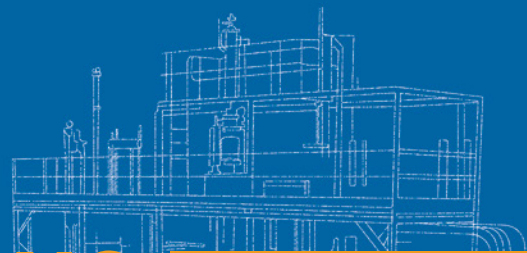


TECHNOLOGY HORIZONS

A publication by Zetron, the pilot plant specialists



FALL 2013

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speed skating

AND MORE!



Horizons is
also available
on our website
at zetron.com



LIFTING OUR BUSINESS TO NEW HEIGHTS

As is often the case in a project-oriented business like Zetron's, new jobs tend to arrive at the same time. In the past year at Zetron B.V., while we were already working on a number of smaller and mid-sized jobs, three large-scale demonstration plant projects were awarded in close succession. And so began a challenging period in our company's history - to manage all these projects, while giving each the attention it needed.

This challenge was accepted wholeheartedly by our engineers and construction technicians, and was

supported by an increase to the physical size of our company, both in terms of shop space and employee headcount. In advance of reaching the construction phase of those three large-scale projects, it was decided to expand the footprint of our construction shop by an additional 40%. This allowed all the project teams to work at the same location, thereby maximizing the safety, efficiency and quality of our projects. The number of staff and contractors doubled during this period, setting a new record for Zetron B.V.

In addition to challenging the limits of our project organisation and increasing

the physical size of our company, we also surpassed the existing record for module weight and size. One of the large-scale demonstration plants consisted of three vertical modules, each with a footprint of 5x6 metres and a weight of 66 tonnes for the heaviest module. In the inset photo, one of these large, heavy modules can be seen being lifted from the manufacturing shop, ready for transportation.

Congratulations to Zetron B.V.'s staff and contractors for their hard work in meeting our customer commitments during this busy period! ■



GLOBAL OUTLOOK

COMMENTARY ON TODAY'S GLOBAL PILOT PLANT DEVELOPMENT TRENDS



Zeton's work in the field of process development involves the design and fabrication of lab scale systems, pilot and demonstration plants and modular commercial plants. In recent years, more and more companies are engaging Zeton to work on multiple plants as they scale their technology from the laboratory to production. Typically,

we start working with a customer at an early stage in the technology development cycle, designing and building lab scale systems or pilot plants to further develop their process. This will be followed by a larger scale demonstration plant, and, depending on the process and the size of the equipment, we can then also build modules for the customer's first (and successive) commercial plants.

There are a number of benefits of this approach for process development that have become apparent through several recent cases where we have worked on multiple plants to develop a particular process. A key benefit is that our project team retains their familiarity with the process and any issues that need special attention during scale up. This significantly reduces the schedule for the subsequent plants that we build. Also, Zeton's team and our customer's project team become accustomed to how each other works, allowing both

teams to work together efficiently through multiple projects. Relationships are also built with key suppliers, allowing for faster equipment deliveries. Another benefit is that the disclosure of the customer's proprietary process information and intellectual property can often be restricted to one external party through the technology development stages.

These benefits also apply in the case of industry-standard pilot plants with the same base design, which we supply to different customers around the world. Examples include the ACE Technology® and Davison Circulating Riser pilot plants that Zeton supplies in conjunction with our technology partners, Kayser Technology and WR Grace. These plants undergo continuous improvements and upgrades, as the design and fabrication team apply the experience gained in working on repeat projects and as new and improved technology becomes available in the marketplace.

Lastly, the same benefits apply to modular commercial plants where a customer plans to build multiple plants of the same process at a number of different locations over a period of time. The efficiency gains in working with one designer-builder on multiple projects will lead to a reduction in capital cost and overall schedule for the subsequent commercial plants.

David Beckman, President, Zeton Inc.

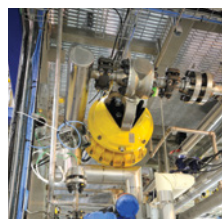
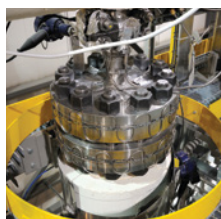
DUTCH MINISTER MR. HENK KAMP VISITS ZETON B.V.



On June 10, 2013, the Dutch Minister of Economic Affairs, Mr. Henk Kamp, visited Zeton B.V. to learn more about the role of pilot and demonstration projects in the biobased economy. According to the Minister, a company like Zeton is truly exceptional. He was very impressed by the high-tech plants that Zeton designs and builds for its customers, and complimented the staff at Zeton B.V. on the important contribution they are making to the emerging biobased economy. The management and staff at Zeton B.V. would like to thank Minister Kamp for his visit. ■

"WE FOUND ZETON TO BE A HIGHLY PROFESSIONAL ORGANISATION DURING THE DESIGN, FABRICATION AND DELIVERY OF THE PLANT, AS WELL AS POST-COMMISSIONING SUPPORT." IAN HENDERSON, DEVELOPMENT PROGRAM MANAGER, QER PTY LTD

ZETON DELIVERS SHALE OIL UPGRADER TO QUEENSLAND ENERGY RESOURCES



Queensland Energy Resources (QER) first contacted Zeton Inc. in May 2009 to design and build a state-of-the-art shale oil upgrading plant to be located at QER's Yarwun, QLD facility, north of Gladstone in Australia.

The original process development work behind QER's shale oil upgrading technology was completed in conjunction with the National Centre for Upgrading Technology (NCUT) in Devon, Alberta, Canada. This was followed by process design work together with US consultants, and validation of the technology in a program at Southwest Research Institute, San Antonio, where small quantities of ultra-low sulphur diesel and jet fuel were produced. The project then progressed into Basic Engineering, involving the teams from QER, Procom (led by Steve Yeardley) and Zeton, led by Leisl Dukhedin-Lalla. An important consideration for the project right from the start was that the plant had to meet all applicable Australian electrical and mechanical codes and standards.

QER's Oil Upgrader Plant (OUP) is a 30 BPD pilot plant for upgrading raw oil extracted from oil shale, into finished products. The feed source is produced upstream by a high temperature pyrolysis, or retorting, process that converts the kerogen in the shale oil to a raw oil. The raw shale oil is then hydrotreated in the OUP. The unit was designed to perform several levels of upgrading, including production of Stabilized Synthetic Crude Oil (SCO, or Syncrude), Low Sulfur Fuel Oil (LSFO), Fungible Jet A-1 (Kerosene) and Ultra Low Sulfur Diesel (ULSD).

In order to accommodate the various modes, the system was designed with 8 hydroprocessing reactors for various stages of hydrotreating including saturation, demetallising, hydrodesulfurization, hydrodenitrogenation and dewaxing, with design conditions of 2205 psig @ 900 F. The OUP also included a distillation column designed to be operated in various modes to realize the various cuts of SCO, LSFO and raw distillate, Kerosene and ULSD.

Following completion of Basic Engineering, approval for detailed design, procurement and fabrication was given in June of 2010 whereupon structural steel frames were fabricated and the long lead equipment items were ordered. Manufacturing began in earnest in September 2010, and completed modules were factory tested and shipped from Zeton's Burlington facility between



TIPS & TOOLS

ADVICE FOR SUCCESSFUL
PILOT PLANT PROJECTS

February and March 2011. Following transportation to site by ocean freight and truck, reassembly of the process modules took approximately 3 to 4 months. In total, the fully-assembled plant consisted of six process modules with a combined footprint of 1150 square feet and an assembled height of 36 feet.

Now fully operational, the Oil Upgrader Unit at QER's New Fuels Development Centre has the capacity to produce (in campaigns) approximately 30 barrels per day of ultra-low sulphur diesel, as well as jet fuel, low sulphur fuel oil and other products. ■

"We are really pleased to have achieved the milestone of producing our first quite large batch of ultra-low sulphur diesel for trucking trials. QER has achieved a first in being the

only shale-to-liquids operation in the world to include all stages of the process from the mining of oil shale to the production of finished transport fuels, and this will assist in providing a showcase that justifies the scaleup to a commercial scale project. We found Zeton to be a highly professional organisation during the design, fabrication and delivery of the plant, as well as post-commissioning support. This has led to a quality process unit that has now delivered as per expectations."

Ian Henderson, Development Program Manager, QER Pty Ltd.



QER's Jason Pringle with a sample of the intermediate raw distillate product from the Oil Upgrader Plant. This material is the feedstock for operation of the higher-pressure Mode 2 operation that produces retail quality ULSD (Photo courtesy of Queensland Energy Resources).



How are fast track projects kept on schedule, or even accelerated, to cope with the needs of a faster moving world? The answer lies in the innovative use of new technology and a willingness to work with customers to realize schedule improvements.

Modern networking technology allows diverse project teams to work in real time, with up-to-date information. At Zeton, we have developed an integrated, digital and real time online environment to support the different phases in the production process. Using modern handheld devices like the iPad technology, we are able to track the construction progress and generate live reports to accurately display the progress to date.

In Enschede, Zeton B.V. has also developed a videoconferencing application, which allows customers, via a secure link, to step into our construction shop and view progress on their project while sitting in their office. In this way, our customer becomes part of our design and construction team, ensuring early feedback and suggestions, which is a basis for further improvement in schedule and product quality. ■

TRIBUTE TO ARCHIE BENNETT



A piece of cake for Archie

Zeton staff at the Burlington and Enschede offices would like to pay tribute to Archie Bennett, formerly President of Zeton Inc. and recently retired Chairman of Zeton International, by recognizing his immeasurable contribution to the growth and success of Zeton since joining the company in 1989.

Twenty four years ago, Zeton was a start-up company with less than 20 employees, operating out of an industrial strip mall in Burlington. Today, Zeton operates out of two state-of-the-art facilities in Burlington and Enschede, and boasts a headcount of over 200 employees, including permanent staff and contractors.

While there have been many successes, Archie's greatest accomplishment was the acquisition and incorporation of Zeton B.V. in 1996. Operating out of two stand-alone but complimentary divisions, Zeton has established itself as the world leader in its industry, serving customers in 35 countries across six continents, while completing over 750 projects (and counting).

A celebration of Archie's time at Zeton was held on September 25, 2013 in Burlington, with staff from both the Burlington and Enschede offices attending. On behalf of everyone at Zeton, and the many customers with whom Archie worked during his time at Zeton, we would like to wish Archie and Jan a long and happy retirement. ■

TEAM SPIRIT HIGHLIGHTING THE ACCOMPLISHMENTS OF OUR STAFF IN THE DUTCH AND CANADIAN OPERATIONS

ZETON B.V. TEAM MEDALS IN SPEED SKATING EVENT

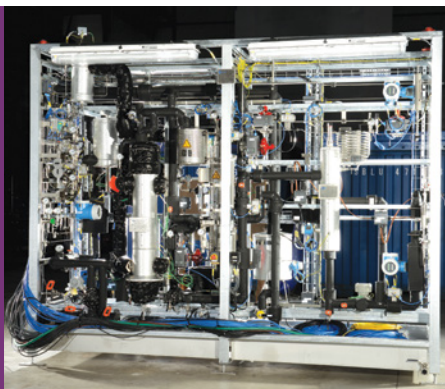
Earlier this year, the Twente regional companies' speed skating team pursuit took place on the indoor ice skating rink in Enschede, The Netherlands. Employees of a number of companies in the region tied their laces to compete against each other. Zeton B.V. participated with two teams, one recreational and one professional, and both took part in exciting races. With encouragement from their families and colleagues, both teams can be proud of their results, with the recreational team achieving a bronze medal finish! It was a very enjoyable event, and both teams plan to compete again next year.



IN BRIEF

HIGHLIGHTING RECENT AND COMPLETED PROJECTS AND ENGINEERING STUDIES

- A bio-based propylene glycol pilot plant
- A novel Fischer-Tropsch reactor technology demonstration plant
- A conventional hydrotreater pilot plant
- A large-scale chemicals demonstration plant
- Completion of a large modular semi-works polymer plant
- Completion of a MBU Pilot Plant with IH2® technology
- An extended basic design study for a small-scale bio-oil production plant
- A basic engineering study for a combined pyrolysis and DCR pilot plant
- A basic engineering study for a specialty chemicals pilot plant



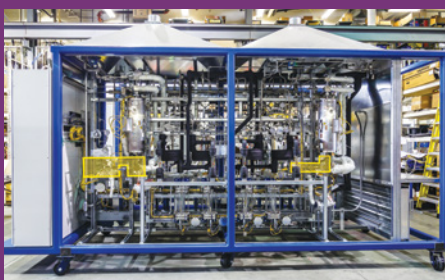
A renewable chemicals product upgrader pilot plant



A high throughput testing plant with 12 parallel reactors



A hydrotreater pilot plant for a customer in Russia



Lab scale fixed and fluidized bed catalyst testing system



A biomass gasification pilot plant



CONTACT US

TO DISCUSS YOUR PILOT PLANT REQUIREMENTS
OR ITEMS IN THIS ISSUE OF HORIZONS, PLEASE CONTACT:

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