



SUCCESS STORY

GIRASSOL FPSO Project

Location: Angola
Order Date: July, 1998
Completion: Dec., 2001
Industry: Oil & Gas

The Girassol FPSO (Floating Production Storage and Offloading Unit) contract for the topsides includes a DCS (Distributed Control System) with an integrated concept to enable operators in the control room to control and monitor the FPSO from unified consoles. The control and monitoring include not only the topsides modules but also the subsea equipment and the vessel packages.

The partners on this project were TotalFinaElf, the operator, Esso Exploration Angola Bloc 17 Ltd, British Petroleum, Statoil, Norsk Hydro and the owner of the field, SONANGOL. The Girassol field lies in 1,350 metres of water and has an expected production of 200,000 b/d from a total of 44 wells (24 production wells and 20 injection wells through risers), now already achieved with part of the wells in operation.

The key dates for the project were:

- April 1996: discovery of the field
- July 1998: project go-ahead
- July 1998: order for the DCS
- March 2000: delivery ex-works
- March 2001: yard completion
- July 2001: towing and arrival in Angola
- December 2001: first oil

The main interfaces were:

- Subsea
- Water treatment
- Ballast Control
- Compressors
- Metering
- Tank Gauging
- HVAC (Heating, Ventilating and Air Conditioning)
- ESD (Emergency Shutdown System) and F&G System (Fire and Gas Safety System)
- Electric Generation and distribution

The main difficulty of the project lay in the fact that only pre-basic engineering studies had been completed when the DCS was awarded, meaning that the engineers working on the project had to perform several tasks in parallel during detailed engineering. Co-ordination, team spirit and parallel engineering were the keys to successful completion of the assignment.

The first phase of the project involved defining the guidelines which would provide the basis for the application configuration while the detailed engineering was in progress. Once this phase had been completed and validated by all the partners, the application configuration was performed using user friendly tools which secured the application and facilitated the tests. These tools also helped during pre-commissioning at the yard, towing

(some of our engineers had a free cruise on board the FPSO to finalise some modifications!) and commissioning in Angola.

Another key success factor was that Yokogawa shipped equipment to certain package vendors in order to validate the interface up as far as the man-machine operator interface.

Since the technology used in the process is new, and as wells start production one by one, the tools have to be very flexible so that modifications can be carried out online and single modifications downloaded without stopping production. Yokogawa was able to achieve this using its standard tools. The methodology for keeping track of modifications is of course closely monitored.

The ability to perform modifications on-line is an essential factor in ensuring uninterrupted production.

Yokogawa is currently implementing the JASMIN project for an extension of the field, which involves two additional risers one line of 6 production wells and one line of 4 injection wells), giving a total of 52 wells.

Further developments are being assessed, and would consist of additional risers and associated utilities on the FPSO. Operators would use the same control room on the GIRASSOL FPSO.

Yokogawa is in charge of the maintenance contract for the Integrated Control and Safety system which includes assistance on site for all components: Distributed Control System, Safety System and Subsea Interface.

Yokogawa also supplied 1500 lb & 2500 lb high pressure Vortex Flow Meters, used to measure the gas lift and water injection flow. The Yokogawa Vortex Flow Meter is a unique reference for oil & gas applications due to its high accuracy (1% of the read value), wide rangeability (30:1) and robust construction (no moving parts, no maintenance).

Yokogawa is very pleased to have been able to take part in this major project, which requires not only long-term support and integration but also co-ordination and close partnership with the key players.

Control System References at TotalFinaElf:

- Ofon Offshore field for Elf Petroleum Nigeria
- Yadana Onshore and Offshore for Total Myanmar
- Tunu North for Total Indonesie
- Obite Onshore field for Elf Petroleum Nigeria
- Girassol FPSO for Elf Exploration Angola
- South Pars phase 2 & 3 for Total Iran
- Amenam FSO for Elf Petroleum Nigeria
- CPTL 137B FPSO and BD1 Offshore platform

System: CENTUM CS

Total I/O: 6,000 Hardwired I/O, 25,000 Serial I/O