



## **BARGE MASTER**

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### **TRACK RECORD AUGUST 2020**



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## 1 INTRODUCTION

Barge Master is dedicated to improving offshore workability. We provide motion compensation systems that help our clients to avoid weather downtime and remain in charge of their operations and schedules.

The Barge Master **Platform** can be installed on any vessel to serve as a working base for any kind of equipment, enabling secure operations in uneven waters.

The Next Generation **Gangway** provides continuous access for people and cargo, ensuring safe transfers to any offshore structure.

The Barge Master **Crane** enables controlled lifting operations in high sea states, making it possible to work at sea almost year-round.

Barge Master systems are developed in close cooperation with selected technology partners, such as Bosch Rexroth and our sister company Temporary Works Design (TWD). This cooperation allows us to ensure the highest quality in motion compensation systems.

Our products are designed to help you deliver your project safely, on time and cost-effectively.



3D MOTION  
COMPENSATED  
**PLATFORM**  
**BM-T700**



## 2 MOTION COMPENSATED PLATFORM – BM-T700

The Barge Master Platform (BM-T700) can be installed on any vessel to serve as a motion compensated working base. Equipment such as cranes, excavators and drilling configurations can be placed on the platform to eliminate the effect of vessel motions, making it possible to operate the machinery with the same precision as onshore.

By compensating the motions of your vessel, the platform effectively turns your deck space into a perfectly stable working area. As a result the operations can continue even in adverse weather, enabling you to stay on top of the execution and timeframe.

### Track Record:

- 2013                700 mT load test  
                         Crawler crane lifting operation  
                         100 mT supply operation
- 2015 - 2016      Malampaya bridge installation
- 2016 - 2017      Drill operation
- 2017                Uxo removal
- 2019                Drill operation

### Systems:

- 2013                Build of the first BM-T700 (available in Singapore)
- 2016                Build of the second BM-T700 (available in Rotterdam)







Figure 1: Overview of the 700mT load on the barge master platform

## 2.1 Compensating a 700mT load

The goal of this operation was to demonstrate the maximum payload capacity of the BM-T700, certify the BM-T700 and demonstrate the continuous performance of the system even for the highest loads. The operations were conducted in one day at the North Sea. In total the motions of the load were compensated in 16 runs with an average of 20 minutes per run. During the operations various conditions were encountered.



*Figure 2: Crane operation lifting a 20ft container*

## **2.2 Crawler crane operations**

Several crawler crane operations were conducted in two days with the BM-T700 during 41 runs with an average of 12 minutes. A Liebherr LR1250 crawler crane was placed and sea-fastened on the platform. The crane radius, cable length and slewing angles were varied over its full range.

Various loads have been lifted by the crane, figure 2 shows the crane lifting a 20ft container filled with water and slewing towards the aft of the barge.

The on-board lifting functionality allowed the BM-T700 to compensate for the relative motions between the load and a certain location on the deck. This means that roll and pitch are fully compensated, while the vertical motion between the selected barge location and load is compensated. The crane itself will have some vertical motion, depending on the selected location. The on-board lifting functionality increases the workability and safety; loads can gently be picked and placed on the barge without any damage of equipment.





*Figure 3: Impression of the supply operations with a Jack-Up Vessel*

### **2.3 Supply operation of a 100mT load**

A supply operation was conducted with the Jack-Up Barge Goliath of GeoSea. A barge with Barge Master and a 100mT load was moored at Thorntonbank, Belgium.

The motion compensated supply barge was moored next to the Jack-Up Barge, subsequently the BM-T700 was set into compensation mode. With the load compensated, the riggers could safely and in a controlled manner connect the 100mT load to the crane hook. The crane then gently lifted the load from the BM-T700 and subsequently placed it back. The Barge Master system ensured that only very minimal motions were left between the crane hook and the supply load thereby significantly increasing the safety and workability of this operation. The vertical accelerations of the 100mT test load remained below  $1.5 \text{ m/s}^2$ .





Figure 4, 5, 6: Boskalis' Ndeavor with BM-T700 and bridge component

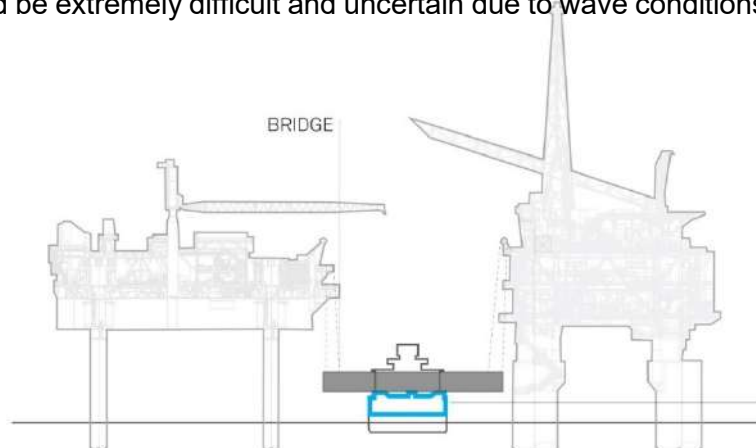




## 2.4 Piping bridge installation for Malampaya gas field

For a safe and controlled lifting operation of a 300mT piping bridge between a gas platform and a depletion compression platform of Shell Philippines Exploration B.V., Boskalis used the BM-T700 in their Malampaya project in the first half of 2015. Positioned at the aft of their multi-purpose vessel Ndeavor, the BM-T700 compensated for the sea induced motions, enabling the connection of the lifting arrangement from the platforms to the piping bridge.

The Barge Master kept the piping bridge steady which enabled gently lifting of the piping bridge, with minimal shut down period of the Malampaya gas field. Installation without the Barge Master at this location would be extremely difficult and uncertain due to wave conditions and seabed conditions.





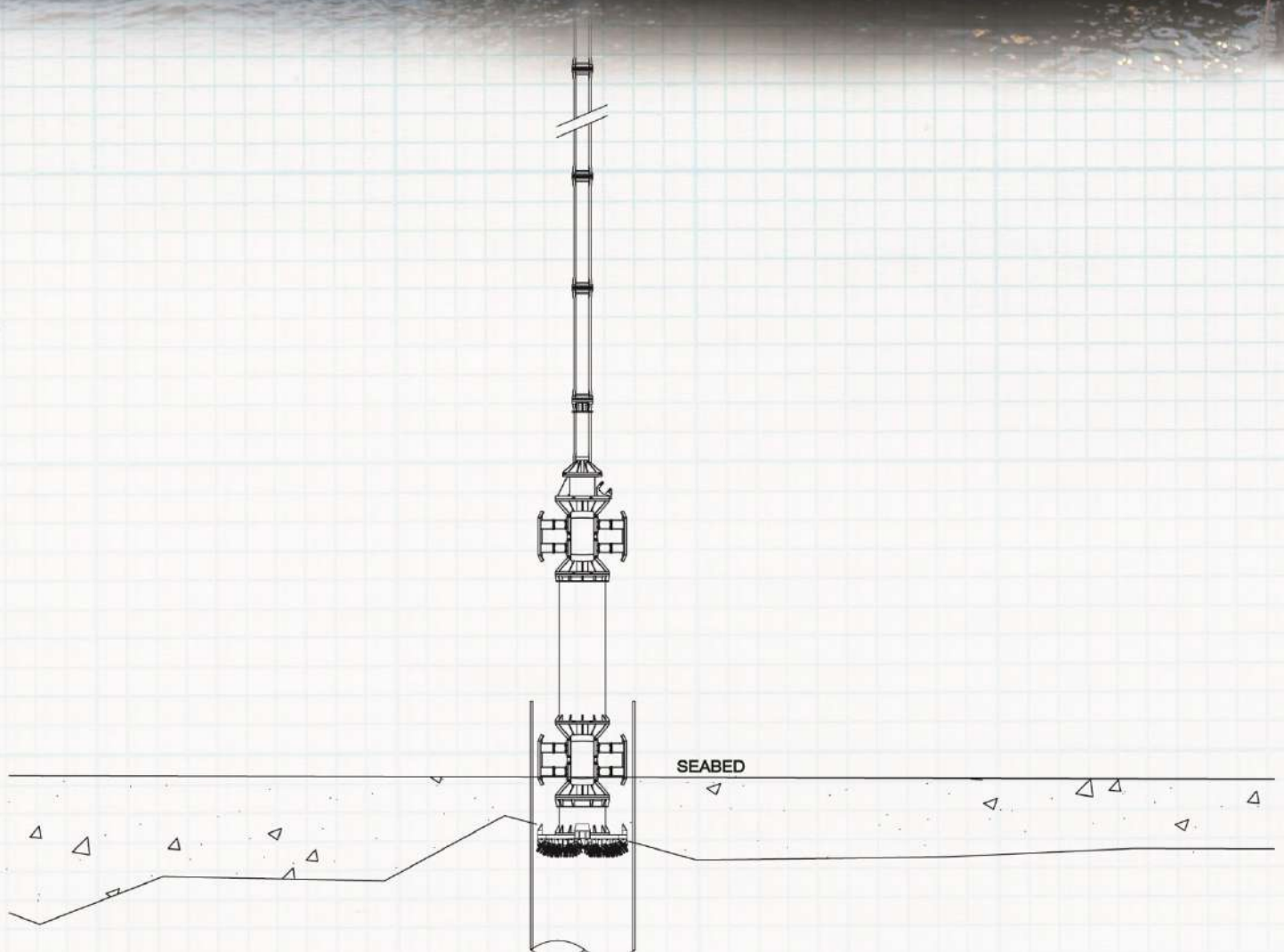
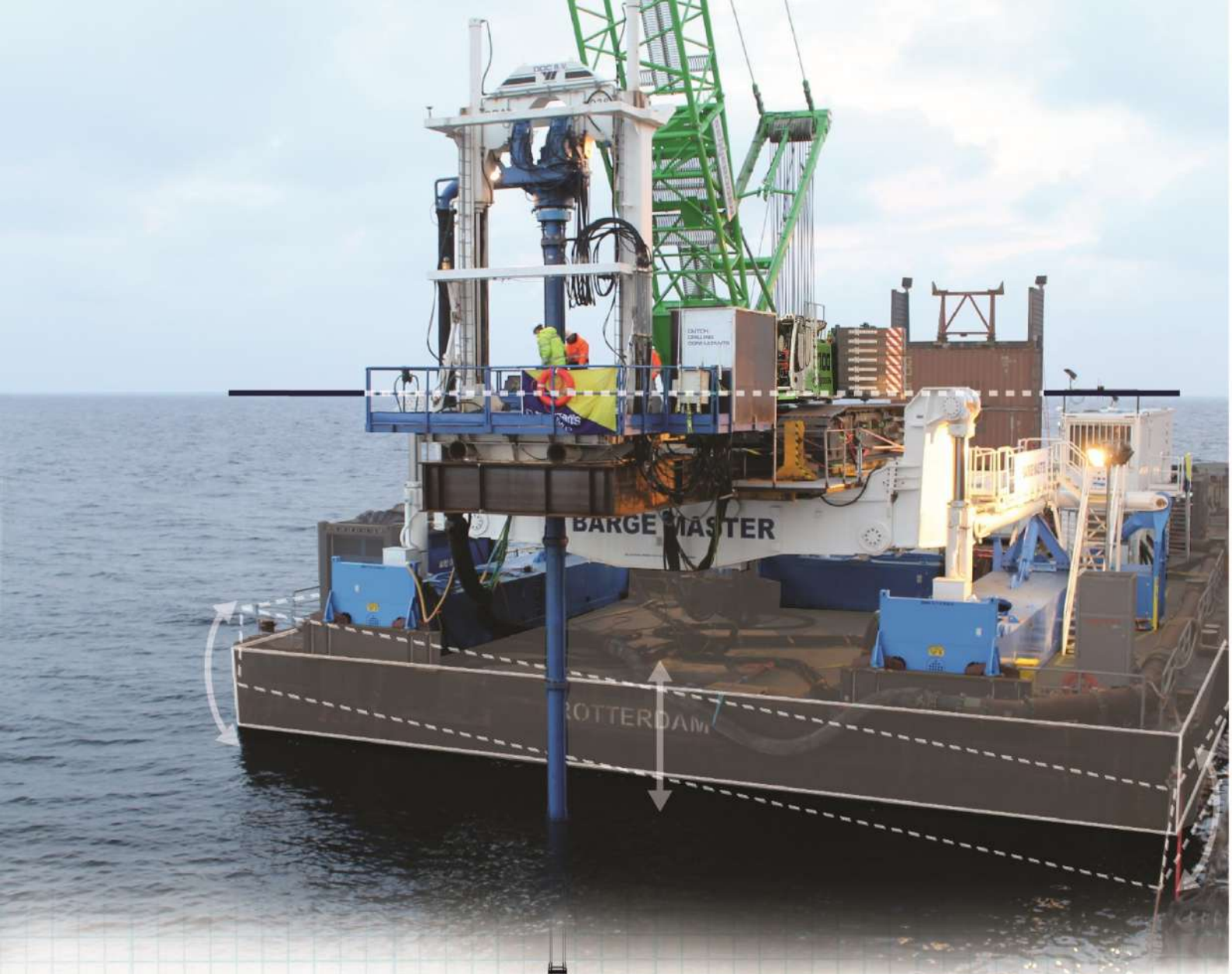






Figure 7, 8: BM-T700 installed on the aft of a barge with a crane and a drilling unit.

## 2.5 Motion compensated drilling for offshore wind project

In the second half of 2016 a project started for offshore wind farm installation. Together with a crawler crane a drilling unit is installed on the BM-T700. Using this setup holes are drilled into the seabed at approx. 40m water depth, for the installation of foundation piles. The soil conditions at the project location don't allow the use of a jack-up barge. Precision drilling from a floating barge would not have been possible without motion compensation.

The crawler crane is used to lift the 70 mT drill into position. Using the onboard lifting mode the crane then continuously feeds drill string. Once the drill is lowered into the foundation pile drilling starts. This operation can take up to 70 hours, where the BM-T700 is compensating the vessel motions continuously.





Figure 9: BM-T700 equipped with excavator with subsea survey equipment.

## 2.6 Motion Compensated subsea Survey & Excavation

In the first half of 2017 the 3D motion compensated platform BM-T700 was used for subsea excavation in the North Sea by Belgium. The platform was equipped with an excavator also containing subsea survey sensors. Because a quick start was needed all the engineering and the mobilization was done in two and a half weeks.

For the operation it was crucial that the excavator was held completely still in the swell and wave heights of the North Sea.



Figure 10: BM-T700 onboard the SBM installer with drilling equipment

## 2.7 Motion Compensated drilling for Buoy installation

In Q1 & Q2 of 2019 Barge Master was contracted by Large Diameter Drilling (LDD) for a drilling job in the Caribbean, for SBM Offshore. Together they have installed the foundations for a CALM Buoy, for the Limetree Bay Terminal.

Difficult seabed conditions and water depths up to 270 m. made conventional methods not possible, therefore an inventive solution was needed, based on the proven technology of Barge Masters' motion compensated platform the BM-T700.

The platform was equipped with LDD's drill rig, for safe motion compensated drilling of the anchor foundations.



# 3D MOTION COMPENSATED CRANE BM-T40



### 3 MOTION COMPENSATED CRANE – BM-T40

The Barge Master Motion Compensated Crane enables controlled lifting operations with a high crane capacity, making it possible to work at sea almost year-round. It has proven to increase workability in the North Sea from 180 to 330 days.

The Barge Master Crane is designed for maintenance support vessels and platform supply vessels. It ensures safe lifting operations for all headings in higher sea states. The motion is compensated at the basis of the crane, ensuring a steady operator cabin as well as a steady load.

The crane features a small footprint and is able to lift 32 metres above sea level at a reach of up to 20 metres or 15 tonnes at a reach of 10 metres. In addition to its lifting capacity, the crane is also manriding certified for safe personnel transfer.

#### Track Record:

- 2015 - current      Servicing Shell/NAM platforms at the North Sea

#### Systems:

- 2014 - 2015      Installation of first BM-T40 on Wagenborg's the 'Kroonborg'
- 2017 - 2018      Build of the second system for Wagenborg's 'Kasteelborg'





Figure 11: Kroonborg equipped with BM-T40

### 3.1 Servicing Shell/NAM platforms at the North Sea

The Barge Master Crane is installed on the famous first walk-to-work vessel the Kroonborg. It was the first vessel where multiple functions were combined for the first time, to service the Shell/NAM platforms.

Offshore platforms have become smaller and more flexible during the last forty years. They no longer have a resident crew or helicopter pads which means frequent journeys to and from the platform by vessel in order to perform maintenance work. With this vessel these operations can be executed in a safer, more efficient and effective manner.

The motion compensated crane on the Kroonborg has increased the workability from approximately 180 to 330 days per year, even in the North Sea's famously rough conditions.

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*Figure 12: Second BM-T40 on the Kasteelborg*

### **3.2 Second system for walk-to-work vessel Shell/NAM**

Wagenvorg has awarded Barge Master with an additional contract for a 3D motion compensated crane, the BM-T40. The second motion compensated crane is installed on the 'Kroonborg' vessel. The new Walk-to-Work vessel will also support offshore operations for the combined NAM and Shell UK business unit at the gas production facilities in the Southern North Sea. It will operate as a stand-by and support vessel for inspection and maintenance of the unmanned platforms in both Dutch and British waters



# MOTION COMPENSATED GANGWAY





## 4 MOTION COMPENSATED GANGWAY

Barge Master's fully motion compensated Next Generation Gangway provides continuous access to any offshore structure. This motion compensated gangway ensures safe and efficient transfer of crew irrespective of weather conditions.

The system provides horizontal gangway access for people and trolleys up to 800 kg., with a lifting capacity of 2.000 kg. Making the system truly unique are its distinctive reliability features, designed especially to guarantee uptime. These features safeguard the workability of the gangway to the highest degree, a single failure will never lead to any loss in compensation.

The gangway can be fitted on a height adjustable pedestal with integrated elevator, making it possible to land on any height and maintain a continuous horizontal workflow.

The Barge Master Gangway is developed in close collaboration with our partner Bosch Rexroth, the drive and control company. Therefore it is of the highest standard, combining Barge Masters's motion compensation knowledge with the drive and control knowledge of Bosch Rexroth. Next to that it ensures global service coverage. The gangway is DNV-GL certified.

### Track Record:

- |                  |   |
|------------------|---|
| ■ 2017 - 2018    | In use for MHI Vestas for the Walney Extension at the Irish Sea |
| ■ 2018 - 2019    | In use for MHI Vestas at Borkum Riffgrund II at the North Sea   |
| ■ Spring 2019    | In use for Total E&P Nederland B.V. for maintenance campaign    |
| ■ 2019           | In use for MHI Vestas at Burbo Bank and Walney at the Irish Sea |
| ■ 2019 - 2020    | Rental system on Bokalift 1 for Viking Vulcan and L10 project   |
| ■ 2019           | Rental system on Boka da Vinci for Viking Vulcan project        |
| ■ 2019 - current | Rental system on Seaway Strashnov for Triton Knoll project      |

### Systems:

- |               |   |
|---------------|---|
| ■ 2017        | Gangway with Height adjustable pedestal with integrated elevator for Vroon's 'VOS Start |
| ■ 2018 - 2019 | Build of second and third system for the rental market                                  |
| ■ Dec. 2019   | Start construction fourth system for the rental market                                  |







*Figure 13: Gangway installed on the VOS Start (Walney Extension)*

#### 4.1 In operation at Walney Extension

This first charter, which commenced in August 2017, involved offshore logistics support, accommodation and walk-to-work services during the first commissioning phase of the Walney Extension Offshore Wind Farm in the Irish Sea.

The Walney Extension Offshore Wind Farm has been built in two phases using turbine technology from two different manufacturers – MHI Vestas and Siemens Gamesa. Vroon was commissioned for the project by MHI Vestas. Once fully complete, later this year, Walney Extension will become the world's largest offshore wind farm.

Throughout the first phase of the project, VOS Start's Barge Master Motion Compensated Gangway provided improved access to the wind turbines. Over nine months, VOS Start facilitated more than 10,000 safe transfers of personnel and trolleys. Considering its first-time deployment, the Barge Master Gangway handled transfers very well, making use of its height-adjustable pedestal, built-in elevator and unique safety features.

As Niek Spiljard, Managing Director of Vroon Offshore Services Den Helder says, "The innovative Barge Master Gangway, integrated with our advanced walk-to-work vessel design, offers an exceptional service level to clients. The step-less transfers are very much in line with the latest walk-to-work market philosophy."



## 4.2 In operation at Borkum Riffgrund II

The performance by both vessel and crew has resulted in the award of a subsequent contract. From May 2018, VOS Start has been supporting the commissioning phase of the Borkum Riffgrund II Offshore Wind Farm.

“The ship with its gangway system enabled us progressing with operations, during shorter weather windows and in rougher weather conditions” Laurens van Pijkeren, Project Manager at MHI Vestas Offshore Wind states. “The award of a second contract underlines the good relationship between Vroon and MHI Vestas Offshore Wind and is recognition of the service quality delivered by VOS Start and her crew during the commissioning phase at the Walney Extension Offshore Wind Farm.”





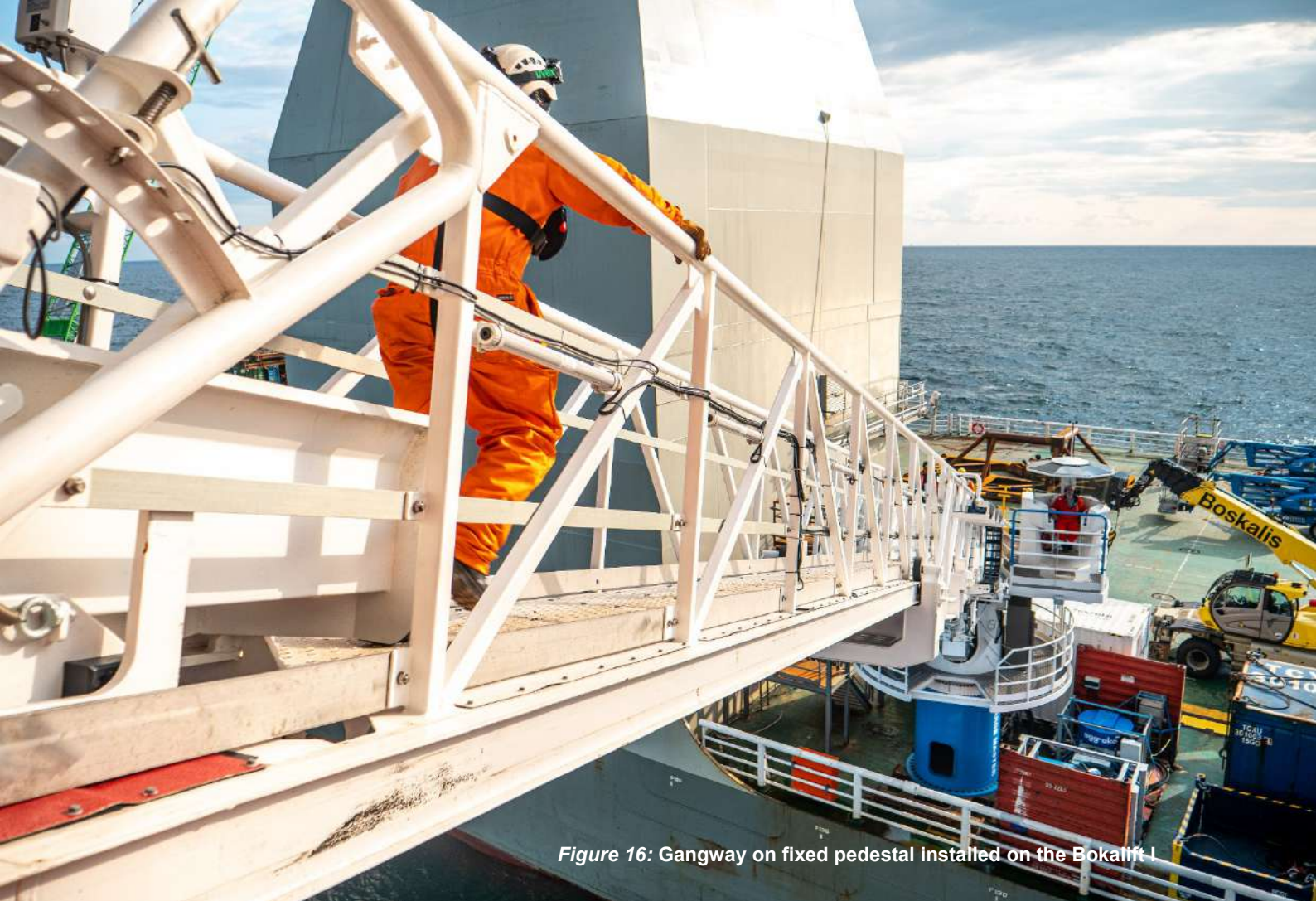
*Figure 15: Gangway installed on the VOS Start (Total)*

#### **4.3 Maintenance campaign for Total E&P Nederland B.V.**

In the first quarter of 2019 the VOS Start was chartered by E&P Nederland B.V. to deliver offshore logistics support to a planned maintenance campaign on Total's offshore assets in the Dutch sector of the Southern North Sea.

During the first seven days of operation, the Barge Master gangway completed 34 gangway connections, transferring a total of 185 people.





*Figure 16: Gangway on fixed pedestal installed on the Bokalift I*

#### **4.4 Rental gangway on Bokalift 1**

Barge Master has delivered two rental motion compensated gangways to Boskalis for their Viking & Vulcan decommissioning project, which started in June 2019.

The gangways are mounted on a fixed pedestal with continuous staircase access via modular units. The systems are installed on the Bokalift I and the Boka da Vinci dive support vessel.

For the Viking & Vulcan decommissioning project Boskalis needs gangway access to the oil and gas platforms at different heights, performing different operations.





*Figure 17: Gangway on fixed pedestal installed on the Boka da Vinci*

#### **4.5 Rental gangway on Boka da Vinci**

Barge Master has delivered two rental motion compensated gangways to Boskalis for their Viking & Vulcan decommissioning project, which started in June 2019.

The gangways are mounted on a fixed pedestal with continuous staircase access via modular units. The systems are installed on the Bokalift I and the Boka da Vinci dive support vessel.

For the Viking & Vulcan decommissioning project Boskalis needs gangway access to the oil and gas platforms at different heights, performing different operations.



*Figure 18: Gangway in operation on the Seaway Strashnov*


#### **4.6 Rental gangway in use on Heavy Load Carrier**

In December 2019 a Barge Master rental gangway was installed onboard the Heavy Load Carrier Seaway Strashnov.

For this project the gangway was further equipped with a lifting winch up to 2.000 kg. and a gangway 'tip ladder'. The tip ladder allows for landing over an existing structure and adds an additional 2 m. to the operational range.



## APPENDIX A: CERTIFICATION BM-T700

		Certificate no: <b>RET0236136/1C</b> Page 1 of 1
Project: <b>Barge Master C400</b>		
Client: <b>Barge Master bv Karel Doormanweg 9d 3115JD Schiedam</b>	Office: <b>Rotterdam</b>	
Clients Order Number: <b>BM-01</b>	Date: <b>04.10.2013</b>	
Inspection Dates First: <b>13.04.2011</b>		Order Status: <b>Complete</b>
		Final: <b>17.02.2013</b>

This certificate is issued to the above named client in order to certify that the undersigned Surveyors did attend their works in Schiedam the Netherlands, v.d. Ploeg, Leeuwarden and Bosch-Rexroth, Boxtel, the Netherlands and BM offshore site location, North Sea (Scheveningen) on and between above mentioned dates for the inspection of the fabrication and witnessing of testing of the following equipment :

**1 (ONE) BARGE MASTER UNIT - C400**

**References**

- Lloyd's Register Rules for Lifting Appliances in a Marine Environment, August 2009
- DNV 2.7-3 for Portable offshore units, May 2011, the container certification scheme 2011 and ISO 1496-1
- BM Technical Specification doc. no. BM-PR010-PC-PF-R-0042

**Design appraisal as per following documents:**

Structure – DAD OGL/TEC/120029, issue 3  
Control – DAD ROT/12E.197/GJV/vho , issue 2  
Container – DAD RET0241539-01 , issue 02  
Cylinders – DAD RDS/ENG/120148 , issue 1  
Hydraulic system – DAD RDS/ENG/120132 – issue no. 1

The following scope of survey was carried out with satisfactory results:

- Review of material certificates
- Review of PQR's , WPQ's and NDE procedures
- Monitoring of fabrication activities at the sites of v.d. Ploeg , Leeuwarden, Bosch –Rexroth, Boxtel, and Barge Master , Schiedam, the Netherlands.
- Witnessing of testing of components at Bosch-Rexroth, Boxtel and Barge Master.
- Final inspection of unit and parts.
- Witnessing of load variation test of unit with a load of 155 T at port conditions
- Witnessing of testing of Barge Master with 700T load.

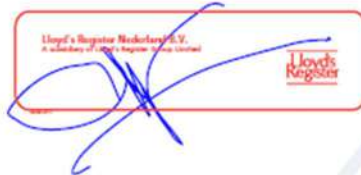
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Form 1123Local (2005.02)

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- h) Witnessing of testing of Barge Master with crane according doc. BM-PR041-EN-TS-R0251 rev. 1.
- i) Review of final fabrication dossier.
- j) Unit marked as per fixed tag plates as follows: RET0237456 -JME

Note : Barge Master unit to be used within design parameters as specified in the above referred DAD's

  
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## APPENDIX B: CERTIFICATION BM-T40

		Certificate no: <b>RET0263621/1D</b>
		Page 1 of 2
		
<h1>Certificate</h1>		
Project:	Barge Master T40 including 15T knuckle boom crane /no. 1236	
Client:	Barge Master , Capelle a/d IJssel, the Netherlands	Office: Rotterdam
Client's Order Number:	BM-26112013	Date: 04 October 2015
Inspection Dates		Order Status: Complete
First:	26 November 2013	Final: 28 April 2015

This certificate is issued to the above named client in order to certify that the undersigned Surveyors did attend the sites of Breman Machinery bv , Genemuiden ; Bosch Rexroth , Boxtel ; Lagendijk B.V. , Wemeldinge and Shipyard Niestern Sander , Delfzijl , the Netherlands on and between above mentioned dates in order to survey the fabrication and witness the testing of the undernoted lifting equipment:

**ONE (1) BARGE MASTER T40 UNIT with  
Knuckle Boom Crane (SWL 15T)**

**References:**  
Lloyd's Register Code for Lifting Appliances in a Marine Environment, edn. August, 2009, Lloyd's Register Rules for the manufacture, testing and certification of materials, July 2013 and NEN-EN 13852-1 / General purpose offshore cranes (personnel lifting).

The following scope was carried out with satisfactory results:

- a) Certification of Barge Master T40 unit as per LR certificate RET0263621/1B dated 28.04.2015
- b) Certification of 15T Knuckle Boom Crane as per LR Certificate RET0266411/1A dated 23.04.2015
- c) Witnessing of load test of assembly (crane and T40) as carried out according BM- PR077-EN-WM- R-0396, rev. 0. Overload test in offshore mode with a load of 18.75 mT (1.25 x 15 mT) at 10 m. and 5.0 mT at 24 m. (main hoist) and in harbour mode with a load of 25 mT (1.25 x WLL) at 10 m and 8.625 mT at 24m. (main hoist) . Carried out thorough visual inspection after the load testing , observed no deformations and/or defects.
- d) Witnessing of site acceptance testing (SAT) of T40 unit executed according BM -PR 077-EN -WM- R -0428, rev. 0. Results as specified in LR VR RET0259658 / JME 2015-02. Review and endorsement of (test) report(s).
- f) Witnessed sea trials of assembly ( T40 unit including crane) according BM procedure no. BM-PR077-EN-WM-R-0369 , rev. 0. Results reported as per LR VR CDT2015-VR-01 dated 09.02.02.2015 .

Based on the above mentioned scope it is concluded that the Barge Master T40 unit including the Lagendijk knuckle boom crane has been satisfactory tested o/b MV "Kroonborg" and complies with the referenced LR Rules , LR Code for lifting appliances in a Marine Environment , EN Standards, specifications and related documents

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Form 1123 (2013.12)

Notes:

- T40 /crane assembly is suitable for manriding (also when motion compensating system is in operation).
- For application of the crane in combination with the T40 unit, AOPS will be activated for all crane positions and orientations both during on and off board lifting. AOPS is only deactivated when the mode for personnel lifting is selected as described in NEN-EN 13852-1 2011.



P. Kuipers for A.J. Meijer, C. de Tempe, F. Blankestijn and self  
Surveyor to Lloyd's Register Nederland b.v.

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## APPENDIX C: CERTIFICATION BM GANGWAY

### CERTIFICATE FOR GANGWAY

**DNV·GL**

Certificate No:  
**N141FBYA**

#### This is to certify

that the product:	<b>Motion Compensated Gangway (MCG) &amp; Eccentric Height Adjustable Pedestal (EHAP)</b>
Type designation:	<b>TYPE 2 Offshore gangway with motion compensating system</b>
Application/context:	<b>Person and Cargo Transport</b>
Serial/tag no:	<b>Please see below</b>

Has been found to comply with relevant requirements in:  
**DNVGL-ST-0358**  
**Certification of offshore gangways for personnel Transfer**  
**Edition December 2015**

The product is intended for

Yard:	-
Yard No:	-
Name of vessel:	<b>VOS START</b>
DNV GL Id No:	<b>37761</b>

#### Particulars of Vendor and Purchaser

Vendor:	<b>Bosch Rexroth B.V.</b>
Vendor reference:	<b>NL002123 / 4505607735</b>
Purchaser:	<b>Vroon B.V</b>
Purchaser reference:	<b>PO 201600197</b>

Issued at **Rotterdam**, Product Certification /Verification on **2017-08-08**



for **DNV GL**

This document has been digitally signed and  
will therefore not have handwritten signatures

**Ven, Arjen van der**  
Surveyor