

UMBILICAL CROSS-SECTION AND IN PLACE ANALYSIS

INTRODUCTION:

Umbilicals are key facilities for the subsea production system of an offshore oil exploitation, as they most generally provide hydraulic control, electrical power, information (monitoring), and chemicals up to the wellheads of a subsea field. It consists of steel tubes, electrical cables, optical fiber cables, fillers, and an inner sheath, which are assembled into an inner core.

UMBILICAL DESIGN:

- Umbilical/Cable Section Drawings;
- Diameter, weight and mass calculation;
- Mechanical Sizing of the tubes (i.e. super duplex) performed in accordance with ISO 13628-5 and DNV-GL-ST101;
- Axial, Bending and Torsion Stiffness definition;
- Bill of Materials list with quantities,
- Dimension and proprieties of each element;
- Tension vs Curvature Plot;
- Accumulated Plastic strain;
- SN Curve fatigue;
- Pressure drop /hydraulic analysis;
- Chemical pump design;



DESCRIPTION

FLUID AND MATERIALS:

- Fluids and material complete database;
- Possibility to customize fluids and materials.

UMBILICAL COMPONENTS:

- Duplex & Super Duplex Tubing;
- Electrical Quad. & Power Conductor;
- Fiber Optic Cable;
- Coating & Tape (i.e. Polyethylene);
- Steel Wire Armour.

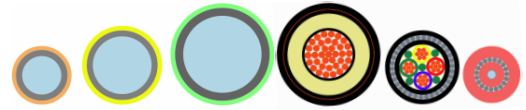


Figure 2 - Umbilical Components

UMBILICAL SECTION:

- Design cable or umbilical.
- Section customization.

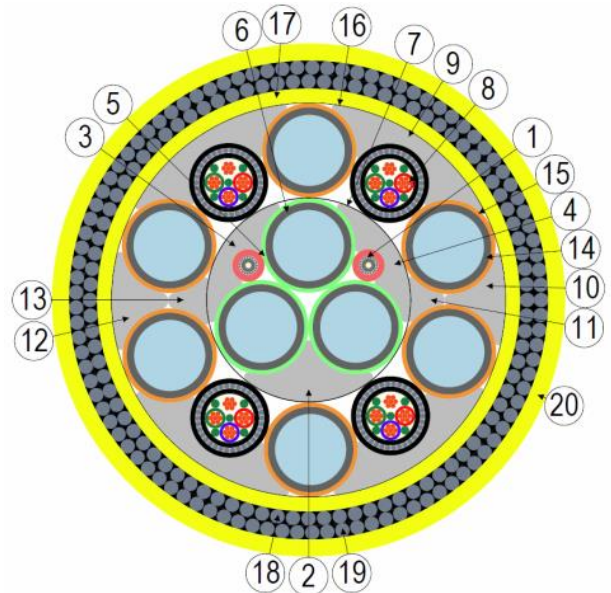


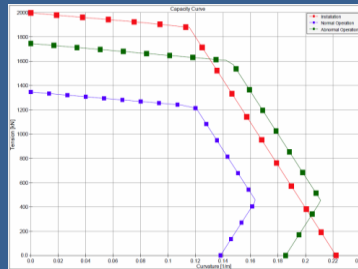
Figure 3 - Typical Umbilical Cross Section

POS	QTY	Description	ID mm	T/Wt mm	OD mm	Material	Mass/Length kg/m
1	2	Fiber Optic Cable			11.50		0.4
2	1	Shaped Filler			23.87	MDPE	0.4
3	1	Shaped Filler			20.50	MDPE	0.3
4	1	Shaped Filler			20.57	MDPE	0.3
5	3	HDPE Coating for Chemical Tube 1" 7500 PSI	30.60	1.50	33.60	HDPE	0.4
6	3	Chemical Tube 1" 7500 PSI	25.40	2.60	30.60	Super Duplex 25%Cr UNS 32750	5.4
7	1	Binding Tape	72.41	1x0.15	73.01	LDPE	0.1
8	4	Elec. Quad 16mm2 Armored			28.26		6.9
9	4	Shaped Filler			25.48	MDPE	1.9
10	1	Shaped Filler			18.75	MDPE	0.3
11	1	Shaped Filler			11.39	MDPE	0.1
12	1	Shaped Filler			19.91	MDPE	0.3
13	1	Shaped Filler			12.64	MDPE	0.1
14	6	Chemical Tube 1" 7500 PSI	25.40	2.60	30.60	Super Duplex 25%Cr UNS 32750	10.8
15	6	HDPE Coating for Chemical Tube 1" 7500 PSI	30.60	1.50	33.60	HDPE	0.9
16	1	Binding Tape	140.21	1x0.15	140.81	LDPE	0.1
17	1	External Sheath	140.81	5.00	150.81	MDPE	2.1
18	88	Circular Armour Wire	150.81	5.00	160.81	Galvanized Steel Wire	14.4
19	97	Circular Armour Wire	160.81	5.00	170.81	Galvanized Steel Wire	15.9
20	1	Ext. Sheath over Circular Armour Wire	170.81	6.00	182.81	MDPE	3.1

Figure 4 - Bill of Material List (Example)

CAPACITY CURVES:

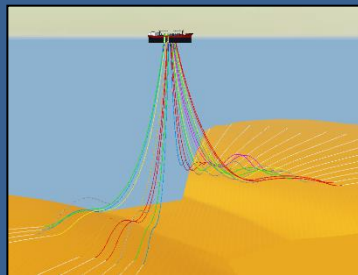
-A capacity curve shows the maximum curvature an element (and its sub-elements) can have under different axial loads, before the element or one of its sub-elements reach a predefined yield limit as per ISO 13628-5 criteria.



Tension-Curvature plot

RELATED SKILLS:

- Static & Dynamic Analysis with Orcaflex®
- On-Bottom Stability as per DNVGL-RP-F109;
- On bottom roughness and free span;
- Routing, Field Layout & alignment sheets;



Analysis with Orcaflex®

CUSTOMIZATIONS

