



SUCCESS STORY

RETROFITTING A HYDROGEN RECYCLE COMPRESSOR SYSTEM FOR SMOOTHER OPERATIONS AND OPTIMAL CONTROL

Discover how CCC's Prodigy® platform helped one of the world's leading petrochemical companies achieve optimal control stability, maintainability and availability.

Our client is a leading petrochemical manufacturer known for its commitment to innovation and agility. When its experts identified limitations in its hydrogen recycle compressor controls system, it moved quickly to explore fast-tracked solutions that could be implemented during an upcoming 2.5-day planned shutdown. Its goal was to retrofit its existing machinery with a control system that enhanced stability, maintainability, and start-up and control availability.

CCC set out to equip the manufacturer's hydrogen cycle compressor with Prodigy — a turbomachinery control platform that leverages more than 50 years of specialized expertise to set a new standard for control innovation.

The Challenge

Our customer's existing hydrogen recycle compressor control system had numerous shortcomings that were leading to critical safety and performance issues. Its antisurge controllers lacked the functionality required to ensure accurate surge protection margins. As a result, margins were often too conservative — a condition that led to excessive recycle flow and, ultimately, the risk of power consumption exceeding process demand. The system's logics for auxiliary controls, lube oil, trips and alarms, seals, startup and shutdown sequencing was lacking in readability. It did not provide a fallback strategy to ensure maximum availability should a transmitter

fail. Beyond its limited functionality, the existing control system lacked proper integration. Without this key capability, our client was left with inadequate surge protection, performance and control accuracy. Our experts also identified potential issues with its antisurge valve and overall control automation, which we would assess during the project execution phase.

CCC's team brings unmatched domain expertise to each client engagement. Although the appropriate solution was clear, the retrofit posed numerous challenges. The retrofit was complicated by outdated as-built drawing and the absence of compressor performance curves. With no compressor performance curves, our field engineers would need to conduct blind surge tests. The customer's tight timeline — just eight weeks — added to the project's complexity.

To help our customer maximize its 2.5-day planned shutdown and overcome the challenges of its existing controllers, we moved quickly through our well-defined Prodigy retrofit process.



The Solution

CCC's experts designed Prodigy to reduce total lifecycle and maintenance costs while maximizing production throughput. With unparalleled ease of use, Prodigy is ideal for demanding processes such as the ones occurring at our customer's petrochemical manufacturing facility. Highly scalable with custom logic programming support, the platform simplifies the solution architecture while supporting CCC's world-class control applications. For these reasons, we identified it as the ideal antidote to our customer's control shortcomings.

Our retrofit included a Prodigy duplex control system equipped with all essential controls — antisurge, performance and system auxiliaries — along with dedicated desktop HMI engineering workstations. CCC also wrote new auxiliary control logic, which increased readability compared to the previous logic from Siemens. To satisfy our client's requirements and streamline the process, we maintained all existing cables, field instruments, relays, signal repeaters and isolators. Our controller was positioned in the same physical location as its existing panels, which was possible thanks to Prodigy's easily scalable design.

This solution equipped the plant with all the capabilities required to minimize performance issues and maximize control, including load share with a master pressure controller. CCC's antisurge and performance control system manipulates the existing antisurge valve, effectively protecting the compressors from surging against low flow. To maintain compressor capacity within a required set point, the Prodigy system manipulates the compressors' inlet guide vanes.

Throughout commissioning and execution, CCC's experts overcame key challenges quickly to maintain the project's tight timeline. We converted the customer's non-readable Siemens logic into a form that could be utilized

by the related machine's auxiliary system and navigated poor, misleading documentation on its previous controller. To optimize performance without critical performance curve data, we conducted blind surge tests that ensured optimal compressor function. Because all compressors were running with low surge deviation values, tuning optimization was even more critical — and more complex — than with a typical Prodigy retrofit.

Our retrofit process also included an in-depth evaluation of the client's existing system. Our experts identified areas in which constraint control could be implemented, which opens the door to automated control. We also made strategic recommendations on the existing hydrogen recycle compressor system's size, location and recycle valve performance; instrumentation strategy; and antisurge control capabilities. Combined, these insights ensured our customer reaped maximum benefit from our Prodigy retrofit.

The Results

By retrofitting its hydrogen recycle compressor with CCC's Prodigy platform, our customer increased productivity, reduced safety risks and obtained a compressor controls system — all within an eight-week window that made the most of the client's planned shutdown. This single platform provides all the advanced functionality required to operate a petrochemical manufacturing facility befitting an innovative global leader. The result is the enhanced control stability, maintainability, and startup and control availability our customer deserves.

Does your control system lack the features required to optimize performance and safety?

Discover Prodigy, the single platform for all your turbomachinery control needs.