ZETON

REALIZE THE FUTURE

TECHNOLOGY HORIZONS

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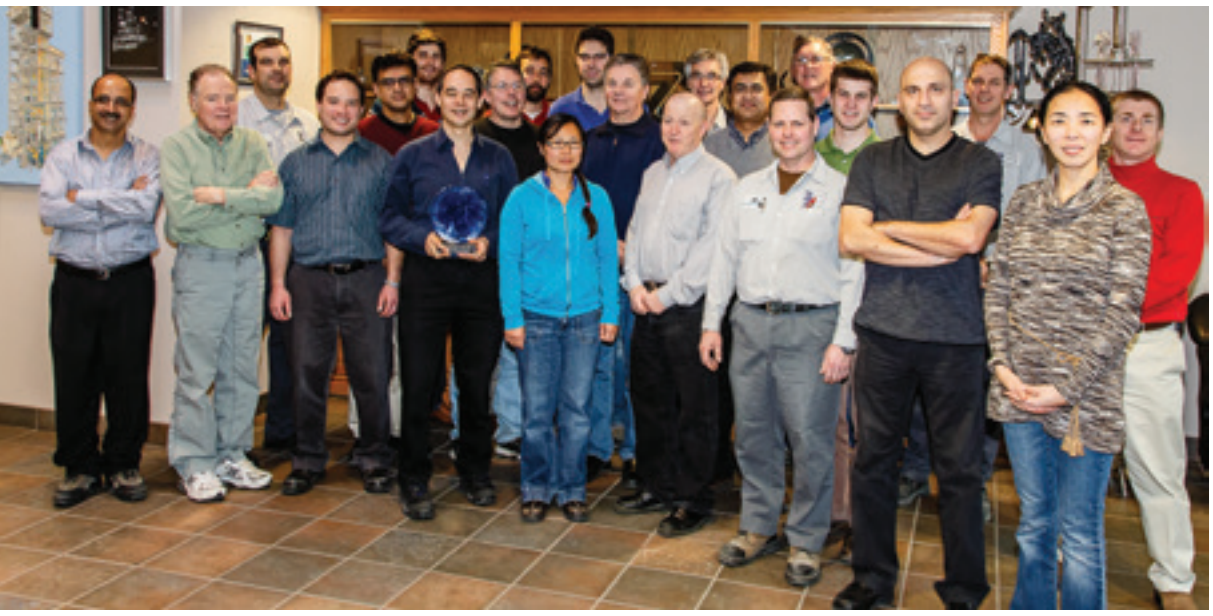

ZETON WINS PRESTIGIOUS INTERNATIONAL DESIGN AWARD

Zeton is proud to announce that its Modular GTL Commercial Demonstration Plant project for CompactGTL and Petrobras was recently chosen by Bentley Systems, Inc. as the award winner in the category of Innovation in Process Manufacturing at the 2012 *Be Inspired Awards* conference in Amsterdam, The Netherlands.

Commenting on the award, Senior Project Manager Troy Wong said, "From an engineering perspective, this was an exciting and challenging project, where the requirements for a compact, modular layout for future commercial scale implementation superimposed fundamental constraints on the design and routing of the hot reformer piping operating at 815 °C. The application of Bentley AutoPLANT and AutoPIPE design tools, in combination, was a key factor in the project's success, and we would like to thank Bentley for recognizing the innovative and groundbreaking engineering work that went into completing this project."

David Beckman, President of Zeton Inc. added, "That this project should take top honors in the Be Inspired Awards program is a source of pride for everyone involved in the project, and is a testament to the extraordinary achievements of the project teams at Zeton and CompactGTL. Given the strength of the submissions to this year's competition, we are truly honoured to be recognized alongside the other 2012 *Be Inspired Awards* recipients."

As previously reported in Horizons, following proof of successful operation in January 2011, Petrobras successfully concluded its qualification test program on the Modular GTL Commercial Demonstration Plant, and has qualified and approved CompactGTL's process and technology for use by Petrobras. For a 3D image of the award-winning plant, see the *Tips and Tools* article on Page 4 of this edition of Horizons.

GLOBAL**OUTLOOK**

COMMENTARY ON TODAY'S GLOBAL PILOT PLANT DEVELOPMENT TRENDS

When looking at today's economy, it's encouraging to see how the chemical industry appears, in general, to be only slightly affected by the market volatility that dominates the news on an almost daily basis. At the same time, as shareholders become more actively involved, legislation to push for a constantly safer and cleaner world becomes increasingly important, and public opinion changes rapidly.

In this environment, industries need to change, and so do the companies within each industry. The most successful companies embrace this responsibility, and take a leadership position in managing change. Such initiatives drive the need for innovation in our fast-moving world, where today's innovation is tomorrow's history.

Now more than ever, these industry-wide trends and shifts in behaviour serve to underscore the importance of time-to-market for new products and technologies. Today, successful businesses require new models of cooperation, where buyer-supplier relationships join together in co-developments and strategic alliances. It's as the old African proverb says: *if you want to go quickly, go alone; if you want to go far, go together.*

How can we learn from each other, and fuel each other's leadership in a specific field? To be truly innovative, we must be creative, and be willing to expose ourselves to new ideas. Over the recent period some nice examples of partnering have been highlighted in the media, not only in the chemical industry, but also in adjacent areas like the semi-conductor industry.

At Zeton, we have noticed this trend now over several years. In partnership with our customers, we have become more and more involved in all aspects of the project from the development phase of innovations through to market entry. Teaming up has led to numerous examples where two of the most important factors in a new business launch – the overall development time, and the total product development costs – have been significantly reduced.

The articles in this issue of Horizon highlight several projects where teaming up was the key to success, both for our customer and for Zeton. Do you recognize the need for change and the same drive for innovation in your company? If so, now is the time to act!

Johan ter Harmsel, Managing Director, Zeton B.V.

Scaling Factors for Bioenergy Processes

The scaling factor for any given process depends on the technology under investigation. The table shows typical scaling factors for bioenergy and biofuels projects compared with the scaling factors for traditional CPI gas-liquid processes. The scaling factors for bioenergy and biofuels processes are an order of magnitude lower than for CPI processes, a consequence of the inherent challenges associated with biomass processing.

Scaling Factor *(typical capacity)*	Traditional CPI Gas-Liquid Process	Bioenergy Process with Solid Biomass Handling (dry basis)
Bench/Lab	0.001-0.1 *1 – 10 ml/min*	0.01-0.1 *1 – 10 g/hr*
Pilot	1 *1 – 5 l/hr*	1 *1 – 5 kg/hr*
Demonstration	100 – 1,000 *5 – 100 bbl/day*	10 – 100 *1 – 5 t/hr*
Commercial	10000 – 30000 *30,000 – 100,000 bbl/d*	1000 – 5000 *200 – 1000+ t/d*

For companies engaged in developing biofuels and bioenergy technology, it is important to work with a company with experience in this industry segment. Since 1986, Zeton has completed twenty biofuels and bioenergy projects involving a wide variety of solid feeds and processes. Several recently completed projects are highlighted in *In Brief* on Page 6.

"ZETON DEMONSTRATED ALL THE REQUIRED COMPETENCY, FLEXIBILITY AND KNOW-HOW." OLIVIERO DIANA, SENIOR PR

SOLVAY AND ZETON DEVELOP FIRST-OF-A-KIND IN SITU FLUORINE PRODUCTION PLANT






As part of the recent trend of using smart-scale satellite production units, Solvay has developed a new, modular plant concept for on-site electronic grade fluorine gas (F_2) production. This cost-effective F_2 production method enables substitution of the potent greenhouse gas NF3 in the photovoltaic, semiconductor and display industry [as a greenhouse gas, NF_3 is 17,200 times more potent than CO_2]. The replacement of NF_3 decreases both the net consumed gas volume and the cleaning time, resulting in improved productivity for the end user. Modularity also gives a high degree of freedom in regards to location, and facilitates future expansion to increase capacity.

For demonstration of this novel technology, the first plant has been designed and built in a partnership between Solvay and Zeton. Solvay's long-standing experience as a Fluorine producer and Zeton's expertise in small scale plant modularization laid the foundations for this partnership. The handling and processing of Fluorine gas must be accomplished with great care, independent of the scale of the process. Safety was, therefore, a prominent aspect in the design of the process, the plant and the skid modules themselves.

The modular F_2 production plant is a self-contained plant including utilities, operator rooms, control/electrical rooms, with the possibility for expansion to include a small laboratory. A novel lifting system has been integrated into the plant to minimize the requirement for external cranes during maintenance of heavy equipment.

While producing F_2 locally at the end-users location is the ultimate goal, Solvay retains control of the plant, and has the option to relocate the plant on short notice and at nominal cost. Zeton enables this ownership and business philosophy during the design and manufacture of the plant modules in its integrated design-build facility. Following the transportation of the complete plant as separate modules to the end user site, reassembly and start-up is achieved quickly. When you can move the modules once, you can move them a second and third time if necessary.

In Zeton's modularization philosophy, both the process itself and the transport and reassembly requirements of the plant are the overriding considerations during the design of the modules. The decision to build the plant in a vertical or horizontal orientation is only made following a complete review and analysis of the process and project requirements. Zeton then applies its standardization techniques and expertise to enhance the modular design characteristics, but only after the optimal sizing and orientation of the plant modules has been determined.

This modularization philosophy has been applied for the Fluorine gas production unit for Solvay. Where a traditional approach would have resulted in a completely different plant, now the plant is built in skid modules for ease of relocation and site reassembly. In fact, the 10 individual modules were reassembled on site, ready for power-up, in the shortest time possible. ■

"Innovation can be complex, expensive and not without risk, and nowadays few companies worldwide are left which can fully develop your project in all required details.

OCESS ENGINEER, SOLVAY

We started our collaboration with Zeton with a well-advanced design concept, nevertheless Zeton was able to simplify and reduce costs even further. Although some key people changed during the time of project deployment, Zeton demonstrated to possess all the required competency, flexibility and know-how needed to deliver the expected results and bring real added value to our project. In particular, we appreciated the flexibility in handling the unforeseen, and the straightforward information flow between Solvay, Zeton's design office, Zeton's workshop and subcontractors. I would suggest Zeton for future projects!"

Oliviero Diana, Senior Process Engineer, Solvay

TIPS & TOOLS

ADVICE FOR SUCCESSFUL PILOT PLANT PROJECTS

The Information Age has given rise to sophisticated 3D Computer-Aided Design (CAD) tools which have revolutionized the way that modular plants are designed. A 3-dimensional design created in Bentley AutoPLANT, AutoCAD® Plant 3D or a similar application is an essential part of any pilot plant project, facilitating the equipment layout, structural steel design, piping and conduit runs, the HAZOP study review, and more.

The benefits of 3D plant design are not limited to the detailed engineering phase of a project, however. Zeton has successfully applied its 3D design expertise in early-stage preliminary (conceptual) engineering, starting from a simple Process Flow Diagram. Our customers are able to visualize the plant at an early stage, and make informed decisions about building requirements and site location.

Once the preliminary 3D layout is underway, Zeton can export it to a non-proprietary file format which customers can view on their laptop or desktop computer using a free-to-download utility. This allows customers to review the 3D layout with their project team, while also providing senior management with a visual representation of the plant as part of due diligence in approving the next step. ■

SMALL SYSTEMS GROUP DELIVERS LAB SCALE CATALYTIC REFORMER UNIT TO SASOL

Sasol Technology, an international integrated energy and chemical company headquartered in South Africa, approached Zeton B.V. for the design and fabrication of a custom lab scale Catalytic Reformer/Isomerization unit. Sasol's previous experience of working with Zeton, and Zeton's experience of having previously delivered multiple versions of this type of unit, resulted in a positive start to the project.

Significantly, this was the first lab scale system that Sasol had contacted Zeton for. Zeton B.V.'s Small Systems Group, a dedicated group of engineers and technicians focused on designing and building lab and bench scale systems, managed the project. Following a review of Zeton's initial technical proposal and incorporation of customer-requested changes to ensure the final unit would meet Sasol's research criteria, the project started with the detailed design phase and ordering of long lead equipment items.

There were a number of specific solutions implemented to enhance the unit's functionality. For example, Zeton suggested using a differential pressure transmitter to control the level in the gas-liquid separator. While this measurement technique was not used on previous Sasol lab scale units, it proved successful during factory testing. A custom alloy reactor was designed to meet Sasol's requirements, and special tools were supplied to facilitate catalyst loading and unloading. And Zeton implemented a syringe pump in continuous operating mode for the addition of additives at a low and constant flowrate.

The close cooperation between the Sasol and Zeton teams during the execution of the project paid dividends, in particular, during the factory acceptance test, with Sasol supplying the unit's control system. The end result was a successful acceptance test, and the delivery of a lab scale unit that precisely met the requirements of Sasol's research program. ■

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

ZETON REPEATS AS CHARITY BEACH VOLLEYBALL TOURNAMENT CHAMPIONS!

Last summer, employees, friends and family from Zeton's Burlington office competed in the Heatwave charity beach volleyball tournament. This annual fundraising event provides valuable support to The Hospital for Sick Kids Foundation, to assist in childhood cancer research.

In the recreational division, Zeton's team battled hard as new teammates worked through some growing pains. They enjoy themselves immensely, and vowed to come back stronger next year. Meanwhile, in the competitive division, Zeton's team was as dominant as they were in 2011, rolling through the competition to a convincing win in the final match, making them the repeat champions and favourites for a three-peat 2013!

Zeton once again had an impressive fundraising effort, with over $2,500 in pledges and tournament entry fees, including a generous corporate donation from Zeton Inc. Congratulations to both Zeton teams for another outstanding tournament, and many thanks to everyone who donated their time and money to this worthy cause.

IN BRIEF

HIGHLIGHTING RECENT AND COMPLETED PROJECTS AND ENGINEERING STUDIES

A Rapid Thermal Processing (RTP™) Integrated Biorefinery (IBR) demonstration plant

A syngas to green gasoline Integrated Biorefinery (IBR) demonstration plant

- An additional process module for a multi-modular chemical synthesis demonstration plant
- Several ACE Technology® R+, AP and HT100 units for Kayser Technology, Inc.
- A Davison Circulating Riser (DCR) pilot plant for a novel chemical synthesis application
- An acetic acid pilot plant
- A biochemical oxidation pilot plant
- A hydrocracker and hydrotreater pilot plant for Lukoil in Russia
- A basic design study for two process intensification pilot plants for pharma and polymer applications
- A basic design study for biochemical by-product processing
- A basic engineering study for a TPA pilot plant
- A basic engineering study for a novel LNG application

Bio-oil upgrader pilot plant with product fractionation

CONTACT US

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

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