator

Step 5-2

- Operate the Injection Head carriage to position the assembly over the connection point



Step 5-3

- Operate the Intervention Frame jacking system to lower down and stab in the Lubricator in to the CT-Link connector
- Place ring joint gasket, align mating ends and bring flange faces to contact
- Install and tighten 12 off bolts

Fig. b (continued): Riser assembly using flanges