J P KENNY

MTS SYMPOSIUM
SESSION 9: SEABED ARCHITECTURE

DELIVERS. EVOLVES.

WHOLE LIFE SOLUTIONS FOR PIPELINE AND SUBSEA SYSTEMS

Presentation 1: Trees

Return to session directory

Subsea Architecture

Trees (Part 1)

- Typical Tree Configurations
- Typical Add-Ons or Options
- Specialized or Custom Trees
- Typical Applications
- Trends

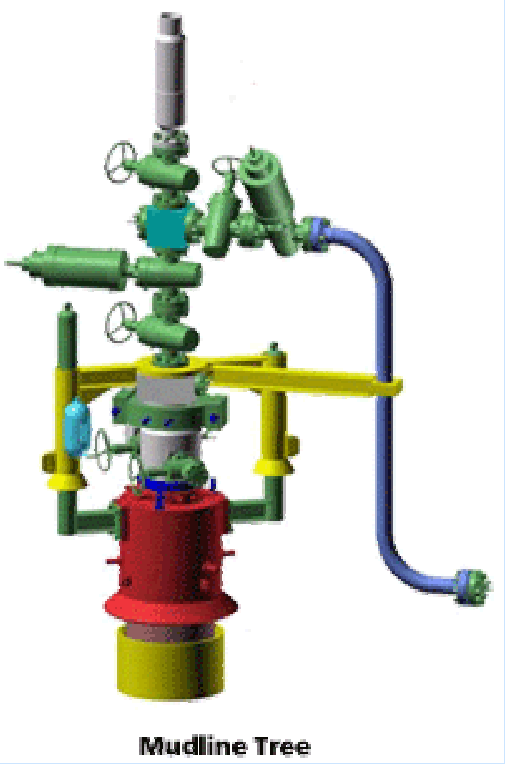
Control Systems (Part 2)

- Typical Control Systems
- Typical Applications
- Umbilicals
- Flying Leads
- Trends

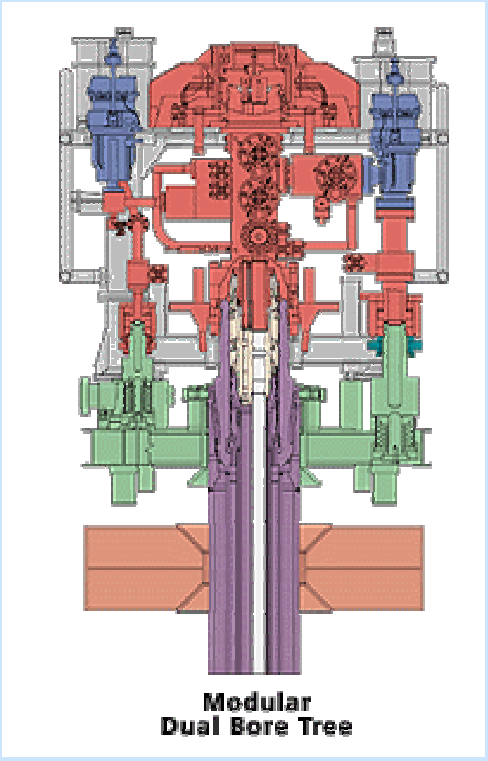
Flowlines (Part 3)

- Flowline Systems
- PLET, PLEMs & Manifolds
- Connection Systems & Jumpers
- Field Layouts – Past & Present
- Trends

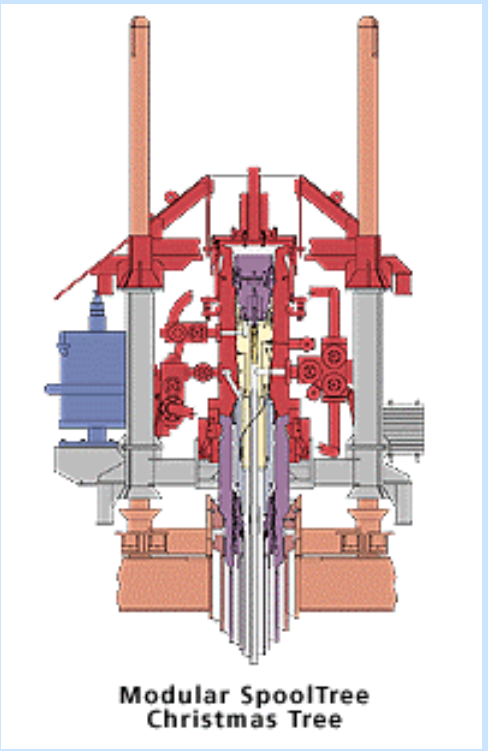
Typical Subsea Trees



Mudline Tree

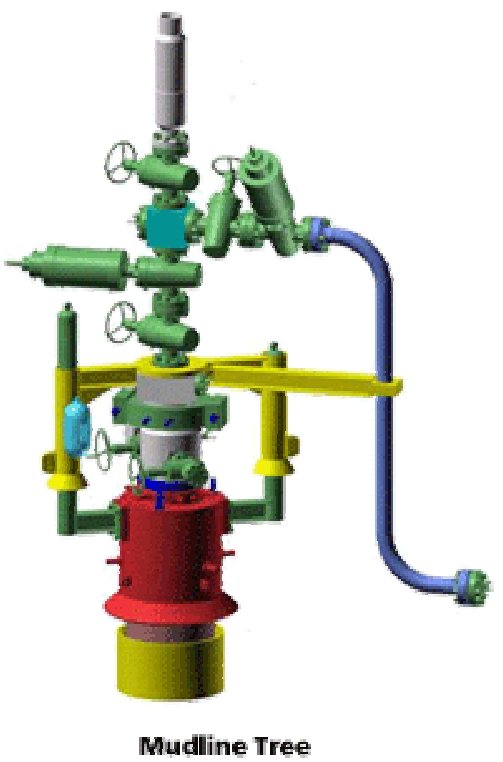


Modular
Dual Bore Tree



Modular SpoolTree
Christmas Tree

Mudline Suspension Tree

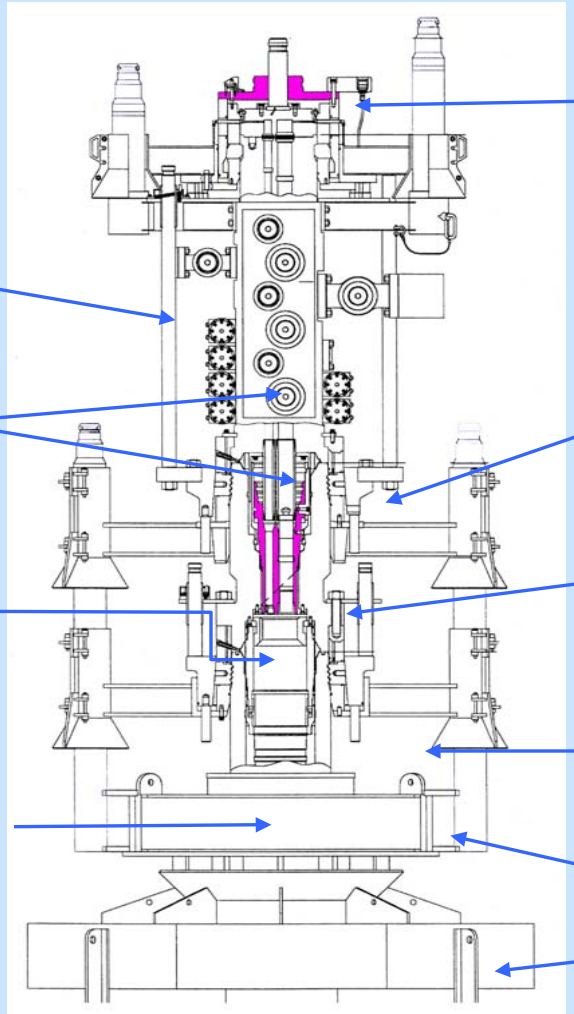

Mudline Tree

- Shallow water applications (Diver Intervention)
- Typically Installed from Jack-up Rigs
- Minimal Hydraulic Functions (4 to 7)
- With and Without Sensors
- Cost is usually 30% to 50% of other trees

Conventional Dual Bore Tree

Features:

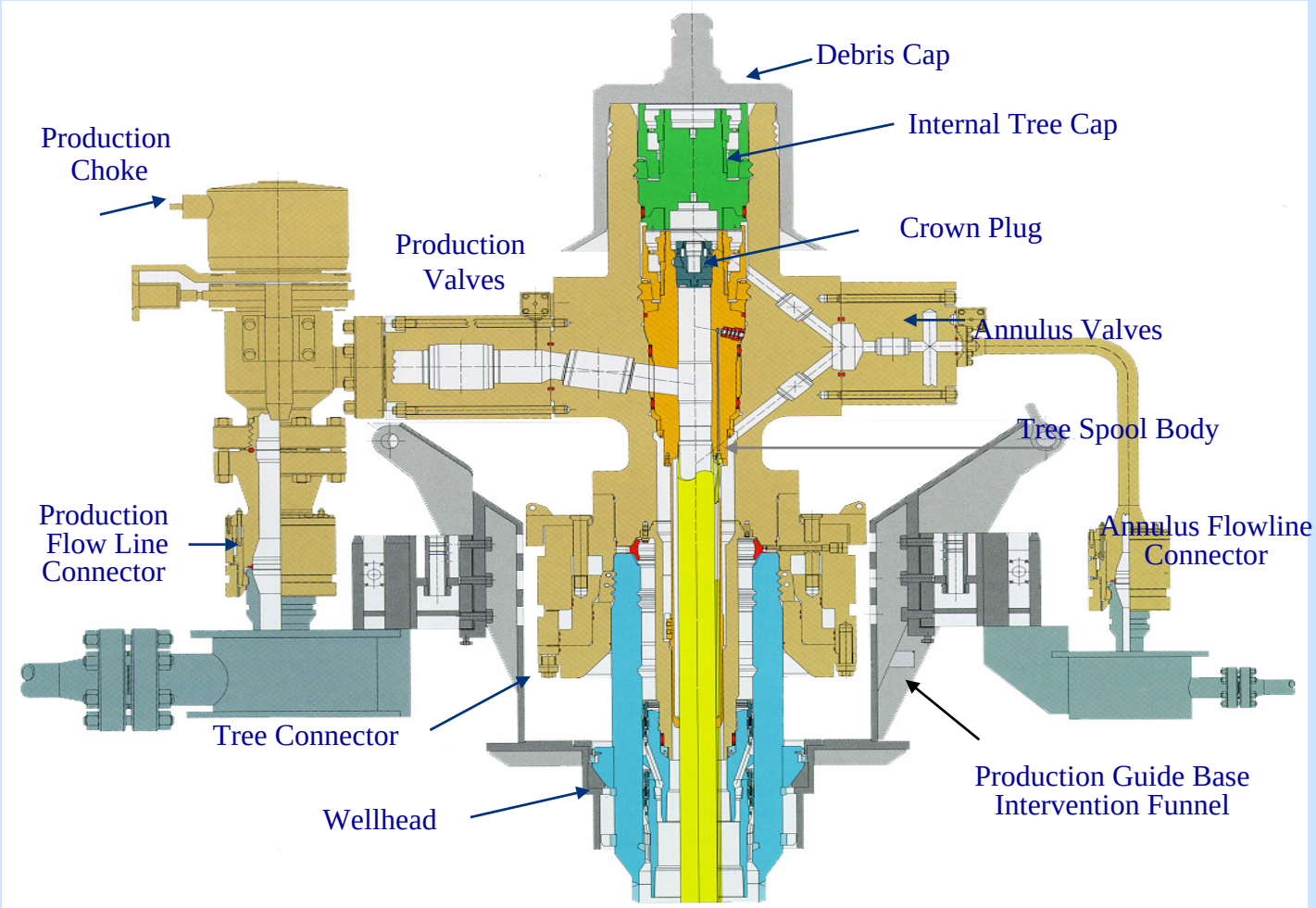
- **Integral Master Valve Block**
- **External Tree Cap**
- **Tubing Hanger Installed In Tubing Spool or Wellhead**



Horizontal or Spool Tree

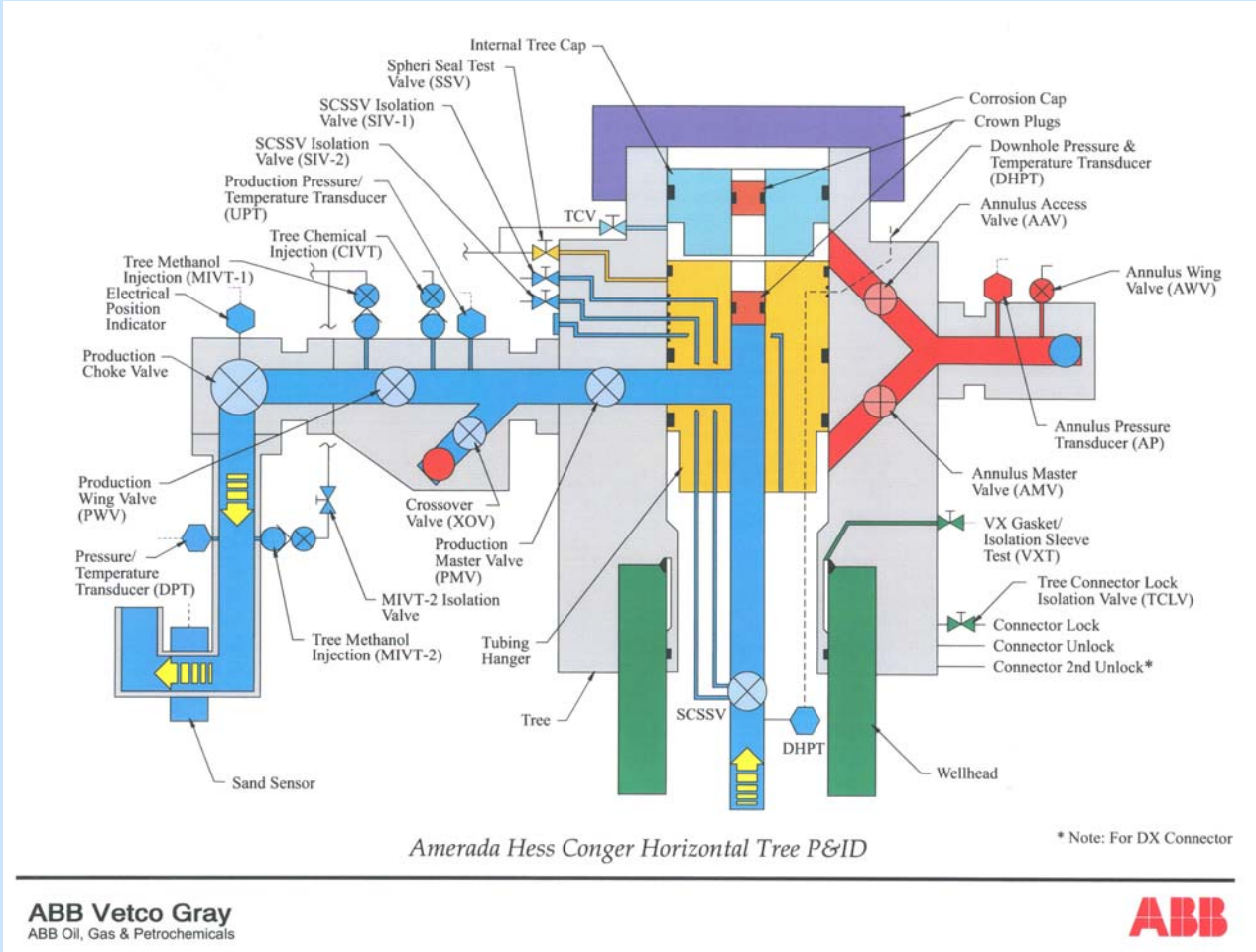
FEATURES

- Side Mounted Valves
- Crown Plug
- Tubing Hanger Lands in Tree Body

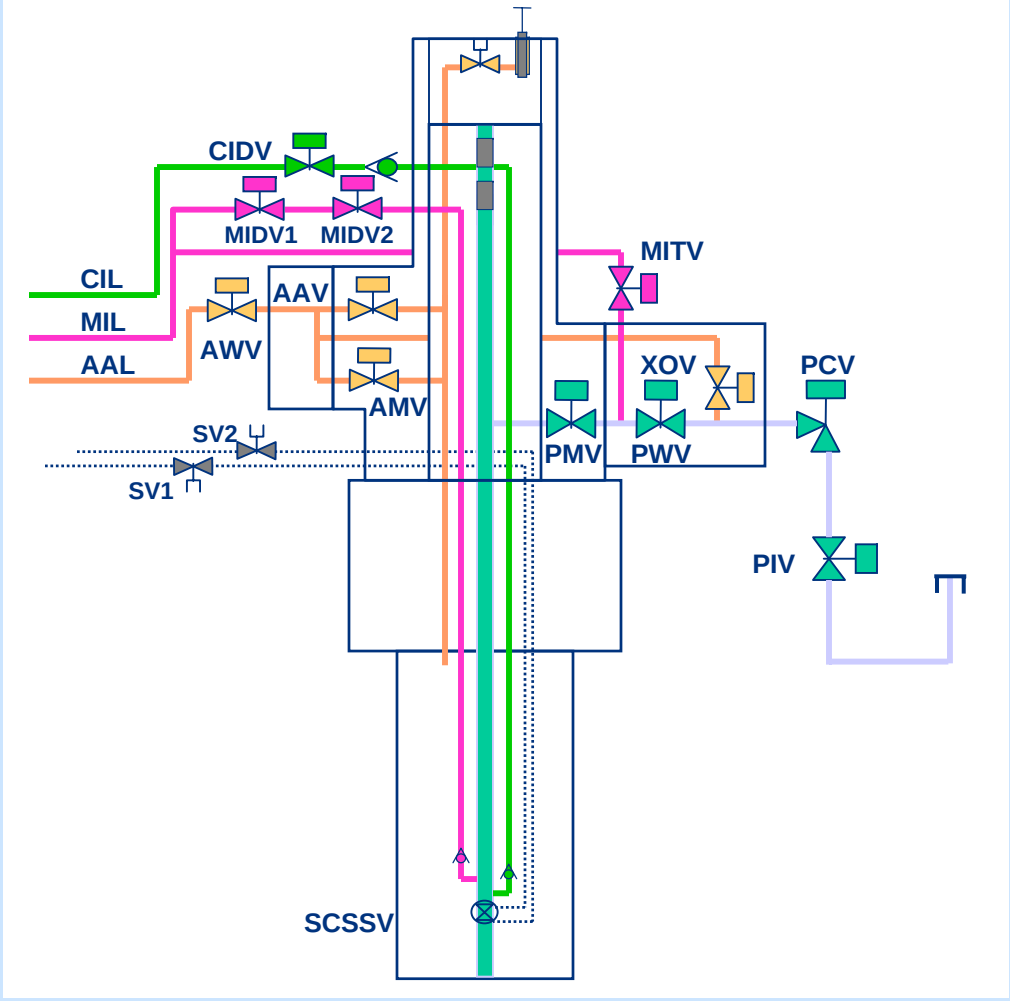


Configuration

All chemical injection in this example is downstream of the master valve.



Configurations



PIV - Production Isolation Valve (also called Flowline Isolation Valve.

This can be used to prevent flooding of the jumper in the event of a choke insert change out.

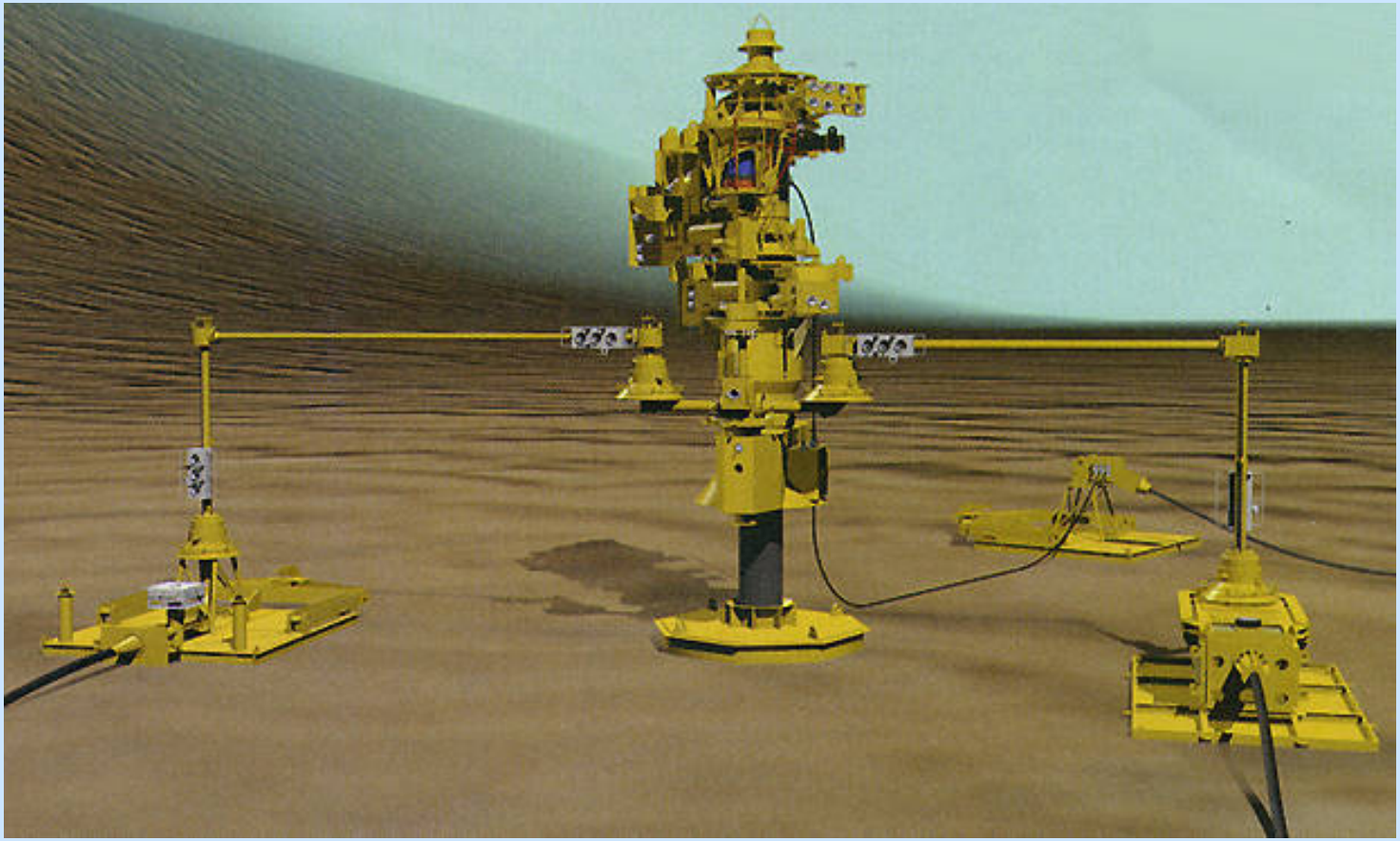
Chemical injection downhole and at tree.

No internal tree cap. Dual plugs in the Tubing Hanger

Other Options

- Secondary Crossover Valve
- TH configured to support smart completions
  - Sliding Sleeves
  - ESP (Electrical Submersible Pumps)
- Choke (Production Control Valve)
- Secondary Wing Valve (usually configured as an orifice gate valve in place of a choke)
- Enhanced Completion Guide Base

Split Tree



Configurations

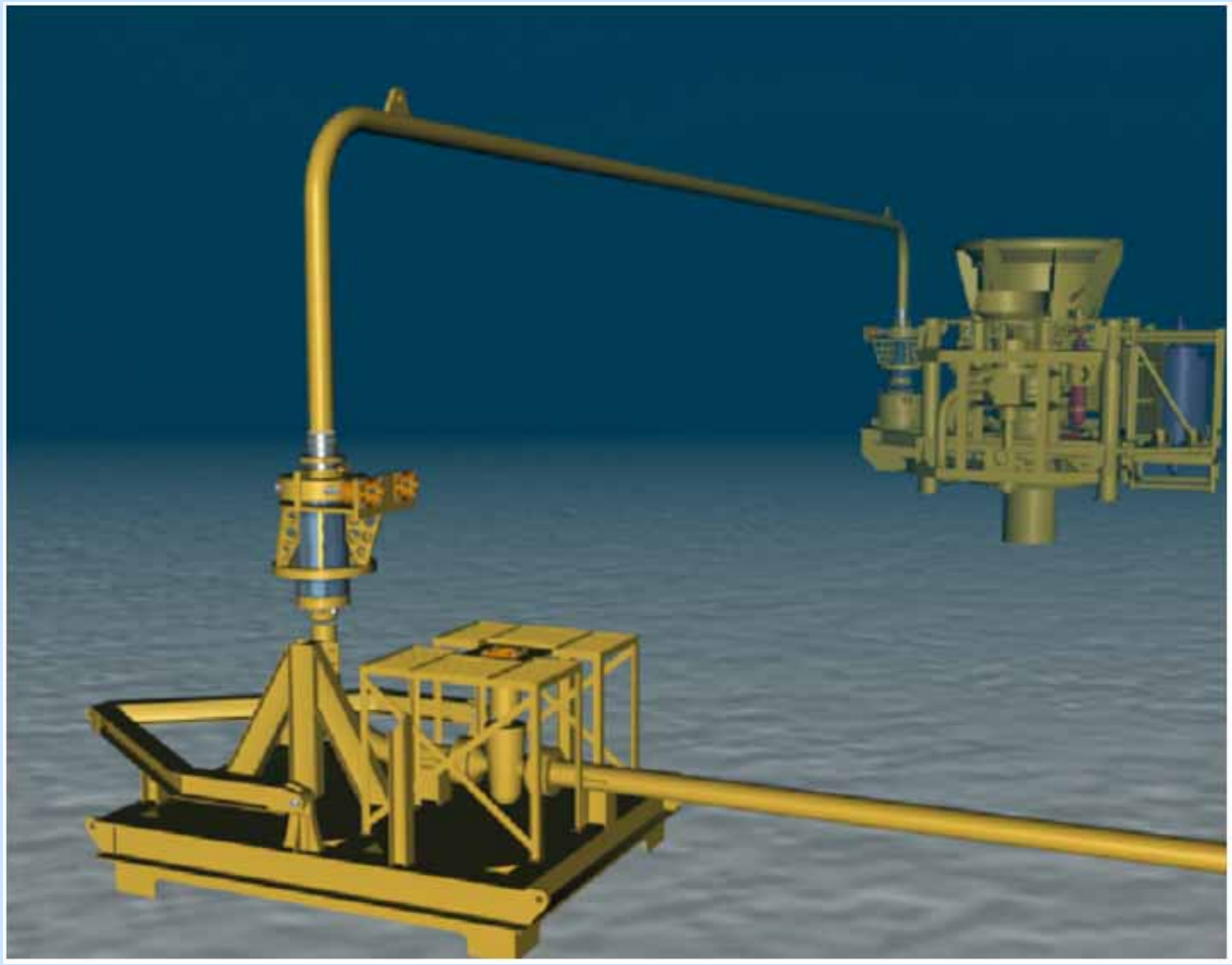
Guideline Diverless

Guidelineless Diverless

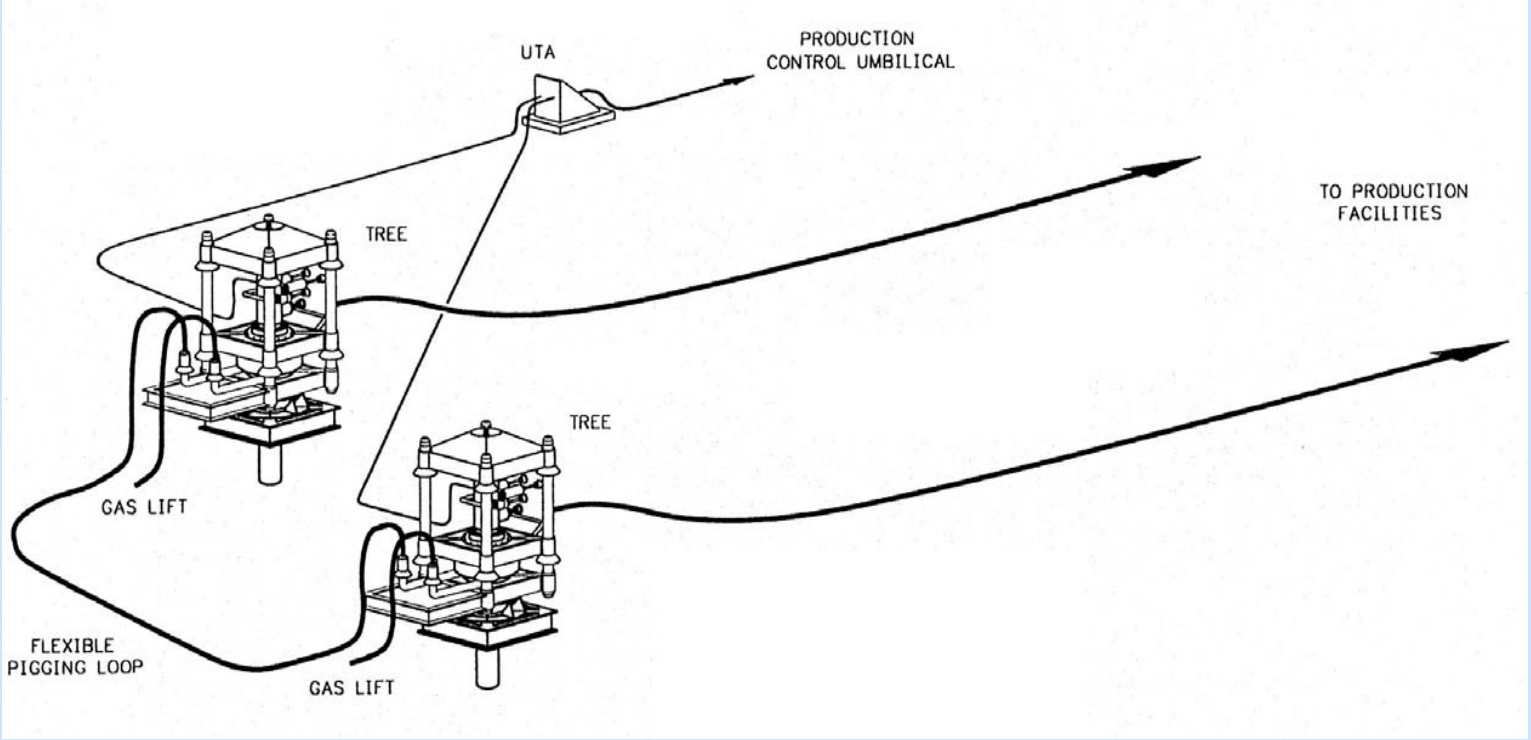
Guideline Diver assist

What Flavor Do You Want?

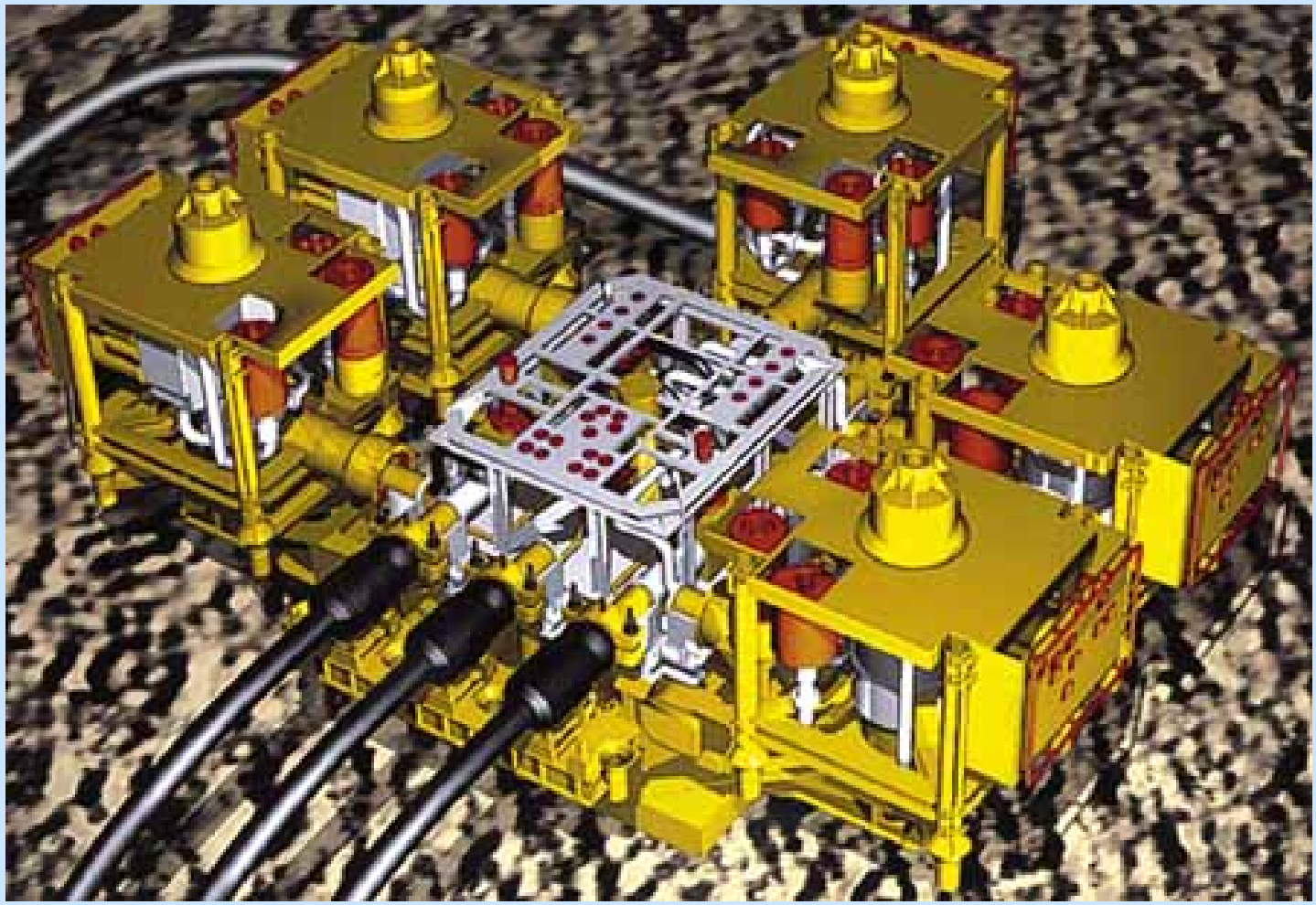
Simple Tie-Back



Daisy Chain


UTA
PRODUCTION
CONTROL UMBILICAL
TO PRODUCTION
FACILITIES
TREE
TREE
GAS LIFT
FLEXIBLE
PIGGING LOOP
GAS LIFT

Template Trees



Trends

- In deepwater applications, Horizontal or Spool Trees are the preferred choice
- Mudline Trees are still in use
- High Temperature High Pressure
- Independents are taking the lead in using “standard” trees
- Large (Elephant) field developments are more likely to see specialized trees
- The all electrical tree is not dead
- Watch MMS notices and regulations (Casing annulus monitoring, etc.)

Parting Thought

No Subsea Trees were damaged during Hurricane IVAN