

# Pumping Efficiencies Into Oil & Gas

EFFICIENT, VERSATILE, RELIABLE CENTRIFUGAL-PUMP TECHNOLOGY CAN PLAY A CRUCIAL ROLE IN MANY APPLICATIONS WITHIN THE UNITED STATES' NEW "GOLDEN ERA" OF OIL-AND-GAS

*By Doug Cumpston*



A new Griswold 811 Series installed in a Lease Asset Custody Transfer (LACT) unit located in the Eagle Ford play in Texas. A LACT unit automatically measures, samples and transfers the oil from a lease location in the oilfield into a pipeline.

## Introduction

Significant advancements in the technology that is used to identify oil deposits below the Earth's surface, most notably in the vast shale-bed fields that can be found in North Dakota, Pennsylvania, Montana and Texas in the United States, combined with innovative new drilling and enhanced recovery procedures, such as hydraulic fracturing, or "fracking," have led many to comment that the U.S. is on the verge of a "new golden era in oil-and-gas exploration and production."

In fact, the *New York Post* made just that argument in a July 2011 article, noting that the United States is already the world's No. 3 oil producer, at 7.5 million barrels per day (bpd), with the ability to add another 1.5 million bpd by 2015, which would leave the likes of traditional oil producers Iran, Kuwait and the United Arab Emirates "in the rearview mirror" in terms of daily production.

This increased U.S. production will be driven by the shale-oil formations that could eventually yield more than 4 billion barrels of oil before they are played out. The fracking process and other advances in sophisticated systems known as Enhanced Oil Recovery (EOR)—such as chemical injection, gas injection or thermal recovery—have also made it economically viable for producers to return to sealed-off wells that had either been deemed played out or too expensive to continuing operating. Many of these wells may actually still hold upwards of 75% of their recoverable oil, which EOR techniques make much more efficient to locate and produce.

The same rosy picture can be painted for natural gas, with the International Energy Agency (IEA) predicting in June 2011 that the world was entering a "golden era for natural gas." Under the IEA's scenario, global natural gas demand from now until 2035 will grow 2% a year, compared to growth of 1.2% in total energy demand during the

same time period. At that rate, demand levels for natural gas would surpass those of coal by 2030 and approach the demand level of oil by 2035. Additionally, 40% of the increase in global natural gas production up to the year 2035 would come from unconventional production processes, such as the fracking of shale beds, or exploiting deposits of coalbed methane gas. Much of that increased production will come in the form of natural gas that is found in North American shale beds.

Hand in hand with this recent 21st-century oil-and-gas boom in the U.S. is the increased need for oil producers to get their drilling and recovery operations online quickly. These multi-million-dollar systems require a wide range of unique pieces of equipment in order to run efficiently, safely and cost-effectively, not only in regards to the actual recovery of oil and gas, but also in the ancillary operations that need to be completed during the production and transportation process. This white paper will take a look at how centrifugal pump technology can be used to maximize operations in two crucial areas of oil-and-gas production.

## The Challenge

Oil and gas drilling and production would be simple if that's all that flowed to the surface when a well was tapped. That, however, is most definitely not the case as a number of by-products come racing up the well bore in tandem with the desired oil and gas. One of the more voluminous by-products produced is saltwater, which has been trapped for centuries with the oil and gas in the formation.

When the saltwater reaches the surface, it must be separated from the oil and gas before the production company deals with it in one of two ways: either has it shipped away via truck or, in some cases, pumped via pipeline for disposal or re-injection into the formation.

These crucial saltwater-handling and transfer processes can only be completed successfully if the production company uses pumping equipment that features materials of construction and a sealing medium that is compatible with and resistant to the abrasive and corrosive substances that can be contained in produced saltwater. In most cases, this means an iron or ductile-iron pump configuration, unless hydrogen sulfide (H<sub>2</sub>S) is present, at which point a stainless-steel pump with stainless-steel shaft and impeller, as well as a silicon-carbide seal face, should be used with sealing methods dependent on the crude composition.

A second crucial pump-related application in the oil-and-gas production and supply chain is what is known as Lease Asset Custody Transfer (LACT). A LACT unit automatically measures, samples and transfers oil from a lease location in the oilfield into a pipeline. It is a critical component in the ownership transfer of oil from the production site to trucks,

pipelines and storage tanks of the terminal or end-user. Think of it as a "cash register" between a company that is selling oil and a company that is buying the oil. Key to helping these LACT units operate efficiently and reliably is the pump that transfers the oil from the owner's transport unit or storage vessel to the buyer's.



The International Energy Agency has predicted that the world is entering a "golden age" in natural gas production and demand.

LACT units can be stationary or mounted on skids for use in portable applications. This portability pays dividends when an oilfield's oil-gathering system is not close to its production operations. In that case, a transport tanker can go in and receive a load of oil, say 10,000 gallons. At that point a ticket is printed with the amount that is contained in the tanker. The transport will then drive to the buyer's storage terminal where it will be offloaded through a skid-mounted LACT unit, which will track the amount of oil that is delivered. When the offloading is completed, the totals on the two tickets will be compared to confirm that 10,000 gallons of oil has been delivered.

Not only are these applications crucial to keeping the oil-and-gas production and supply process moving efficiently, they also occur in trying conditions. Simply put, oil-and-gas production is not for the timid. Most of the operations take place in isolated areas of the country that are at the mercy of the elements, from wind to rain to snow with extreme hot and cold temperatures thrown in for good measure. The oilfield landscape also does not allow for neat installations like those that would be found in a nice, clean indoor application. Therefore, the mounting of any pumping equipment is oftentimes not precise, which can lead to increased stress and opportunities for equipment breakdowns, which can put an undesired halt to the production process.

## The Solution

So, faced with the unique challenges in saltwater-handling and LACT-related operations that are common in oil-and-gas production, as well as the need for robust equipment that can conquer extreme operating conditions, more and more oil-and-gas production companies are turning to centrifugal-style pumps in order to optimize their operations. More specifically, an increasing number of producers are choosing 811 Series ANSI Centrifugal Pumps from Griswold™ Pump Company, Grand Terrace, CA, USA, for these applications. Griswold 811 centrifugal pumps are versatile enough to pump produced saltwater into trucks or pipelines, while they can also be used to facilitate a complete transfer of oil from a tanker to the client's storage tank, as well as transload from a tanker truck to a railcar. In many low-temperature and low-pressure applications found at a refinery, the 811s can be used for tank transfer, and truck loading and unloading for both incoming crude or outgoing refined products.

Griswold's 811 Series pumps, which were among the first to meet centrifugal-pump manufacturing criteria established by the American National Standards Institute (ANSI) in 1977, meet the pumping needs of varied oil-and-gas applications because they have been engineered for operational flexibility, efficiency and durability. They have two times the wear area between the case and impeller when compared to closed impeller designs, which optimizes the performance of the pump's open impeller. The open-impeller design also minimizes concentrated wear by balancing the hydraulic axial thrust load and reducing the stuffing-box pressure, which maximizes pump performance while simplifying maintenance, extending pump life and reducing repair costs.

The pump's casing can be constructed of a wide choice of materials, including ductile iron, CDM4Cu, alloy 20 and stainless steel, which can be used in applications, for example, where the produced saltwater has a high level of hydrogen sulfide (H<sub>2</sub>S), a colorless, poisonous, flammable gas with the characteristic odor of rotten eggs. Griswold constructs its 811 Series pumps through an investment and no-bake casting process that ensures smooth, precise, superior finishes and consistent, reliable performance. Griswold also employs metallurgists that strictly supervise all heat-treating operations so that maximum durability for all alloys is achieved.

The 811 Series pumps are available in a full range of sizes, as well as options and upgrades that can be tailored to meet virtually any liquid-handling flow rate, up to and including 4,000 gpm (15,142 lpm). Griswold offers a wide variety of mechanical-seal options, all of which give the 811 pumps the ability to operate in temperatures up to 500°F (260°C). Other standard-setting features of the 811 Series

pumps are self-tightening impellers that reduce leaks and failures; the ability to externally adjust the clearance so that peak efficiency is maintained, even after wear-area loss; and standard enhanced power frames that make them an estimated 33% stronger than competitive models.

The simple operation of the 811 Series pumps also means that they will consistently operate at their full capabilities, provided that nothing more than a routine regime of preventive and protective maintenance is followed. This maintenance routine should include the monitoring of bearing and lubricant condition; shaft seal condition; pump vibration; and changes in discharge pressures, all of which can be completed on a simple quarterly or annual maintenance schedule. These maintenance checks should be



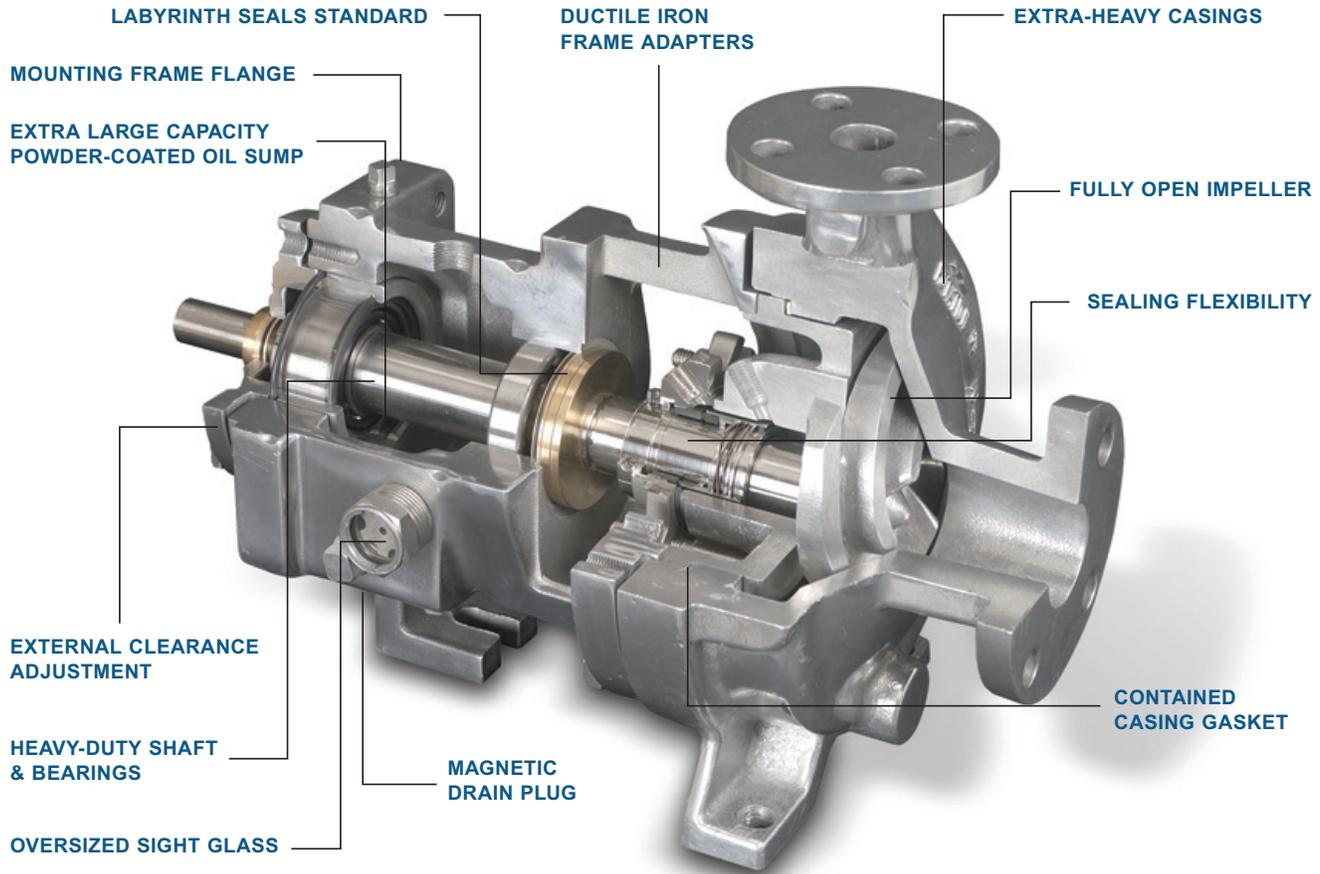
Griswold™ 811 Series ANSI Centrifugal Pumps

performed more often if the pump is used in severe-service conditions, such as those commonly found in oil-and-gas production.

All of these operational traits have helped Griswold's 811 ANSI Series Centrifugal Pumps become one of the more well-respected pumps in the oil-and-gas market, with a recent study showing that less than 1% of Griswold 811s in the field have experienced any breakdown issues. Dimensionally, the Griswold pumps are identical to all ASME B73.1-rated competitive models, meaning they can be dropped in place during replacement without the need to disturb the pumping-system setup.

Finally, the boom in oil-and-gas production in the United States means that many production companies are completing a new well every other day. This ambitious schedule demands that the necessary equipment be available at a moment's notice. Recognizing this, Griswold has made a commitment to the industry and has ramped up production at its manufacturing plant in order to keep up with the

## Griswold™ 811 Series ANSI Centrifugal Pump Design Features



increased demand from the field. This includes having a ready supply of replacement parts on hand in the rare occurrence that an 811 Series pump needs to be repaired.

### Conclusion

There's no question that the opportunities for production companies in this new "golden era of oil and natural gas exploration and production" are limitless. The ability to access oil and gas reserves that were once thought to be out of reach will help the United States set the direction of the global oil-and-gas market in the future. But only if the producers can efficiently, reliably, safely and cost-effectively get these precious commodities out of the ground and to the end-user.

To meet this lofty standard, oil-and-gas producers must first identify the technologies that can best satisfy their needs and then use them as part of a cohesive system that is beneficial not only to them but to all of the players along the production and supply chain. With that in mind,

centrifugal-pump technology has stepped to the fore in a number of areas that are crucial to the success of any oil-and-gas production operation. These pumps, which adhere to strict ANSI standards for operation that were put into place 35 years ago, can aid any production operation in meeting not only its actual production quotas, but also its regulatory, environmental safety and self-imposed cost and efficiency requirements.

### About the Author

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