Optimizing Production Throughout the Well’s Lifespan

Gas Lift
Leading Brands. Leading Solutions.

Apergy’s artificial lift division is a team of industry-leading companies that utilize their collective resources to help oil and gas producers optimize revenues, profitability, safety, and environmental compliance through high-quality production, completion, gathering and control systems.

Our story is founded on a simple truth:
Life Requires Energy.

We’re focused on unlocking energy with highly engineered products and technologies used to drill for and produce oil and gas efficiently and safely around the world. Our products include a full range of equipment essential to efficient functioning throughout the lifecycle of the wellsite—from drilling to completion to production.

Our products consist of artificial lift equipment and solutions, including rod pumping systems, electric submersible pump systems, progressive cavity pumps and drive systems, plunger lift, gas lift, and hydraulic lift, as well as polycrystalline diamond cutters and bearings for drilling. We provide a full automation offering consisting of equipment, software, and IIoT solutions for downhole monitoring, wellsite productivity enhancement, and asset integrity management. We have operations in eight countries and employ more than 3,100 associates globally.

Whatever your production challenge is, Apergy Artificial Lift has a solution. Our Artificial Lift experts work with you to understand your short-term challenges and long-term goals. We fine tune the right lift solution, drawing from our complete portfolio of Artificial Lift technologies, application expertise, and in-depth analytical tools. For every stage of the field’s operating life, we will help meet our customers production goals quickly, safely, and most cost effectively.

Vision Statement
Our vision is to improve the lives of our customers, employees, shareholders, and those in our communities. Working toward that vision—through our actions, our products, and our commitments—is why we get out of bed in the morning. Unlocking Energy is the economic engine that will support us as we improve lives and achieve relevance in the marketplace.

Core Values
We have no interest in being just an ordinary company. We’re committed to creating a positive culture that improves lives. Our goal is to make Apergy a customer’s collaborative partner and a rewarding place to work. We strive to maintain a unique culture that values and encourages honesty, unity, respect, hard work, friendship, and an entrepreneurial spirit.
Gas lift is an effective and economical artificial lift solution from initial kick-off through eventual well depletion.

Often a well does not have sufficient natural energy to move liquids to the surface at desired rates. Changing well conditions, such as reduced reservoir pressure, increasing water cuts, and decreasing gas liquid ratios can make consistent and predictable production a challenge. When you need a means of artificial lift that is flexible enough to optimize production throughout the lifespan of the well, you need Apergy – Gas Lift.

Capable of producing wells with a range of flow rates, Apergy – Gas Lift is an extremely flexible form of lift. There are many instances where gas lift can be both effective and economical:

- Producing wells that can’t flow naturally
- Unloading a well that will flow on its own later on
- Increasing the production rate of a flowing well
- Accommodating deviated and horizontal well bores
- Removing solids by back flowing
- Producing wells with sand and scale problems

FLEXIBLE TO MEET CHANGING NEEDS
Our superior design process accounts for both current and anticipated conditions and can accommodate changing conditions over the life of the well.

DESIGNED TO FIT YOUR NEEDS
We know that every well is different and the success of a gas lift system largely depends upon the initial design. We work with you to understand your needs, design the best system for your well, and then deliver that system using a full range of equipment.

PRODUCT BREADTH AND EXPERTISE
We offer a full range of equipment to accommodate vertical and horizontal well bores, as well as your specific well conditions. And we employ trained experts with extensive local knowledge to provide the highest levels of service.
How Gas Lift Works

Gas lift uses a high-pressure source to inject gas down the annulus and into the tubing string. The gas is injected through gas lift valves, which are housed in gas lift mandrels. The mandrels are installed at specific intervals in the tubing as determined by the design of the system, downward to the lowest point possible.

The gas lift valves open and close based on preset pressure settings. When open, they allow gas to be injected into the production string. They also allow liquids to escape the casing when using gas lift to initially unload a well.

As the gas flows to the surface, it expands, reducing the density and column weight of the fluid. By reducing the flowing tubing pressure, differential pressure between the reservoir and the well bore is created, allowing the well to flow.

**FIGURE 1**
- Gas injection into the casing has begun
- Fluid is u-tubed through all open valves
- No formation fluids being produced; all fluids are from the tubing and casing

**FIGURE 4**
- Casing pressure drops and valve #5 closes
- All gas is being injected through valve #4
- Lower valves remain open
- A reduction in casing pressure causes upper valve to close

**FIGURE 5**
- All gas is being injected through valve #3
- Lower valves remain open
- A reduction in casing pressure causes upper valves to close in sequence
**FIGURE 2**
- The fluid has been unloaded to top (#5) valve
- The fluid is aerated above this point in the tubing and fluid density decreases
- Pressure is reduced at top and all lower valves
- Unloading continues through lower valves

**FIGURE 3**
- Fluid level is now below valve #4
- Injection transfers to valve #4 and pressure is lowered
- Unloading continues through lower valves

**FIGURE 6**
- Valve #2 open; this is the Point of Injection (ability of reservoir to produce fluids matches the ability of the tubing to remove fluids)
- Casing pressure is dictated by operating valve set pressure
- Upper valves are closed
- Valve #1 remains submerged unless operating conditions change (i.e., formation drawdown)
Design plus expertise equals success.

The success of gas lift is largely dependent upon the initial design of the system. Installation of Apergy – Gas Lift begins with a carefully engineered design using OPTIpod™, our gas lift design software. Using a number of well characteristics, OPTIpod helps determine the optimal amount of gas needed to deliver fluids to the surface and the best locations in the production string, based on pressure, for the gas to be injected. These determinations are critical, as identifying the proper points of injection is the key to optimal production.

While our software is a central component of system design, the experience and expertise of our personnel is the real key to the success of Apergy – Gas Lift systems. With more than 30 years of experience designing, installing and troubleshooting gas lift, our production experts have the experience and know-how to design systems for a variety of well conditions and deliver the best possible production outcomes.
Flexible to suit your well conditions.

When designing the system, we also determine the type of gas injection that will be most effective based on the well conditions and characteristics. There are four main types of gas injection:

1. Continuous Flow
2. Intermittent Flow
3. Casing (Annular) Flow
4. Gas Lift with Plunger Lift

**Continuous Flow**
Continuous flow gas lift is most commonly recommended and is ideal for wells that produce at higher rates and with higher reservoir pressures. In the continuous flow gas lift well, the compressed gas is continuously injected to increase reservoir drawdown and subsequently maximize production.

**Intermittent**
For wells that produce at relatively low rates or have low reservoir pressure, intermittent lift is often a better solution. As the name implies, intermittent gas lift injects the gas in cycles. Between injections of gas, the reservoir produces a liquid slug. To remove the slug, the gas is introduced below it and in a single burst of high pressure. The gas expands quickly, forcing the slug to the surface. The injection stops, and the slug clears the surface. The reservoir pressure builds again, producing another slug, and the cycle is repeated.

**Casing (Annular) Flow**
A casing flow installation is one in which gas is injected down the tubing string, and well fluids are produced out the casing. Particularly efficient in high-volume, continuous flow wells, this application is recommended when very large amounts of fluids—at volumes exceeding the tubing capacity—must be removed.

**Gas Lift with Plunger Lift**
With increasing regularity, gas lift is being used in conjunction with plunger lift for more economical and efficient lift operations. Because plunger lift utilizes only the well’s natural energy for operation, it is a highly economical form of lift. However, it requires sufficient gas volume and pressure to lift the plunger and liquid slug to the surface. By introducing gas lift, operators are able to apply cost-effective plunger lift in a wider range of wells.

Continuous flow gas lift can be aided by flow-thru (continuous flow) plungers to increase overall lift efficiency and economize compressor utilization and associated costs. By introducing a plunger and sweeping more fluid from the tubing, a lower flowing bottom hole pressure can be achieved, leading to an increased production rate and lowered injection gas requirement. Consequently, compressor costs are lowered or, in some cases, eliminated. This combination is particularly effective in directional and deviated wells that produce higher liquid volumes, as well as on pad well sites. And, as with all plunger lifted wells, the plunger’s travel helps prevent hydrate, scale, and paraffin buildup.

Similarly, older continuous flow gas lift wells can often be more efficiently and economically produced by incorporating plunger lift with gas lift. By switching to intermittent gas lift aided by traditional plungers, the well is able to more efficiently deliver the liquid slug to the surface with minimal fallback. By both improving liquid removal rates and reducing the amount of injection gas required, more economical lift can be achieved.
Extending the range of gas lift to perforated intervals.

As more and more wells are being drilled horizontally and completed with long, perforated intervals, Apergy is leading the way in gas lift advancements to address the unique production challenges these wells present. Most commonly, liquid loading and pressure build-ups occur because of inadequate velocities in the casing.

To ensure optimum reservoir drawdown in wells with long perforated intervals, we offer several alternatives to more costly re-fracturing or well abandonment. Apergy’s latest advancements to its Gas Lift systems create adequate velocity below the packer to recover fluids, maintaining the lowest possible flowing bottom hole pressure (FBHP) and most efficient operation.

The result: optimum production rates are achieved without applying additional back pressure on the formation.

Apergy – Gas Lift has refined six innovative methods that allow gas lift to be introduced to a deeper point in the well:

- Annular Bypass Assembly (ABA)
- Dip Tube
- Enhanced Annular Velocity (EAV)
- Marathon® Annular Velocity Enhancement (AVE)
- Dead String
- Open-Ended Packerless System
Innovative methods for horizontal and deep vertical wells.

**Annular Bypass Assembly (ABA)**
The ABA is a hybrid of the conventional gas lift system with a packer, and the open-ended, packerless system. It utilizes tubing and gas lift valves above the packer and a bypass assembly to allow injected gas to pass through the packer.

**Dip Tube**
This method of deep lift utilizes a crossover flow adapter and a unique mini wellbore below the packer. This assembly will facilitate the deepest point of gas injection without applying additional back pressure on the formation.

**Enhanced Annular Velocity (EAV)**
The EAV method of gas lift utilizes tubing and gas lift valves above a packer and a selectively sized injection string with internally mounted gas lift valves below.

**Marathon Annular Velocity Enhancement (AVE)**
Once thought impossible, a wireline retrievable AVE (similar to the EAV) system has been patented by Marathon and is exclusively sold and manufactured by Apergy.

**Dead String**
A Dead String installation can be used to prevent liquid loading in wells with long perforated intervals or horizontal laterals to ensure stable production and the lowest possible flowing bottom hole pressure.

**Open-Ended Packerless System**
The Open-Ended Packerless System is applicable when the use of a packer is prohibitive or the deviation of the wellbore limits how deep a packer can be set. This system allows the operator to obtain the ultimate point of lift without installing a packer.
Why choose gas lift?

Gas lift installations can generally handle the flowing conditions throughout the life of the well. Changing reservoir pressures, water cuts, and formation gas rates can be taken into account with the initial design. And because gas lift equipment is durable and has few moving parts, it offers a longer life compared to other forms of lift.

- Low initial installation cost
- Low maintenance cost
- Can control production rates at the surface
- Produced sand has little effect on gas lift
- Well suited for deviations and horizontal well bores

Eight Facts about Gas Lift:

1. Gas lift can produce almost any oil or gas well that requires artificial lift.
2. Gas lift is limited only by the availability of gas.
3. Gas lift can unload and kick-off wells that flow on their own.
4. Gas lift can increase the rate of flowing wells.
5. Gas lift can increase the velocity in a gas well to ensure produced fluids are recovered at the surface.
6. Large tubing or annular flow gas lift can be utilized to produce extremely high rates.
7. Intermittent gas lift can produce wells with low production rates or low reservoir pressure.
8. Side pocket gas lift mandrels can be installed with dummy valves in the initial completion when the well may flow on its own. Later, when the well has loading problems, gas lift valves can be installed with wireline to enable the gas lift system.
Partner with the best team in the business.

Apergy offers a comprehensive line of artificial lift equipment, accessories, and services strategically designed to drive the operational excellence of each of our customers.

- Decades of experience recommending and servicing lift systems to accommodate changing well conditions
- Unrivaled expertise in plunger lift, gas lift, hydraulic lift, well control, and well unloading
- The best performing, highest quality, and safest products designed, engineered, and manufactured in-house
- Experienced and responsive field support staff with extensive local knowledge
- The highest commitment to the protection and safety of our employees, our customers, and the environment
- Comprehensive customer training and product support

Apergy – Gas Lift products and services are available in the following North American locations:

**Administrative & Manufacturing**

- Frederick, CO ........................................... 720.407.3550

**Alabama**

- Citronelle .................................................. 251.866.7099

**California**

- Bakersfield ................................................. 661.316.9255

**Canada**

- Calgary, AB .............................................. 403.464.5782
- Edson, AB ..................................................... 780.723.2759
- Grande Prairie, AB ................................. 780.532.0804
- Red Deer, AB .............................................. 403.464.5782

**Colorado**

- Evans ......................................................... 970.539.9003
- Denver ....................................................... 903.216.3750

**New Mexico**

- Hobbs ......................................................... 575.397.0040

**North Dakota**

- Mohall ......................................................... 701.756.6934
- Watford City ............................................. 701.842.2231

**Oklahoma**

- Oklahoma City ........................................ 405.603.7492

**Texas**

- Karnes City .............................................. 830.299.8508
- Pleasanton .............................................. 830.299.9745
- Odessa ......................................................... 432.582.2335
- Tomball ..................................................... 713.922.3597
- Tyler .......................................................... 903.533.8266

**Utah**

- Roosevelt .................................................. 435.722.4520