

TECHNOLOGY HORIZONS

A publication by Zeton, the pilot plant specialists

SPRING 2014

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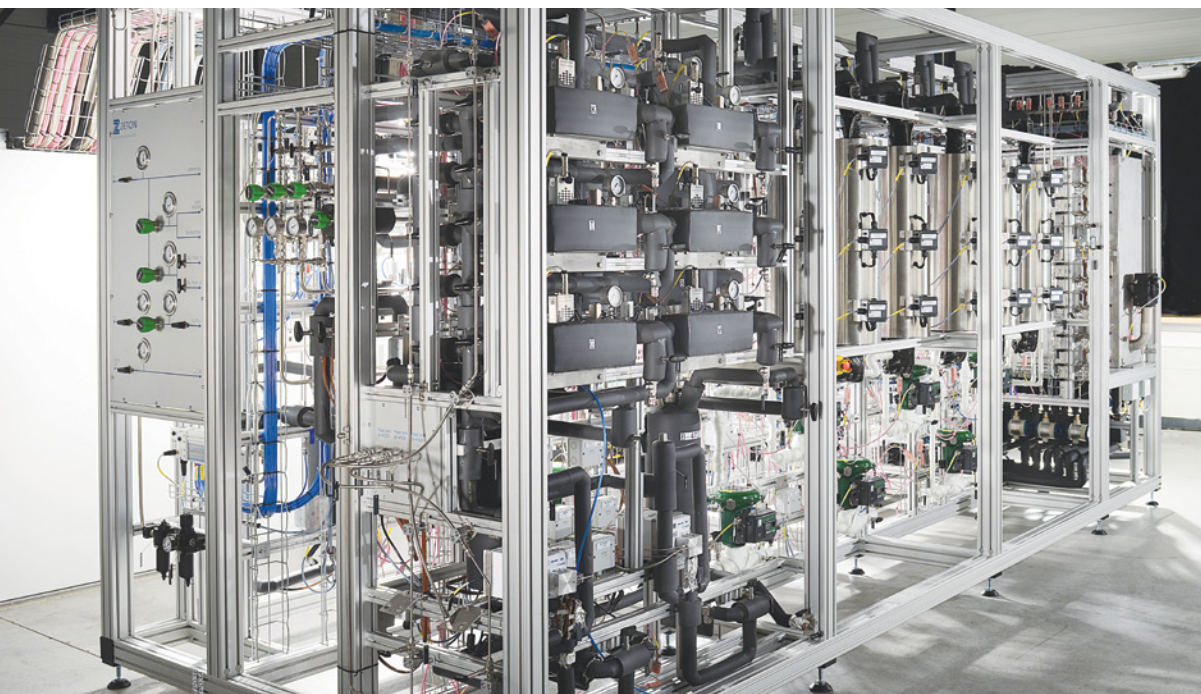
He Shootzzzz, He Scorezzzz!

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AND MORE!



Horizons is also available on our website at zeton.com



TOPSØE AND ZETON CELEBRATING 15 YEARS

Topsøe, a global supplier of catalysts and technology, has served a wide range of industries and customers since it was founded in 1940. Zeton is proud of its association and longstanding cooperation with Topsøe over a 15-year period, with pilot plants supplied for catalyst testing and process development, and demonstration plants supplied for the development of new process technologies.

As a global leader, Topsøe has worked with Zeton's operations in both Burlington, ON, Canada and Enschede, The Netherlands. Over the past decade and a half, Zeton has designed, built and delivered more than 10 pilot plants to Topsøe, underlining

the special relationship developed between the companies during this time. The companies share a common understanding of the importance of product quality and safety, and how both are paramount to achieving the desired results for Topsøe's catalyst research and process development programs.

As usual, people are the key to a successful relationship. Working with the same people on joint projects over the years has in itself acted as a catalyst, leading to improved yield and selectivity in the projects completed! Through multiple project executions together, and an excellent understanding

of Topsøe's requirements, expectations and preferences in pilot plant projects have been reached. In addition, the technical capabilities and experience with similar processes and plants within both companies has created the opportunity to maximize results.

Moving forward, there is a commitment at Topsøe and Zeton to seek improvements in quality, costs and project schedule, in addition to bringing our cooperation to the next level. This shared spirit of cooperation has been the key to the success of past and present projects which, we hope, will be the basis for new projects to be realized in the future. ■

"ZETON HAS DONE EXCELLENT WORK ON THIS UNIT." LYMAN FROST, CHIEF TECHNOLOGY OFFICER, WESTERN HYDROGEN



ZETON DELIVERS HYDROGEN TECHNOLOGY PILOT PLANT TO WESTERN HYDROGEN

Zeton delivered a first-of-its-kind pilot plant to Western Hydrogen in Fort Saskatchewan, Alberta in late 2012. The plant uses Molten Salt Gasification technology, which was licensed by Western Hydrogen from the US Department of Energy's Idaho National Laboratory, and Zeton collaborated with both organizations on the project. The ultimate goal for the plant is to produce hydrogen from a variety of carbon-based feedstock in addition to the current asphalt feedstock. These could include petroleum coke, natural gas, and glycerol, which is a waste from biodiesel production. In September 2013, Western Hydrogen announced that it had accomplished its preliminary goal of producing hydrogen gas with asphalt as the feedstock.

The plant had a number of unique and challenging attributes. It operates at very high temperatures and pressures, making safety a significant concern for

the detailed engineering effort. In fact, Zeton was involved with the project from the earliest stages of Basic Engineering, familiarizing itself with the unique aspects of the technology. Zeton also participated in the HAZOP study, along with Western Hydrogen and Idaho National Laboratory.

The most critical and unique component of this plant was the furnace system. Since the reactor would run at pressures up to 2000 psig and temperatures up to 1000 °C, it needed to be housed in a special furnace which could be pressurized to maintain the reactor at low differential pressure. This furnace system had critical safety systems, including an intricate locking mechanism to ensure that the furnace could not run unless it was properly closed. It also included a water cooling system and a dedicated control system. This system was integrated mechanically, electrically, and in the control system by Zeton. Close liaison and coordination with the furnace vendor

was essential to the successful completion of the project.

One of the other challenging aspects was a 300 kW boiler designed for 2500 psig. Safety was also a major concern for this piece of equipment. Zeton's mechanical engineer designed this vessel and obtained approval from the Alberta Boiler Safety Association (ABSA). Zeton's qualified welders fabricated the vessel and all essential testing was performed to ensure safe operation.

Zeton used project management skills, creativity and attention to detail to remain on schedule for Western Hydrogen. For example, although the furnace system was ultimately delivered later than scheduled, Zeton was able to mitigate the effect of this delay by doing all work possible prior to its arrival. A mock-up of the furnace body was built and installed in the plant so that piping and tubing could be pre-fabricated and run. This required close attention to the 3D model and drawings, and skilled fabrication. This was done successfully, thereby minimizing the effect of the late delivery of the furnace on the project schedule.

Overall, Western Hydrogen was very pleased with Zeton's work. Lyman Frost, Chief Technology Officer, referring to a planned future addition to the plant:

"I anticipate that based on the excellent work your firm has done on this unit that we will be back to Zeton for engineering design and fabrication of this additional scope. The best test of a satisfied customer – repeat business." ■

ZETON DELIVERS DCR FCC AND BIOMASS PYROLYSIS PILOT PLANTS TO NREL



In November 2012, Zeton Inc. was awarded a contract by the Energy Department's National Renewable Energy Laboratory (NREL) in Golden, CO for the design and fabrication of a Grace Davison Circulating Riser (DCR) FCC pilot unit, and a biomass pyrolysis pilot plant. While the Grace DCR unit was a standard design, the novel aspect of the project was the custom, front-end biomass pyrolysis pilot plant connected to it.

The first step in the project was the completion of a Basic Engineering Study,

following which the project was approved for fabrication in May 2013.

The pyrolysis pilot plant consisted of a biomass feeder, a pyrolysis reactor and downstream solid and liquid separation sections. The biomass feeder comprised a gravimetric feeder, a pressure lock hopper, a feed hopper with an internal arch-breaker and a live bottoms screw feeder capable of dosing up to 4 kg/hr of dry biomass to the pyrolysis reactor. The biomass feed system was successfully tested on a mixture of pine, oak and

switch grass ranging in size from 200 - 2000 microns.

The pyrolysis reactor was a fluidized bed type which operated at 50 psig and used either steam or nitrogen as the fluidizing medium. Downstream of the reactor, two cyclones and a hot gas filter removed fines from the pyrolysis vapour stream, while a direct contact condenser/cooling system condensed pyrolysis vapours and collected bio-oil product and water. In addition, the pilot plant also included a custom device designed to eliminate char plugging.

Liquids collected from the biomass pyrolysis plant may be co-processed in the Grace DCR unit. The system was also configured to enable a slip stream of the hot pyrolysis vapours or the non-condensable gas stream to be fed directly to the DCR. ■

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

HE SHOOTZZZZ, HE SCOREZZZZ!

The Al Reid Memorial Hockey Tournament in Niagara Falls, Ontario is an annual pilgrimage for the Zeton Zoomers hockey team. For the past 7 years, the age-defying "Over 35" veterans have been showcasing their skills in the weekend-long competition, while raising money for local charities.

This year, the Zoomers began by facing off against the Niagara South Oldtimers, with the Oldtimers storming back from two goals down to win the game 6-2. The second game against the G&S Old Macks was much closer, with the Macks holding

a slender 1-0 lead heading into the final minutes of the game. The final game saw the Zoomers battle the Galvcast Oldtimers. The Zeton team played with heart, but Galvcast proved too strong offensively, as they handed the Zoomers their second 6-2 loss.

Although the Zoomers failed to advance to the championship game, they represented the company with distinction, and took home some valuable lessons for next year: practice more and recruit a bunch of young ringers!



IN BRIEF

HIGHLIGHTING RECENT AND COMPLETED PROJECTS AND ENGINEERING STUDIES

- A continuous emulsion polymerization pilot plant
- A Grace DCR FCC unit with a front-end biomass pyrolysis pilot plant
- A speciality chemicals polymer pilot plant
- A heavy oil upgrading pilot plant
- Several ACE Technology® R+, AP, HT-100, C and FB units
- A basic design study for a continuous pharmaceutical production plant
- A preliminary engineering study for a biomass pretreatment pilot plant



A biomass to green fuels pilot plant



A large scale chemicals demonstration plant



A free fatty acid pyrolysis pilot plant



A bio-oxidation and crystallization pilot plant



CONTACT US

TO DISCUSS YOUR PILOT PLANT REQUIREMENTS,
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