TechnipFMC

Subsea Production Systems

04.May.2021

Agenda

- Take 5 Moment
- Wellhead Systems
- Subsea Tree Systems
- Intervention and Workover Systems
- Manifold Systems
- Interconnection Systems
- Questions/Discussion

Take 5 Moment

In everything we do, we never compromise on:

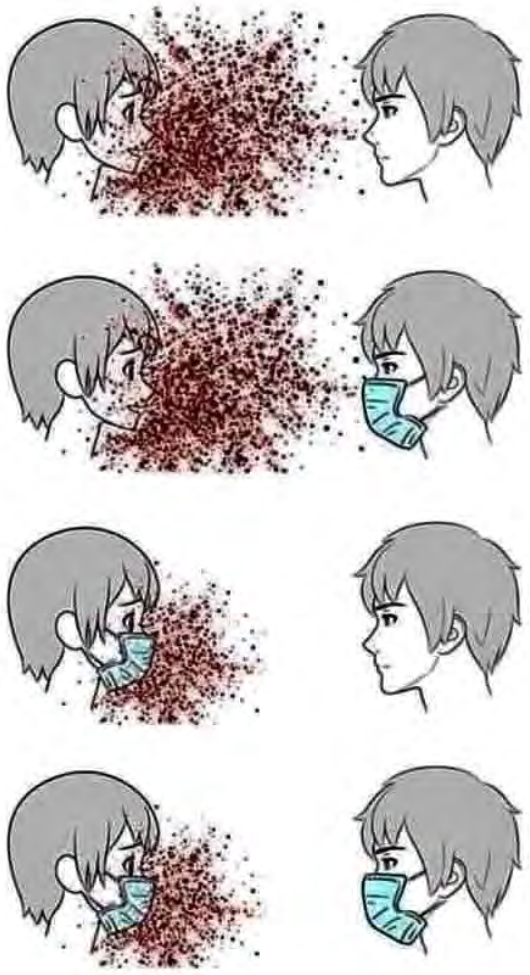
Safety | Integrity | Quality | Respect | Sustainability

James Martin

Take 5 Moment – COVID-19 Probability of Contagion

In everything we do, we never compromise on:

Safety | Integrity | Quality | Respect | **Sustainability**



VERY HIGH

HIGH

MEDIUM

LOW

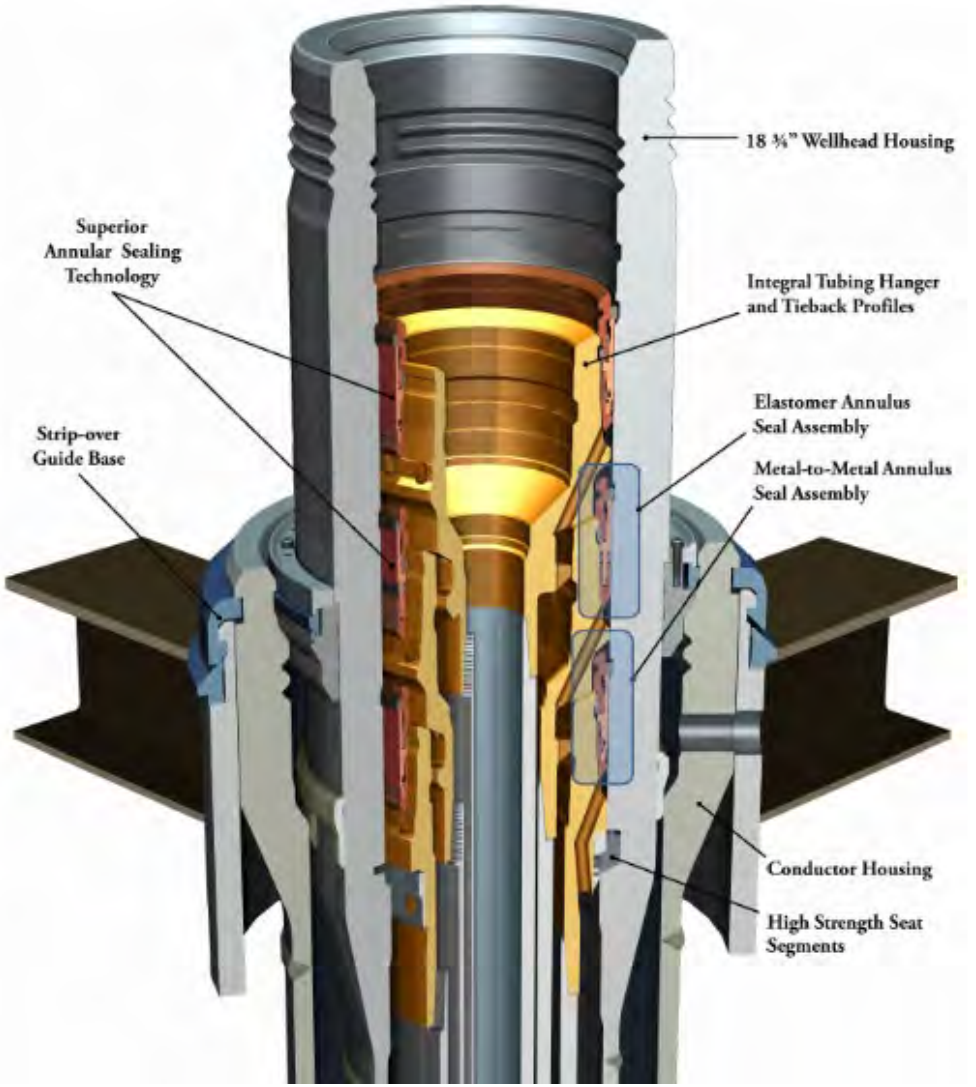
Wearing a face mask is certainly not an iron-clad guarantee that you won't get sick – viruses can also transmit through the eyes and tiny viral particles, known as aerosols, can penetrate masks. However, masks are effective at capturing droplets, which is a main transmission route of coronavirus, and some studies have estimated a roughly fivefold protection versus no barrier alone

Australia COVID Page:
https://pop.technipfmc.com/sites/country-sites/australia/SitePage/264137/covid-19-incident-management

Kuala Lumpur COVID Page:
https://pop.technipfmc.com/sites/country-sites/malaysia/kuala-lumpur/SitePage/264141/coronavirus-covid-19

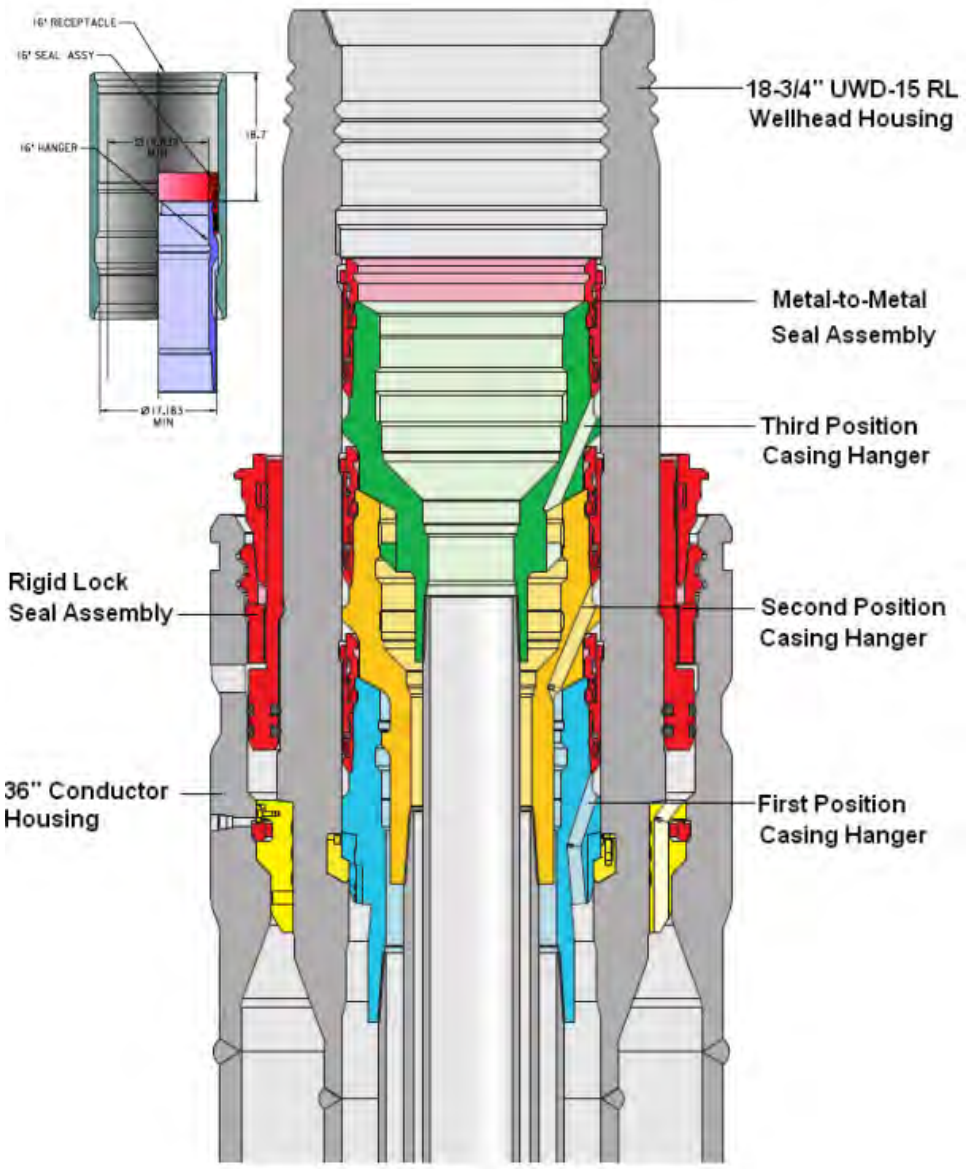
Subsea Wellheads

What does the Wellhead System Do?



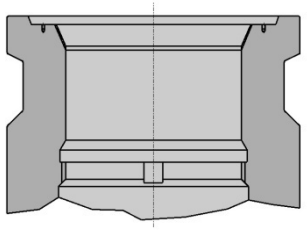
- Suspends Conductor & Casing of the well.
- Transfers loading in to the soil/formation
- Conductor and Casing size decreases with depth
- Conductor to soil and conductor to casing annulus often cemented.
- Installed with Drilling Rig
- Standard Systems, little or no customer preferences and so little design engineering required.
- Different Wellhead Systems available
- Tooling is usually rental

Wellhead Systems Components

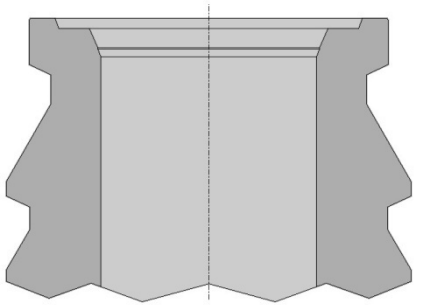


- Conductor Housing (LP) for 30" or 36" Conductor Pipe
- Wellhead Housing (HP) for 20" to 22" Casing
- Up to three (3) Casing Hangers with passive load shoulders
- 1st Position - 14", 13 5/8" or 11 3/4" Casing
- 2nd Position - 10 3/4" or 9 5/8" Casing
- 3rd Position - 7" Casing
- Metal to Metal Sealing Annulus Seal Assemblies
- Elastomer Sealing Backup Annulus Seal Assemblies
- The potential for Sub-Mudline casing hangers in larger bore wellhead systems

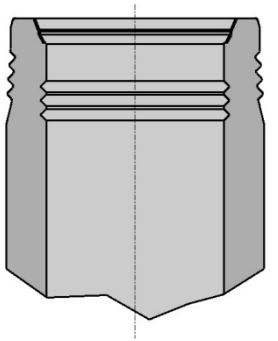
Typical Wellhead Connector Profiles



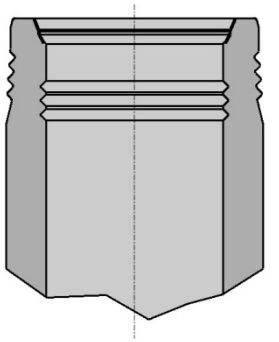
API / Cameron
Hub 25°



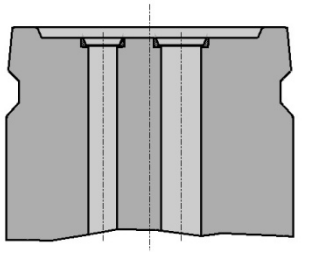
Cameron
DWHC
Hub 25°



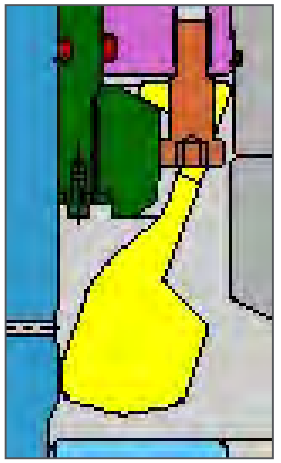
Dril-Quip
DX Hub

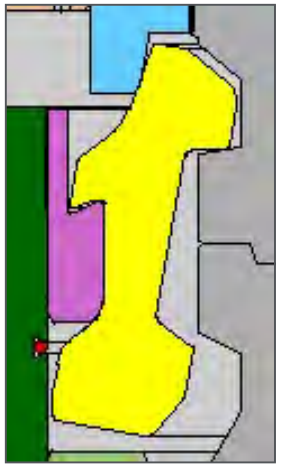


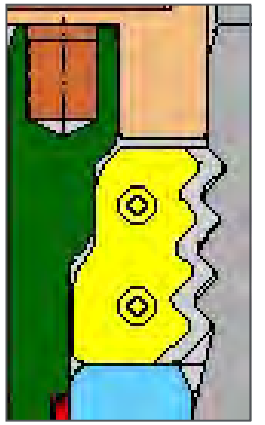
GE (Vetco) H4
Hub 45°

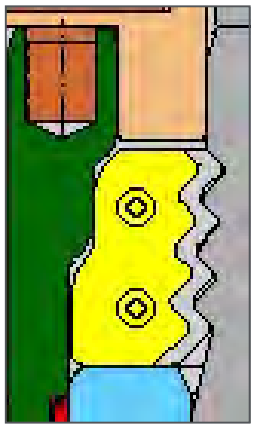


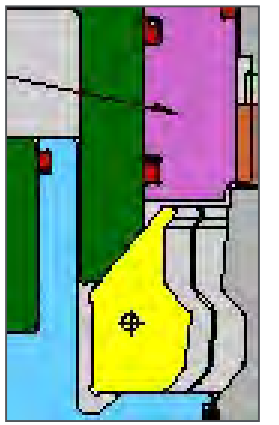
FMC Torus
Hub 45°



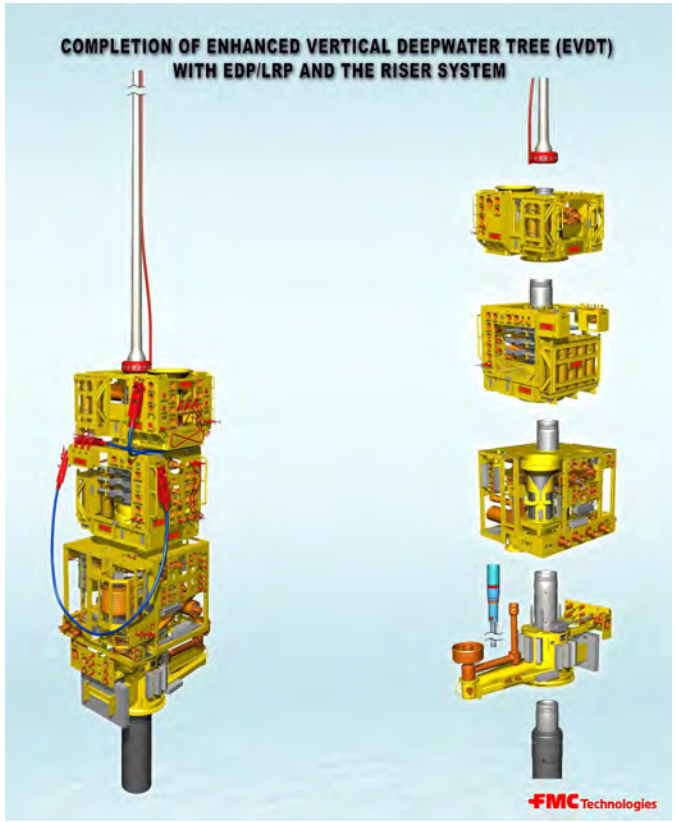


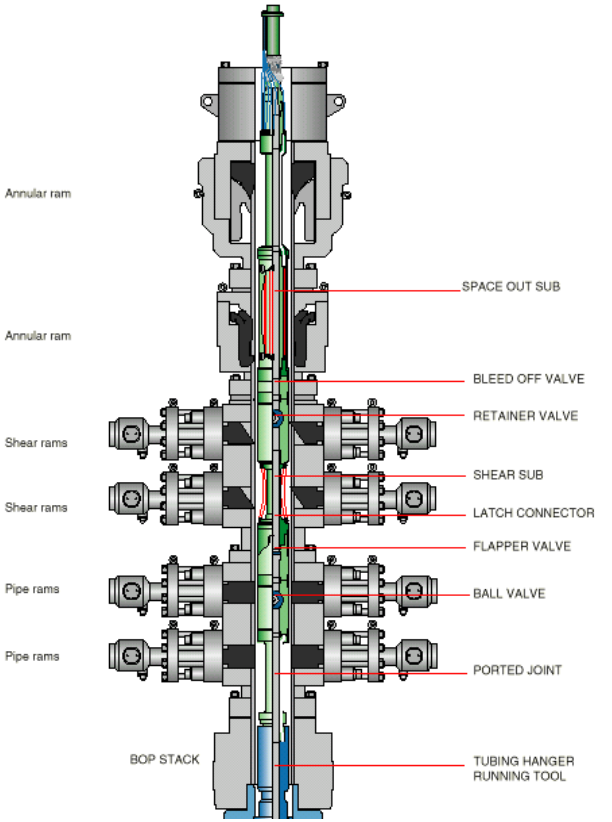


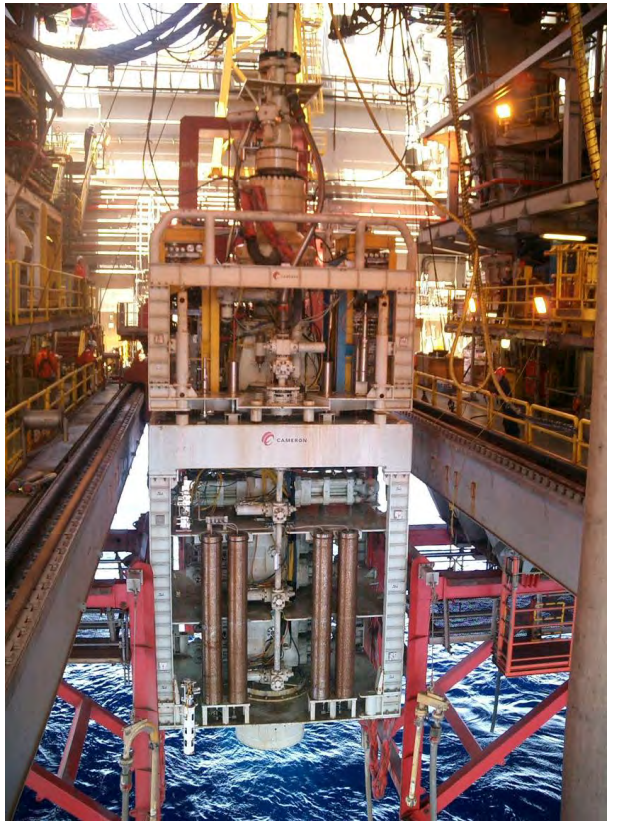




Fatigue in Wellhead Systems

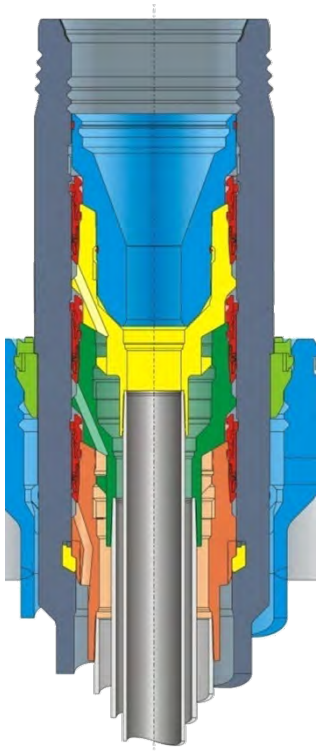




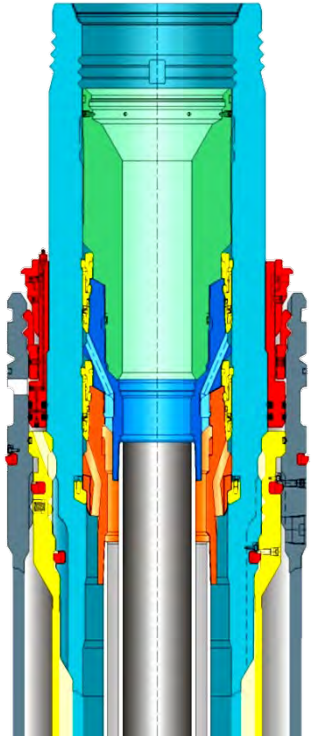


Wellhead System Options:

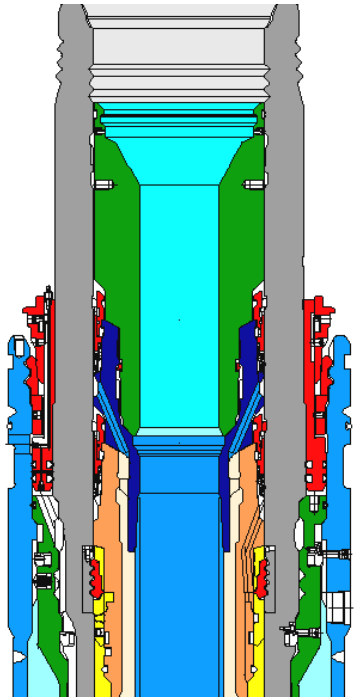
TechnipFMC's Subsea Wellhead systems are provided in five main types



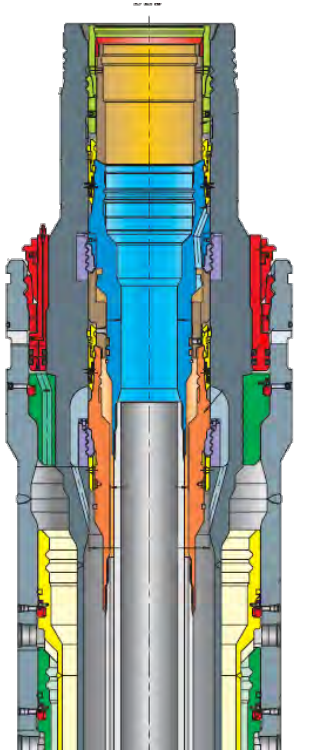
Standard



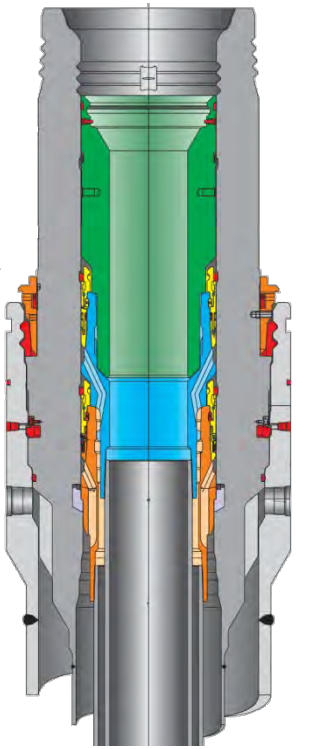
Rigid Lock
Stack Down



Large Bore



High Capacity

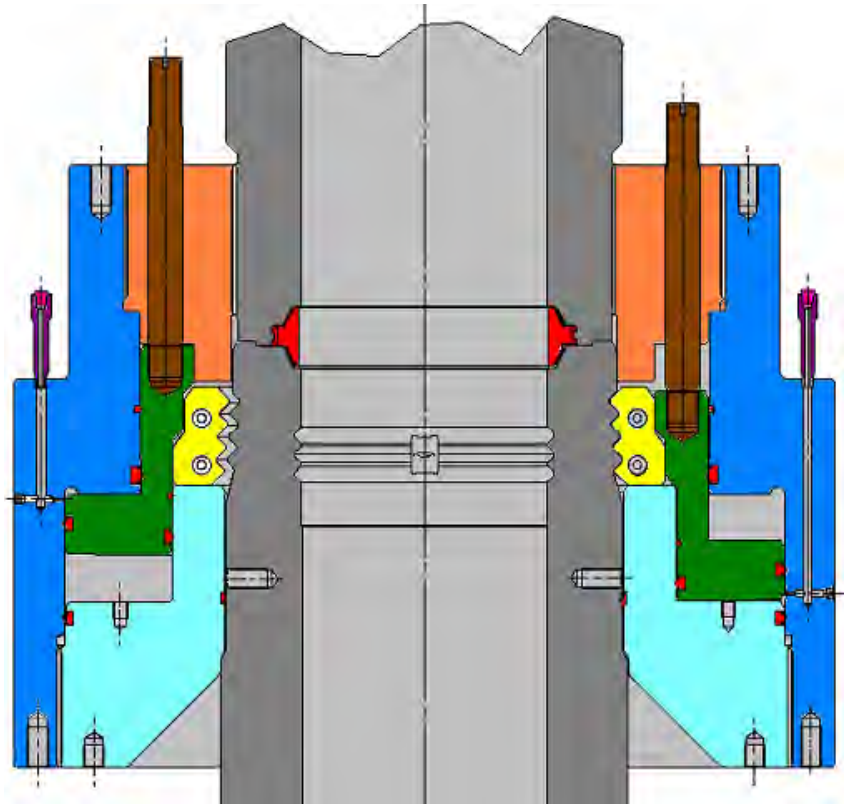


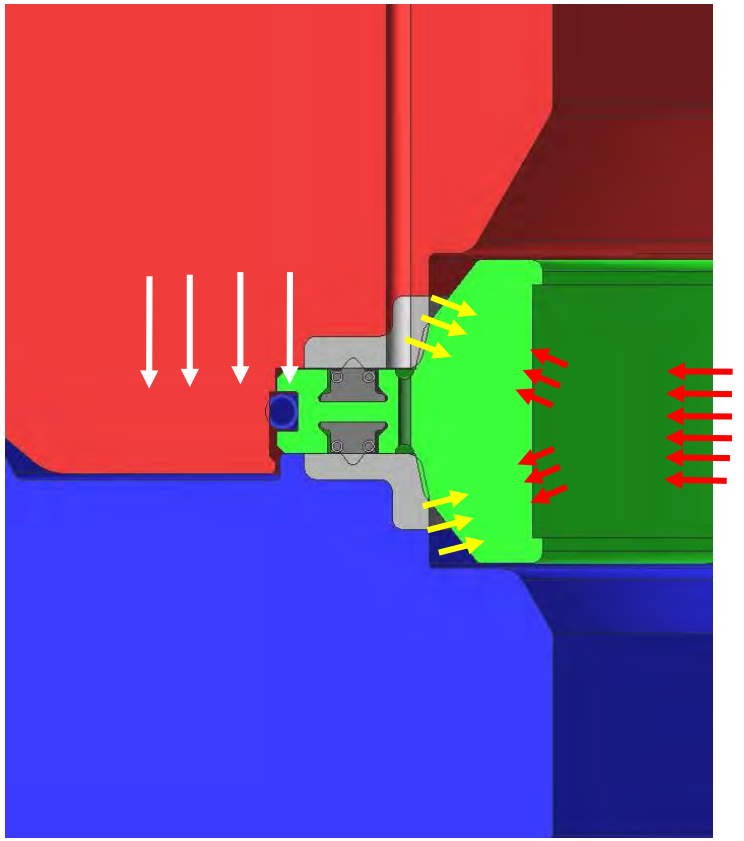
Slim bore

Wellhead System Primary Seal to the environment:

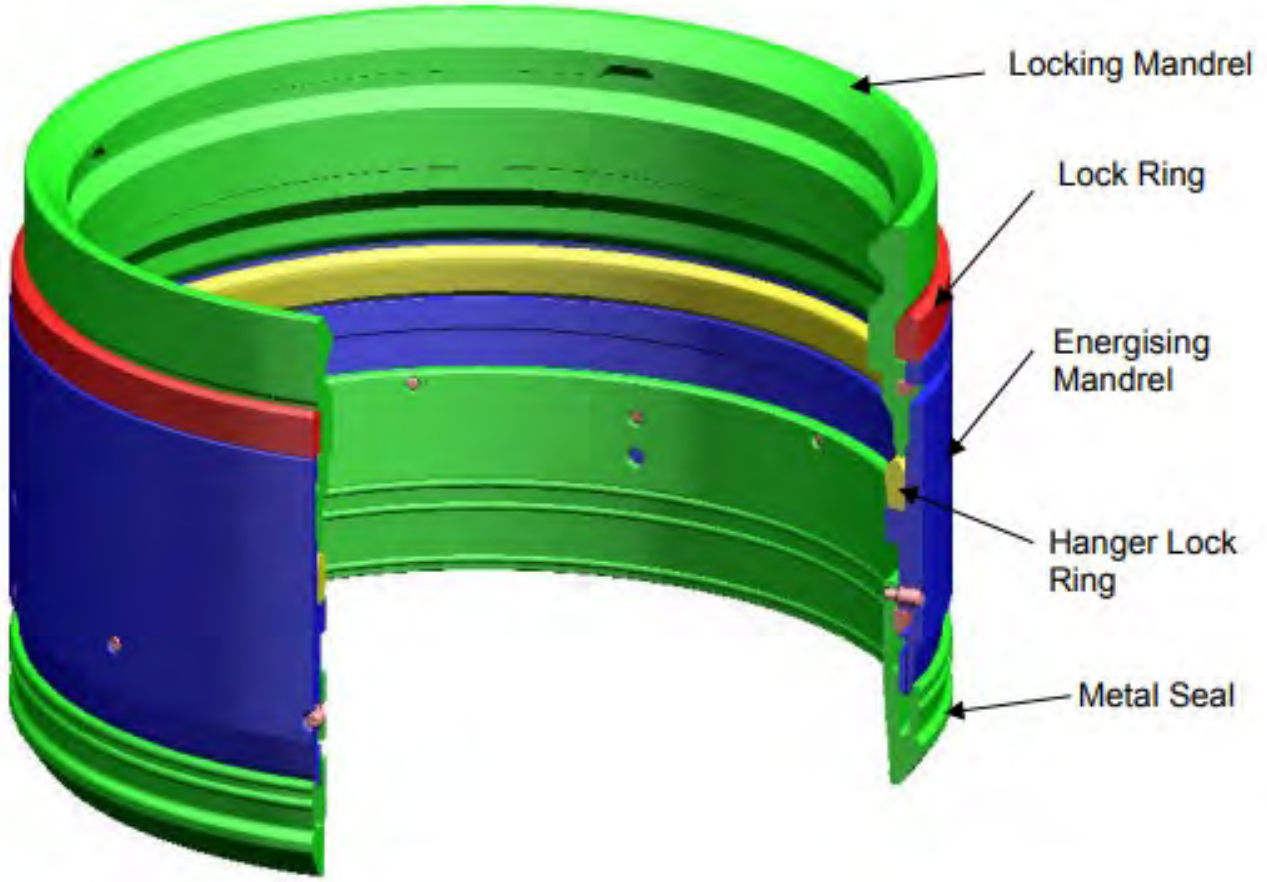
Metal to Metal Seal:

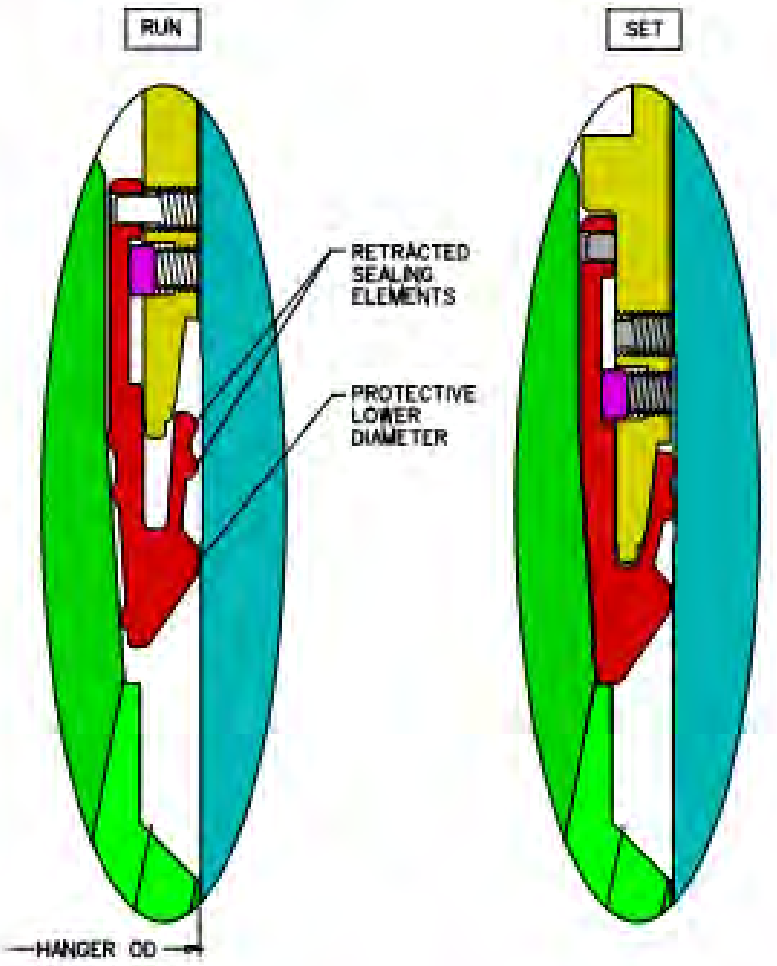
- H4/VX Type
- Self Energized : ANIMATION



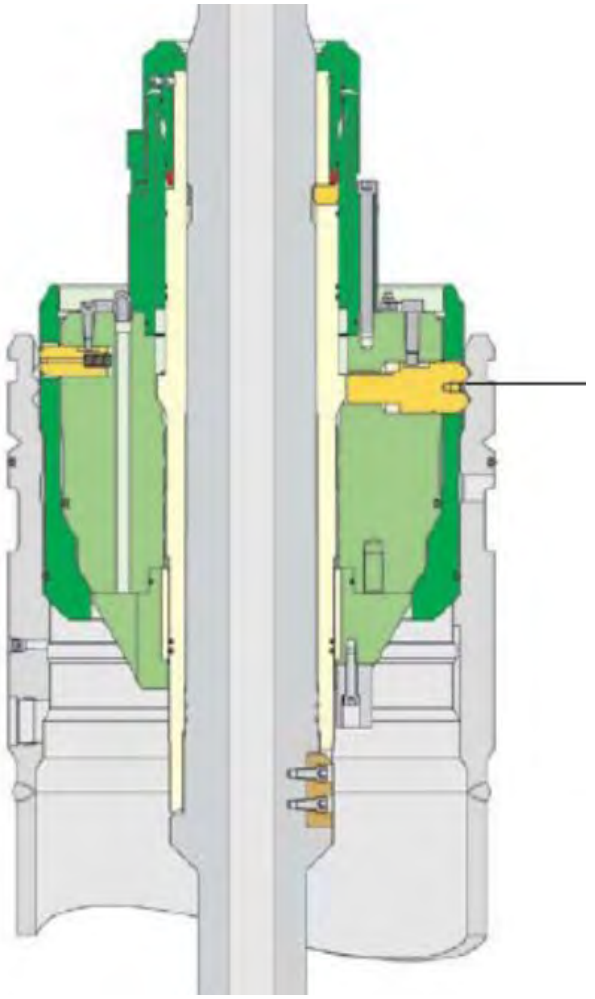


Wellhead System Annulus Seal Assemblies:

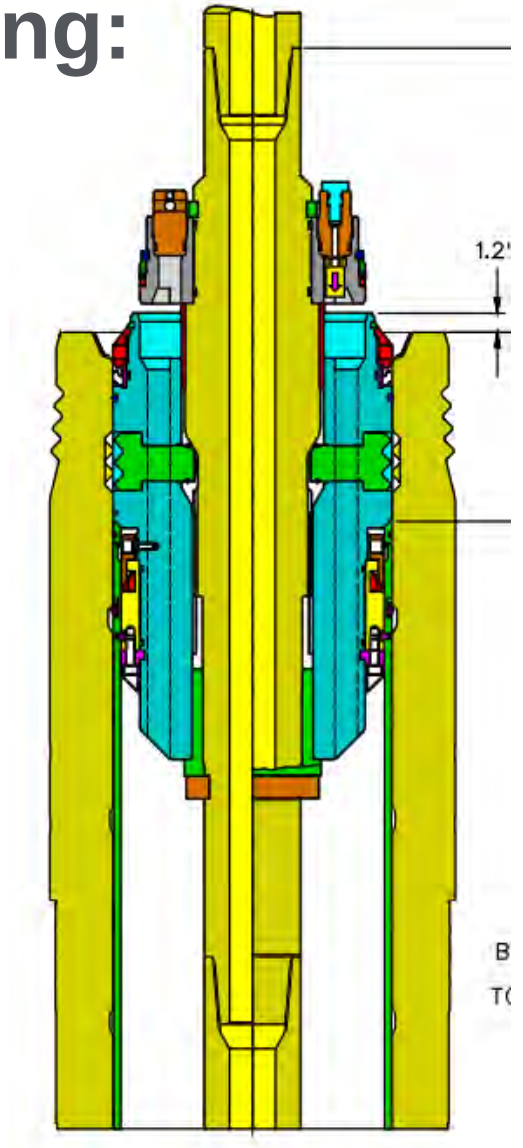




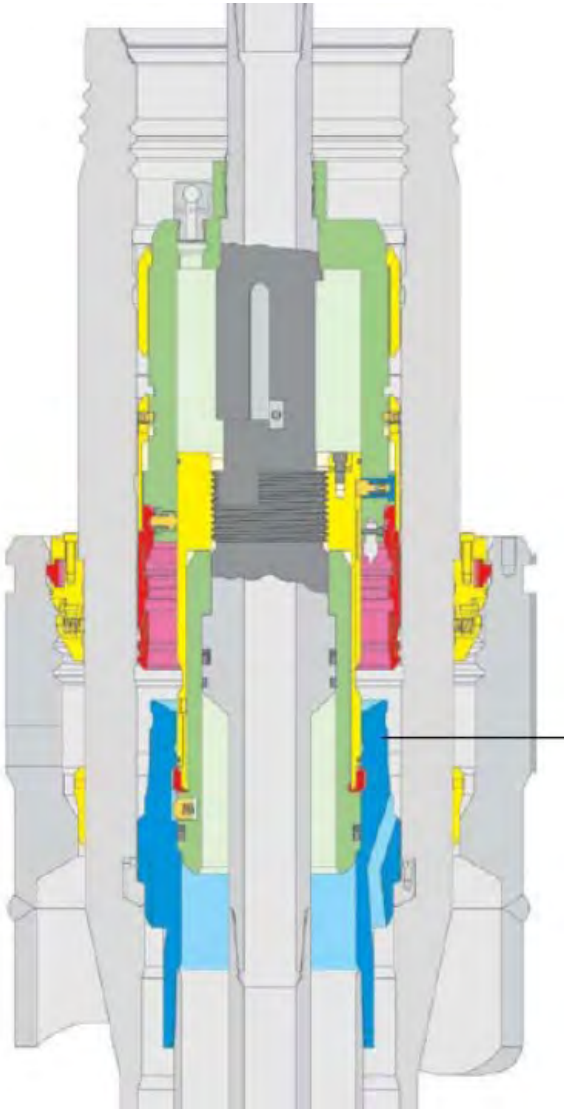
Wellhead System Tooling:



LP Conductor Running Tool



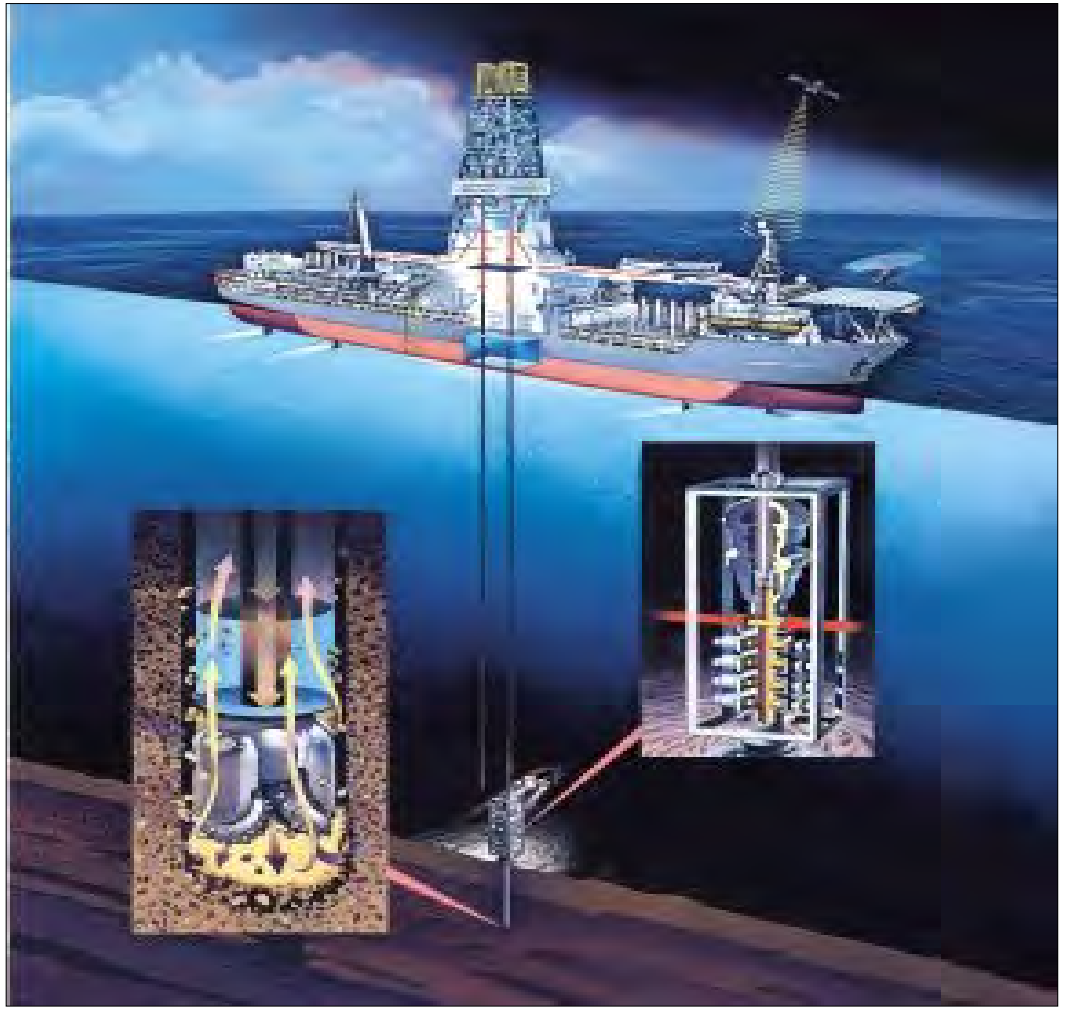
HP Housing Running Tool



Single Trip Tool

Rigs Typically Utilized to Drill Subsea Wells

Drill Ships



Courtesy:
http://www.deepwater.com/DiscovererEnterprise.cfm

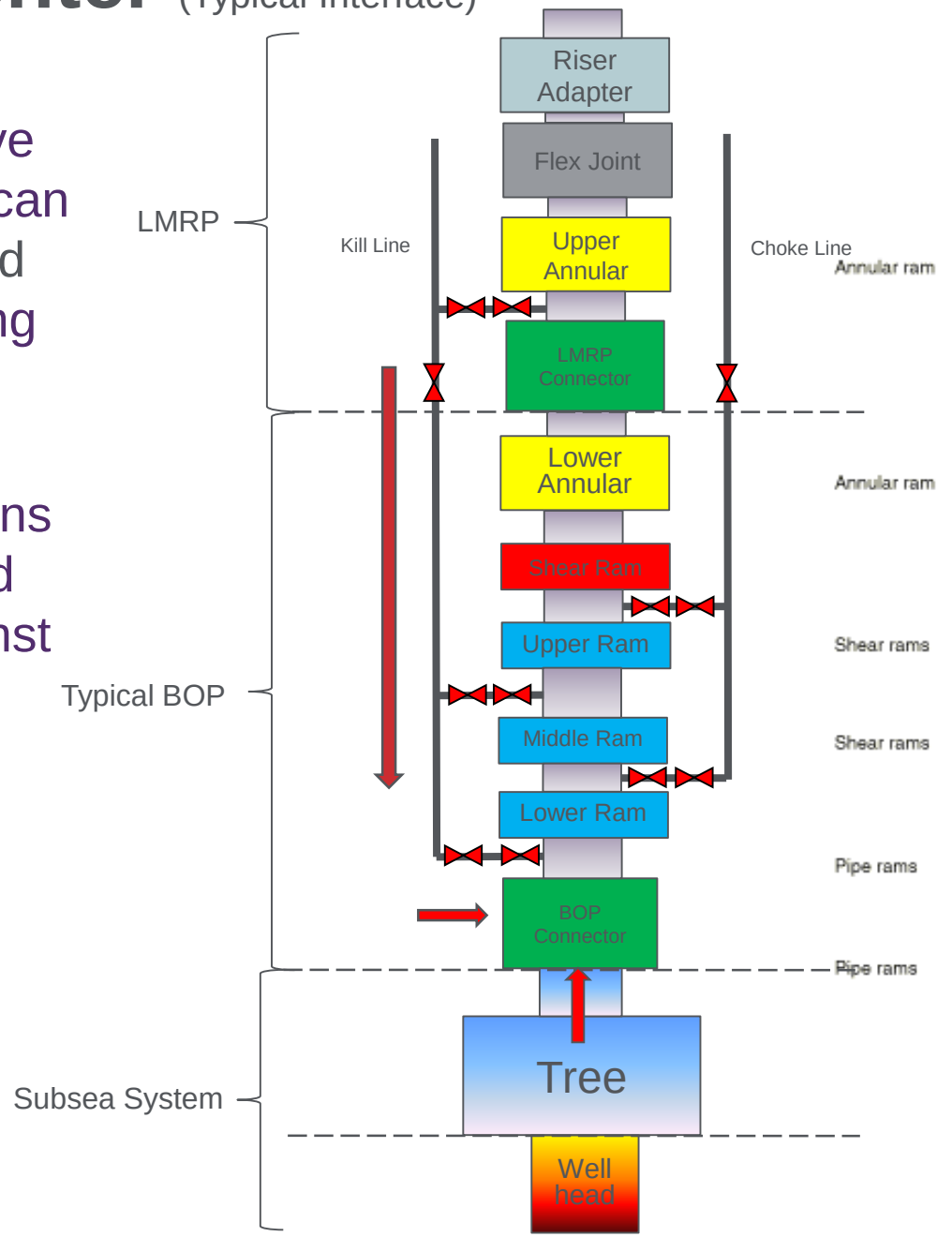
Semi Submersibles

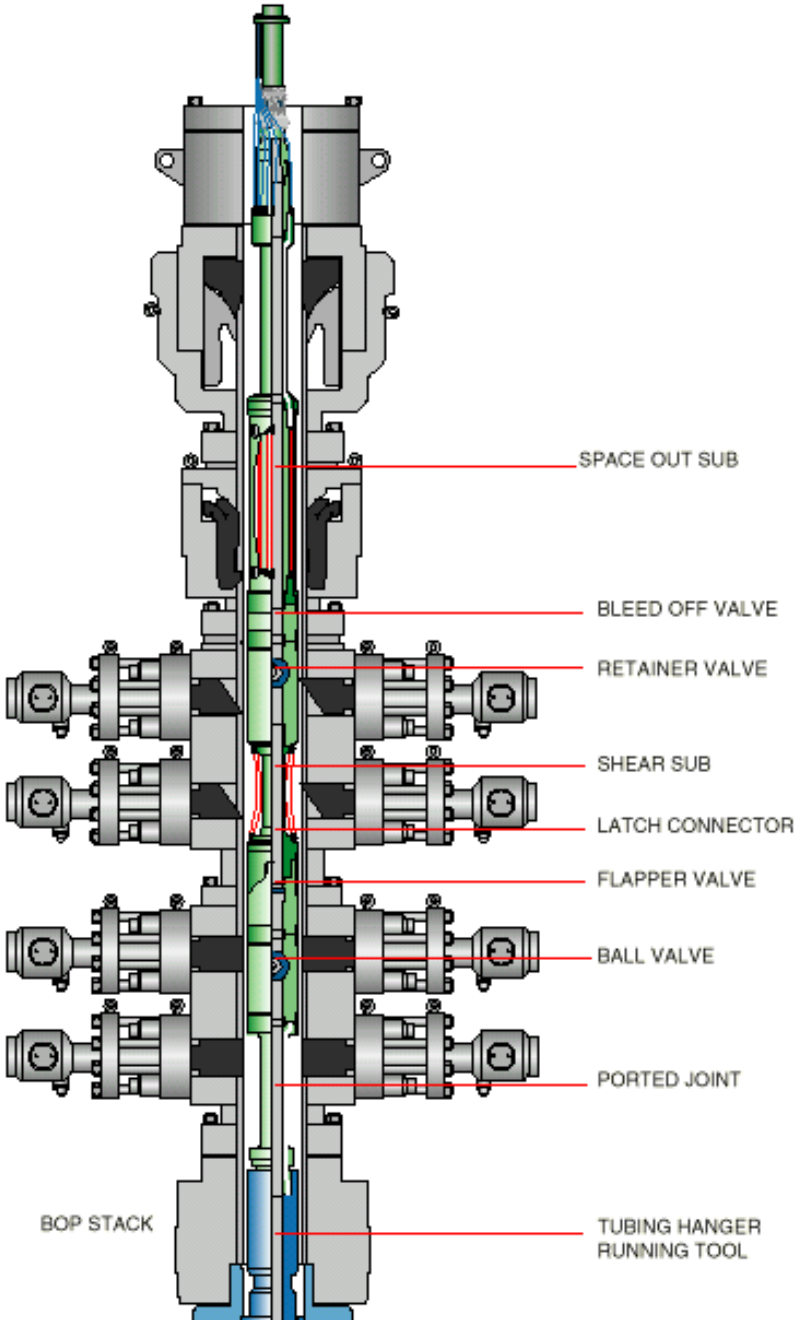
Courtesy:
http://www.deepwater.com/SedcoExpress.cfm

Key Rig Systems Utilized to Drill Subsea Wells

Blow Out Preventer (Typical Interface)

- Definition: a large valve [or set of valves] that can seal off at the wellhead [or tree] for a well being drilled or worked over
- Purpose: Prevent the release of hydrocarbons to the atmosphere and to protect the rig against explosive pressure release
- Safety Device





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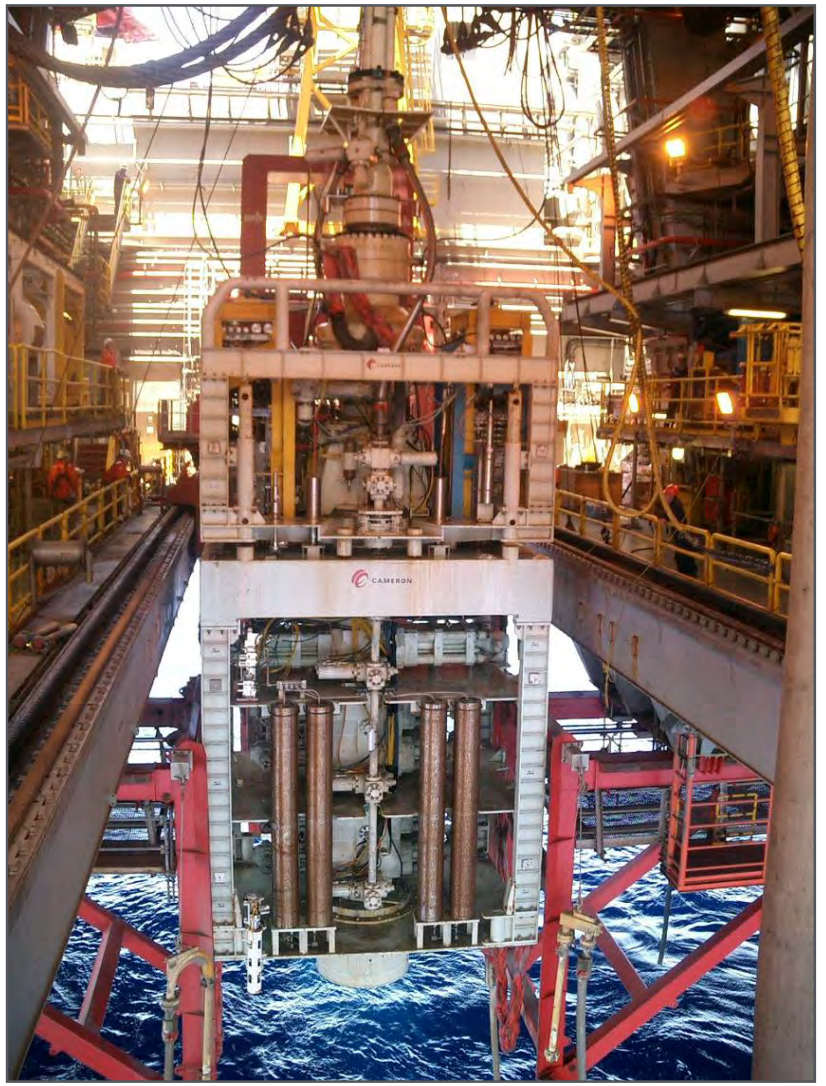
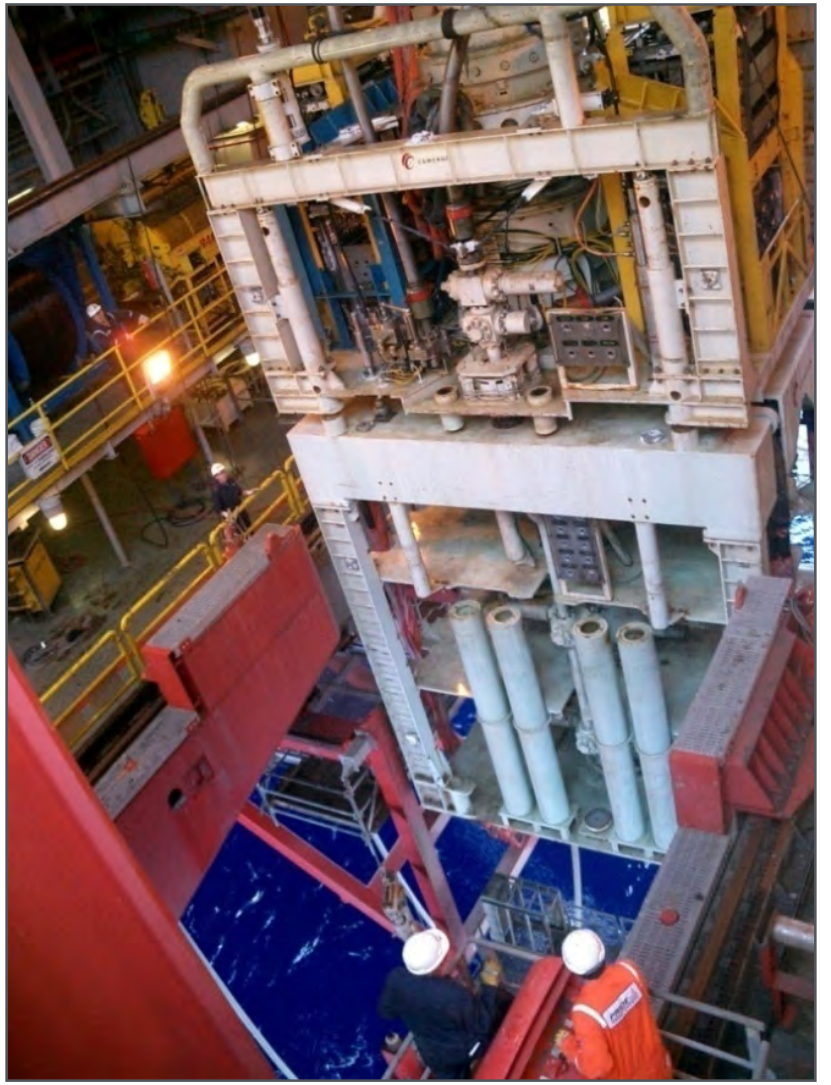
BOP Deployment

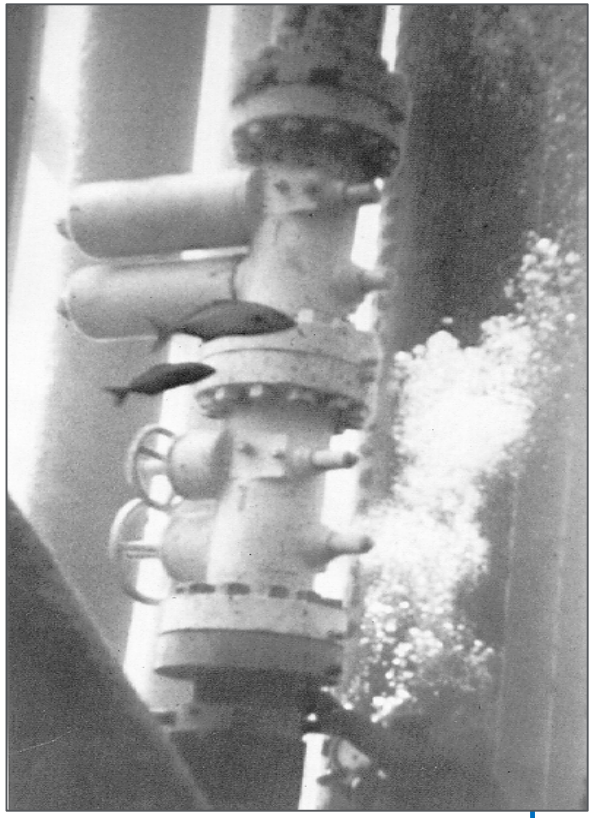




Subsea Tree’s

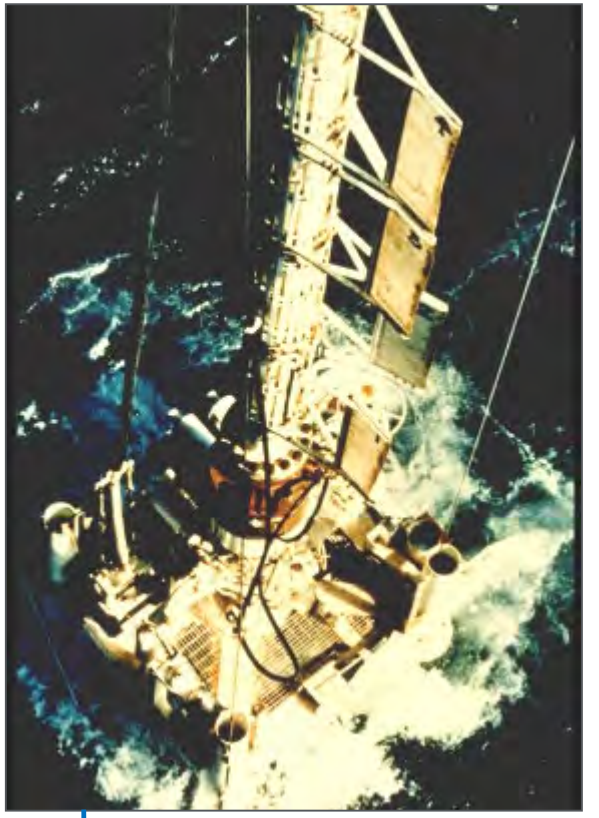
Evolution of Subsea Trees

Fire Safe “USV’s” under a Platform



Diver Intensive Mudline

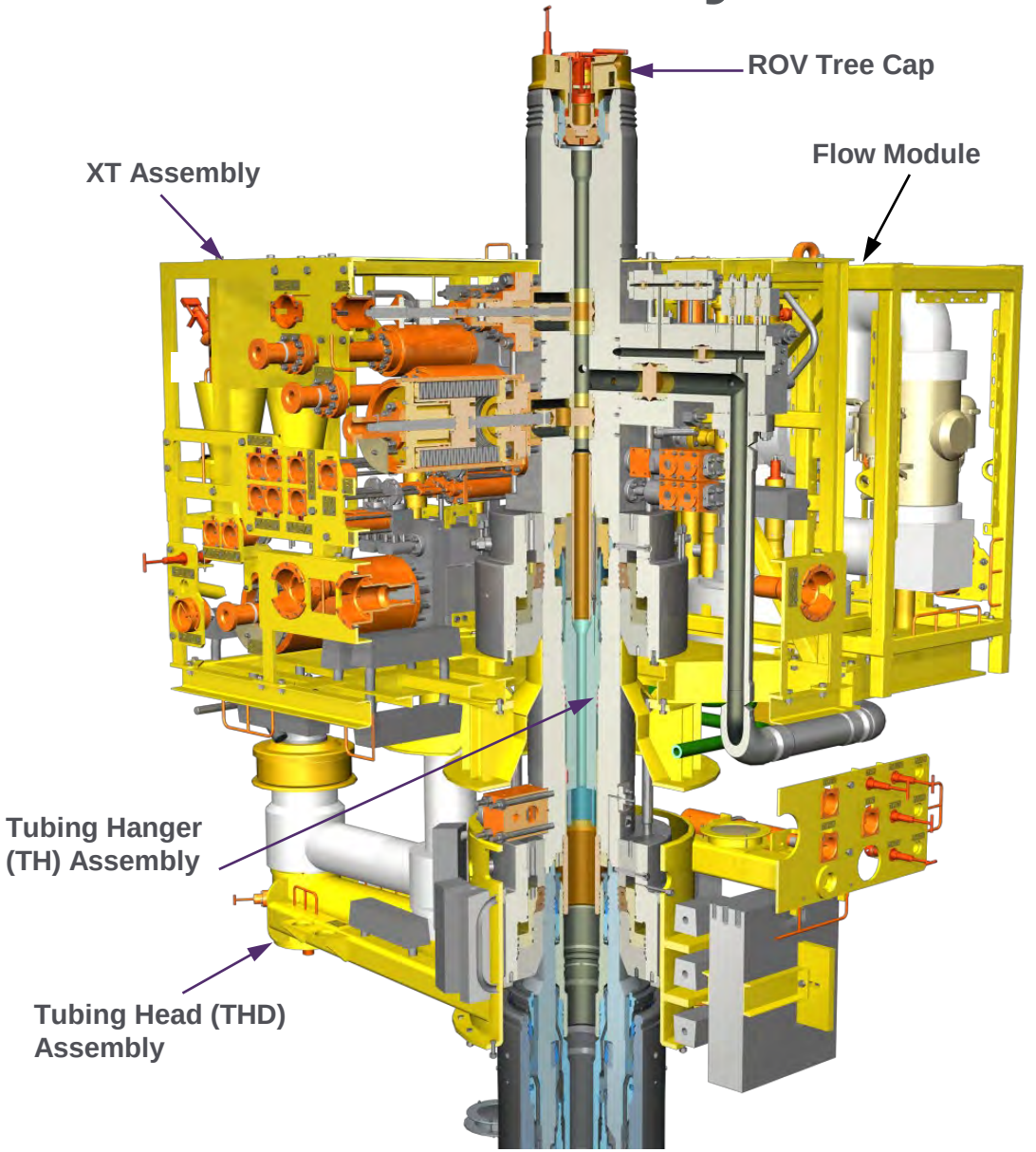
Diver Assist Tree



1960’s → **1970’s** → **1980’s**

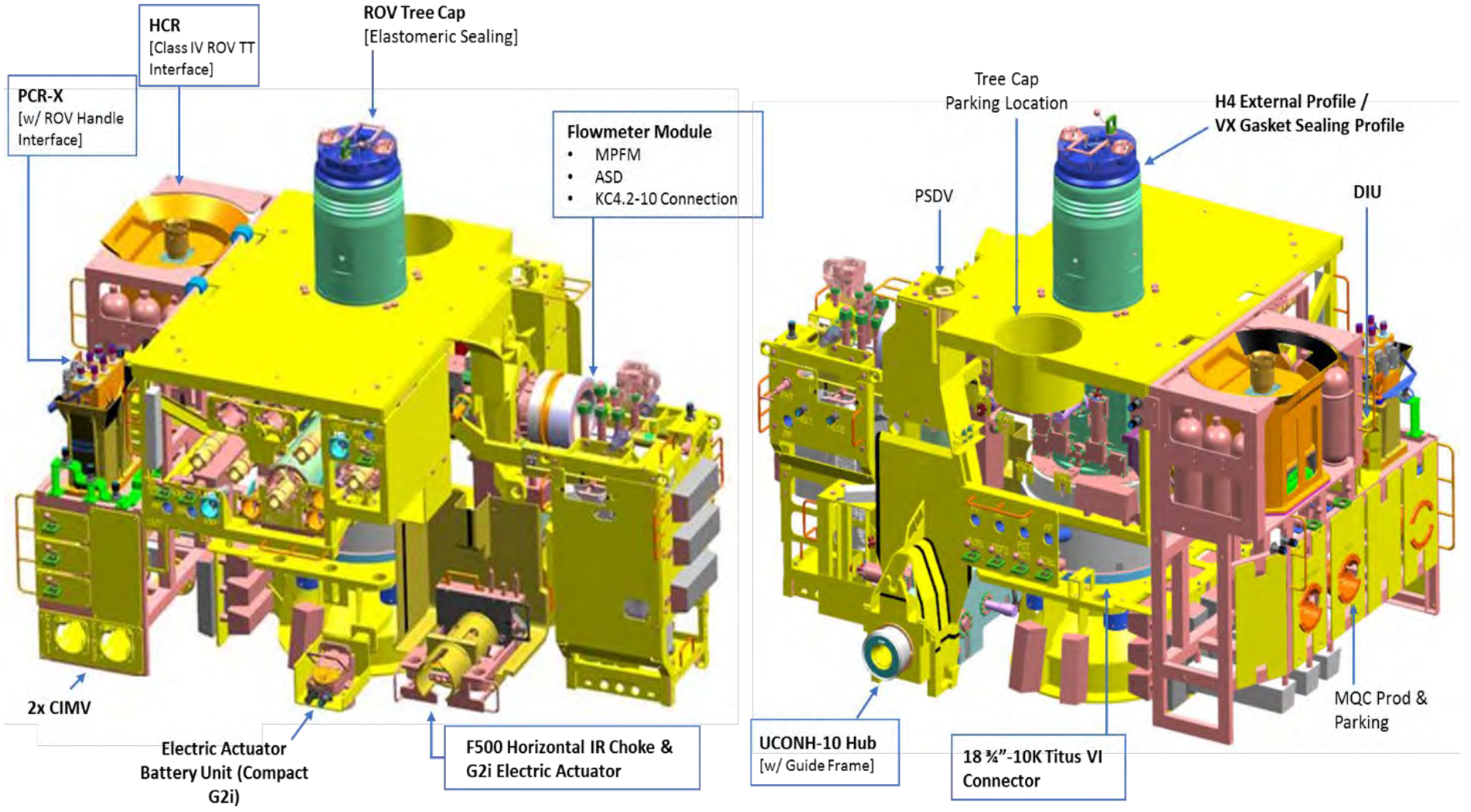
Evolution of Subsea Trees

What does the Tree System Do?



- Provides fail safe close barriers at the wellhead.
- Provides a means to mount sensors:
  - Pressure & Temperature (PT/TT)
  - Acoustic Sand Detectors (ASD)
  - Erosion Probe (EP)
- Provides means to control the well flowrate via a choke
- Provides a means of measuring flowrate via a flowmeter
- Provides access to the annulus of the wells
- Provides the profile to lock on the Installation/Workover Riser for well entry

Tree Walk Around



Retrievable Flow Module

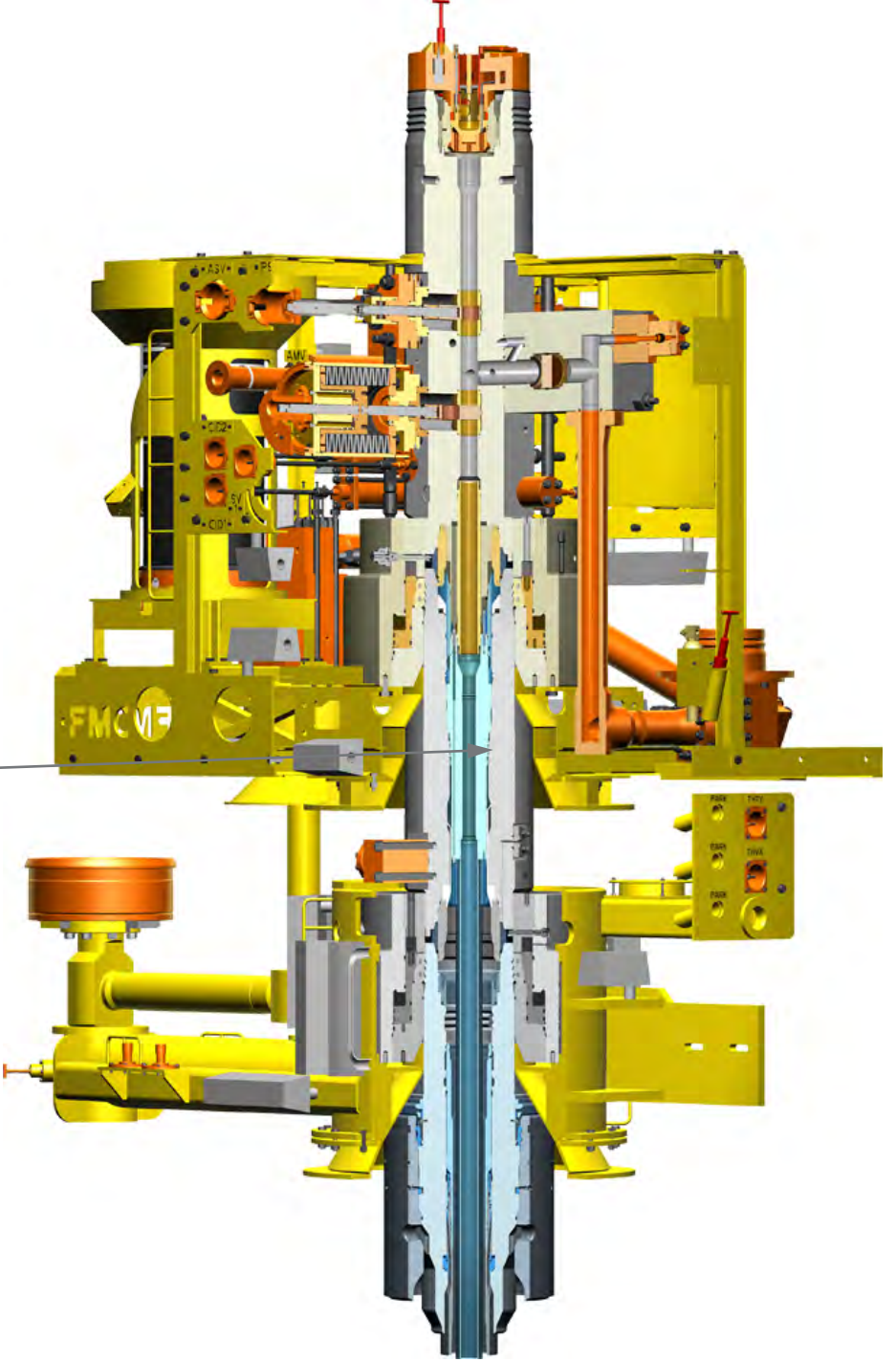
Flow Module

Tree Cap

Tree

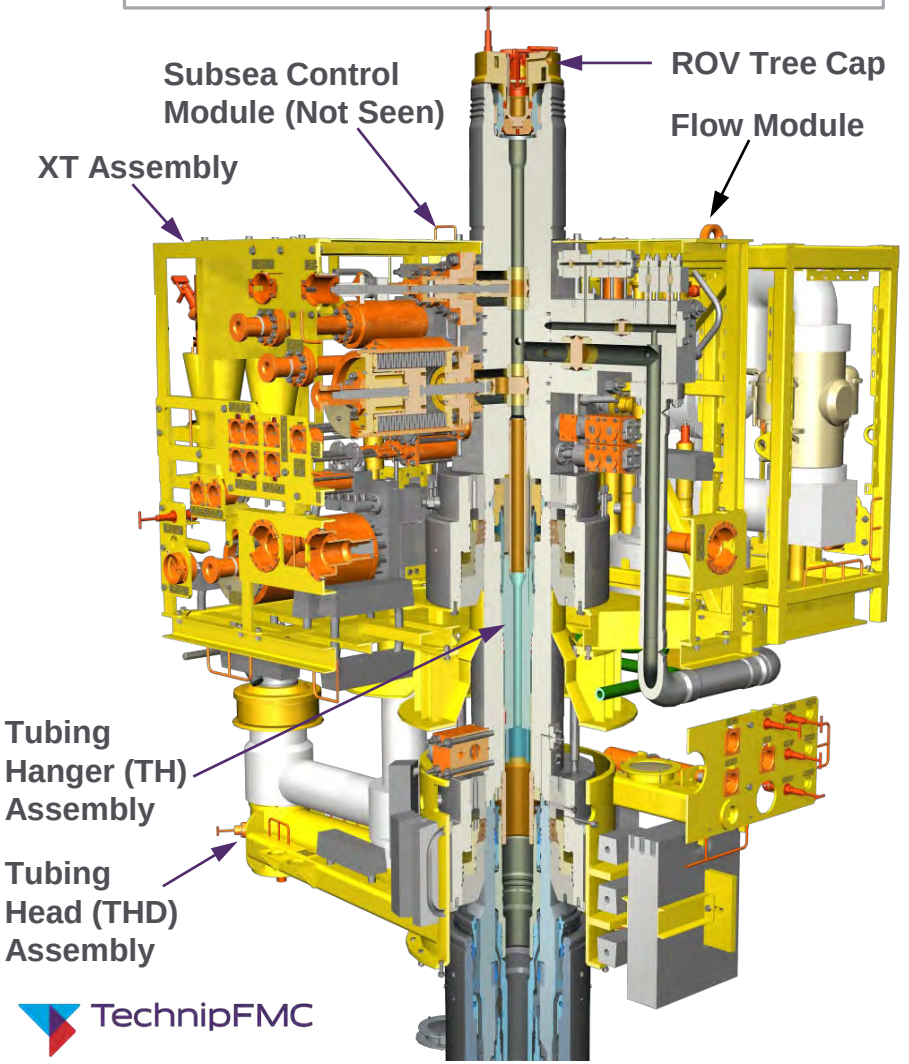
Tubing Hanger

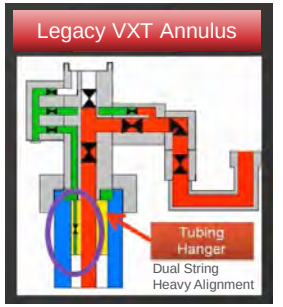
Tubing Head

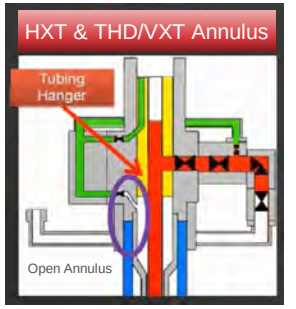


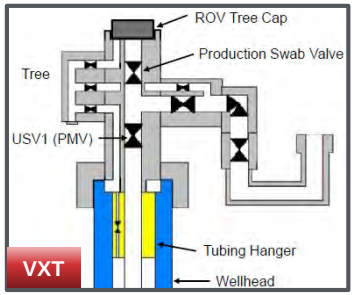
Subsea Tree Types – Vertical vs. Horizontal Comparison

VERTICAL TREE SYSTEM –
Including Tubing Hanger, Tubing Head, ROV Tree Cap









- Dual Bore (Legacy) & Monobore Configurations
- XT is installed <u>after</u> completion of Well
- Tubing Hanger (TH) is installed in Tubing Head (THD) or Wellhead (ITW)
- PMV & PSV valves configured above TH, Stacked vertically in the bore
- Environmental Barrier:
  - PSV & Tree Cap provide dual environmental barriers
- XT can be retrieved without need to recover TH & downhole completion string

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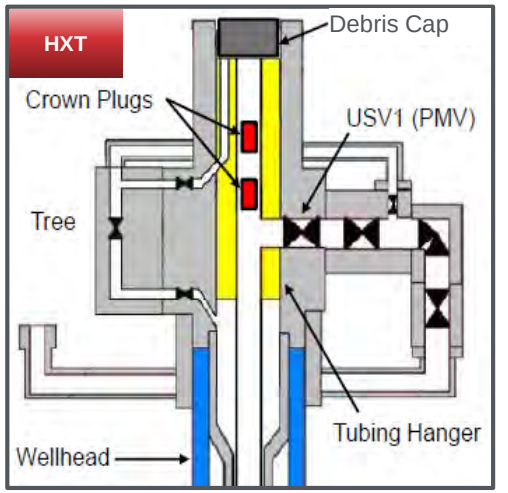
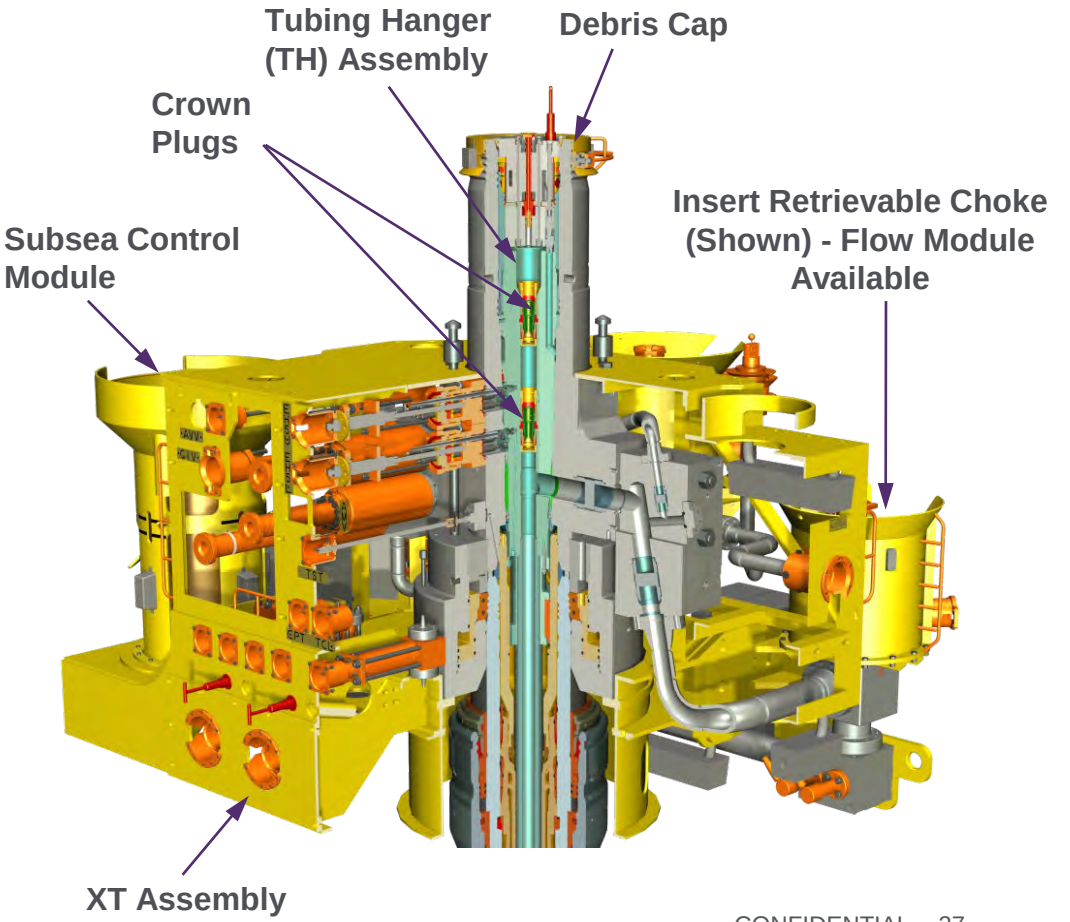
Subsea Tree Types – Vertical vs. Horizontal Comparison

- Tubing Hanger (TH) is installed into the XT
  - XT is installed directly onto Wellhead & final completion operations are thru the XT
- PMV & PWV are configured to the side of the main bore
  - The TH contains a side outlet through which the fluid flow passes to the PMV / XT production flow path
- Environmental Barrier:
  - 2x Wireline Plugs located in the TH (no Tree Cap)
- TH/Completion string can be retrieved without need to recover the XT
  - If XT retrieval required, must recover the completion string

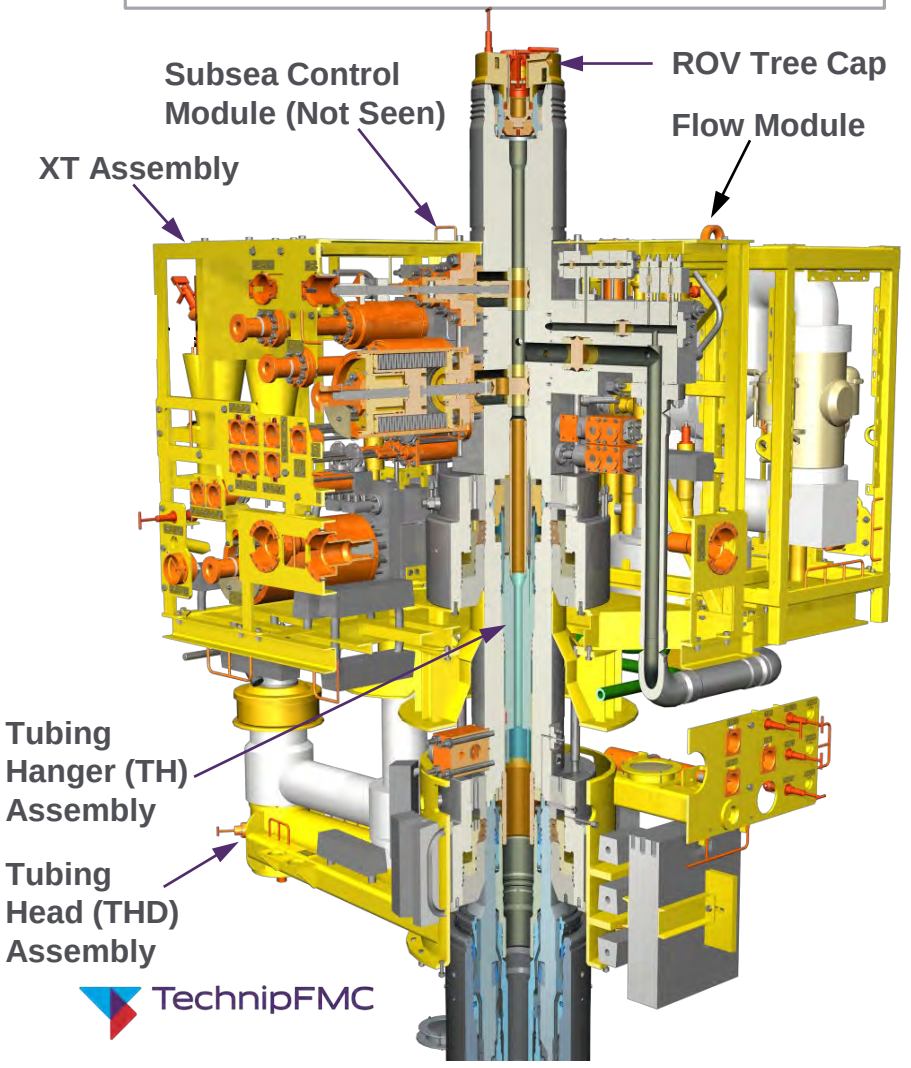


HORIZONTAL TREE SYSTEM –
Including Tubing Hanger, Crown Plugs installed in Tubing Hanger, Debris Cap



Subsea Tree Types – Vertical vs. Horizontal Comparison

VERTICAL TREE SYSTEM –
Including Tubing Hanger, Tubing Head, ROV Tree Cap



DESIGN VARIATIONS

Location of the Main Valves

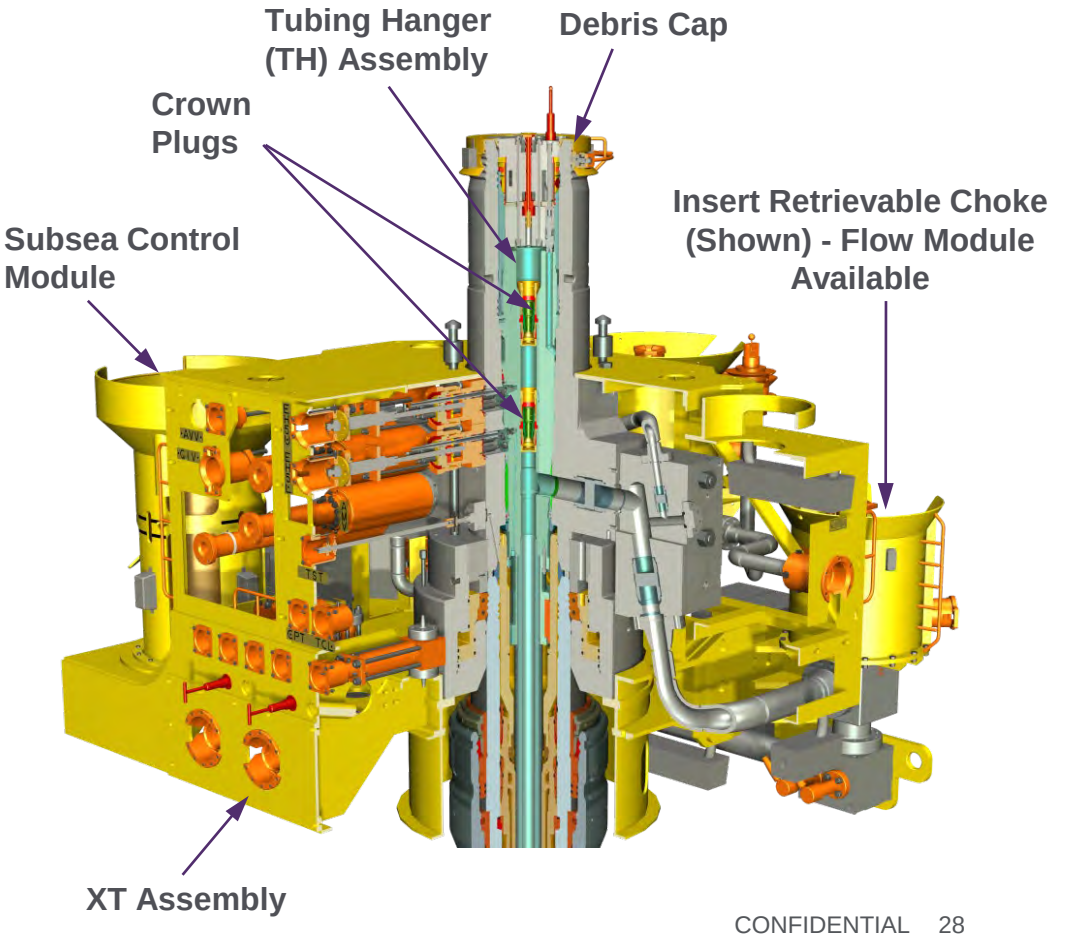
Location of the Tubing Hanger

Routing of the Downhole Functions

Use of Wireline Plugs

Different Installation & Workover Sequences

HORIZONTAL TREE SYSTEM –
Including Tubing Hanger, Crown Plugs installed in Tubing Hanger, Debris Cap



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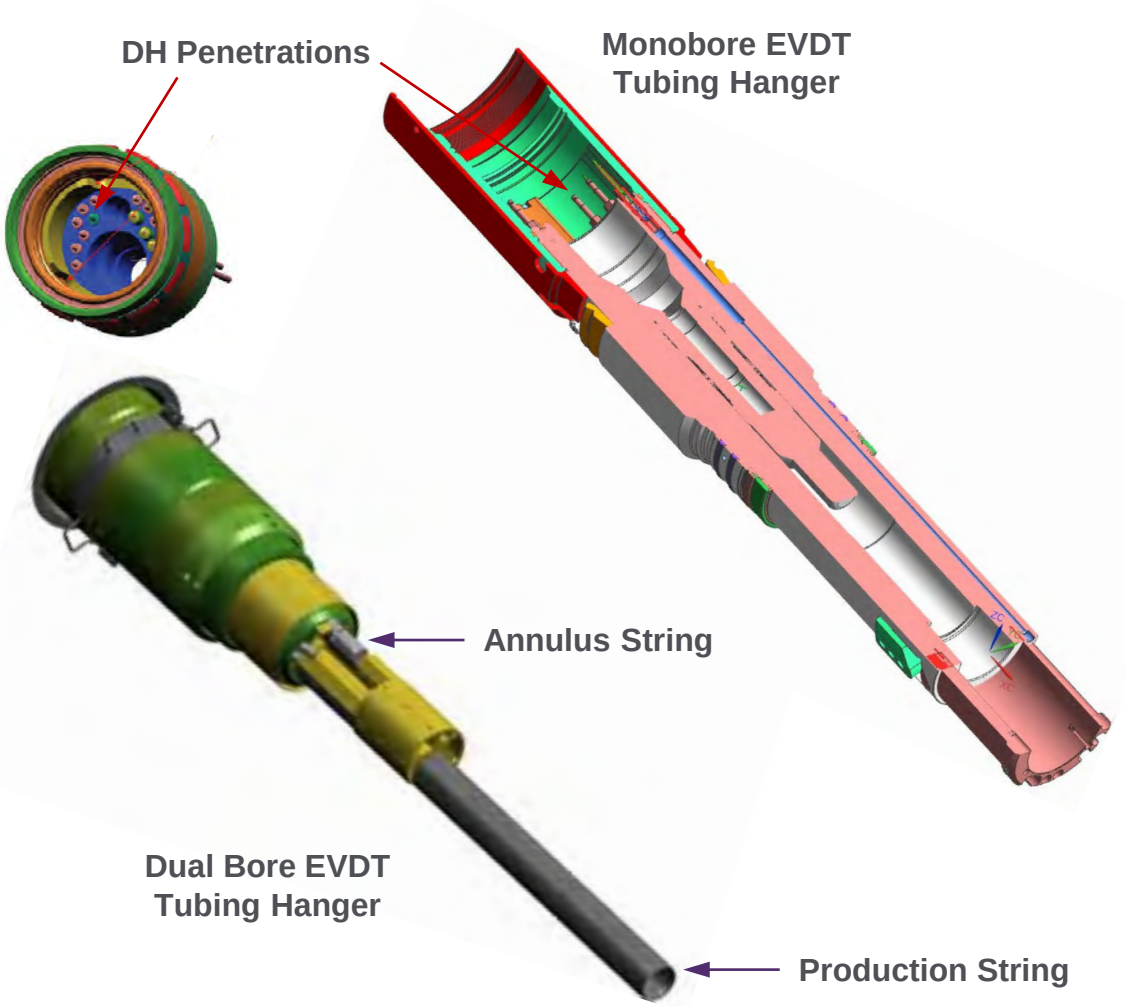
Subsea Tree Types – Vertical vs. Horizontal Comparison

VERTICAL TUBING HANGER SYSTEMS



FUNCTION

Suspend & Seal the Tubing String

Provide DH Communication

DESIGN VARIATIONS

Landing location of the Tubing Hanger

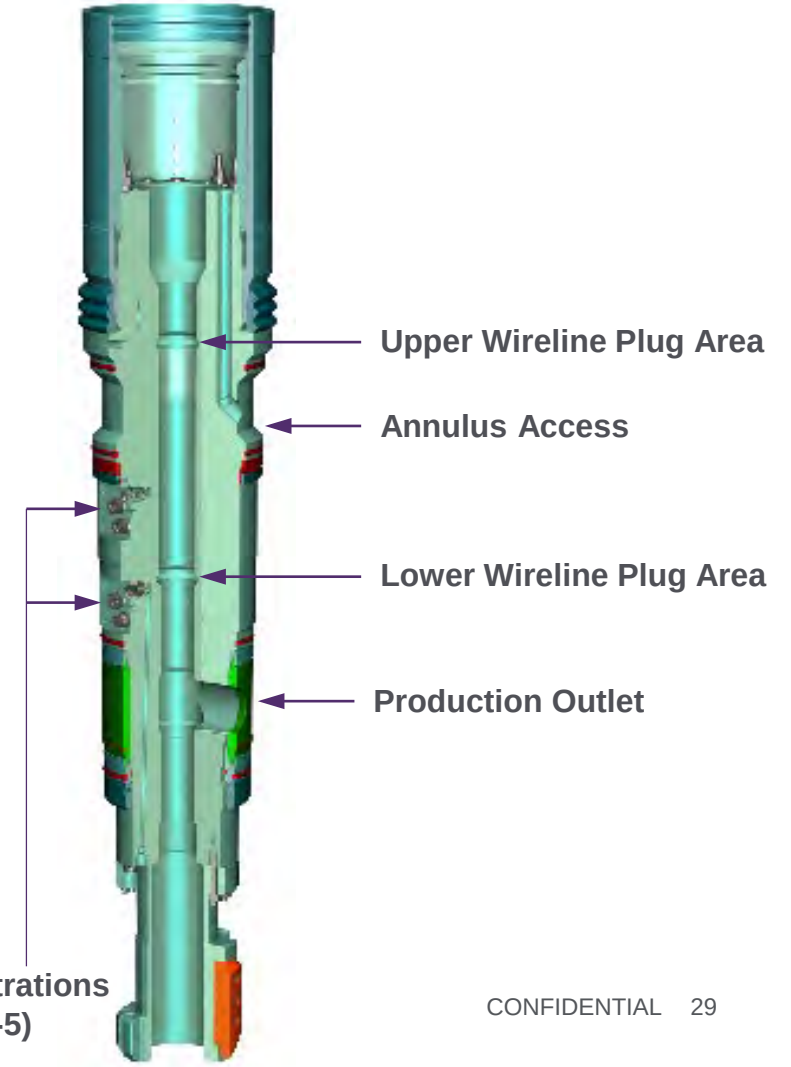
Production Outlet

Production / Annulus DH Access

Installation & Workover Sequences

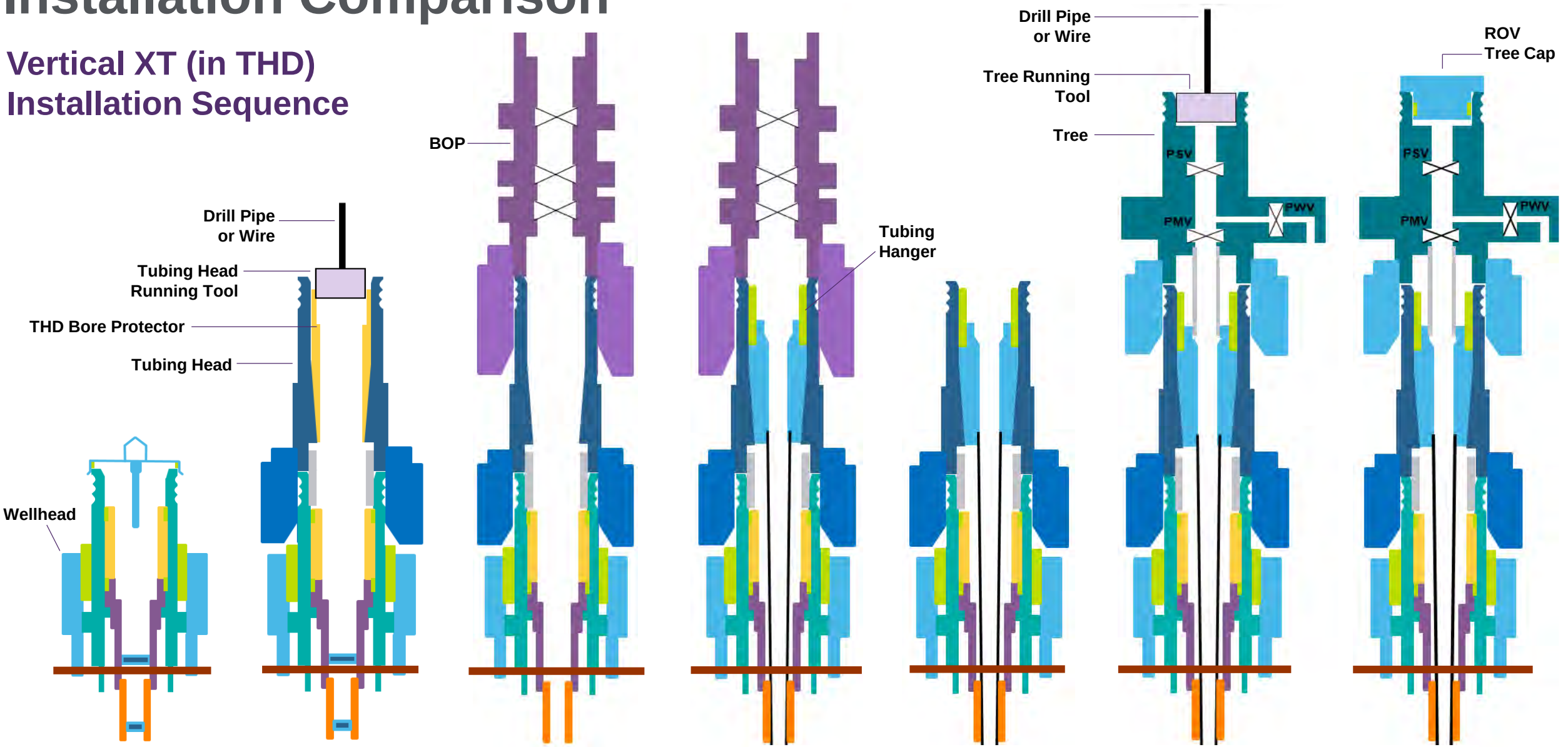
System Barrier Requirements
(i.e. - Crown Plugs)

HORIZONTAL TUBING HANGER SYSTEM



Installation Comparison

Vertical XT (in THD) Installation Sequence



Wellhead & Casing Program installed

Wellhead TA Cap removed

1) Install & Test Tubing Head

2) Install BOP

3-4) Drill thru Cement Plugs

5) Pull THD Bore Protector

6) Run & Test TH & Completion (THRT & Landing String)

- Open & test completion elements
- Flow Testing, Well Clean up, Shut in Well

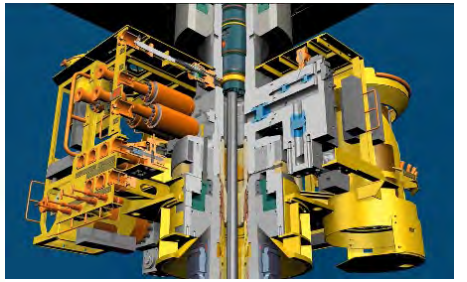
7) Pull THRT & BOP

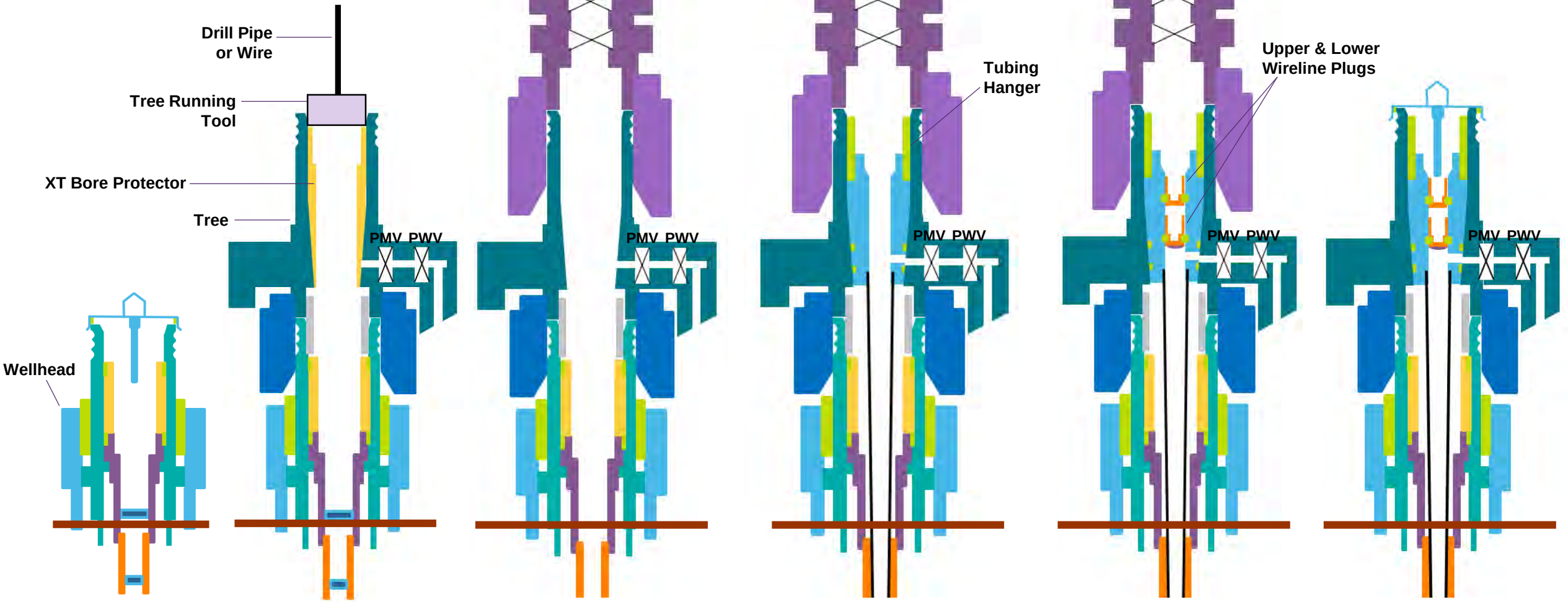
8) Install VXT

9) Install Tree Cap

Installation Comparison

Horizontal XT Installation Sequence





Wellhead & Casing Program installed

Wellhead TA Cap removed

1) Install & Test HXT

2) Install BOP

3-4) Drill thru Cement Plugs

5) Pull XT Bore Protector

6) Run & Test TH & Completion (THRT & Landing String)

- Engage EH5 Penetrators
- Open & test completion elements
- Flow Testing, Well Clean up, Shut in Well

7-8) Pull THRT

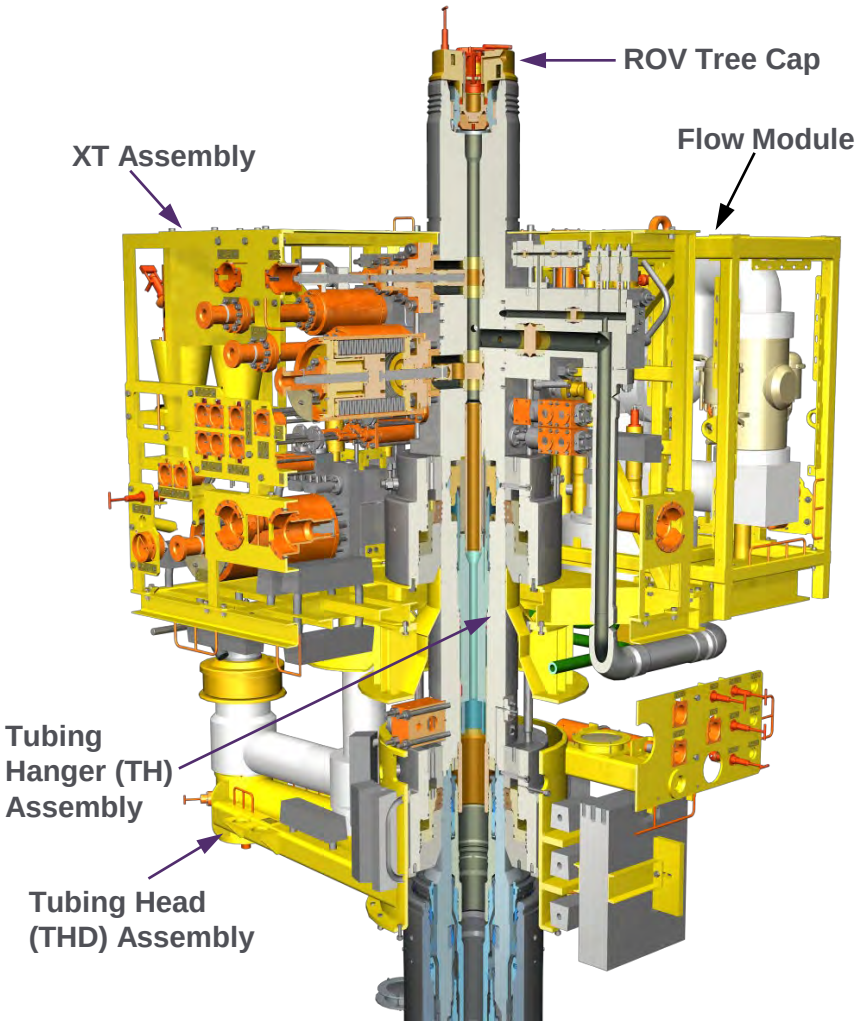
Install Lower & Upper Wireline Plugs

Pull BOP

9) Install THISL & Debris Cap

Subsea Tree Types – Vertical XT Parameters

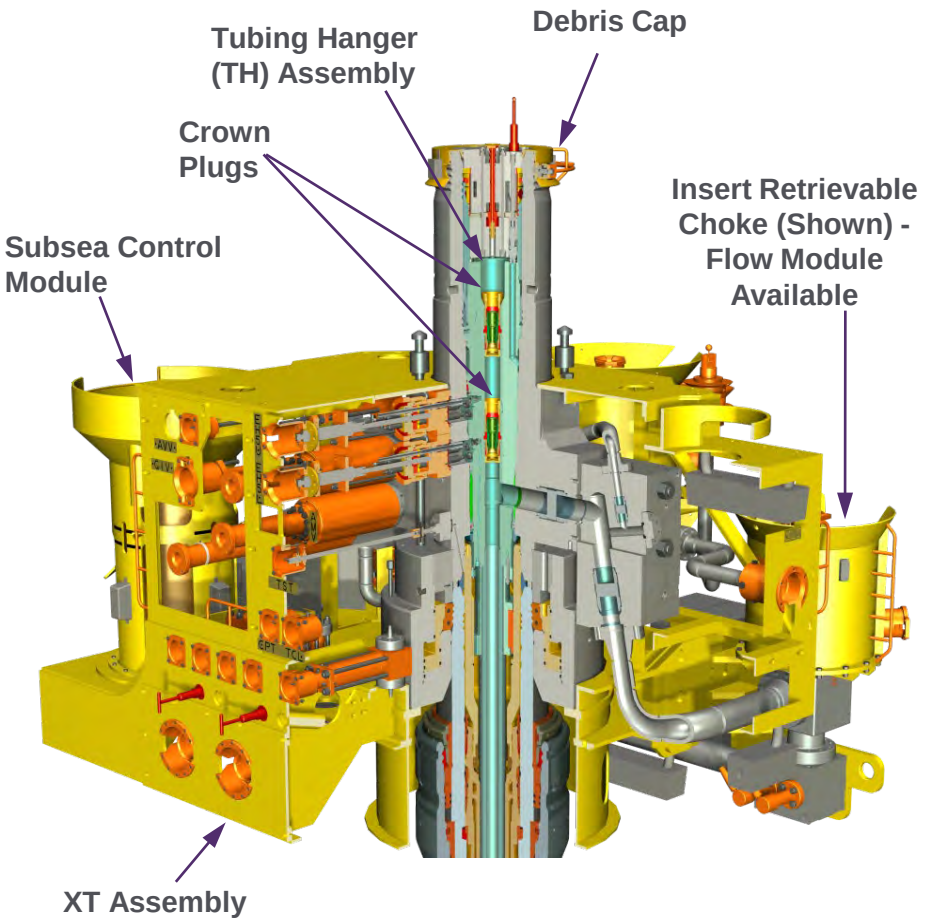
VERTICAL TREE SYSTEM



Parameter		Vertical XT (VXT)
Advantages: ↑	**Financial**	• **Better for XT Workovers** (- Lower Life of Field OPEX costs)
	Reservoir Complexity	• Simpler reservoirs, **Low frequency of tubing retrieval workovers** • Little or no plans to recomplete
	Installation	• **XT not on critical path** with drilling / completion program
	Interfaces	• The Tubing Head is compatible with multiple Wellhead suppliers (& offer advantages over ITW as well)
	Workovers & Interventions	Better for fields that expect to do more **Thru Tubing** &/or **XT Retrieval Interventions**: • Simpler & cheaper to change out a VXT if needed – TH/Completion does not need to be retrieved – Well Jumper may remain parked on THD if XT is retrieved – Allows XT recovery &/or Intervention without rig • No wireline plugs to remove for a well / tubing string intervention
Common Areas: (VXT & HXT) ↔	**Financial**	• Equivalent or Slightly Higher initial CAPEX (ITW vs. THD solution)
	Interfaces	• Annulus Access the same as HXT with use of THD & XT
	Installation	• BOP trip count the same as HXT for THD-TH-VXT installations [Less trips for ITW] • VXT/THD can be run on wire or drill pipe • TH can be run using a Simplified Landing String (SLS) [if no flowback testing is required (i.e.- will do testing/cleanup with CWOR)] • TH self-aligns in the THD (does not require BOP modifications)
Disadvantages: ↓	**Interfaces**	• ITW – Compatible with TechnipFMC Wellhead only • For some VXT designs (i.e. – dual bore, ITW), a TH Orienting mechanism is required in the BOP stack (not required for THD design)
	Installation & WO	• Completion Riser System (CWOR) with EDP/LRP typically used for XT Installations &/or workovers (if plan to test/well clean up through CWOR rather than BOP/LS)
	Workovers & Interventions	• If the **workover operations such as recompletion**, changing tubing, installing extra downhole tools, etc. are required, **a VXT must be removed** in order to install BOP on top of the well.

Subsea Tree Types – Horizontal XT Parameters

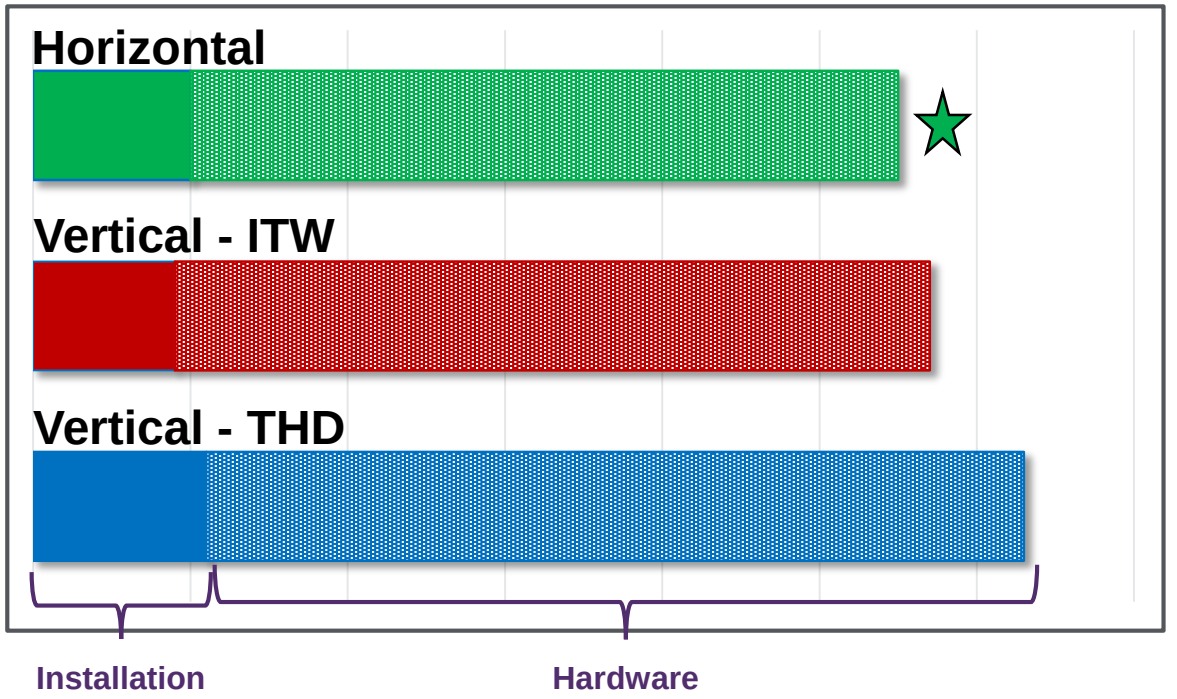
HORIZONTAL TREE SYSTEM



Parameter		Horizontal XT (HXT)
Advantages:	**Financial**	• **Better for Tubing / Downhole Workovers** (- Lower CAPEX costs)
	Reservoir Complexity	• Complex downhole completion / high maintenance wells • **High frequency of tubing retrieval workovers** • Little or no plans to recover XTs
	Interfaces	Compatible with multiple Wellhead suppliers (since the TH interfaces with the XT)
	Workovers & Interventions	Better for fields that expect to do **tubing retrieval** & workovers quite often (because the HXT does not need to be removed).
Common Areas: (HXT & VXT)	**Financial**	• Slightly Lower initial CAPEX
	Interfaces	• Annulus Access the same as THD & VXT
	Installation	• BOP trip count the same as for VXT installations (with THD) • HXT can be run on wire or drill pipe • Tubing Hanger (TH) may be installed with a Subsea Test Tree or Simplified Landing String (if no flowback testing). • TH self-aligns in the HXT (does not require BOP modifications)
Disadvantages:	**Financial**	• **Higher Life of Field OPEX** (due to intervention costs)
	Installation	• **XT on critical path with drilling / completion program** (rig planning)
	Workovers & Interventions	• Workovers require rig to pull wireline plugs to gain bore access (i.e. - Thru Tubing Intervention) • Workover cost to rectify damage to an HXT is expensive as a full well decompletion would be required (pulling the TH/tubing string) – Well Jumper must be retrieved if XT is retrieved – XT recovery requires rig

CAPEX & OPEX Comparison – Hardware, Installation & WO

CAPEX Comparison – Hardware & Installation (Relative $/Well)



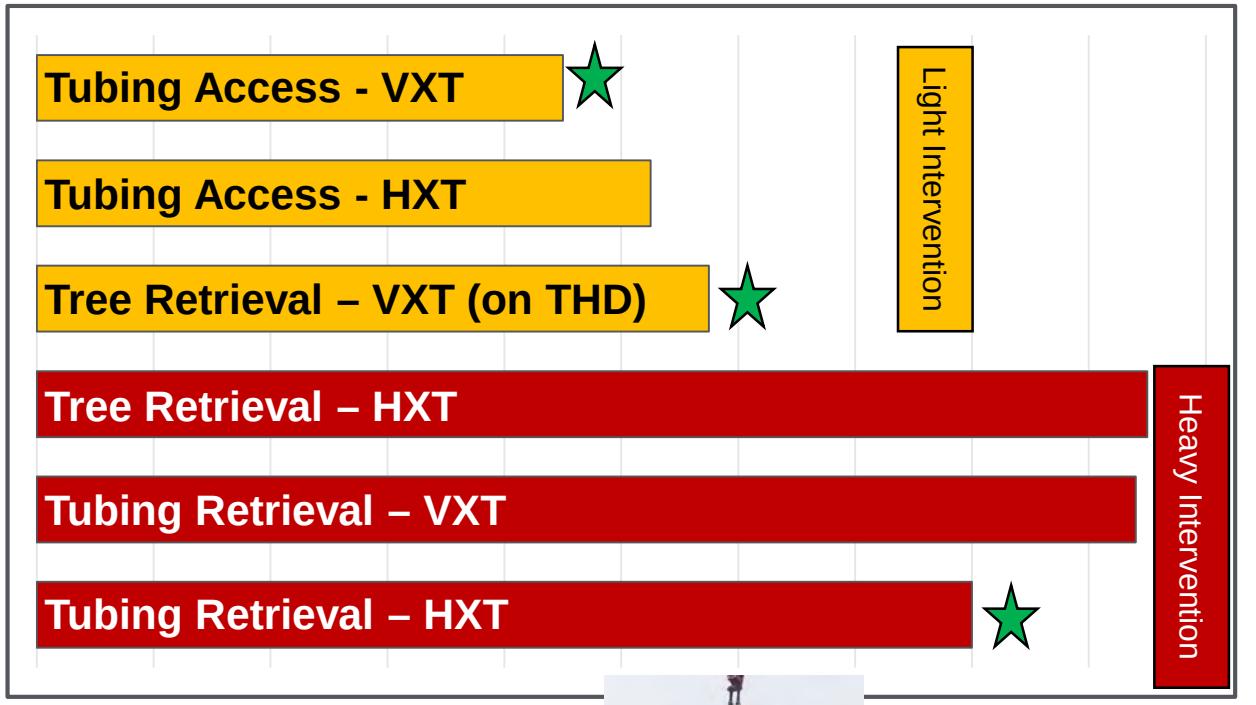
Installation Cost:

- Installation time / cost for the HXT and VXT systems are very similar

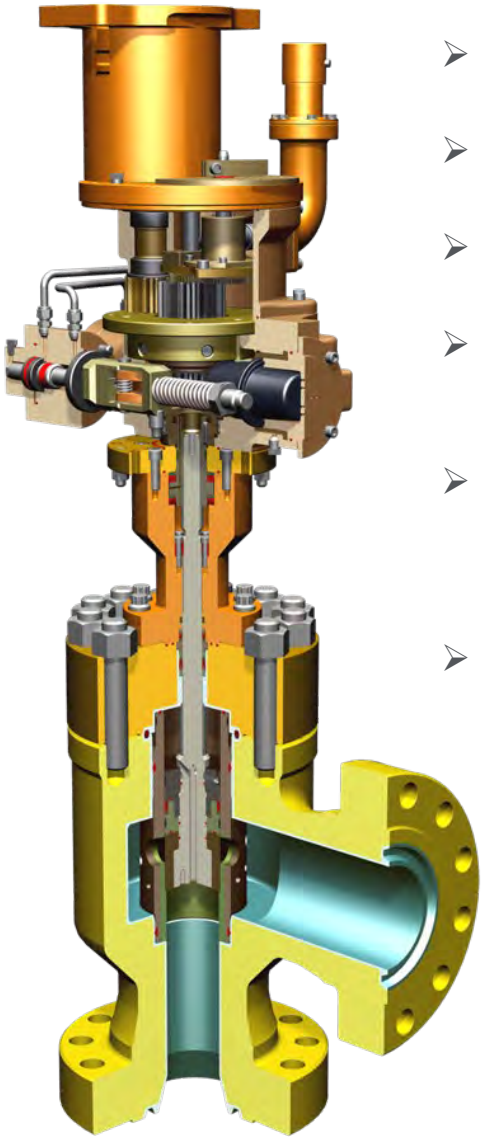
Hardware Cost:

- HXT has a slight hardware cost advantage due to the added cost of VXT w/ Tubing Head
- ITW completion VXT systems have an equivalent hardware cost to that of an HXT system

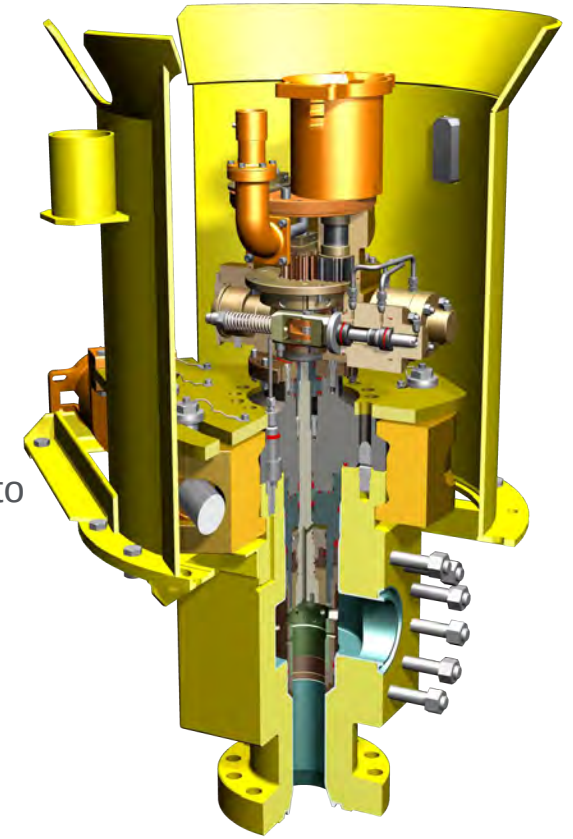
OPEX Comparison – Intervention (Relative Rig Duration)



Subsea Chokes: Insert Retrievable and Non Retrievable



- Typically installed in a Flow / Choke Module
- Entire assembly replaced with Module
- Large body gallery to prevent premature body erosion
- Multi-hole tungsten carbide plug and cage with stainless steel protective jacket around the cage
- Fully guided, pressure balanced plug, rigidly attached to the stem to resist flow induced vibration damage
- Body outlet designed to accept a full tungsten carbide liner for complete wear protection



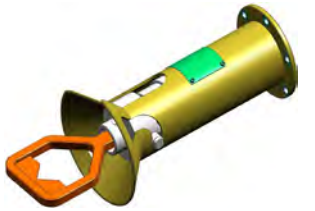
- Production / Water / Gas Injection
- Typically Tree Mounted
- Two segment FMC hinged clamp connector with horizontal ROV interface
- Funnel type guide structure to interface with the choke running tool
- Funnel equipped with an ROV grab bar and electrical parking receptacle
- Choke body with two off stab type wet-mate hydraulic couplers
- Insert replaceable while body remains on Tree

Tree Mounted Controls

Sensors and Chemical Injection.

Subsea Control Module (SCM)

Chemical Injection Thottling Valve (CITV)



Acoustic Sand Detector (ASD)

Pressure and Temperature Transducer (PT/TT)

Erosion Probe (ASD)

Workover & Intervention Systems

What does the Workover & Intervention Systems Do?
Also known as Well Access Systems (WAS)

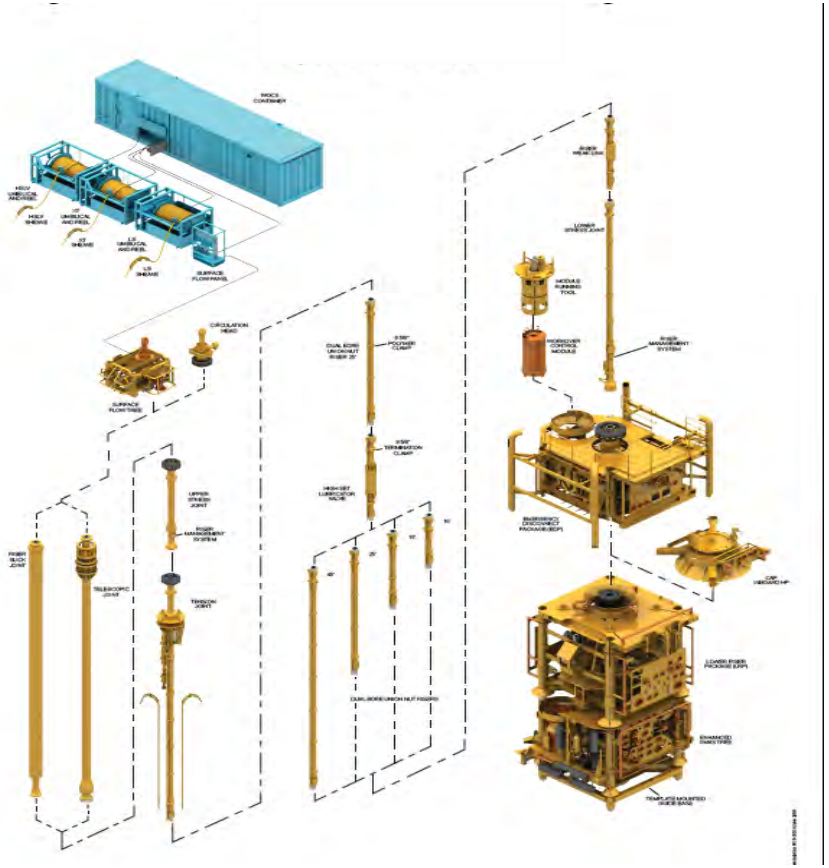
- **Maintains well integrity during:**
  - Installation/retrieval of Tubing Hangers
  - Installation/retrieval of Trees
  - Testing of production
  - Maintenance operations (Installation/retrieval of plugs, wireline, coiled tubing operations, etc.)
  - Increased Oil Recovery (IOR) Operations

- **Enables the ability to:**
  - Access the well under controlled conditions
  - Shut in the well with at least 2 off barriers to the environment
  - Shear wire or coil tubing in the bore in order to shut in
  - Quickly disconnect from the well

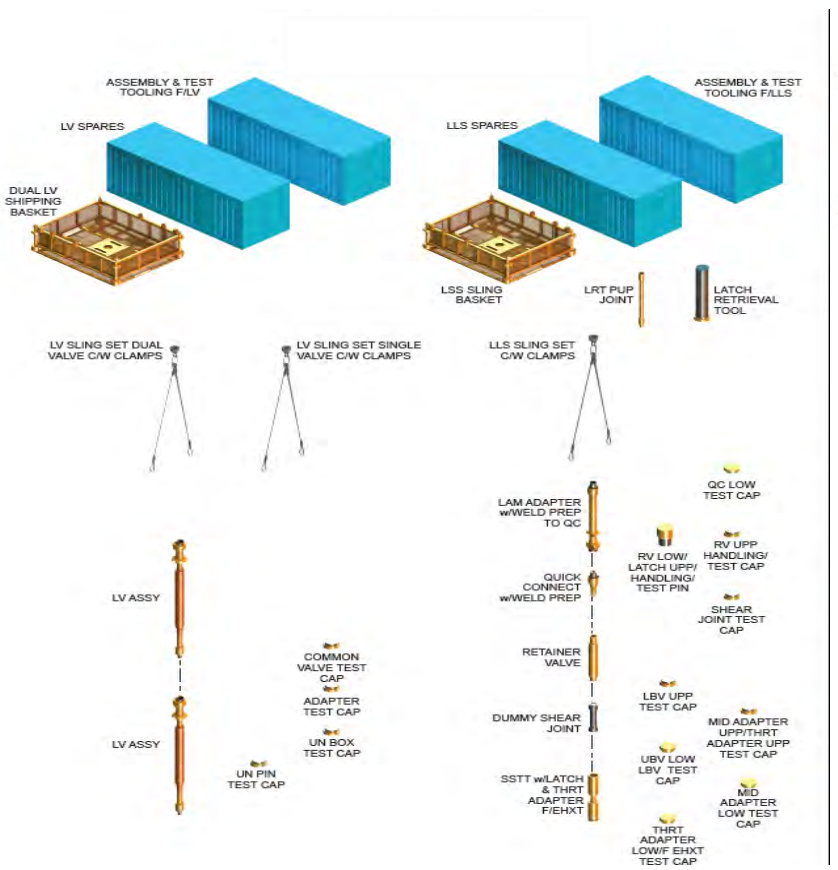
Well Access Systems Product Portfolio

In-riser, rig and vessel based systems

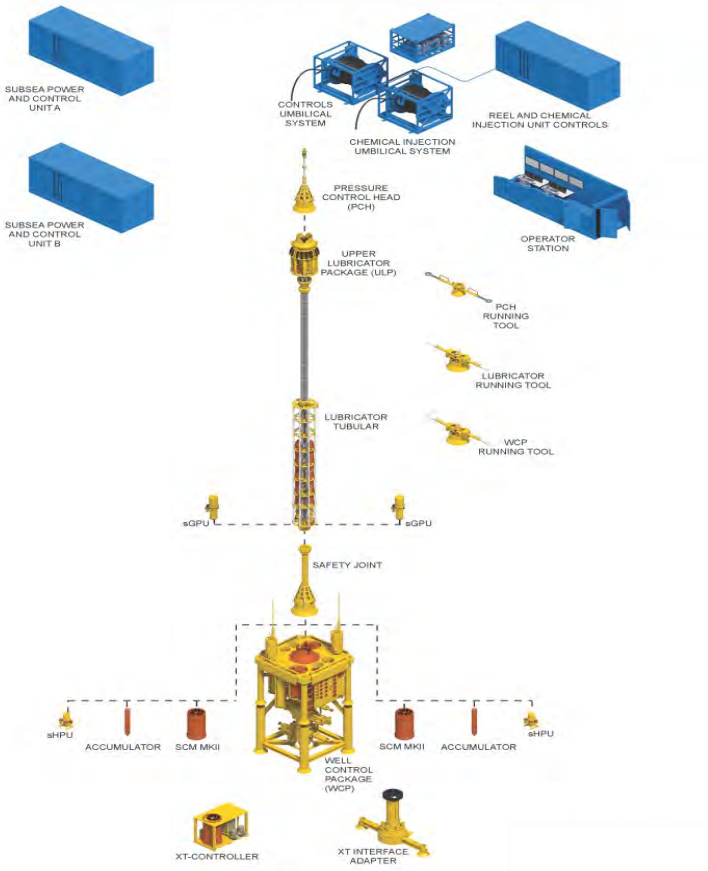
Completion Workover Riser (CWOR)



Landing String / Subsea Test Tree (SSTT)



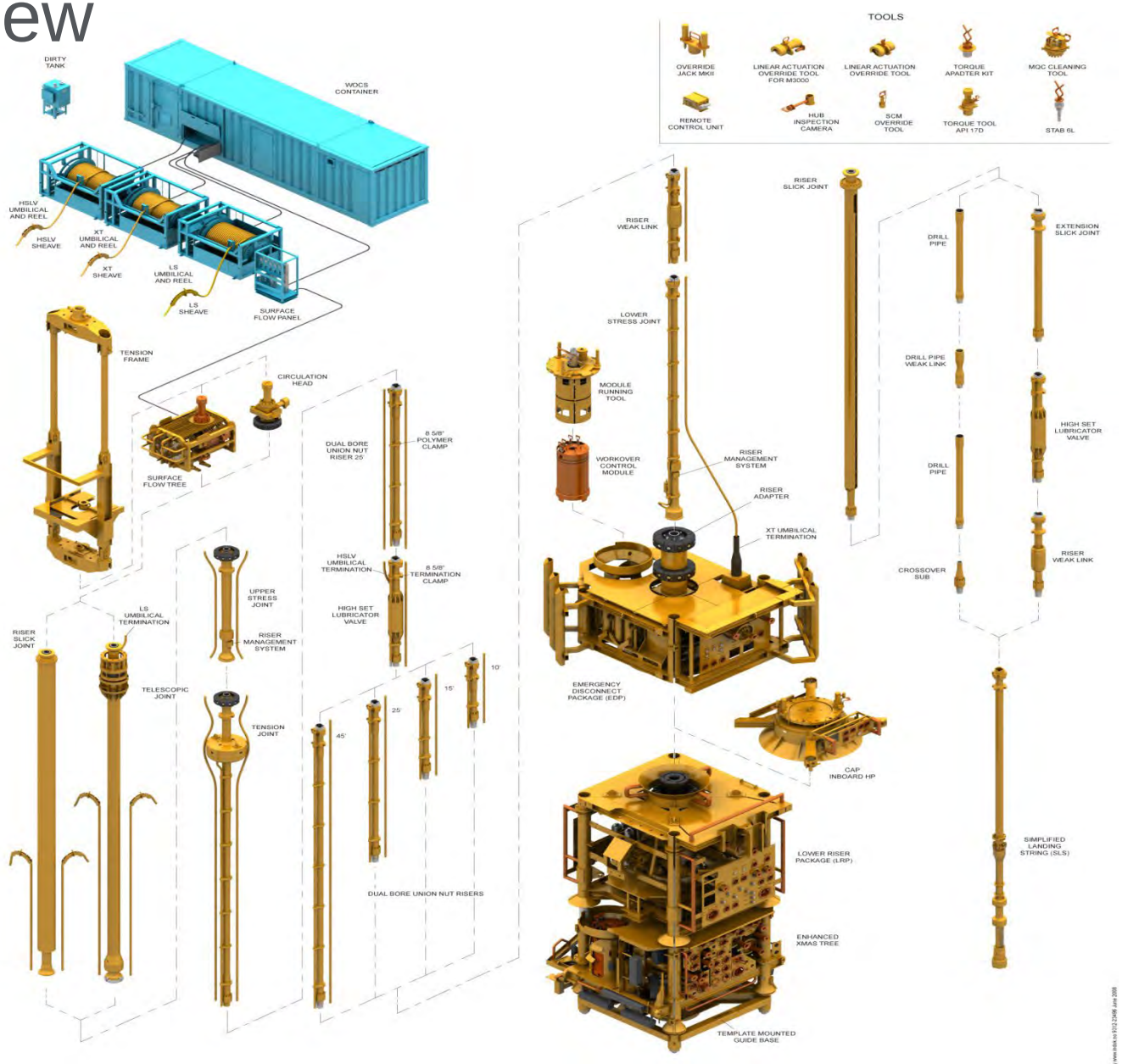
Riserless Light Well Intervention (RLWI)



Completion Workover Riser (CWOR) System

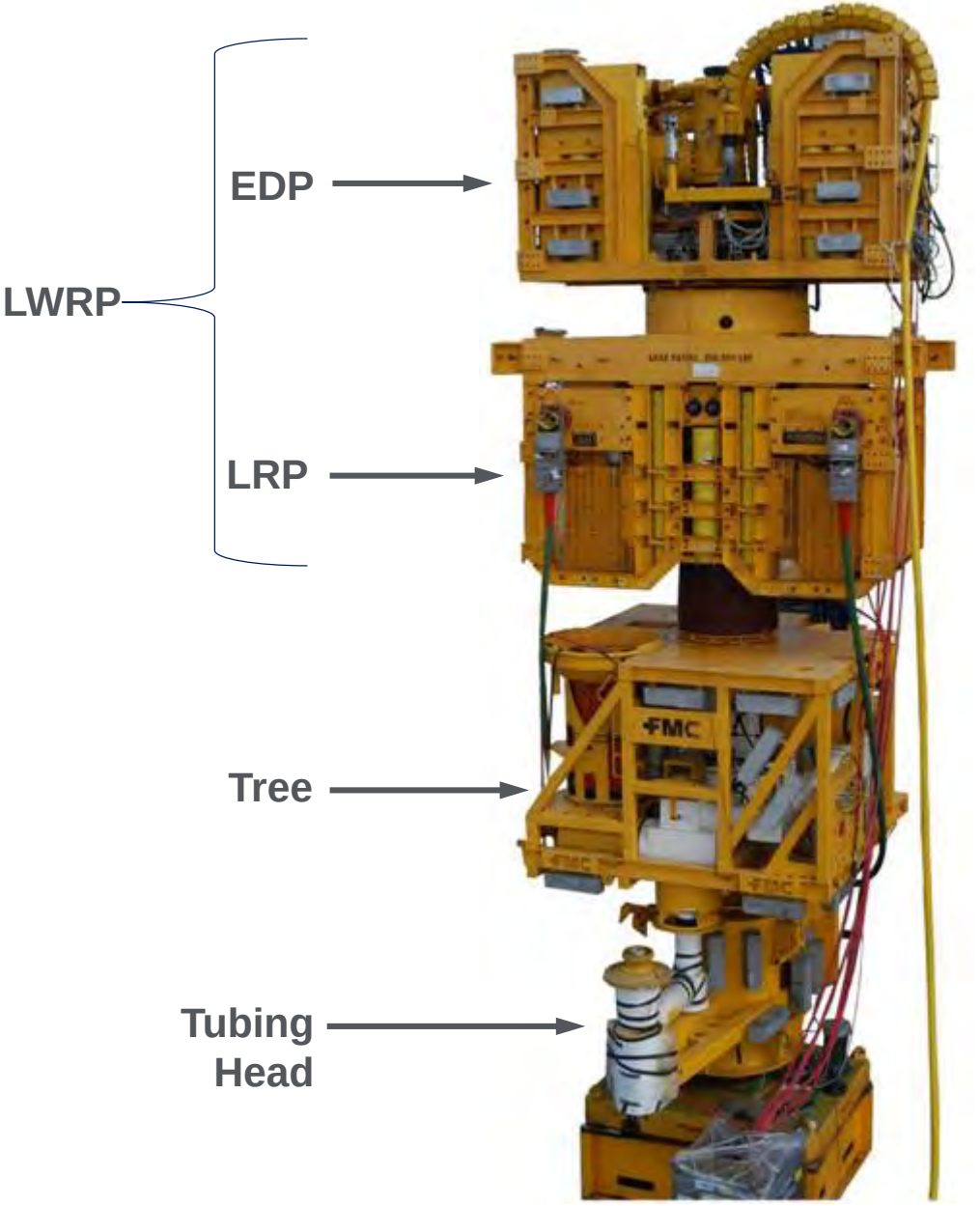
CWOR – System Level Overview

- Lower Riser Package (LRP)
- Emergency Disconnect Package (EDP)
- Dual bore or monobore riser (Union Nut, Drill pipe, Casing)
- Fixed or flexible annulus
- Safety joint
- HSLV – dual or single FAI valves
- Stress / Telescopic joints
- Surface flow tree / tension frame
- Hydraulic Power Unit/Master Control Panel, HPU/MCP, container system
- XT umbilical and reel system
- SLS/LS umbilical and reel system
- HSLV umbilical and reel system
- Work Over Control Module for EDP
- Subsea jumpers systems for EDP, SLS/LS and Tree Running Tool

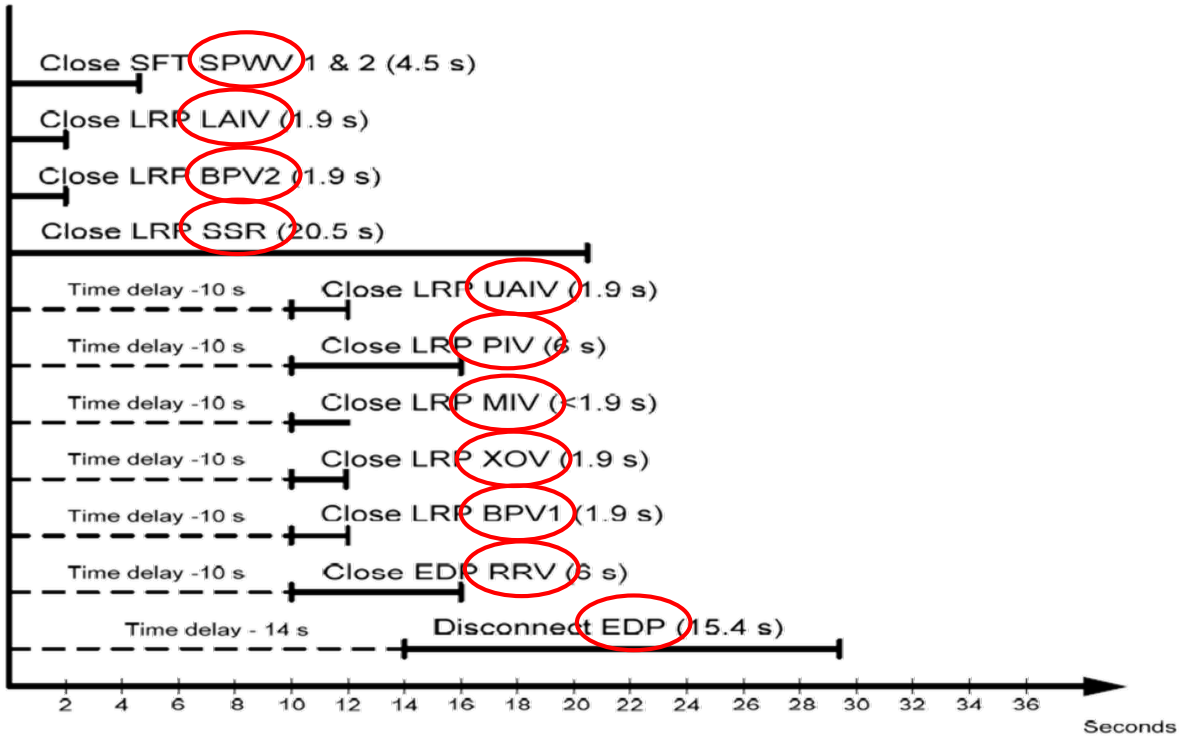


LWRP/LRP Overview

- Lower Workover Riser Package (LWRP) made up of EDP w/ LRP
- High angle release connector on EDP permits emergency release in the event of a drive off while maintaining 2 well control barriers
- LRP connects to tree
- Umbilical from surface provides hydraulic supply and electric signal to SCM mounted on EDP

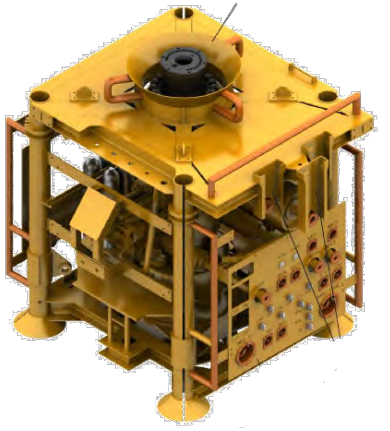


Emergency Quick Disconnect (EQD)

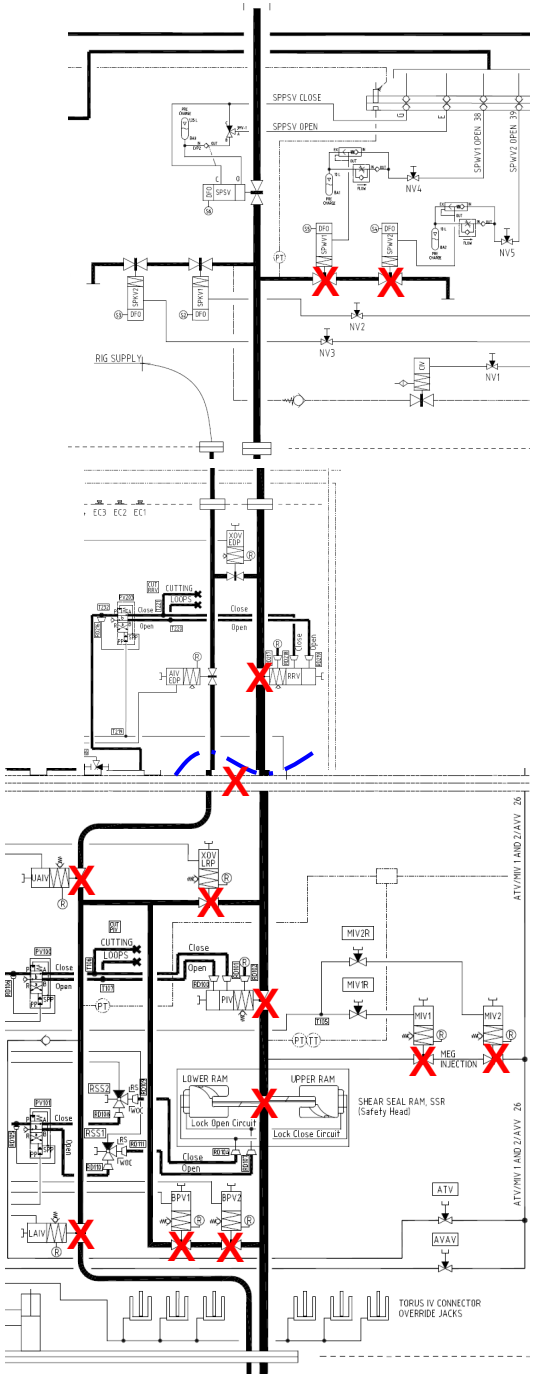


SFT

EDP

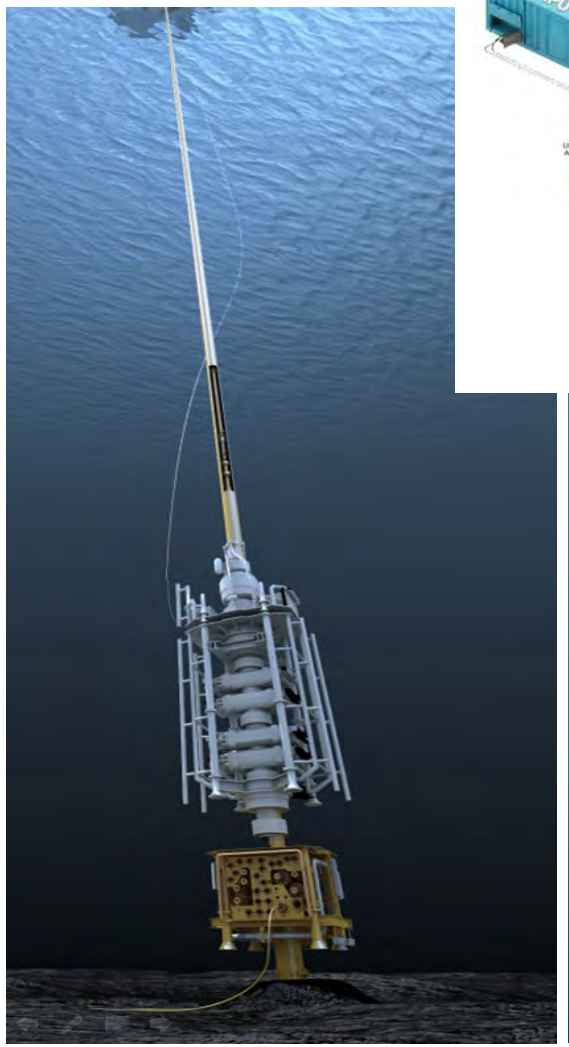


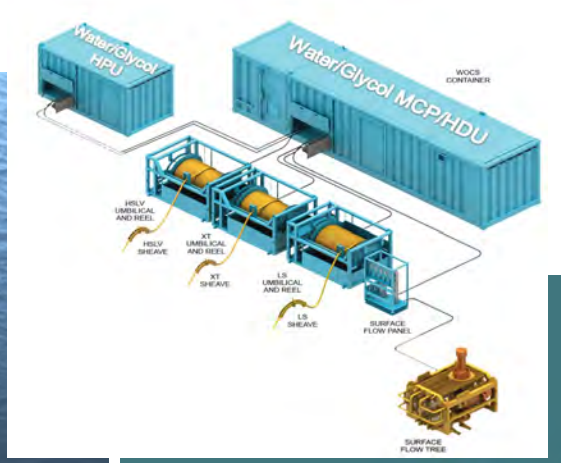
LRP

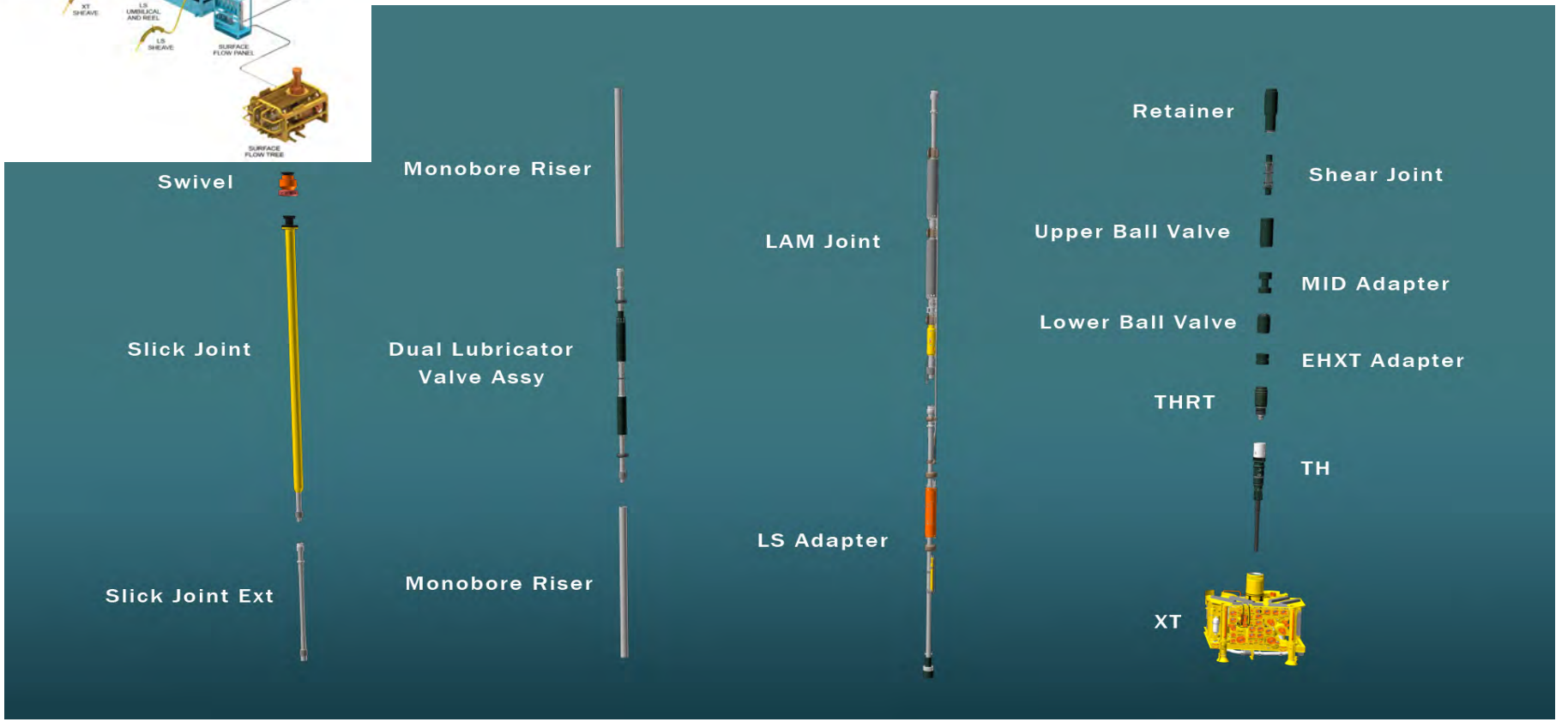


Landing String / Subsea Test Tree (SSTT) System

Landing String Scope of Supply

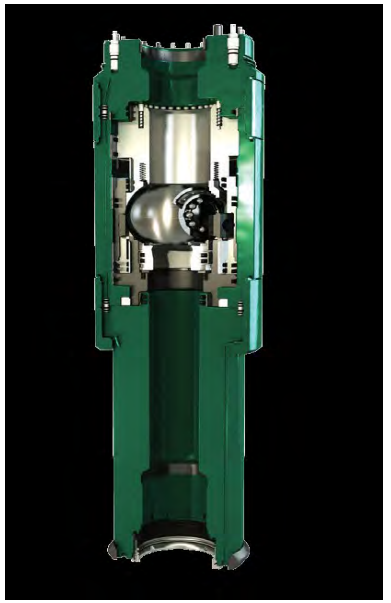






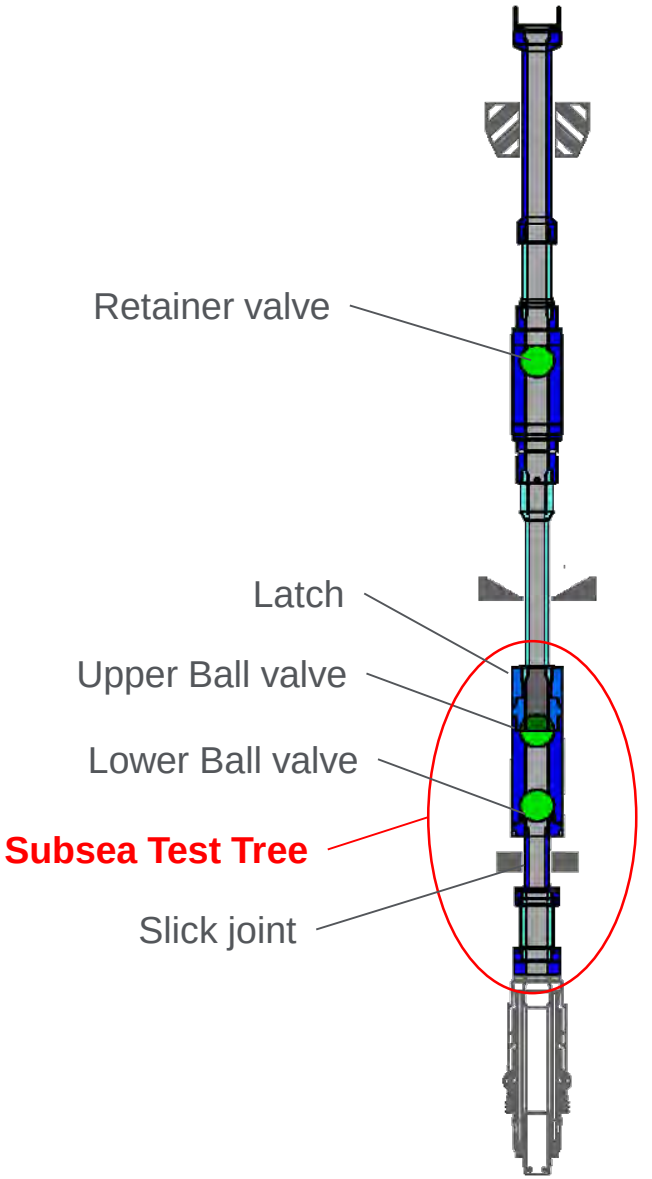
Landing String (LS) – Subsea Test Tree (SSTT)

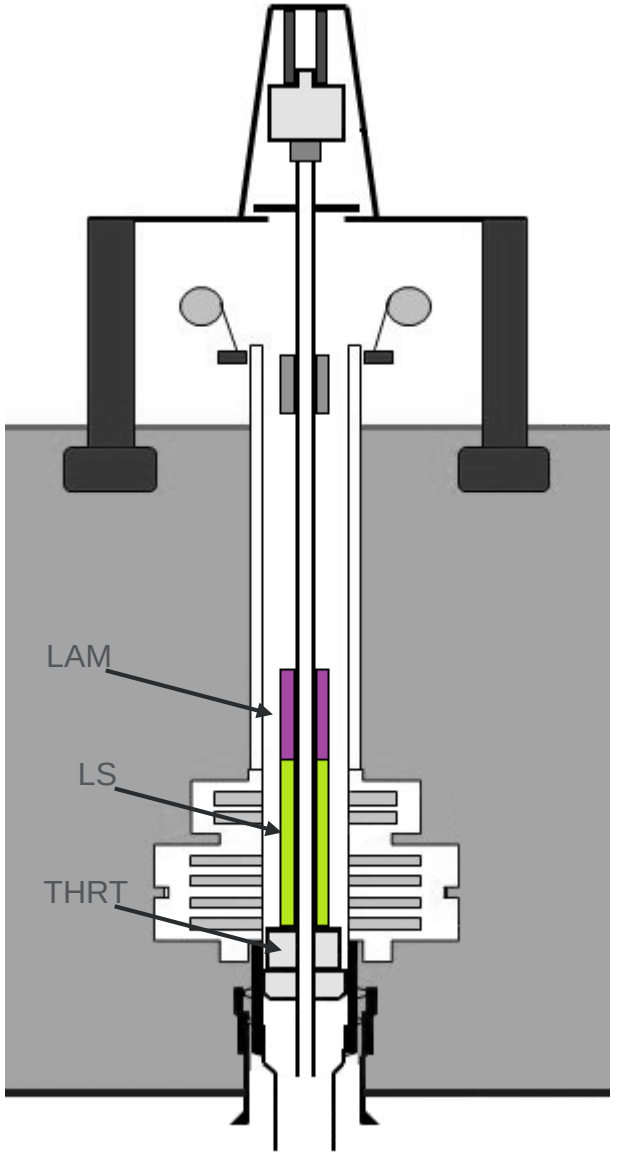
- To install Production Tubing & Tubing Hanger (TH)
- To Test TH Seals and Overpull
- Same as SLS + Pressure control (Subsea Test Tree)
- Can be used during flow testing in combination with Surface Flow Tree (SFT)
- Landing String Accumulator Module (LAM) for safety control



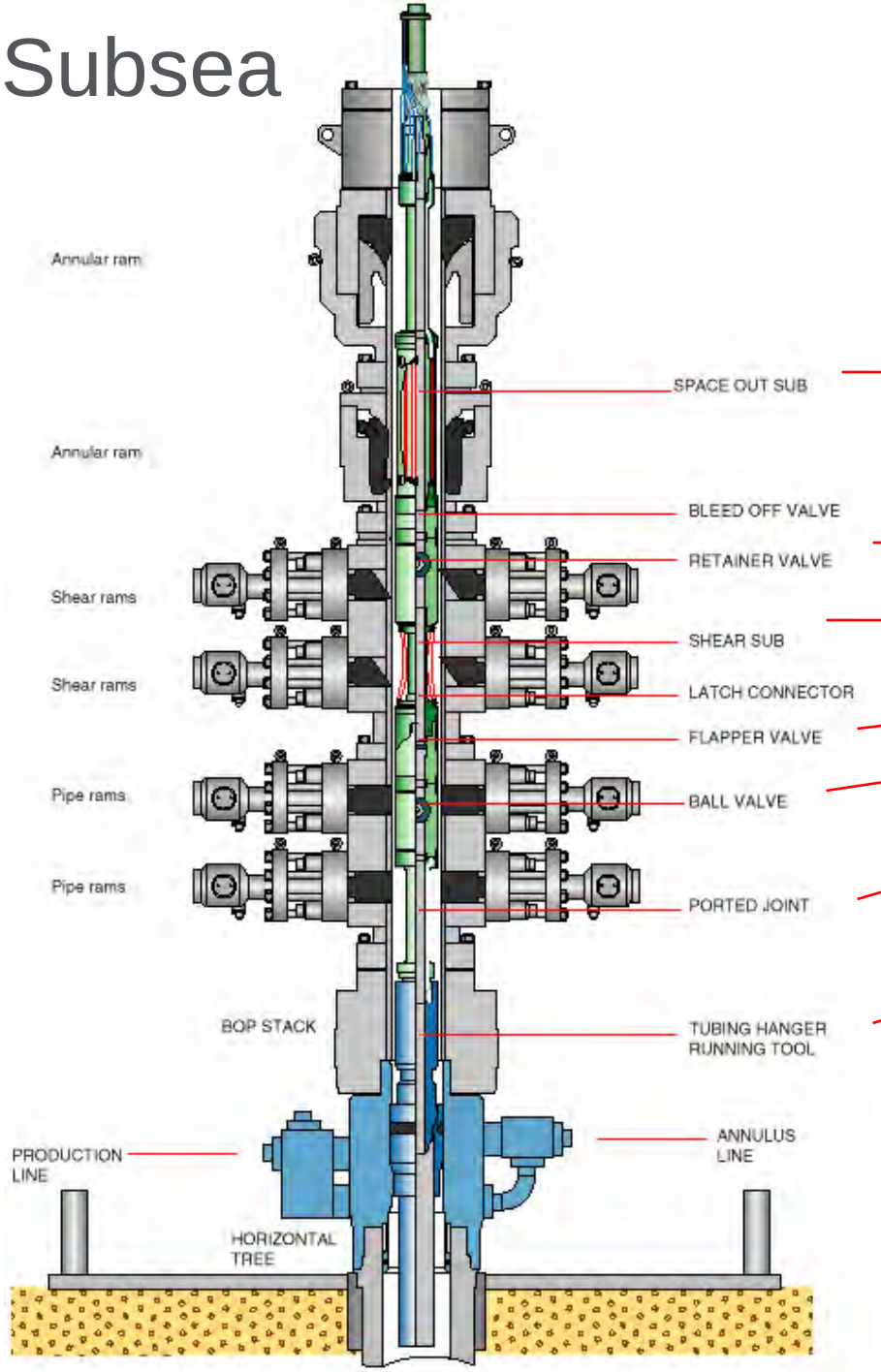
Retainer valve

Subsea Test Tree



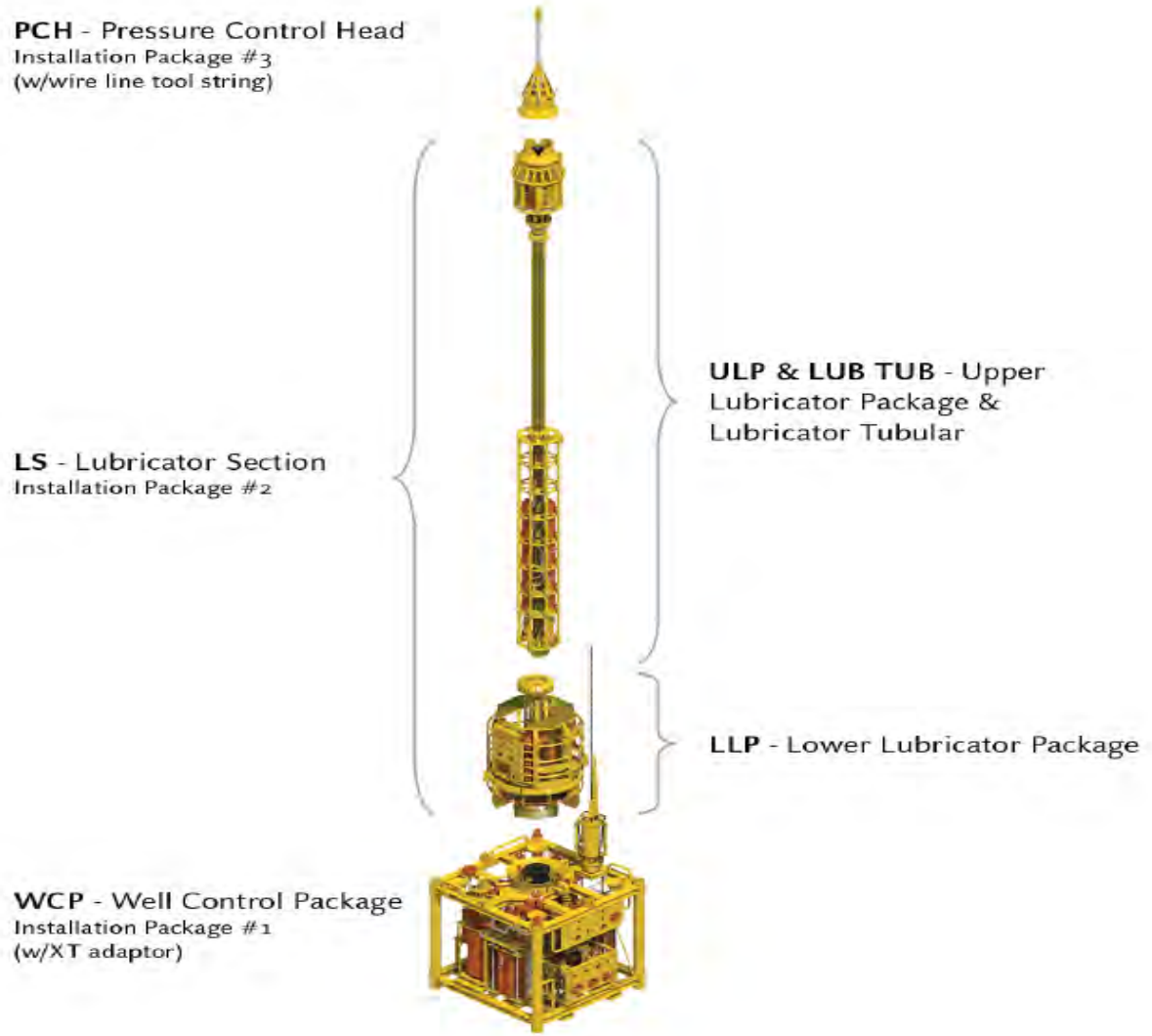


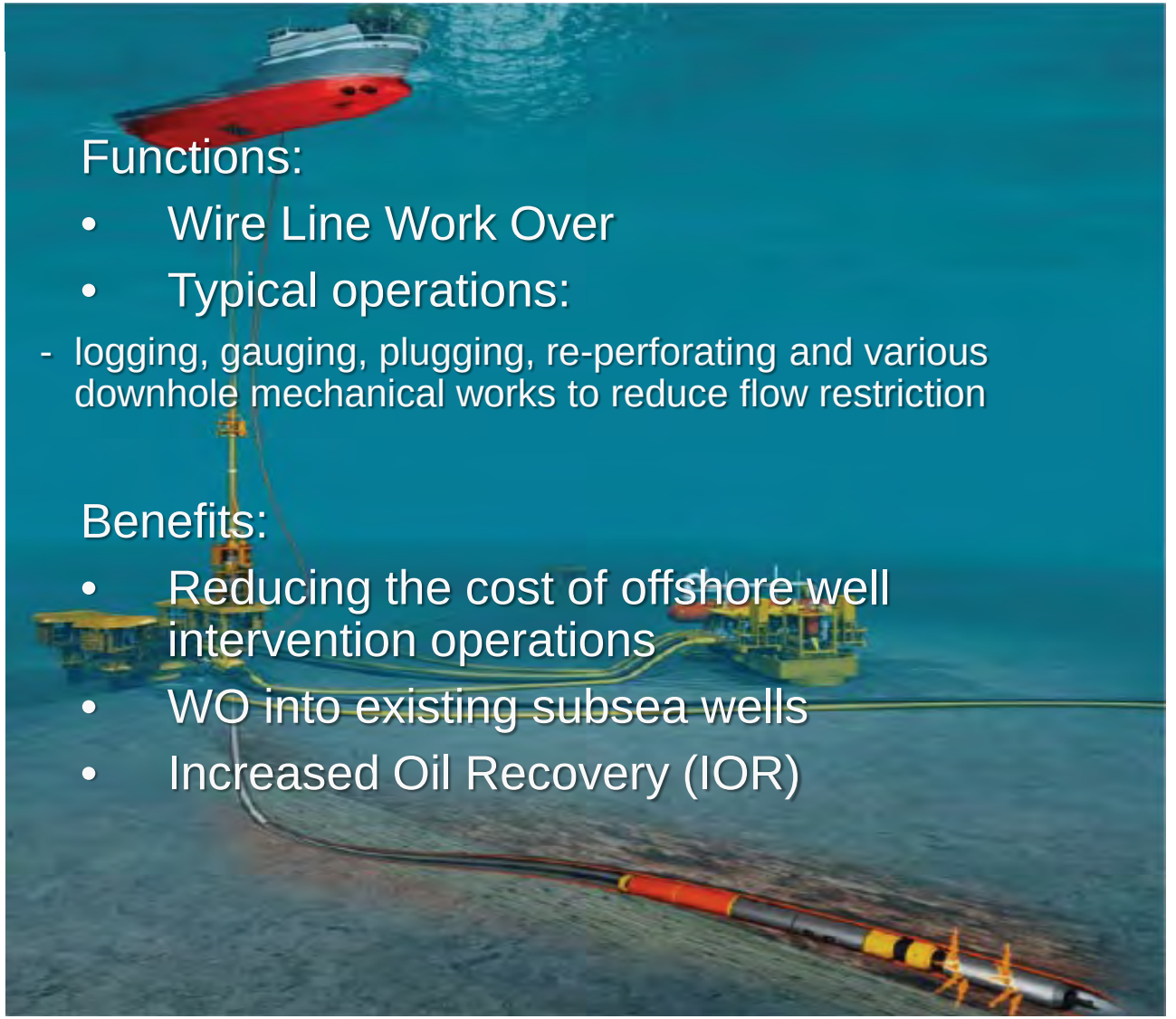
SSTT Installed to a Subsea BOP



Riserless Light Well Intervention (RLWI) System

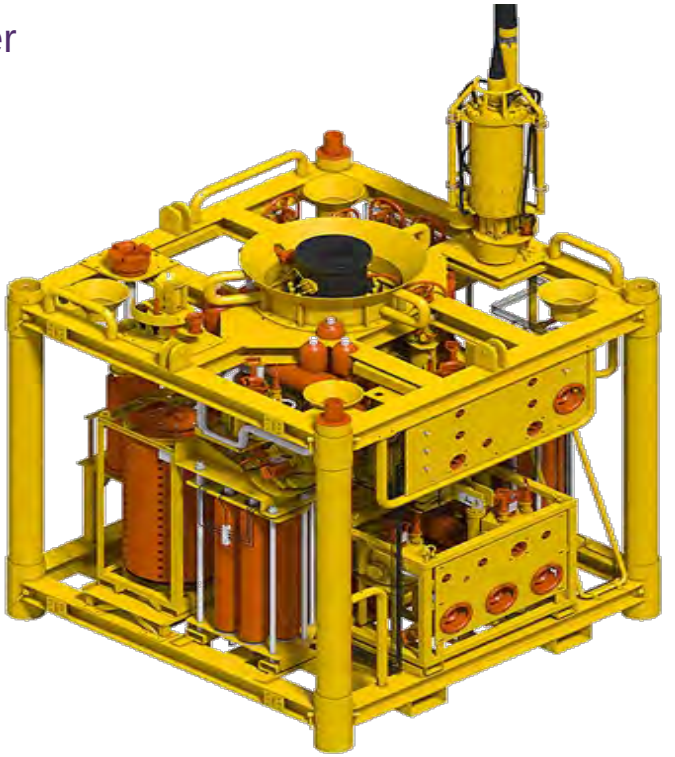
Riserless Light Well Intervention (RLWI)



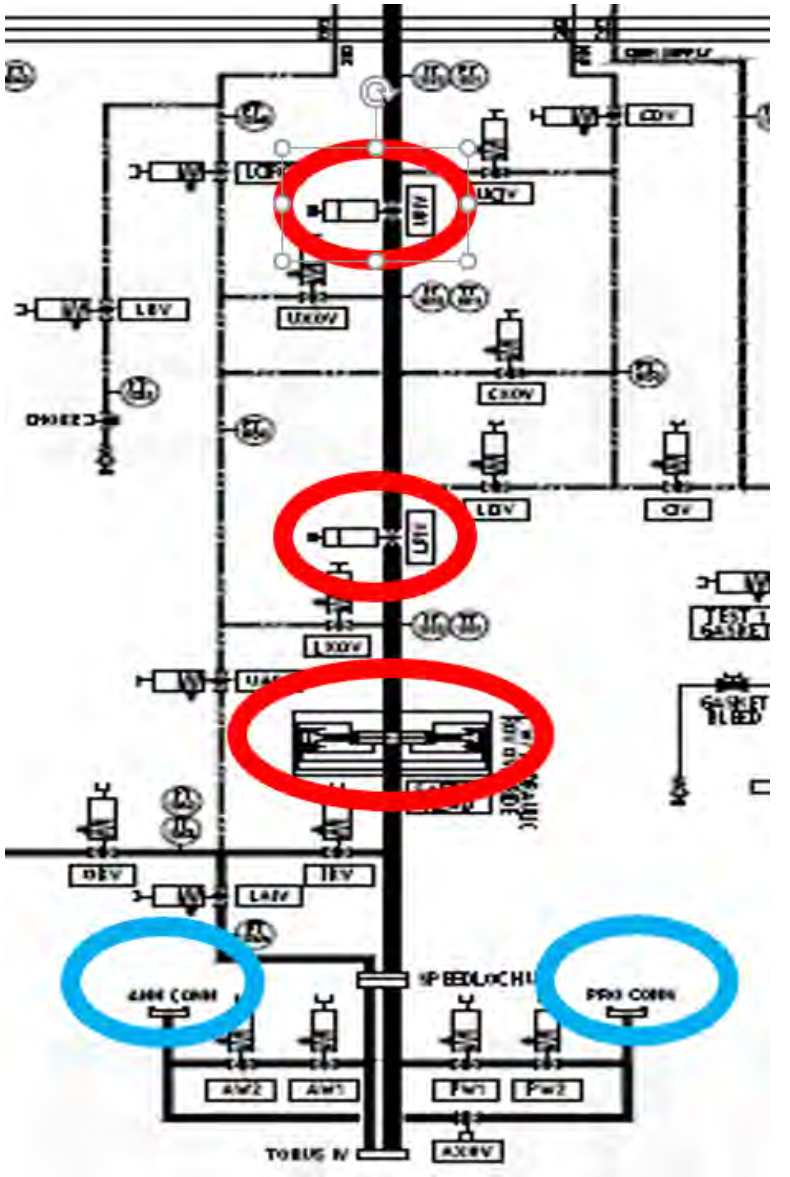


Well Control Package

- Main Safety barrier towards well
- Shear/Seal Ram cuts wire line, coiled tubing and WL tool string.
- Enables flushing of hydrocarbons back into well
- Provides hydraulic pressure and supply, as well as communication to XT functions.
- XT-adapter/X-over

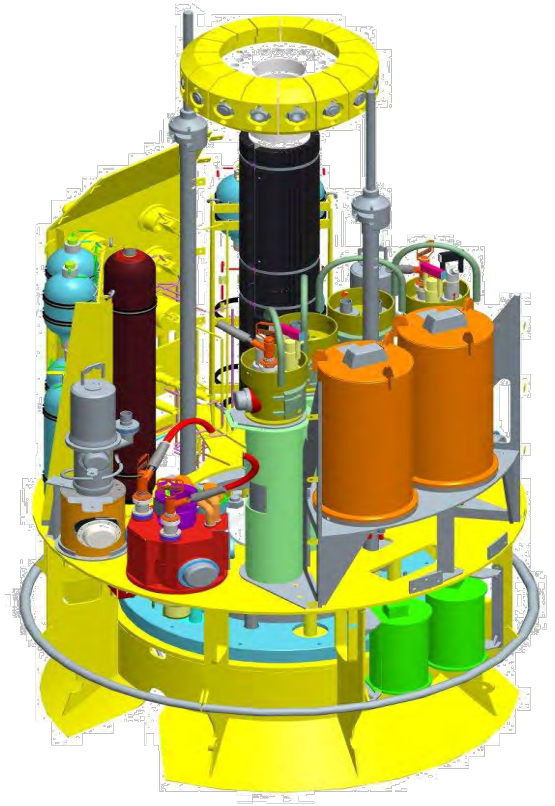


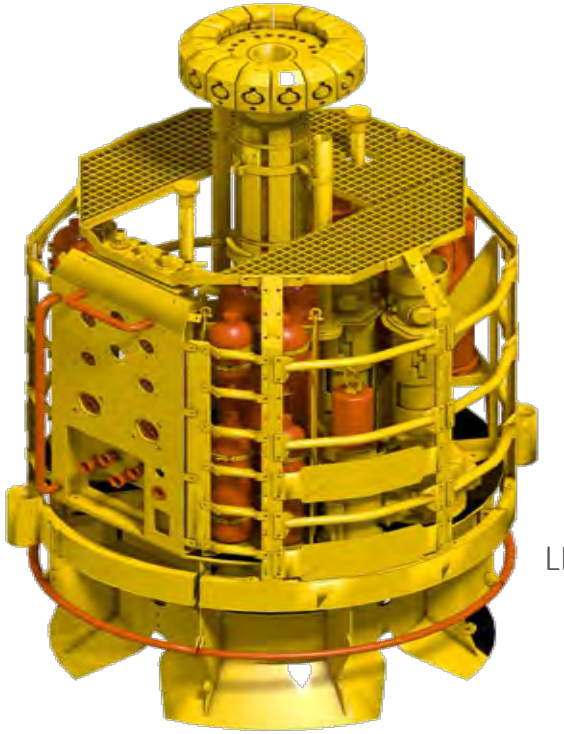
WCP

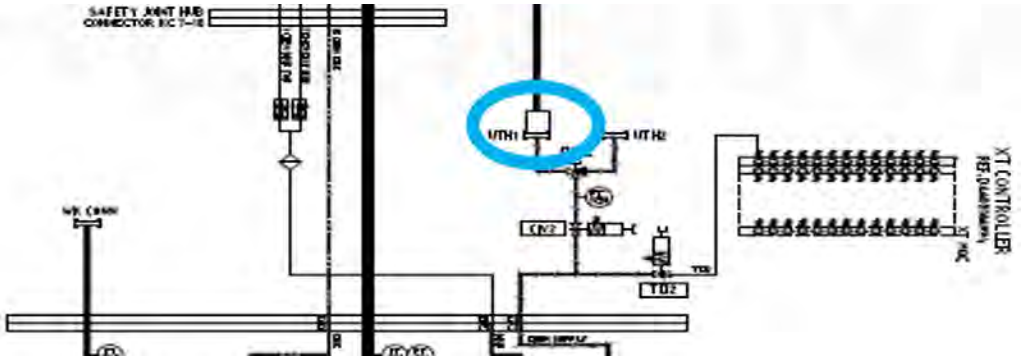


Lower Lubricator Package

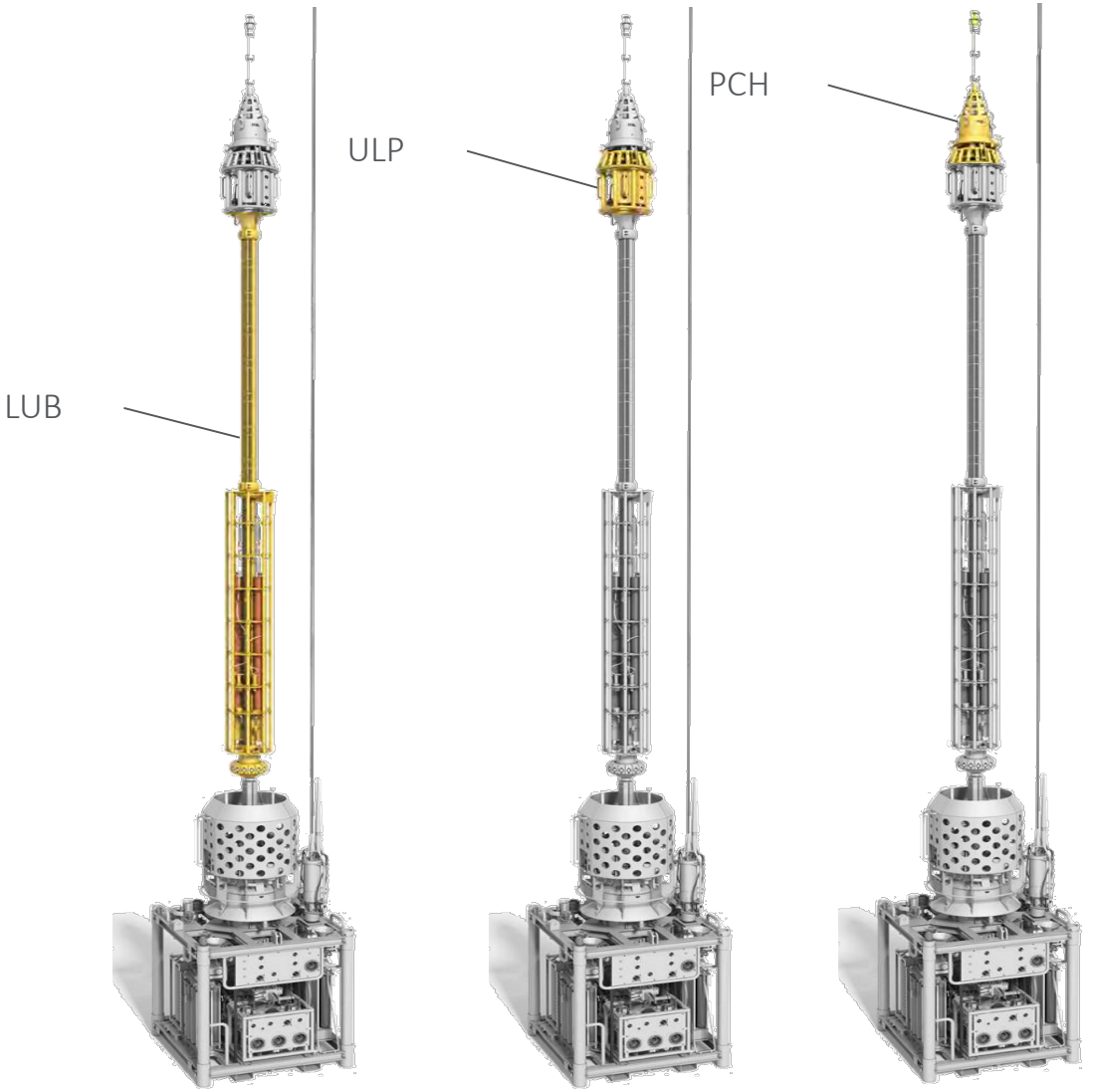
- Safety Joint to protect Well Head.
- Carrier for controls equipment

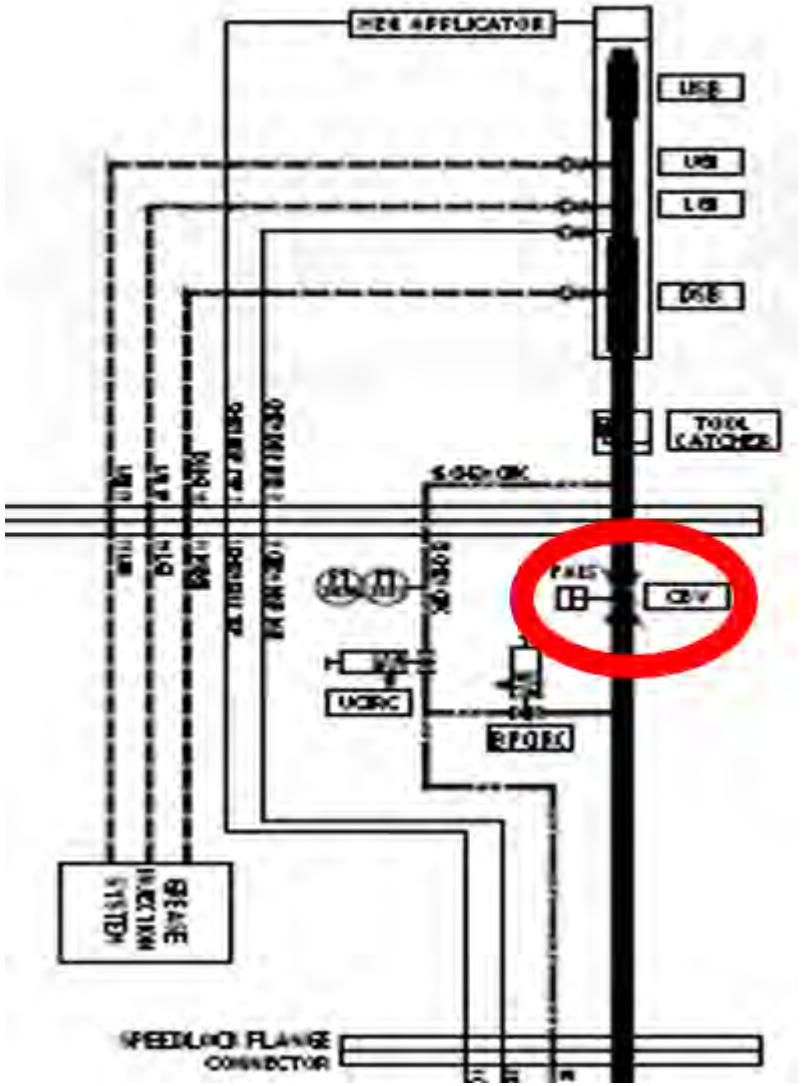






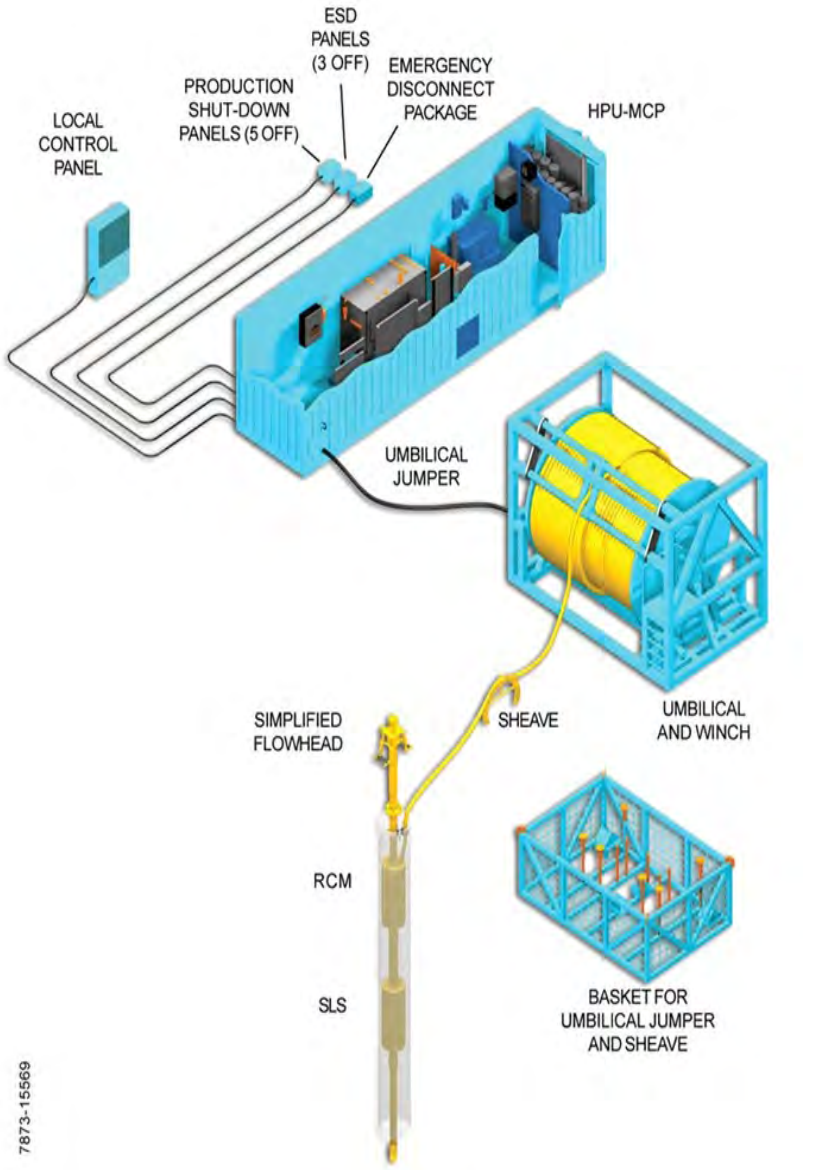
Upper Lubricator Package & Pressure Control Head





Intervention Workover Control System (IWOCS)

Intervention and Workover Controls System (IWOCS)



The IWOCS carry out the following main functions:

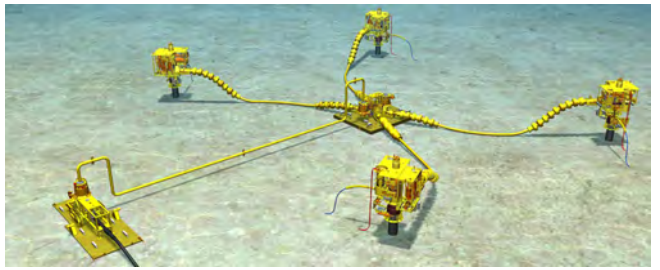
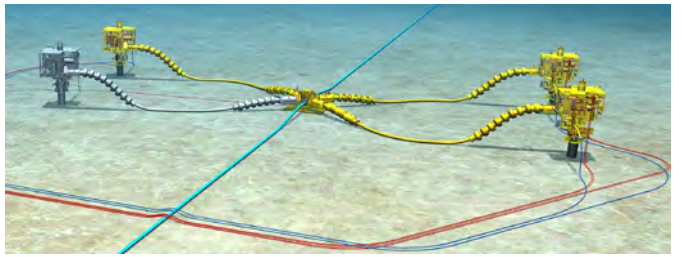
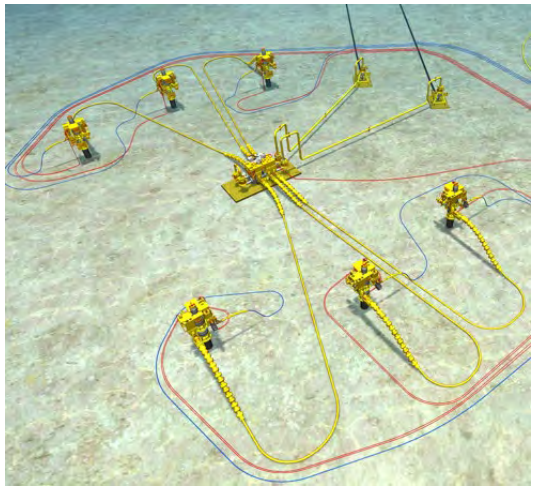
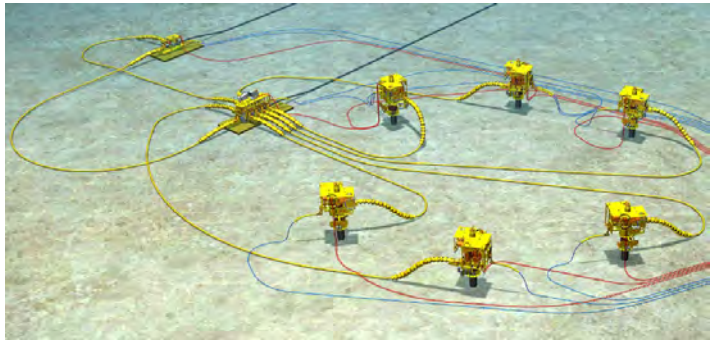
- Normal operation of Tree functions and monitoring of production equipment and system status
- Normal operation of Well Access functions and monitoring of equipment status
- Execution of Production Shutdown (PSD), Emergency Shutdown (ESD) and Emergency Quick Disconnect (EQD)

The main components in the IWOCS are:

- Hydraulic Power Unit/Master Control Panel (HPU/MCP) Subsea Tree umbilical and reel system
- Umbilical and reel system
- Subsea jumpers systems for EDP, SLS/LS and Tree Running Tool
- ESD and PSD Panels
- Test equipment Riser
- Monitoring and Management

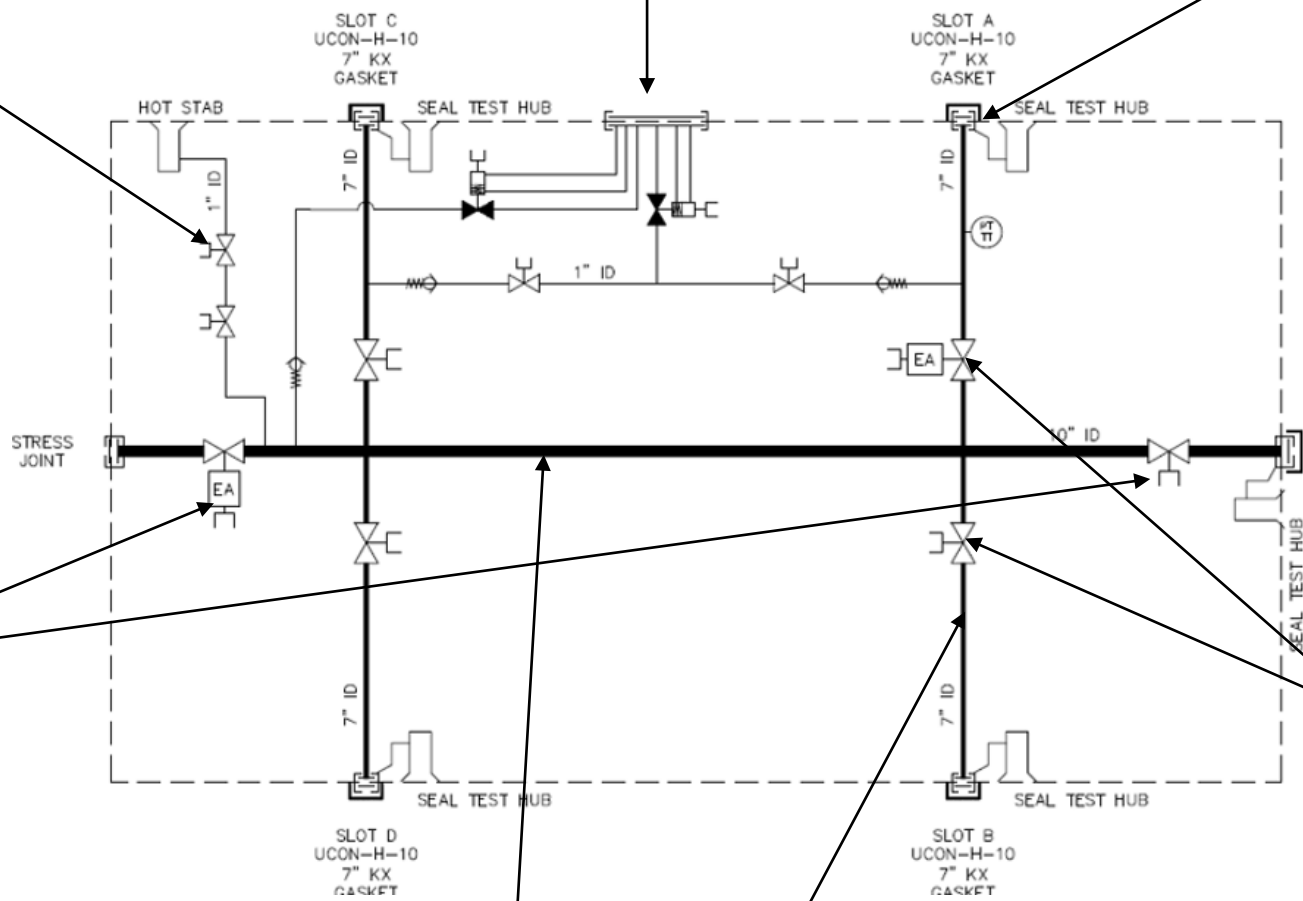
Manifold Systems

What does the Manifold System Do?

	Compact Cluster Manifold	In-line Manifold
Single Flowline		
Dual Flowline		

- Collects the product from each of the wells and distributes to the flowline
- Provides the opportunity for future expansion
- Provides a means of pressure isolation
- Provides a means to mount sensors, meters and/or chemical injection points
- Can provide distribution of power, hydraulics and chemicals

Manifold Systems Key Features



Header access line

MQC f/Hydraulic and Chemical Distribution

4x UCON-H10 Hubs f/Branches

UCON-H14 Hub f/Header

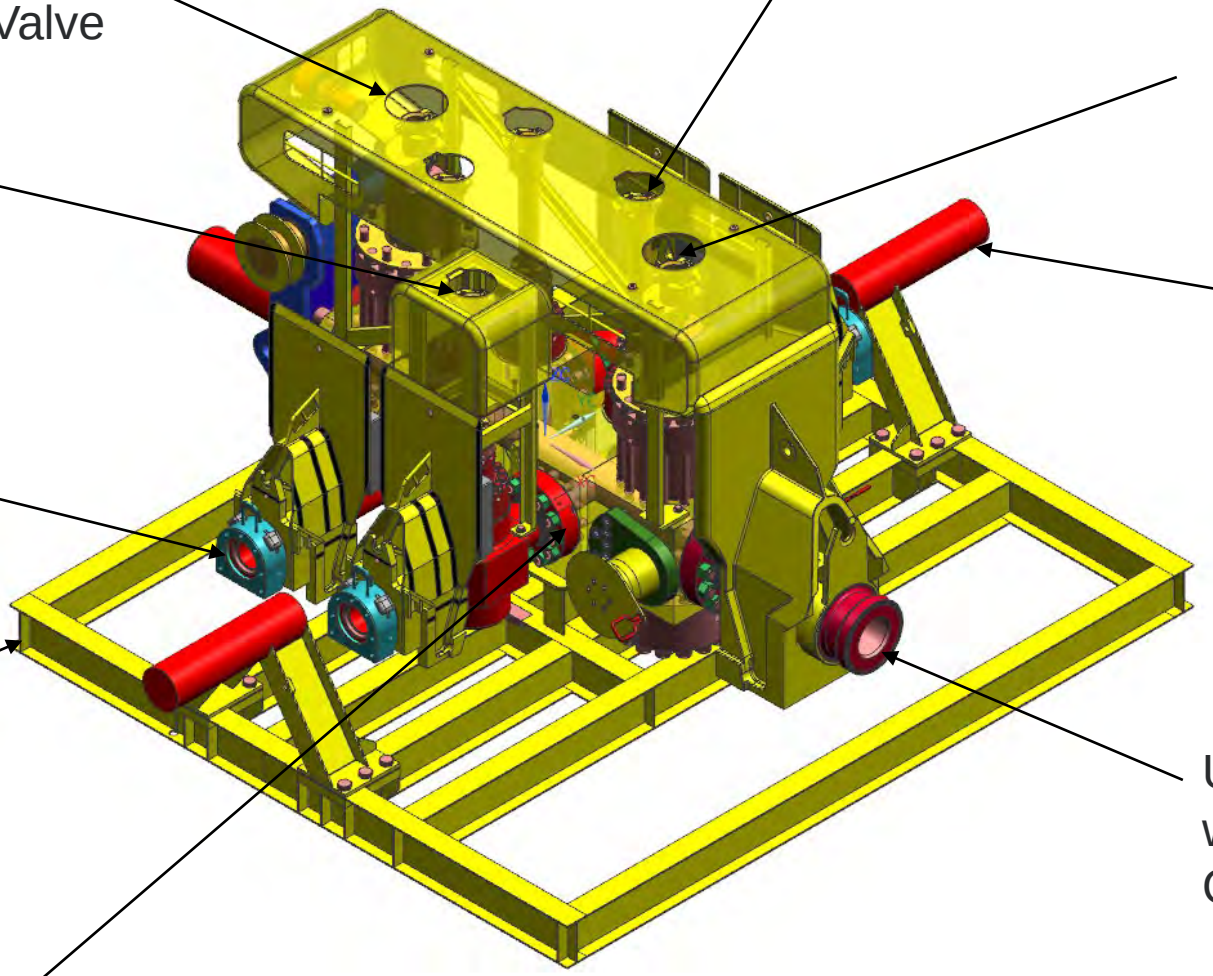
Header Isolation Manual & Actuated Gate Valve

Branch Isolation Manual & Actuated Gate Valve

Header

Branch

Manifold Systems Key Features



10” EA Gate Valve

3 x 7” Manual Gate Valve

10” Manual Gate Valve

7” EA Gate Valve

Trunnion for interface to Installation Vessel

4x UCON-H10 Hubs

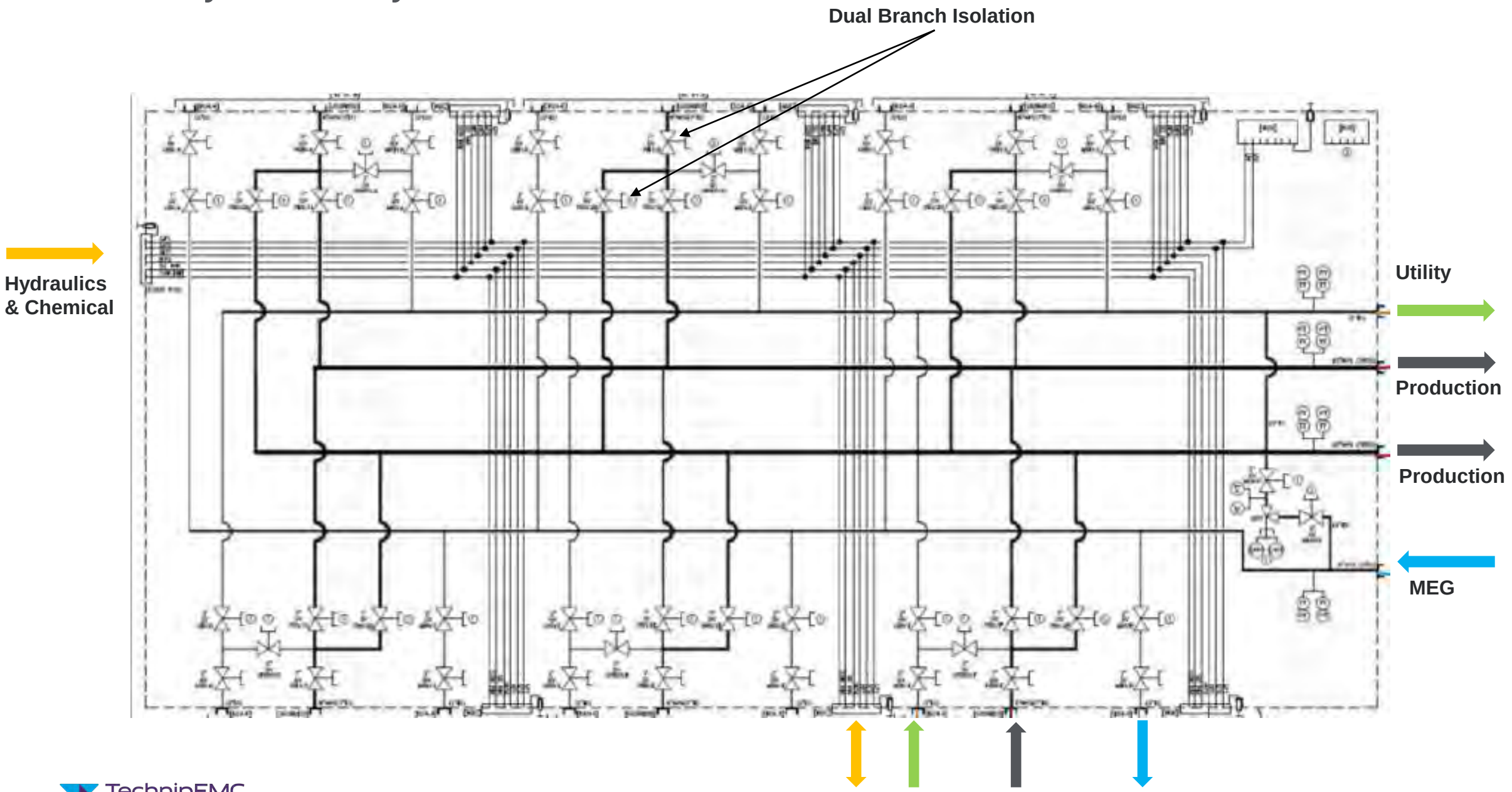
Foundation Interface Structure

UCON-H14 Hubs w/ Machined 10” GV

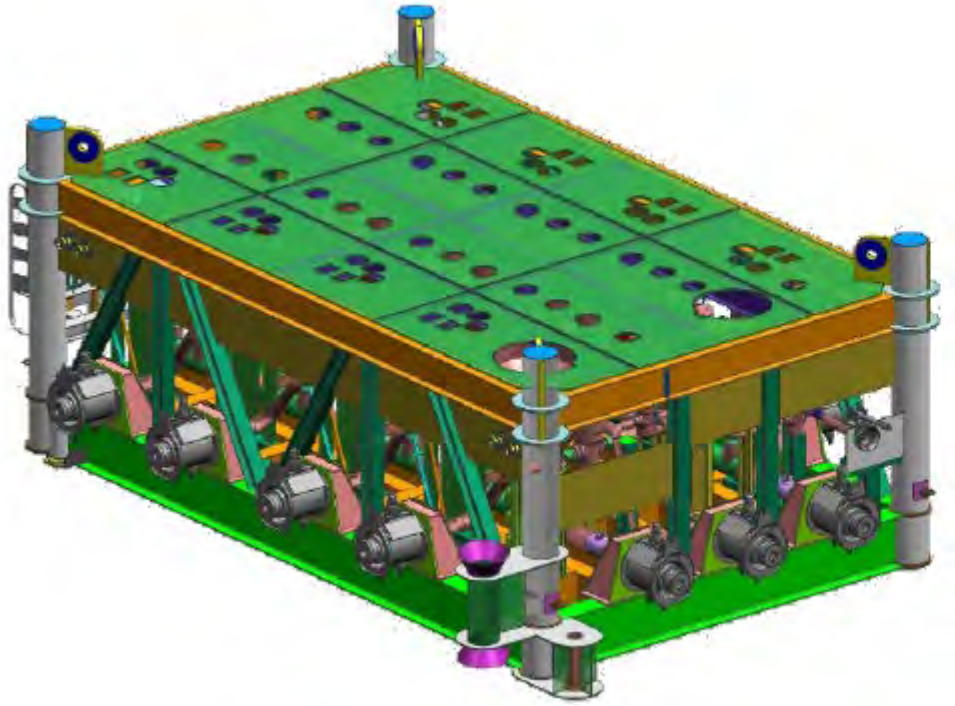
Main Block

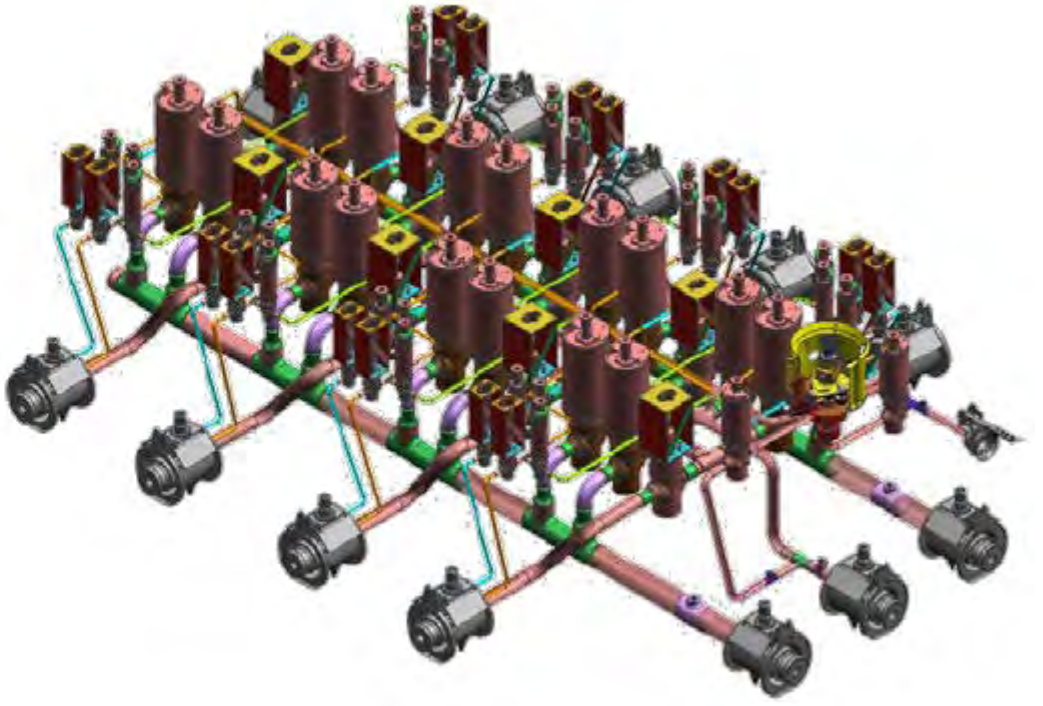
5m x 7m x 3.5m
Est. Weight: 46 mT

Manifold Systems Key Features



Manifold Systems Key Features





- Consists of header(s) and branch(es)
- Incorporates hubs for subsea tie-in
- Incorporates valves for selective isolation
- Configuration (number of branches and headers)
  - Numbers of wells
  - Option of round-trip pigging
  - Option of future tie-in

13m x 11.5m x 5.5m
Est. Weight: 320 mT

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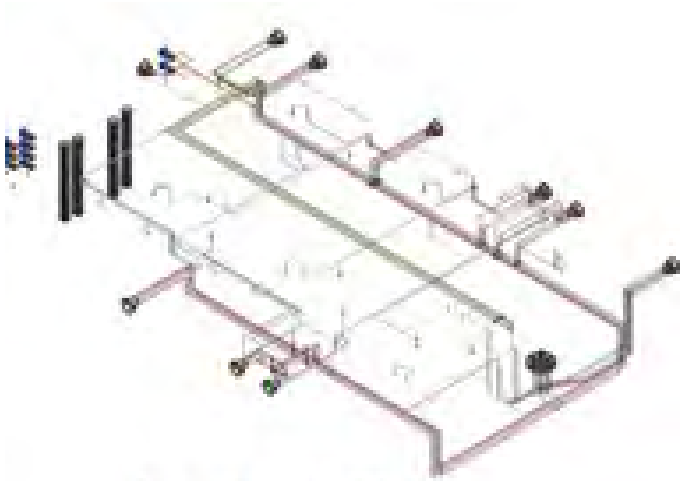
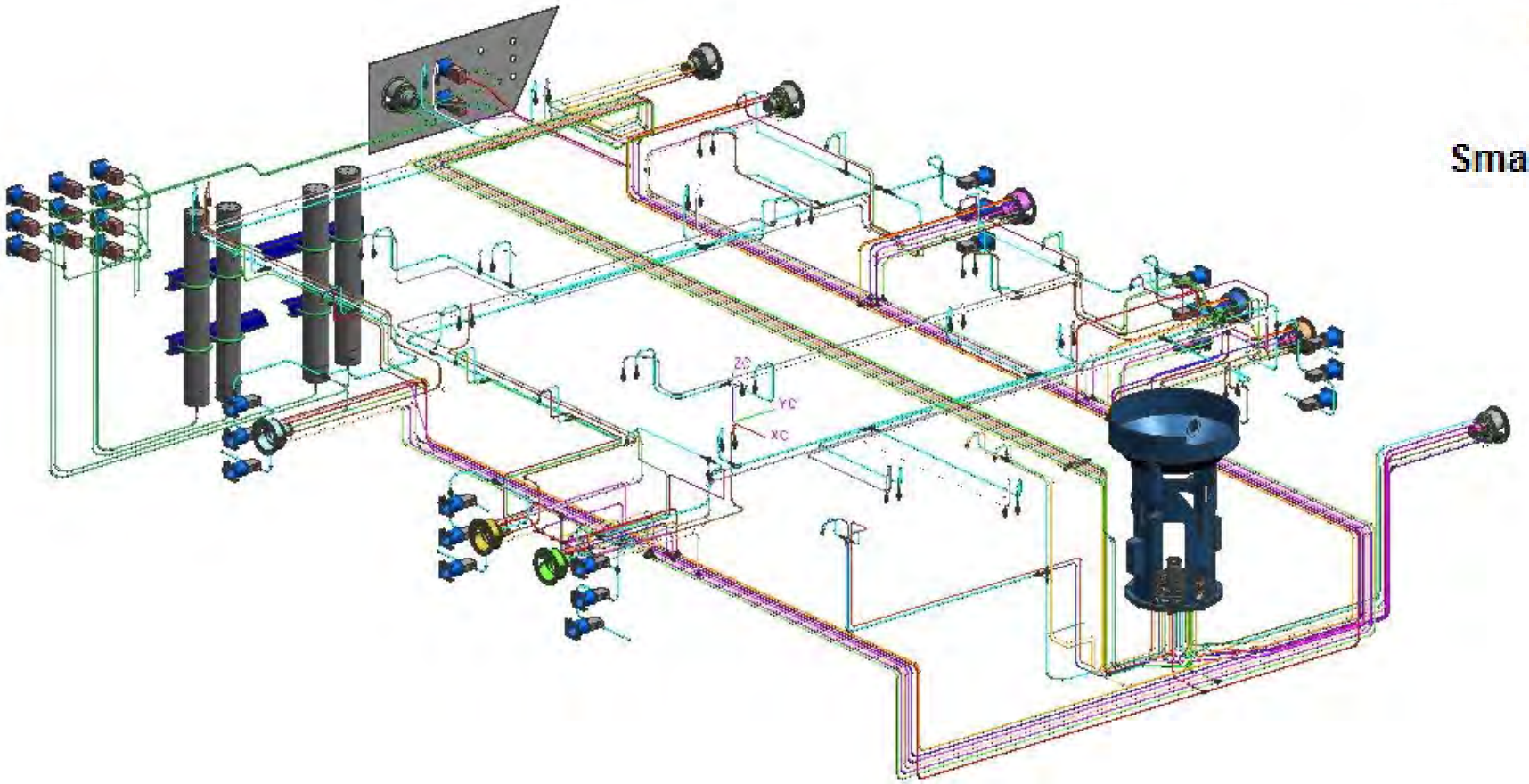
Manifold Systems- Small Bore Piping

- Distribution of chemical
- Distribution of hydraulic



Small bore Piping



Foundation Structure- Functions

- Provides the interface with the soil
- Provides vertical support for manifold
- Provides the interface for levelling of the structure and levelling (wherever required)
- Provides supports for tie-in system (wherever required)
- Provides supports for well interface

Foundation Structure- Types

Piled foundation

Anchored to sea bottom through one or more drilled/jetted conductor housing

Skirted foundation (mudmat)

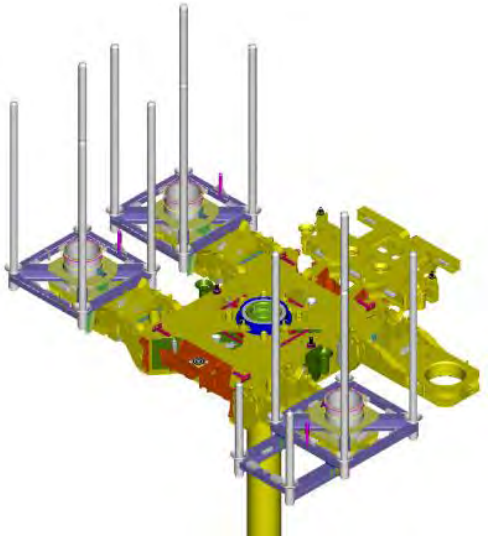
- Anchored to the sea bottom through frictional forces created by the skirt

- Can be achieved by self penetration (gravity based) or creation of under-pressure inside the skirt (suction anchor)

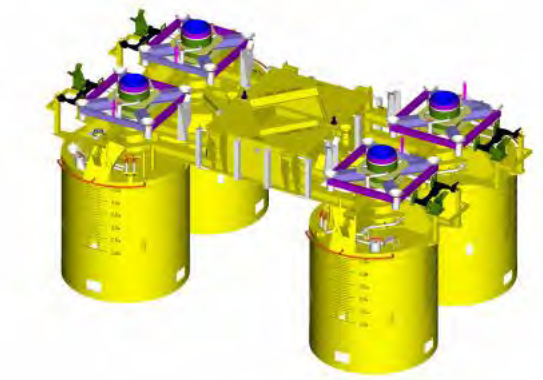
Foundation Structure- Selection

The selection of the type of foundation is influenced by:

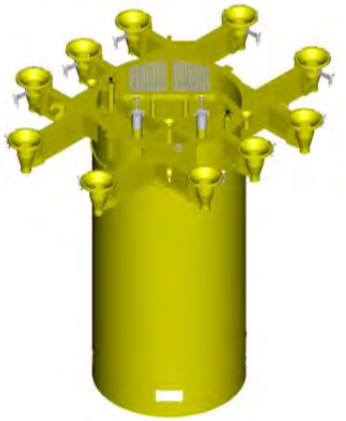
- **Geotechnical conditions**
- **Seabed slope and levelness requirement**
- **Installation vessel availability**
- **Tie-in System selection**
- **Structure Subsidence**
- **Field Layout**



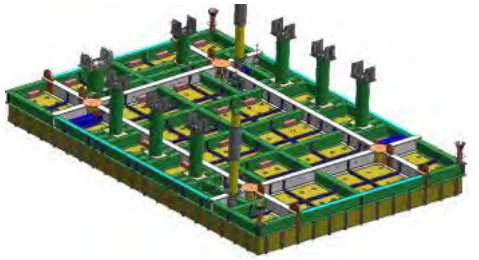
Single Drilled and Cemented Conductor



Template with multiple Suction Anchors



Suction / Driven Pile

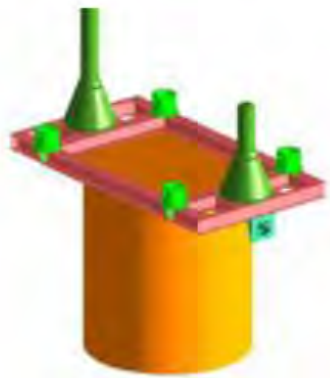


Skirted Mudmat

Foundation Structure - Analysis

Mud Mat

Drilled &
Cemented
Monopile

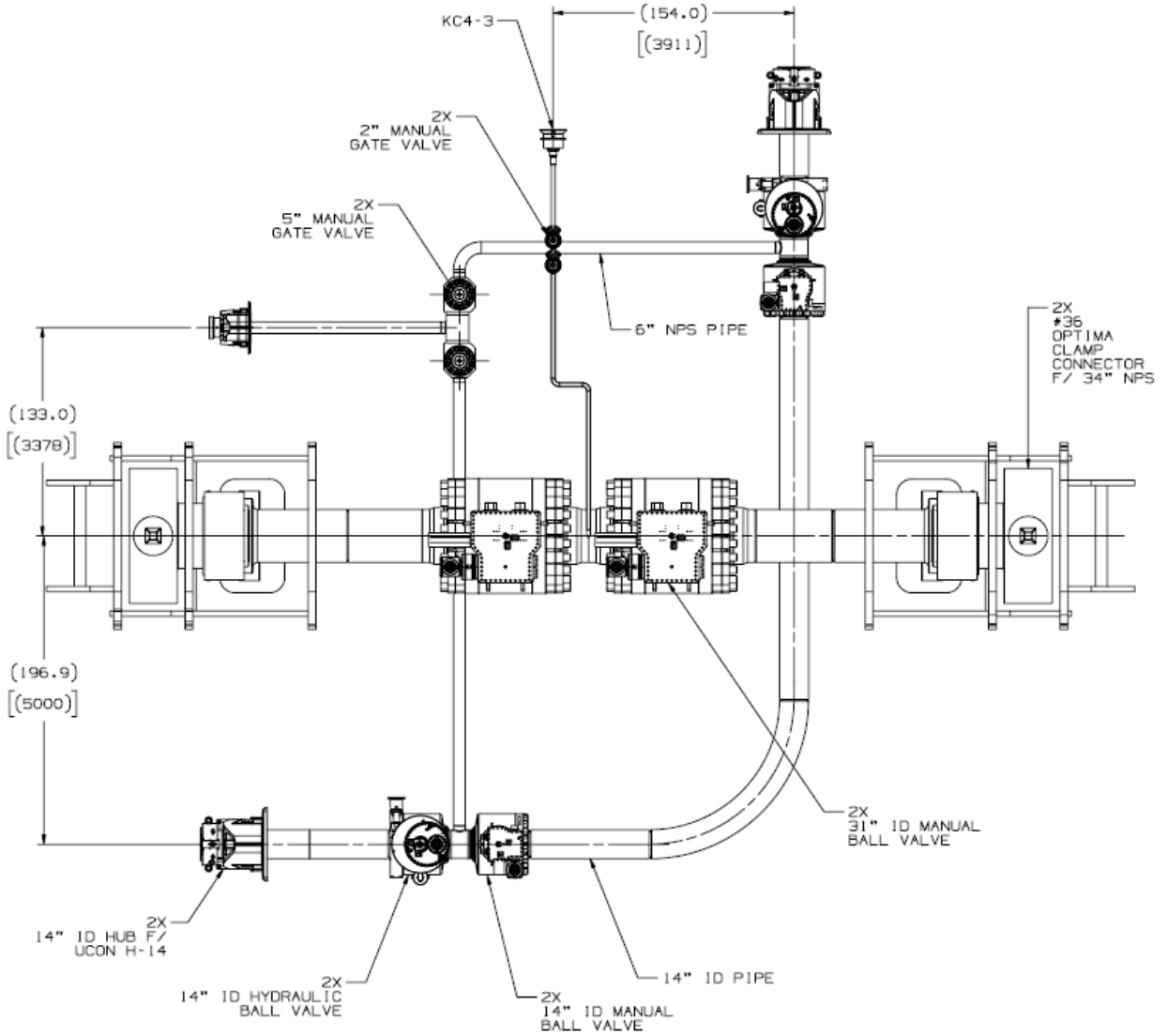


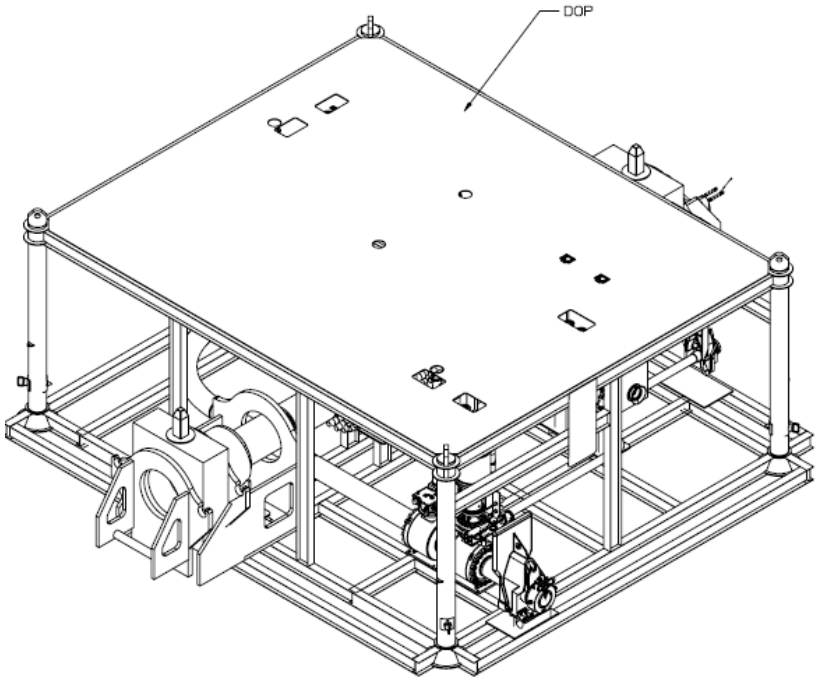
Suction
Anchor

Decreasing Soil Strength

Increasing Cost

Manifold System Types: Export Riser Bases





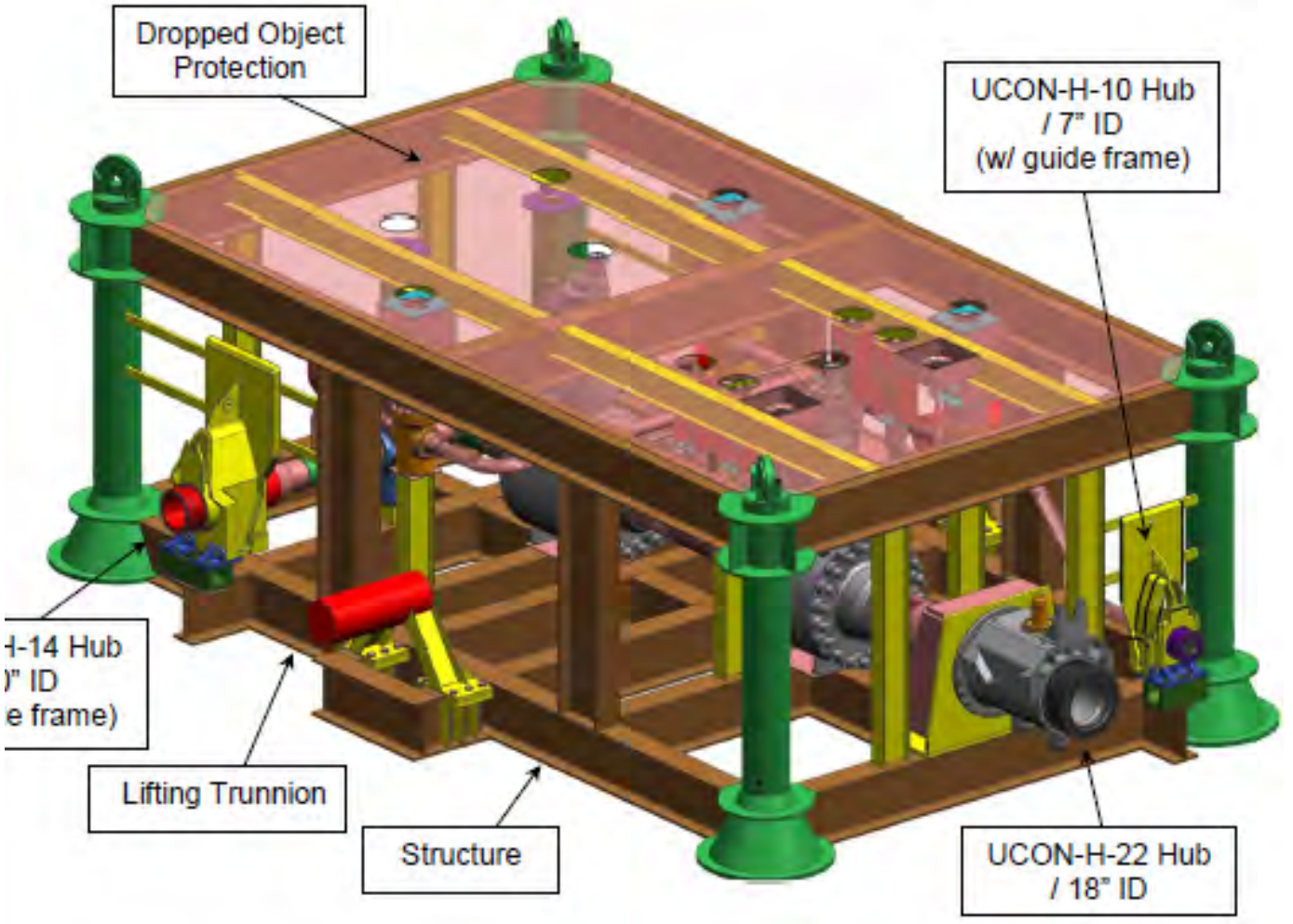
Functionality:

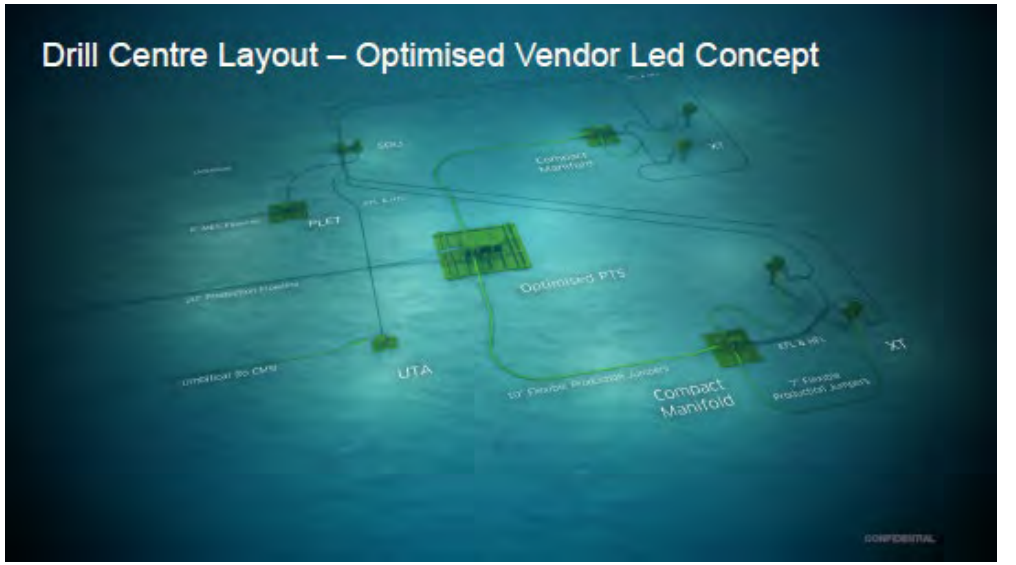
- Gathers the export product from facilities risers and distributes to export trunkline
- Provides a means of launching and or receiving inspection pigs
- Enables pigging of the risers
- Enables isolation of trunkline from facility

Features:

- Usually large bore and so conventional (stick built)
- Often have Subsea Isolation Valves (SSIV)
- Have valves and pipework that enables gas to be directed to the pig launcher to ‘kick’ the pig into the header.

Manifold System Types: Pipe Terminations Structures (PTS)





Functionality:

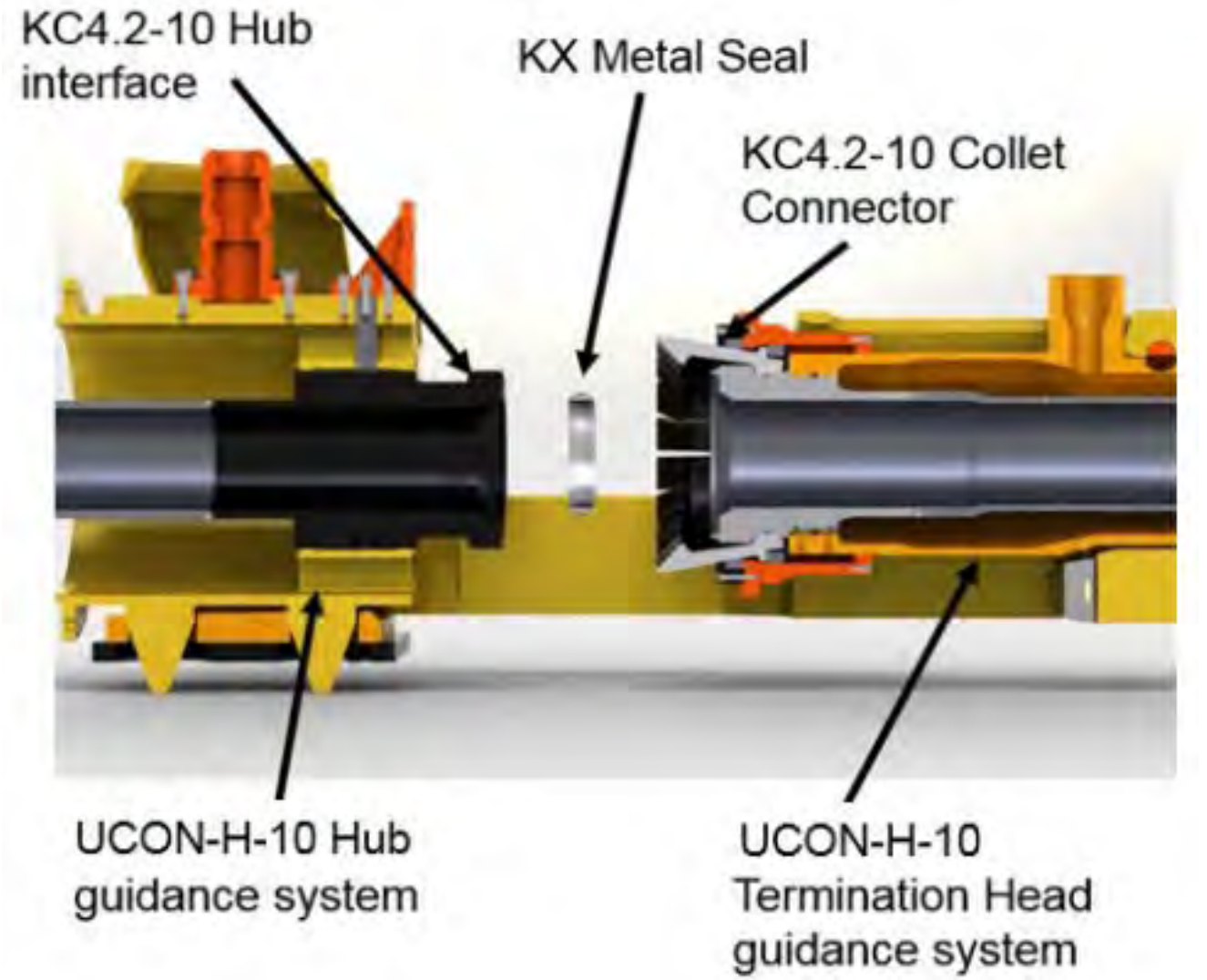
- Gathers the product from the drill center production manifolds
- Provides a means of launching and or receiving inspection pigs
- Enables isolation of Drill Centers from pipeline

Features:

- Usually large bore and so conventional (stick built)
- Often have large bore ball valves
- No more than 2 branches usually
- Pipework that enables gas to be directed to the pig launcher to 'kick' the pig into the header.

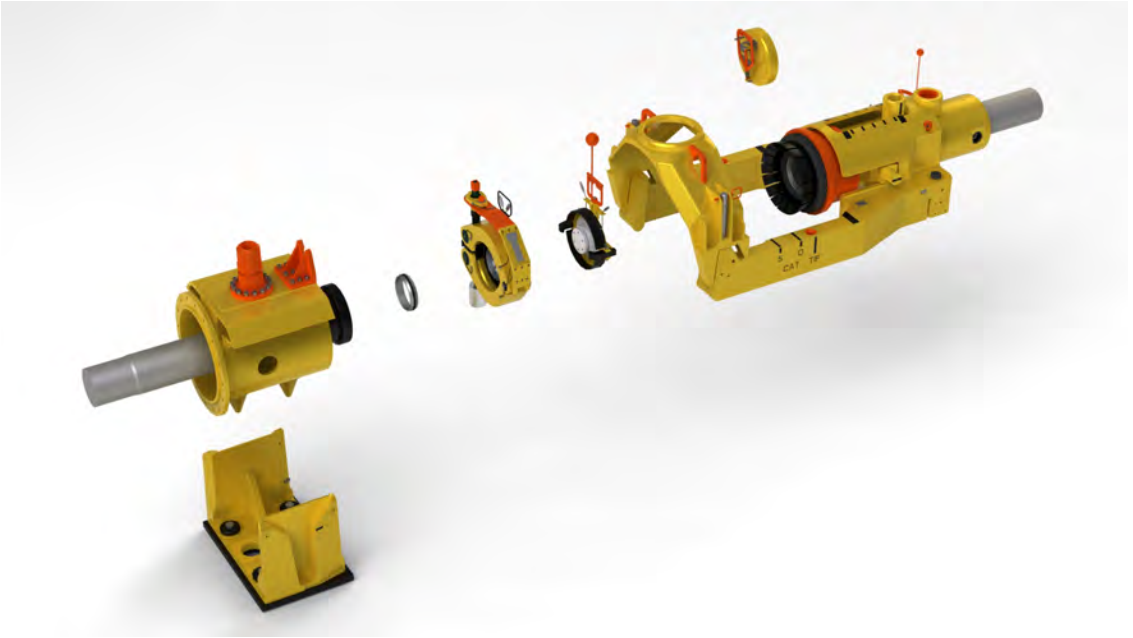
Interconnection Systems

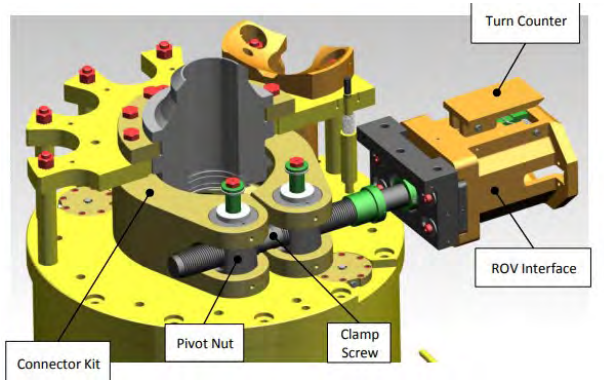
What does the Connection System Do?

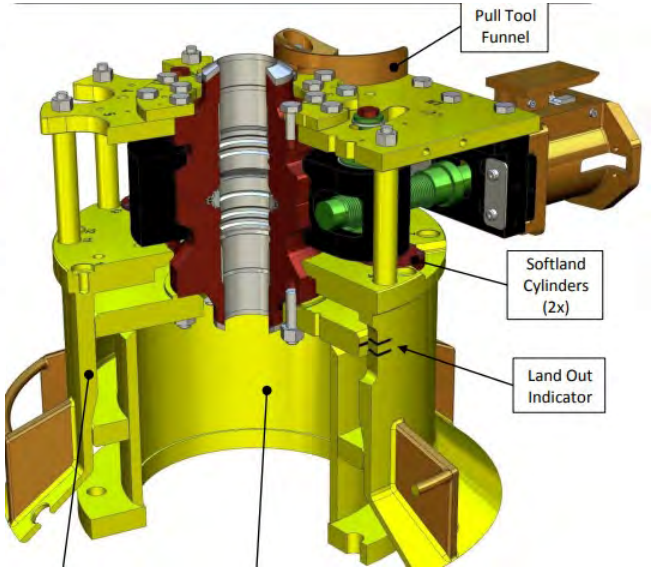


- Provides a means of making up a pressure containing interface subsea.
- Used to connect:
  - Flowlines, Flowspools and Well Jumpers
  - Flowmeters or Flow modules
  - MEG and Gas Lift lines
  - Umbilicals (Multibore)
- Can be vertical or horizontal
- Typically Collet or Clamp type
- TechnipFMC have a number of connection systems

Connection System Types and considerations: Horizontal vs Vertical







Pros:

- Low profile; less susceptible to snagging or vortex & flow induced vibration due to sea bed interaction
- Can be parked prior to make up
- Seals are easily changed out and sealing surfaces easily cleaned
- Lend themselves well to flexibles

Conns:

- A more involved make up requiring a larger suit of tooling
- Require a specialist crew offshore
- Take up more area in transportation (rigid only)

Pros:

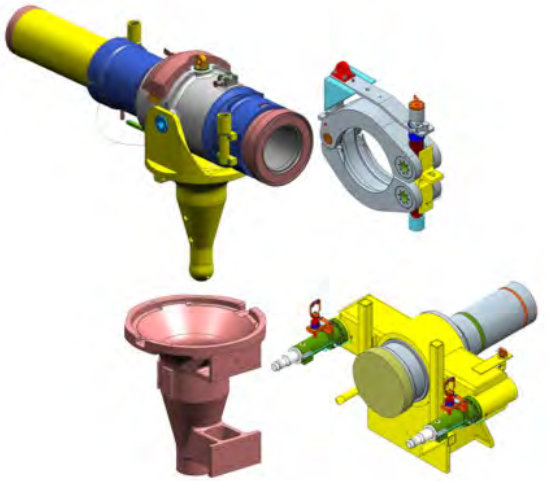
- Easier to make up offshore, quicker
- Require less tooling
- Can we transported side by side
- No Specialist crew required

Conns:

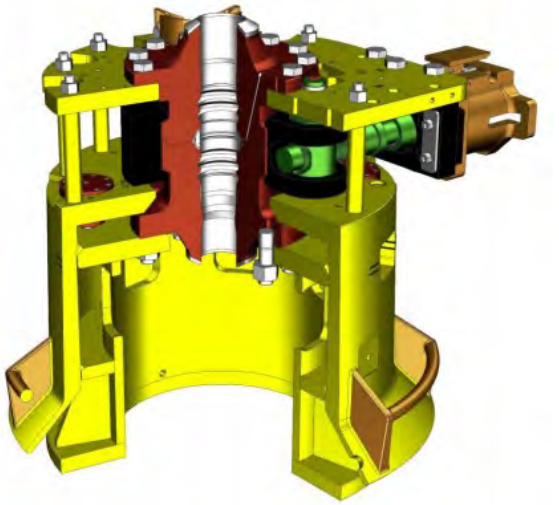
- Susceptible to snagging or vortex & flow induced vibration due to less sea bed interaction
- Cannot be parked prior to make up
- Difficult to change replace seals or clean sealing surfaces
- Do not work as well with flexibles

TechnipFMC Connection Systems

UCON-H:
- UCON-H 10
- UCON-H 12
- UCON-H 14
- UCON-H 18
- UCON-H 22



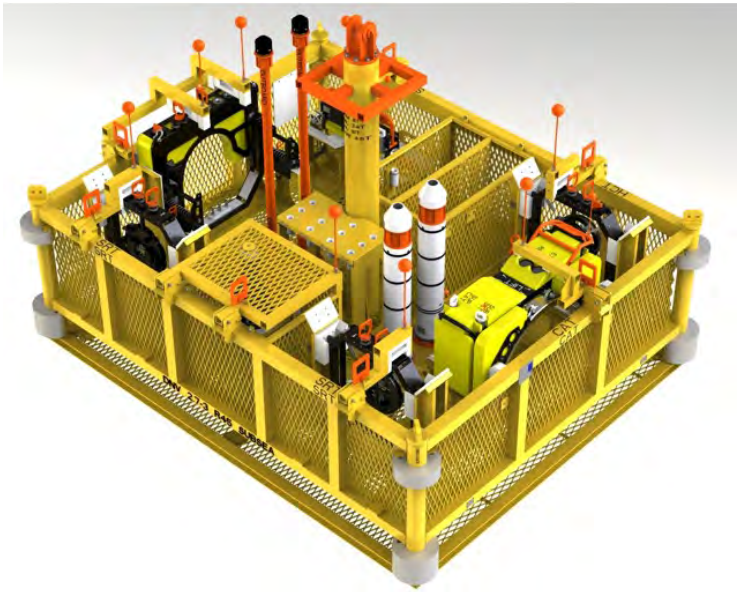
STABCON:
- STABCON - 18
- STABCON - 27



KLV:
- KLV – 8
- KLV – 10
- KLV – 14
- KLV - 16

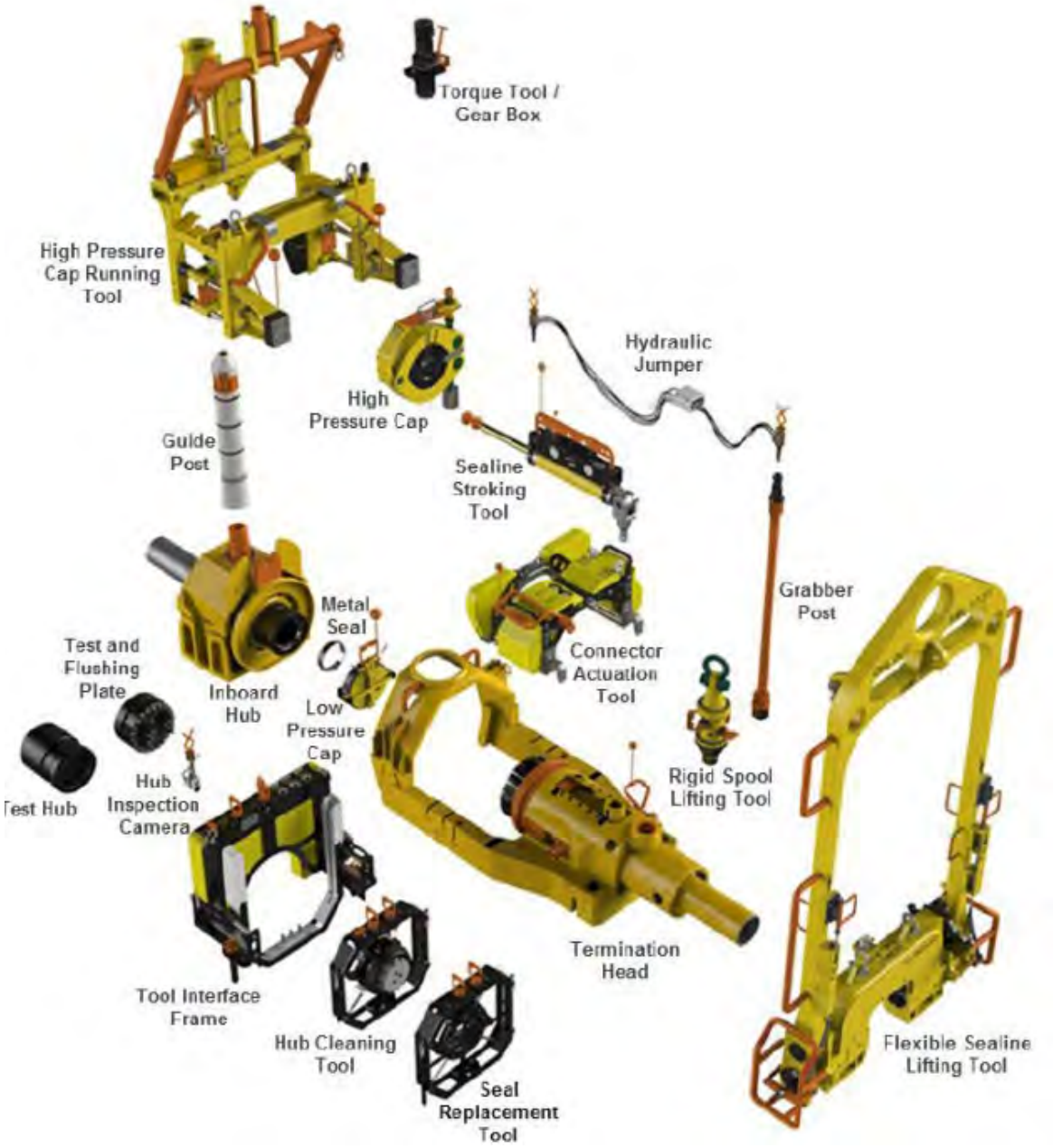
KC4-4 & KC4-3:
- KC 4–3
- KC 4–4

UCON-H Connection Systems Tooling

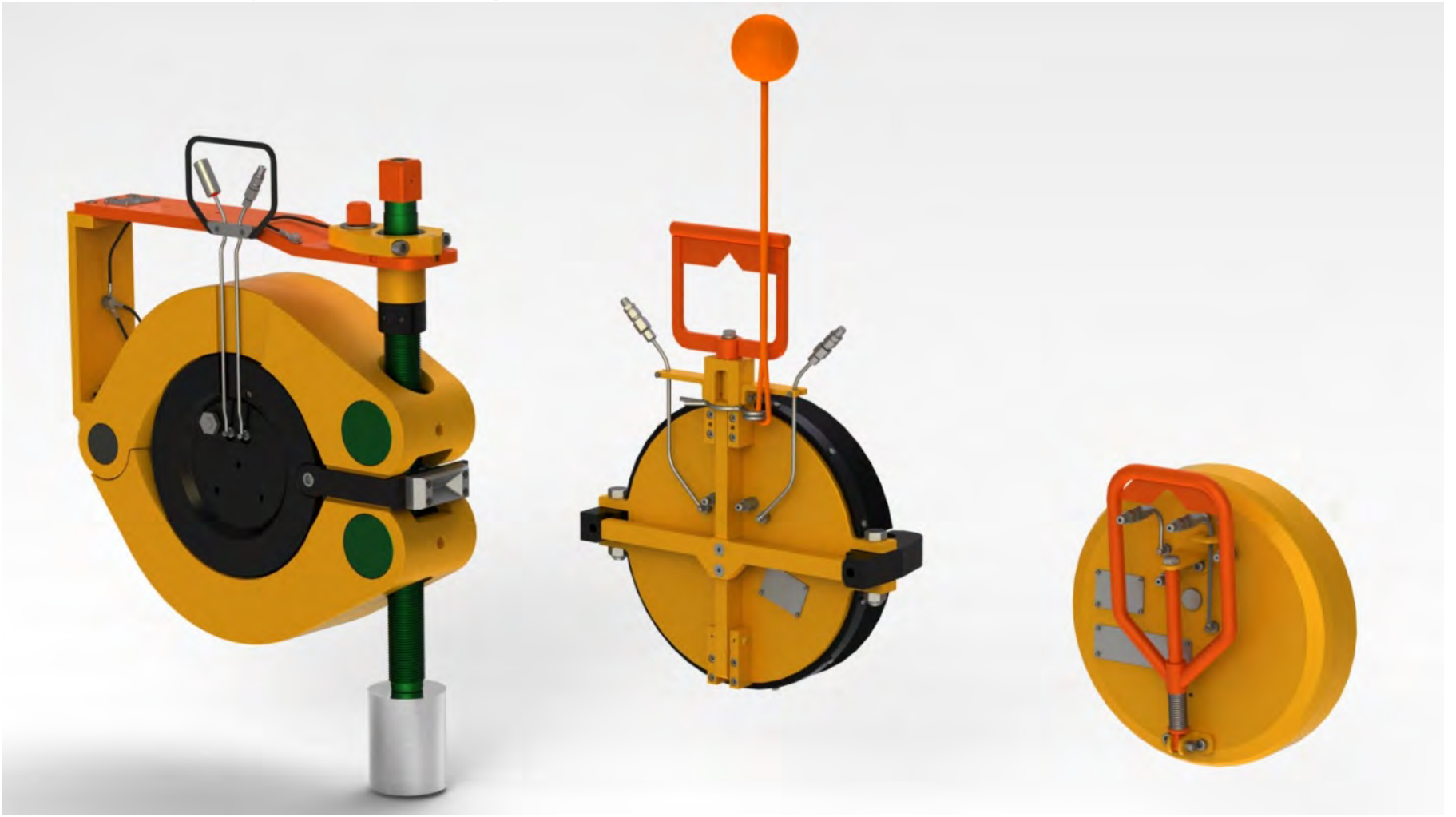


Tooling basket

CAT and SST made up



UCON-H Connection Systems Caps

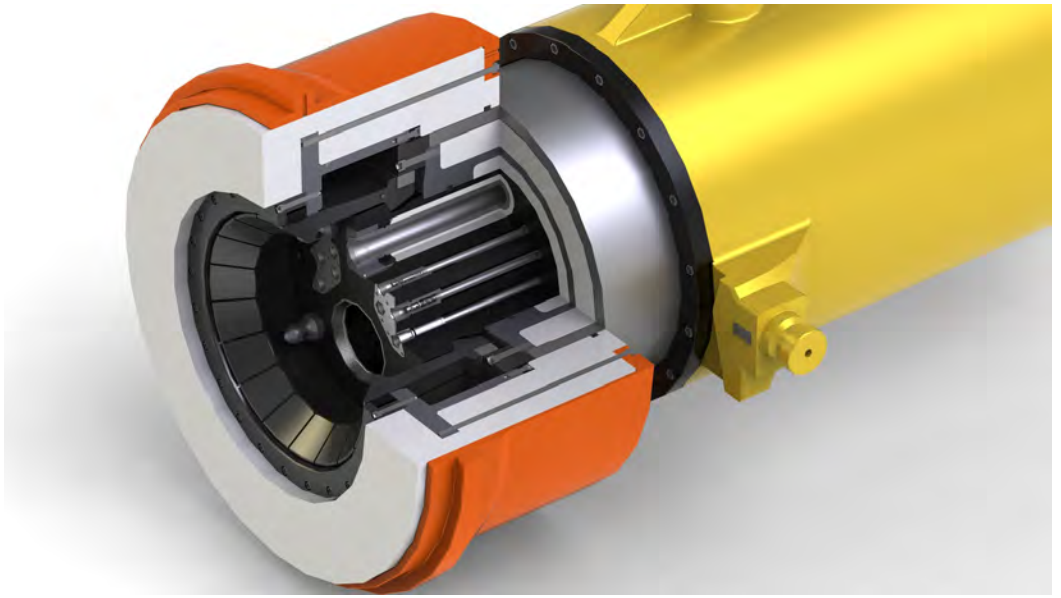


Cap Inboard HPMRI (High Pressure Metal Re-Installable)

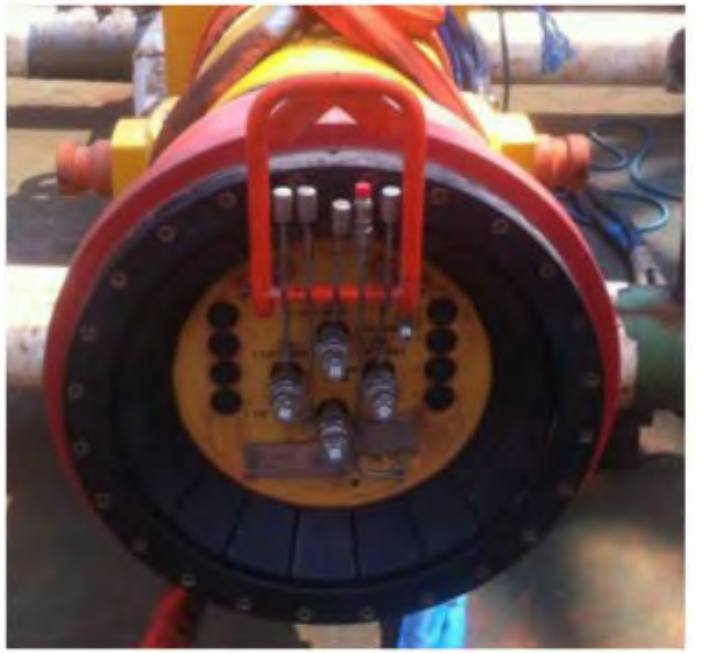
Cap Inboard LPE (Low Pressure Elastomer)

Cap Outboard HPE/LPE/HPM

UCON-H Multibore



Multibore w/Production, Hydraulics and MEG



Multibore Seal Plates f/Production, Hydraulics and MEG

Outboard High Pressure Caps for Umbilical