

Keeping the Kristin project under control

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When Tom Henningsen became responsible for planning the engineering and construction of topsides on behalf of Aker Kvaerner for its client Statoil, he turned to Safran. With millions of dollars at stake, a project of this size and scope calls for specialized computer software that is relied upon to provide the kind of close project control demanded by a manager.

Henningsen had a key role in blending all the ingredients for engineering procurement and construction into a seamless recipe for success. He had to plan construction of the high pressure and high temperature Kristin process deck at the Aker Stord yard in Norway to ensure delivery of a completed platform facility which would meet with an exacting client's schedule. And he had to do it all within a fixed time frame, coping with delays caused by events over which he had no control.

Aker Kvaerner is a global engineering group providing engineering and construction services, technology and solutions in a range of sectors including oil and gas, refining, chemicals and biotechnology. Employing 22,000 in more than 30 countries, it has annual revenues in the region of US \$4.5 billion. Aker Kvaerner was one of the first customers for Safran's project management software back in 1996 and it was chosen as much because of its geographical, cultural and historical ties with the oil and gas industry.

So far, Safran's software has been a contributing factor in the success of many projects executed by Aker Kvaerner in recent years, including multi-billion dollar projects such as Snorre B, Grane, and Åsgard. Safran is now also being utilized on Snøhvit and Ormen Lange.

Aker Kvaerner's contribution to the Kristin project is now successfully completed, both in terms of budget and time schedule, and with no carry-over work. The platform set off from Aker Kvaerner's yard on the island Stord on 25 March 2005. The unit arrived on the Halten Bank in the early hours of 29 March with the assistance of five of the world's largest seagoing tugs. The installation work was completed by 15 May, and regular production started in October 2005.

Risk. By 1996, major oil and gas contractors found themselves bidding engineering procurement and construction (EPC) projects on a lump sum basis. So it was critical to carry out work the right way for the right price, otherwise the client would expect the contractor to fund the cost of any project over-run.

“Developing a project management system is part of the evolution of managing projects.”

“If you look at handling responsibilities for just engineering or procurement on a reimbursable basis, you are not running a large amount of risk,” says Henningsen. “But if you are running an EPC project on a lump sum you are running a large risk with respect to the project’s interfaces.”

Consequently project managers had to find a way to reduce that project risk, from late construction completion, to delays in procuring key equipment, or manpower shortages - all of which could jeopardize a project’s profitability for a contractor operating on a fixed price bid. Managers needed a system which could identify, catalogue and integrate all project elements in a way which would optimize a build process, to ensure the best possible project delivery in terms of both time and cost for the client – and their own profitability.

“If you are just doing engineering for a project, if you deliver engineering drawings, it does not matter if a fabrication yard needs them a week earlier and could cost them another US \$1 million,” Henningsen illustrates. Also, if a fabricator received compressor equipment after steel supports on a process deck were completed, then it would be up to the fabricator to install the compression equipment as best as he can - before the next deck is built on top. It’s these kind of interfaces that Safran’s project management software is designed to identify and manage in an optimal way, to avoid clashes in a construction program.

Oil and gas industry. “After 1996 when EPC-style projects became the name of the game, it was to our competitive advantage to have the optimum support with EPC contracts,” Henningsen says. “We needed a more sophisticated planning system that was capable of networking with a multitude of processes and a lot of activities in a very large activity network.”

Several systems were evaluated by Aker Kvaerner but it opted for Safran’s project management software because the rival systems were considered to be less flexible and less powerful. Henningsen describes a rival system (Primavera) to be more accountancy biased, a much more





generalized system that could be used by anybody, whereas Safran is designed to support the complex projects in the oil and gas industry.

Although not involved in the selection of Safran, Henningsen says: "Our evaluation at that time was that Safran gave us the amount of business functionality that we wanted. Their knowledge of the oil and gas industry and of the contracting business and the challenges associated with it also played an important part."

"Safran really excels when it comes to handling complex projects in complex environments."

Approach. Henningsen has extensive experience from the oil and gas industry from working for Aker Kvaerner, and previously Kvaerner, since 1980. The transition to Safran's project management software in 1996 meant a more coherent and systematic approach to the overall project management. For example, previous systems could not match Safran's sophisticated functions for "What if?" scenarios to check the

impact of events further along a project's cost and timing schedules.

As Henningsen explains: "Other systems that we were looking at had bar charts and things which were quite good, but they did not have the interfaces that we needed. Safran has the functionality that we need and it is easy to sort information in any shape or form. It is user friendly and you can extract information both in a standard form and for reporting - you can extract reports to analyze a particular aspect of a project."

When he first started using Safran's project management software, Henningsen found that once he understood the operating instructions, it was easy to begin working with Safran. "But you do need experience to utilize its full capability. You don't need to be an engineer but you need to have been in the industry for some time to understand the sequence of things." On Kristin, Safran's project management software was relied upon to provide control of all engineering, procurement and construction work. It controlled the schedule by which engineering drawings had to be completed, to interface with procurement and construction activities. Equipment specifications, ordering and delivery checking were input to Aker Kvaerner's Kristin project execution model (PEM), which relied on Safran.

Dozens and dozens of project management personnel had direct access to the system during the Kristin programme. Foremen, supervisors and engineers, had to extract information from the PEM to see how their part in the work programme was progressing, measured against specific project milestones. "There were a lot of people communicating with Safran every day. On Kristin it was in the region of 100 people."

Specific. What makes Safran so specific to oil and gas projects? "Developing a project management system is part of the evolution of managing projects. Safran allowed us to handle networks of previously unmanageable sizes and levels of detail. Being able to add more details to your schedule ensures accurate planning of the work to be completed and all relevant and real-life interfaces between the different activities allow us to exercise tighter control of our projects. Previously we were constrained by the limitations of less sophisticated software. Safran really excels when it comes to handling complex projects in complex environments."

One of the key points Henningsen makes about project management is the need to retain control throughout the work, from the initial engineering through procurement and construction to delivery. "If you lose control of a project it can cost you astronomical amounts of money. If you get delayed, you have to pay damages to the client, and if you lose control you have to recover and that recovery process is very costly. If you fall behind the schedule you have to put a lot of manpower to work in a non-productive sequence. It could easily cost you millions of dollars."

Safran's project management software has gained its prominence largely due to its flexibility. "When you get surprises, changes or variations, the system is very responsive to putting these into chains of events. It is easily added in. I think Safran is superior in that respect," Henningsen says.

Two major elements of the Kristin platform's construction - a riser balcony and a flare tower - were both completed late by an outside contractor. Welding cracks on the flare tower had to be rectified before it could be installed on the platform. This additional work had to be built into the project schedule. Safran allowed Aker Kvaerner to manage it so that they did not miss their delivery date for load out and mating

with the Kristin semi-submersible hull – built by Samsung in South Korea and delivered in September 2004. "When we get incomplete work from other suppliers or contractors, we are able to implement those [additional] activities into our network and work it into a chain of events, allowing us to reach our delivery target."

The Kristin platform is now safely moored in the North Sea, on schedule, and the first oil and gas arrived safely in the platform's production facility.

Kristin field facts

Kristin is located in blocks 6506/11 and 6406/2 on the Halten Bank about 240 km off the Norwegian coast. The field has estimated recoverable reserves of 42 billion standard cubic meters of gas and 219 million barrels of condensate - (35 billion standard cubic meters – including lean gas and 9 million tonnes of natural gas liquids) and is in water depth of 240 to 370 meters. Kristin's reservoir is between 4,500 and 4,850 meters subsea, with high pressure at 910 bar and high temperature at 170 ° Centigrade.

The production platform has treatment capacity for 18.3 million standard cubic meters per day of gas; 125,000 barrels per day of condensate and 31,250 barrels per day of water, and accommodation for 104 personnel.

Platform topsides weigh is 18,000 tonnes and the semi-submersible hull is another 13,670 tonnes. The field will be exploited with 16 subsea wells producing back to the semi-submersible platform – the first High Pressure/High Temperature field worldwide to use a subsea solution. Project cost is US \$2.4 Billion / 17 Bn NOK.

Field partners are:

Statoil (operator)	46.6%
Petoro	18.9%
Norsk Hydro	12.0%
ExxonMobil	10.5%
Norsk Agip	3.0%

