Kajima Corporation has a rich history of operations and experience as a civil engineering construction company. The “enterprising spirit” drives the company and its employees to take on new and big challenges. One of the challenges that Kajima Corporation has taken on, is the construction of the first big offshore wind farm the Japanese offshore waters. Kajima Corporation has expressed the wish to obtain knowledge in the field of offshore engineering to aid the company in its challenge of constructing this new type of project in traditional time lines. DOB-Academy is an industry knowledge institute that puts the sharing of knowledge as a vocal point of the organisation.

DOB-Academy’s courses combine theory and industry practise and will provide participants with comprehensive background knowledge for them to prosper in their jobs. The company’s in-house experts are complemented by a great network of industry experts. Next to theoretical lectures, DOB-Academy can provide hands-on cases and share EU best practises in the different stages of an offshore wind farm design and project execution. Together, the total package from (background-) knowledge and hands-on experience is a golden formula in training people and equipping them with the right knowledge and tools for the job.
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PROGRAMME

The three two-day course programmes are listed below. An overview of the topics can be found in the section “Tailor specifics” on page 16.

INTRODUCTION OFFSHORE WIND (DAY 1)

8:30 Welcome & coffee
9:00 Course introduction
9:15 History offshore wind
9:45 Electricity, society & policy
10:15 Break
10:30 Case: DIY rotor competition pt. 1
11:00 What is wind?
11:30 Case: DIY rotor competition pt. 2
11:45 From wind to torque
12:30 Lunch
13:15 Case: Energy Yield calculation
14:15 Break
14:30 Offshore wind in numbers
15:00 Power generation
15:15 Offshore power networks
16:00 Closing remarks
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>8:30</td>
<td>Welcome &amp; coffee</td>
</tr>
<tr>
<td>9:00</td>
<td>Introduction to support structure design</td>
</tr>
<tr>
<td>10:00</td>
<td>Break</td>
</tr>
<tr>
<td>10:15</td>
<td>Theory of the monopile</td>
</tr>
<tr>
<td>10:45</td>
<td>Case: simplified design of monopile support structure</td>
</tr>
<tr>
<td>11:30</td>
<td>Break</td>
</tr>
<tr>
<td>11:45</td>
<td>Design and installation</td>
</tr>
<tr>
<td>12:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:15</td>
<td>Case: installing a miniature offshore wind farm</td>
</tr>
<tr>
<td>14:15</td>
<td>Break</td>
</tr>
<tr>
<td>14:30</td>
<td>Operation and maintenance</td>
</tr>
<tr>
<td>15:00</td>
<td>Future technologies</td>
</tr>
<tr>
<td>15:30</td>
<td>Break</td>
</tr>
<tr>
<td>15:45</td>
<td>Exam</td>
</tr>
</tbody>
</table>
OFFSHORE WIND TRANSPORT & LOGISTICS (DAY 1)

8:30 Welcome & coffee
9:00 Course introduction
9:15 Offshore wind introduction
10:00 Break
10:15 Offshore transport
11:00 Case I: Seafastening
11:45 Transport equipment
12:30 Lunch
13:15 Onshore transport
13:45 Planning & strategy
14:30 Case II: Onshore routing
15:15 Break
15:30 Ports
16:15 Closing remarks
PROGRAMME

OFFSHORE WIND TRANSPORT & LOGISTICS (DAY 2)

8:30  Welcome & coffee
9:00  Heavy lifts & transport
9:45  Contracting
10:30 Break
10:45 Insurance
11:30 Case III: Logistic modelling
12:30 Lunch
13:15 Health, safety and environment
14:00 Break
14:15 Case IV: Installation & communication
15:15 Future challenges in T&L
15:45 Break
16:00 Exam
16:30 Closing remarks
OFFSHORE WIND SUPPORT STRUCTURE DESIGN (DAY 1)

8:30  Welcome & coffee
9:00  Course introduction
9:15  Data collection
9:45  Data processing
10:30 Break
10:45 Project: data collection & processing
12:15 Lunch
13:00 Wind turbine dynamics
13:30 Project: monopile dynamics
14:30 Break
14:45 DNV GL design code for OWT
15:15 Load calculations
15:45 Project: Load calculations
16:45 Break
17:00 Project: Design checks
17:45 Closing remarks
OFFSHORE WIND SUPPORT STRUCTURE DESIGN (DAY 2)

8:30   Welcome & coffee

9:00   Ultimate and fatigue limit states Bladed

9:30   Project: detailed load case definition (ULS)

10:00  Break

10:15  Project: Bladed ultimate limit state calculations

11:45  Break

12:00  Fatigue

12:30  Lunch

13:15  Project: detailed load case definition (FLS)

13:45  Project: Bladed fatigue limit state calculations

15:15  Break

15:30  Offshore power networks

16:00  Project: Offshore power network design

17:00  Presentation: MP design

17:45  Closing remarks
DOB-Academy offers a variety of courses consisting of lectures supported by challenging practical cases. The courses enable people from different backgrounds to speak a common language, something essential in a multidisciplinary field such as the offshore industry. During lectures participants will gain in-depth knowledge which they will apply in a hands-on serious games and project hours.

DOB ACADEMY LECTURES AND CASES

The proposed programme consists of three two-day courses. The requested information in relation to the course content can be found in section “Tailor specifics” on page 16. The proposed programme of the three courses focus around the following learning goals:

- Comprehending what wind is and how it can be used to generate electricity

ELECTRICITY, SOCIETY AND POLICY

- We are going offshore
- How to meet the targets?
- Dutch situation
- Policy & effect
- Aruba
- National anxiety

FROM WIND TO TORQUE

- Wind to torque
- Catching the wind
- Pitch & safety
- Power output
- Twist
- Rotational velocity

OFFSHORE POWER NETWORKS

- Lead profiles
- Electricity transmission
- Everything connected
- Properties of the transmission grid
- AC vs DC
- Transmission losses
- Voltage transformation
• Understanding the principles and parameters in the design of an offshore wind turbine support structure

INTRODUCTION TO SUPPORT STRUCTURE DESIGN

• Gaining insight into the life cycle of a typical wind farm including design, construction, installation, operation and maintenance

DESIGN AND INSTALLATION

• Comprehending all the components and processes in the logistics of the installation, operation and maintenance of an offshore wind farm

OPERATION AND MAINTENANCE

OFFSHORE TRANSPORT
• Gaining awareness of all the challenges and possible weak links in the logistics chain

ONSHORE TRANSPORT

• Gaining insight into the optimization of the installation and operation and maintenance process from a logistical point of view for a typical offshore wind farm
• Understanding all the different aspects encountered when designing a typical wind farm

LOAD CALCULATIONS

• Processing raw data into usable input data for the design of a support structure

WIND FARM LAYOUT

DATA COLLECTION

DATA PROCESSING
• Performing and understanding ultimate load and fatigue load calculations

**LOAD CALCULATIONS**

- Limit states
- Importance
- Load combination
- Gravitational
- Hydrodynamic
- Actuation
- Aerodynamic

**FATIGUE**

- Fatigue check
- Miner damage
- Time-varying loads
- S-N curve
- Long-term statistics
- Stress histogram
- 3D scatter diagram
- Stress signal
- Load cases

• Performing relevant design checks

**ULTIMATE AND FATIGUE LIMIT STATES BLADED**

- Batch calculations
- Bladed
- Structure modeling
- FLS
- ULS
- Wind fixes
TAILOR SPECIFICS

Kajima Corporation has sent a specific set of topics and questions to be treated in the course by DOB-Academy. The list has been carefully studied and inspired the choice for the three two-day courses. In the table on the next page, the topics can be found. The columns next to the topics, match the courses, lectures and cases that will be treated to the requested information.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>COVERED IN COURSE</th>
<th>COVERED IN LECTURES</th>
<th>COVERED IN CASE</th>
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<td>OWSSD</td>
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<td>Design of pre-assembly yard</td>
<td>OWTL</td>
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<tr>
<td>Design of sea-fastening and grillage</td>
<td>OWTL</td>
<td>Transport equipment</td>
<td>Offshore transport \nSeafastening</td>
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<tr>
<td>Electrical design of MP/TP</td>
<td>OWSSD, IOW</td>
<td>Introduction support \nstructure design \nSupport structure &amp; \nElectrical infrastructure</td>
<td></td>
</tr>
<tr>
<td>Code check according to DNVGL standard</td>
<td>OWSSD</td>
<td>Load calculations \nUltimate limit and \nfatigue limit state design \nDetailed design</td>
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<td>Seismic design</td>
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<td><strong>SPECIFIC QUESTIONS YARDS:</strong></td>
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<tr>
<td>Preparation and necessary equipment of pre-assembly yard</td>
<td>OWTL</td>
<td>Transport equipment \nPorts</td>
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<tr>
<td>How to store the MP, TP and tower</td>
<td>OWTL</td>
<td>Planning &amp; strategy \nOffshore transport</td>
<td>Onshore routing</td>
</tr>
<tr>
<td>The detail of the pre-assembly work (focus on TP and tower)</td>
<td>OWTL</td>
<td>Transport equipment \nPorts</td>
<td></td>
</tr>
<tr>
<td>How to secure the TP and tower during pre-assembly work (mind earthquakes)</td>
<td>OWTL</td>
<td>Transport equipment</td>
<td>Seafastening</td>
</tr>
<tr>
<td>The quantity and quality of cranes</td>
<td>OWTL</td>
<td>Transport equipment</td>
<td></td>
</tr>
<tr>
<td>How to load the TP and tower onto the vessel</td>
<td>OWTL, IOW</td>
<td>Transport equipment \nHeavy lift and transport</td>
<td>Seafastening</td>
</tr>
<tr>
<td>How to organise the personnel on a round the clock basis</td>
<td>OWTL, IOW</td>
<td>Health, safety \n&amp; environment</td>
<td></td>
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<tr>
<td>Lessons learned (troubles to be expected)</td>
<td>OWTL</td>
<td>Lessons learned</td>
<td></td>
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<tr>
<td><strong>SPECIFIC QUESTIONS VESSEL:</strong></td>
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<tr>
<td>Jack-up vessel layout</td>
<td>OWTL</td>
<td>Transport equipment \nOffshore transport</td>
<td>Seafastening</td>
</tr>
<tr>
<td>How to place the MP, TP, tower and hammer on vessel</td>
<td>OWTL, IOW</td>
<td>Design &amp; installation \nOffshore transport</td>
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<tr>
<td>How to keep accurate verticality of the monopile during installation</td>
<td>IOW</td>
<td></td>
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<tr>
<td>The steps to pour the grout?</td>
<td>IOW</td>
<td></td>
<td></td>
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<tr>
<td>The deck plan to load the tower. Will the tagline be loaded at this point?</td>
<td>OWTL, IOW</td>
<td>Design &amp; installation \nOffshore transport</td>
<td>Seafastening</td>
</tr>
<tr>
<td>How to evacuate the vessel and personnel during windstorm</td>
<td>OWTL, IOW</td>
<td>Health, safety \n&amp; environment</td>
<td></td>
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<tr>
<td>Lessons learned (troubles to be expected)</td>
<td>OWTL</td>
<td>Lessons learned</td>
<td></td>
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OWSSD: Offshore wind support structure design \nOTL: Offshore wind transport and logistics \nIOW: Introduction offshore wind \nDHLC: Dutch Heavy Lift Consultants
TEACHERS

JAN VAN DER TEMPEL

Jan van der Tempel is co-founder and director of DOB-Academy. He is an expert on offshore wind support structures and innovations. He was previously head of Offshore Engineering at the TU Delft and inventor & founder of Ampelmann.

NIELS DIEPEVEEN

Niels is an aerospace engineer with a PhD in offshore wind energy. He has a leading role in the development of the DOT innovative turbine concept.

THIJS KAMPHUIS

Thijs is a teacher and researcher at DOB-Academy and holds an MSc in offshore engineering. Field of interest: offshore wind turbines, and graduated on vibration installation of monopiles and the slip joint connection.
TEACHERS

NIEK MEURS
Niek is a researcher at DOB-Academy in the field of installation and logistics. He is currently investigating operation and maintenance strategies for large offshore wind farms.

ELENA STROO-MOREDO
Elena has a decade of experience of teaching, research and course development in the field of Maritime Technology at both TU Delft and Netherlands Maritime Technology. As a course coordinator at DOB-Academy, she is both part of our didactical and our sales team.

HENRIK GOOS
Hendrik has worked in the Marine and Offshore Industry in various roles since 1986. He is experienced in setting up educational programmes on offshore topics and is committed to meeting the needs of the offshore industry with this.
MARTIJN BIJMOLT

As business developer, Martijn is always looking for links and value between partners. He is also involved as application developer for DOT, setting the stage for a new type of wind turbine.
EMPOWERING ENGINEERING EXCELLENCE