



PROCESS INSTRUMENTATION

The Past, Present and Future of Fracking

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There is no doubt that the practice of hydraulic fracturing, also known as fracking, has completely changed the oil and gas landscape in recent history. There is also no doubt that this is a highly technical process.

To shed some light on the practices and technology behind the rise of fracking, we spoke with Siemens Industry Process Instrumentation. We covered horizontal drilling, process instrumentation, and the future of fracking.

[What is the history of hydraulic fracturing? How did it become such a popular practice?](#)

Hydraulic fracturing began in the 1940s and is a process that allows natural gas, (oil in some cases), to be extracted from deep reserves belowground; 5,000 to 8,000 feet below the surface. This process has become more popular over the last 10 years due to higher gas prices driving the capital investment for fracking to access energy sources that were previously unavailable. If it weren't for the initial higher gas prices, the capital investment needed would not have occurred. Today, companies are investing in technology to

improve efficiency and lower product costs for their new and existing wells due to the low price of natural gas.

[Why do we hear so much about fracking in the news? What are the controversies around it?](#)

Much of what we hear about fracking in the news is around the abundance of recoverable natural gas estimated to still be in the ground (trillions of cubic feet). U.S. gas reserves historically have been recognized in Texas and the Gulf of Mexico. The number of states across the U.S. with recognized reserves has increased with the onset of shale production. The onset of shale production led the U.S. to a boom, increasing the development of gas wells/production and communities.

Some of the effects of drilling and fracking have received a lot of press, causing controversies as to whether fracking has a negative impact on the environment. Many communities are rightfully concerned and want to make sure there aren't any health or environmental effects. However, there are many positive aspects to fracking, and regulations have been developed to reduce or mitigate the effects of fracking.

How has the increase of fracking in the U.S. changed the oil and gas industry?

Hydraulic fracking has fueled a boom in the U.S. oil and gas industry by increasing fracking wells from 23,000 prior to the year 2000 to over 300,000 currently, allowing the U.S. to increase production more quickly than it ever has. With the increase in frack wells along with innovative technology, shale wells can be drilled and produce gas quickly, thus driving the price of natural gas downward. Companies are now going through a digital transformation to increase production efficiency levels. These new methods of connectivity will provide analytical data across their value chain, providing real-time and remote operation to optimize decision-making, eliminate downtime, allow preventive maintenance, and achieve production excellence.

What is horizontal drilling, and how is it combined with hydraulic fracturing? How has this combination changed the fracking industry?

Horizontal drilling, otherwise referred to as directional drilling, in hydraulic fracturing is the process of accurately steering the well in directions to reach targets that cannot be drilled with a vertical well.

Some targets that may not be able to be reached are areas that require permits in a populated area, parks, or obstructions like roads or airports. A horizontal well can be drilled to reach these areas. Horizontal drilling can also improve the well productivity and increase the length of the “pay zone” by allowing access to pockets of oil and gas that otherwise would be difficult to reach.

What is fracturing sand and why is it so vital? What are the important considerations for operations to make the most of fracturing sand?

Fracturing sand, or proppant, is a crush-resistant material that can resist compressive forces making it ideal for fracking. Fracturing sand is used to create fractures in the oil and gas reservoir rock. The sand carried in the fracturing fluid remains in the fractures, keeping them open and allowing the oil or natural gas to flow freely. A very important consideration for operations to make the most of fracturing sand is understanding the depth and pressure of the reservoir, which will determine the size of the proppant required. The smaller the particle, the stronger it tends to be, but there is a trade-off as smaller particle size will also affect the conductivity.

What issues do silica sand present to operations? What instrumental solutions exist to help them overcome these?

Silicosis is the largest safety and health issue for fracking operations. Too much inhaling of silica dust over a long period of time from sand or ceramic proppant can lead to silicosis. The oil and gas industry has implemented a lot of

safety rules which are regulated by the Mine Safety and Health Administration (MSHA) and personal protective equipment (PPE) to protect its workers.

The practice of using dust collectors and dust covers over the conveying system has cut down silica dust at frac sites, but many have installed level measurement instruments atop the frac sand silos, not only for inventory management, but to keep the silo from overflowing, and this has cut down the silica dust exposure dramatically.

Examples of this level measurement equipment can be found in the Siemens LR560 radar for continuous level measurement and the Siemens LPS200 rotary paddle switch for point level measurement.

How are belt scales used by fracking operations?

In order to properly blend the frac fluid, a precise weight of proppant is required to ensure a successful frac stage downhole. Too much proppant and the fracture is plugged. Not enough proppant and the fracture will close. A belt scale can regulate this by controlling the load on the belt and conveying the proper mass of proppant. This is done by controlling the amount of proppant being loaded on the belt which can be automated by using a belt scale system.

How do you see fracking and its process instrumentation developing in the near future?

Moving from manual or semi-automated systems in blending frac fluids will lead to more fracking success downhole. Many believe that by automating the system, the industry can improve production of a well at the minimum of 25 percent without having to increase assets or resources. This will not only cut the overall cost of drilling, but will also make it safer for the operators in the field. Instead of having operators in the field monitoring the fracking process, it can all be done in the control room of the mobile data trailer. The right process instruments are key components to any automated system.

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For more information please contact Martin Dingman at martin.dingman@siemens.com

Legal Manufacturer
Siemens Industry, Inc.
100 Technology Drive
Alpharetta, GA 30005
United States of America
Telephone: +1 (800) 365-8766
usa.siemens.com/pi
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