
LET'S BUILD IQIP

# DYNAMIC OUTRIGGER FRAME

The Dynamic Outrigger (DOF) Frame is designed to install windturbine foundations (monopiles) from a floating heavy lift vessel keeping position by means of its DP system. The system ensures correct pile position, orientation and verticality during the pile driving process.
The DOF will reduce installation cycle time as no anchors need to be deployed to keep the vessel in position.

# DYNAMIC OUTRIGGER FRAME

## BUILD ON EXPERIENCE

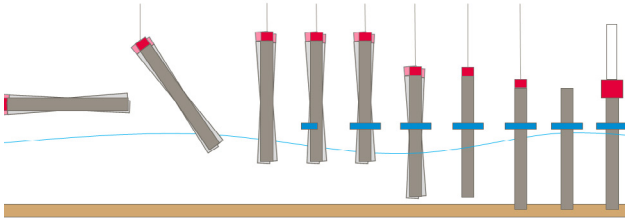
IQIP has an extensive track record for monopile handling, pile driving & motion control. Our equipment has installed >5.500 monopiles in >80 projects. With all disciplines and expertise in-house, IQIP is in a unique position to provide the Dynamic Outrigger Frame from concept right through to actual design, build, delivery & operation.

## INCREASING SAFETY

Redundancy in system architecture provides a very reliable system which can maintain operation in severe conditions. In the unlikely event of a failure the system will go to a safe modus based on fall back scenarios which are defined with the help of extensive FMECAs.

## INCREASING EFFICIENCY

By using the Dynamic Outrigger Frame a total of 30% to 40% cycle time reduction is possible per installed monopile.



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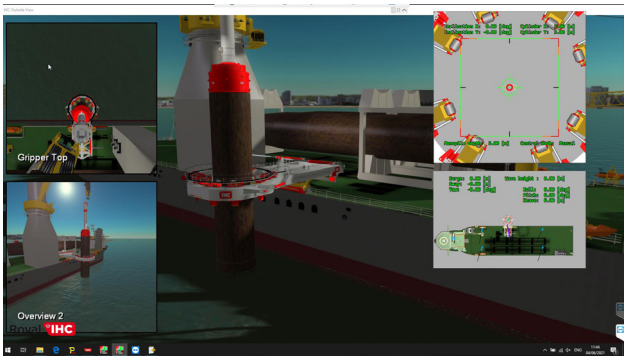
|---|---|
| **GENERAL** | |
| Water depth (typical) | 15 – 60m |
| Operational Hs | 2.5m |
| **MONOPILE TYPICALS** | |
| MP Diameter | 6.0 – 12m |
| MP Length | 110m |
| MP Weight | 1500 – 3500 mt |
| **MOTION COMPENSATION** | |
| Compensation stroke | +/- 3.0m |
| Compensation speed | 0.70m/s |
| Load | 350mt |
| **INSTALLATION TOLERANCES** | |
| Horizontal deviation | 1 m |
| Verticality | 0.2 degrees |
| Pile orientation | 2.5 degrees |
| Level of MP top | 0.1 m |

**OPTIONS**

XY stroke, speed & force increase
Monopile diameter increase
Diesel driven autonomous HPU
Noise mitigation system
Operator training simulator




## FROM CONCEPT TO REALISATION

To support your operation we have developed an integrated simulation model of the complete monopile installation sequence with all relevant real world systems & parameters included.

With this simulation model we have validated our technology and it provides a good basis to check design parameters such as loads, stroke & speed in combination with a mechanical concept tailored to your needs. This simulation model is used to evaluate the gripper performance in combination with the vessel and DP system performance to ultimately result in increased workability.

This simulation environment is also used throughout our projects to define parameters for detailed design, the basis for the control system, platform for testing, training and life cycle support.

Our in-house product development has led to several patent pending innovations; for example the ability to safely catch the swinging monopile with the gripper, accurate positioning on the target location and dealing with a wide range of soil conditions during pile driving.