



SPT Offshore

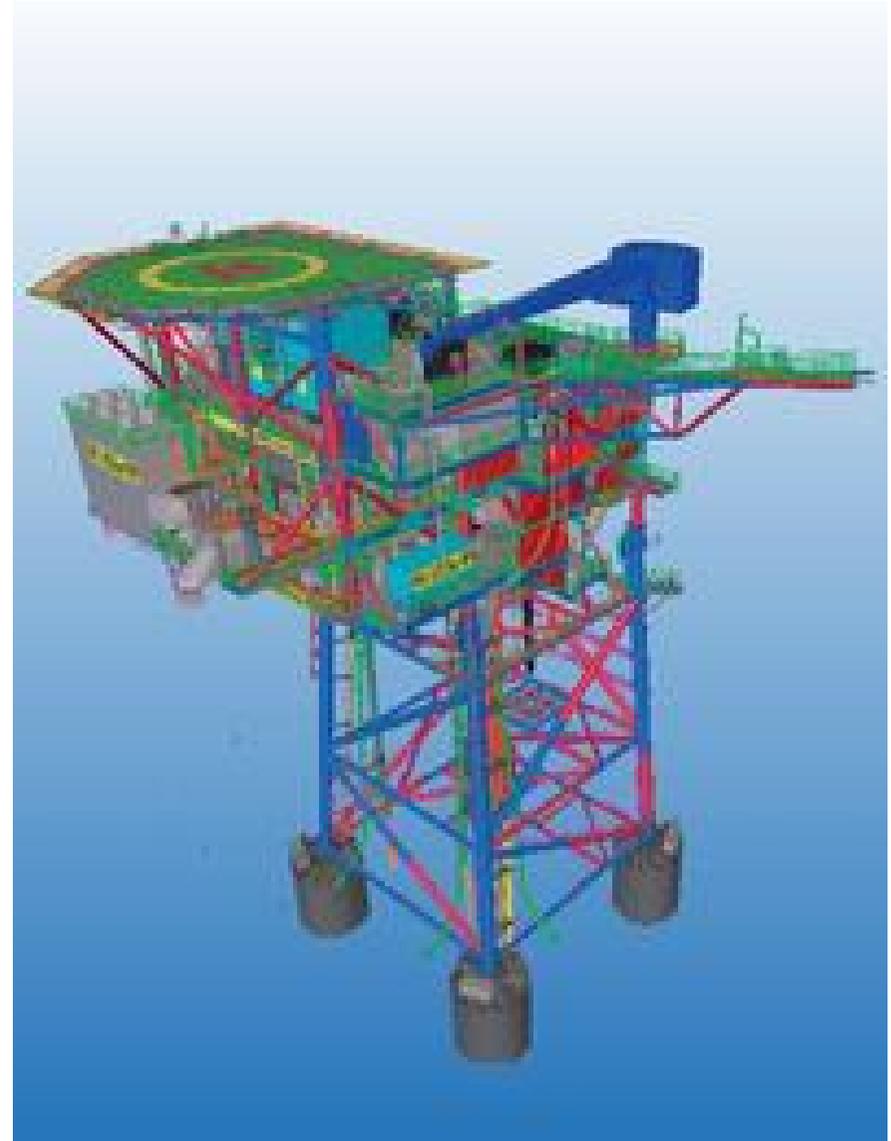


Q13a-A Foundation Installation
O.J. Dijkstra – Engineering Manager

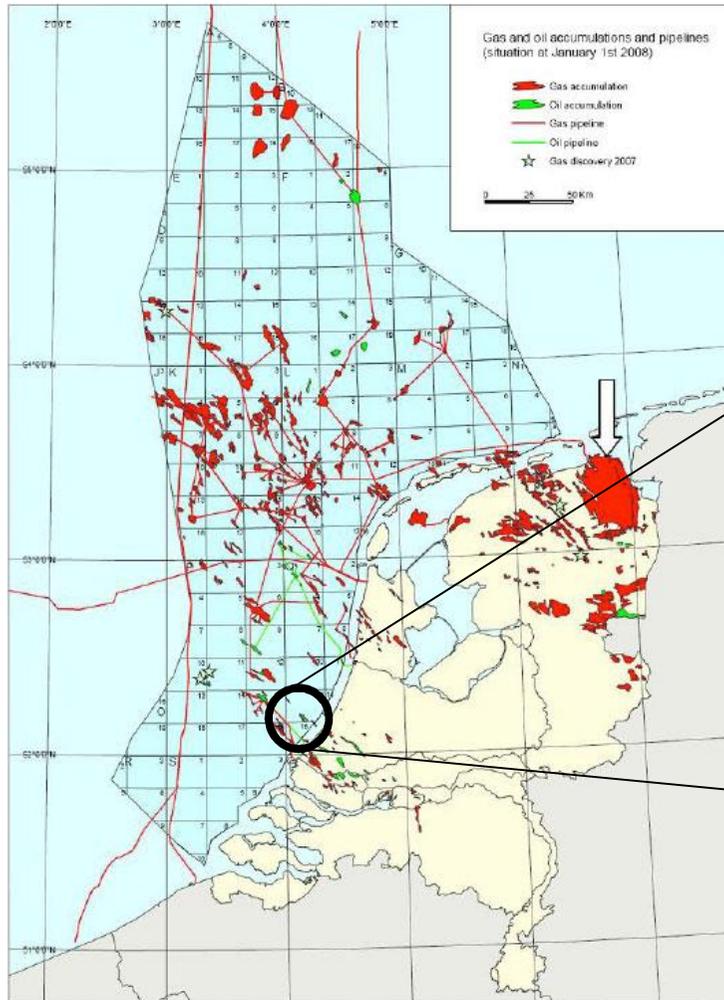
Q13a-A platform installation

Contents

- Q13a-A Amstel field history
- Project History
- Foundation Design
- Jacket/Foundation Installation



Q13a-A location



Q13a-A – Amstel field history

- Discovered in 1962
- 1984 – 1998 NAM
- 2000 – 2003 various licensees
- 2008: Delta Hydrocarbons / EBN B.V. becomes government participant in the activities
- 2010: GDF SUEZ E&P Nederland B.V. becomes joint licensee of Q13a
- 2011: exploration drilling by GDF SUEZ E&P Nederland
- 2013: installation of the platform



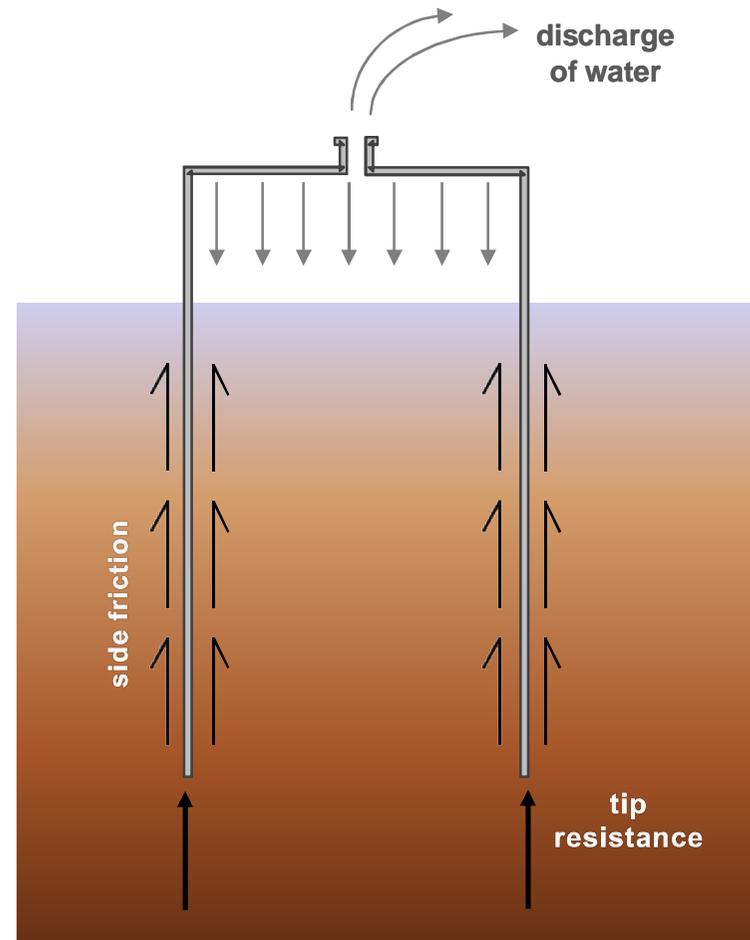
Project history

- Suction Pile Foundation was part of the original license of Delta Hydrocarbons
- License was taken over by GDF-Suez
- From well-head platform + production platform (SIP-2 concept) to one full size oil production facility
- Jacket designer: Iv oil & gas
- Foundation designer: SPT Offshore



How do Suction Pile installations work?

- Lower SP to seabed
- Self penetration
- Discharge of water by pumping, causes difference in water column inside and outside
- Driving force on the top-plate (10 tonne / m² / bar)



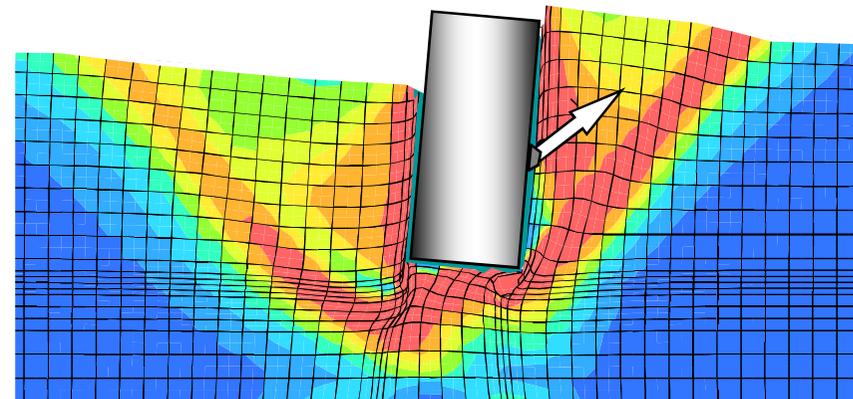
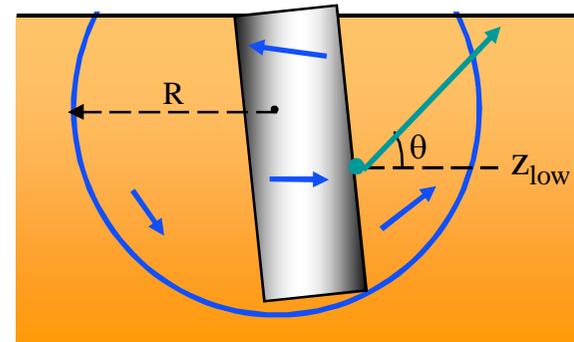
Suction Pile Design (geotechnical)

Design Aspects

- Shallow/intermediate foundation
- Capacity skin friction, moment & torsion
- Installation by differential pressure
- API & DNV codes
- Scour protection needed in non-cohesive soils
- Software 3D
 - Plaxis FE

Suitable soils

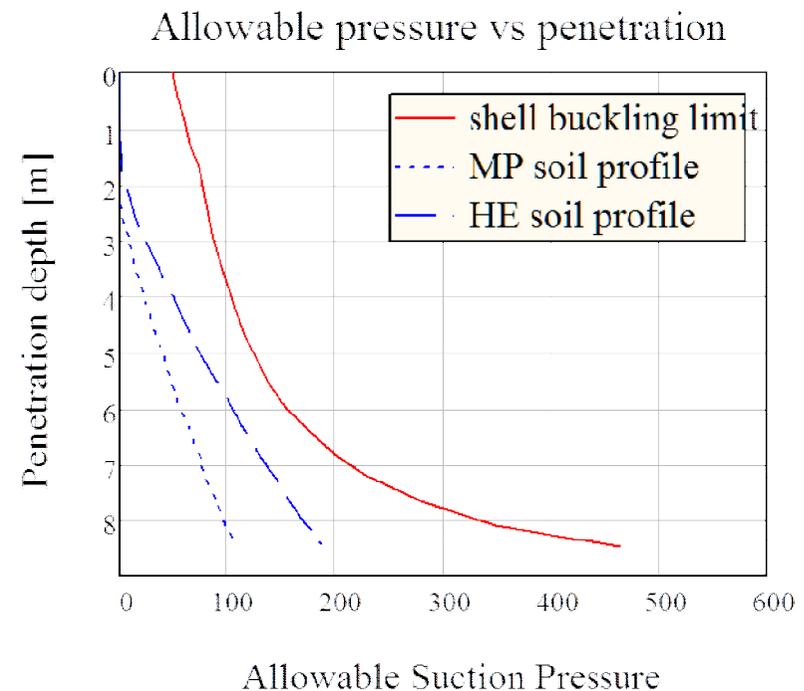
- Loose to dense sands
- Soft to very stiff clays
- Layered soils



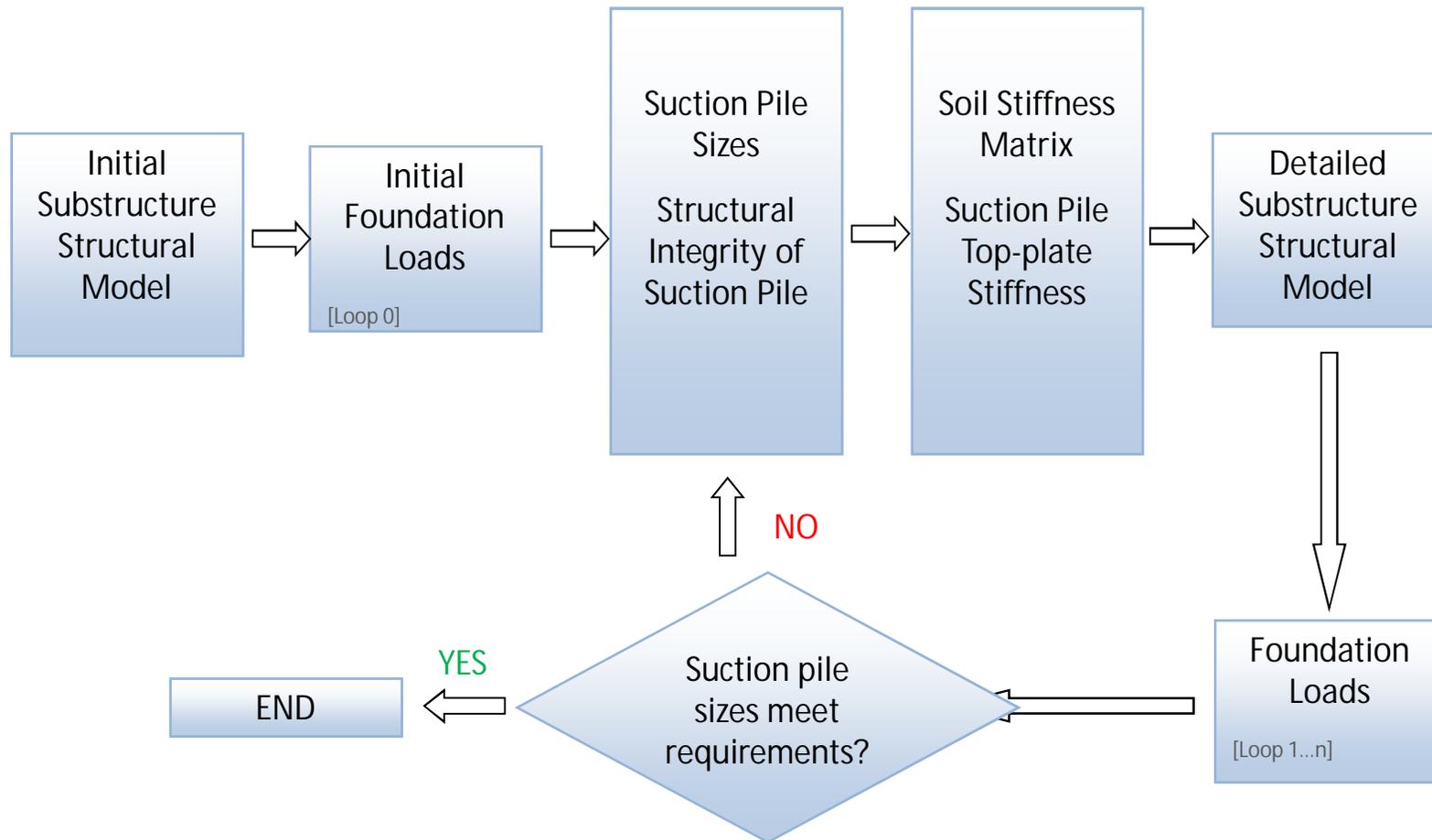
Suction Pile Design (structural)

Design Aspects

- Installation Pressure differential
- Shell buckling
- Lifting design loads / lifting equipment
- Transport & Installation loads
- In-place design loads
- Corrosion protection
- API, ISO & DNV codes
- Selection of steel types
- Software
 - FEMAP/NX Nastran
 - SACS

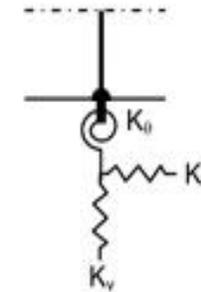
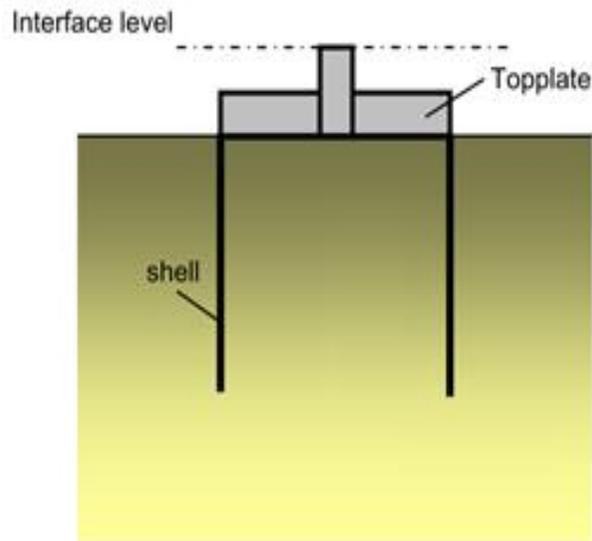


Design Process



Q13a-A platform foundation design (1)

Loads:	Operational	Boat Impact
Compression [MN]	16	20
Tension [MN]	0.3	4.3
Lateral [MN]	2.9	7.8
Moment [MNm]	6.8	23.2



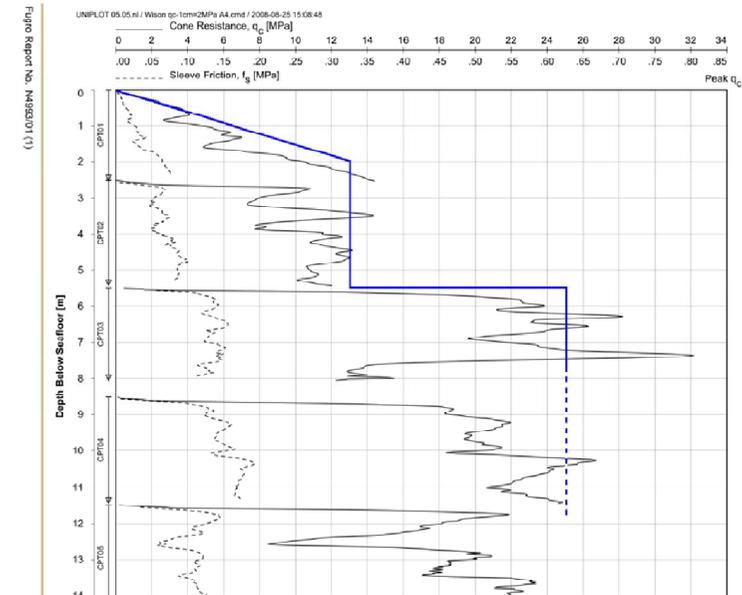
Q13a-A platform foundation design (2)

Geotechnical parameters

Description	Depth	γ [kN/m ³]	Friction angle, ϕ [°]	Cohesion, c' [kPa]	$E_{50,ref}$ (best est.)	Cone resistance, q_c
	[m] BML				[MPa]	[MPa]
Dense to very dense SAND	0.0 - 2.0	10.5	35	0	80	0.0 - 13.0
	2.0 - 5.5				70	13.0
	5.5 - 8.0				90	25.0
	> 8.0				55	Assumed 25.0

Note:

- $E_{50,ref}$ is a reference stiffness modulus at a reference stress of 100kPa.
- Young's Modulus derived according to correlation $E_{oed} = 3 \cdot q_c$; $E50 = 0.67 \cdot E_{oed}$



Q13a-A platform foundation design (3)

Geotechnical Design

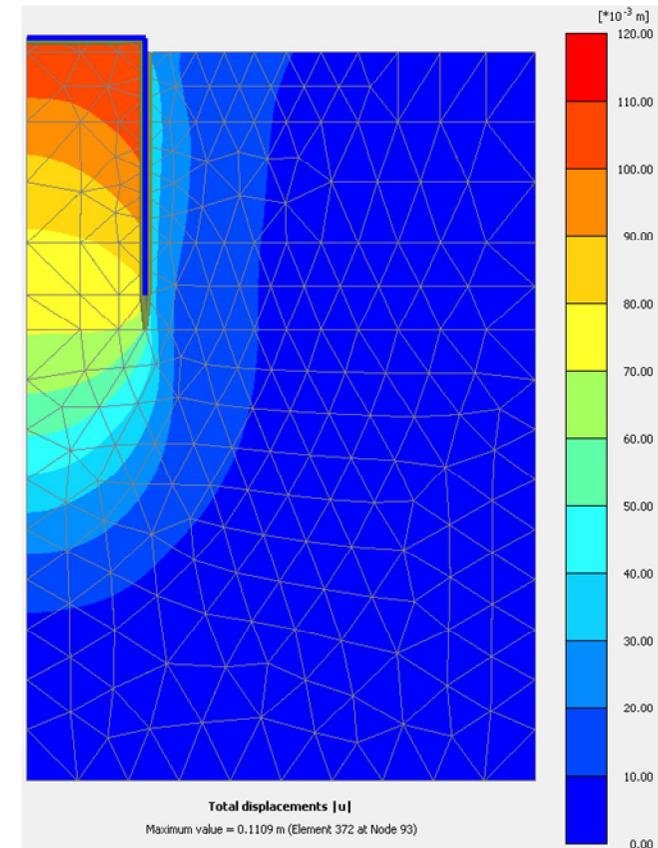
Dimensions:

- Diameter: 7.0m
- Penetration: 6.9m

Vertical capacity by:

- Shaft friction
- End bearing

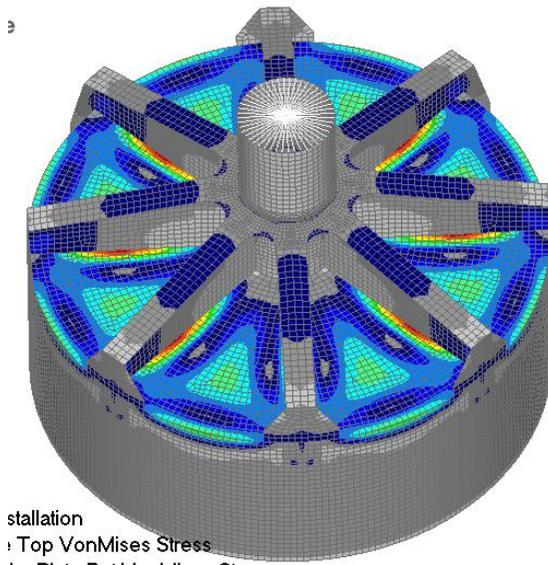
Under base grouting applied because of settlements requirements



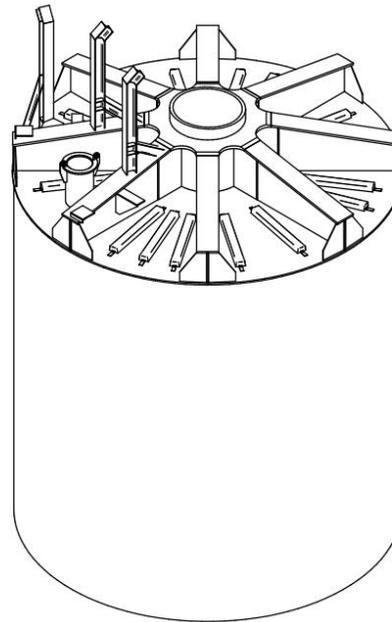
Q13a-A platform foundation design (3)

Structural Design

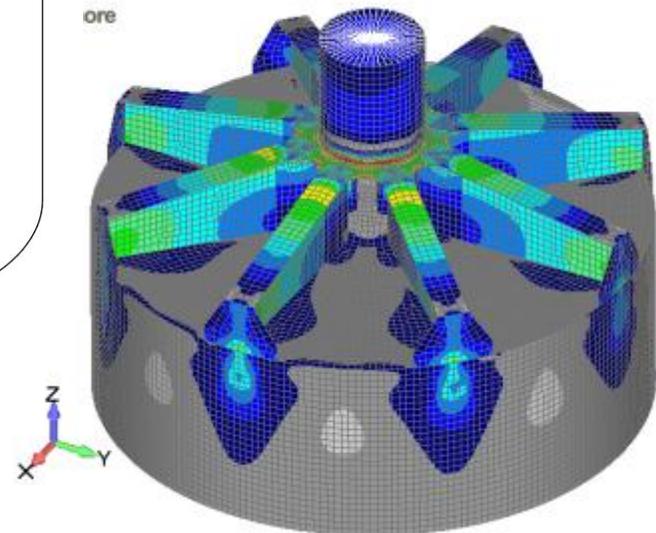
- Installation condition
- Static In-Place condition
- Fatigue life design



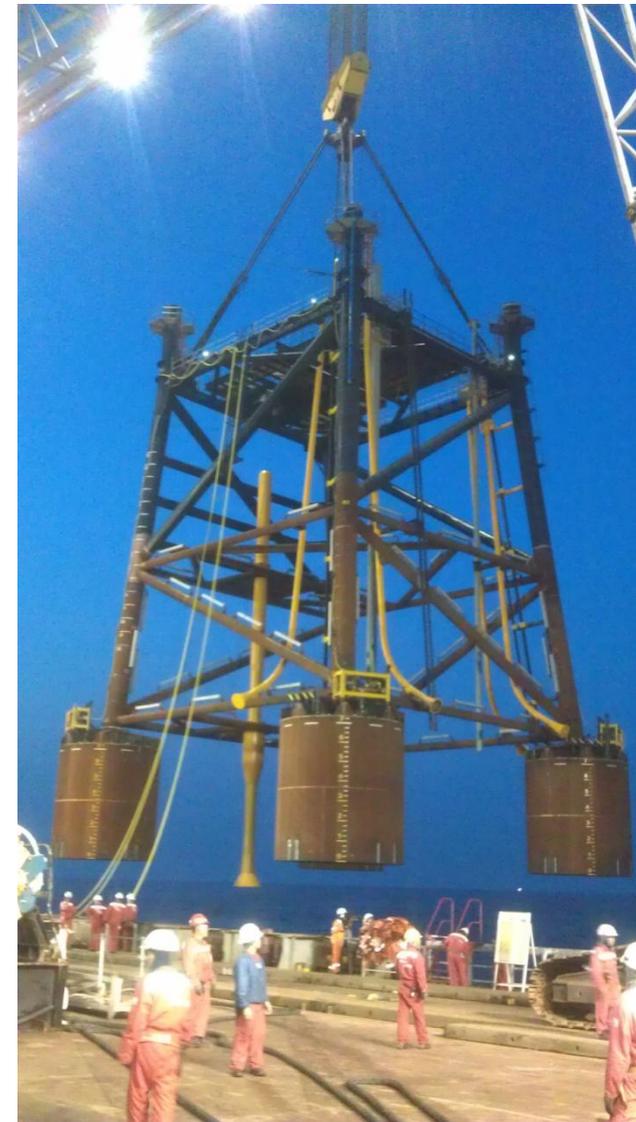
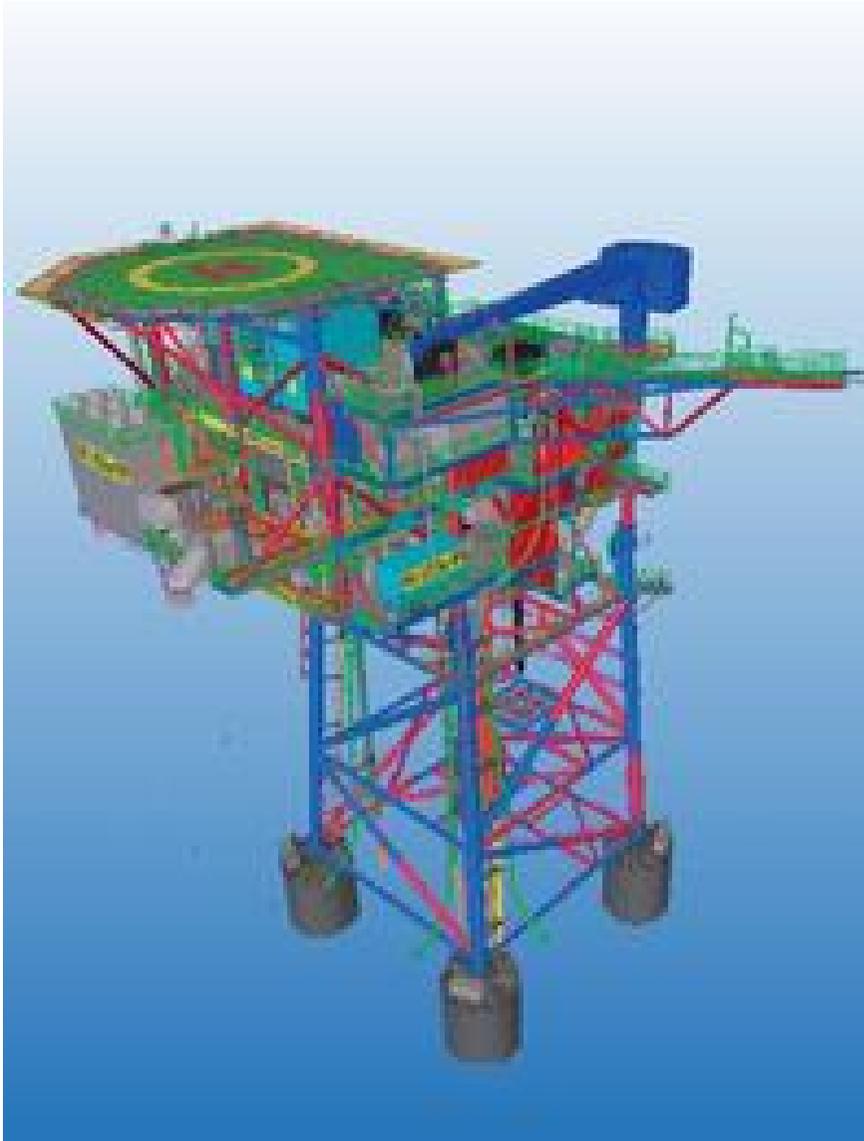
Installation
condition



In-Place
condition



Overall design result



Gaz de France, Q13a-A, Platform Installation

- Operator/Client: **GDF SUEZ**

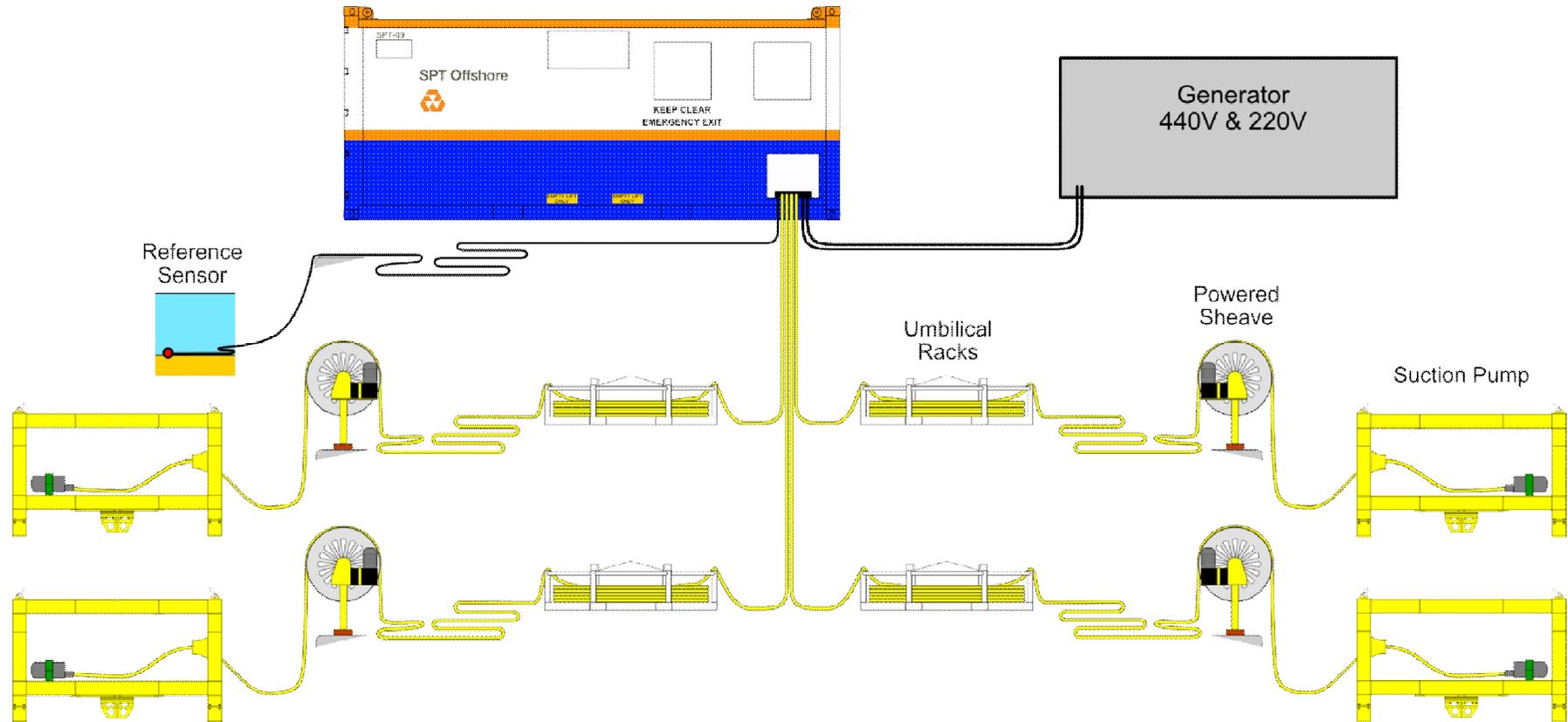
- Offshore installation contractor: **Seaway Heavy Lifting**



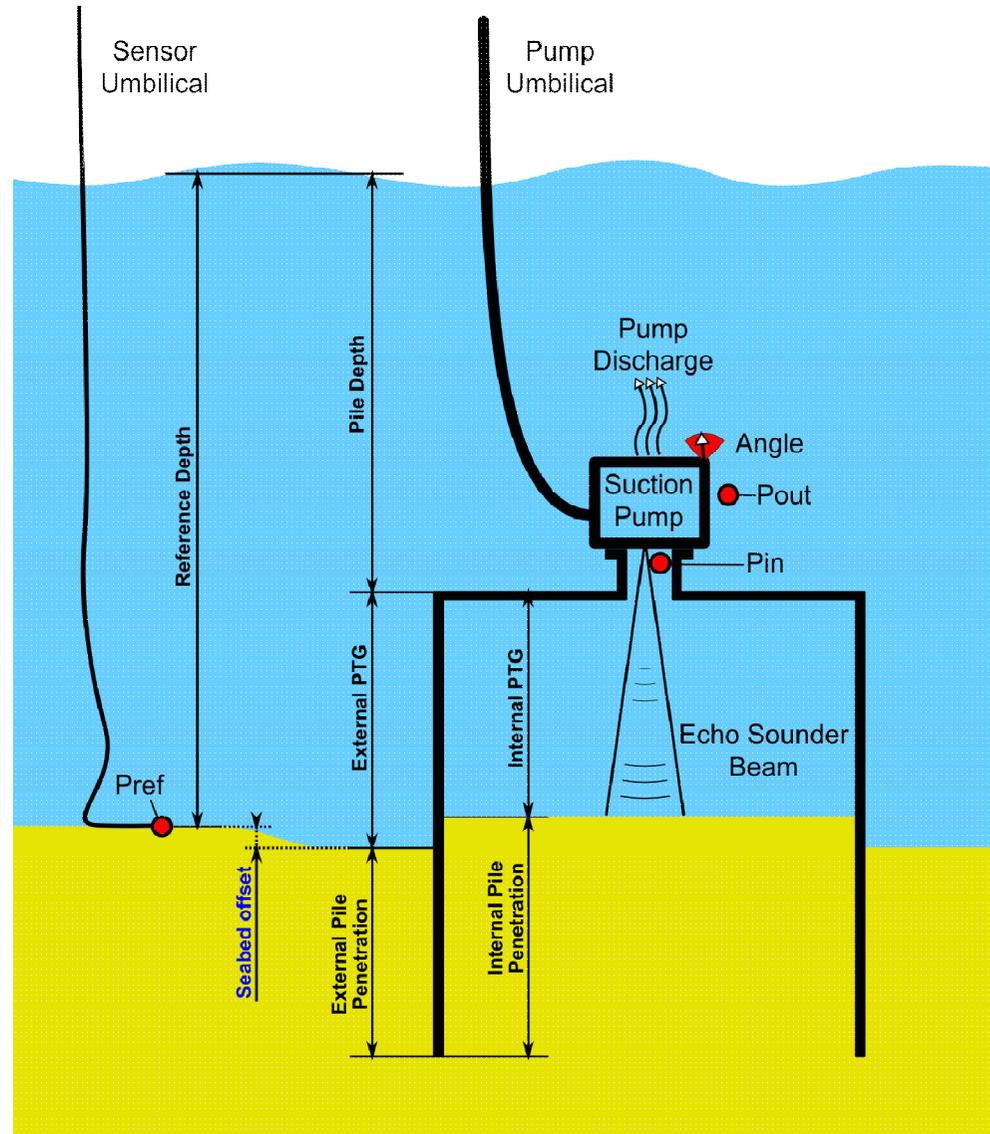
- Suction installation Sub-contractor: **SPT Offshore**



SPT Scope: Typical layout of the system



Suction Pump Skid parameters



Jacket on fabrication-yard NAMI



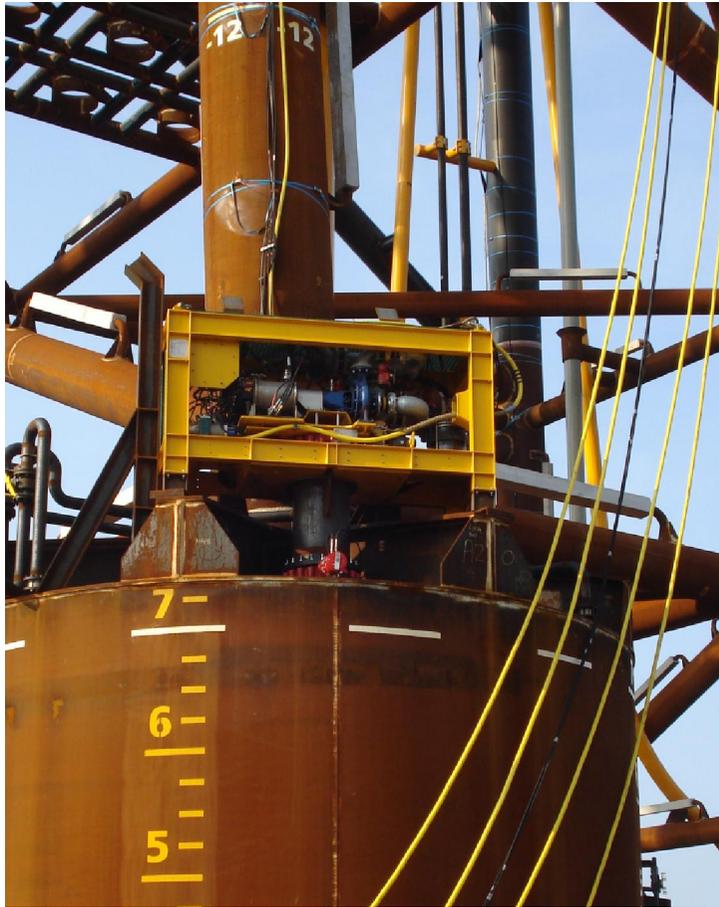
Installation of Suction Pump Units and Umbilicals



Commuting to your work



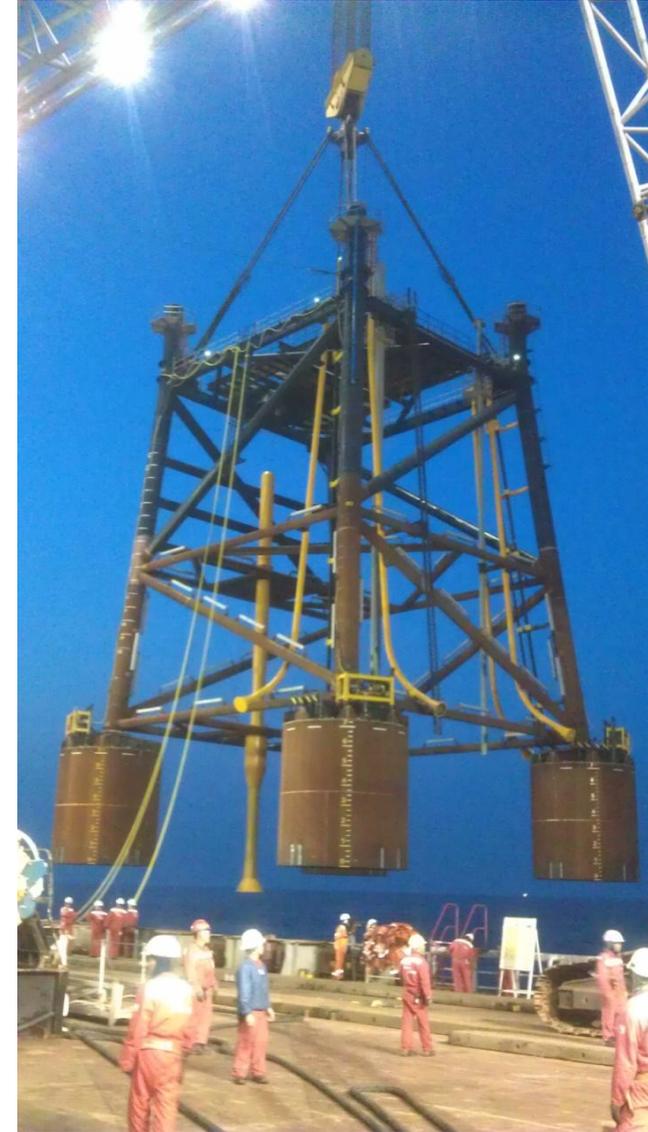
Arrival of the Jacket and Topside on the barge



Suction Pump Unit



Offshore Lift of the Jacket

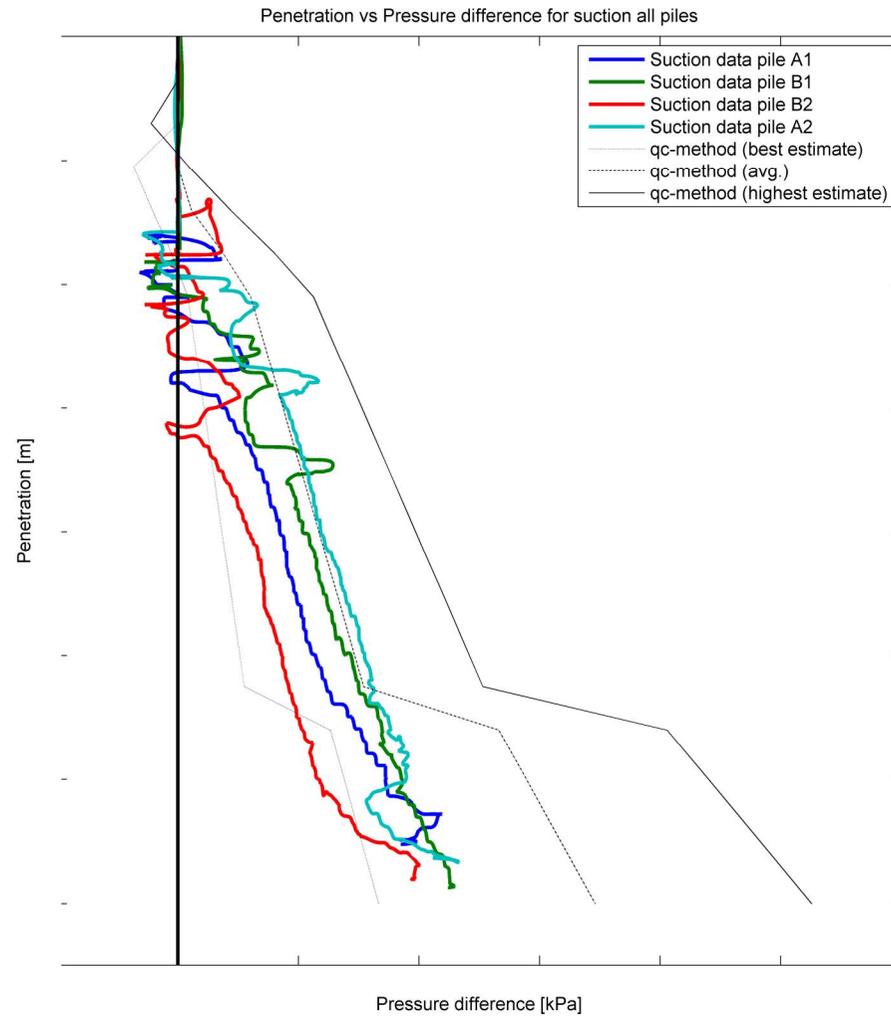


Suction Installation

It's Nighttime

Installation Results vs Theory

Installation pressures vs penetration depth



Top side lift



Foundation Job Done!

