Boskalis

VINCENT KOSTER **PRODUCT SPECIALIST OFFSHORE WIND**

TAIPEI

18 SEPTEMBER 2018

Boskalis

Vincent Koster

Product Specialist Offshore Wind

Responsibility:

- Development and optimization of Offshore Wind at Boskalis
- Development of special wind related tools.
- Involved in all parts of the business unit (tender; engineering; operations)

Experience:

- During the past period I have been involved in multiple Offshore (Wind) Projects in which I full-filled the role of technical interface manager between engineering and operations.
- Important long term projects in which I was involved in are Malampaya DCP installation, OWF Wikinger, OWF West Duddon Sands, OWF Aberdeen Bay.

Figure:
Asian Hercules 3 installing suction bucket jacket Aberdeen

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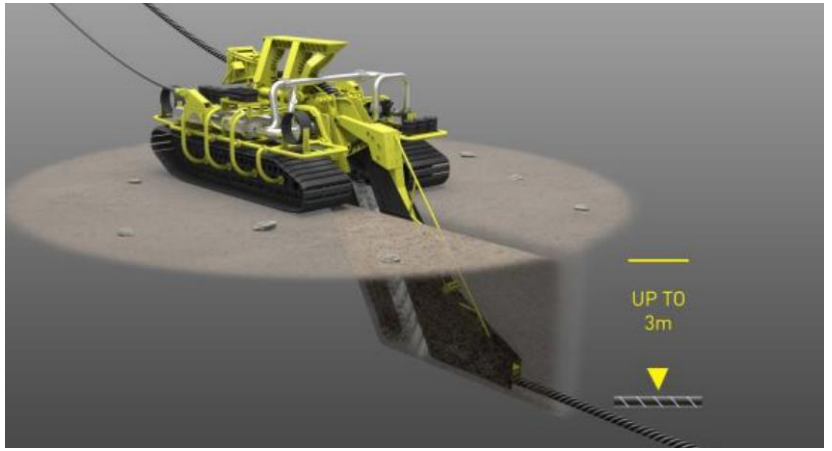
BOSKALIS CREATES NEW HORIZONS

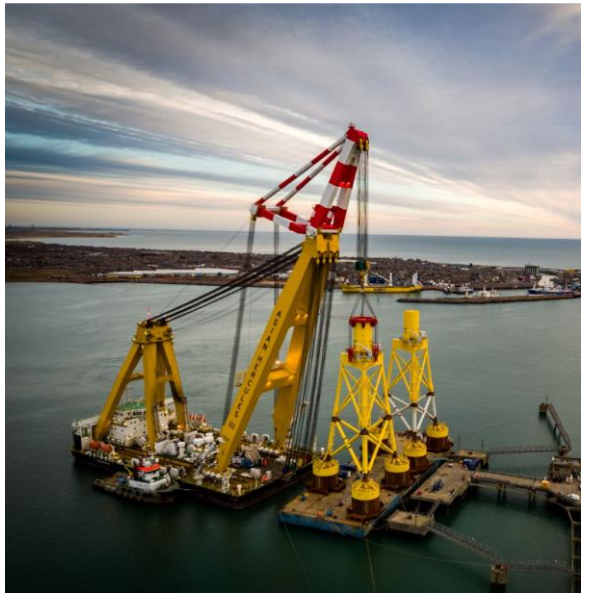
Malampaya phase 3

Dolwin 2



3D drawing
transformer burial tool

Salvage operation Baltic ace



Asian Hercules 3 @ Aberdeen Bay OWF

Artificial reef development

OFFSHORE WIND CHALLENGES

- **USE OF MORE COMPLEX SITES**
  - Water depths increasing
  - Difficult Soil parameters
- **FOUNDATION SIZES INCREASING**
- **WTG SIZES INCREASING**
- **CHANGING FOUNDATIONS**
  - Jackets (suction buckets; pin piles)
  - Drilled and grouted solutions
  - Floating foundations
- **PRICES UNDER PRESSURE**

Figure: Jacket transport Wikinger with S-class

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FLOATING INSTALLATION ASSETS

Figure:
Jacket and pin pile installation East Anglia 1

FLOATING INSTALLATION KEY IN TAIWAN

- SOIL CONDITIONS, RESULTING IN HEAVY PILES
- EARTH QUAKES
- TYPHOON

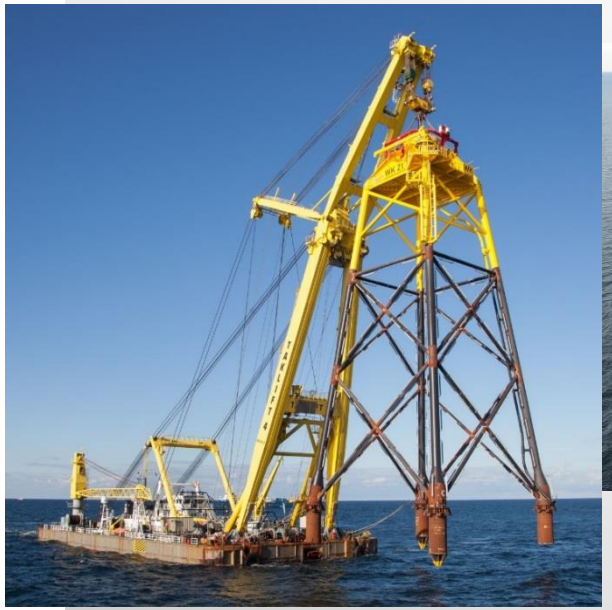

Figure:
Jacket installation Wikinger
70 foundations

Figure:
Pin pile installation Wikinger
70 foundations

Figure:
Jacket and Pin pile installation East Anglia
ongoing

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PROJECT EQUIPMENT DEVELOPMENT

Figure:
MP installation
Veja Mate

JACKET INSTALLATION –PIN PILES

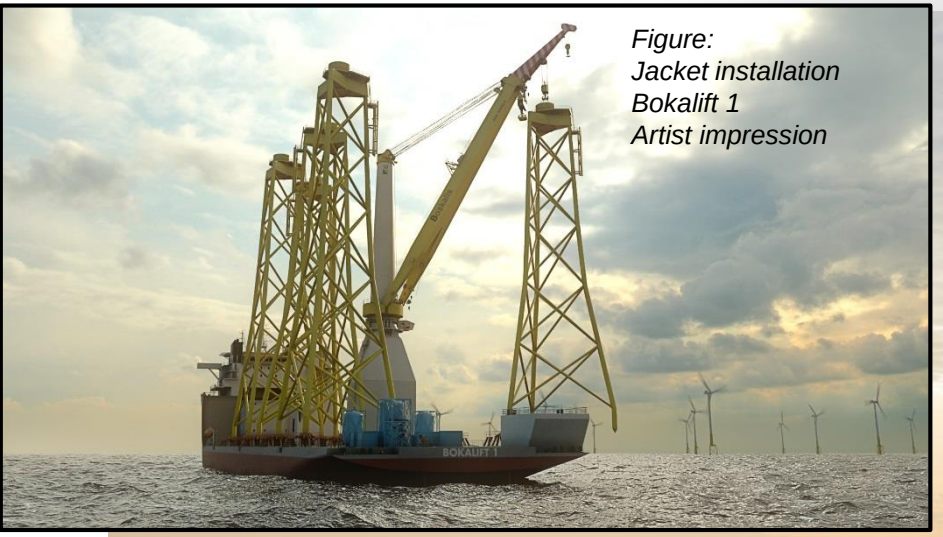

Figure:
Jacket installation
Bokalift 1
Artist impression

Figure:
Jacket installation
Taklift 4
Wikinger

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EXAMPLE: WIKINGER PROJECT

Transport

Pile Installation

In pile Dredging

Jacket Installation

Jacket-Pile Grouting

Motion compensated Drilling

DRILLING

MAIN VESSEL

- Stemat 92; moored to Giant 7

OUTFITTING

- Barge master T-700 motion compensated platform
- Sennebogen 7700
- DDC drilling spread on Barge master

Figure:
Bargemaster motion compensated drilling solution

Figure:
Drilled material
Flint/ lime stone

CUTTING

- **SOMETIMES IT IS NEEDED TO CUT A PILE.**
- **CAN BE ALSO CONSIDERED A CONTINGENCY SOLUTION**
- **ABRASIVE CUTTING:**
  - 3000 bar
  - 50 l/ min
  - Abrasive material (special sand)
- **PERFECT CUT OF A FEW MM**

Figure:
Abrasive cutting of a pin pile

JACKET INSTALLATION – SUCTION BUCKET

Figure:
Jacket installation
Bokalift 1
Artist impression

Figure:
Aberdeen sucktion
vbucekt installation

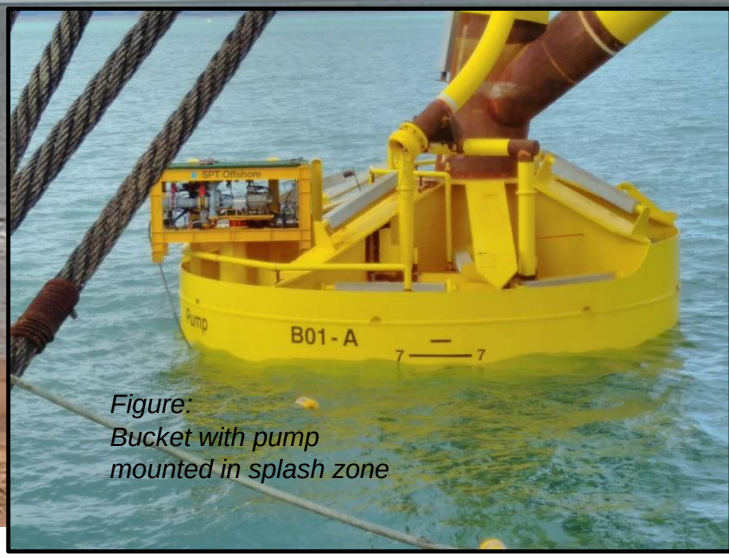


Figure:
Bucket with pump
mounted in splash zone

EXAMPLE: ABERDEEN BAY OWF

Client	Vatenfall
Contractor	Boskalis Offshore Wind
Project	Aberdeen Bay
Scope	Balance of plant (BOP) • Foundation Design Package (DES) • Foundation Fabrication Package (FAB) • UXO investigation and clearance • Foundation Transport and Installation Package (TI) • Cable Supply and Installation Package (CSI) • Wind Turbine Generator (WTG) Installation Package
Foundation Type	Suction bucket jacket
Amount of Foundations	11
Main Sub Contractors	Ramboll, Smulders, JDR, Swire Blue Ocean, 'VBMS', 'Boskalis Subsea', 'Boskalis Hirdes'

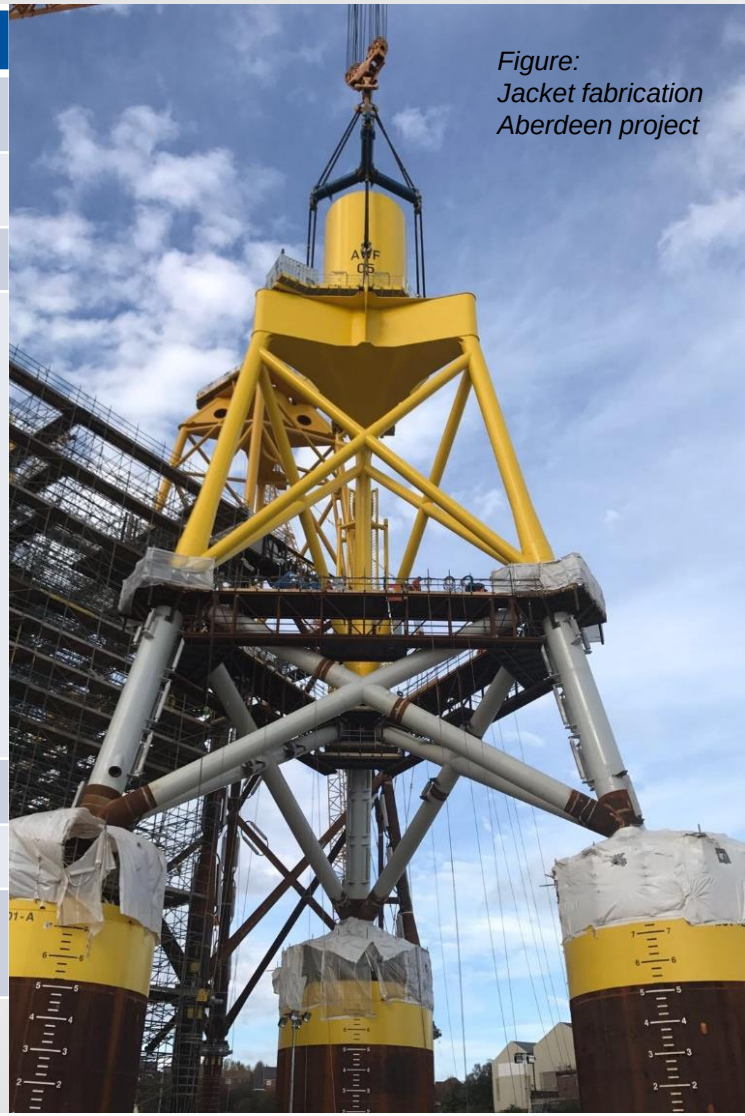
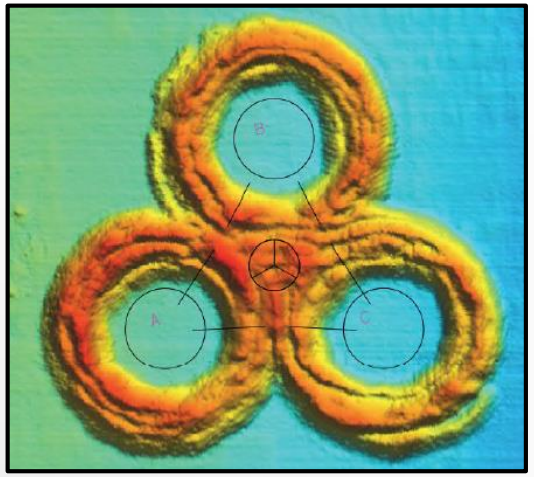


Figure:
Jacket fabrication
Aberdeen project

SEQUENCE OF INSTALLATION

ABERDEEN BAY OWF

Design and fabrication



Pre-lay scour protection

Transport of jackets

Installation of jackets

WTG installation

Export and array cable installation

Grouting and post scour protection

Secondary works and hand over

BOSKALIS TOOLBOX KEY TO SUCCESS IN TAIWAN

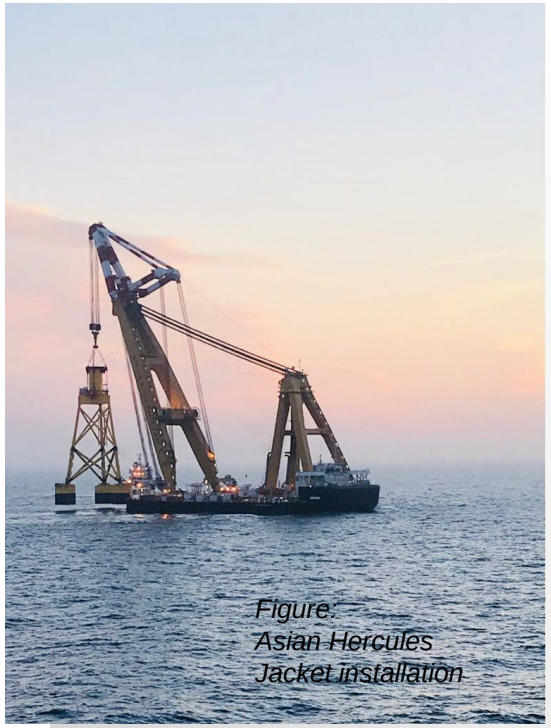


Figure:
Asian Hercules
Jacket installation

Figure:
East Anglia template
installation

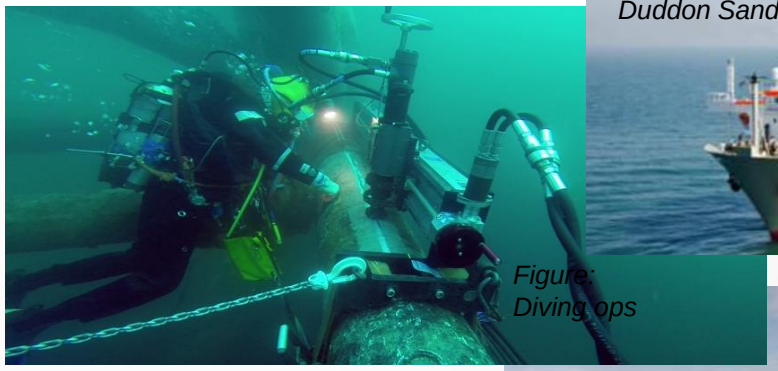


Figure:
Diving ops

Figure:
Sea horse @ west of
Duddon Sands

Figure:
Aberdeen Bay

Figure:
Wikinger pin pile
installation

Figure:
Nduronce/ transformer

Figure:
Borkum OSS

QUESTIONS?

Figure:
Asian Hercules 3 leaving port of Aberdeen with jacket to be installed @ Aberdeen Bay OWF