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RedaHPS surface pumps **Schlumberger**

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FEBRUARY 2008

▶ Recovering Oil in Aging Fields

Brock Tisdale, Quadna, Inc.

Oil has never been a more sought after commodity then it is today, so having the ability to capture every drop is paramount.

Recently, our company worked with Veco, an Anchorage, AK-based engineering firm and owner Resolute Natural Resources, an oil and gas company based in Denver, CO, to develop a custom booster skid system to help the company recover oil in an aging field.

The goal of constructing the giant 40-ft by 16-ft, 85,000-lb liquid carbon dioxide (CO₂) booster skid was to use it in a water and gas (WAG) flood- an injection of water followed by CO₂. Because CO₂ is miscible in oil, it changes the relative permeability of oil to flow through the reservoir. Water used in the process helps sweep the fluid towards the well bore. The combination of WAG results in greater oil recovery then the injection of gas or water alone.

At high pressures, the CO₂ acts like a detergent and actually "scrubs" oil from the rocks. This process will recover a significant amount of additional oil, which could not otherwise be recovered. The new pump skid plays an integral role making this process work.

The project got underway in November 2006 with the objective of fabricating a custom-designed skid that contained all of the pumps, components and controls needed to boost CO₂ in the pipeline. Due to changing elevations along the pipeline path, the booster skid was needed to help carry the product to its destination.



The custom-designed skid needed to contain all of the pumps, components and controls for boosting carbon dioxide to the pipeline.

Bringing the Skid to Life

The skid design involved several critical calculations including:

- High pressures are required to boost the CO₂
- A constant pressure of 3000 pounds per square inch had to be maintained at all times
- Piping walls had to be able to withstand temperatures ranging from negative 20-deg F to more than 120-deg F

The skid, which was the largest we ever fabricated, was designed with pressure relief valves to prevent the piping and the Schlumberger pump from over pressurization. A second like pump will be added in the future to accommodate increased demand.

Massive drops in CO₂ pressure can create enormous changes in temperature and affect the pipe wall material. We had to select piping in a very specific quality grade to handle the variations in temperature.

Our team conducted a pipe stress analysis to ensure pipe walls could withstand temperature projections. The goal was to ensure that changes in process liquid



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THE LATEST

SCHLUMBERGER (HOUSTON, TX) . . . announces that Chevron business units use its seismic-to-simulation software for integrating geology and geophysics workflows. Using Petrel software, Chevron will develop and deploy proprietary geological and geophysical workflows in addition to standardizing processes.
www.slb.com

CONTROL MICROSYSTEMS, INC. (SCOTTSDALE, AZ) . . . presents 2007 Innovators Award to the Metropolitan Water District of Southern California for Innovation and Excellence in SCADA Applications. The award is given to the engineering team that displays the highest level of excellence and innovation in solving complex SCADA...
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A.O. SMITH ELECTRICAL PRODUCTS COMPANY (MILWAUKEE, WI) . . . appoints Thomas A. Scrimo as senior vice president-global operations and a member of the company's senior leadership team. Scrimo will have overall responsibility for the \$906 million company's electric motor manufacturing operations in the United States, Mexico, China, and Europe...
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CALGON CARBON CORPORATION (PITTSBURGH, PA) . . . announces the election of Randall S. Dearth to its board of directors. Dearth has served as president and CEO of LANXESS Corporation since it was created in 2004, when the former chemicals business of the Bayer Group became a separate...
www.calgoncarbon.com

COMMTST, INC. (KNOXVILLE, TN) . . . opens a brand office in Dubai, UAE. Commtst will use the new office to provide sales and technical support for the Middle East and North Africa Regions, and as the hub for its planned expansion into these markets. Emad Bitar

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Pumping Machinery



temperatures would not cause the piping to expand or contract outside design parameters. In addition to managing crucial pipe wall issues, engineering and fabrication experts designed and installed air actuated isolation valves, pressure relief valves and check valves to complete the functionality of the horizontal, multistage centrifugal pump (horizontal pumping system).

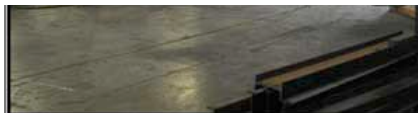
In addition, we used variable frequency drives to vary the pump speed and fluctuate the output to meet desired booster pressures and flows. Our welding professionals even obtained welding recertification to ensure they could produce welds for wall thicknesses required by the customer.

We partnered with an electrical systems packager to design and supply an electrical powerhouse that contains the VFD line filter and critical switchgear and intelligence required to manage skid functions.

Approximately 6000-cu ft of carbon dioxide is needed to produce a barrel of oil. The custom liquid CO₂ booster skid, which was installed in September 2007, now resides at a Resolute facility in Aneth, UT, near the four corners area of Arizona, Colorado, New Mexico and Utah.

■ P&S

Brock Tisdale is the sales engineer for Quadna, Inc., 14452 West 44th Avenue. Golden, CO 80403, www.quadna.com.



The skid was the largest the company had ever built.



The final product is located in Aneth, UT.

...
www.commtest.com

DANFOSS DRIVES (LOVES PARK, IL) . . .

... was recognized as one of the World's Most Ethical Companies for 2007 by Ethisphere Magazine. Ethisphere Magazine annually analyzes, recognizes and rewards ethical leadership and business practices to companies worldwide, and Danfoss is one of just five companies to be...
www.danfossdrives.com

HAYWARD TYLER GROUP (LUTON, UK) . . .

... names Darren Cowley as oil & gas market development manager, responsible for consolidating the company's position in the international oil & gas markets.
www.haywardtyler.com

HYDRAULIC INSTITUTE (PARSIPPANY, NY) . . .

... is seeking qualified individuals in North America to participate in the review process for the draft of updated standards, under the approval of the American National Standards Institute (ANSI). The first, ANSI/HI 9.6.2, Rotodynamic (Centrifugal and Vertical) Pumps – Allowable...
www.pumps.org

FIRST COAL BED METHANE PROJECT IN HENAN PUT INTO COMMERCIAL OPERATION . . .

... The first coal bed methane project in Central China's Henan province was officially put into commercial operation on October 9, 2007. Coal bed methane is the often-referred to gas in coal mine accidents, and is of the same quality as...

INDIAN JOINT VENTURES PUTTING \$10 BILLION INTO REFINING, PETROCHEMICALS . . .

... The diverse network of major project development deals between Indian-based or Indian-connected companies continues with a memorandum of understanding signed between Hindustan Petroleum (HPCL), Mittal Investments (Luxembourg) and Total (Paris, France) to construct a \$6 billion oil refinery and petrochemical...

NTPC-BHEL JOINT VENTURE FORMS INDIAN STATE-OWNED INTEGRATED POWER MONOLITH . . .

... India's state-owned National Thermal Power Corporation (NTPC) has moved past official disquiet on its intentions to engage in the power-equipment-manufacturing sector by signing a memorandum of understanding with Bharat Heavy Electricals Limited (BHEL) to form a joint venture to carry...

CELLULOSIC-BASED ETHANOL PLANT PLANNED BY RANGE FUELS TO START CONSTRUCTION

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SHURflo Pumps & Parts
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NEXT MONTH . . .

Privately held Range Fuels Incorporated (Broomfield, CO) plans to start construction next month on a cellulosic-based fuel ethanol plant in Soperton, GA. After the ceremonial groundbreaking on November 6, 2007, the company expects to start turning dirt at the site...

NEW BIODIESEL PLANT INAUGURATED IN ROSARIO, ARGENTINA . . .

One of the world's largest biodiesel plants with a production capacity of 230,000 tons per year was inaugurated in San Lorenzo in Argentina's Santa Fe Province. The \$30 million plant was constructed by Renova, a consortium formed by Vicentín SACI,...

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www.wqa-aquatech.com

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turbolab.tamu.edu

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