

Digital technology manufactures a new future at BHGE plants

By partnering with Capgemini, Baker Hughes, a GE company implements an Industrial Internet of Things (IIoT) solution that transforms shop floor processes and the Manufacturing Execution System

The future of smart manufacturing

Oil and gas play a monumental role in the basic functions of daily life for people across the world. As a result, a technology leader such as BHGE that provides products and services to the oil & gas industry has a substantial global impact and its efforts to innovate can be felt by millions every day. This responsibility has driven the organization to not only improve its operations but also to enhance its services in order to help customers acquire, transport, and refine hydrocarbons more effectively and with a smaller environmental footprint. By providing support on Upstream, Midstream, and Downstream activities, BHGE has become the world's first and only fullstream service provider. Through the use of digital technology, BHGE breaks down silos and reduces both costs and risks in over 120 countries.

As part of a continuing effort to improve its efficiency and productivity within a highly competitive industry, BGHE Turbomachinery & Process Solutions (TPS) business wanted to improve the productivity of and visibility into its manufacturing process. Moreover, it desired the ability to make decisions and manage production in real time based on data drawn from all relevant devices and machines. With this additional level of insight, the organization would be able to make improvements to its existing processes while reducing downtime. Doing so would require modern digital technology and a partner with a thorough enough understanding of digital manufacturing and the Manufacturing Execution System (MES) to create and implement a powerful solution.

Overview

Client: Baker Hughes, a GE company (BHGE)

Region: Italy

Sector: Oil and gas

Client Challenge:

BHGE wanted greater visibility into its manufacturing processes as well as the ability to manage production in real time

Solution:

By partnering with Capgemini, BHGE implemented an industrial internet solution that gathers data from all manufacturing devices and machines to provide operators and engineers with a new level of insight and the ability to adjust production at a moment's notice

Benefits:

- Enhanced visibility and insight
- Real-time management of manufacturing processes provides nearly 50 users with real-time status updates, analysis of historical data, and visual metrics dashboards
- Prevention of 26,000 hours of downtime in 2017 (across all BHGE's plants in Italy)
- 12% increase in machine utilization five months after the deployment of the solution



Combining IT and OT to form a shop floor solution

In order to access the necessary expertise to execute its vision, BHGE selected Capgemini as its industrial partner for the duration of the project. This decision was a result of Capgemini's extensive understanding of shop floor technology and its history with digital manufacturing solutions. Indeed, Capgemini's new global business line DEMS (Digital Engineering and Manufacturing Services) combine all its deep expertise in IOT, and connected products, smart engineering and digital manufacturing. Together, the partners formed a strong team for transforming BHGE's shop floor by committing to a collaborative, "One Team" approach.

Working in unison to formulate a delivery plan for the project, BHGE and Capgemini performed an in-depth analysis of the existing manufacturing processes. Based on the results of this study, the partners determined that the ideal solution would be an Industrial Internet solution. This technology offered an effective method of connecting the various devices and machines that made up the manufacturing process. By doing so, BHGE would be able to create a complete picture of the organization's opportunities for enhancement. In addition, this solution would be created within the existing infrastructure at BHGE to ensure minimal disruption to operations during the implementation and a reduction in the overall complexity of the solution.

With a comprehensive solution template in place, the partners agreed to utilize Capgemini's unique, agile methodology to connect Information Technology (IT) and Operational Technology (OT) into a single solution.

Real-time manufacturing management

By following the mutually established plan, Capgemini and BHGE implemented an Industrial Internet of Things (IIoT) solution that transformed shop floor processes. With IIoT, every machine is connected within a network that compiles data in order to generate a comprehensive report on the state of the production process. The solution drew upon numerous data sources, including machine tools, ovens, cranes, the MES, and the Computerized Maintenance Management System (CMMS) to create its overall view of the shop floor. This ensured complete coverage and a total view of machine performance, which could then be shared with external systems.



In Florence, where the main production line comprises 94 machines, we avoided 26,000 hours of downtime in 2017. A numerical control machine usually has 4,500 hours scheduled per year and the cost to buy a machine is roughly \$1M. The Industrial Internet solution implemented therefore increased the shop's capacity by as much as six new numerical control machines, so it would have cost us \$6M to achieve the same result."

Davide Marrani

Vice President Global Supply Chain TPS,
BHGE



In addition, the data is compiled and reported in real time, providing operators and engineers with the ability to both view data-based shop floor insights at any given time and take action quickly. This also enables those same technicians to make informed decisions at the right moment to ensure that BHGE plants continue running at optimal levels.

While connecting manufacturing devices and machines, Capgemini also implemented standardized processes throughout BHGE's shop floor, in effect aligning all its Turbomachinery & Process Solutions (TPS) Italian plants on a common way of working. As a result, operators no longer need to contend with location-specific challenges and can respond to disruptions in a uniform manner, substantially enhancing the speed and effectiveness of their adjustments. With this solution, Capgemini and BHGE have connected machines, manufacturing operations, and people in real time, creating a new, modern manufacturing approach.

The combination of greater insight, enhanced access to data on the part of the operators, and standardized processes led to an overall decrease in the amount of machine downtime. By forming a comprehensive view of the shop floor, the solution empowered technicians to identify disruptions and preempt them before they actually affected the manufacturing process. This has resulted in a 12% increase in machine utilization in different sites within five months of deployment as well as millions of Euros in savings.

The Collaborative Approach:

By combining their unique capabilities and expertise, BHGE and Capgemini delivered an innovative IIoT solution that has revolutionized manufacturing within the oil and gas industry. Once again, BHGE has established itself as a leading industry innovator that provides best-in-class services to its customers and ultimately supports the daily lives of people across the planet. For its part, Capgemini has added another example of its unique capacity for digital manufacturing solutions to its industry-leading track record.

Following the success of this delivery, the industrial partners agreed to transfer ownership of the project IP to Capgemini and, in doing so, the organization executed upon the principle of design, operate, and transfer. BHGE and Capgemini will continue to develop the solution by adding state-of-the-art IoT and Big Data technology to bolster the already substantial success while ensuring that BHGE's manufacturing operates on an even more effective infrastructure.

About Capgemini

A global leader in consulting, technology services and digital transformation, Capgemini is at the forefront of innovation to address the entire breadth of clients' opportunities in the evolving world of cloud, digital and platforms. Building on its strong 50-year heritage and deep industry-specific expertise, Capgemini enables organizations to realize their business ambitions through an array of services from strategy to operations. Capgemini is driven by the conviction that the business value of technology comes from and through people. It is a multicultural company of over 200,000 team members in more than 40 countries. The Group reported 2018 global revenues of EUR 13.2 billion.

Learn more about us at www.capgemini.com

About BHGE

Baker Hughes, a GE company (NYSE: BHGE) is the world's first and only fullstream provider of integrated oilfield products, services and digital solutions. We deploy minds and machines to enhance customer productivity, safety and environmental stewardship, while minimizing costs and risks at every step of the energy value chain. With operations in over 120 countries, we infuse over a century of experience with the spirit of a start-up – inventing smarter ways to bring energy to the world.

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People matter, results count.