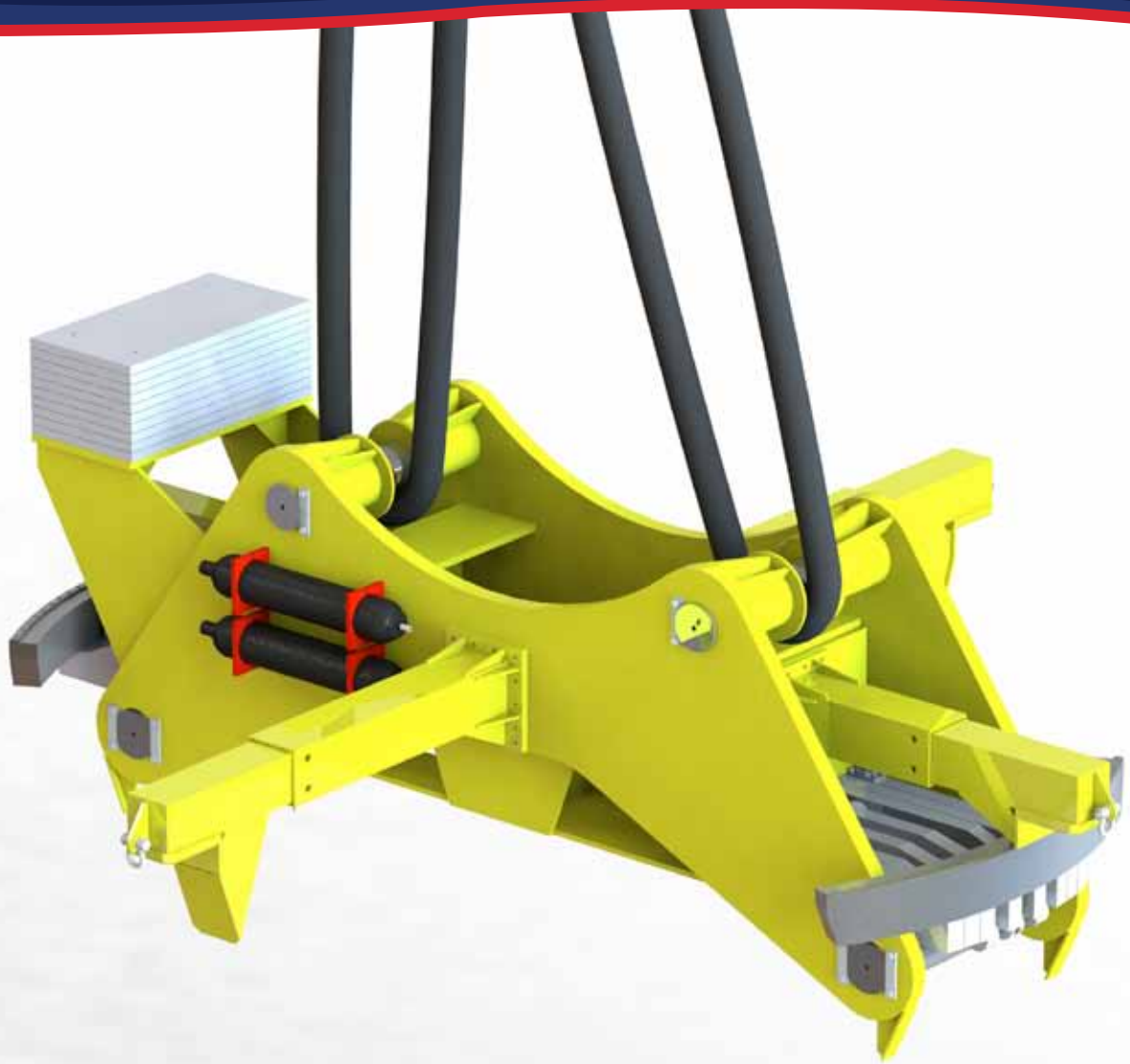
HOULDER

TRANSITION PIECE AND ANODE CAGE LIFTING TOOL (TPLT)

Lifting and upending monopiles and transition pieces safely from the main vessel hook



Application

+ Construction of Offshore Wind Farms (OWFs) – Installation Transition Pieces

The tools remotely lock into the top of the transition pieces under remote control to enable them to be crane lifted safely and securely. The use of wireless remote control negates the need for human intervention and increases the speed of installation.

BENEFITS

- Existing Lifting Tool has a proven track record with zero project downtime
- The new anode cage and TP lifting tool is based upon the same principles
- Wireless remote control for self-engagement with the TP, which helps to avoid personnel going into more hazardous locations
- The Anode cage lifting mechanism is integrated into the TP lifting tool, reducing critical path time for re-rigging
- The design of the tools should not require modification to the design
- Capable of lifting MPs with a maximum weight of up to 883t and TPs with a maximum weight of 399t
- The design also aims to minimise the height and weight of the tools in order to maximise operational flexibility with regard to hook height
- Lifts transition Piece flange diameters of between 5m – 6.5m
- Anode cage lifting and automatic release
- Wireless remote operation

OPERATIONAL TRACK RECORD
MONOPILE UPENDING & LIFTING TOOL

Houlder has recently supplied two (2) Pile Upending Tools to ensure safe and effective monopile foundation installations for the Rampion Offshore Windfarm. The tools were leased to E.ON to aid the installation of 116 turbine foundations over a 10 month period which was completed ahead of schedule.

The project was an overall success as Houlder supplied a highly innovative piece of equipment which met E.ON's exact requirements. The equipment had no recorded downtime throughout the installation works which was a huge contribution to the success of the foundation installation programme.

RELEVANT CODES, STANDARDS & LEGISLATION

Goods will conform to all relevant design codes for Lifting Equipment:

- ISO 9001 Certification
- DNV 2.22 Lifting Appliances
- Lifting Equipment Compliance Certification Operations Manual

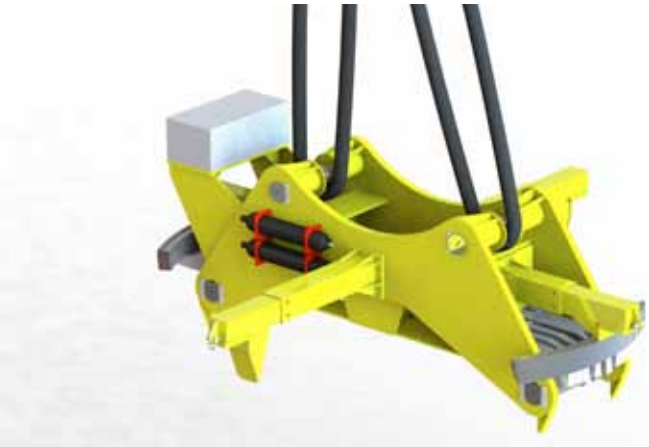
HOULDER TRANSITION PIECE AND ANODE CAGE LIFT TOOL

The main design specifications are listed below:

- Tool engages with the underside of the flange
- The tool is designed to conduct a 400t lift
- The tool is designed to ensure that the TP is not overstressed for any temporary load cases throughout its operation (i.e. engagement, lifting etc.) – this is to be confirmed via FEA modelling of the lifting process
- Total weight of system (tool and rigging) is approximately 30t
- The tool is designed such that it can be remotely operated (wireless electronic control system) for engagement/disengagement to/from the TP
- Anode cage lifting is based on 4 off lifting lugs
- Tool will provide the remote operator with confirmation that the tool is engaged as per the design requirements and that the lifting operation is safe to commence
- Designed such that it is inherently safe inasmuch that it would not lose the load should power be terminated from the tool or whilst there is any load born by the tool
- Has an integrated power supply and contains a secondary means of operation should the primary controls and or power system fail
- Provides sufficient protection on areas that physically interface with the TP such that the tool will not cause any form of damage which may affect the performance of the TP
- Capable of providing light to illuminate lockable areas/lift points during hours of darkness
- Integration of camera to confirm tool is fully connected
- Supplied with certified lifting accessories required for the operation of the tool (including lifting accessories to connect to the hook of the crane)

The sytem is made up of the following components:

1. Main structural body
2. Locking Latch Assembly (2)
3. Locking Latch Cylinder
4. Accumulators
5. Endless Sling (2)
6. Counterweight



REDUNDANCY INFORMATION

The main method of operation is via the wireless control. In the event of a failure the tool can be operated by the manual operation of the hydraulic valves. Further redundancy is provided by the use of an emergency hand pump to release the tool from the TP in the event of a power failure.

VARIATIONS

The TPLT can be integrated with the houlder monopile unpending tool. If reduced deck space is required.

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Houlder is an independent, innovative offshore engineering company. We build on 30 years' offshore expertise and work closely with clients to design solutions for their technical challenges. We provide complete EPCI services with special equipment, consultancy, project management and engineering solutions for the offshore wind and wider energy sector.

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