

Advance Planning and Collaboration Lead to Successful Turnaround at Canadian Refinery

Customer

Oil Refinery, Canada

Equipment

Two Elliott compressor trains and one non-Elliott compressor train (four compressor units)

Challenge

Plan and execute a turnaround while dealing with the challenges and obstacles associated with the global coronavirus pandemic.

Solution

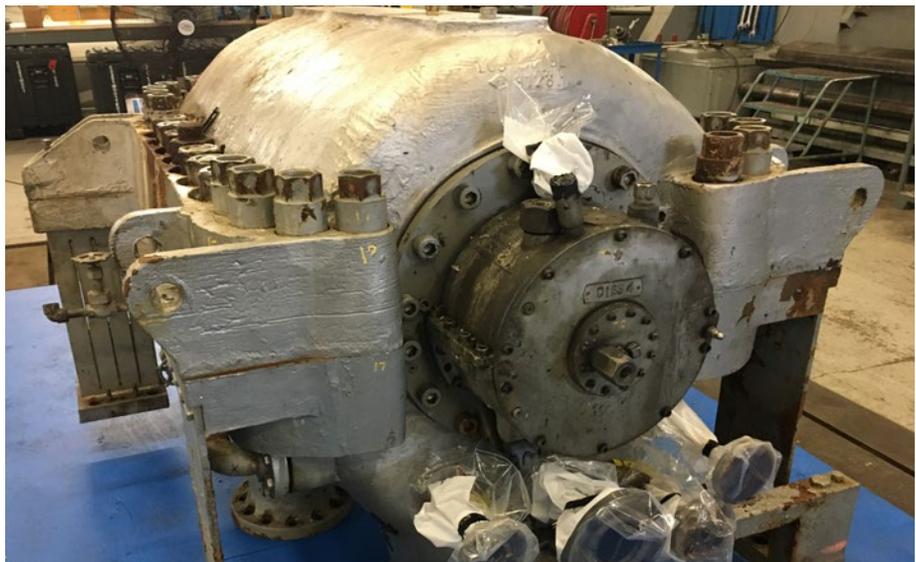
Elliott and the oil refinery worked together to update the project plan and navigate through the challenges. Elliott completed all associated work at the Burlington Service Center and supervised all work at the oil refinery, meeting all turnaround deadlines.

Before taking on the grand task of a turnaround that was scheduled to begin in the spring of 2020, a leading oil refinery in Canada asked Elliott to work with them to plan and execute the project from start to finish.

The turnaround plan initially included six compressor trains – five Elliott compressor trains and one non-Elliott train – but the scope of the project unexpectedly changed when the 2020 global coronavirus pandemic emerged weeks before the start date. Covid-19 introduced a new level of challenges and obstacles which limited the resources available to complete the full turnaround. The project team reevaluated the plan and determined that they could complete two Elliott equipment trains and one non-Elliott train (four compressor units) as scheduled, and postpone the other three trains to 2023.

The scope of work included:

- Managing the overall compressor turnaround from the planning stages through execution
- Developing detailed project plans and schedules
- Creating custom parts kit boxes and tooling kits
- Performing a complete overhaul of an ethylene refrigeration compressor at Elliott's Burlington Service Center
- Modifying the feed gas compressor train's upper casings at Elliott's Burlington Service Center by adding new injection points to the existing wash systems and replacing interstage seals
- Supervising on-site overhauls of the Elliott feed gas compressor train
- Documenting all processes and procedures



Ethylene refrigeration compressor prior to inspection and overhaul at the Burlington Service Center.

This turnaround was a collaborative effort between the refinery and Elliott. To ensure success, it required teamwork, trust, expertise, advanced planning, project management, and continuous communication. Elliott assembled a team of experts from Field Service, Engineered Solutions, Service Parts, Sales, and the Burlington Service Center. Additionally, Elliott stationed a field service engineer on site at the refinery for nearly two years to work directly with the internal turnaround team to plan and manage every detail of the project.

Effective Planning and On-Site Project Management

The on-site field service engineer developed comprehensive plans and schedules to guide and track each phase of the turnaround. All teams participated in bi-weekly meetings to provide status updates and review the project plans and timelines.

The team's meticulous preparation and advanced planning allowed them to determine which compressor trains could be overhauled in 2020, while dealing with the challenges of the pandemic.

Compressor Wash System Modifications

The oil refinery's feed gas compressor train included two Elliott units – a low-pressure (LP) compressor and a high-pressure (HP) compressor driven by an electric motor and gear increaser. Both units had existing wash systems that required major modifications.

The wash systems were originally designed to be intermittent. For this turnaround, the refinery wanted to keep them as intermittent, but they asked Elliott engineers to consider their future plans to convert the systems to continuous solvent injection. Additionally, the LP compressor was experiencing periodic vibration issues. Elliott's Engineered Solutions team determined that the root cause was fouling buildup, which could be addressed by adding new nozzle locations to maximize flow distribution.

The engineering team revised the injection schemes for the two compressors based on the current requirements and future needs. They developed the necessary engineering drawings with the associated specifications and requirements that the service center used while completing the modifications. Each unit required the addition of four new injection points.



HP compressor upper casing prior to wash system modification.

Custom Parts Kits and Tooling Kits

While Engineered Solutions was working on the updated wash system designs, Elliott's Service Parts team began developing custom parts kit boxes and special tooling kits for each of the six units that were included in the original turnaround plans.

The refinery sent its parts inventory to Service Parts in Jeannette, PA, to be visually and dimensionally inspected. This process allowed Elliott to identify any deficiencies in the existing inventory that could negatively impact turnaround execution.

The Service Parts team built 25 custom parts kits using a combination of new components and the existing inventory that passed inspection. The final kits were shipped to the refinery well in advance of the turnaround start date. Because each kit box was customized for each machine, the refinery placed each one near the associated equipment, making the parts and tooling easily accessible as the work was completed. After the parts were used during the turnaround, the refinery sent the kit boxes back to Elliott for replenishment.



A look inside a custom Elliott Parts Kit Box that was used during the overhaul at the Burlington Service Center.

Compressor Overhauls at the Burlington Service Center

The Burlington Service Center personnel were in constant contact with the Engineered Solutions team as they developed the drawings, specifications, and requirements for the HP and LP compressor wash system modifications.

As scheduled, the service center team received the HP and LP upper casings, ethylene refrigeration compressor, and all associated parts and tooling kits from the refinery. They immediately began the disassembly and inspection process.



LP compressor upper casing prior to inspection and interstage seal replacement.

The inspections revealed that the ethylene refrigeration compressor required repairs and several new parts to ensure safe, efficient compressor operation. The service center team also recommended the application of an engineered coating to the casing to prevent corrosion. Due to the low suction temperature, the suction end of the machine is encased in an ice ball during operation. The ice ball leads to accelerated corrosion rates of the metal.



Ethylene refrigeration compressor after overhaul and coating application at the Burlington Service Center.

In addition to the HP and LP compressor wash system modifications, the service center recommended replacing the interstage seals.



LP compressor upper casing with new interstage seals.

The full turnaround team discussed all findings and approved the additional scope of work. The service center team completed the compressor overhauls, wash system modifications, interstage seal replacements, and coating application in five weeks, meeting all deadlines, and shipped the equipment back to the refinery on schedule.



Elliott technicians modifying the HP compressor casing with new wash system injection points.

Compressor Overhauls at the Refinery

The two additional Elliott compressors and the non-Elliott unit at the refinery were overhauled at the same time as the two compressors at the service center. The on-site field service engineer supervised all work on the Elliott units, providing technical expertise and guidance, validating proper execution and quality workmanship, and ensuring project deadlines were met.

The on-site field service engineer also created over 200 integrated maintenance documents, including drawings, processes, critical lift plans, and procedures that the refinery will reference in the future.

This complex turnaround was an incredible collaboration between Elliott and the oil refinery. Advanced planning, effective project management, and ongoing communication were essential to the success of this turnaround and every turnaround that Elliott manages. Each team of experts focused on their area of expertise, used proven processes and procedures, and ensured that safety was a priority. This resulted in the highest quality work and zero safety incidents. The turnaround goals and objectives were achieved by all teams, and the turnaround was successfully completed by the oil refinery's designated deadline.



The overhauled ethylene refrigeration compressor loaded on a flatbed truck at the Burlington Service Center.



901 North Fourth Street
 Jeannette, PA 15644-1473
 Phone: 724-527-2811
 Fax: 724-600-8442
 Email: info@elliott-turbo.com

T H E W O R L D T U R N S T O E L L I O T T



C O M P R E S S O R S ■ T U R B I N E S ■ C R Y O D Y N A M I C S ■ G L O B A L S E R V I C E