Subsea Umbilical Systems

Presented by

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Lecture 1: Introduction to Subsea Umbilical Systems

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Introduction

- **Subsea umbilicals** are installed between the **host facility** and the **subsea facility**.

- In general, the **umbilical** includes a **catenary riser (dynamic segment)** transitioning into a **static segment** along the seabed to the **umbilical termination assembly (UTA)** at the subsea facility.

- For **shorter lengths**, the **segments** may be identical.

- The **umbilical pull-head** will include a split flange (or other) assembly for hang-off of the **umbilical at the host facility**.
Introduction

- A **bend stiffener** or **limiter** may be installed at the top of the **catenary riser** and at the **UTA**.
Introduction

- General requirements for the **umbilical system** include:
  - **Electrical power, control, and data signals** should, as a base case, be contained on the **same pair of conductors**.
  - **Super duplex steel tubes** should be used.
  - The **umbilical** is fabricated in one continuous length.
  - The **umbilical system** is designed without any planned change-out over the design life.
Introduction

- A subsea umbilical is a combination of:
  - electrical cables,
  - fiber optic cables,
  - steel tubes, and
  - thermoplastic hoses

  Or two or three of these four **components** that **execute specific functions**.

- These **components** are **assembled** to form a **circular cross section**.

- The **functions** and **characteristics** of the **four umbilical components** are described and specified in the following sections of this module.
Introduction

The main functions are listed below and described in the following sections:

- Subsea production and water injection well control;
- Well workover control;
- Subsea manifold or isolation valve control;
- Chemical injection;
- Subsea electrical power cable.
Introduction

- The **umbilical delivery procedure** typically includes the following steps and schedule:
  
  ✓ Feasibility study;
  
  ✓ Umbilical specifications and request for quotation;
  
  ✓ Qualification tests for fatigue and other tests (specifications and execution);
  
  ✓ Long-lead item procurement;
  
  ✓ Bid evaluation;
  
  ✓ Supplier selection;
  
  ✓ Project sanction and umbilical procurement;
  
  ✓ Detailed umbilical design and analysis by the supplier;
Introduction

- The **umbilical delivery procedure** typically includes the following steps and schedule cont....
  
  ✓ Third-party design verification by an analysis specialist;
  ✓ Prototype qualification tests;
  ✓ Umbilical manufacturing (normally requires a period of 1 year);
  ✓ System integration test;
  ✓ Umbilical delivery to host vessel;
  ✓ Commissioning;
  ✓ System start-up;
  ✓ Project management, QA/QC.