air POLLUTION

3-D software brings new perspective to emissions control business

By Kathleen Woods and Mike Varner

New businesses need all the help they can get to grow and survive. A start-up environmental company in California recently found that applying the right engineering software helped expand its business opportunities while improving engineering efficiency. San Jose, Calif.-based Thermatrix Inc. provides air pollution control systems based on a patented, flameless thermal-oxidation technology that destroys air toxics and volatile organic compounds. Compared to incineration, carbon absorption and other conventional methods, the Thermatrix technology results in substantially lower emissions rates that often can qualify users for regulatory exemptions.

For every system it installs, Thermatrix first produces a detailed proposal explaining how the system will fit into the customer's operation. When an order is received, staff engineers then create fabrication and installation drawings. The company recently improved its engineering efficiency after installing AutoPlant plant engineering software from Rebis, a Walnut Creek, Calif., firm.

AutoPlant allows Thermatrix engineers to produce proposals containing a complete, three-dimensional representation of the air pollution control equipment and adjacent areas of a customer's plant. If a contract is awarded, the model is carried forward, allowing Thermatrix to recover the up-front engineering needed to win the contract and accelerating later phases of the project. For example, layout drawings and piping isometrics can be generated from the 3-D model with little additional effort. Interferences can be detected on-screen. The data can be sent electronically to anyone, including subcontractors, regardless of their location.

In a Thermatrix system, the VOC waste stream is mixed with air before entering the oxidizer. A gas distribution plenum evenly directs the vapor stream into an inert ceramic bed, or matrix, which provides thorough mixing of oxygen with the fume. Once oxidation temperature is reached, the hydrocarbons react to form carbon dioxide and water vapor. The heat released by the oxidation reaction is absorbed by the ceramic matrix, which acts as a heat sink. Air emissions from the system are innocuous.

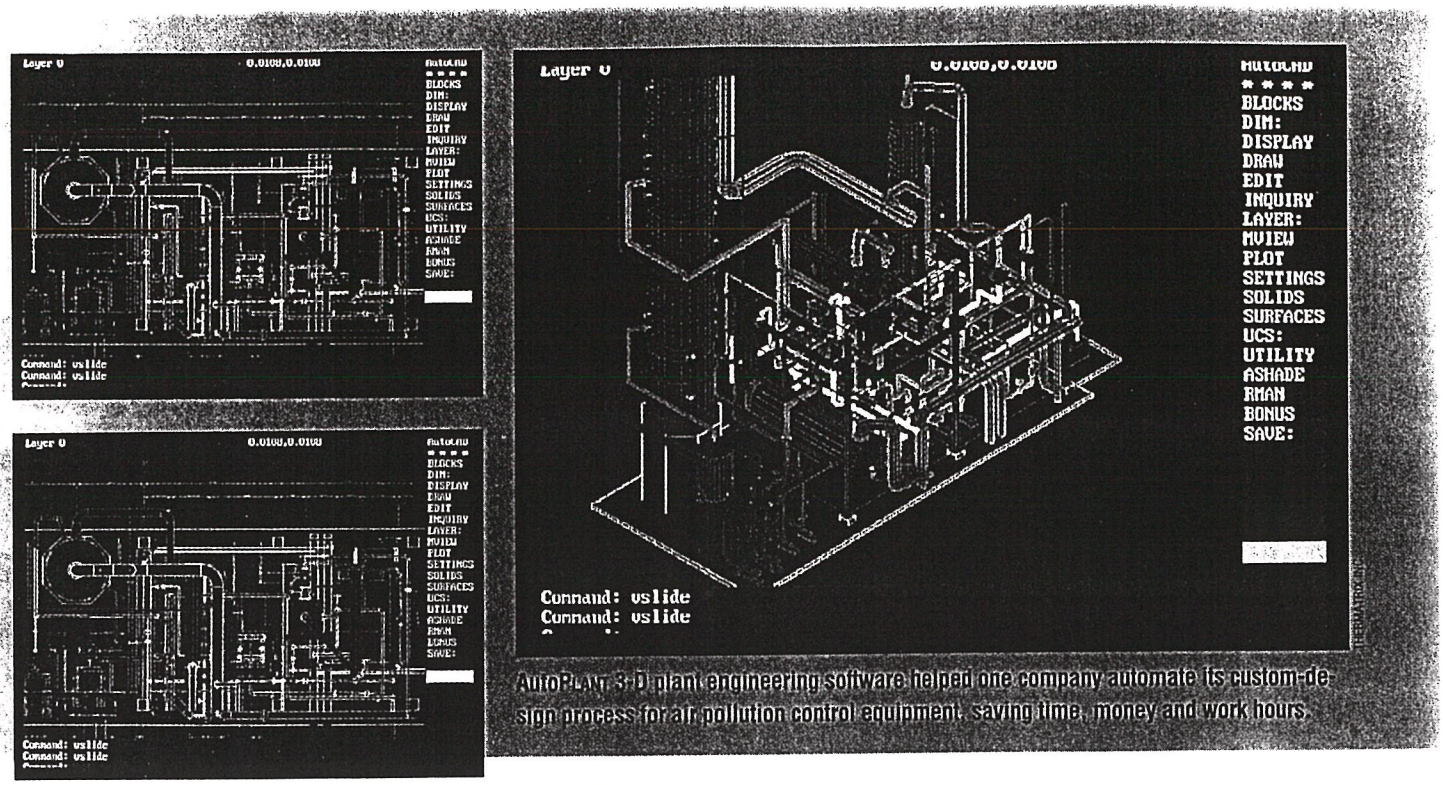
The custom-designed, modular systems consist of oxidizer units, piping, and such auxiliary equipment as fans and scrubbers. The systems are designed to be integrated into production processes in the chemical, pharmaceutical, oil and gas, and related industries. Thermatrix also offers process engineering, project management and permitting services.

Thermatrix engineers discovered a need for greater efficiency when they were asked to design and install a $350,000 pollution-control system for a major chemical manufacturer. At the time, they were using stock AutoCAD systems. The project was a "fast-track" job requiring that construction start before all of the engineering work was complete. Such jobs demand swift, close interaction among all parties, even when they are scattered geographically. To save time, Thermatrix engineers often performed work that otherwise would have been handed off to others if they had been nearby. This solution helped meet deadlines but proved costly in terms of engineering overtime.

Another issue that arose was duplication of effort caused when engineers recreated information. At the recommendation of an experienced colleague, Thermatrix installed AutoPlant. Because the software incorporates the familiar AutoCAD user interface, engineers with AutoCAD experience learned the new system quickly and put it to use on another project for the same client.

Adding a new dimension. Using AutoPlant eliminated much wasted effort on the second project, a preliminary process design for a $2 million pollution control system. Because information created and stored in the CAD system was accessible to all project team members, little time was spent recreating data.

The CAD system's ability to automate time-consuming tasks also contributed to a better use of engineering time. For example, engineers no longer had to enter materials descriptions on drawings. Instead, a less-skilled employee typed specifications for each



AutoPLANT 3-D plant engineering software helped one company automate its custom-design process for air pollution control equipment, saving time, money and work hours.

component into a simple, flat-file database linked to AutoPLANT. This freed engineers from a time-intensive chore, while enabling them to produce bills of materials quickly from drawings.

Although the $2 million project involved designing a much larger pollution control system than the earlier one, it was completed in about the same amount of time at a substantially lower engineering cost. If Thermatrix also had installed the system, the benefits would have been even greater. For example, because the system was modeled in 3-D with elevation an integral part of the drawing, clearances and fits could have been checked on-screen. In addition, piping isometrics could have been produced almost automatically from the orthographic model.

Thermatrix established AutoPLANT as the foundation of the company's "pencil-less" engineering program, which includes a critical change-management strategy designed to comply with the Occupational Safety and Health Administration's regulation 1910.119. The rule recognizes that initial designs rarely cause safety problems, but that later design or manufacturing changes can propagate through a chemical process and cause serious damage. By ensuring that all design changes are entered into the CAD system and all project team members work from the system's database, the dangers posed by design changes are mitigated.

The company discovered another, unexpected benefit of using 3-D modeling when it began using AutoPLANT for proposals. As a start-up company with few installations and a technology that differs from others on the market, Thermatrix is aware that potential customers have trouble visualizing the systems. Using AutoPLANT, engineers can create 3-D drawings of proposed systems in a few days, allowing prospective customers to understand how the emissions control system fits into their process. Such models also allow customers to assess fits and interferences.

Creating proposals in 3-D formats has given Thermatrix a progressive image and helped promote new business. Using AutoPLANT for proposals also has increased engineering productivity dramatically, resulting in reduced proposal costs. □

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For more information about Rebis, Walnut Creek, Calif., and AutoPLANT, circle 203.

For information about Thermatrix Inc. and its services, circle 204.