

# Dow and Aker Kvaerner Join Forces for METEOR™ EO/EG Licensees

**A**s a result of its recent cooperation agreement with Aker Kvaerner, a leading European engineering and construction group, The Dow Chemical Company is now offering several new services to licensees of its METEOR™ ethylene oxide/ethylene glycol (EO/EG) process technology. The agreement was announced in early July of this year and combines the respective chemical and engineering expertise of both companies. The joint effort provides greater support in implementing the METEOR EO/EG process technology through all phases of a project, from front-end to engineering, procurement and construction (EPC) to commissioning.

“Aker Kvaerner and Dow have a long history of technology cooperation, which has led to a highly successful model for project execution,” says Wim van der Zande, president of Aker Kvaerner’s AK Process business.

The time dedicated to learning the nuances of Dow’s proprietary technology makes Aker Kvaerner the most cost-effective partner for Dow in helping customers establish their EO/EG production. Because of the collaboration, the learning curve in each plant design is diminished, and the time otherwise spent obtaining and reviewing engineering bids is eliminated. Licensees are, therefore, assured of a customized facility that seamlessly integrates METEOR EO/EG process technology and brings product to market in less time.

Aker Kvaerner employs its deep understanding of the METEOR EO/EG technology to provide licensees a complete set of services, including:

- customized process design package (PDP)
- 3-D modeling
- control systems design
- design of offsite facilities necessary to support the EO/EG battery limits
- procurement and construction services as needed
- lump-sum turnkey EPC bidding with strong use of local business partners
- supply of key equipment and bulk materials

The engineering process is set in motion with the PDP, which takes into consideration a facility’s required capacity, available site, feedstocks, utilities supply sources, logistical restrictions, etc. The plan allows a manufacturer to visualize the design and foresee capital investment, construction expenses, production capacity, energy consumption and maintenance costs.

The integrated approach between Dow and Aker Kvaerner ensures that specific client requirements are taken into account at the start of PDP development, thereby adding real value to a client’s project. Furthermore, it allows an early sourcing of major and key equipment. Long-standing relationships with suppliers reduce time between design and construction, providing an overall time savings that can amount to up to six months of revenue-generating production.

## SINOPEC Benefits from the Cooperation

Two new METEOR™ EO/EG plants in China will be the first to benefit from the cooperation between Dow and Aker Kvaerner. In mid-July, Dow awarded Aker Kvaerner the engineering contract to assist in the development of the PDP for each facility.

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*Wim van der Zande, president, Aker Kvaerner AK Process business*

One project is at the SINOPEC Tianjin ethylene complex in the Dagang District of Tianjin, and the second is at SINOPEC Zhenhai Refining and Chemical Company’s production facility in Ningbo, Zhejiang Province. Both branches have received approval for one thousand kilo-tonne per annum (KTA) ethylene crackers.

The Tianjin EO/EG plant is slated to produce up to 420 KTA monoethylene glycol (MEG) and 40 KTA pure EO. The Zhenhai EO/EG plant will be able to produce up to 650 KTA MEG product, and 100 KTA of pure EO. The combined production capacity of these two plants amounts to roughly six percent of current global demand.

Aker Kvaerner has begun developing engineering plans for each. Normally, a health, safety and environmental standards assessment would follow; however, years of experience in China afford Aker Kvaerner the expertise to include it in the PDP portion of the project. Eliminating this step accelerates plant construction.

Throughout planning, design, construction, startup and operation, Dow and Aker Kvaerner provide comprehensive support to each licensee. The cooperation enhances the depth of service, shortens time to commercial production at the plant, and improves return on investment. ■

# Simulation Pays

## UNIPOL UNIPPAC™ APC Software Continues to Thrive – continued from page 3

Plants fitted with UNIPOL UNIPPAC™ APC software have realized measurable benefits, including a 60 percent reduction in product variation, 10 percent increase in production volume, 5 percent reduction in off-grade, and a reduction in unplanned downtime due to operating or instrument failures.

### The Future of UNIPOL UNIPPAC™ APC

Operating on an open-architecture Windows® platform, the software has the flexibility to integrate new process, product and catalyst technologies. While additional features are continuously being developed, UNIPOL UNIPPAC™ APC software currently offers the following key modules:

- Dynamic Multi-variable Gas Composition Control
- Production Rate Calculation, Control and Maximization
- Advanced Resin Prediction and Control
- Analyzer and Instrumentation Fault Detection
- Exception and Compliance Handler
- Product Recipe Management
- Automatic Adjustment to Reactor and Product Constraints

As a licensor and operator of both the UNIPOL™ PP Process as well as the UNIPOL UNIPPAC APC software, Dow is committed to ongoing technology development and support. “We have received good support from APC specialists, and should any problem arise, the modem connection built into the system provides immediate access to expert assistance,” says Propilco’s Velez. The proven methodology and proficiency of Dow offer licensees enduring value that can span a lifetime of operation.

Facilities interested in licensing UNIPOL UNIPPAC APC software can receive a full assessment and estimate of plant improvements by contacting their UNIPOL PP licensing manager or by visiting our web site at [www.dow.com/licensing](http://www.dow.com/licensing). ■

Using data generated by ASPEN Plus chemical simulation software, the Dow PTA Process Technology licensing and manufacturing group has realized significant process and plant performance improvements at the Equipolymer PTA plant in Ottana, Italy.

Information collected from a two-year simulation of critical plant processes has translated to a reduction in capital equipment costs, an increase in product quality and a decrease in raw materials consumption.

Ultimately, employing the ASPEN software has resulted in the development and patenting of a new-generation technology for the separation of PTA crystals from water through one-stage pressure filtration. In contrast to most competitive PTA technologies, which use a combination of pressure centrifuge and rotary vacuum filter, the corresponding section in one-stage pressure filtration cuts maintenance expenses by 80 percent, reduces energy consumption by 50 to 70 percent and recovers two to three percent of operating factor.

### New data has lead to a reduction in capital equipment costs, an increase in product quality and a decrease in raw materials consumption.

The ASPEN data also helped generate a new patent for the core oxidation reactor, which includes a revised configuration of the agitation system and internals. This modification decreases solvent cost by seven percent and improves product quality.

## People ON THE MOVE

**Bruce Lipsitt**, business manager for Dow Technology Licensing (DTL) has been named Asia Pacific business development director for DTL and has moved to Beijing, China. He will continue in his current role as global commercial manager for LP Oxo<sup>SM</sup> Technology Licensing.



**Tayfun Altug** has taken over the role of licensing manager for India, Middle East and Africa. He is based in Dubai.



The technology is further enhanced by a new control strategy, which involves installation of process analyzers and employs an efficient, dedicated and interactive process simulator. Deep simulation of the reactor chemistry helps find optimum operating plant conditions to promote steady and controlled reaction operations that result in further reductions of solvent and energy consumption.

Additionally, a dynamic simulation of the main distillation tower, and the rearrangement of column feeds and recycles that followed, demonstrated the potential to redesign the whole section of the plant, which delivers a 30 percent reduction in equipment sizing and cost.

Licensees of the PTA Process Technology from Dow could realize a three to four percent savings in the capital cost of the license package (I.S.B.L) and potentially benefit from the increased competitiveness and reliability of this technology. ■

# Ethylene Oxide Catalyst Unit Expansion Proceeding Successfully

The Dow Chemical Company has successfully increased the production capacity of ethylene oxide (EO) catalysts at its world-scale plant in Institute, West Virginia. The facility's existing equipment was upgraded, and Dow invested in a modern distributed control system (DCS). In operation now for more than a year, the DCS and other improvements have demonstrated an increase in production capabilities for METEOR™ EO and SURECAT catalysts, which are used in the manufacture of ethylene oxide.

The customized DCS for the EO catalyst unit tightened up the control process, which helped improve efficiency and increase the plant's output.

## EO Catalysts

Most EO catalysts on the market are either high activity or high selectivity. High activity catalysts produce more EO per volume of catalyst but require more raw materials. High selectivity catalysts, on the other hand, use raw materials more efficiently but do not produce as much EO per volume of catalyst. For customers that license METEOR™ EO/EG Process Technology from Dow, METEOR EO catalysts offer the advantages of both. The combination of high activity and high selectivity give the METEOR EO/EG Process Technology its unique ability to use only one reactor. EO/EG facilities that employ more than one reactor can realize greater raw material efficiency with high selectivity SURECAT catalysts.

## EO Demand Trends

Demand for ethylene oxide and, subsequently, EO catalysts, is chiefly driven by demand for ethylene glycols and the consumer products made with them. The intermediate is used in the manufacture of a variety of products, including antifreeze, gas dehydration, heat transfer fluids, solvents and, most commonly, polyester fibers.

“EO technology is a growing market, and Dow is investing in this plant to support the growth.”

Joseph Bromley, business director, Dow Technology Licensing

Industry estimates indicate about 66 percent of EO is used in the manufacture of monoethylene glycol (MEG), with the lion's share of MEG used in polyester applications such as polyethylene terephthalate resin (PET), films and fibers.

“Dow expects MEG to grow 5 to 6 percent globally per year between 2006 and 2010. EO technology is a growing market, and Dow is investing in this plant to support its growth,” says Joseph Bromley, business director, Dow Technology Licensing. ■



Dow's world-scale ethylene oxide catalyst unit in Institute, West Virginia.

Upcoming  
CONFERENCES

DTL will present the latest offerings and updates at the following conferences:

### 3rd Asia/China PP Markets and Technology Conference

March 12 and 13  
Shanghai, China

### APGC 2007 Asia Petrochemicals and Gas Technology

May 24 and 25  
Kuala Lumpur, Malaysia

# Global UNIPOL™ PP Technology Exchange Meeting Highlights

**T**he UNIPOL™ PP Process Technology Exchange Meeting (TEM), recently held in Houston, Texas, brought together nearly 100 attendees from around the world.

A review of UNIPOL PP licensee technical performance metrics demonstrated year-on-year improvements – accredited by many licensees to the information gathered at previous TEMs.

The topic most frequently discussed was Dow's new SHAC™ Catalyst ADT system. Licensees that have been operating the system reported rapid implementation – having switched 100 percent of their product mix within a very short time. They repeatedly cited exceptional reactor stability, no fouling of reactor internals and product features that now “set the standard” in their regions.

Dow engineers presented a number of the latest UNIPOL PP design updates, including modifications to analyzer and gas composition control technologies.



Attendees of the recent UNIPOL™ PP TEM discuss the latest UNIPOL PP design updates.

Several safety topics were discussed as well, giving attendees practical ideas for increasing plant safety performance.

Dow Technology Licensing will host TEMs for each licensing offering during 2007. ■

## Dow is Committed to Growth in China – continued from page 1

Apart from offering technologies well suited for the chemical market in China, DTL has dedicated significant resources and capital to ensure smooth deployment and operation for its customers. DTL is committed to making China a more cost-effective investment for manufacturers and has implemented an organization model that provides a strong geographic structure, dedicated leadership and a region-specific growth strategy.

### DTL Presence in China

The Dow Chemical Company now has five business offices and 10 manufacturing sites in China, providing employment to nearly 2,000 people. With DTL representatives in Beijing and Shanghai, customers are well supported by a network of sales and technical staff and benefit from easier communication and faster responses.

DTL extends this support network by collaborating with key international and local businesses. One such collaboration is with Aker Kvaerner, a leading European engineering firm with deep knowledge of local codes and regulations and familiarity with the specifics of Dow-licensed technologies. Dow and Aker Kvaerner have recently teamed to develop two METEOR™ EO/EG plants in China and will partner on a new UNIPOL™ PP facility as well.

Dow's established relationships with local suppliers prove especially helpful to new facilities, as Chinese regulations require that the majority of plant parts be supplied by domestic manufacturers.

### Addressing Sustainability

Through startup and beyond, DTL enables the success of new licensees by providing excellent technology transfer, training and operations support. Quality service is a long-term pledge to customers, and a local

presence in China offers quick and convenient access to technical assistance. In some cases, DTL brings a training simulator to licensee sites and conducts special instructional sessions.

Perhaps the greatest advantage for DTL customers in China is having a continuous link to Dow's R&D efforts. Dow is committed to keeping its technologies leading edge and has made regionally-specific R&D investments that address the market needs of new and existing customers in China. As part of its ongoing effort to help its customers stay ahead in the changing marketplace, DTL shares advancements and evolving petrochemical technologies at annual technology exchange meetings.

Leading-edge technologies, a strong and still-growing presence, partnerships that aid local companies and aggressive R&D all represent Dow's dedication toward developing long and successful relationships with businesses in China. ■

*Process Technology Report* is a publication for customers of the Dow Technology Licensing<sup>1</sup> business. Your comments and suggestions are welcome. To provide story ideas, add a colleague to our mailing list, or if you have general questions or concerns, please contact:

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### Among the technology platforms available through the Dow Technology Licensing business are:

**UNIPOL™ PP Process** – the process for the production of a comprehensive line of polypropylene resin

**LP Oxo<sup>SM</sup> Technology** – the process for the manufacture of alcohols by low-pressure hydroformylation (e.g., 2-Ethyl Hexanol and Butanol)

**METEOR™ EO/EG Catalyst and Technology** – the process and catalysts for the production of ethylene oxide and ethylene glycol

**QBIS™ Technology** – the process for the production of bisphenol-A

**PTA Technology** – the process for the production of Purified Terephthalic Acid



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