Field Compressors for Coal Seam Gas Gathering Systems

Screw or reciprocating compressors. . . . how to choose?   A decision analysis tool for the owner's management. . .

1 Introduction

For CSG projects designed to deliver gas into high pressure transmission pipelines, the design flowing wellhead pressure (FWHP) at peak flow - as specified by the owner's petroleum engineers - has a significant bearing on cost of downstream compression. Field (or "nodal") compressors are normally required to move the gas from the wellheads to the central plant. Connecting HDPE gathering lines are sized to satisfy the design pressure constraints of **P1** (maximum desired back pressure on most distant well) and **P2** (minimum field booster compressor suction pressure)

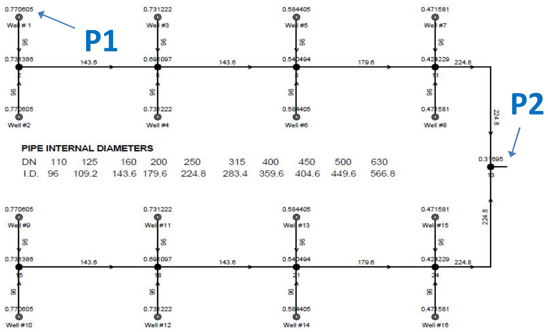
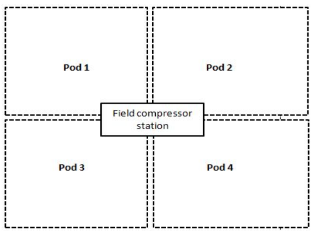


Fig. 1 Example network simulation of a CSG well "pod"

2 Number of boosters required



A field compressor takes gas at pressure **P2** and sends it by trunk line to a central gas plant for final compression, dehydration and metering.

Fig. 2 Field compressor stations are replicated over the field

The number of units at each field compressor station depends on several factors, the most significant of which is capacity of each unit at **P2**. A standard size (1,000 hp) field compressor has a capacity of 5-8 TJ/day depending on **P2**. Approximately 170 TJ/day of CSG field production is required for every million tonnes of LNG to be produced. Hence the large number of compressor "footprints" required for CSG to LNG projects.

3 Field compressor selection

When a large number of compressors are employed, resultant capital, operating & maintenance costs have a significant impact on profitability. Engineers and consultants evaluate competing bids and make recommendations. This is a complex task due the need to incorporate judgements on "intangible factors". The responsibility for final decision-making normally rests with the project owner's management, whose job and responsibility is to understand and evaluate these intangible or strategic factors.

4 Different technologies

Where each vendor offers the same brand or type of compressor, the bid evaluation task is more straight forward. With new or unfamiliar technology, there is uncertainty or subjective factors that bear on the evaluation process. The owner's management therefore needs a pragmatic and transparent method of addressing uncertainty and reaching a decision

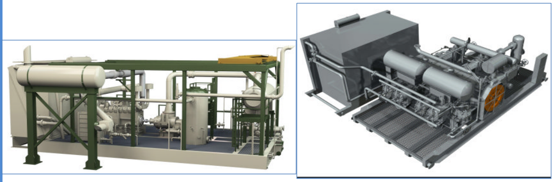


Fig. 3 High speed screw (left) and slow speed integral (right)

5 Decision analysis methodology

This is based on the book *Choosing By Advantages Decisionmaking System*, by Jim Suhr (ISBN 978-1-56720-217-5). The procedure offers an ideal approach for collecting and presenting data from competing proposals. It solves the problem of subjectivism and lack of transparency in some tender evaluations.

6 Tangible data

This consists of capital, operating and maintenance (O&M) cost estimates. These estimates are converted to a net present value (NPV) cost over the life of the project. The owner's FEED consultants are generally best equipped to generate the input data required to estimate NPV cost for technically acceptable options.

7 Intangible data

Task for owner's management:-

Step 1: List project-specific advantages, such as a) delivery period/impact on schedule; b) local service support; c) risk profile of supplier; e) operability of package; f) ease of future relocation; g) turndown; h) discharge pressure

Step 2: Agree on a weighting factor (0-100) to reflect the perceived project impact of these intangible factors.

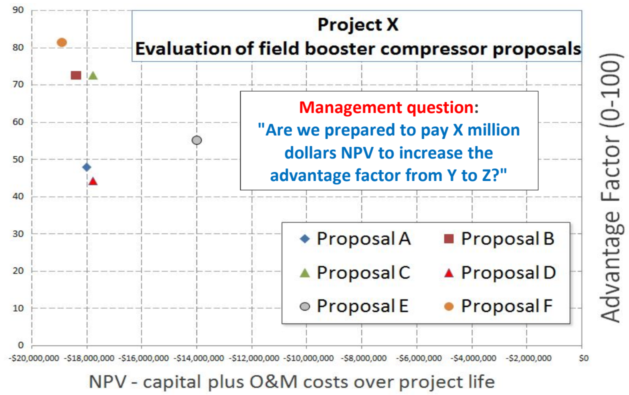
Step 3: Use investigative skills to allocate vendor's a score (1-5) against the above selection criteria. A single "advantage factor" (0-100) is then calculated for each vendor proposal by means of weighted summations of the allocated scores.

Minimising uncertainty

Different advantage factors may be received from different engineers and consultants, due to individual biases, lack of time for proper investigations, or influence by a vendor's marketing people. The owner's management are in a position to address these deviations, ideally, but not always, to achieve consensus.

8 Plot decision analysis chart

The final bid evaluation results are ploted on a single chart that summarises all estimates and engineering judgements. Accountability and traceability of the decision-making process is documented in accordance with principles of good governence.



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