

Case Study 2

Acquisition Appraisal

Context

Our client, an international oil and gas company with over 120,000bpd production, was interested in acquiring an E&P company with operations in Western Africa. The target firm owned concessions that included producing, undeveloped and prospect fields. The available data consisted of exploration reports and historic production records. The combination of short time-frames and unavailability of relevant data called for using alternatives to detailed simulator models.

The Challenge

The aim of our client was to generate P10, P50 and P90 production forecasts that would be used as input to the economic analysis of the acquisition.

However, the nature of the information available to our client is such that they needed to use a combination of methods and data sources. For instance, decline curve analysis (DCA) could be used to generate forecasts for producing fields while simulator generated "well type" profiles could be used for undeveloped fields.

Moreover, the economic value of an asset is related, on one hand, to the constraints of shared production facilities (such as pipelines, FPSOs, platforms etc.) and on the timing of the development of new projects on the other. Consequently, it was necessary for our client to link the subsurface performance with the characteristics of the surface facilities, rig numbers and well schedules.

The Alternative

Hence, the challenge consisted in achieving the combinations of profiles, carrying out the necessary calculations, generating the three economic reserves categories (P10, P50 and P90) and building several field development scenarios for rig number and well schedule optimisation within the limited allocated time and using an auditable method.

The most widely used tool for such tasks would be a generic spreadsheet programme. However, these have the following limitations:

- They are error prone, and the bigger the spreadsheet the higher the probability for errors to occur.
- They are not convenient for managing multiple profiles properly, especially when different scenarios need to be built.
- It is difficult to apply shared facilities constraints.
- Optimising and planning rig numbers and well schedules can be very complicated tasks for a spreadsheet.

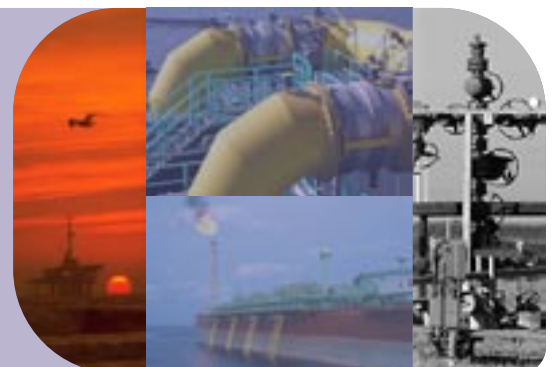
*Future®
impact on
a major
acquisition
appraisal*

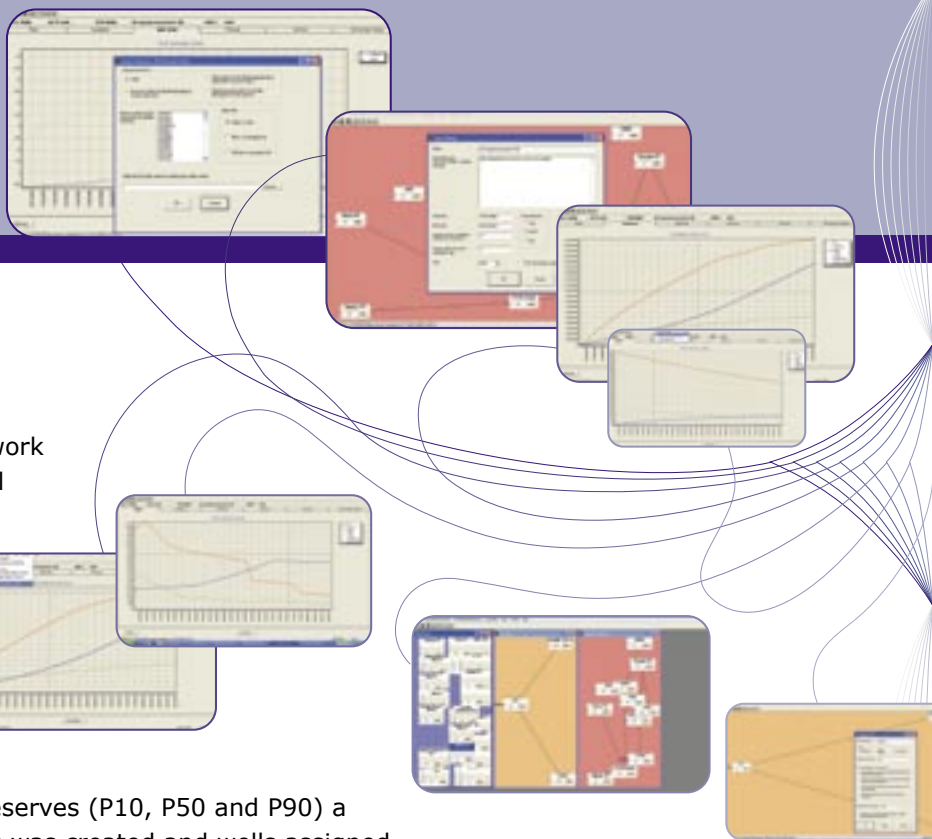
The solution

Our client, who have taken the lead in the use and further development of Serafim Future®, have integrated the use of Future in their business process and as a result were aware of the benefits it can yield in such situations. ♦

About Serafim Future®

Serafim Future is a software application and database developed by Serafim Ltd for handling of oil and gas production profiles. Production profiles generated by reservoir simulators, decline curve analysis or other methods can be imported, generated, aggregated, shifted and studied under different production constraints. Serafim Future is targeted at Reservoir Engineers who need to combine profiles from different sources, forecast future production, estimate reserves and study the effect of shared facilities constraints. Serafim Future can also be useful for asset managers and executives who need a secure and auditable reserves estimation system and a tool for field development planning and studying the effects of different development options.





Modelling

The leading Reservoir Engineer started by creating a surface network that honours the actual and potential future configurations.

Facilities constraints at the network nodes were modelled and applied.

For each category of reserves (P10, P50 and P90) a model of the reservoirs was created and wells assigned to each reservoir.

For producing fields, historic production data was imported and interactive decline curve analysis was carried out (within Serafim Future®) generating future production profiles. Forecasting of associated gas production used the free-gas: liquid ratio method.

Where undeveloped fields are included, "type well" production profiles, generated using reservoir simulation sector models, were imported and assigned to the appropriate wells and reservoirs. One type well was generated for each category of reserves. Prospects were modelled using a similar "type well" approach.

Calculations

Rig numbers and well schedules were modelled by specifying a number of work sequences (timings of wells coming into production). For each category of reserves and work sequence a production optimisation (a run in Future® terms) was run.

The results

Thanks to the flexibility of the software and the fast run times, it was possible to copy and change run settings to generate profiles for different surface facilities and work sequences. It was also possible to compare the profiles graphically in order to assess the impact of the changes..

As a result, P10, P50 and P90 production profiles were generated with different rig schedule, facility capacity and pipeline timing.

Results were reported per field and for the whole project.

The use of Serafim Future allowed our client to quickly assess the potential of the acquisition and proceed with it. Shortly after the purchase, a large drilling programme was commissioned, boosting our client's portfolio substantially.

Our client's perception

- Future® gives the chance to combine surface networks with field performance.
- It offers great flexibility for reporting.
- Fast run times, which give the possibility to analyse several different scenarios in order to analyse optimum conditions.
- It is an easy tool to use, it offers the ability the right degree of details the user wants (field, manifold, well or completion levels).
- Future® offers the flexibility to combine inputs from Excel files, simulator runs, built in DCA etc. to build forecasts.

About Serafim Ltd

SERAFIM Ltd specialises in applying mathematics and mathematical reasoning to understand and solve practical problems in engineering and software development.

From the development of innovative solutions to their final implementation in the form of high value-adding software, our work is based on the techniques used in scientific and mathematical research. We currently work predominantly in oil-field reservoir engineering and project economics. Our clients are oil and gas companies, oil-field service firms, governments and other consultancies.

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