



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	4.50 to 6.00 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
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	

Scope of Work:

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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