The overflowing cup

If you were to summarise your business, would your cup be half full or half empty?

When you have David Bond steering your drilling engineering team, expect the 'cup to runneth over' in regards to both company enthusiasm and ingenuous strategic direction. With an uncanny ability to embrace problems as simply 'the opportunity to find solutions', Ophir Energy has transitioned from a start-up company with limited resources to a formidable oil and gas exploration company that is breaking new territory with innovative exploration and drilling techniques.

Since its foundation in 2004, Ophir has acquired an extensive portfolio of deep-water exploration interests consisting of 16 blocks within eight jurisdictions in Africa. According to providers of oil and gas licensing data and intelligence IHS Inc, the company is now one of the fifth largest deep-water exploration acreage holders in Africa in terms of net area.

Bond believes that what makes his company distinctive from others is the team of exceptional people who are allowed to get on with what they do best—there is total trust and commitment from all layers of staff and management.

"We have had great confidence from the senior management, a desire to get somewhere and an ability to spot talent, and importantly, not suppress it. I look back at the amount of trust that's been given and there aren't many places in the world where that happens", Bond said.

"The essence of what we've done at Ophir is to enrol teams and understand what will motivate them. In performance leadership there are two forms; you can coerce and you can encourage. I've come to a strong conclusion that the coercion will last as long as you coerce. If you're going to go down the coercion road and rule by fear, make sure that you're there all the time."

As part of its rapid growth from inception in 2004, Ophir has acquired an impressive collection of high-profile shareholders which matches its extensive exploration portfolio. Despite having the funding in place the company has faced a number of significant challenges along its path of rapid growth.

David Bond, Ophir General Manager, Drilling

In 2006, Ophir recognised that without deep-water drilling rigs it would not be able to translate its large acreage position into real worth. The lack of ultra-deep-water rig capacity, which had become a thorn in the side for the global oil and gas sector in 2006 when rigs were 100% utilised (and predicted to stay that way over the next two-to-three years) could have stopped dead Ophir's exploration aspirations.

Fortunately, through an introduction by Fearnly Offshore, Ophir was able to enter into a rig share agreement with ExxonMobil for 300 days on the new build dual activity rig *West Polaris*. In order to drill its acreage in Gabon, Ophir also gained an additional 135 days access to the DP drillship *Deep Venture* which could drill in up to 1,280 m of water. Internally, Ophir's acreage in Equatorial Guinea was gaining prominence; the only problem was Block R was in 1,700 m of water and beyond the *Deep Venture*'s range.

Bond's role on joining the company was to build up a drilling team to manage the challenges of drilling in Africa. To help the process, Ophir brought in AGR to provide people and capability under Bond's leadership.

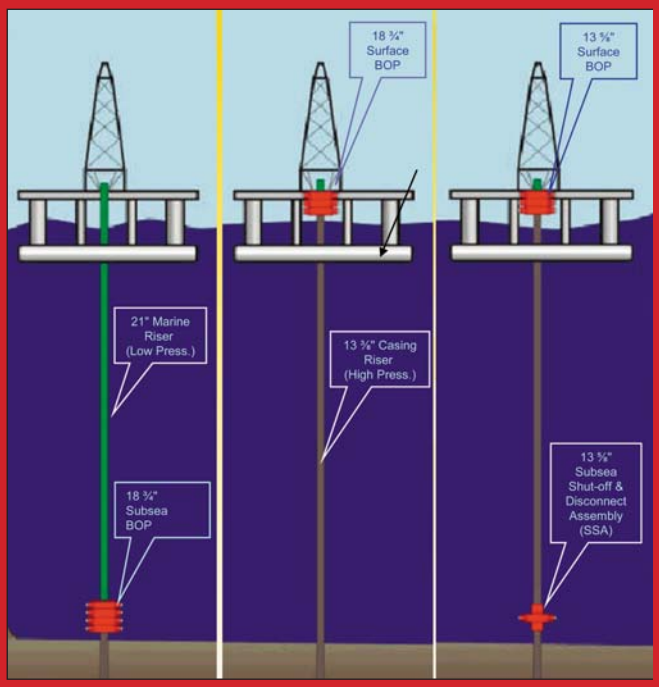
"AGR brought us a very quick access to some talented individuals. That way we were able to build a nucleus of a team starting with AGR's Project Manager Richard Turner, then expanding out to John Herriot and Mike Marshall as superintendents, Ivar Holm as Chief Drilling Engineer, Greg Crum and Bill Richmond as drilling supervisors and two young drilling engineers Petar Sasic and Paul Sainsbury who really stood up to the plate when asked."

As the team was building, some new challenges emerged; Ophir was faced with a two year wait before it was able to drill at its acreage in Equatorial Guinea based on when the *West Polaris* became available.

"We had a technical bust with no worldwide spare capacity to be able to get hold of rigs so we had a choice —we either wait for the *West Polaris*, which had the capability to drill to 3,000m and delay the Equatorial Guinea opportunity, or we come up with an innovative solution to allow the *Deep Venture* rig to be able to extend itself into the deep water. The idea was to take the *Deep Venture* to Gabon where it would have suited the water depths of where we were exploring. It's a dynamic drill ship but a much smaller one than the *West Polaris*."

Bond was excited to draw on extensive research and quantitative risk assessment he had been involved with during his tenure at Woodside

An Innovative Solution: Surface BOP



Conventional BOP

- Large ID 18¾" Subsea BOP, weight about 200 to 300t, normally needs buoyancy in deepwater
- Well Control via choke and kill lines on outside of riser
- Need large deck space and ability to hold riser

Surface BOPs

- In 1995 Unocal started experimenting with SBOPs to reduce overall drilling costs
- 18¾" stack suspended in moon pool from riser tensioners. Casing cemented in at seabed. No emergency disconnect facility
- Maximum water depth gradually increased with experience. (From 72 ft to 6,746ft.) Third generation rigs used with pre-laid moorings, limited to use in SE Asia
- To-date more than 200 wells have been drilled using SBOPs
- Shell modified system to include Subsea Shut-Off & Disconnect Assembly ("SSA") - allows application of SBOP in harsher environments
- Including SSA allows SBOP to be used on a DP or moored vessel
- Stena Drilling built a copy of the Shell system for their own rigs

almost a decade prior. Because of the massive mobilisation and demobilisation costs associated with bringing deep-water rigs to isolated Australia, as Woodside's Principle Drilling Engineer, Bond had coordinated a study that looked at surface BOPs, which is a technique pioneered by Unocal in Thailand.

The government at the time shunned the idea as too risky, although all components of the survey (as well as successful operations by Unocal) indicated the technology was actually safer than the current technology—a decision that has cost Australia dearly, Bond said.

"You're talking about importing rigs from a long way away when you could have used rigs that were already here in Australia. You needed clusters of wells to justify the mobilisation costs, so individual wells were never drilled.

"The drilling technology has always been there, the wells are just as simple to drill, so in my view - and I said it quite vocally—we should have taken the government to task. Woodside chose not to do that so the technology has sadly sat on the fence".

"When I joined the company, I sat down with Alan Stein [Ophir Managing Director] and said 'I think these surface BOPs can do the job in Equatorial Guinea, but don't take my word for it—let's do a detailed feasibility study that will demonstrate we have taken care of all the risks'", Bond said.

"Quantitative Risk Assessment (or QRA) is a technique that was originally developed for nuclear power stations, designed to demonstrate that certain risks are acceptable when you haven't actually carried out that particular project before. I've used QRA for four or five major studies and each time we've gained a really good understanding of where the big risks are. The magic of QRA is once you have agreed with the individual inputs you can't argue with the answer … and the answer is usually so counter intuitive you're saying 'wow that wasn't what we expected'! When you think about the answer then it should seem sensible."

The study set off a chain of events which involved bringing together a series of world-class contractors in drilling, including Stena Offshore (providing the Surface BOPs), pore pressure experts KSI (to ensure the design pressures would never be exceeded), IRC in Houston for quantitative risk assessment, and riser analysis with 2H in the UK, to verify that Surface BOPs were indeed a safe technology.

Ultimately, Ophir's insurance underwriters also needed to believe in the technology for Ophir to obtain Control of Well Insurance.

"We were able to go back to our insurance underwriter in London with the feasibility study and show them that if we used surface BOPs we would expect them to be an order of magnitude safer than conventional subsea BOP systems in terms of blow-out risk. Bottom line—they (the insurers) gave us a 15% discount on our insurance when using the surface BOPs compared to conventional systems. Now that's putting your money where your mouth is and is a testament to our commitment to the quality of work and to safety."

Ophir designed a system that used not just a land BOP suspended at the surface, but a second dual shear ram BOP attached to the seabed, which was able to be run much more efficiently by using 13-3/8 inch casing instead of conventional riser joints.

"We changed technology and designed surface BOPs which would take the rig far beyond its design capabilities, enabling it to drill in depths previously inaccessible. The objective of putting another simplified BOP on the seabed is that you actually have two, so you can disconnect the riser and close the shear rams, or isolate the wells if ever the riser failed. What you gain now with a subsea shut-off assembly (SSA) is essentially two BOPs. We demonstrated that if the riser vibrated too much as the water flowed past, it was like taking a paper clip and bending it a few times—eventually it would break", Bond said.

"We looked at the stresses and strains given the environmental conditions to ensure we weren't going to have a riser failure and came up with solutions. For example, we ordered a special casing connection that was very fatigue resistant before the riser analysis results had come back. After we received the study, it said the fatigue life of the riser with that connection was 43 years (we planned to have it in place for ten days). Perhaps we went a bit far with our design work!

The Ophir team also put a great deal of effort into understanding the running requirements of the equipment—the underlying concern was would it all fit? Planning an intricate operation on a rig working for another operator in several different countries on the west coast of Africa presented another technical challenge. Ophir overcame this pulling the team together wherever it could and working the running steps in detail.

The result? "Using the improved surface BOPs with a Seabed Shut Off Device and the concept of 'Technical Limit', we were able to save millions of dollars", Bond said. "While there is no doubt that saving $20 MM per well for the bigger companies wouldn't have much of an impact, for smaller companies the savings are very significant.

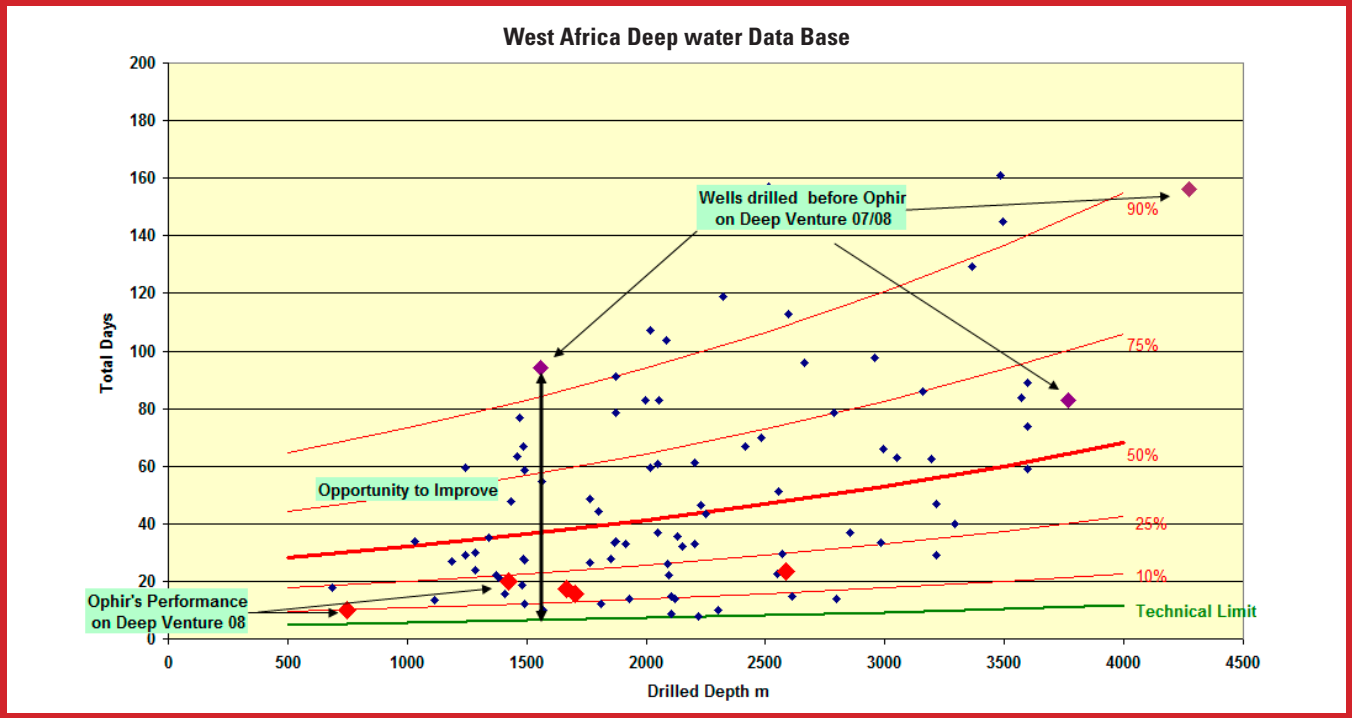
"When it was impossible to get our hands on a conventional deep-water rig, this new technology allowed us access to everything in our block, accelerating our drilling programme by a year to a year and a half."

Another example of Ophir's belief in detailed engineering and the ability to resolve potential problems prior to project commencement is the degree of pre-planning it conducted. It was the educated conservatism at the outset and close association between geoscience and drilling that Bond attributes to Ophir's outstanding performance.

"We were seeing other companies drilling wells within the same area and conditions for over 80 days. Ophir managed to drill five wells in two countries in under 89 days, with one well being done in just 10 days—and made two discoveries along the way!

"We had several factors building up in our favour, which explains why we can achieve things that others don't seem to be able to do. We've built teams that are highly capable, we spend a lot of time pre-planning, and we're also being measured against a completely different benchmark: the Technical Limit, it's an internal benchmark which very few people actually follow because it means you expose yourself.

Technical Limit Drilling



- Ophir utilises Technical Limit ("TL")methodology to optimise drilling performance
- Offset wells are analysed in great detail a step at a time to:
  - Understand what issues prevented the well being on the Technical Limit Green Curve
  - Identify both Non Productive Time (NPT) and Invisible Lost Time preventing the well from achieving the Technical Limit (refer to the references at the end of the article)
  - Develop engineering solutions required to address the identified problems
- Invisible Lost Time (ILT) generally accounts for 60-80% of the gap between the TL and actual performance
- Addressing ILT involves both accepting it exists and being prepared to address it's removal
- To get an improved outcome requires substantial investment in upfront planning by the entire team

"I'll tell my team members: 'Come into my office and tell me if you're afraid of failing. Then, when you're exposed, let's take on your worry head-on and engineer the way we work as a company and eliminate the problem. Far better to have tried and failed than never tried at all, at least that way you can fix the problem!'"

A common theme that runs through every aspect of Ophir's work culture, whether it be the process of enrolling drilling contractors or making technical decisions, is the importance of the team and complete belief in each member.

Bond quoted from *The Intrapreneur's Ten Commandments*: "Never bet on a race unless you're running in it."

"If you want to deliver an outcome you need to control it. We recognised that if we wanted to achieve high performance we had to build a rapport and relationship with the drilling contractor Larsen—in too many companies it's a case of 'us and them'. To start with Larsen, who were based in the UK and South Africa, wouldn't even answer the phone calls or emails we left them so, eventually, I said, 'look I'm coming over'. We got their attention.

"We realised that without the drilling contractor on our side we were never going to be able to deliver performance, so we needed to build them into our team and get them to want to work in our direction. We moved with time to a position of incredible trust and understanding, so when we asked them how we were going to fix problems they (Larsen) came up with some great ideas.

"Remember, there's no incentive for contractors to do this as they're going to receive the same money over the term of their contract whether they operate slowly or quickly. However, these guys know what the problems are as they do it every day, so if they can get excited about working with you, you move to the great position where you can do something about the issues.

"It demonstrated that you could bring people into a team and enrol them into where you want to get to—the definition of 'enrolling' is painting a picture that they want to walk into it. And if you do that, you've achieved something special. The big distinction is to how you treat people—it is the freedom to create things that creates special things.

"I look back with pride to see how everyone in the team made a contribution and the really great performance we were able to achieve in a tough part of Africa.

"Ultimately what makes the difference is the old adage of the cup. It can be half empty or half full ... or even overflowing!"

How does your cup measure up?

Reference Papers

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