Petrobras conducts a wide variety of offshore operations, often using cutting-edge techniques for deepwater operations. Petrobras’ PROPOÇO program aims to place the company in the top quartile of well-construction performance.

Petrobras’ ambitious PROPOÇO a ‘road map’ for optimizing well construction performance

By Wajid Rasheed, contributing editor

KEY PERFORMANCE Indicators (KPI) are routinely used by oil companies to measure operational performance. In drilling, for example, a common indicator is a depth vs days curve, in which specific well construction events are plotted against the duration or time taken per event. This highlights “flat-spots” showing the occurrence of downtime or NPT (nonproductive time). Worldwide, the average value for NPT varies between 20%-30% of overall well construction time. Oil companies with the highest performance levels typically exhibit NPT between 10%-15%.

Petrobras recently launched the PROPOÇO program, which aims to place the company in the top quartile of well construction performance by improving the well planning process and reducing NPT associated with well construction and maintenance. The program is being conducted under the leadership of Braulio Bastos, general manager of well technology for Petrobras.

PROPOÇO A “road map” for realizing top performance, PROPOÇO emphasizes extensive planning, best practices and information sharing as the way forward. Consequently, it applies “thresholds” or minimal requirements and “benchmarks” or standards for projects, personnel, wells and documents. By propagating best practices, it promotes efficiency.

By reviewing the processes and flow of information behind planning, drilling and completing an oil or gas well, PROPOÇO will help engineers plan wells from inception to drilling and completion — not just with time charts, but detailed well-engineering studies, including all necessary calculations and designs for a specific well.
The backbone of the program is a comprehensive analysis of Petrobras well-engineering activities and recommendations on areas for improvement. PROPOÇO is based on five distinct programs, including the overall PROPOÇO management plan.

The Information Management and Performance Evaluation program (INF — derived from Portuguese), is the second PROPOÇO program, the first being the overall management of PROPOÇO itself.

Coordinated by Felipe Rego, INF seeks to recommend KPI and adopt minimum performance standards. INF also seeks to permanently and systematically compare Petrobras’ well engineering with other oil companies and thereby identify and adopt best practices. It also aims to define a standard well-engineering documentation system. INF is discussed in further detail below.

The third program, Continuous Process Management and Standardization (PROC), seeks to review the management of well-engineering processes, especially those related to standardization, in order to develop a system that is less bureaucratic and fit-for-purpose based on critical success factors and the actual needs of users. It also seeks to review the way “lessons learned” and non-conformance are applied. PROC is discussed in further detail on Page 142.

The Project Management, Planning and Controls (PROJ) program is based on a simplified operational version of Petrobras’ PRODEP model. PROJ focuses on implementing a well-design and approval system using an integrated management approach. The well-design and approval system is split into three stages — concept, draft and management plan — combining scope, cost, quality, risk, team, supply/procurement and communication. PROJ is discussed on Page 140.

Finally, the Knowledge and Workforce Management (CON) program is concerned with attracting, training and retaining technically capable people within well-engineering functions. It also identifies needs for well engineering competency areas as well as allocating technical personnel where necessary. In addition, it develops specialists and integrates technical communities, as well as creates tools and standards for engineering processes. See Page 143 for details on CON.

INF
INF is divided into six sub-projects that range from the management of sub-projects, diagnostics, documentation, well-engineering KPI, offshore and onshore benchmarking.

INF MANAGEMENT
This sub-project covers initial diagnostics that are used to identify all potential areas of improvement as well as drawing up detailed work-plans for sub-projects. It also covers internal and external communication procedures and content.

DIAGNOSTIC ANALYSIS OF CURRENT PRACTICES
Coordinated by Paulo Barata, this sub-project focuses on analysing current well-engineering IMPE practices as related to information and documentation systems and finding solutions that guarantee standardized and integrated practices, databases and applications across all Petrobras well-engineering operations. It includes, but is not limited to, the structures and ways in which information is collected and documented.
Results of these diagnoses will enable Petrobras well-engineering information and documentation systems to be restructured in a standard integrated format.

IMPLEMENTATION OF INFORMATION AND DOCUMENTATION SYSTEMS

Once diagnostics have been carried out, information and documentation systems will be restructured to ensure standardization and integration of practices, databases and applications across the company’s well-engineering operations. This sub-project is also coordinated by Mr Barata and covers the implementation of well-engineering information and documentation systems coherent with directives and planning proposed in the earlier diagnostic stage.

Designed specifically to effectively capture all necessary well-engineering information, the new integrated system will store and handle information and documents in a standard format.

WELL ENGINEERING KPI

Coordinated by Joao Carlos Ribeiro Placido, this sub-project assesses process performance indicators used in well engineering. The program seeks to redefine both final and interim KPI across all well-engineering processes, ensuring minimal standards or “threshold” are met. It also includes input, result indicators and a threshold, which covers cost, timeline and conformance with specifications and quality standards. The program will result in a number of standardized Petrobras KPI for well-engineering across all assets.

OFFSHORE AND ONSHORE BENCHMARKING

By establishing two separate well-engineering performance evaluation processes for offshore and onshore assets respectively, Petrobras will be able to “benchmark” process performance through a series of audits. This will clearly identify and prioritise areas of improvement, enabling best practices to be subsequently implemented across all offshore and onshore assets.

Coordinated by Renato Pinheiro, the Offshore Benchmarking project encompasses all well-engineering processes in floating rigs and fixed platforms. The project distinguishes between internal and external benchmarks. For internal benchmarks, procedures are drawn up for the information that needs to be captured. This information is used to form the basis of a benchmark that is implemented in all well-engineering assets managed by each business unit. In order to compare performance between different assets, the system will check, rank and identify improvements and best practices managed by Petrobras ENGP.

The system also incorporates a planning and control model to accompany corrective and other actions within each process. External benchmarking includes a contract with companies for benchmarking analysis.

The onshore benchmarking system covers all well-engineering processes related to land rigs and modules. It is based on similar processes to those of offshore benchmarking in terms of internal and external benchmarking, with the only difference being that the nature of the information collected is from onshore assets. Again, the system allows for performance comparisons between different assets, identifying improvement actions and best practices managed by Petrobras.
DEEPWATER PROJECTS are becoming ever more complex. Gone are the days when risks were “known” and highly profitable giant fields could be developed using conventional off-the-shelf technology. Large oil companies today face a series of deepwater production challenges created by smaller and more remote offshore oil and gas fields, lower permeability, and at times, higher temperatures and pressures. In such circumstances, it is vital for the oil company to apply knowledge in three key areas: engineering, new technologies and project management.

A simplified scheme of a typical producing well in the Campos Basin is represented in Figure 1.

Internationally, Petrobras is considered to be at the cutting edge of deepwater production technology as well as new technology application. Illustrating this, Petrobras has twice received the coveted OTC (Offshore Technology Conference) Award for Offshore Deepwater Technology.

Petrobras has increased the use of management tools across the life-cycle of the well in both exploratory wells and producers. This enables the company to better handle the increasing complexity, higher costs, risks and uncertainty inherent in deepwater wells.

Project Management – Planning and Control (PROJ) is the 4th sub-project within PROPOÇO and will implement a formal system for the design and approval of well plans. The system will be based on several key stages or gates, such as Opportunity Identification, Project Plan, Basic Well Plan and Executive Plan. From a management perspective, the system integrates a wide range of factors such as scope, timescale, cost, quality, risk, team, supply/procurement and communication.

Supported by broad participation from specialised business areas, well services and corporate functions, the PMPC project team has produced results such as the following:

- Defining Front End Loading (FEL) needs for the well and personnel responsible for different stages or gates of the well-plan.

International experience confirms that projects based on good reservoir characterisation – seismic, rock and fluid analysis – linked with a detailed well-plan, show fewer time and cost deviations. The sub-project will look next at standardizing the contents of all well-engineering documents.

Please see PROJ on Page 142

![Figure 1: Petrobras has long stood at the cutting edge of deepwater technology.
A typical Campos Basin well lies in water depths up to 2,000 m.](image)

![Figure 2: PROJ themes expected to be completed by year-end 2008.](image)
Continued from Page 141: PROJ

Further results include:

- Predicting probabilistic demand for well intervention. This allows production assets to estimate resource usage for example rigs that are necessary to workover wells that show a drop in either productivity, or injectivity as in the case of water injectors.
- Planning and managing well campaigns within specific field developments. Essentially, this is a best practices manual for well engineering.
- Standardizing analytical procedures for well planning and construction. This enables costs to be allocated properly, increases the control of performance indicators and identifies priority tasks thereby improving process performance.

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5-part PROC designed to review well-engineering management, emphasizing standardization issues

COORDINATED BY Helder Pinheiro, the third PROPOÇO program – Continuous Process Management and Standardization (PROC) – will review the management of current well-engineering processes, especially those related to standardization. It is structured in five sub-projects and will be based on the actual needs of users as well as critical tasks and will deliver a less bureaucratic and fit-for-purpose system. By reviewing the way “lessons learned” are applied and non-conformance events are handled, it will improve the overall efficiency of well-engineering processes.

PROCESSES, SPECIALITIES, CRITICAL TASKS

Coordinated by Raimundo dos Anjos, this sub-project focuses on mapping and validating different well engineering processes. It also breaks down the complex interaction and interdependencies between these processes so that they can be better understood and managed from a performance perspective. Typically, such processes cover information flow, well engineering specialties such as directional drilling, the interaction between Petrobras and its suppliers and processes linked to critical tasks such as landing BOPs. In doing so, Petrobras will be able to clearly determine critical tasks, different well engineering processes and their interaction.

PROCESS AND EXECUTION STANDARDS AND STANDARDIZATION SYSTEM

Coordinated by Gilson Campos, this sub-project will evaluate current standardization procedures, allowing Petrobras to visualise where changes are necessary. As a result, the new system will be tailored according to the needs and specifications of well engineering using software solutions and flow charts.

This sub-project will evaluate Petrobras’ philosophy of establishing and using standards. This methodology will be applied to all processes and relationships that are associated with the development of the detailed content of the well plan, the operational needs of technical applications, as well as knowledge levels of the user. It will also evaluate the management of standards in interfaces with technical service providers by considering factors such as accessibility, updates, common standards and responsibility. The new system will be adjusted according to the needs and specifications of well engineering. This involves a complete review of process and execution standards, management standards in well engineering and will result in the restructuring in format and/or content of standards.

NON-CONFORMANCE AND FINAL WELL EVALUATION SYSTEM

Coordinated by Pedro Paulo, this sub-project will evaluate existing well-engineering system in terms of handling non-conformance. It will also evaluate suggested revisions and their suitability of content, focusing on dissemination, adjusting standards and overall applicability. It also evaluates the management of non-conformance in the interaction with technical service providers. It seeks to adjust the non-conformance system according to needs and specifications of well engineering. It also provides a system for handling non-conformance in well-engineering whose format and content can be reviewed where necessary.

PROCESS MANAGEMENT

Coordinated by Humberto Maia, this sub-project will standardize well engineering process management. It will establish a process review system that will be continually updated to ensure that best practices are communicated in a consistent manner. It will also certify the activity of process management within well engineering. It will also identify and evaluate operational changes in wells and best practices within process management. This will ensure Petrobras benefits from performance improvements as well as integrated and consistent communications throughout the well engineering community. It will enable routine process management tasks such as standardization, auditing, diagnostics, VCT, to be consolidated and become more efficient.

IDENTIFICATION AND EVALUATION OF CHANGES IN WELL OPERATIONS

Implementation of tools and methodology proposed by management is based on pilot assets and well engineering interfaces, as well as various stages: planning, design, program and execution. The sub-project will evaluate the impact and practicality of the proposed tools and methodology and assess the suitability of tools and risk analysis techniques proposed by management. The deliverable will be methodology and tools proposed by all well engineering management and well engineering shown in SINPEP procedural standards.
CON segment of PROPOÇO designed to attract and develop technical staff, regardless of future market conditions

COORDINATED BY Adolfo Polillo Filho, the fifth PROPOÇO program is Knowledge and Workforce Management (CON).

By attracting staff and developing their technical capabilities, Petrobras will be guaranteed a core of technical and functional specialists irrespective of future market conditions. Enabling this is the task of CON, which will identify needs and develop competencies within well engineering. It will utilize newly created mechanisms to post functional staff where required, as well as develop technical specialists.

Additionally, it will increase knowledge sharing by integrating technical communities, information databases and technical standards. The CON is structured in six sub-projects. Three sub-projects are currently under way – Critical Competences, HR Attraction & Retention and Project Directives. Another related to “best practices within the community” has been completed. A further two sub-projects are yet to commence – firstly, consolidating directives for projects, well plans and engineering methods, and secondly, automating well plans.

Coordinated by Valdo Ferreira Rodrigues, Critical Competences will select and help develop a broad range of skills and competences critical to well engineering. By considering present and future workforce requirements, this sub-project will meet medium and long needs generated by diverse well-engineering specialities. Furthermore, it will generate career paths and professional development plans that offer specialized training courses corresponding to Master or Doctorate qualifications.

The fourth sub-project, “Implementation of Best Engineering Practices with the Well Engineering Community,” includes a total of 15 well construction directives that have been established. Of these, 10 have already been validated within the company in the following areas:

- Geomechanics;
- Well control;
- Well start-up;
- Directional drilling;
- Bits;
- Drilling fluids;
- Casing and cementing;
- Well geometry and drillstring;
- Completion fluids;
- Sand control;

Five further directives are being evaluated.

- Formation stimulation;
- Completion;
- Formation evaluation;
- Well abandonment;
- Intelligent completions.

Upon conclusion of the sub-project, all 15 directives will become companywide standards for well construction.