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Ethanol Plant Overcomes Seal Maintenance Problems

**Goulds TaperBore™ and
John Crane Flushless Seal
Provide the Solution**

When demand is high, production must run at the height of efficiency. And while the myriad of tanks, pumps and mechanical seals that comprise an ethanol plant are expected to show signs of wear-and-tear due to their harsh environment, a one-day lifespan of a crucial piece of equipment has drastic effects on production. According to Russell Konwinski, Maintenance Manager and an eight-year veteran of the Abengoa Bioenergy (formerly known as High Plains Corporation) ethanol fuel plant in York, Nebraska the facility was experiencing great trouble with seal longevity on their process pumps. “Although most of our seals only lasted about 60 to 120 days before failing, one seal lasted a mere day before leaking,” said Konwinski. “It was obvious that we needed something more reliable.” The scenario was further complicated by the actual product created at the facility – a yellow sticky corn mash containing about 30 to 35 percent solids. While double seals are typically the recommended solution for ethanol plants, the time and expense associated with the installation of a pressurized seal support system and the potential to dilute the process fluid with barrier water escaping the seal simply complicated the scenario. Fortunately, Russell had already recognized the need for a flushless single cartridge seal that would not require external seal water support or a barrier fluid system necessary with double mechanical seals. Although originally developed for the pulp and paper industry, the flushless seal has already been proven in a variety of process industries, water and wastewater plants, as well as food and beverage facilities. Konwinski and



The Abengoa Bioenergy Ethanol Fuel Plant in York, Nebraska.



While double seals are typically recommended for ethanol plants, the time and expense with the installation of a pressurized seal support system and the potential to dilute the process fluid with barrier water escaping the seal simply complicated the scenario. John Crane, a leading supplier of engineered sealing systems and associated products – recognized the need for a flushless single cartridge seal that would not require external seal water support or a barrier fluid system necessary with double mechanical seals.

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Russell Shockey, a pump technician for Abengoa Bioenergy, were introduced previously to the John Crane Type 5870 flushless single cartridge seal. Since Abengoa Bioenergy was in the process of changing their pump styles at the time, Konwinski said it made sense to incorporate John Crane's Type 5870 solution during their re-tooling. The factory preassembled single cartridge design allowed the complete pump system to be easily installed in a few hours, quickly tested and in service for a trouble-free startup. The Type 5870 Flushless Seal is designed to operate specifically in process pumps fitted with a TaperBore™ PLUS seal chamber containing the Vane Particle Ejector (VPE) ring. The TaperBore™ PLUS reduces the solids entering the seal chamber and promotes circulation within the chamber to prevent solids and gases from accumulating. This allows unsupported single seal operation in all light slurry applications. John Crane's 5870 open-profile, abrasive-resistant sealing faces positioned near the impeller, allows cool running and clog-free performance. According to Tom Evans, Marketing Manager for John Crane, the Type 5870 Flushless Seal and TaperBore™ PLUS are designed to operate unsupported and was an obvious solution. The open-profile, abrasive-resistant sealing faces positioned near the impeller allow maximum cool running and clog-free performance and the large, dynamic o-ring prevents fibers or solids from causing seal hang-ups. Additionally, the 5870's single-coil spring allows for greater shaft motion due to cavitation, pulsations and other upset operating conditions. At the ethanol plant, the Type 5870 and TaperBore™ PLUS seal solution also provides savings as no external seal support system; tank reservoir or barrier fluid is needed.



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According to Evans, the key selling point of the 5870 single seal and TaperBore™PLUS combination was its flushless attribute and its robust design to accept pump cavitations, dry running and air bind operation. Since external seal water flush support burdens a system with extra liquid that must later be removed to create a final product, users of the John Crane 5870 single flushless seal and TaperBore™PLUS are able to better maintain control and reduce cost with this flushless option. Evans stated that the flushless seal also will prove extremely beneficial in reducing water dependency. For example, when drought conditions exist and water prices increase, lowering water dependency truly lowers operating costs. “Seals frequently fail due to sporadic or poor seal water flush conditions,” said Evans. “If you can operate a seal that eliminates this weak link – your flush water supply – you can improve your process reliability.” Although no flushing is required, the 5870 does incorporate a quench connection, for possible upset pump operating conditions and therefore a grease or water quench media maybe used to lubricate and cool the atmospheric side of the seal. After installing an initial seal in May 2002, two more were installed on larger pumps in July and November – all of which have incorporated the grease style quench and are exceeding customer performance expectations. According to John Finley, the local John Crane Sales Engineer, the sealing arrangement has not only saved dollars in terms of decreased maintenance and down-time, Abengoa benefits in not having to purchase another pump or resize existing pumps due to inherent problems. Upset operating conditions such as cavitation, dry running or air bind operation will cause a less robust seal to fail prematurely. Shockey concurs. “Elimination of seal support is the key benefit,” said Shockey. “Now we can install a pump and not have to support it with



Type 5870 Seal

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seal maintenance except for the grease quench.” From a cost standpoint, Konwinski said the seal and TaperBore™*PLUS* quickly paid for themselves. “The cost of a double seal, as well as the cost and manpower associated with a flush system quickly adds up,” said Konwinski. “We are pleased with the John Crane/Goulds Pumps solution and are happy to report that everything advertised about these products are true.”