maxoil
PROCESS SOLUTIONS

MAXIMISING PERFORMANCE THROUGH
OPERATIONAL EXCELLENCE

Case Study

Significant Separation System Design Improvements Achieved Through Using a More Robust Basis of Design

Varying design options allow the client to decide the most optimal solution to satisfy project CAPEX

Overall Impact

- Serious production chemistry issues highlighted and reacted to
- Significant OPEX savings associated with temperature decrease
- Early design optimisation to avoid major CAPEX investment after start-up

Background & Challenge Recap

- Original separation philosophy created from incomplete data set
- Inadequate consideration to production chemistry issues during design
- Very tight crude export specifications

Maxoil Approach & Results

- Sampling battery to complete data set
- Proposed design options fully rationalised
- Vessel sizing estimations included; design options graded

Project Background & Challenges Faced:

A client was at the conceptual design stage of developing a new topsides facility on a brownfield site. The current site was experiencing oil/water separation issues. Maxoil identified gaps in the fluid data and obtained field samples to increase the robustness of the design basis used for the new production facilities. An oil/water separation technology review was performed and improvement recommendations to the base case design were advised.

The Scope:

As independent specialists in oil/water separation with no affiliation to any equipment suppliers, Maxoil were asked to validate, and if necessary modify, the original topsides design based on the fluid properties revealed following the sampling battery.

The Approach:

Fluid samples were taken and transferred to a specialist third party for full characterisation. These analyses were included in a comprehensive production chemistry review.

The proposed field separation philosophy was reviewed in light of the issues highlighted during the fluid characterisation work. Proposed modifications to the original topsides design were fully rationalised, with high level equipment sizing calculations included.

An objective assessment and comparison of the various design options put forward were carried out.

The Results

Three different design solutions were presented incorporating combinations of interstage heating, produced water (PW) recycling and two stage desalting.

Each design solution of varying CAPEX was able to achieve a different level of performance allowing the client to decide the most optimal solution to satisfy project CAPEX and the crude export strategy.

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Equipment sizing carried out for all design options provided the client with an estimate of vessel weights & sizes. Design options were graded against a range of categories.

Significant cost saving was identified by reducing the inlet heating requirements from 75°C to 50°C.

The current base case system was highly unlikely to achieve the product specifications due to previously unknown production chemistry issues and selected operating conditions.

Major system design changes to the current base case to improve oil/water separation:

- Low temperature bulk oil/water separation incorporating PW recycling.
- Employed interstage heating downstream of the 1st stage separator.

A single stage desalter was unable to meet the crude salt specification therefore two stage desalting was required.

DESIGN OPTION:	Current Base Case	Design Option 1	Design Option 2	Design Option 3	VIEC Option
SYSTEM DESIGN INFORMATION					
Design Liquid Capacity	550mbd	550mbd	1,133mbd	1,133mbd	550mbd
Temperature profile	(75/75°C)	(50/80°C)	(50/80°C)	(50/80°C)	(50/80°C)
TRACK RECORD / CAPEX / OPEX					
Track Record					
CAPEX					
OPEX					
SEPARATION TOOLS					
Chemicals (Demulsifier)	yes	yes	yes	yes	yes
Interstage Heating	no	yes	yes	yes	yes
Residence Time	yes	yes	yes	yes	yes
PW recycle	no	no	yes	yes	no
Two Stage Desalting	no	no	no	yes	no
No. of Separation Tools[a]	**2**	**3**	**4**	**5**	**3**
SYSTEM PERFORMANCE					
Export Crude (PTB)	>2020 PTB	<2020 PTB	202 - 404PTB	5 (< 30PTB)	>2020 PTB
Export Crude (BS&W)	5 - 20%	<5%	0.5 - 1%	0.15%	Unknown (5 - 20%)
PW Discharge (ppm)	>40ppm	<40ppm	<25ppm	<25ppm	>40ppm