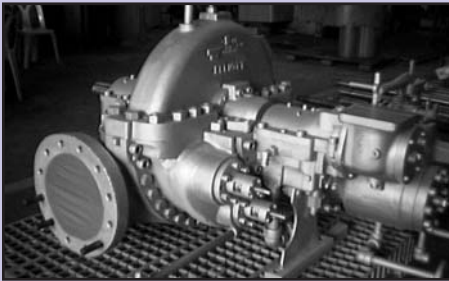


Service Solutions...

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Turbine repair is just one of the Thai PRO Center's specialties.

Utilizing our Global Resources

Our global expertise enables us to offer not only repair equipment, but also equipment upgrades. Upgrading results in extended run times and reduced cost of ownership, improved reliability, and increased profitability for our customers. This global reach allows us to repair and upgrade:

- Vacuum Pumps
- Centrifuges
- Babbitt Bearings
- Blowers
- Gear Boxes
- Fans
- Mixers
- Turbines
- Valves
- Agitators
- Compressors

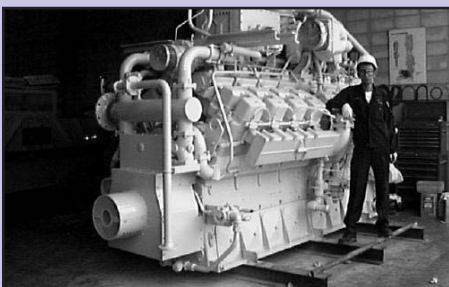
One-Stop Shopping

John Crane has a seal repair cell in our facility and there is a motor repair shop next store, giving us the ability to give our customers a one stop shopping capability. An agreement with Dresser-Rand Compressors will also give us re-blading capability for steam turbines. One call, one face, one invoice.

Regional Reach

The challenge now facing us is to grow our reach outside of Thailand. We have successfully completed repair projects in Indonesia, India, China and even in the Middle East. With our new portable valve repair equipment, we can work on-site anywhere during a plant shutdown.

With the new Thai facility, we have the resources to completely fulfill the requirements of our customers. ■



Recently completed engine repair.

Refinery Realizes Significant Savings by Modifying versus Replacing Equipment

Leonard Cadena, P.E.

Project Engineering PRO Services

The Problem

A large oil refiner was challenged with reducing their emissions to 2000 PPM to meet the EPA requirements for 2004. As they began changing seals in their overhung and between bearings process pumps, they found they were unable to "fit" an API 682 seal in a number of the pumps originally designed for packing. With the limited stuffing box room and the smaller diameter shaft the seal vendor was unable to guarantee the performance of their seal. There were 34 total pumps involved. The question was, replace the pumps or modification them.

Due Diligence

ITT PRO Services was asked to evaluate the equipment along with several other vendors. Our process for evaluating the centrifugal pumps is standard. The engineer evaluates their hydraulic characteristics vs. the needs of the current system, not what they were designed for possibly decades ago. Once this has been done the engineer looks at the mechanical features of the pumps. Are the bearing brackets of current design and are we maximizing the seal chamber design for the size of the pump? The engineer also evaluated the foundations of the equipment. They were inspected for voids in the grouting, the general condition of the bases, and reduction of integrity of the base metal and

welds. The piping design was also evaluated. A stress study was performed to determine where additional supports and design changes might improve the efficiency and reliability of the pumps.

Results

The final report was presented to the customer. Of 34 pumps, twenty-four were candidates for upgrade through either hydraulic or mechanical methods. Our hydraulic study found that several could justify being hydraulically rerated. ITT Goulds impellers were installed in the cases and the volutes were modified to match the hydraulics of the impellers. A significant savings in energy costs resulted in a 12 month pay back for the hydraulic re-rates. The mechanical upgrades were accomplished by keeping the casing and, in some cases, the impellers. The rest of the components were replaced in the overhung and between bearing process pumps. The base plates were machined to renew the flatness. Replacing them would have increased the total cost (ie construction, grout, etc.). Piping was only minimally changed to obtain the desired results.

Savings in Time and Dollars

The objective was to spend only as much money as was required to meet the requirements of the systems and no more. This approach saved approximately 60% over the price of total replacement and was accomplished in 5 weeks vs. months with replacement.

Clearly PRO Services helped the customer to meet his objections with a cost effective solution of upgrading equipment versus replacement. ■

