Pumps For Fracking Sand

Hydraulic fracturing has increased in many parts of the world as other energy sources, such as coal bed methane production, stagnate or decrease. Shale gas fracking provides a valuable source of energy for countries that effectively make use of it. However, due to a variety of geographical, political, and technological factors, certain countries and regions find fracking more accessible and available than others.

By Robert McIlvaine, President & Founder, The McIlvaine Company and Hailey Ardell, Assistant Editor

The United States remains a leader in fracking. According to the 2018 BP Energy Outlook, despite the U.S.'s continued ability to produce substantial amounts of shale gas, it will be unable to contribute as significantly to exports as it has done in the past. U.S. oil and gas production is projected to increase to approximately 18% of global production by 2040; this is a significant increase from the 12 % experienced in 2016. U.S. oil and gas exports, however, are only projected to make up roughly 9 % of the global market in the same time frame.

The pressure pumping of proppant, for shale fracturing, is one of the largest markets for pump suppliers. As the sand, which is required for fracturing, needs to be excavated and cleaned, it also entails a sizable pump investment. The excavation and cleaning of sand is therefore a smaller yet fast growing market segment.

The techniques developed in the U.S. to fracture shale, for the purpose of extracting oil and gas, are the foundation of the success of the U.S. economy in the last decade. Developers have continually attempted to reduce the associated costs with new techniques, such as horizontal drilling. The primary challenge for designers of these sand plants is that both the parameters of the incoming sand and the proppant end use change continually. Water use has to be integrated with the changing production needs.

Bob Carter, president of IAC and a supplier of sand plants, indicates that pump flow control and energy minimization are both important parameters in the optimization of the process, especially as sources and end uses change. The need for pumps starts with sand excavation. A pump can be attached to an excavator and the sand can then be pumped to the processing plant.

Additional pumps are needed in the sand manufacturing process. Wet processing typically begins with either a

horizontal or inclined primary vibratory screen in either a two- or three-deck design. While making the coarse-end separation that is required, the vibratory screen also provides the introduction point for the addition of water into the process. Water addition begins in the sluicing feedbox and continues with spray bars as the material crosses the screens. The introduction of water in this manner completely hydrates the sand. After exiting the screening process, hydrated sand in slurry form enters a sump and pump arrangement. The pumps used in this process are typically rubber lined due to the abrasive nature of silica sand.

Image curtesy of Eddy Pumps Corp.

The sump and pump arrangement typically sends the slurry to a large-diameter hydrocyclone, the primary function of which is to provide feed material to a hydraulic classifier at an ideal density and in a manner that provides even distribution of the slurry into a stilling feed well.

There a number of other smaller pump requirements. A dosing pump is a prime example of an additionally required pump. It is needed to transport the flocculants used to separate the clays from the desirable sand fraction. More pumps are also needed to meet the demands associated with water reuse.

Ultimately, the market is expected to grow at robust rates in the U.S.. Presently, Argentina and China are smaller markets but promise to be substantial in the future.

Image Courtesy of Mclanahan.

Fracking Costs

Manufactured Frac Sand Plant image Courtesy of IAC.

The transport of sand with the correct fracking features from Wisconsin and Minnesota to West Texas, is very costly. In response to this expenditure, one of the most recent cost reductions efforts is to manufacture high quality sand from the lower quality resources available in the region.

The West Texas Permian Basin is relatively arid and its freshwater supplies are limited. The new fracking sand mining plants in the basin, add to the large water demand already caused by the fracking process. One possible solution for the fracking sites is the use of treated municipal wastewater. Another potential solution is the treatment and use of brackish water. Although these are both potentially viable options, fresh water will remain the main source for the foreseeable future.

Overall, conservations addressing these issues have become a high priority. Fracking sand plant suppliers have risen to this challenge by designing systems which reuse as much as 98 % of the process water needed.

About the Author

Robert McIlvaine is the President and Founder of The McIlvaine Company, which publishes reports across worldwide pump and valve markets. He was a pollution control company executive prior to 1974, when he founded The McIlvaine Company. He oversees a staff of 30 people in the USA and China.