Pre-drilling with templates, tiebacks offers savings

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THE USE OF PRE-DRILLING with templates and tiebacks is becoming an optimum choice for marginal fields where additional reservoir data are needed and where drilling-to-production time needs to be reduced.

The methodology can be cost effective when executed by experienced and skilled engineers.

During the late 1970s and 1980s, pre-drilling was increasingly utilised to enhance project economics. For both oil and gas reservoirs, drilling wells while jacket and topsides structures were under construction reaped significant rewards.

Once wells were tied back and completed, platform production could often be achieved shortly after first production.

With the increased demand for pre-drilling, the major wellhead companies enhanced the mudline tieback equipment for both jackup and semisubmersible drilling.

Surface wellhead equipment was developed to allow space-out with mandrel type hangers.

Additionally, pre-drilling template designs were optimised for installation by mobile drilling vessels, making available major cost savings in pre-drilling economics.

IMPACT OF SMALL PLATFORMS

In recent years, with the development of smaller hydrocarbon accumulations and the advent of substantially lighter platforms, there has been an increased tendency to drill through jackets once in position, rather than using a pre-drilling template methodology.

These small platforms have a much-reduced fabrication cycle.

The perceived complexity and increased costs associated with well tiebacks had made a number of operators prefer platform drilling options.

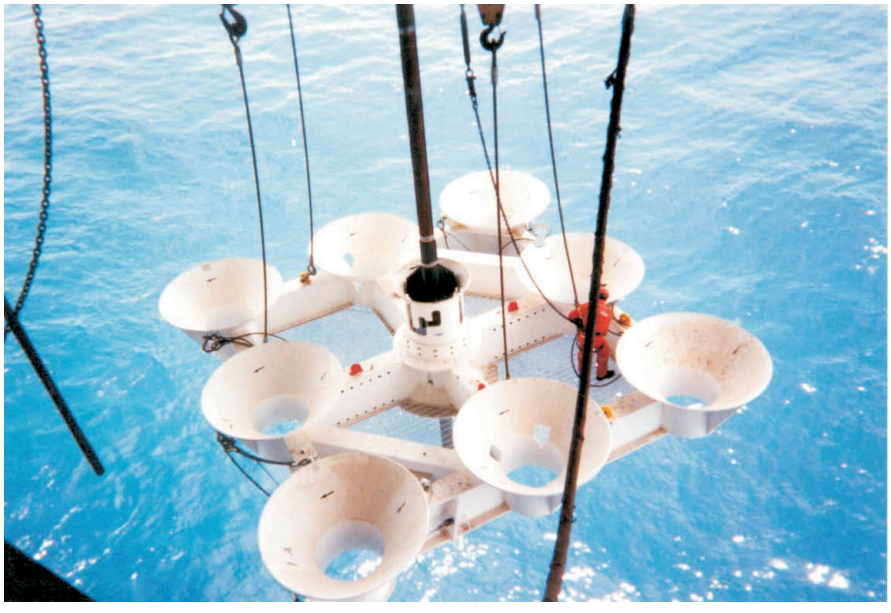
These preferences were fuelled by bad experiences from early pre-drilling and tieback campaigns, when issues were less understood and planning was less extensive.

With many technical operations that occur infrequently, limited knowledge and experience often lead to budget overruns.

This is particularly the case for template and tiebacks, where many aspects of the equipment and operations occur at the interface between drilling, structural and mechanical engineering.

With the benefit of experience, a typical rig-installed drilling template is in place within 24 hours, with an average well tieback taking less than 48 hours.

As the oil sector has matured, field developments are increasingly marginal. Even the larger accumulations have substantial technical challenges and hence reduced economics.



Template used for pre-drilling project in the Rosetta gas field in the Nile Delta allowed completion of project in time to meet gas delivery dates. 4 wells were pre-drilled and 2 30-in. conductors set.

In such instances, the services of a specialist provider can add significant value to the project by identifying risks and remaining uncertainties, as well as optimising processes based on other operators' experiences.

An individual operator may carry out a template and tieback program in a region every 5 years or so. In a similar period, a specialist provider experiences involvement in more than 20 times that work scope.

NEW INTEREST

Once again, however, operators are evaluating the pre-drilling option for their developments.

Successful tieback of wells is now normal where there is adequate planning and manufacture of cost effective drilling templates, and there are many such examples around the world.

Operators are therefore increasingly looking to innovative use of known technologies to reduce costs.

Focus with marginal fields is now on the earlier re-use of appraisal wells in order to acquire more reservoir data, and the decoupling of drilling and project schedules in order to mitigate risk and cost overruns.

The increased cost of template and tieback hardware is often offset by time savings afforded by batch drilling or completion processes.

Refining economic models and replacing annual historical coarse inputs with monthly reports, makes the "time value" of money (through discounting) penalty less onerous in advancing drilling for compressed field development schedules. This scenario is entirely appropriate for short development schedules.

EXAMPLE APPLICATION

Rashpetco in the Nile Delta executed one of many such projects that have taken place in recent years. This typical, successful pre-drilling project was on the Rosetta Field during 1999-2000.

As with other accumulations in this area, the development of the Rosetta gas field required completion of the project on time to meet contractual gas delivery dates. With this in mind, it was important to ensure an adequate number of wells could be completed and made available at first production to meet nominations.

After careful consideration of fabrication schedules for jackets and topsides, availability of lift barges in the region and the necessary time to comfortably complete drilling operations, it was decided to proceed with a pre-drilling and tieback scenario.

A 9-slot casing supported template was located over the first development well by the drilling rig allowing wells to be spaced out on the unstable seabed. Using the jackup drilling rig "King Singapore" a total of 4 wells were pre-drilled along with two 30-in. conductors set for use as docking piles.

Pre-drilling with templates and tiebacks can be cost effective when executed by experienced and skilled engineers. With the benefit of experience, a typical rig-installed drilling template is in place within 24 hours, with an average well tieback taking less than 48 hours.

To avoid the bottom bracing and docking pile locating guides of the jacket clashing with the template, the template structure around the 30-in. docking piles was removed by the rig using only ROV intervention, after completion of the pre-drilling program.

Angular and horizontal alignment tolerances were successfully achieved for the jacket installation. This, coupled with careful inclination control on the pre-drilled wells, allowed a standard structure and operational tieback design.

As with the template installation, extensive planning for operation and contingencies allowed the full tieback program to be executed within 7 days for the 4 wells, which was significantly under the budgeted allowance.

The project demonstrated that new pre-drilling and tieback of wells can be cost effectively executed, while at the same time removing drilling activity from the project critical path, mitigating interface scheduling and delayed first production risks.

The key to this success is the careful evaluation of historical experience, the appropriate selection of proven technological methodologies and the optimisation of the process through planning by personnel with the necessary competencies. ■