“For every marginal or mature field, there is a cost-effective solution to maximize your profits.”

Jacques Melman, Managing Director, with Frames since 1991
“Unlocking resources from marginal and mature fields is becoming more and more important, but also challenging in times of low oil prices. At Frames we provide the vital link between the well and the pipeline. Our experience around the world, onshore and offshore, has given us the know how to design and supply highly productive solutions that seamlessly fit existing operations.

In the current market situation we help create cost-effective and fit-for-purpose solutions. Whether developing marginal fields, or extending the lifespan of a mature field, our goal is to constantly optimize production. By working closely together with our clients and creating partnerships, we achieve this goal. In this white paper, we share our expertise with you on how to reach cost-reducing production optimization in relation to marginal and mature fields.”

Jacques Melman, Managing Director Frames

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The Situation and the Challenge
Marginal fields are oil and gas resources of which development is considered uneconomical due to reserve size, market conditions and production costs. The number of marginal fields worldwide has increased. Partly due to new discoveries and, partly due to low oil prices resulting in fields being classified as marginal because of the shifted cost versus returns balance. Production optimization is essential to develop a marginal field economically.

With declining revenues at existing facilities, especially in maturing and end-of-life fields, it is essential to keep production levels as high as possible with the least investment. Cost-effective production solutions for these fields are of critical importance. These include clever technical adjustments to the existing facilities.
Maximizing Recovery Rate

With the 'easy' oil and gas being largely identified and tapped into, maximizing the recovery rate of the maturing fields containing the oil and gas is an attractive strategy for maintaining production at low costs, especially with decreasing oil prices.

When reservoirs are depleting, artificial lift processes are applied to maintain production, like injection methods which are used to maintain reservoir pressure. To this end, gas or water is often injected into the reservoir, thereby raising the recovery rate. However, this comes at the expense of process challenges.

Applying artificial lift to exploit maturing fields changes the behavior of the well and alters the composition of the production stream. Existing process equipment installed to separate the mixture of oil, water and gas might no longer be suitable to achieve the original design requirements. For oil fields, when the water content of the produced stream rises significantly (in some cases up to 90%), water will be carried over to downstream equipment, causing poor separation performance. For gas fields, when the pressure drops, the downstream equipment no longer performs due to a corresponding increase in volume flow. In such cases it is required to debottleneck the process equipment by installing skid-mounted add-ons, modifying existing equipment or replacing entire sections.
Saudi Aramco’s Gas Oil Separation Plants: Converting existing equipment

Frames is familiar with the process-related challenges of mature fields and has been providing debottlenecking solutions for many years. For Aramco, the world’s largest oil company, we provide support through engineering studies, CFD analyses, revamps of process equipment and installation of advanced separation solutions. In some Gas Oil Separation Plants (GOSPs) such as Hawiyah and Uthmaniyah, Frames is actively involved in altering the service of the separation equipment to enable coping with continuously increasing water cuts. Converting existing separators from 2-phase to 3-phase in these cases is known to save up to 60% in pump OPEX, many 100,000 USDs in heater OPEX savings and reduce the demulsifier consumption.

Find out more about our separation solutions.

Wintershall Gas Fields: Revamp of existing designs

Smaller gas fields, such as those operated by Wintershall in the North Sea, have also proven to be worth exploiting beyond original projections with the aid of Frames know-how. The A6-A platform that operates on a gas field facing decreasing well pressure required an innovative and cost-effective solution to upgrade the capacity of the existing scrubbers. Replacing the scrubbers entirely would be costly, requiring hot-works, rerouting of piping and a long shutdown period. Frames offered a revamp of the existing designs with state of the art internals that ensured an improvement in throughput of 60% and a decrease in pressure drop of 50%. But equally important, the revamping solution avoided the need for in-situ welding and required only a brief installation window and offered the operational gains at a modest investment.

Frames is very much aware of the squeeze that operators and end users face and has proven to be a supplier of inventive onshore and offshore solutions that not only mitigate the technical challenges, but also allow cost-effective recovery of these resources.

Find out more about our separation solutions.
Working Closely Together

The challenge of economical and profitable developments for marginal and maturing fields often pivots around interest of the different parties involved. Working closely together with partnerships all over the world makes it possible to overcome these challenges. Every partnership or collaboration is unique, addressing the goals of stakeholders and individual demand. Yet experience shows most partnerships have several benefits in common:

- Partnerships deliver higher quality and fit-for-purpose project outcomes by creating a fertile platform of knowledge and innovation.
- Partnerships result in shorter delivery times (and thus a reduced time to market) by combining expertise and compressing steps in different phases.
- Partnerships provide effective communication, with a single point of contact.

“I think there is a big and exciting future ahead and within the industry for a long time to come. We’ll be going after the more difficult hydrocarbons of the smaller scale. So, I find it exciting.”

Roelof Platenkamp, CEO, Tulip Oil

The Donkerbroek and Hemrik Project: Working together to provide fast-track total plant solution

Trust is earned. It takes time and effort. At the Donkerbroek and Hemrik development project in The Netherlands, we worked intimately with our client, Tulip Oil, to provide a fast-track total plant solution for this marginal field development.

The close cooperation between Tulip Oil and Frames allowed us to cut lead time substantially, as well as focus our engineering capabilities on optimizing capital and operational costs. Ultimately, the installed costs per standard cubic foot were 40% lower than conventional operations.

As a Frames total plant solution, the work scope included a wide range of activities: project management; basic and detail engineering; procurement and subcontracting; manufacturing, inspection and shop testing; site construction and erection; pre-commissioning, functional test and startup; process tuning and personnel training.

In addition, at Frames we worked under strict project delivery parameters, including a fixed number of labor hours and a final cost variance (15%) that was half of the industry norm.

The contract was awarded in 2013, and the first gas flowed in January 2015.

Thanks to the close working relationship between Frames and Tulip Oil, the project fast-tracked from the design stage straight into the project execution stage. The final investment was, indeed, within 15% of the target price. The plant has operated more than 7,200 labor hours without a lost time incident (LTI).

Find out more about our total plant solutions.
Optimization

Optimization is all about maximizing the return on investment on oil and gas fields. It is especially important for marginal and maturing fields. There are different ways to accomplish optimization. Process optimization ultimately leads to production optimization. Taking control of the design and supply of a total plant creates integration optimization for the client, based on the ideal combination of processing equipment and utilities.

Black Box Approach

Process optimization is all about freedom. With a black box approach, the only agreements and specifications are output, performance and safety. All stakeholders use their specific knowledge and expertise to optimize the process and, subsequently, design the module layout, resulting in the most cost-effective solution.

Value Engineering

At the outset of a project, the people involved establish high-level agreements about philosophy and functions. Often terms such as “as low as reasonably practicable” are invoked, balancing the level of risk (based on safety and quality) with cost. During the early development of the field, situations might occur which could influence the feasibility of development. At that point, integrating the specific process design knowledge with the client’s expectations and requirements creates a solid basis to look for even further cost reductions.

Unmanned Operations

Cost reductions are not only effective in capital expenditures, but also in operational expenditures. Operating unmanned process facilities is strongly driven by OPEX considerations. OPEX cost savings are most visible in offshore applications, but the effect of unmanned onshore operations can also be substantial. Unmanned operation can be achieved with the right technical design supported by strong MTBF (mean time between failure) and RAM (reliability, availability and maintainability) studies.

The Viura Project: Optimizing life cycle costs

Viura is a natural gas field located at a depth of 400 meters in La Rioja, Spain. A three-company consortium, led by Union Fenosa Gas (UFG), was formed for its exploitation.

The Viura Modular Gas Plant delivered by Frames includes engineering, procurement and construction. Our complete portfolio in oil and gas processing, offering a technologically neutral solution optimized in both CAPEX and OPEX, was the key to our success. In close cooperation with UFG, the project life cycle costs were optimized by processes such as combining dehydration and hydrocarbon dew pointing by methanol injection.

Drawing on our 30 years of experience in oil and gas processing, we started the project at concept selection without an extensive FEED (front-end engineering design) study. This concept resulted in a safe, solid, technically sound and cost-effective modular facility, able to be operated by remote control.

Wides Schiavo, Head Project Manager, Tomé Engenharia

Find out more about our total plant solutions.

Viura, Total Plant Solution

“The partnership with Frames was of vital importance to the project. Thanks to Frames’ wealth of experience, and its technology, it was able to meet all specifications.”

Wides Schiavo, Head Project Manager, Tomé Engenharia

Find out more about our total plant solutions.
Standardization

Reduce costs by combining fit-for-purpose solutions with standardized, pre-engineered, proven designs, experience and know-how. It might seem counterintuitive. But this combination can be practical and profitable, especially in marginal and end-of-life oil fields.

Fit-for-purpose or Standardized?

One of the biggest challenges in developing oil and gas fields is reducing costs. In smaller fields, cost-effective solutions are even more important. The lower the initial costs, the greater the economic viability. One worthwhile solution is to combine fit-for-purpose with standardization, dialing back the process to essentials – producing oil and gas safely, at a predefined quality – and combining it with a range of pre-engineered, proven-in-use designs. Finding the balance between designing re-deployable solutions (for example well production flexibility) and solutions for shorter life span, is of high importance for marginal fields.

Engineering Standards

The role and influence of specifications in the oil and gas industry is enormous. But the increase of prescriptive specifications often leads to less cost-efficient solutions. The use of engineering standards, in combination with a black box approach, can be the answer. The purpose of engineering standards is to ensure efficient performance, meet safety requirements and make sure that the solution is repeatable.

Frames wellsite package: A cost-effective, plug-and-play solution

In order to ensure a guaranteed supply of gas for the coming decades, the Dutch government developed the marginal field policy (“kleine velden beleid”). This policy obliges operators in The Netherlands to focus on development of these small gas fields.

Frames was approached by a client (Nederlandse Aardolie Maatschappij) to jointly develop a conceptual design for a skid-mounted integrated wellsite. Together with other leading industry partners, the Keep it Smart and Simple (KiSS) concept was created. This concept encouraged the partners to diverge from existing paths and ideas. The result of one year of joint input was the KiSS skid. The skid is a tailor-made solution which can be used on most small fields. It provides a cost-effective, plug-and-play hookup. By integrating all the components of a traditional wells site onto a single steel structure, it is possible to test the complete system before dispatch to the field. This significantly reduces the site installation time. The mobility also allows relocation of the skids to new fields when the small fields are depleted. NAM was so inspired by the development of this concept that they changed their operating and maintenance philosophy.

Find our more about our Wellsite Packages.
About Frames

At Frames we provide the vital link between well and pipeline. We design, deliver and construct separation, treatment and control and monitoring systems as well as total plant solutions and modules for the international oil and gas market. Our people work directly, one-on-one, with each client for the best results. Sharp. Together. Committed.

Reducing Costs in Marginal and Mature Fields

Here are some simple ways to cut costs.

- Artificial lift can be used to maintain production levels.
- Revamping of designs is often achievable and cost effective.
- Partnerships enable you to combine expertise, share knowledge and communicate effectively.
- A black box approach can significantly reduce costs due to smoother development processes.
- With the right technical design and studies, unmanned operations can be achieved.
- Costs can be reduced by finding the right balance between fit-for-purpose solutions and standardized designs.

Contact

For more information about Marginal and Mature Fields, contact:
Tim Lauret t.lauret@frames-group.com +31 172 461600 or
Geert Willemse g.willemse@frames-group.com +31 88 0033300 or
Chris Klukkert c.klukkert@frames-group.com +31 172 504800

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