CRINE - Learning To Survive, January 1996
The People Dimension

Cleeton Compression Project

Gainshare Covering Both Capex and Opex

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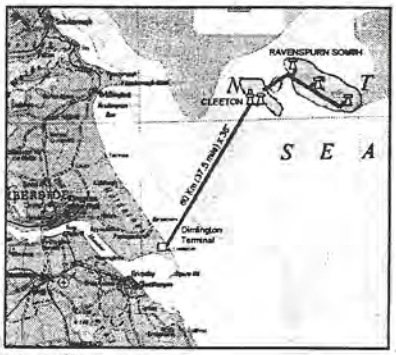
Introduction

What Is Cleeton Compression?

Cleeton Compression is a new platform consisting of a 1,000Te compression module sitting on top of a 1,000Te jacket in 50m of water, bridge connected to the existing Cleeton Production platform. The new facility is designed to maintain production from the existing Cleeton and Ravenspurn gas reservoirs which lie approximately 35 miles north-east of the Humber.



Map of Location

Who Are the Cleeton Alliance?

BP

TRAFALGAR JOHN BROWN OIL & GAS LIMITED

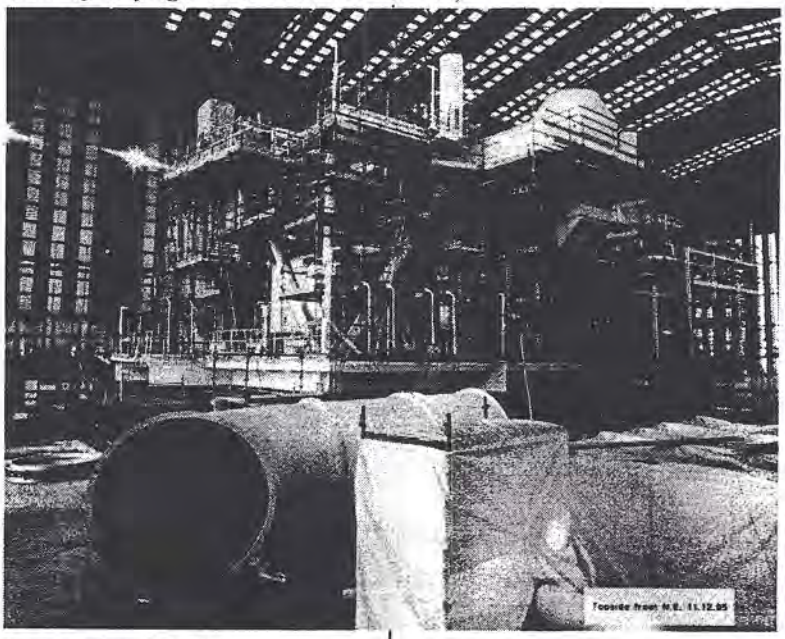
BARMAC

SHL Seaway Heavy Lifting

DRESSER-RAND TURBO PRODUCTS DIVISION

Participating Companies

The Cleeton Alliance is a team of companies with a common goal to achieve outstanding success for the project



Module at just under 50% complete

How Far Have We Got?

Design of the facility is 99% complete, with progress at the yard approximately 50%

Gainshare and Alliance Formation

Where Did it all Begin ?

Like many recent projects in the North Sea the concept of a future Cleeton Compression platform was partially built into the design of the existing platform which became operational in 1987.

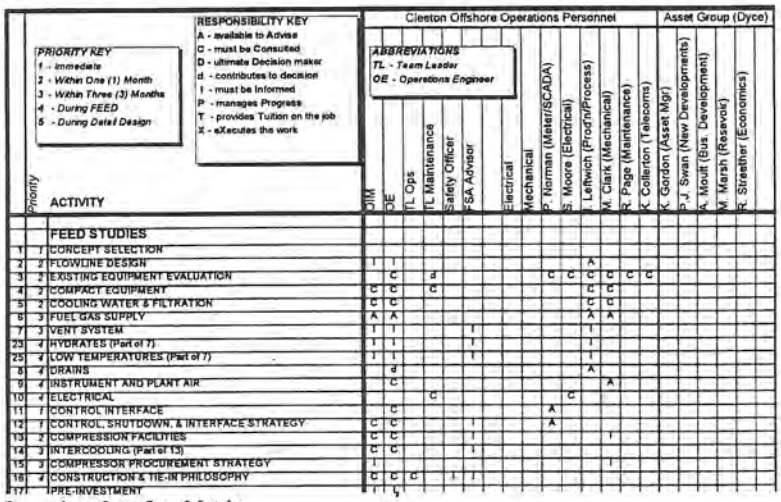
Early BP concepts put the cost of the facility at circa £100m, but by the time the tender for contractor design input came out, in September, 1993, options had been whittled down. Amongst those remaining was a 13.5MW single train option at circa £58m.

Novel Tender for FEED

From a contractors standpoint, whilst some precedence had been set by the BP Andrew tendering process, the Cleeton request took the functional specification approach one step further.

In essence all that was said was that BP would like to have Front End Engineering and Design for a compressor platform and these are the *Key Success Factors* we wish you to address.

- Safety
- Capital Expenditure
- Operational Expenditure
- First Gas Date - start-up date for compression (October '96)
- Availability
- Constructability - later incorporated within Capital Expenditure
- Fitness for Purpose - incorporated via life cycle based assessment
- Operations Interface; making most effective use of the existing operations team



PRIORITY KEY
1 - Immediate
2 - Within One (1) Month
3 - Within Three (3) Months
4 - During FEED
5 - During Detail Design

RESPONSIBILITY KEY
A - available to Advise
C - must be Consulted
D - ultimate Decision maker
d - contributes to decision
I - must be Informed
P - manages Progress
T - provides Tuition on the job
X - eXecutes the work

ABBREVIATIONS
TL - Team Leader
OE - Operations Engineer

Priority	ACTIVITY	OIM	OE	TL Ops	TL Maintenance	Safety Officer	FSA Advisor	Electrical	Mechanical	P. Norman (Meter/SCADA)	S. Moore (Electrical)	I. Leftwich (Prod'n/Process)	M. Clark (Mechanical)	R. Page (Maintenance)	K. Collerton (Telecoms)	K. Gordon (Asset Mgr)	P.J. Swan (New Developments)	A. Moult (Bus. Development)	M. Marsh (Reservoir)	R. Streather (Economics)
	FEED STUDIES																			
1	CONCEPT SELECTION											A								
2	FLOWLINE DESIGN	I	I									C								
3	EXISTING EQUIPMENT EVALUATION		C		d					C	C	C	C	C	C					
4	COMPACT EQUIPMENT	C	C		C							C	C							
5	COOLING WATER & FILTRATION	C	C									C	C							
6	FUEL GAS SUPPLY	A	A									A	A							
7	VENT SYSTEM	I	I				I					I								
23	HYDRATES (Part of 7)	I	I				I					I								
8	LOW TEMPERATURES (Part of 7)	I	I				I					I								
9	DRAINS		d									A								
9	INSTRUMENT AND PLANT AIR		C										A							
10	ELECTRICAL				C						C									
11	CONTROL INTERFACE		C							A										
12	CONTROL, SHUTDOWN, & INTERFACE STRATEGY	C	C				I			A										
13	COMPRESSION FACILITIES	C	C				I						I							
14	INTERCOOLING (Part of 13)	C	C				I													
15	COMPRESSOR PROCUREMENT STRATEGY	I											I							
16	CONSTRUCTION & TIE-IN PHILOSOPHY	C	C	C		I	I													
17	PRE-INVESTMENT	I	C																	

Cleeton Offshore Operations Personnel

Asset Group (Dyce)

Operations Interface Matrix

To these initial factors, one extra was later added

- External Opportunities - flexibility to incorporate the addition of new gas reception options.

There was no request for Cost Time Resource sheets or other scope limiting documentation, just a request to demonstrate how the above factors would be met, what rates would be charged, and, importantly, who would be performing the work.

In best practice terms these Key Success Factors ***clearly defined the objectives for the project.***

Tender Response with a Difference

The Trafalgar John Brown response had four elements which were different to the norm;

- a proposal on how an Alliance might be structured to achieve maximum incentive against the Key Success Factors.
- a nomination for the position of *value manager* whose role would be to manage the quantified optimisation of Key Success Factors
- an execution statement which proposed how the use of the time available would be maximised via a "window of opportunity"
- the inclusion of director level fabrication yard and corporate engineering facilitators to ensure that the full experience of the TJB organisation could be brought to the project.

Unusual Basis for Award

At the time the scoring system used to select the contractor was slightly unusual in that there was an increased weighting split toward the non-commercial "soft" issues.

One of the new ideas brought to the table at that meeting was the proposal to use an Operations interface matrix to manage the interface with Operations - an idea borrowed from a project management text.

Confirmation of Basis

In order to agree the starting point for FEED, and for the design team to become familiar with the work which had already been done, one of the first goals was to take the BP concepts, confirm the process design, develop a detailed equipment list, and re-estimate the cost. This exercise broadly confirmed the £58m (13.5MW) cost estimated by BP.

The "Value Model" and Measures

In parallel with this traditional initial engineering and estimating exercise, a life cycle cost "value model" was built and all *Key Success Factors* quantified..

*CAP*ital EXpenditure

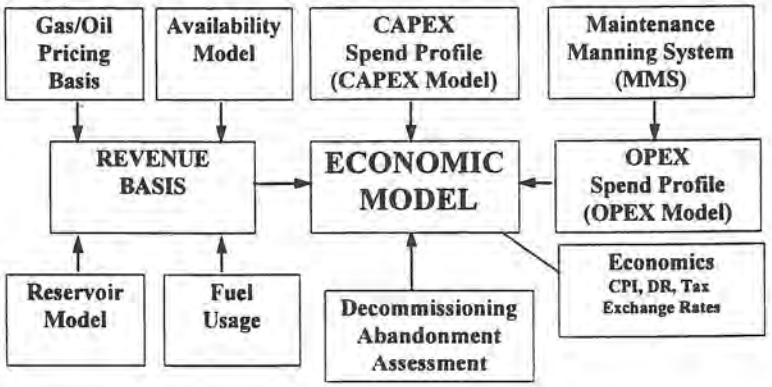
The CAPEX element of the model started as a traditional estimate but was rapidly developed into an integral part of the engineering design systems; initially with the equipment list, and subsequently with the 3D model, instrument index, and structural take-offs, significantly improving the responsiveness of the estimate to engineering change.

*OP*erational *EX*penditure

The OPEX side of the model was based upon links with two other data sources; the Maintenance Manning System, a system jointly developed by BP and Trafalgar John Brown, for estimating maintenance technician manhours, and the existing 1994 budget for the SNH Asset - made available to the project.

Revenue

BP provided a spreadsheet which mimicked the revenue calculation carried out by the Asset. This took into account the different gas properties from the Ravenspurn and Cleeton reservoirs, and the split of sales to BP Chemicals (on Humberside) and British Gas. This was re-engineered by the project; linked dynamically to the database of



Inputs to the value model

reservoir production profiles, and incorporated into the overall model.

One thing which helped the credibility of the project, rather than the "client" running this model, was the discovery by the project of a minor glitch in the logic used by the Asset mainframe programme.

Mutual respect usually has to be earned - it is not a given.

Also incorporated into the revenue calculation was a reasonably accurate deduction for fuel gas consumption by the various different turbine driver options.

Availability

Use was made of the existing availability model held by BP. The effect on loss of revenue was incorporated within the value model.

First Gas (Start-up) Date

Start-up date was simply modelled via the cash flow difference arising from delayed acceleration of production.

Whilst usually treated as sacrosanct, the fact that dates can be converted to a loss, or gain, in cash flow, as opposed to a delta production, should be appreciated more by projects.

Safety

In modern parlance the risks to personnel should be *A*s *L*ow *A*s *R*easonably *P*ractical (ALARP). In practice this has to be translated into some form of economic measure but this is sensitive to overall profitability of the project.

Risks are now calculated via a quantified risk assessment which typically results in figures such as Potential Loss of Life and frequency of Lost Time Accidents (LTAs). The high cost of these incidents to the industry are well publicised.

Operations Interface

This was not equated to value, except that the project accepted all responsibility for any post-start-up remedial works that may be justified by the operations team.

External Opportunities

New gas opportunities were driven by the Asset in that the project was asked to study a significant number of different schemes for bringing in gas from outside the existing reservoirs.

Whilst it is understandable that details of potential third party gas entrants are sensitive, and that the economics are driven by more than just the reception facilities, it became clear that in some cases detailed work was carried out when coarse overall economics would have indicated viability. ***To add value, study work in particular should have some form of economic framework within which to work.***

Overall Economic Parameters

Aside from the revenue basis, BP also provided the discount factor, inflation rates, and currency conversion factors, etc., necessary to compile the overall Net Present Value (NPV), Profitability Index (NPV / CAPEX) [referred to by BP as Capital Efficiency], Pay-back Period, and Rate of Return necessary to assess the value of the project.

It was made clear on what basis the project would be sanctioned and how it would be valued. On a day to day basis the project used these measures to assess the value of any changes.

Decisions made on the basis of "value"

The following decisions were amongst the more significant of those made via the value model.

- The use of a more expensive CAPEX, but lower OPEX, gas turbine driver.
- The selection of the compressor, and the planned rotor changes.
- The selection of air cooling versus water cooling and the elimination of one bay of coolers.
- Single train, versus dual, fuel gas skid.

Risk and Reward - Gainshare System

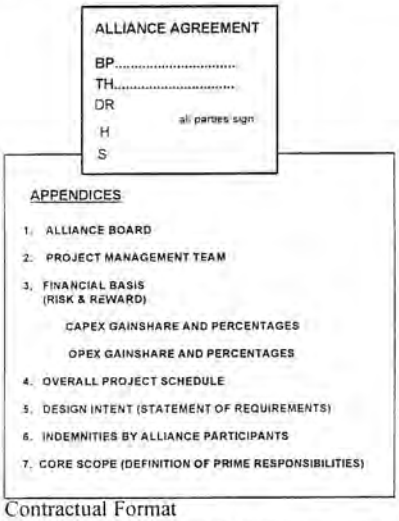
Having established the basis for decision making, the next step was to convert the model into a gainshare system which would provide a formalised incentive for all likely participant companies and which would encourage alignment.

The initial approach was to try to use one of the overall economic measures as a single basis for risk and reward. However, whilst used for project sanction purposes, there were, and are, significant obstacles to taking this route;

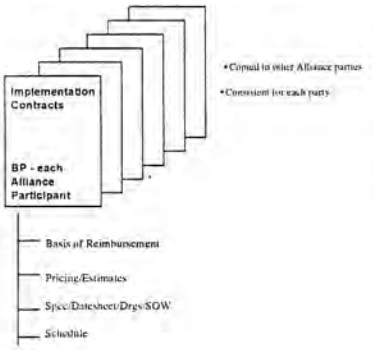
- Incentives should be based upon ability to influence, different parties have influence over different aspects of the economics.
- All contributors to total economics are subject to risk. Companies have difficulty in accepting risks which are beyond their control or of which they have no knowledge.
- A significant amount of education is required to achieve common understanding of the many diverse disciplines which contribute to overall economics.
- At some point in time the outcome has to be assessed in order to determine risk / reward, ideally by measurement. Whilst for CAPEX this is relatively straight forward, there are other factors, particularly where an addition is being made to an existing infrastructure, which are extremely difficult to measure on a consistent basis with that used for sanction.

In the end, the formalised proposal was to use;

- CAPEX, incorporating post start-up remedial work and any actual gas penalties incurred on BP.
- Availability, measured via a modified version of the existing shut-down report.



Contractual Format



- Maintenance technician man-hours, providing a balance to availability - a preventative maintenance strategy costs man-hours but improves availability, whereas a corrective strategy saves man-hours but reduces availability.

It was proposed that the whole gainshare scheme be measured;

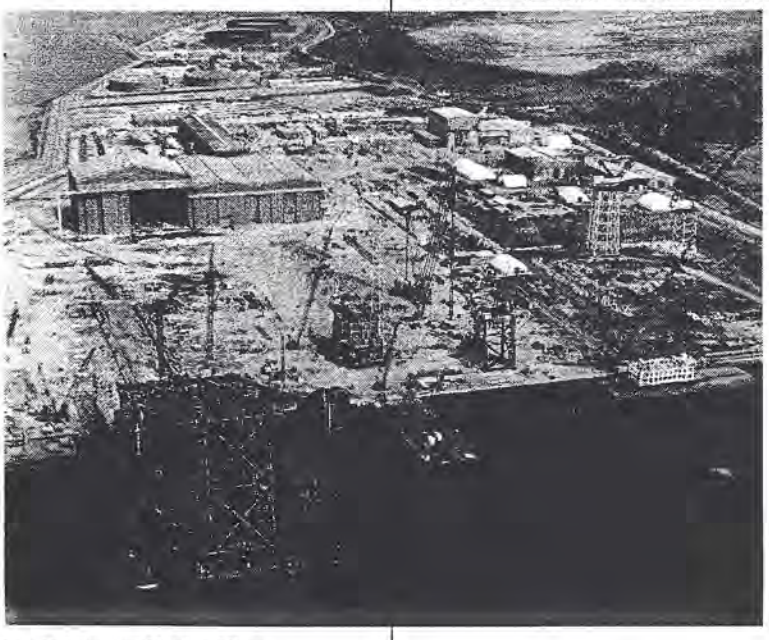
- CAPEX gainshare at the end of CAPEX spend, but with a retainer to cover OPEX exposure.
- 25% of OPEX gainshare after one year of operation, incorporating a factor to allow for the settling in period (the reliability "bath-tub" effect)
- the remainder, 75%, after two years of operation.

The final agreement cut out maintenance man-hours, but incorporated a formal commitment by the project to continue to make engineering decisions on the basis of full economics, independently of gainshare.

OPEX Gainshare - Lessons Learnt

Having gone through the cycle there are a few points to note;

- It is worthwhile spending time to create an incentive scheme to suit each party; whether it be designer, fabricator, or supplier.
- Availability as a single, unbalanced, OPEX measure, whilst an indicator of operational complexity, does have weaknesses;
  - the theoretical model incorporates partial availability and this is difficult to measure.
  - it is heavily dependent on maintenance strategy.
  - it is affected by sparing philosophy.
  - at a detailed level, accurate reliability statistics are difficult to obtain - particularly for electronics where historical figures have largely been superseded by technology changes.
- A potentially improved solution is to create a non-gainshare based OPEX pot which can be used to offset negative CAPEX impact in a situation of OPEX/CAPEX trade-off.



The Fabrication Yard at Nigg

Contractual Framework

The final element of building the Alliance framework was to wrap the detail into a legal basis.

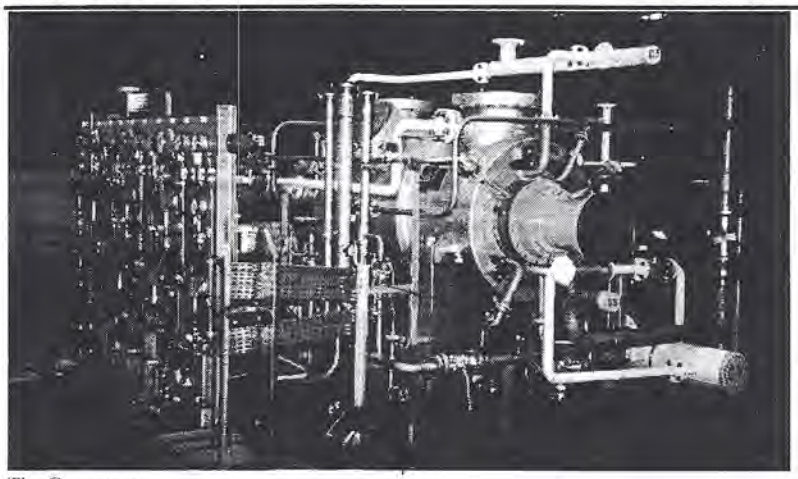
It is true to say that many of the principles behind CRINE and Alliancing can be implemented without an Alliance contract and that projects can still make significant achievements - as evidenced by other projects at the conference. However, it is typically only when things go wrong with one party that contracts start being quoted. With this in mind it is worth highlighting the points made in the article in the January edition of CRINEWATCH, also available at the conference. To summarise;

- an Alliance board, consisting of directors from each member company, was created to manage the implementation contracts.
- All reporting was to the board
- open book costs
- no non-gainshare liabilities

Building the Team

Selecting the Companies

Selection of participants to join the Alliance was carried out prior to the final scheme being selected, when the estimate was still £58m.



The Compressor

The Fabricator

Like the designer, the fabricator was selected on the basis of a mixed commercial / culture basis.

Approximate weights for the options were generated and the bidders asked to provide man-hours per tonne, and cost per man-hour for each of the material categories. A breakdown of indirects was requested separately with an indication of whether they were fixed (lump sum) or variables (proportional to weight, direct man-hours, etc.). Profit margins and other commercial elements, such as finance costs, were also separated out.

For the contractors with the highest scores, an open book audit was carried out to determine if the claims being made could be substantiated.

Brown and Root McDermott (BARMAC) were picked on this basis.

Some observations out of this process;

- the industry would benefit significantly from common breakdown structures similar to the Standard Cost Coding System (SCCS) developed by Hydro, Saga, Statoil, and the Norwegian Petroleum Directorate. This would significantly reduce misunderstandings, the likelihood of comparing apples with oranges, and provide a sensible basis for realistic benchmarking.
- there is a tendency to try and fix as much of the cost as possible in order to minimise risk. In a correctly implemented gainshare based system, there are benefits in clearly identifying cost drivers, and treating costs which are variable as such.

Gas Turbine Compressor Supplier

The project elected to have the compressor supplier prime, and within the Alliance, and to treat the turbine supplier on a sub-contract basis.

An EC pre-qualification exercise preceded the formal enquiry. The scoring system included points for the "soft" issues as well as a detailed evaluation of life-cycle costs taking into account proposed rotor design characteristics. Following award to Dresser Rand, the traditional commercial basis was changed to one which was totally open book in line with the rest of the Alliance.

Once the power requirement had been set the turbine suppliers were short-listed and a more or less traditional bid evaluation process undertaken by Dresser, with input by the Alliance. After a detailed life-cycle analysis, an ABB Stal GT35 turbine was selected.

It is also worth making a few observations here;

- In hind-sight both ABB and Dresser could have been direct parts of the Alliance, given the complexity of the driver.
- A traditional supplier data chain evolved - a direct peer-to-peer information path, making much greater use of communications and video technology would have added significant value.

The above comments should not detract from the overall success of the relationship; the package arrived on time and within original budget, despite some scope adjustment.

Installation Contractor

The process was similar for selecting the installation contractor. Most of them prefer to execute work on a lump sum basis and prices alter dramatically depending on market conditions. However, provided that the other parties recognise and accept a significant market driven proportion of total cost, there are opportunities to be realised by having this contractor in an open book gainshare basis. In our case Seaway scored highest of the contractors and were prepared to join the Alliance.

The benefits of having the installation contractor as part of the full CAPEX/OPEX Alliance are significant in areas which they can influence including seafastening, load-out transportation, and installation. However;

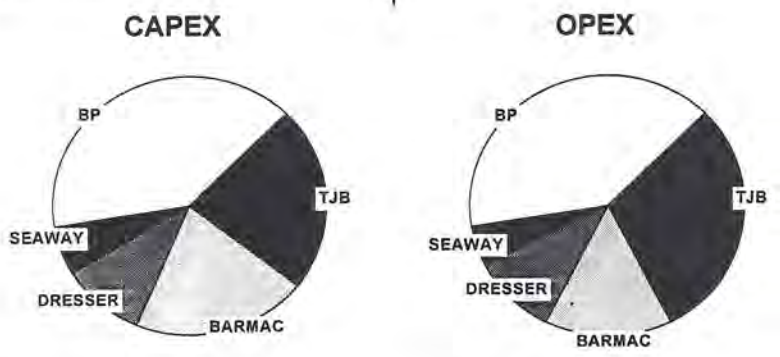
- in practice the installer has little influence on overall facilities design, and virtually none over OPEX.
- their price is more driven by market forces and risks than other Alliance parties. It is therefore less sensitive to minor changes of scope.
- while having limited corporate exposure to non-installation matters, Seaway have asked questions which in turn have directly contributed significantly to the whole process of challenging overall costs.

Non-Alliance Participants

Risk and Reward arrangements were made with other suppliers, notably with Pall / Hobal on a delivery basis, and with ICS on an out-turn cost basis.

Gainshare Split

The above figure illustrates how the gainshare will be split between



Proportional Split of Gainshare between the Alliance Parties

the various Alliance parties. Note that whilst BP take a 40% share in both cases. The relative share of the other parties varies in proportion to their ability to influence outcome.

It is important to ensure that ability to influence is taken into account and that it is not just an organisations capacity to take on board risk which determines their share.

Potential Rewards on the Basis of Current CAPEX Forecasts

The figure at the bottom of the page illustrates the rewards which could be shared between the Alliance if current CAPEX forecast is maintained and if we achieve the best OPEX success.

People

Early Involvement

The main reason for having early involvement by all parties in the Alliance is that influence is greatest early on, specifically;

- early input by the Fabricator creates a design which is optimised to their build preferences - for example by allowing the use of low cost sub-assembly fabrication shops. It ensures that the content of design drawings is adjusted for direct shop use early enough.
- early installation input influences ballast requirements, load-out, transportation and lifting grillage / sea-fastening.
- commissioning involvement, in our case via the offshore services arm of Trafalgar John Brown, provides the ideal mechanism to streamline the design from a system breakdown aspect.
- in the case of major packages and control systems there can be more timely identification of significant control logic and subsidiary equipment impact.

Most importantly, an early involvement by all allows the programme to be optimised;

- unnecessary releases of documentation can be avoided.
- instead of resource peaking at major milestone dates, information can be piece fed to suit requirements.
- the procurement schedule can be optimised to suit downstream requirements
- duplications in scope can be eliminated.
- fabrication can be planned on the basis of no shift work or overtime.
- the likelihood of rework can be significantly reduced.

Early involvement need not be costly and the benefits can be significant. ***The Cleeton Project reduced the predicted cost from £58m to £40m during the FEED period whilst achieving the same functionality.***

In hindsight it is felt that even more could have been achieved by still earlier involvement.

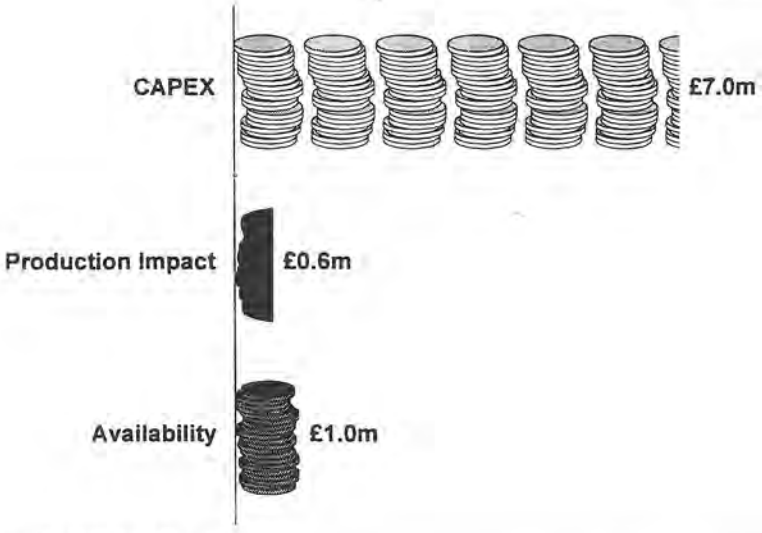
Creating Relationships

Relationships don't just happen, they require effort and time - but without them it is difficult to see how anything could have been achieved.

Openness by Example

Immediately on selection of the design contractor, BP invited TJB for meetings in Aberdeen, Dimlington, and offshore. There were two objectives; for TJB to present the proposed approach and for BP to present status.

Right from the word go BP made it clear that no relevant information would be withheld. Direct one-to-one contact was offered between anyone on the project and the reservoir engineer, commercial analyst, and Asset management based in Aberdeen,



Potential Gainshare Rewards

the whole onshore support team based in Dimlington, and to the Offshore Installation Managers and senior operations engineers offshore.

This in turn encouraged the design team to be totally open and the effect cascaded throughout the whole Alliance.

If the initiator of a relationship is not open, the likelihood of openness downstream is much reduced.

Team Building - Mutual Respect and Trust

Without dialogue, no understanding is achieved of capability, and no opportunity for respect and trust is built.

It was recognised that individuals respond differently to different environments;

- some felt that they learnt most about others during the odd informal drink at the local hostelry.
- others valued the formal team-building sessions operated by JMW.
- many preferred the occasional organised project event.

What is common about all of them is that people learn most about each other outside the normal office environment.

Team Building Consultants

It is worth dwelling a bit on the value of external consultants since their relatively high cost always raises questions. In our case, JMW were actively involved during the FEED stage;

- they definitely made a significant contribution to openness by giving individuals a language which de-personalised critical comment.
- they encouraged the flow of innovative ideas via their "paradigm shift" methodology.
- they helped focus minds on the real issues - although we suspect time away from day-to-day office interruptions played as significant a part.
- issues which were adversely affecting individuals were brought to the surface and acted upon.
- they helped provide a discipline for organising "actions".

Empowerment

The final ingredient, which required the openness, respect, and trust developed above was to fully empower all of the levels in the organisation.

- BP empowered the Alliance to manage individual implementation contracts,
- each Alliance party was empowered to carry out its scope without monitoring or approval from the other parties.
- individual team leaders were empowered to manage their own areas without excessive reporting or management interference.

This is illustrated by;

- the fact that monthly project reporting amounted to less than ¼inch of paper a month - a fifth of that usually required.
- in-house and unmodified industry procedures and standards have been used extensively - addendas have been actively discouraged.
- lead engineers have been given full control over their overall budgets. Whilst reporting has been at activity level there has been complete freedom to move hours (and costs) between activities. This encouraged the engineers to judge the appropriate amount of work to complete a task thoroughly, rather than defensively justifying variations to detailed budgets. This led to accurate reporting, no time wasted discussing variations to activity budgets, and overall discipline objectives were met. The overall of minimising installed cost was far more important than local man-hour budgetary control. Because of this, on the design side the project hopes to have a far more accurate history of what really happened on the job.

As one lead engineer put it ***"at long last I have been able to carry out the job I have been trained to do".***

It is estimated that as much as 50% of a lead engineers time can be locked up in reporting and "covering their rears" in the traditional environment.

Peer-to-Peer Interaction

By delegating full responsibility down the tree the project has encouraged direct peer to peer communication, cutting out all of the unnecessary middle management bottlenecks, accelerating information transfer and problem resolution.

Inevitably there have been times when things haven't quite worked out, but management have resisted the temptation to implement double dipping "in case it happens again". Instead the individuals have been made to carry their responsibility and resolve the problems themselves.

Enthusiasm and Motivation

By operating in this way, everyone has thoroughly enjoyed the project, ideas for significant savings have been forthcoming, and there has been real motivation to do a good job .

Management Team Structure

In order to ensure active participation by all parties, there was a joint management team meeting every couple of weeks. Management from all Alliance parties met to discuss commercial and schedule progress, review outstanding actions, and to raise new ones. Regular face to face contact further enhanced the relationships and provided a forum to vent frustrations prior to them becoming issues.

The team was fully integrated in the sense that there was no duplication of function; single QA, Safety, and Project Control functions, with cross-company lines of reporting. For example BP engineers reported to the TJB engineering management, site based TJB engineers report to the

BARMAC Fabrication Engineering Manager.

The only area for improvement in the future would be to replace some of the meetings with video conferencing in order to reduce time spent travelling.

Integrated Team

Early Input of Expertise

As stated earlier the project moved from £58m to £40m prior to sanction, and signing of contracts.

One of the first hurdles to overcome was to persuade parties that whilst gainshare hadn't started, ideas should still be brought forward. If the relationships had not existed to trust that early ideas would still be reflected in setting project budgets it is doubtful if as many ideas would have been forthcoming.

The value of having this early input of expertise can clearly be demonstrated by the typical influence / cost / time graph opposite.

Adopt Vision Budgets

The management team jointly reviewed the detailed estimates for all of the measures being taken to sanction. This included Availability, OPEX, and overall economics, in addition to CAPEX.

Risk Analysis

A formalised risk analysis was carried out via a number of brain storming sessions to identify risk and opportunity and quantify them both in terms of value and probability. The results were then fed into a Monte-Carlo simulation to establish confidence levels for achieving different outcomes.

The main value of going through this cycle was not the numbers, but the identification of areas to pay special attention to during project execution. It became very clear that in order for fabrication to come in under budget, timeliness in handover of design deliverables and material delivery were critical.

The process also helped all parties to understand the issues which affect each organisation - issues which are normally damaging because they bubble away as hidden agendas.

The budget set by the Alliance was endorsed via an independent risk analysis carried out by BP, thus aligning all parties to the overall project objectives.

Realistic Budgets - Visionary Control Targets

If a budget is given to someone and it is perceived to be tight they will spend effort to "make change" in order to recover the situation - which in turn takes effort. Thus costs escalate.

In the case of design engineering we opted for a slightly different approach;

- We asked the engineers to estimate their work.
- As expected the first estimate had a significant amount of fat to cover the "what-ifs".
- Their initial estimates were challenged and eventually about 30% shaved off to reflect an outcome which they believed achievable if the project went reasonably well.
- They were allowed to bank this budget.
- They were then asked to develop a control target budget which reflected a visionary outcome about 15% lower.

The results have been interesting;

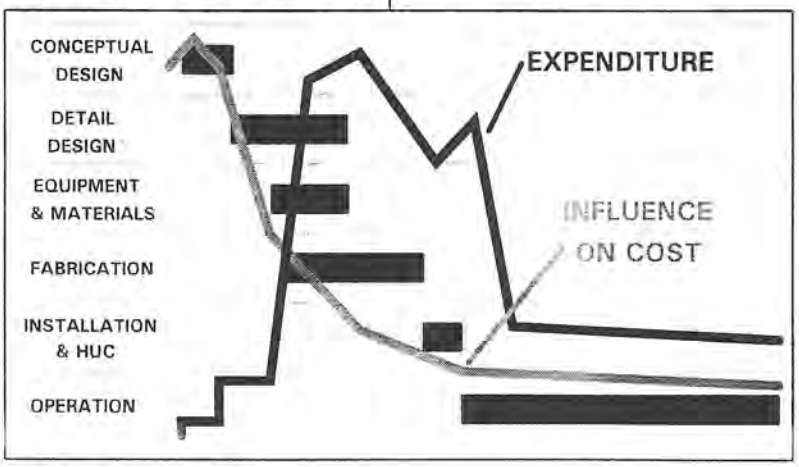
- because they originated the budgets, the engineers have been committed to achieving them - there has been no "change" mentality.
- by controlling to vision, but by knowing that they had "realistic" budgets available, they have felt free to explore ideas - short term increase.
- the fruition of those ideas has resulted in savings which have not only reduced their scope, but have contributed significantly to the overall project achievements since sanction.
- in the longer term the reduction in scope has reduced their man-hour requirement - in many cases beyond vision.

This approach - resulting in cost reductions beyond vision - seems to have been more successful than that traditionally applied. So much so that the whole Alliance is now operating the principle.

The Ideas for Improvement (IFI) System

One of the vehicles for collecting ideas was to introduce an IFI form, illustrated on the next page. This operated as follows;

- Everyone was encouraged to fill in IFIs, no matter how obscure the idea. An electronic equivalent was either used directly or updated with the details.
- Order of magnitude approximations were quickly made on impact on CAPEX, OPEX, schedule, etc.
- For every management team meeting, an IFI status register was printed and decision made on whether to cancel, investi-



Cost / Influence / Time Graph

IFI - IDEA FOR IMPROVEMENT PAGE / OF /

CLIENT CLEETON ALLIANCE PROJECT CLEETON COMPRESSION PLATFORM PROJ NO 8393

TITLE *Drain tank* IFI NO 061 (COMPLETED BY COST ENGR.)

RAISED BY HALSE Ken DISCIPLINE Engineering Manager DATE 16-Jan-95

DESCRIPTION OF PROBLEM / ACTIVITY / OBSERVATION

Drain tank specified as separate equipment item. this requires Engineering specification and Procurement for one low-value tank.

YOUR SOLUTION/S

Design in-deck by Structural, HiFab to fabricate as part of secondary steel scope.
REV 1 - 23 Feb:-
Now changed to drain sump, CN024 RAISED

PERCEIVED BENEFIT/S - QUANTIFY IF POSSIBLE

Delete requisition/PO/vendor data review.
REV 1 - 23 Feb:-
Drain sump:-
Low cost CS construction
Allows access to deck u/s for maintenance
Possible withdrawal for inspection.
Disadvantages:-
Design for wave load
Additional offshore work

VALUE

COST ITEM	VALUE	COMMENT
Mech(Vessels) = Procurement m/h		35+80 115 m/h saving
Struct m/h	-	170 m/h (100 m/h for in-deck, 70m/h for sump)
NET COST CHANGE	-	

PERCEIVED RISKS

Maintainability.

REMARKS

Fab benefit of scale not quantified, but assumed to outweigh Eng cost (REV 1 23 Feb).
HiFab advise construction/coating problems with in-deck design - alt. design being investigated.
REV 1 - 23 Feb:-
Struct m/h for sump: 50 DO, 20 Eng (JJ 23 Feb).

ACTIONS

ACTION ON	BY DATE	Accepted	SPECIFIC ACTION	ACTION TAKEN	COMPLETE
HALSE Ken		☒	Raise CN	CN 24 raised	☒
HALSE Ken		☒	Instruct engineering to proceed	To be re-designed - see remarks.	☒

CRITICALITIES

Time Critical: ○ Urgent ◉ Soon ○ Can Wait
Cost Critical: ○ > ○ ○ ◉ <
Risk Critical: ○ High ○ Medium ○ Low
OPEX Critical: ○ Major ◉ Minor ○ None

ALLIANCE ACTION

SIGNED ON BEHALF OF ALLIANCE MANAGEMENT TEAM

PLEASE TICK
○ REJECTED - NO FURTHER ACTION
◉ APPROVED - RAISE CHANGE NOTE
○ INVESTIGATE
○ APPROVED - INCORPORATE - NO COST IMPLICATION

Ideas for Improvement Form

gate further, or implement.

- All actions raised on the IFI were logged in a project wide "actions" database. Actions arising from all internal meetings were also logged here so that a composite report on all actions on an individual could be produced and reacted to.
- If there was a commercial impact or scope movement then a change order procedure would be invoked - simply to manage budgets - for no other reason unless it was considered to be a project variation.

Corporate Pressures

Interestingly, in this project environment, where there is a strong sense of mutual co-operation across organisations, it is the corporate bodies, used to traditional ways, who can re-introduce adversarial practices. The project at times found it had to resist these pressures, examples of which included;

- the relationship with Dresser - Alliance member versus traditional supplier.
- corporate specialist expertise wishing to amend specifications to cover "what-ifs" - counter to standard practices.
- local activity project controls versus managing overall project goals.
- slipping into the "old way of doing things" versus introducing cost saving "common sense" methodologies.

Project Approval (Sanction)

Apart from the financial memoranda and 10 minute presentation, the Alliance compiled the complete sanction package. Most of the pulling together was done by non-BP personnel.

Following sanction, the Contracts could then be signed by each Alliance member, and the project able to kick off in earnest.

Management Systems

Individual Safety and Q.M.S.

The Alliance Safety and Quality Management systems have been tailored to make use of existing established systems within each organisation. Whilst the Alliance has overall QA and Safety managers reporting to the Project manager, their role is mainly to manage external QA and Certification matters, in the case of the former, and the Safety Case issues in the case of the latter. The occasional spot audits have however, been carried out, to ensure that the in-house procedures are being operated.

Minimise Project Specific Procedures

As stated in the article in the January edition of CRINE-WATCH, the project has made use of the CRINE working practices where they existed. Likewise we have made extensive use of functional specifications and actively discouraged project specific addendas. The occasional one has been necessary where there has been tight integration with the existing facilities - the platform in many ways is a modification.

Minimise Inspection

The project policy has been to eliminate inspection at source, eliminate 100% quality approval, and instead opt for handling the odd exception at destination, and

to ensure procedures are being followed by spot audits.

There have been a few instances where field inspectors have been called in, but these have mainly been in instances where a presence is required to ensure other larger projects did not get priority treatment - something an incentive might equally achieve at lower cost.

Open Book with Audit - Cost Control

Cost reporting by each party was minimal - a five to ten line summary of existing budget, money expended, committed, and forecast to go.

A single A3 spreadsheet, assembled by the single project controls team, summarised this for the whole project.

The bottom line for each party was passed on to the Alliance board.

Commercial Audits

In order to give corporate management the confidence that each party was following open book principles in assembling the figures, two semi-independent commercial audits were carried out on each party - the second to simply to ensure that follow-up actions arising from the first had been carried out.

Since all BP costs are being charged to the project, BP were audited on behalf of the Alliance by a team which involved the Fabricator, BARMAC - a truly mutual open book Alliance.

Other Project Services

Planning

A high level integrated plan was created. The procurement schedule and deliverable production plan were dynamically adjusted to suit.

Traditionally on a project there would be major design milestones where large packages of deliverables would be produced to meet a theoretical fabrication programme. This would be managed via regular updates to a detailed document index - a time consuming and painstaking exercise usually done by the lead engineer.

On the project, because there was peer-to-peer interaction, there was no need for this detailed level of planning. Documents were issued to suit, intermediate revisions were often bypassed, and priorities dynamically adjusted to meet fabrication needs. The only time the register was used in earnest was at the tail end of design when it was used in "punch-list" closeout mode.

Similarly in the procurement cycle - in a number of cases it was possible to delay placement of orders until design was much further on than usual.

The net effect was;

- much reduced design manpower peaking - eliminating expensive learning curves.
- much reduced re-work - documents were not issued just to meet an arbitrary milestone. Some issues were eliminated altogether.
- clearer understanding of the state of what was on drawings - it was possible to identify where fabrication could proceed even if officially the area was on hold for final vendor data, for example.
- significantly reduced effort in reporting
- less wastage - although not altogether successful in piping largely due to a significant late design change.

Overall we are predicting to be one month ahead of planned schedule.

Procurement

Early on it was identified that bulk steel procurement would be much better carried out by the fabricator, and not the design office. This was because the fabricator is better placed to perform material take-offs, knowing his own approach to nesting and hence judging cut and waste. The open book policy allowed this scope to be moved with no contractual impact.

Equipment and most of the rest of the bulks were procured by the TJB procurement group.

As usual on a project, there were minor problems with late arrival of quality vendor documentation.

The answer must lie in revisiting the procurement process, perhaps;

- by looking at the procurement planning process in much more detail to take into account data which could be provided at order, data which is unavailable until the item is built, and that the vendor has also to go through a design, procure, manufacture cycle.
- for significant packages, to have much closer peer-to-peer interaction in the early stages of the order, rather than waiting until drawings appear and it is too late.
- to offer appropriate incentive schemes - delaying payment only works if the amounts are significant, and penalties are difficult to enforce, particularly if the item is delivery critical.
- to make greater use of long term call-off supply agreements - especially as individual projects get smaller and their ability to influence becomes more marginal.

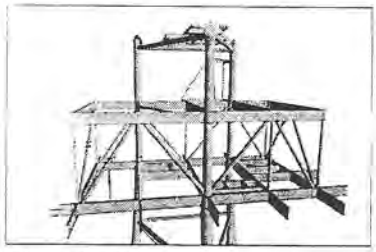
Whilst we consider that this is still an area of major opportunity, overall, however, materials procurement has gone well, with a significant contribution to the savings realised since sanction. The excellent relationship between engineering, procurement, and the various construction sites has made this possible.

Electronic Systems

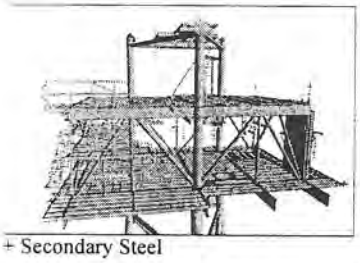
3D CAD Model (PDMS)

For the first time within TJB the 3D model was used to produce structural drawings and incorporate a fully multi-discipline design. Drawing boards were outlawed at the study phase, and nearly 80 different layout options were studied during FEED, carried out directly in the model.

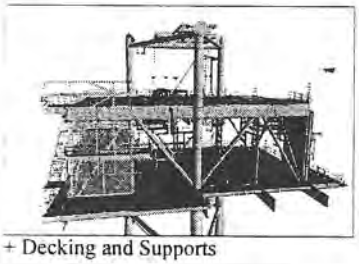
Despite the significant number of options, and considerable change when a large filter coalescer was introduced, layout man-hours were significantly less than on traditional projects. This is a consequence of using the latest fully interactive tools and of having layout expertise that could manipulate the model. Traditionally these skills have been separate.



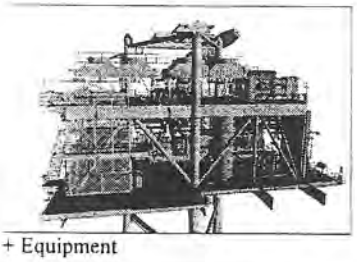
Primary Steel



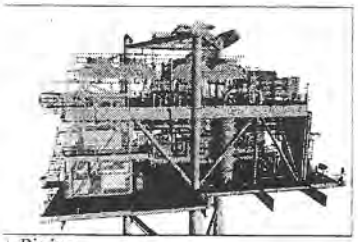
+ Secondary Steel



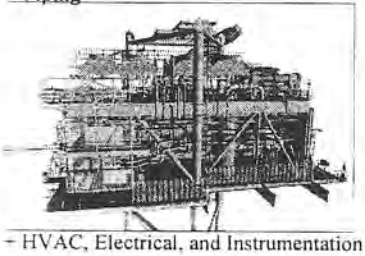
+ Decking and Supports



+ Equipment



+ Piping



+ HVAC, Electrical, and Instrumentation

At the fabricator's request all small bore piping was modelled, and if the Alliance were to work together again, the yard have requested that everything be modelled down to light fittings, small size cable rack, and junction boxes.

The model has been a major success.

Electronic Transfer and Electronic Mail

At the start of the project email links were established between all the UK members of the Alliance; TJB, BP, and BARMAC. Unfortunately, for a variety of reasons, they were not altogether successful with BP but worked very well with BARMAC.

Drawings were regularly transmitted via email to site, and if not via email, then by floppy disk. Weekly material updates were also issued electronically to the site material control system.

Links with suppliers were somewhat limited in the early days with spreadsheet format dumps from design databases being issued to some of the Instrumentation suppliers. Latterly, however, the Internet has been successfully used to transfer actuator drawings and comments.

In hindsight we wished we had spent more time resolving the early problems with email and would certainly make sure it all worked next time - it provides a much more interactive forum for getting things right.

Use of Databases

The project made significant use of database technology;

- the integrated instrumentation and cabling database is now being used directly by the on-site Electrical and Instrumentation contractor for completion and testing purposes, and during design produced consistent versions of all of the instrumentation schedule type deliverables,
- 3D model, material take-off, and procurement databases were linked via an Access database to highlight and help manage overall materials.
- all of the process schedules were put on database, and coupled where necessary to piping and instrumentation.
- the whole estimate for Sanction was put on database as was most of the Value Model.

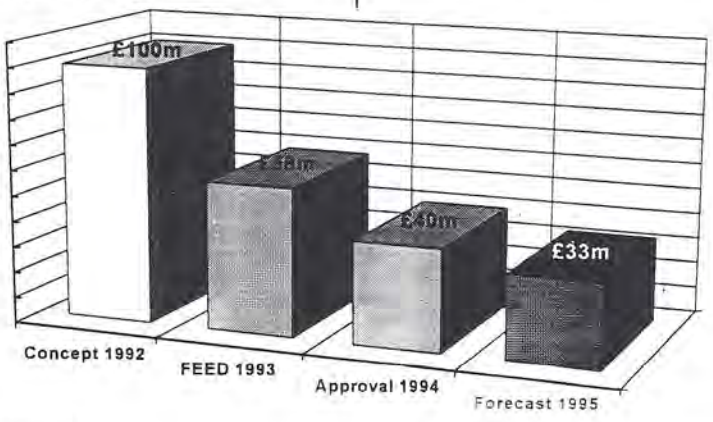
Overall, because information has been stored in this way, and we have had total flexibility to manipulate the data, and modify the structure, maximum use has been made of electronic transfers.

Achievements

And finally what has been the result of all of this;

- We don't know OPEX details yet (predicted at 10% savings), but CAPEX is illustrated below.
- One month ahead of schedule.
- "a major success with respect to relationships between people.

It's all about people!



Achievements