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REPORT TYPE

Complete IOR Catalogue

09.Sep 2019
Solutions for oil flow-rate improvements

Category: Topside modifications incl. water management
Subcategory: Upgraded utilities and separation systems
Type: Product

Aibel has extensive experience with utilities and separation systems upgrades, debottlenecking and water treatment system upgrades for oil flow-rate improvements. We provide tailor-made module facilities for platforms, where deliveries range from single modules to complete turnkey systems.

Our solutions comply with stringent requirements and design focus on cost-effective installation. Aibel's products can be adapted to specific project requirements:
• Injection of water or gas to maintain reservoir pressure
• Thermal recovery by introduction of heat to lower the viscosity of heavy or viscous oils
• Chemical injection with polymers to increase effectiveness of water flood and lower the surface tension
• Gas injection of natural gas, nitrogen or CO2 to push oil and lower oil viscosity

Technology readiness level (TRL)

According to API RP 17N

Not applic: Not applicable.

Reference

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BPT conceptual studies

2019-04-12 - Billington Process Technology

Category: EOR
Subcategory: Modelling and simulation tools
Type: Service

BPT conceptual studies uses the “BPT Apps for process simulations” allowing capacity evaluation on a facility to be revealed as a capacity envelope for a variation of fluid variations, as well as for changes to geographically conditions. A high degree of automation allows the engineers to use more time to think and less time to do, ensuring high quality designs can be concluded early.

Using CODES secures optimal compressor configurations identifying minimum impeller set needs and ensures correct drive-end power ratings. Piping sizes are automated allowing an early degree of optimization. EXT sizing routines ensures realistic scrubber matched to the compressor maps. Standardized execution sequence using reporting templates brings conceptual process work down from weeks to only a few days.

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

BPT website

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 ClampOn DSP Well Collision Detector

2019-04-10 - ClampOn

**Category:** Reservoir management  
**Subcategory:** Data acquisition and monitoring  
**Type:** Product

The Well Collision Detector is designed to prevent collisions involving directional drilling within the proximity of existing wells. It provides operators with real-time data so that collision risk analysis calculations are not the only factor determining the bit's proximity to existing wells.

The overall purpose of the Well Collision Detector is to prevent environmental damages caused by collisions and to help increase safe drilling speed and decrease downtime caused by collisions. The ClampOn DSP Well Collision Detector provides the operator with an advanced real-time collision monitoring system with minimal equipment and personnel requirements.

**Technology readiness level (TRL)**

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

**Reference**

ClampOn website  
ClampOn DSP Well Collision Detector

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ClampOn DSP Particle Monitor

2019-04-10 - ClampOn

**Category:** Reservoir management  
**Subcategory:** Data acquisition and monitoring  
**Type:** Product

The ClampOn DSP Particle Monitor sensor monitors sand through passive ultrasonic technology. It detects the ultrasonic signal that is generated by particles impacting the inside of the pipe wall, just after the pipeline bend where the sensor is installed. The instrument has onboard Digital Signal Processing (DSP) for analysing of the collected data and it sends real-time results to control system, giving the operator immediate warning when/if sand is being produced.

Operators are using particle monitors widely to increase production rate by finding a maximum sand free rate. By monitoring and evaluating the data in real-time, the operator can make immediate decisions to ensure safe production.

**Technology readiness level (TRL)**

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

**Reference**

ClampOn website  
ClampOn DSP Particle Monitor

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FRAMO water injection pumps

**Category:** Reservoir management  
**Subcategory:** Drainage technologies  
**Type:** Product

FRAMO water injection pumping systems are the reliable way to increase reservoir pressure. The high-power stages are arranged back-to-back for balanced thrust forces, and the high-speed shaft operates well below first critical speed. The system is designed for minimal wear and tear and easy maintenance, even when working with produced water. The system has shown more than 98% average availability in over 4,000,000 operating hours logged, making it reliable and suitable for use in remote locations.

The FRAMO water injection pumping systems is value-adding by having less than half the footprint of a BB pump. Because a booster pump is integrated into the main injection pump, we eliminate the need for a separate pump with associated piping, valves and manifolds.

**Technology readiness level (TRL)**

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

**Reference**

FRAMO website  
FRAMO water injection pumps

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GeoTool-Inject

2019-04-05 - Geomec

Category: EOR
Subcategory: Gas injection/WAG/CO2
Type: Service

GeoTool-Inject is a software and technical support service aimed at monitoring and analysing the behaviour of water injection wells for pressure support, disposal and fracking. It does so by allowing rapid extraction of relevant real-time information from the data acquired by the operator.

The software gives improved ultimate recovery rate by 5-10% compared to current best practices due to advanced algorithms and real-time monitoring. It reduces the risk of out-of-zone injection (OOZ) and reduces probability of well & reservoir leakages to seabed from more than 25% to less than 5%. GeoTool-Inject is very economical wrt. the work involved (50 times faster). It also allows rapid analysis of past injection records and is especially applicable to mature fields and/or non-operated assets.

Technology readiness level (TRL)

According to API RP 17N

TRL 6: Technology installed Full-scale prototype built and integrated into intended operating system with full interface and functionality test program in intended environment. The technology has shown acceptable performance and reliability over a period of time

Reference

Geomec Engineering website

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Seabox™

2019-04-02 - NOV

Category: Flow assurance
Subcategory: Subsea separation, pumping and compression
Type: Product

The Seabox™ subsea water treatment module is installed on the seafloor, designed to treat 40,000 bpd of sea water for injection, directly into subsea wells or via topside. The Seabox™ module disinfects water and removes all solids down to 10 μm using electrolysis and long residence time. Subsea water treatment ensures operators’ flexibility to adjust capacity needs as well as implement water injection on fields otherwise found too expensive.

For arctic conditions, the Seabox™ module will mean a reduction in chemicals used, lower energy demand and reduced need for offshore manning. It is not obstructed by topside weight and space or distance to injection wells. The Seabox™ will accelerate production and increase recovery through flexibility and a more active reservoir management.

Technology readiness level (TRL)

According to API RP 17N

TRL 6: Technology installed Full-scale prototype built and integrated into intended operating system with full interface and functionality test program in intended environment. The technology has shown acceptable performance and reliability over a period of time

Reference

NOV Seabox website

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The SWIT™ subsea water treatment and intake technology, with the Seabox™ module as its cornerstone, utilizes filtration and membrane technology to tailor raw seawater to reservoir requirements – particle-free, low salinity or low sulfate water. The SWIT™ technology reduces the need for maintenance without compromising performance, all done subsea. Removing filtration and membrane equipment from topside facility reduces topside infrastructure and offshore manning. There is a significant reduction in CAPEX and OPEX, but still greater availability is achieved through the SWIT™ water treatment technology.

For arctic climate this solution provides a more environmental friendly approach to water treatment, due to decreased use of chemicals, power consumption and need for topside infrastructure.

**Technology readiness level (TRL)**

According to API RP 17N

TRL 3: New technology tested Prototype built and functionality demonstrated through testing over a limited range of operating conditions. These tests can be done on a scaled version if scalable

**Reference**

NOV subsea water injection
NOV SWIT™ technology

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Gravitude DepthWatch

2019-06-19 - OCTIO

**Category:** Reservoir management  
**Subcategory:** Data acquisition and monitoring  
**Type:** Service

Geophysical monitoring of hydrocarbon reservoirs provides increased recovery, hence a more efficient use of resources in environmentally sensitive areas. However, traditional surveying with active seismic guns is a costly operation with impact on sea life, e.g. on mammals in arctic regions. Gravitude DepthWatch provides an alternative based on measurements of seafloor deformation, with negligible environmental impact.

Seafloor deformation can be related to reservoir compaction. Monitoring it provides:
- Improved performance forecast
- Identification of sealing faults and undepleted compartments as infill-well opportunities
- An improved geomechanical model, which increases the value of other monitoring measurements
- Early warnings if subsidence challenges seafloor installation integrity

**Technology readiness level (TRL)**

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

**Reference**

Gravitude DepthWatch: seafloor subsidence monitoring

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Gravitude gWatch

2019-06-19 - OCTIO

Category: Reservoir management
Subcategory: Data acquisition and monitoring
Type: Service

Geophysical monitoring of hydrocarbon reservoirs provides increased recovery, hence a more efficient use of resources in environmentally sensitive areas. However, traditional surveying with active seismic guns is a costly operation with impact on sea life, e.g. on mammals in arctic regions. Gravitude gWatch provides an alternative monitoring technology based on seabed gravity measurements with a negligible environmental impact.

Gravimetry monitoring provides:
• Measurement of aquifer strength, providing a better estimate of remaining reserves and an optimized recovery strategy
• Monitoring of fluid contact movements, providing better forecast of water break-through
• Mapping of hydrocarbon depletion and identification of unproduced compartments, representing infill well opportunities

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

Press release multi season contract
4D Gravity at the Seafloor

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SafeLift IPO - gas lift valve

2019-06-28 - Petroleum Technology Company (PTC)

Category: Flow assurance  
Subcategory: Low pressure depletion (incl. gas lift)  
Type: Product

Unloading valve reliability issues often arise as traditional bellows systems have major limitations when it comes to pressure, open & close cycles and temperature. These effects are more pronounced in deeper, hotter wells.

PTC’s SafeLift® Injection Pressure Operated (IPO) valve is the only valve accredited to the most extreme barrier and erosion testing requirements. SafeLift IPO’s unique bellows technology and erosion and chatter resistant check valve design, provides enhanced well integrity and well uptime. Since its introduction in 2007, the product family has achieved significant market penetration with all major operating companies.

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

Petroleum Technology Company website  
SafeLift IPO

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SafeLift - orifice gas lift valve

2019-06-28 - Petroleum Technology Company (PTC)

**Category:** Flow assurance  
**Subcategory:** Low pressure depletion (incl. gas lift)  
**Type:** Product

Change out of gas lift valves (GLV) due to valve failures or non-optimum gas lift design can be costly, especially in offshore and subsea environments. Interruption of, or non-optimum gas lifted production has a negative impact on field economics. Furthermore, leaking GLV’s often lead to downgrading of the wells integrity level.

PTC’s SafeLift® gas lift valve is the only valve accredited to the most extreme barrier and erosion testing requirements. SafeLift’s unique erosion and chatter resistant check valve design, provides enhanced well integrity and well up-time. Since its introduction in 2007, the product family has achieved significant market penetration with all major operating companies.

**Technology readiness level (TRL)**

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

**Reference**

Petroleum Technology Company website  
SafeLift - orifice gas lift valve

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DuraLift - scale resistant GLV

**Category:** Flow assurance  
**Subcategory:** Low pressure depletion (incl. gas lift)  
**Type:** Product

Failure of gas lift valves as a result of scale deposition has been an issue that has plagued the industry for decades. In certain fields GLV´s have to be changed several times per year. Interruption of, or non-optimum gas lift assisted production will have a negative impact on field economics.

PTC’s DuraLift™ gas lift valve is an evolution of the field proven SafeLift® product family. DuraLift has a unique architecture and surface coating which significantly reduces the propensity for mineral scale deposition. Since its introduction in 2015, DuraLift has delivered significant well uptime improvements for major operating companies.

**Technology readiness level (TRL)**

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

**Reference**

Petroleum Technology Company website  
DuraLift™

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GoLift - retrofit gas lift system

2019-06-28 - Petroleum Technology Company (PTC)

Category: Flow assurance
Subcategory: Low pressure depletion (incl. gas lift)
Type: Product

Dwindling production and/or sub-optimal completion design may require introduction of artificial lift or different gas unloading/injection depths at some point in well’s life cycle. Although a full workover could potentially solve the issue, the relatively high costs of such an operation may render the project to be unviable.

PTC’s GoLift™ gas lift sub is installed as part of a straddle assembly within the production tubing. It incorporates PTC’s barrier qualified gas lift valves and provides a reliable means to retrofit or repair gaslift functionality without a workover. Since its introduction in 2013, GoLift has delivered significant incremental production for many operating companies.

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

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GoLift™

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Life of Field - gas lift design tool

2019-06-28 - Petroleum Technology Company (PTC)

Category: Flow assurance
Subcategory: Low pressure depletion (incl. gas lift)
Type: Service

Traditionally decisions regarding the optimum number and setting depths of valves in gas lifted wells have been made considering only a small number of operating scenarios. As a result, wells often do not perform as expected.

PTC’s proprietary gas lift simulation software tool facilitates the design and comparison of multiple gas lift simulation cases. As a result, decisions on mandrel depths and valve settings can be taken considering the entire range of lifecycle operating scenarios. Numerous operating companies rely on PTC’s gas lift design tool to configure their well completions.

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

Petroleum Technology Company website
Life of Field - gas lift design tool

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ShearLift T - shear open GLV

2019-06-28 - Petroleum Technology Company (PTC)

Category: Flow assurance  
Subcategory: Low pressure depletion (incl. gas lift)  
Type: Product

When completing new gas lift wells the standard practice is often to install dummy valves in all side pocket mandrels. These dummy valves provide a barrier between the annulus and the tubing during the well completion phase. Before the wells can start producing, the dummy valves need to be replaced with gas lift valves. These intervention operations are often time consuming and costly.

PTC’s ShearLift-T™ are the only gas lift valves that allow multiple IPOs and orifice GL valves to be simultaneously sheared open using tubing pressure. ShearLift-T’s unique design eliminates the need to run dummy valves, thus saving significant time during well completion or commissioning. To date, an average of two days rig time has been saved per well.

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

Petroleum Technology Company website  
ShearLift T

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ShearLift A - shear open GLV

2019-06-28 - Petroleum Technology Company (PTC)

Category: Flow assurance  
Subcategory: Low pressure depletion (incl. gas lift)  
Type: Product

When completing new gas lift wells the standard practice is often to install dummy valves in all side pocket mandrels. These dummy valves provide a barrier between the annulus and the tubing during the well completion phase. Before the wells can start producing, the dummy valves need to be replaced with gas lift valves. These intervention operations are often time consuming and costly.

PTC’s ShearLift-A™ annuls pressure activated gas lift operating valves, are accredited to the most extreme barrier and erosion testing requirements. ShearLift-A's unique design eliminates the need to run a dummy valve, thus saving significant time during well completion or commissioning. The product family has an excellent track record since its introduction in 2009.

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

Petroleum Technology Company website  
ShearLift A

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NexLift RO - SPM

2019-06-28 - Petroleum Technology Company (PTC)

Category: Flow assurance
Subcategory: Low pressure depletion (incl. gas lift)
Type: Product

Current manufacturing processes for conventional Side Pocket Mandrels (SPM) have inherent challenges related to welding and heat treatment. Welding and post weld heat treatment rely on extensive human intervention, requiring stringent and elaborate QA/QC processes exceeding the current standards.

PTC’s NexLift RO™ is an innovative SPM with only two circumferential welds, manufactured using proprietary robotic TIG welding eliminating many of the shortcomings in the conventional manufacturing processes. This enhances the quality and reduces the risk of completion failure along with issues related to intervention operations. International operating companies are now installing the field proven NexLift RO worldwide.

Technology readiness level (TRL)

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

Reference

Petroleum Technology Company website
NexLift RO

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Conventional Side Pocket Mandrels (SPM) have inherent challenges related to welding and heat treatment. These issues are exacerbated when welding nickel-chromium alloys, such as S13%Cr, 25%Cr and Alloy 718, common materials for high cost completions.

PTC’s NexLift SI™ is the only true single-piece, unwelded SPM in the industry. This unique design provides unrivalled structural integrity, removes the last welded completion component from the well along with issues related to installation and retrieval of valves. International operating companies are now installing the field proven NexLift SI worldwide.

**Technology readiness level (TRL)**

According to API RP 17N

TRL 7: Proven technology integrated into intended operating system. The technology has successfully operated with acceptable performance and reliability within the predefined criteria

**Reference**

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