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How Algorithms Are Taking Over Big Oil

A visitor to one of BP's natural gas fields in Wyoming a few years ago might have noticed an odd sight: smartphones in plastic bags tied to pumps with zip ties. This was an early test of a multistate initiative by the oil giant to link a network of Wi-Fi sensors to an artificial intelligence system—one that now operates the Wamsutter field in Wyoming with far less human oversight than before.

Artificial intelligence has come to the oil patch, accelerating a technical change that is transforming the conditions for the oil and gas industry's 150,000 U.S. workers. Giant energy companies like Shell and BP are investing billions to bring artificial intelligence to new refineries, oilfields and deepwater drilling platforms. Already, these investments are paying for themselves by helping drill tricky oil wells faster, predict equipment failures and slash fugitive methane emissions.

It might not be great for job security, but the next generation of jobs should get safer and more productive. BP says its algorithm-assisted oilfields are now getting 10% more work from 43% fewer workers. At the same time, the smart systems should reduce life-threatening situations in these often dangerous production spots and cut down on the spills that can foul water bodies for years, a better outcome for the consumers who rely on fossil fuels for their everyday needs.

Take the case of BP's aging Wyoming field. Partnered with San Francisco-based start-up Kelvin, BP deployed thousands of sensors across hundreds of wells to create streams of real time data. They hooked up Kelvin's AI system, which listened and watched the data from the sensors, then built a digital twin of the field—a simulation that could predict how opening a valve on one side of the field can change pressure readings on the other side.

BP decided to see what would happen if the AI system was given free rein to essentially tweak the knobs and levers at Wamsutter. BP estimates the methane vented from the field is down 74% thanks to better monitoring and maintenance. Gas production rose 20% using the AI-powered system, and costs fell 22%. Jobs have started to change as a result. "Now field techs are getting trained in Linux and Python," says Brian Pugh, head of BP's Lower 48 operations.

On oil rigs like Shell's 120,000-ton Olympus platform in the Gulf of Mexico, roughnecks used to get hurt while handling 300-pound, 30-foot lengths of thick steel drillpipe. Automation has taken out a lot of the risk. Instead of wrangling the pipes with a rope, workers use an automated pipe handler built by Weatherford International. "We reduce risk," says Ashlee Janeke, a Shell drilling engineer. "We want them to have their hands off the equipment."

Automation is one thing, but thanks to the sensor revolution, it's getting to where the drillbits will be steering themselves. Shell still has seasoned drilling engineers on Olympus overseeing these $100 million wells and steering their thousand-toothed, diamond-tipped drillbits through 15,000 feet of rock. But now Weatherford International sells an AI-enabled drilling system, which steers itself, no humans needed. The results are striking. Add in all

the tech advances since 2015, and Shell says it can now drill oil wells in 60% of the time for 40% of the cost. Working 14 straight days of 12-hour shifts on a platform in the middle of the ocean is not a job for everyone, especially in regions like the frigid, storm-wracked North Sea. “We can prevent a lot of people from having to come offshore,” says Wael Sawan, Shell’s deepwater chief.

Outside St. Louis, technicians at an Emerson Electric factory install industrial control modules into steel boxes the size of semi-trailers. Once transported to a customer site, these boxes become “the brains of the plant,” says Emerson CEO Dave Farr. At industrial facilities like BP’s Whiting refinery near Chicago or Sasol’s $13 billion liquefied natural gas export facility in Louisiana, Emerson’s brains run powerful software like Emerson’s Plantweb, which sucks in data from tens of thousands of sensors and feeds it to an analytics platform. Nothing is too mundane for the algorithms to “listen” to. One customer using the artificial intelligence-powered system saved 7% on its steam needs by installing wireless acoustic sensors next to steam traps or pressure relief valves so the system could predict which ones were getting clogged and schedule a clean-out.

Some companies are ready to take the next step—handing an entire facility over to a digital minder. Mitsubishi Hitachi Power Systems, headquartered in Florida, will soon market a fully autonomous, gas-fired power plant—everything run by AI. “If *they* watch long enough they can learn what’s anomalous without even knowing how it’s designed,” says Mitsubishi Hitachi CEO Paul Browning, of the AI algorithms. “They teach themselves.” One customer saved $1 million a year simply by using AI to tune a power plant’s combustion system. Mitsubishi Hitachi is already been operating its proof-of-concept fully autonomous plant for a year, in Japan. It needs needs no human intervention except for maintenance; the plant takes its orders to ramp power generation up or down from the automated grid system, schedules its own maintenance, and predicts its performance and capital requirements three years into the future. When humans need to interface with the plant, they talk to it.

Artificial intelligence is in its infancy. We’ll soon find that the same kind of AI that can operate an autonomous power plant will work as a digital assistant for a family—learning routines, watching for anomalies while monitoring phones, cars, financial accounts, work and school schedules, appliances, thermostats and security cameras. This blanket of awareness would learn and evolve, eventually becoming part of the family, foresees Amir Husain, CEO of Austin-based SparkCognition (which works with Mitsubishi Hitachi) and author of *The Sentient Machine*. “We will discover that the biological machine called the brain that runs the software called the mind doesn’t necessarily need to be this complex to support the kind of mind that we would want.”

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