

### FEATURE REPORTS

#### Summary Part I: *Boosting Energy Efficiency in Chemical*

**Manufacturing: A look at Cogeneration.** Many chemical manufacturing processes require large amounts of energy, and chemical companies are faced with the constant challenge of determining how to use that energy as sustainably as possible. More and more chemical companies are prioritizing a range of energy efficiency measures aimed at decreasing energy use and costs while reducing environmental impact. One of the most promising energy efficiency technologies being used in the chemical industry today is cogeneration — or combined heat and power (CHP).

Cogeneration offers financial, operational and environmental benefits by concurrently producing electricity and heat from a single energy source. It has the potential to convert more than 80% of the energy obtained from fossil fuel into power and steam. Adding to cogeneration's potential for chemical and other energy-intensive manufacturing industries is the fact that the technology is adaptable, scalable and can be seamlessly integrated into existing manufacturing facilities with the right planning and expertise.

Part one of this month's Feature Report presents the advantages CHP in the CPI, using Eastman Chemical Company as an example of one organization leveraging cogeneration to boost the efficiency of its manufacturing operations. The company today meets more than 90% of its global electricity needs with cogeneration — resulting in 40% less fuel and significantly fewer greenhouse gases (GHGs) emissions than the conventional uses of fossil energy.

**Summary Part II: *Combined Heat and Power for the CPI: Modern Concepts.*** After a brief overview of the combustion turbine and Brayton cycle, this report presents the advantages of combined-cycle energy generation, with practical information on maximizing capacity output. The article also reviews the importance of HRGS chemistry.

**Related equipment and services:** Turbines, boilers, steam generation and handling, heat exchangers, heat-recovery systems, condensers, cooling towers.

**Relevant industries:** All sectors of the CPI require power and heat.

### Filtration and Separation Considerations

**Summary:** Separation processes, such as filtration and others, play an important role in the chemical process industries (CPI). As an example, in the oil-and-gas industry, sulfur plays a major role as a contaminant, existing in various forms and requiring separation from both water and process streams. The most common separation technologies in sulfur recovery include demisters, suspended-solids/liquid filters, adsorption beds, gas coalescers, flash tanks and two- or three-phase separators. This article examines key filtration and separation considerations in the amine unit of sulfur recovery operations. The concepts discussed in this article for both gas and liquid streams can, for the most part, also be applicable to other units elsewhere.

**Related equipment and services:** Filtration equipment; adsorption beds and adsorbents, such as activated carbon; flash tanks; liquid-liquid coalescers.

**Relevant industries:** This article is particularly relevant to the oil-and-gas industry.

### NEWSFRONT

#### Coatings

**Summary:** This news article will take a look at some of latest developments in coatings in the chemical process industries, including nanostructured coatings and other surface engineering innovations.

**Related equipment and services:** Technologies related to coating pipes, vessels, pumps and other process equipment to prolong lifetime or enhance performance.

**Relevant industries:** All CPI sectors would theoretically be interested in innovative coatings for process equipment and piping.

#### Single-Use Technology

**Summary:** In some applications where cleanliness is of supreme importance, it can be easier and safer to use process equipment once rather than having to rely on costly and time-consuming cleaning procedures. For many years "single-use" has been common for simpler items, such as filter media and reactor vessels. Now even pumps and valves are being designed for single-use applications. This month's Newsfront will present trends in single-use equipment.

**Related equipment and services:** Pumps, valves, mixers, reactors, filters and so on.

**Relevant industries:** Single-use equipment is particularly used in pharmaceuticals, biotechnology and the electronics- and fine-chemicals sectors.

Editorial submissions for considerations should be sent to contributing editor, Joy LePree (jlepree@che.com)



### FACTS AT YOUR FINGERTIPS

#### Gas Detection

**Summary:** This one-page reference will examine the properties of a host of toxic gases in industry.

**Related equipment and services:** Gas detection systems of all kinds, including portable detectors and fixed systems. Also, safety equipment (personal protective equipment) for respiratory protection, and air-pollution control systems.

**Relevant industries:** All industries would need to monitor gases in their processes for quality control, environmental protection and personnel safety.

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### FRACTIONATION COLUMN

**Summary:** This monthly column in *CE* is written by the technical director at Fractionation Research Inc., a consortium of end-users, engineering companies and distillation equipment providers that pool budgets on distillation research.

**Related equipment and services:** Distillation towers; trays and packings; tower-scanning equipment and services.

**Relevant industries:** This column addresses segments across the entire CPI, and is relevant in the currently booming markets of downstream oil and gas processing.

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### ENGINEERING PRACTICE

#### Using the Direct Integration Method for Relief-Valve Sizing

**Summary:** Properly sizing relief valves is a perennial challenge for engineers. This article discusses a proven approach — the use of the Direct Integration Method — that is appropriate for virtually every situation, including two-phase flow and supercritical fluids. This method involves numerical integration of the isentropic nozzle equation, and is more accurate and easier to use than traditional methods or formulas. With the widespread availability of process simulators and spreadsheet software, this task is now easier and more accurate than ever for determining the mass flux through the relief valve.

**Related equipment and services:** Relief valves, nozzles, process simulators, modeling software, spreadsheet programs, pressure-detection devices.

**Relevant industries:** Relief valves are ubiquitous throughout the CPI.

### FOCUS

#### Seals and Gaskets

**Summary:** Sometimes referred to as “the weakest link”, seals and gaskets are extremely important for keeping products isolated from the surroundings and preventing harmful chemicals from leaking into the environment. They are found in all types of process equipment (pumps and compressors, valves and piping, mixers, heat exchangers, reactors and so on). This month's Focus will present the latest products and services in sealing technology.

**Related equipment and services:** All types of seals, gaskets, o-rings; new polymer formulations for elastomers; and more.

**Relevant industries:** All sectors of the CPI will have some seals and gaskets as part of their operations. These range from special seals for high purity applications, corrosion-resistive materials to the lowly elastomers used to keep pumps from leaking oil.

Editorial submissions for considerations should be sent to senior editor, Gerald Ondrey (gondrey@che.com).

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### ENVIRONMENTAL MANAGER

#### Measurement Diagnostics for Safety-Instrumented Systems

**Summary:** This article provides guidance for designers and operators of safety-instrumented systems. It reviews a variety of best practices and new technologies — in particular new smart transmitter diagnostics and digital protocols, including wireless options — that can help to ensure the strength and reliability of these safety systems, which are meant to minimize risk and maximize failsafe plant operation.

**Related equipment and services:** Safety equipment systems, temperature-measurement devices, pressure-measurement devices, flowmeters, smart transmitters, wireless transmitters, vibration-monitoring systems, process control systems.

**Relevant industries:** Safety-instrumented systems are ubiquitous throughout the CPI.



### SHOW PREVIEW

#### Interphex 2013

**Summary:** This show preview will include short descriptions of the products and services that will be on display on the exhibit floor at Interphex 2013, taking place in April in New York.

**Related equipment and services:** All pharmaceutical and biotechnology processing equipment and services that will be exhibiting at Interphex 2013.

**Relevant industries:** Pharmaceutical and biotechnology.

For editorial consideration for this section, please send product-related press releases and photos to Chemical Engineering associate editor Scott Jenkins (sjenkins@che.com). The products and services described in the press release should be those slated to be on the exhibit floor at the Interphex 2013 meeting. Please include "Interphex 2013 show preview" in the subject line of the email.

#### POWTECH 2013

**Summary:** With more than 700 exhibitors from 26 countries, POWTECH (April 23–25; Nuremberg, Germany) is the largest European trade fair on mechanical processes for the CPI. This month's show preview will present some of the new products offered in the areas of size reduction, mixing, conveying, dosing and filling, and particle analysis.

**Related equipment and services:** All types of mills, classifiers, dust-handling equipment, particle size analyzers, blenders, level meters, conveyors, agglomerators and more.

**Relevant industries:** Roughly 80% of the CPI handles solid materials at some point in their processing. For example petroleum refining handles catalysts, additives and sulfur; pharmaceuticals deal with ultra pure and hygienic powders at many stages of operations, including the final pelletizing and packaging; mining requires massive mills and conveyors; and so on.

Editorial submissions for considerations should be sent to senior editor, Gerald Ondrey (gondrey@che.com) (deadline is March 10).

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April 25**

**This month's topic will cover pipe flow. Don't miss this exclusive opportunity to introduce your products and services with a banner ad, white paper, or text ad.**

LOOK FOR THESE ARTICLES COMING IN  
THE MAY ISSUE:

VALVES

SOLVE PROBLEMS WITH ROOT-CAUSE ANALYSIS

TRENDS IN DUST CONTROL TECHNOLOGIES