

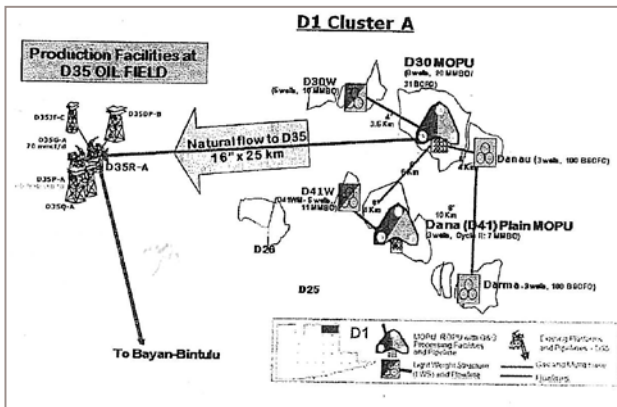
MMC Oil & Gas Engineering Sdn Bhd D1 Cluster Development

Wellhead Support Frames (WHSF)

ICON Engineering was contracted by MMC Oil & Gas Engineering Sdn. Bhd. to provide conceptual engineering and detailed structural design of two wellhead support frames (WHSF) at the D30 and DANA locations that are part of the D1 cluster of fields being developed by the PCPP Joint Operating Company. The PCPP JOC consists of Petronas Carigali, Pertamina and Petrovietnam. The D1 cluster of fields comprises the D30, Dana, Danau and Darma reservoirs, located offshore Sarawak.

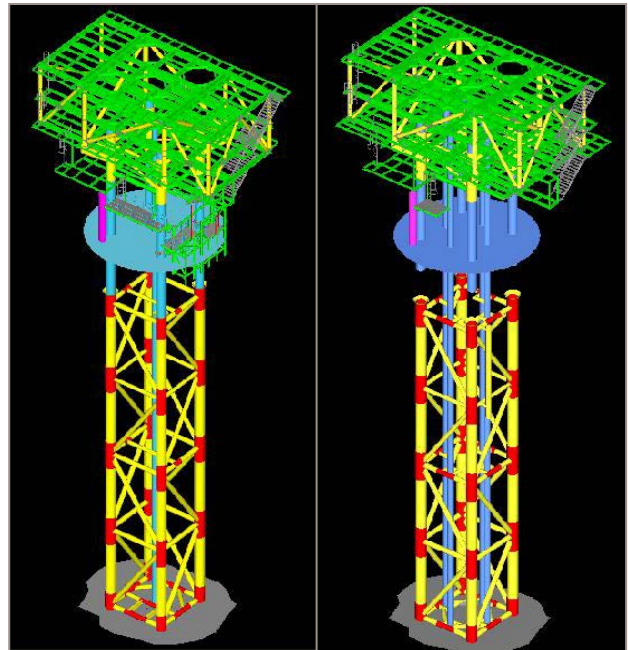
crude stream before final export to the Bintulu Crude Oil Terminal (BCOT).

Each of the wellhead support frames designed by ICON consists of a below sea level substructure or jacket and a topsides. The substructure acts as a drilling template with 36" conductors driven and grouted into the four (4) 40" legs and so double as structural piles. Four internal 24" conductors can be supported within the substructure at D30 and one internal 24" conductor can be supported at Dana. The D30 substructure is thus designed to accommodate a minimum of eight wells while the Dana substructure can accommodate a minimum of five wells.



The Field Development Concept

The wellhead support frames (WHSF) at D30 and Dana will be located in approximately 45m of water offshore Sarawak.



The Field Development Concept



Similar Development Illustrating the use of a WHSF

The wellhead support frames will receive the full well stream production (FWS) from the D30 and Dana reservoirs and transfer it to basic Mobile Offshore Production Units (MOPUs) that will be connected to each of the WHSFs. Production from the D30 and Dana MOPUs will then be further exported via a new pipeline to the existing D35 processing platform for processing. Production will be commingled with the existing D35

ICON also produced the conceptual installation study and procedures for installation of the D30 and Dana WHSFs using the jack-up rig installation method. The key deliverables that applied to the design of the two WHSFs also included:

- The Basis of Design document
- Detailed engineering and design drawings of the jackets and topsides
- Detailed design reports that included analysis for in-place, dynamic, fatigue, lift, transportation and load-out conditions
- Detailed weight control reports
- Fabrication shop drawings for the jackets and topsides
- Conceptual installation study and indicative installation procedures.