



Nexus Controls
a Baker Hughes business



Case study:

Transportadora de Gas del Sur (TGS) modernizes Gas Turbine/ Compressor train unit control systems using Nexus OnCore[†], delivering improved reliability, user friendly interfaces, and enhanced diagnostic capability

Customer overview

Fiat Compression Station, part of the Transportadora de Gas del Sur (TGS) General Cerri complex, is located on the south side of Buenos Aires, the capital of Argentina. This complex manages the transition of three major pipelines into a single pipeline that supplies most of the gas to Buenos Aires. Built in 1967, the Fiat Compression Station had an obsolete mechanical control system that is common with a twin facility, Conesa Compression Station, that is in General Conesa, Rio Negro Province.

TGS is the largest natural gas distributor in Latin America. With more than 9200 km of pipeline throughout central and southern Argentina, TGS supplies 60% of Argentina's gas, including 100% of the gas to Buenos Aires.

Formed in 1992, after the privatization of Argentina's energy sector, TGS is focused on maintenance initiatives that deliver reliable, safe and efficient pipeline operation for the country. TGS has also successfully delivered on various ambitious expansion programs to ensure that they can scale their operations to meet the region's growing capacity needs.

Customer challenge

The TGS Fiat Compression Station was experiencing significant reliability issues with their old and obsolete mechanical turbine controls. Some of the issues that TGS experienced included extreme wear, as well as, accelerated calibration deterioration. In addition, during the non-reliable startups the Turbo Gas Expander (Westinghouse) tripped in numerous times on overspeed. TGS also experienced unavailability of spare parts, and limited data availability which complicated the failure diagnostic process. These chronic issues prolonged the root cause analysis that resulted in longer unplanned outages and increased labor costs. Further aggravating the plant's availability, was the high frequency of trips (during startup) that extended the down time, while negatively impacting the equipment life.





It was not uncommon that the TGS Fiat Compression Station experienced (on average) one failure per month. The greatest contributors to these failures were the controller and mechanical systems. To reduce the impact, TGS assigned dedicated resources to maintain the obsolete control systems.



TGS Fiat Compression Station managed to maintain their obsolete control system equipment by leveraging the spare parts from the twin site. However, this reactive strategy was not sustainable

because the inventory was being rapidly consumed without an option to replenish inventory.

Turnkey solution

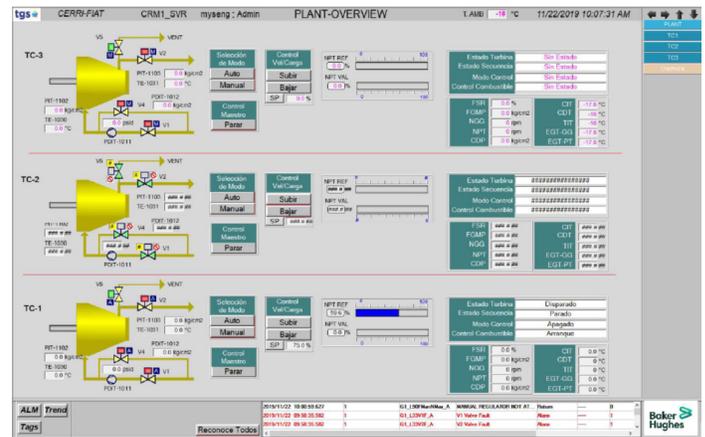


Nexus Controls installed the next-generation Nexus **OnCore**[†] Control System on three Fiat gas turbines / Nuovo Pignone gas compressor trains, and updated the supporting mechanical, instrumentation & control systems, as well as, implemented advanced Nexus **OTArmor**[†] Cybersecurity protections for the newly installed Nexus **OnCore** Control Systems. The turnkey project allowed the customer to modernize its outdated mechanical, pneumatic, and relay logic gas turbine control, to a leaner and more reliable digital control. Nexus Controls was able to replicate – in a digital control algorithm – the functionality performed by the old mechanical system.

The Nexus Controls' complete solution for TGS includes: a main automation contract (MAC) that covers an integrated design for the Nexus **OnCore** Control System (digital platform), as well as, instrumentation, mechanical adapters, overspeed protection, starter gas expander control, gas fuel control valves, advanced Nexus **OTArmor** cybersecurity system, Bentley Nevada vibration monitoring & protection, and all the required interface connections for optimal performance of the completely new and modern solution.



Results



The Nexus **OnCore** solution for TGS offers complete machine control that is focused on several critical parameters such as: speed, temperature, vibration, pressure, flow, and the ability to assertively identify and correct any failures combined with the overall operational reliability. Also included was a turbo expander independent speed control and its overspeed protection. The Nexus **OnCore** Control System provides TGS with a reliable, repeatable and safe start & stop sequence process because every step is controlled and monitored in an independent manner. The new Nexus **OnCore** algorithms replicate the old TGS system functions while incorporating modern, digital, state-of-the-art core logic for control and protection – with much higher availability, efficiency, and faster operations – resulting in an improvement of the overall unit safety and startup reliability.

With the Nexus **OnCore** Control System, TGS now has an enhanced troubleshooting ability due to the trending data kept in the Nexus **OnCore** data historian which is included in the HMI. With the old system, the TGS operators used to be totally dependent on the mechanical system and had to react to issues as they manifested. Now the TGS operators have more freedom to perform other previously neglected, yet critical, tasks allowing them to be much more efficient in the running of the plant.

The Nexus Controls' domain experts complimented the Nexus **OnCore** Control Systems, by designing a state-of-the-art, Nexus **nTrinsic**[†] mechanical system, with smart valves and sensors. The mechanical system's instrumentation was integrated into the control system to allow the customer full visibility to the status and performance of their equipment from the Nexus **OnCore** HMI.

The Nexus Controls' team created as-built drawings of the existing equipment without impacting the operation of the facility, as well as, designing the Fuel/Gas metering skid. They leveraged the information to develop 3D models of the new equipment designs that resulted in the flawless execution of upgrades and the new replacement hardware fit perfectly into the limited space afforded by the existing equipment. As a result, the upgrades were executed without modifying the existing pipe structure.

The Nexus **nTrinsic** Mechanical, Instrumentation and Control (I&C) upgrade applied to each of the three Gas Turbine / Compressor trains and included: state-of-the-art Combustor Gas Control Valves, Combustor Gas Shutoff Valves, Combustor Gas Venting Valves, Masoneilan Actuator, Booster & Shutoff Valves for Startup Expansion Turbine, Speed Sensing Assemblies, Oil Level Transmitters, Pressure Transmitters (Gauge & Differential), Temperature elements for Natural Gas and oil, temperature measurement, Proximity Switches for Natural Gas Bypass Valves position monitoring, and Limit Switches for Natural Gas Process Valves. The result was that the Nexus **nTrinsic** Mechanical I&C upgrades provided the modernization of sixty-one devices.



The fully integrated Nexus **OnCore** solution ensures accurate monitoring and protection that helps TGS avoid unplanned outages. The Nexus **OnCore** OptimumC software, with integrated HMI, provides TGS with an intuitive, easy-to-use operator interface, that presents information in a simple, clear and logical format. The TGS operators can now manage the plant operation, equipment performance, and system alarms all from a centralized location.

The modernization of the three TGS Fiat Compression Station Gas Turbine/Compressor train control and Mechanical systems allows quality, stability and optimization improvements for every process of TGS operations and provides them with a reliable diagnostic tool for centralized and safe controls.

Delivering in uncertain times

The TGS Fiat Compression Station control system automation project was implemented in three separate phases with an independent outage for each phase. Phase one was delivered in February 2020 prior to the global response

to the COVID-19 pandemic. As the Nexus Controls' expert implementation team was in the process of executing phase two of the project, Argentina restricted access to the country. The Nexus Controls' team quickly responded by replacing the Brazilian members of the team with local "in-country" Argentinian resources. By leveraging Nexus Controls' remote support staff and by providing intense on-site training – the new team flawlessly implemented phase two on time despite strenuous lock-down conditions. In the end, TGS was impressed with the flexibility and rapid adaptability of Nexus Controls and was delighted with the solution provided.

Customer quotes

Gabriel Darío Pombo – Fiat Specialized Technician – TGS

"There was a really noticeable improvement in the operation, mainly for the available tools the system has like alarms, trends and historical data that give us very meaningful information, plus the user-friendly software; this allow us to simplify the operation, identify failures quickly, and even anticipate them. Even the time that the operator spends operating the units was reduced since systems installation. These systems not only bring improvements to the normal operator duties, but also they will positively impact in a reduction of the human hours dedicated to operations."

"Ha habido una mejora notable en la operación, principalmente por las herramientas de alarmas, tendencias e historiadore que brindan mucha información, y el software muy amigable; esto nos ha permitido simplificar la operación y detectar rápidamente algunas fallas, e incluso anticiparlas. Inclusive el tiempo que el operador le tiene que dedicar a la operación propia del equipo se redujo desde la instalación de los sistemas. Esto seguramente traerá no solo mejoras para el trabajo del operador, sino también impactará positivamente en una reducción del número de HH dedicadas a operaciones."

About nexus controls

Nexus Controls LLC (formerly GE Energy Controls Solutions) exists as the collective experience and history of multiple companies whose expertise, knowledge and lineage spans 150 years. Our global team of domain experts are in 44 countries on all six continents and have successfully delivered over 11,000 successful projects in the power, oil & gas and various industrial markets.

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