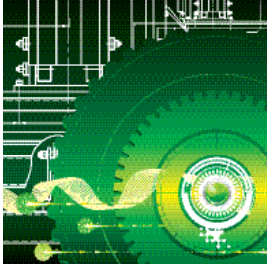

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The Chemical Industry Phoenix

Seven years ago, I wrote a column for another publication entitled "The U.S. Chemical Industry: R.I.P." This pillar of American economic strength, which a few years earlier was the leading exporter among U.S. manufacturing sectors (with net exports of $15–20 billion annually), was shriveling due in large part to policy blunders and regulatory mistakes. Natural gas — the lifeblood of the industry — was being diverted to power generation and its cost escalated, rendering chemicals produced in the U.S. uncompetitive in world markets. New construction slowed dramatically, and with it the activities that support the chemicals industry.

According to recent data from the Bureau of Labor Statistics, the U.S. chemicals industry directly employs about 825,000 people, with many more (perhaps three million) employed by the industry's suppliers. The Federal Reserve Board places the chemicals industry's 2011 revenues at $453 billion, making it the largest revenue producer of any U.S. manufacturing industry category.

The U.S. chemicals industry is now in the early stages of a resurgence. A key driver is the development of significant domestic natural gas supplies — some particularly rich in ethane, which is an important feedstock for petrochemical synthesis.

Like a phoenix, the legendary bird that re-emerges from its own ashes with youthful vigor, the U.S. chemicals industry has announced a wave of expansion projects, many of them grassroots facilities — the mark of a dynamic, vital, growing business. This is great news for chemical engineers and technologists (including process automation specialists), who can practice their art within this dynamic framework. It is also great news for the U.S. economy, because the chemicals industry, with its array of supporting industries, acts like the anchor store in a shopping mall, assuring a solid basis for the larger assemblage. Further good news for the economy is the re-emergence of a strong, export-oriented, internationally competitive manufacturing industry to improve the country's beleaguered trade balance.

As of the first quarter of 2012, the American Chemistry Council (ACC) listed 30 significant petrochemical projects that will employ as many as 200,000 workers and will have a total economic impact approaching $50 billion. Almost 30% of these projects are greenfield, and the majority are being designed to use ethane feedstock.

At the World Petrochemical Conference held in early 2012 in Houston, Gary Adams, Chemical Chief Advisor of conference sponsor IHS, projected a 4% annual gain in worldwide petrochemical output, reaching 1,000 million m.t. in 2020, up from the current 680 million m.t. This is twice the anticipated gain in worldwide gross national product (GNP), indicating that world markets can absorb the increased U.S. output.

Understanding the market potential is only the first step; striving to be a low-cost producer is Step 2, and maybe Steps 3 and 4. This is where process automation technology can be crucial. It has helped U.S. chemical workers to be among the most productive worldwide, with a safety record (time-loss injuries per million man-hours) that is the envy of other industries.

Computerized process automation has been evolving for more than 50 years. Before that, process automation consisted of analog feedback control (pneumatic and electronic) and mechanical servos — technologies that could not handle information automation. Today's digital control technology includes a much wider range of measured variables in process control, many of them analytical in nature, as well as highly complex relationships among the variables that can only be understood with the aid of electronic computation.

This transition was initially met with problems related to hardware (computer failures, insufficient memory, limited analog input/output capability, limited measurement capability, etc.). Shortcomings in software also existed, but they were overshadowed by the hardware deficiencies. The development of large-scale electronic circuit integration in the 1970s effectively cured the hardware problems, and software became the Achilles' heel of process control technology.

A Dept. of Energy grant to MIT's Chemical Engineering Dept. provided the initial funding for the Advanced Systems for Process Engineering (ASPEN) project, which produced an industry-standard process simulator, Aspen Plus. The spinoff company, AspenTech (Burlington, MA), has been a leading developer of process optimization software for over 30 years.

Elinor Price, Director of Chemicals Industry Marketing at AspenTech, recently identified three major trends pushing the frontiers of process automation software:

- expanded accessibility and improved data contextualization for faster decision-making
- faster information discovery to simplify analysis and expedite decisions
- updated navigation and more intuitive workflows to reduce ownership costs.

A common thread through these software trends is data-sharing collaboration — bringing data from remote sites, harsh environments, and diverse geographies into a single location where resident experts can tackle any problems. This was not possible even a few years ago.

The resurgence of the U.S. chemicals industry is a great opportunity for our industry and our nation. Let's not screw it up.

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