Typically, wind turbine jackets are constructed in two stages: first the piles are driven, on which the jacket is then installed. To assure the jackets will fit, strict tolerances apply to the verticality and the distances between the pre-installed piles.

A foundation installation campaign can only be successful if an efficient and reliable pre-piling template is used. At TWD, the design of this critical piece of equipment is in experienced hands.

Since the pre-piling template is subjected to severe impact loads during piling, it is essential to maximize the robustness of the template. By using proper structural principles, fatigue friendly connections, and avoiding complex and delicate mechanisms under water, we design simple, light weight, and cost effective templates, capable of accurate positioning of the piles throughout the entire installation campaign.

This design approach has already proven to be successful on multiple pre-piling projects. The design of templates for 3-legged jackets (Baltic II), 4-legged jackets (Ormonde, Thornton Bank, Belwind) and tripods (Borkum West), installed with different vessels and subjected to different sets of boundary conditions, provides TWD’s designers extensive insight in a wide variety of pre-piling related challenges and their most effective solutions.

Besides designing a reliable piling template, TWD can assist with the optimization of the installation method and the design of the additional temporary works required. With effective pile stacking systems, the available deck space can be used optimally. Smart upending solutions avoid unnecessary changes to the rigging, resulting in a significant shortening of the cycle times.
POSITIONING OF TEMPLATE

For pre-piling executed from a jack-up barge, TWD designed templates suspended by winches. By using the jack-up legs as guides, the templates were lowered swiftly and positioned accurately, even in rough weather. By reeving the winch wires, the lifting capacity is upgraded to make sure vertical friction forces are overcome during pile driving.

For floating installation, sea-bed based templates are used, making use of smartly designed and fail safe hydraulic leveling systems. Designing several templates has taught us the optimal shape of mud mats.

INSTALLATION OF PILES

To speed up the pre-piling, all piles (3 or 4) can be placed in the sleeves before the driving. This approach avoids multiple changes to the rigging, significantly shortening the cycle time. To release the template after piling and prevent it from getting stuck on the piles, we use passive release systems consisting of smartly positioned insert pieces in the pile sleeves. Alternatively, for larger stick up lengths, a fail-safe active release mechanism is implemented.

MEASURING SYSTEM

The cycle time can be further optimized by equipping the pre-piling template with integrated measuring systems that measure driving depth, pile inclination and distances between the piles. Furthermore, cameras are used to facilitate the pile insertion in the sleeves. The need for maintenance is minimized, however access is provided for inspection of all systems in order to reduce possible below water failure as much as possible.

"TWD’s template designs assure a cost-effective and robust pile guiding frame, equipped with efficient functionalities to minimize cycle times and to reduce the risk of operational down time."