

Abstract

Currently available solutions for the connection between monopiles and transition pieces are associated with disadvantages like varying quality in grout connections or fatigue damage as a result of pile driving. A radial bolted connection design is proposed that uses standard bolts and can be implemented with any number of bolts. Hence, the fatigue stresses during the life time of the connection are reduced and can be determined reliably. The increased reliability results in enhanced operational safety and reduced installation costs.

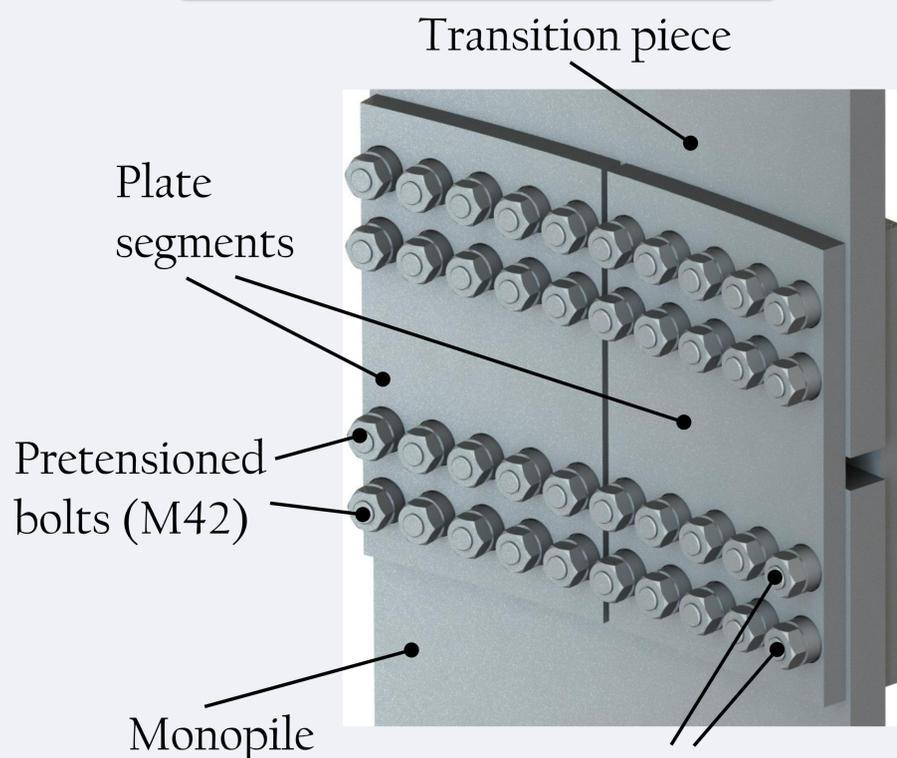
State of the Art

Changes in weather conditions often have a negative effect on the curing process of grout connections, [1]. This introduces uncertainty in the quality of the grout and adds to the financial risk in offshore projects. In alternatives using bolted connections, welds experience significant fatigue damage during pile driving and require additional shimming and special bolts, [2].

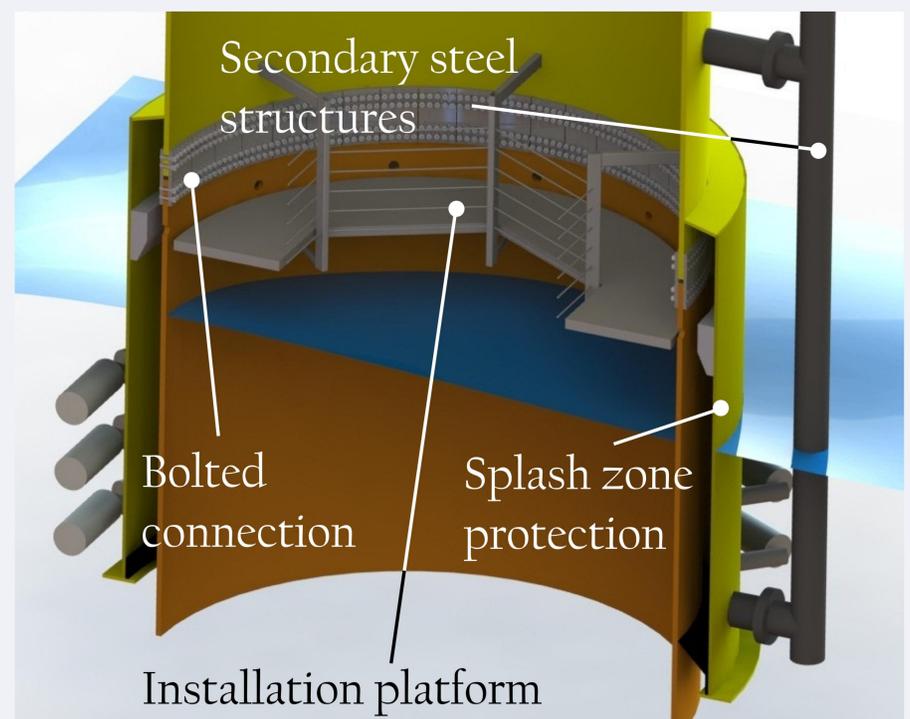
Design and Installation

The connection is implemented by plate segments that are pre-mounted on the inner and outer sides of the transition piece. The transition piece shields the bolted connection from exposure to salt water and supports secondary steel structures. The contact between monopile and transition piece is established by friction to relieve the bolts from shear and bending stresses. All installation operations are performed from a platform inside the monopile.

Design in Detail



Installation Concept



Conclusion

- Reduced uncertainty in fatigue resistance compared with grouted or welded connections
- Low-risk workflow during installation with regard to project delay and resulting costs

Future Work

- Implementation and validation of the connection in the field
- Evaluation and optimization of installation techniques

References

- [1] C. R. Golightly, Geotechnical and Engineering Geology Consultant (2011): Monopile Grouted Connection Failures
 [2] P. Gollub, J. Fisker Jensen, D. Giese, S. Güres, Stahlbau (2014): Flanged foundation connection of the Offshore Wind Farm Amrumbank West – Concept, approval, design, tests and installation

