To support Venture Global’s commitment to provide a low capital cost, low operating cost, and fast-to-market LNG production, Baker Hughes is supplying highly efficient and reliable modularized compression liquefaction trains as well as power generation and electrical distribution equipment. The modularized system offers a plug-and-play approach that enables faster installation and lower construction and operational costs. These LNG modules are being manufactured, assembled, and tested at state-of-the-art Baker Hughes plants in Italy.

Virtual string test

A string test is a major project milestone performed on the first full set of equipment. Replicating and simulating site operation conditions for the complete system, it is the only way to prove that all the major components function together as they should.

Every component that will be shipped to and operated at the final project site is commissioned and validated in order to verify whole functionality in real-mode condition. The test performs a mechanical running assessment, and measures equipment vibration and bearing temperatures at full speed and full load. Any fit or assembly problems are identified prior to the test and resolved. The auxiliary and control systems are also calibrated, which minimizes these activities in the field.

COVID-19 travel and assembly restrictions around the world have created various challenges to business continuity. In many cases, emphasis on remote work and social distancing have inspired business leaders to seek reliable and innovative solutions. Baker Hughes collaborated with Venture Global to successfully conduct from Italy the first ever virtual string test on critical turbomachinery to meet the major milestone for the Calcasieu Pass LNG project.

Case study

Successful Virtual String Test for Venture Global’s Calcasieu Pass LNG project
Challenge
As part of the ongoing execution of the Calcasieu Pass LNG project, Venture Global needed to verify the functionality and performance of the project’s first compression train at the Baker Hughes testing facility in Massa, Italy. Obtaining a scheduled String Test Acceptance Certificate is an important indicator of on-time delivery for the overall project.

String tests are often time-consuming and can take from just one day up to several days or weeks to complete. Typical test days involve the face-to-face participation of various customer representatives, inspectors, engineering and project management teams—which often results in well over 30 people present on the test site to verify the equipment performance.

However, COVID-19 travel restrictions have made the traditional approach infeasible.

Solution
To avoid delaying the project, Baker Hughes put measures in place to enable remote/virtual test participation avoiding the need to have anyone travel specifically for the test. It involved 21 people across five cities around the world, accomplishing the procedure on equipment located at the Baker Hughes testing facility in Massa, Italy. Thanks to meticulous planning, the string test was completed in less than eight hours—which is an outstanding feat.

Rod Christie, Executive Vice President of Baker Hughes Turbomachinery & Process Solutions, said “The willingness and flexibility of our customer Venture Global to participate in this type of innovation was key to its success, while the site team in Italy and the joint Baker Hughes and Venture Global engineering and project management teams deserve all the credit for their dedication, perseverance, and high quality and safety standards to conduct this test in a safe and successful way, especially considering COVID-19, technology was a key enabler. In 2020 alone we have completed over 50 virtual string tests and inspections. We expect more customers to adopt this approach.”

In preparation for the remote string test, Baker Hughes leveraged a combination of teleconferences and virtual-meeting software to foster audio and video interaction with multiple locations around the globe. The actual string test involved field technicians for both Baker Hughes and Venture Global in Massa, Italy, as well as design engineers, operations engineers, testing experts, project managers, and project executives in Houston, Texas, Arlington, Virginia, and Florence, Italy. This structure allowed participants to see and hear each other in real time, and view the live testing data screens.

Baker Hughes field service engineers used a Smart Helmet—an industrial wearable that combines a hard hat with various cameras, computer vision, and sensors—to let everyone participate in a walkdown of the string test equipment in Massa. It enabled real-time communication so the customer engineers could view specific parts of the equipment package.

We quickly answered the few technical questions that Venture Global had after the test, and they signed the String Test Acceptance Certificate the same day, which is rare.

Remote string tests were introduced by Baker Hughes several years ago but Venture Global was the first to adopt the safe, reliable and fully remote approach. In addition to its already standard service offerings offered in remote such Remote Monitoring & Diagnostics, Baker Hughes has also extended the use of remote technology to offer customers outage preparation, as well as virtual training, inspection, and repairs on critical rotating equipment in operation in the field.