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COURSEULLES

-- Offshore Monopiles Foundations --

Services Contract

Employer :

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IFR	REQUIRMENT SPECIFICATION - DRIVE CRADLE LOAD CELLS	FUS
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Existing Employer ref	

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REVISION RECORD SHEET

Revision	Status	Description of Updated/Modified Sections (if any)
0.1	FUS	FIRST ISSUE

REQUIREMENT SPECIFICATION - DRIVE CRADLE LOAD CELLS

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REVISION HISTORY					
LDD Rev	**Client Rev**	**Date**	**Originator**	**Checked**	**Approved**
01	0.1	09/08/2022	Matthew Vansittart	PK	SS
Revision Description			First issue		

1. CONTENTS

2. TABLE OF FIGURES

3. INTRODUCTION

3.1 OVERVIEW

The Load Cells are located along the load path between the Drilling Machine to the Leader Tower. They feedback live data to the Control System which in turn provides monitoring and control of:

- Hold Back / Weight on Bit.
- Load Share over single Carriages groups (x4 Slip Table & x4 Rotary Table).
- Load Share between Carriage Groups (Slip Table and Rotary Table).
- Carriage location during DM Installation and retrieval.
- Confirmations of DM Release and Engagement during Installation and retrieval.
- Push Down and Pull Out loads applied to the Casing.

3.2 DESIGN INTERFACES

The Load Cells are mounted in the Drive Cradle which form part of the Carriage. The Carriages connect the Drilling Machine (DM) and the Casing Handling System (CHS) to the Design Leader Tower (DLT).

The Carriages are connected to the DLT via a Rack and Pinion system, the Rack is fixed to the DLT and the Pinion is mounted in the Carriage Assembly, this system permits vertical translation of the Carriages within the DLT.

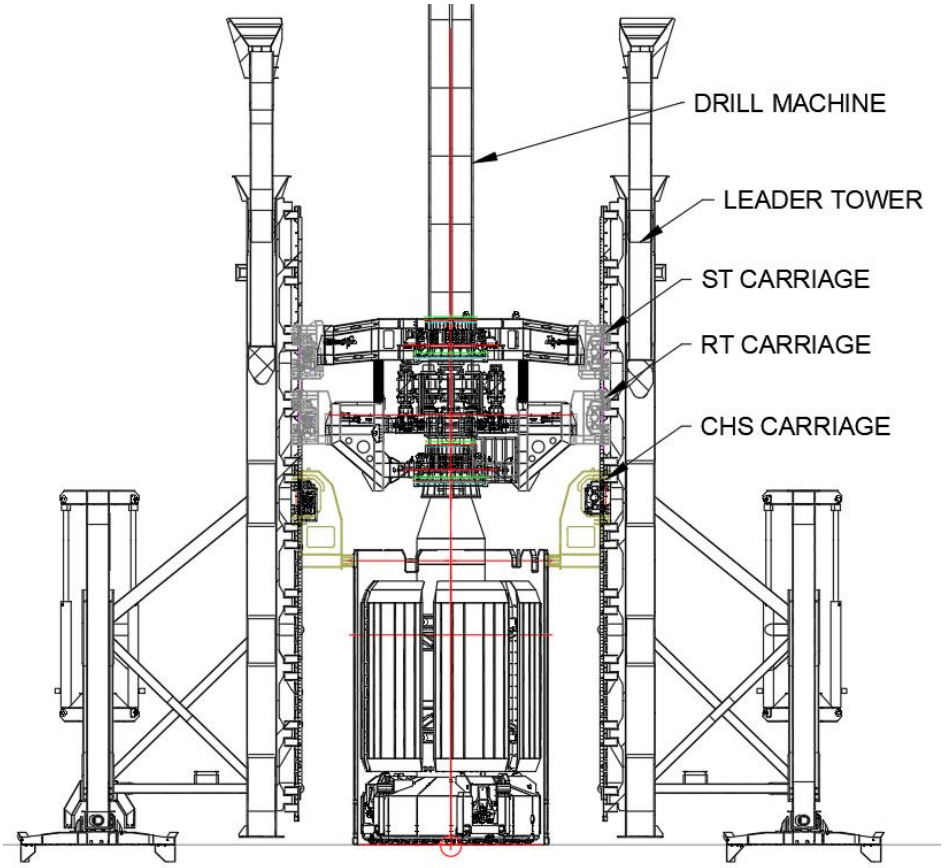

Figure 1 – Leader Tower Arrangement

The Slip Table and the Rotary Tables are mounted on the Drilling Machine, these connect the Drilling Machine to the Slip Table Carriages and Rotary Table Carriages in the DLT.

The Casing Handling System Carriages are mounted on the DLT in the same manner, the CHS holds the Casing in position via a retractable Casing Gripper.

The Carriages are made up of two main components as highlighted below, the two components being The Carriage Body and the Drive Cradle.

Figure below shows the Carriage Body and Drive Cradle, the Drive Cradle highlighted green:

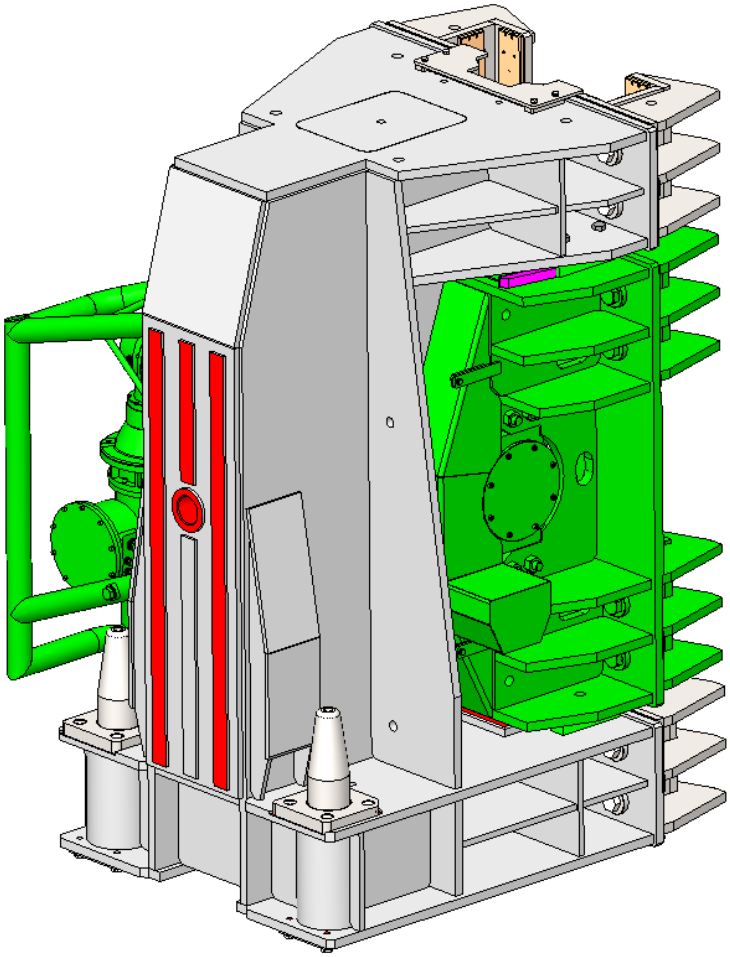

Figure 2 – Carriage Arrangement (Carriage Body and Drive Cradle)

The Drive Cradle is identical throughout the DLT serving the Rotary Table, Slip Table and Casing Handling System.

The Load applied to the Carriage Body is directly transferred to the Drive Cradle via the Main Bearing Plates. The Drive Cradle has two Main Bearing Plates, one upper and one lower. Depending on the operational scenario, only one of these plates is being used at a time (either hold back or push down).

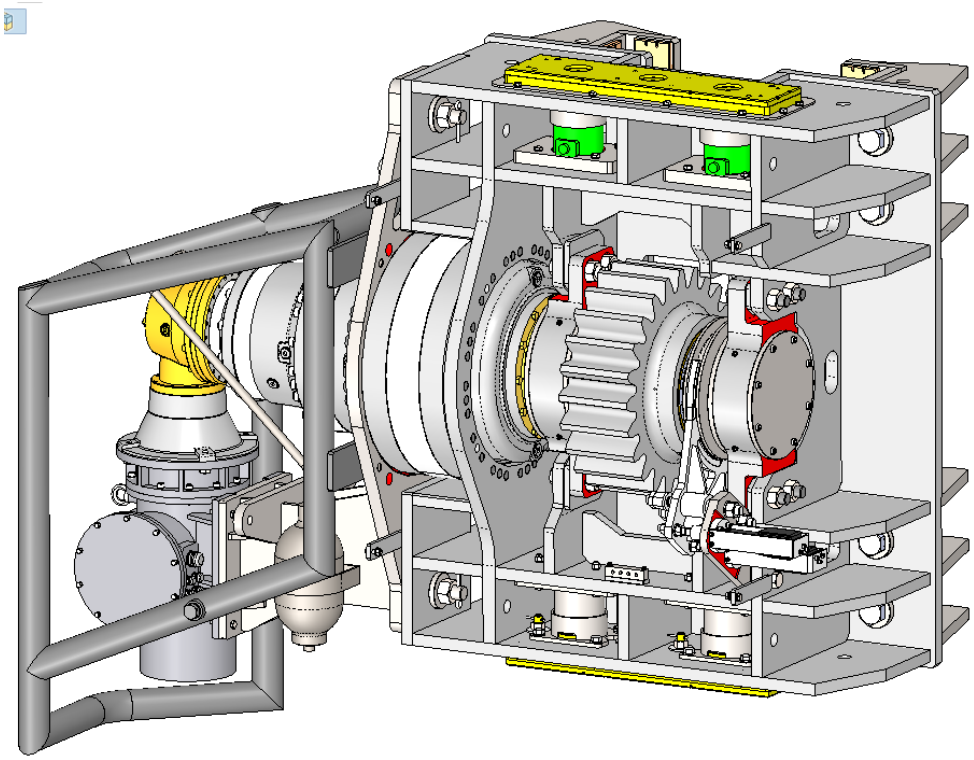

Figure 3 – Drive Cradle General Arrangement

The Load applied to the Main Bearing Plate is transferred to the Pinion by two Load Cells. The Main Bearing Plate and Load Cell Arrangement is presented below:

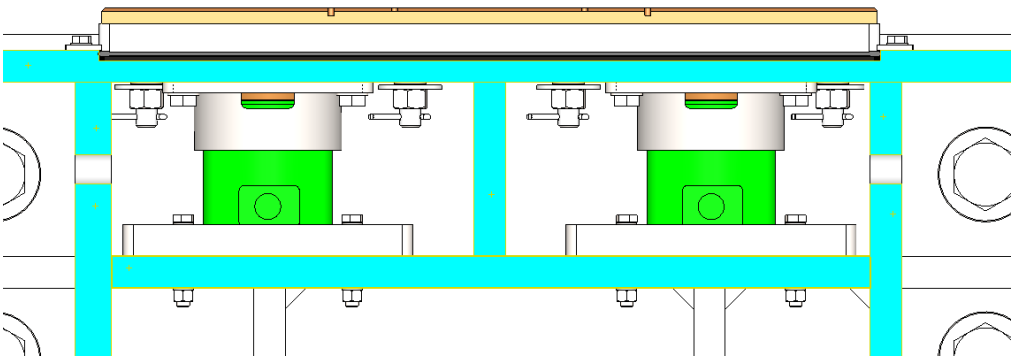

Figure 4 – Drive Cradle Load Cell Arrangement

The arrangement of Load Cells is specific to the DM Tables (RT & ST) and the Casing Handling System.

The Slip Table and Rotary Table carriages have Load Cells mounted in the Top of the Carriage to monitor Hold Back and Push Down Loads. Note the Tables are holding back the total DM and Carriage weight. Maximum Push Down is achieved when the load cells see the difference between the Total Hold Back weight and maximum Push Down.

The Casing Handling System has Loads Cells mounted in the Top and Bottom of the Carriage. The CHS weights significantly less than the DM, without this ballast there is not enough weight available to include the push down in the Hold Back Total, therefore the Carriages actively push against the lower CHS Bearing Contact to push Casing into the ground. The lower Load Cells feedback this information to limit the amount of push to prevent Casing damage.

The Carriages are identical, to compensate for the requirement for Lower Load Cells in the CHS, the locations in the Slip Carriage and Rotary Carriage are blanked with a Load Cell Dummy. The following images show the Table Carriage Load Cell Arrangement and the Casing Handling System Arrangement:

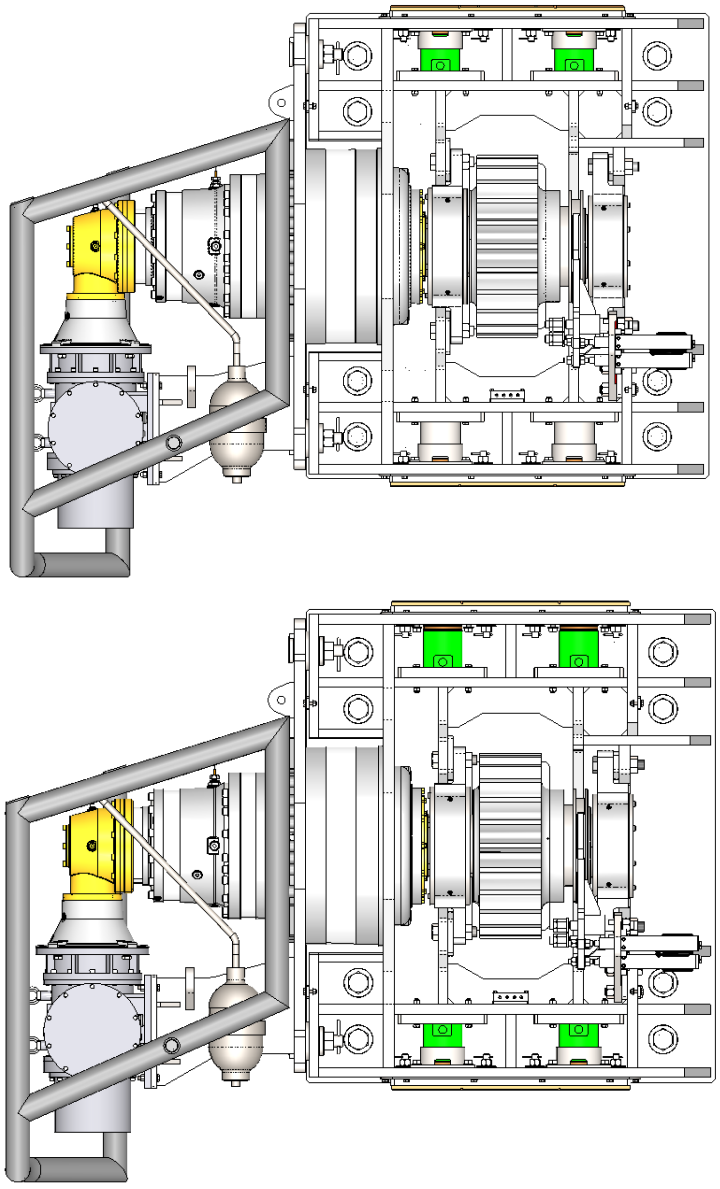

Figure 5 – Drive Cradle – Load Cell Arrangement (ST, RT & CHS)

The Load Cells are all common with 130t capacity.

4. SCOPE OF SUPPLY

4.1 ENGINEERING

Engineering minimum requirements are as follows for Mechanical and Electrical Components

Mechanical

1. Sub Sea Operation (seawater).
2. Maximum operational water depth 60m.
3. Tested to 100m water depth.
4. Ambient Sea Temperature 5°C - 25°C.
5. Maximum Load 130 tonnes.
6. ULS Safety Factor 1.3.
7. Material Factor 1.15.
8. Maximum Body Dimensions: Ø122mm x 120mm (h).
9. Mounting with 4x M8 Tapped Holes in Base, 90mm PCD.

Electrical

1. Integral ICA4H Amplifier - 3wrie 4-20mA Signal.
2. Submersible Cable Connection to meet above depth requirement.
3. 30m Submersible Cable Assembly (Control System Cable Termination to be agreed with LDD).
4. Maximum tolerance band on readable load +/- 2% of Capacity (~1.3 tonne).

LDD to be supplied with detailed 3D Model (.stp), Schematic, Spec Sheet and BoM for approval prior to procurement and manufacture of any components.

4.2 ITEM LIST

	Load Cells	30m Cable Assemblies
LDD REF NO	B16-00029	N/A
ST Drive Cradle	8	8
RT Drive Cradle	8	8
CHS Drive Cradle	16	16
SPARE	4	4
TOTAL	36	36

4.3 PACKING & TRANSPORTATION

4.3.1 PACKING

Packaging of components suitable for:

1. Long term storage in ocean side environment prone to sea spray.
2. Handling with standard means (forklift, slings etc).
3. Protected from average collision expected during general handling shipping.

4.3.2 DELIVERY

Delivery to UK location.

5. DOCUMENTS & DRAWINGS

5.1 CONTROL DOCUMENTS:

Manufacturing schedule to be supplied.

5.2 TECHNICAL DOCUMENTS:

5.2.1 GENERAL ARRANGEMENT DRAWINGS

Must contain the following details:

- Overall Dimensions
- Scale, Date, Title, Revision, Projection, Mass
- Maximum Height (uncompressed)
- Minimum Height (Compressed)
- Tapped Mounting Hole: Thread Size, PCD and Depth
- Bill Of Materials to include Qty, Part Numbers, Material, Sizes

- Sectional Views clearly identifying internal parts.
- Load Cell Rated Capacity.
- Maximum Operational Depth and temperature.
- Cable Connection Port details and sizes.

5.2.2 STEP FILE

Supplier must provide a STEP File of the Load Cell Assembly (cable excluded)

5.3 PROCEDURES AND INSTRUCTIONS:

Operating and Maintenance manual.

5.4 CERTIFICATION DOCUMENTS:

- Certificate of conformity.
- Pressure test certificates.
- Electrical test Certificates.
- Load Test Certificates.
- Cleanliness certificates.
- Material test certificates.
- CE certificates.

6. CERTIFICATION REQUIREMENTS

CE Marked suitable for operation in subsea environment.

Load Testing Calibration Certificate.

7. TESTING REQUIREMENTS

Type and extent of testing as per supplier standards (unwitnessed).

8. REFERENCES

8.1 LDD REFERENCE DOCUMENTS

[1] B16-00029 (Rev01)DRAFT2022-08-02.pdf

8.2 INTERNATIONAL CODES AND STANDARDS

[2] Designed in accordance to recognised offshore standard.

APPENDIX A: B16-00029 (DRAFT)