1 of 1 DOCUMENT

Offshore

January, 1995

Alliance changes economics of Andrew Field development

BYLINE: Ash Bakshi, Brown & Root; Ash Bakshi is director of business acquisition for Brown & Root Energy Services, Europe and Asia. He served as deputy project manager on the BP Andrew Alliance and is the creator of the gainsharing mechanism applied to the Alliance partnership. He holds an MS in mechanical engineering from the University of Colorado (US) and a BS in mechanical engineering from Birla Engineering College (India).

SECTION: ALLIANCES & PARTNERSHIPS; Pg. 30

LENGTH: 3308 words

HIGHLIGHT:
Contractors and operator, sharing in cost risk and profits, produce model for model for other marginal field developments

A clear vision for the strength of alliances in offshore developments finds the BP Andrew Alliance in the UK North Sea working to build a better future for the energy industry.

Sucess to date on the BP Andrew Alliance results from a new behavior within British Petroleum's integration of commercial, subsurface, and facilities teams, combined with an alliance approach taken to project development. These integrated efforts have instigated substantial cost reductions. The lessons learned here hold new business opportunities for marginal fields worldwide.

Despite a 20-year span of reservoir appraisal and investigations of numerous development options, BP Andrew remained a marginal field. BP's evaluations led it to believe that technology alone would not produce an economic solution for Andrew.

Efficient technology coupled with a change in project management behavior would create a viable solution for Andrew Field development. BP linked these conclusions with its significant strides for reducing development costs on other North Sea alliance projects to create a vision for an Andrew Alliance.

"We believed innovation, combined with a commitment to cost savings, would deliver extraordinary results," explained John Martin, Andrew Alliance project manager from BP.

The project is built on confidence that cost savings are realized through leadership and cooperation. The alliance concept encourages a non-adversarial approach to relationships that reinforces the innovative thinking necessary to effectively reduce costs. As a result, the team is increasing profitability for all participants, contributing to the long-term future of each company, and, potentially, the energy industry.

Importantly, the Andrew Alliance is demonstrating the benefits of accountability and the value of working toward a common objective. Each Andrew Alliance member, its employees and its suppliers, has a clear understanding of the business requirement -- to bring the field into production at a target cost of £373 million, with first oil targeted for Jan. 1, 1997.

BP secured project sanctioning in February 1994 based on these targets. The anticipated production is 70,000 b/d oil and 32 MMcf/d gas. Using a traditional approach, BP estimates the project would have cost £450 million. The 21% reduction in capital expenditure (CAPEX) results mostly from a combining of resources, improved relationships, reduced interfaces, and design innovation (Table 1).

TABLE 1. Where the 21% reduction in capital expenditures came from:

* Reduction of BP personnel by combining resources (7%)

* Improved supplier relationships, less documentation, non-prescriptive specs (3%)

* Reduced interfaces, integration of design and fabrication teams, optimum equipment delivery (8%)

* Design innovation (3%).

Further cost savings are resulting from a commitment to gainsharing and teamwork. The Alliance team has set an internal target cost of £320 million with first oil Sept. 1, 1996. based on an achievement of these targets, a saving of approximately £50 million experienced on the project will be shared by all participants, in addition to the normal profit included in the sanction estimate.

Reduced interfaces, informed decision-making from greater participation, and firm commitments from all parties have helped to define these targets and generated increased confidence among the Alliance members that even more efficiency is possible for the benefit of all.

The Andrew story began in 1974, when BP discovered the field on Block 16/28 in 381 ft of water. From 1983-1986, BP evaluated several development options to no avail. The options included a production and quarters platform, incorporating a subsea system; a floating production and offshore storage facility; and a combination production/drilling and quarters platform.

10 minimum conditions

Almost 10 years later, BP called on seven major North Sea contractors to address 10 minimum conditions of satisfaction for bringing value to the Andrew project and to ensure sanctioning. Rather than just requesting commercial bids for specified work, BP presented non-prescriptive expectations for an alliance-type approach to Andrew development.

BP invited the contractors to address issues including: efficiency, accountability, profitability, continuous improvement, quality and safety management, reliable, fit-for-purpose design standards, minimal offshore intervention with low-cost operations, information systems, quality relationships, and project commitment.

Brown & Root proposed alliance agreement principles that would being a balance of risks and rewards, while creating an environment for increased profit for all participants.

Risk is shared between the operator and contractors through gainsharing. Brown & Root's commitment to the alliance approach and associated gainsharing earned it the responsibility for project management support, platform jacket and top-sides design, and procurement.

The selection process for Brown & Root did not include the commercial evaluation, simply the 10 minimum conditions relating to the project's success. BP and Brown & Root then proceeded with the selection of other alliance participants that could again bring value to the Andrew project and bring the much needed sanctioning. The process required a balance of commitment to the project and a commercial evaluation.

Selling the concept

Selling the concept to potential Alliance members represented the team's first hurdle in bringing down contractual walls. Accountability for the overall cost was the biggest concern among the contractors, reported Santa Fe, the Andrew Alliance drilling contractor.

"While we were cautiously optimistic, our initial concern rested with the significant commitment necessary in the gain/loss scheme without total control over the final outcome," said John Bergeland, deputy managing director of Santa Fe.

A willingness to listen on the part of the various contractors, however, helped to create an open dialogue and eventual buy-in to the alliance concept. The Alliance team is demonstrating that profitability is not dependent on reimbursable staff hours or lump sum contracts with extensive contingencies. Efficiency and teamwork are becoming the culture for success.

Santa Fe was the first Alliance member selected by BP and Brown & Root. The driller's early involvement would provide Santa Fe's input and ownership of the drilling module design, leading to cost avoidance in the development phase and cost savings in operations.

As the selection process continued, BP's 10 minimum conditions were well received among the North Sea contractors.

In joining the Alliance, each contracting member said it would abide by BP's Offshore Contractors' Charter. The document defines appropriate behavior and ethics for participating contractors and expects each Alliance member to treat its employees in a respectable manner. Four major principles are addressed: a safe working environment, respect for individuals, fair reward, and employment continuity. While the participating contractors maintain these ethics in their daily work practices, most regarded the commitment as profound and welcomed the leadership approach.

All members were on board by october 1993 and produced the pre-sanction target cost within two months. The Alliance team included eight participants with varying percentage interests in the project's success. The percentages are based on a company's level of risk and each company's degree of influence on the final cost.

Table 2. Division of Alliance risk/profitability shares:

BP - operator (46%)

Brown & Root - project management support and detailed engineering for jacket, deck topsides, and subsea facilities (22%)

Brown & Root Highlands Fabricators - jacket, template and piling fabrication (6%)

Trafalgar House - deck and topsides fabrication (12%)

Saipem - platform transportation and installation (6%)

Allseas - pipeline installation (4%)

Santa Fe - platform drilling facilities and well construction (3%)

Emtunga - accommodations (1%)

Despite the varying percentages, the Alliance works as a team in the decision-making process. A single alliance agreement exists between the main contractors and BP, aligning the contractors financially to the overall success of the

project and establishing a framework for guidance via an integrated management team. Each member has an equal vote. The intent is to provide an open forum where discussion and resolution can take place without any member feeling threatened. The blame for problems that arise between the project phases is removed.

First major test

The Alliance was put to its first big test in late January 1994. With the drop in the oil price to $ 12/bbl from $ 18/bbl, BP needed to improve the economics of Andrew and called on its Alliance members to deliver the project within reduced 1994 and 1995 capital expenditure limits. The team met the challenge and everyone contributed in some way.

* Highlands Fabricators delayed its original start date for jacket fabrication from May 1994 until December 1994. That alone deferred expenditure of £10 million.

* Allseas agreed to reschedule the pipeline installation to maintain the option of early oil.

* Brown & Root made a commitment to expend 10% less in the cost of staff hours. A redesign of the jacket, reducing the number of piles for 16 to 12, saved the project another £1.8 million.

* Saipem saved £450,000 by offering to reuse lifting beams developed for previous North Sea projects.

The project has continued with a high level of commitment in striving for improvement and greater cost savings. Brown & Root has continued to reduce project overhead by 10% each year without sacrificing performance. Early participation, say Alliance members, set the momentum for change and increased opportunities for flexibility and compromise.

Driving down costs

Throughout the process, the Alliance members have challenged traditional practices.

Guidelines for execution include 100% onshore completion, allowing for only essential offshore completion activities, and designing facilities fit-for-purpose for the Andrew production needs.

The Alliance members report that early input into the process avoids unnecessary redesign, meaning further cost savings. Santa Fe's direct involvement of drilling crew members in the design and construction of the oil rig will avoid any subsequent rework on its part, explains Oliver Hinton, project manager for Santa Fe.

Conventionally, engineering contractors design a rig they will neither build nor operate. On Andrew, a designated drilling crew is already on board, selecting equipment and reviewing the design. From the very start, the Santa Fe superintendent has worked with BP to ensure that the rig's functional specification is tailored to the drilling needs for Andrew. Storage and equipment ratings also have been optimized for the specific application.

Keeping with the fit-for-purpose objective, the rig will weigh 1,800 metric tons, versus the more typical UK platform rig weights in excess of 2,000 metric tons. Thus, the Andrew rig is costing significantly less. The small-modular unit is removable for any possible reuse.

Life-cycle planning

Focusing on lifecycle costs, Brown & Root has collaborated with Alliance members and suppliers to develop a simplified facilities design system. The team maintains a minimum facilities philosophy without bringing risk to personnel, relates Derek Langford, Brown & Root's engineering manager. Key attributes of the system include:

>* A single gas compression train with two 50% export oil pumps.

* One platform pedestal crane.

* Three gas turbine-driven power generators with combined capacity of 130% of peak load supply main electrical power. The three generators provide a more cost-effective solution over the life of the field than two larger units because power demand will decrease in the later years of operation.

* A complete electrical distribution system for the supply of power transformers, HV and LV switchgear and all distribution boards. This integrated design reduced the number of power transformers from three to two.

* An integrated system, rather than three separate systems, for process control, monitoring, emergency shutdown and fire and gas detection. This system facilitated procurement efforts, eliminated compatibility interfaces, resulted in hardware savings, and will minimize the number of suppliers necessary for maintenance.

* Proven standard equipment with high reliability and availability.

* A maintenance strategy focused on designing out routine maintenance and adopting a reliability maintenance-centered program.

* Involvement of BP's key operations and maintenance personnel in facilities design.

* Isolation valves for maximum ease of maintenance and corrosion inspections based on material assessments.

The Andrew Alliance procurement strategy has focused on reducing the traditional total procurement cost for products and achieving non-adversarial relationships. The strategy has earned the Alliance a 17% price reduction in product manufacturing costs and an estimated 30% reduction in the total procured cost. Peter Jessup, Brown & Root's procurement manager, says this cost savings is attributed to minimal documentation requirements; non-prescriptive bid requests; an elimination of field expediting and minimum inspection; and a high level of confidence in Andrew suppliers to manage and control their work.

3D CAD innovation

A new 3D CAD system for structural steel work, known as Triton, has further facilitated the design and fabrication effort. Structural fabrication shop drawings are produced directly from the CAD model and issued to the fabricator. Trafalgar House, says Brian Colpitts, project manager for THOF, said the group has saved 40,000 hours against traditional fabrication norms because of direct interface with Brown & Root engineering and from fit-for-purpose practices.

Brown & Root's 3-D CAD drawings are sent electronically to the Trafalgar House Teesside Yard in England and issued directly to the platecutting machines in the yard's fabrication shops. These technology improvements have saved the project a further 10,000 hours of work in steel and fabrication drafting time. Interactive CAD modeling is producing substantial efficiencies in the design office, compared with previous generation CAD systems. Clash-free designs are now more easily and quickly received.

Improved software for pipe support design and for producing spool isometrics directly from the computer model is allowing the Andrew team to work from a single set of drawings, meaning no more duplication of work between engineering and fabrication.

Highlands fabricators, which is building the 7,500-metric ton jacket for Andrew, has assisted and benefited in the design process as well. Hifab reviewed various early design concepts, advised on which ones would be less expensive to build and selected designs best-suited to its fabrication facility at Nigg, Scotland. Archie Carmichael, Hifab's project manager, reports that the project generated 200 fewer drawings because of a close working relationship with the engineering designer.

As a lum sum contractor, Saipem says the opportunity to influence the design phase is critical to ensure the price doesn't escalate. Early enrollment of the platform installer further ensures use of optimum barges and the availability of Saipem's *Micoperi 7000* semisubmersible crane vessel. The jacket and deck structures also are configured to complement the capabilities of the heavy-lift vessel, further controlling design costs.

Tony Press, Saipem's project manager, reports the Alliance team has been able to think laterally and challenge industry standard practices to cut costs. Saipem and the Alliance team saved £700,000 for the project by eliminating water-tight diaphragms from inside the jacket legs.

The leg compartments, as formed, were intended to restrict the inflow of water in the event of damage and prevent crane overload. The single leg compartment damage design case is a traditional good-practice approach.

But by eliminating the leg diaphrams and running the flood valve hydraulic lines on the inside of the legs, the team significantly reduced the number of valves needed. The team also eliminated the risk of mechanical damage during installation and avoided additional costs for removal of the externally run hydraulic lines.

An additional Saipem idea for cost savings calls for assisting with platform hook-up and commissioning by using its crane vessel for the quick removal of redundant temporary steelwork, instead of spending up to 36 hours welding the deck to the jacket following installation.

The Saipem idea complements the initiatives of the Alliance completions group which is helping the project achieve 110% onshore completion. The completions team has literally taken a clean sheet of paper and challenged the need or industry expectation that certain work must be completed offshore. Allseas, which is installing the export pipelines, questioned reports that a 30-in. diameter spool piece was necessary to tie-in to the Amoco CATS gas line. Closer review of detailed drawings proved that a 24-in. diameter bore was available, meaning less steel and less welding.

Eric Van Baars, Allseas' project manager, cited the fact that pipeline contractors are usually never involved in early discussions and usually work on a defined design. In fitting into the overall scope, Allseas was able to influence pipeline connections and work in parallel with changes in pipeline length and diameter, without a lot of rework.

Allseas will use its dynamically positioned Lorelay pipelay vessel to install the two export lines. An eight-in. diameter, 46-km gasline will be installed from Andrew to the Amoco CATS tee connection. A 10-in. diameter, 16.5-km pipeline will tie-in to the Brac oil pipeline.

Emtunga of Sweden, which is building a 530-metric ton, 72-man accommodation unit, reports that early participation allowed it to have a greater choice in materials and influence int he plot plan. The utilities -- electrical, eater, instrumentation, etc. -- have been worked around the accommodation unit. Often, facilities and various equipment must be redesigned to make room for accommodations, explains Sia Payani, Emtuga's project manager.

Applying a modular approach to the design and construction of the accommodations unit, Emtunga provides a cost-effective alternative to conventional space-frame structures. The system, which can be built totally under roof, eliminates many heavy structural members and presents cost savings in weight and construction time.

Fabrication is under way at Emtunga's Vara yard and assembly will take place at Gothenburg, Sweden, where all systems will be tested and pre-commissioned for rapid installation and hookup.

Going forward

Long-term, the Alliance members are exploring opportunities for the Alliance to be carried forward. The team has developed enthusiasm, commitment and understanding in how to work together effectively for low-cost developments.

The team believes it can deliver a new development of a similar scheme at a 30% cost reduction and within a 30% accelerated schedule, compared to the current project. The removal of the staged bidding process and the opportunity to develop integrated working relationships provide fertile ground for continued improvements to have their greatest impact.

The true accomplishment here is the challenge now presented to the industry to gain more insight and to build on the contributions of the Andrew Alliance.

LOAD-DATE: January 24, 1995

LANGUAGE: ENGLISH

GRAPHIC: Picture 1, Focusing on lifecycle costs, Brown & Root collaborated with Alliance members and suppliers to develop a simplified 3D CAD facilities design system, known as Triton.; Picture 2, Trafalgar House, a member of the Andrew Alliance, saved 40,000 staff hours in deck and top-sides fabrication by using fit-for-purpose practices and another 10,000 staff hours when electronic 3D CAD drawings (Triton) were issued directly to plate-cutting machines.