

TECHNOLOGY HORIZONS

A publication by Zetron, the pilot plant specialists

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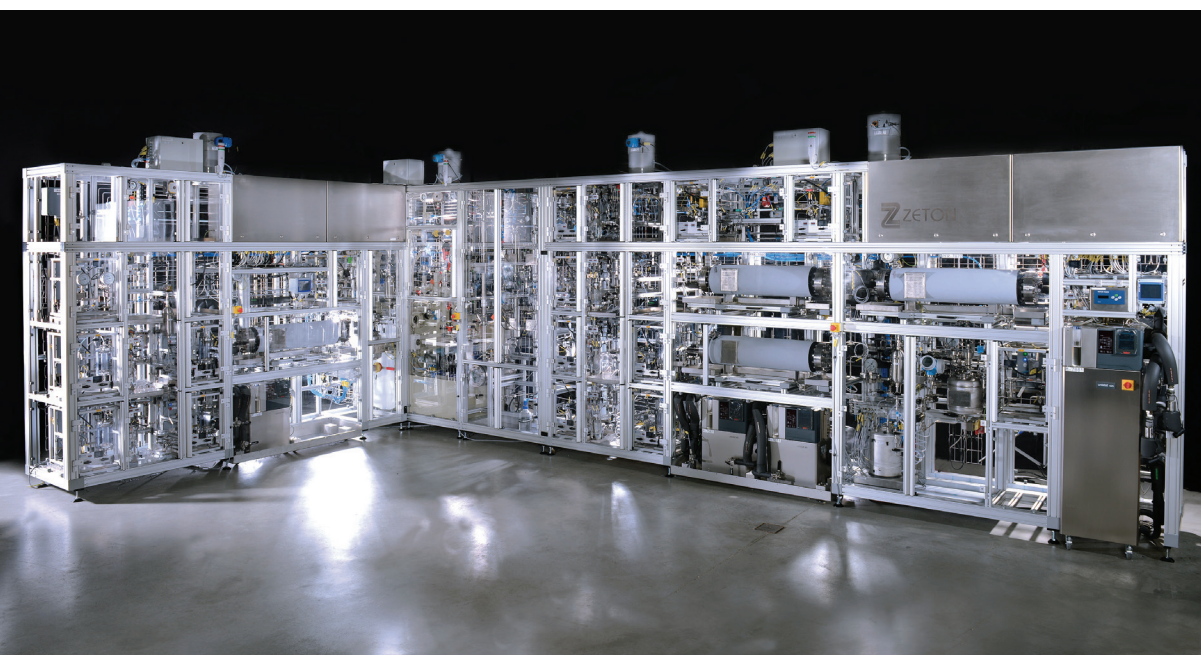
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Horizons is also available on our website at zetron.com



MODULAR FLOW CHEMISTRY API PRODUCTION SYSTEM DELIVERED TO GSK

GlaxoSmithKline (GSK), a science driven global manufacturer of innovative medicines, has reached the next milestone in continuous API products production. GSK's experience in flow chemistry and Zetron's experience in the design and fabrication of lab scale systems and modular pharmaceutical plants were the key ingredients in realizing this project.

To design for continuous production, and create certainty in long term operation, the system requires hot-swap functionality for critical equipment like pumps and instruments, and the implementation of a

submodule philosophy, where standardised submodules can be switched out during operation. The automation solution for the pharma plant ties everything together, to ensure all production is compliant.

Looking forward, working with submodules also creates flexibility. Rearranging the different submodules provides the option to run multiple processes with the same equipment in a plug and play arrangement, and accelerates the development time from lab to production.

This adaptability in scale-up was demonstrated during project execution,

when an additional processing step was changed from batch to continuous. This extra process section was seamlessly integrated into the overall plant, using the standardised submodular approach.

Zetron is proud to have been GSK's partner for the first industrial scale continuous modular API production plant. The strong (and flexible) cooperation between the project team members, together with each party supplying its know-how and expertise, has created a solid foundation for the efficient realization of continuous pharma processing systems in the future. ■

“ZETON WORKED CLOSELY WITH US TO FAST-TRACK THE DESIGN AND CONSTRUCTION OF A WORLD-CLASS PILOT PLANT.” NEIL CAMARTA, PRESIDENT & CEO, FIELD UPGRADING

ZETON DELIVERS NOVEL HEAVY OIL UPGRADING PILOT PLANT TO FIELD UPGRADING

After a successful project with Western Hydrogen in late 2012, the same key investors are now behind a new Canadian venture named Field Upgrading Ltd. (FUL). Neil Camarta and his team approached Zeton at the very early stages of development of another new, challenging and potentially market-disrupting technology for the desulphurization, heavy metal removal and partial upgrading of heavy oils, invented by and developed in concert with Ceramtec in Salt Lake City, Utah.

This new process injects liquid sodium metal into the heavy oil feedstock, along with hydrogen at conditions which are very modest relative to those used in a hydrocracker. The sodium substantially desulphurizes the feed without generating H_2S , removes the nickel and vanadium, and results in partial upgrading (reducing density, viscosity and TAN), producing a solid byproduct stream. Feeds including Athabasca bitumen, vacuum resid, hydrocracker bottoms and asphaltenes can be successfully upgraded using the technology, in some cases producing products which may be directly marketed to end users without further processing or blending. The key to the process is regenerating the feed sodium. This is done using a proprietary ceramic membrane electrolysis cell developed by Ceramtec.

Field Upgrading involved Zeton into the project from the earliest proof-of-concept testing stages. Zeton was uniquely qualified to assist Field Upgrading with the desired pilot project, which was to operate at a substantial scale (10 bbl/d) to demonstrate the commercial viability



of the process to an oil market which sometimes dismisses smaller units as mere “pots and pans”. Zeton assisted with monitoring and providing input to the lab development program, providing references for specialist subject matter consultants, advice related to reaction engineering, preparation of a mass and energy balance, and of course the ultimate design and costing of the process modules for the pilot plant. FUL's aggressive schedule required flexibility to work with a partially defined and continually evolving design basis. Each module of the combined pilot plant was designed and proposed as soon as sufficient lab data was available. By carrying out the preliminary design, basic design, then procurement and fabrication for the plant modules in parallel phases as the lab data became available, with designed breaks between modules to allow their testing in isolation as each one is complete, the program was able to save as much as one year in overall project schedule. Succeeding in this type of aggressive project execution takes mutual trust and close cooperation

between the project teams, which Zeton had earned and demonstrated to the founders of FUL on their previous project.

The pilot plant, recently completed and shipped to FUL's Fort Saskatchewan Alberta site, contains many innovative solutions to the unique challenges of piloting this novel process. Zeton's role in the project also extended to the design and procurement of utility packages and other components outside the skid battery limits. Zeton is also providing reassembly and pre-commissioning support to ensure a smooth hand-over to the operating team. ■

“We involved Zeton right off the bat – when we had nothing more than some really encouraging lab-scale data. From there, Zeton worked closely with us to fast-track the design and construction of a world-class pilot plant.”

Neil Camarta, President & CEO of Field Upgrading

ZETON INC. AND LEE ENTERPRISES CONSULTING FORM STRATEGIC ALLIANCE IN EMERGING TECHNOLOGIES AREA



LEE ENTERPRISES
CONSULTING, INC.

Zeton Inc. is pleased to announce a strategic alliance in the emerging technologies area with Lee Enterprises Consulting, Inc., an umbrella organization for a team of consultants and strategic alliance partners with a worldwide presence across many different industries.

"We have a number of clients in biofuel emerging technologies" says Wayne

Lee, CEO of Lee Enterprises Consulting. "Zeton is a world leader in the scale-up of technology - from bench scale, to pilot plant to full-scale demonstration facility - so this alliance will be of great benefit in our serving those clients." Lee notes that while his group has alliances with companies specializing in biodiesel and ethanol plants, the building of demonstration plants using emerging technologies has been challenging. "As we continue to field more calls about pyrolysis, biochar, torrefaction, and other emerging technologies, I continue to be very excited about our new alliance with Zeton."

David Edwards, Zeton Inc.'s Vice President of Sales & Marketing: "Zeton is excited to be joining Lee Enterprises Consulting as a strategic alliance partner, and our focus will be on the new and emerging technologies area, where the company has significant expertise which will greatly benefit the group. The group also allows Zeton's clientele access to a highly credentialed team of consultants available to handle their specialized emerging technology needs." ■

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

CONGRATULATIONS TO ZETON'S RIDE FOR THE ROSES TEAM!

On September 6, 2015 the 18th edition of the Ride for the Roses was held in the Netherlands. A popular 25, 50 or 100 km event in the Dutch cycling calendar, Ride for the Roses is a bike ride in support of the fight against cancer.

It is a well-known event for Zeton B.V. employees and their families as well. Many staff ride recreationally, and have completed the Ride for the Roses before. This time a group of experienced and inexperienced Ride for the Roses cyclists joined the Zeton team.

To make it even more challenging, they started their ride a day early. Together with people living in the eastern part of Holland, they cycled the "Pre-Ride". This involved cycling to the start of the Ride

for the Roses event at the Flora Holland Flower Auction in Aalsmeer, a distance of 200 kilometers from Enschede.

On the day of the ride itself, they all cycled the longer 100 kilometers route through the beautiful landscape of the Netherlands. The finish was a special

moment, with each participant receiving a rose, symbolizing "a tomorrow for everyone". In a sporty, healthy and enjoyable way, 9,000 cyclists took a stand against cancer and raised EUR 854,000 for the KWF cancer foundation. Congratulations to all Zeton-staff participants!



IN BRIEF

HIGHLIGHTING RECENT AND COMPLETED PROJECTS AND ENGINEERING STUDIES

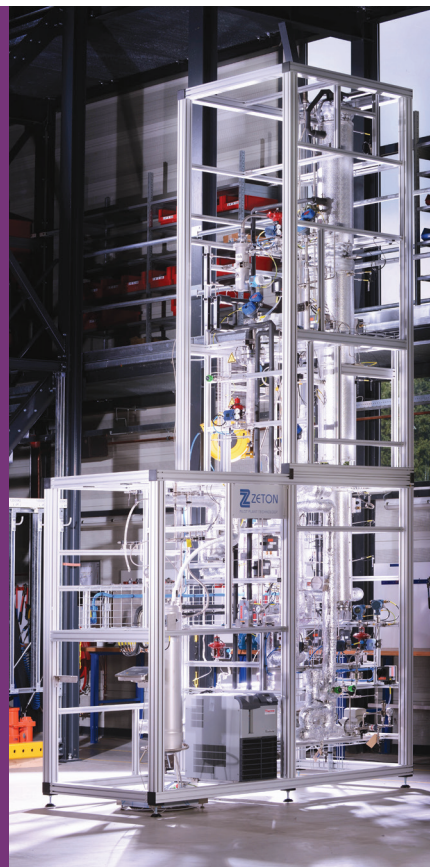
- A heavy oil upgrading pilot plant
- A biomass pretreatment pilot plant
- Two polyolefins pilot plants
- A fractionation pilot plant
- A basic design for a GTL pilot plant
- A basic design for a bio-catalytic power to gas demonstration plant
- A basic engineering study for an FT pilot plant
- A preliminary engineering study for a produced water recycle pilot plant
- Several control system (upgrade) projects



A bench scale chemicals catalyst testing unit



A polyolefins pilot plant



A fractionation pilot plant



CONTACT US

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

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