Mator news

01/00

Provider of innovative consultancy services in oil/water/gas separation technology and condition based maintenance technology for the oilfield industry.

Phillips Bayu-Undan project – Providing a basis for making decisions about separation choices

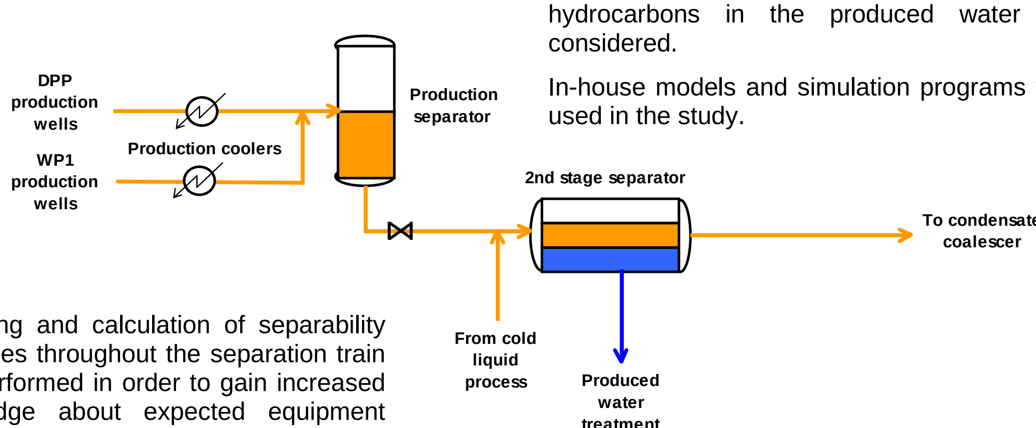
Mator recently completed a contract for Phillips Petroleum, Perth, WA, for a separability study for the Bayu-Undan project.

The Bayu-Undan field, located in the Timor Sea, contains gas/condensate with estimated reserves in excess of 400 million barrels of liquid and 3.4 tcf of gas. Full processing is to be carried out offshore, including significant amounts of produced water discharge to sea. Anticipated commercial production is by late 2003. Further information and status of the Bayu-Undan project can be found on www.phillips66.com/bayuundan/

Main challenge was to characterise the dispersed phase break-up and coalescence phenomena occuring in choke valves and piping. Different configurations of inlet sections, separator internals and other critical design parameters of the 3-phase separator were evaluated, together with two vendor proposals.

Different produced water treatment methods were simulated and evaluated, both with respect to expected discharge and cost/benefit based on LCC. A solution for reject oil treatment was proposed, and the impact of dissolved hydrocarbons in the produced water was considered.

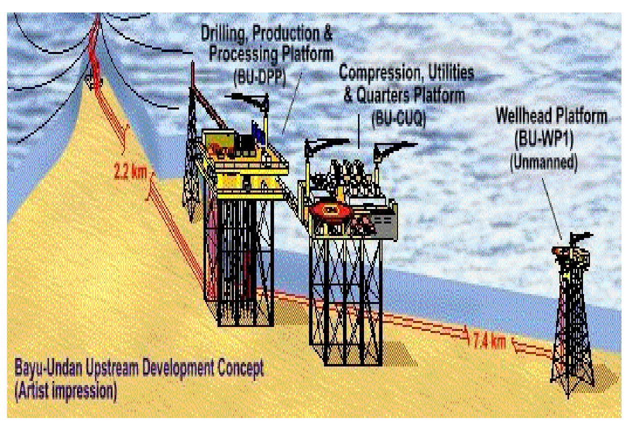
In-house models and simulation programs were used in the study.



Modelling and calculation of separability properties throughout the separation train was performed in order to gain increased knowledge about expected equipment performance. These results were then used as input to

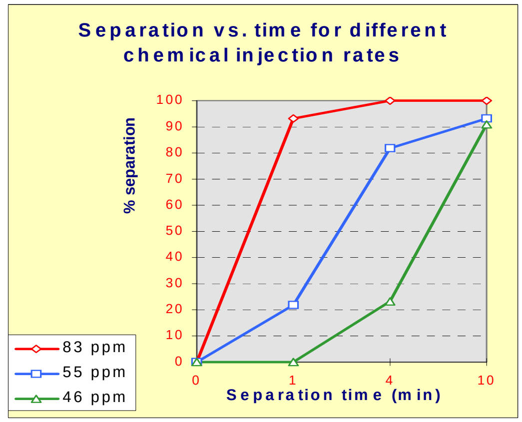
- establish functional requirements for the separation equipment, and
- identify factors that influences the difficulty of the phase dispersion.

Different operating regimes were identified in order to characterise the process with respect to effect of the production of salt-free water of condensation during the initial operation followed later by significant amounts of saline formation water. Quality of the condensate and water phases was estimated from upstream of the choke valves to downstream of the 3-phase separator and at the produced water treatment system discharge.



Heavy crudes? Fluid specific information becomes even more important

Mator has worked extensively with heavy crudes in 1999/2000 with API's down to 10.6 together with very high viscosities. Heavy oils differ from more typical light oils in that the density difference between the oil and water phases is less and that the viscosity ratio between oil and water is significantly larger. The higher the emulsion and foam stability, as is normally the case for heavy oils, the greater the separation challenge is. All these factors illustrate the challenge to select the correct tools and methodologies for providing the correct information as input to cost efficient and optimal process design.



Contact us if you need input on heavy crude solutions!

Process "snacks":

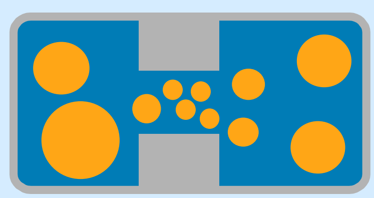
Droplet break-up in choke valves

The following model will predict the droplet size distribution created by valves provided no droplet coalescence do occur inside or downstream the valve:

$d_{sm} / D_p = k_1 * (D_o / D_p)^m * H^n * N_{Re}^p * N_{We}^q * V^r$

where: d_{sm} = surface mean droplet diameter (Sauter mean)
D_p = pipeline diameter downstream valve
D_o = orifice diameter
H = volume fraction of dispersed phase
V = viscosity correction factor

and: N_{Re} = $(D_p * v * \rho_c) / \mu_c$
N_{We} = $(\rho_c * v^2 * D_p) / \sigma$



where: v = turbulent velocity
ρ_c = density of continuos phase
μ_c = viscosity of continuos phase
σ = interfacial tension

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