Mono-Pile Upending Trolley

General:

For MT Højgaard and the Sheringham wind turbine farm in the UK, KNUD E. HANSEN has designed a "mono-pile upending trolley", which solves the problem of how to upend a mono-pile from a supply vessel by a floating crane with a fixed hoist. The trolley runs on longitudinal tracks on the supply vessel. A tiltable cradle is suspended on a hydraulic heave compensating system and a wooden-lined shoe that carries one end of the mono-pile is suspended in the cradle on a slew bearing allowing an angular movement of the mono-pile.

Further studies for the project include interface investigations and drawings for the supply vessels and the floating crane " Svanen ", design and FEM analysis of the rail systems on the supply vessels, seafastening for the mono-piles and transition pieces as well as design of specialized equipment for transport and installation of two substations, including installation of internal and external J-tubes.

Main Particulars:

Weight of trolley	135 t
Maximum weight of mono-pile	600 t
Diameter of mono-pile	4.5 to 6.0 m
Heave compensating capability	+/- 300 mm within 7 seconds
Max. stroke length	+/- 600 mm
Max. roll of supply vessel	+/- 7 degrees

Miscellaneous:

Classification and approval	DNV/Statoil
Number of trolleys built	2

Scope of Work:

Detailed 3D design and workshop drawings for:
Upending trolley
Tracks, mono-pile cradles & jacks, deck equipment etc. on supply vessels
Seafastening for mono-piles, transition pieces and J- tube racks on supply vessels

3D Interface drawings for 3 different supply ships in the dock of the floating crane "Svanen", including 3D computer images and upending animation video.

FEM analysis of:
Upending trolley
Track systems and internal structure in the supply vessels
Hydraulic jacks and mono-pile support shoes

Loading conditions and calculation of accelerations
Mooring calculations and towing arrangement
Dynamic analysis of mono-pile lashing
Model testing of upending procedure

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