

# ENGINEERING SOFTWARE MAKES THE LEAP FROM THE MASTERS TO THE MASSES

Ease of use and integration extend software capabilities from plant design to the plant floor

One are the days of one-size-fits-all engineering software packages. Today, solution providers offer versions with improved integration for advanced data sharing and simplified user interfaces with the ability to multitask between the design house and the plant floor, bringing the power of engineering software to everyone from trained experts to software novices who just want to run a few calculations.

CAD, simulation and other engineering solutions are being redesigned because the current business climate demands faster, more accurate transfer of data and information during the design stage, as well as during operations.

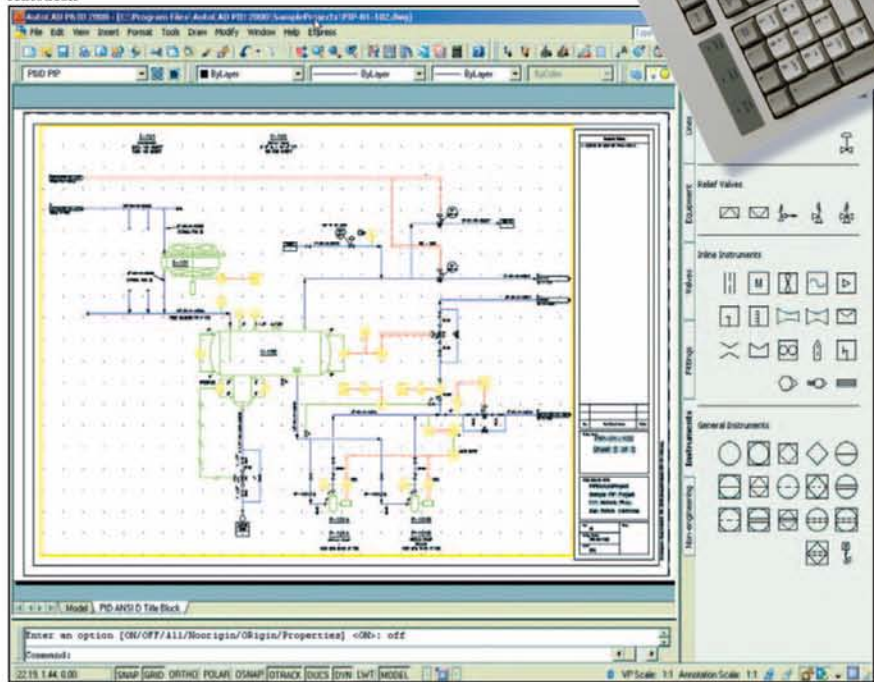
## Benefits for plant designers

Mark Strassman, vice president of the plant solutions group with Autodesk (San Rafael, Calif.), creators of the widely used AutoCAD design software, says a worldwide increase in process plant construction has created a serious backlog at engineering firms. As a result, high-end software that requires extensive training is no longer an option.

"Instead, systems with learnability, trainability and [little need of] IT support are essential," he says. "Users in this space need packages that combine familiarity with the power of data sharing."

Autodesk responded to this trend first with P&ID 2007, followed by the recent release of the 2008 version, which are schematic tools for laying out the front-end design of the plant. "Users find they can be up, running

Autodesk



**FIGURE 1.** AutoCAD P&ID 2008 is designed to make it easy for engineers working on a project to extract the accurate P&ID logic and information necessary for operational and design decisions

and designing in the same day they download the software if they are already familiar with AutoCAD," he says. "That's the benefit of combining the familiarity of AutoCAD with a process and instrumentation diagramming tool."

Sanjeev Mullick, director of product marketing for process engineering with AspenTech (Cambridge, Mass.) adds that data sharing in an integrated environment is crucial, because a suite of integrated products can drive the productivity of engineering teams to higher levels.

"The trend is picking up even more because [engineers] are faced with the market realities of executing high-quality products in a short period of time," he explains. "Integrated tools translate to a higher return on investment because [users] don't have to re-enter data and can perform tasks faster and more accurately."

He says integration in AspenTech's simulation offerings is geared towards using as many common components as is possible between products, thus allowing interoperability. For example, if a plant designer needs to send

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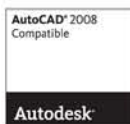
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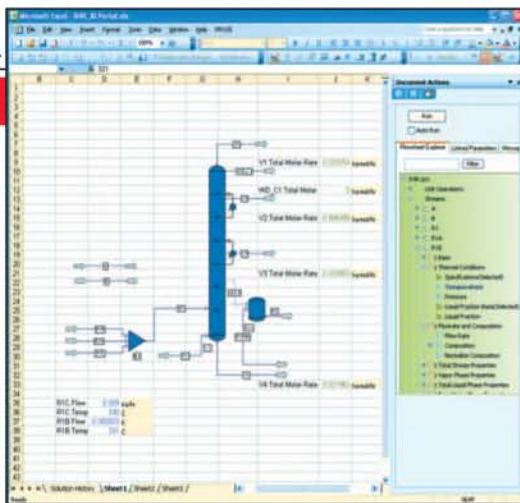
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## Newsfront

**FIGURE 2.** SimSci-Essor is in the process of integrating all its software, including SIM4ME applications, with Microsoft Excel to allow even novice users to solve problems using advanced simulation technology



information to an equipment designer there is no longer a need for the second user to re-enter data. "We have enabled our products to talk to each other so data can be transferred with the push of a button," explains Mullick.

Integration and data sharing between discipline-specific programs from a variety of vendors is also vital, according to David Lott, member of the global business development team with Intergraph (Huntsville, Ala.), a supplier of CAD software for process plant design. The company developed SmartPlant Enterprise and SmartPlant Foundation to serve as open systems that can interface with a variety of programs that perform plant-design-related calculations. But there are plans to take it a step further, according to Lott.

In typical situations, process simulation software determines flowrates, temperature, pressure and other calculations for various operations. The next step in the design process relates to sizing the equipment. Intergraph will work with third-party software programs in the sizing space. "While we will not be providing the calculation solutions, we will be working on programs that allow integration of those discipline-specific products and transferring information between them on a managed basis."

He says Intergraph is taking the plunge into third-party data integration programs because "there is a lot of time to be saved in having a central data store."

Within the design space, a lot of data needs to be handed from one discipline to another. While this has traditionally been done manually, people don't have the luxury of the time this requires anymore, due to working in a

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more distributed environment where they are under pressure to reduce design-cycle time. "Concurrent engineering defines the necessity to start your activities before someone else is completely finished, which defines the need to do that more efficiently," says Lott. "For this reason, our software is all about faster, more reliable data transfer and improving the design workflow."

### Moving to the plant floor

The same features — integration that permits data sharing and simpler user interfaces — have recently delivered the power of engineering software to the plant floor, allowing inexperienced engineers access to solutions that solve complex calculations in a less complicated, more timely fashion.

In some cases, vendors are developing products that work with solutions from other software companies to better assist plant floor users. For example, ANSYS (Canonsburg, Pa.)

## COMPLIANCE SOFTWARE SIMPLIFIES REPORTING

### DUPONT REDUCES TIME SPENT CALCULATING AND REPORTING TRI EMISSIONS DATA

**A**nalysts suggest environmental compliance reporting, within all industries, dwarfs even Sarbanes Oxley, which regulates financial practice and corporate governance, in terms of data management and IT manhours, according to Larry Goldenhersh, president and CEO of Enviance (Carlsbad, Calif.), a provider of Internet-based environmental compliance solutions.

One grueling aspect of environmental compliance is the U.S. Environmental Protection Agency's (EPA) Toxic Releases Inventory (TRI) reporting. Created by the Emergency Planning and Community Right-to-Know Act of 1986, TRI requires all facilities to collect data and report on the toxic chemicals that are released into the environment each year. While TRI applies to approximately 650 chemicals, organizations are exempt from TRI reporting of individual chemicals if levels do not exceed the threshold. And, de minimis levels of chemicals may be excluded from these threshold calculations. However, some estimates suggest that, even with the exceptions, nationwide TRI reporting accounts for 8-million hours of preparation and over 80,000 reports per year.

Realizing there must be a way to minimize the associated labor, Dupont employed Enviance's technology to simplify processing, calculation and reporting of its TRI emissions data across its 75 sites.

The Enviance TRI management system automatically calculates the thresholds, taking advantage of the de minimis allowance, and simultaneously calculates the release data required if thresholds are exceeded; it also automatically creates reports and electronically files them with the EPA.

After four years of using the solution, says Aldo Morell, director of safety and environmental issues for Dupont (Wilmington, Del.; [www.dupont.com](http://www.dupont.com)), the company is saving thousands of manhours and is better able to integrate disparate data sources, automatically perform calculations, populate fields and analyze data at the facility, business-unit and enterprise levels.

"However, the biggest advantage to us is that the system keeps up with the changing regulations as the software is updated annually," says Morell. "We don't have to install updated software as we would with another package because it's Internet based. We simply log on and know that we are getting accurate numbers for the EPA and ourselves."

He says the other advantage is that since the data entry and calculations aren't done manually, there are no issues with incorrect keypunching and mistakes. "It is important to us to have those numbers right for the EPA and for internal use," he says. The later is because DuPont takes the reports generated and sent to the EPA and uses them to get a corporate view. Automatically and accurately feeding the information into its corporate database, which is used to set the company's internal emission waste reduction goals, provided the data Dupont needed to track TRI releases, and ultimately lower them by 75% in a four-year period. □

sees a developing need in the chemical process industries for connectivity to plant-level process simulation tools as well as molecular modeling tools. One project currently underway involves connecting AspenTech's Aspen Plus software, used for a variety of chemical engineering tasks, with ANSYS computational fluid dynamics tools. Another project entails developing technology to combine micro-scale modeling with macro-scale modeling. "The overall benefit to the process engineering community is the ability to use standard integrated technology that can cover the entire range of scales typically dealt with in design, production and operation of chemical products, equipment and plants," says Ahmad Haidari, industry segment manager at ANSYS.

Other software providers, including

AspenTech, are taking a stab at plant floor operability through integration of their own modules along with simplified user interfaces.

"Traditionally, simulation and engineering software has been used by design groups to create processes or design plants; but today we see user modules permeating into the operation side," says Mullick.

This means that operations groups — the engineers concerned with running the plant — are using models to make decisions about process changes, avoid problems or optimize the plant on a day-to-day basis. In the past this was approached in the form of large-scale, realtime optimization projects or applications.

Mullick says AspenTech's Simulation Workbook links simulation tools with Microsoft Excel to make the job



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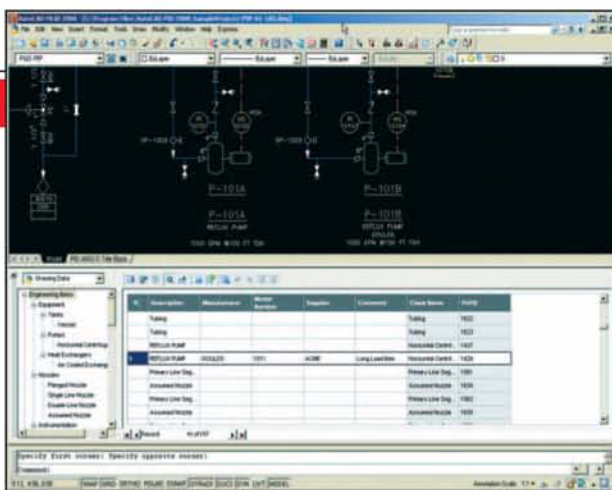
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easier for inexperienced users. "This provides a point-and-click, drag-and-drop type of approach to linking more sophisticated models to an Excel front end," he says. "Since most people in a plant already know how to navigate Excel, this has extended the power of simulation to the masses."

Similarly, SimSci-Esscor (Lake Forest, Calif), the Invensys division that provides SIM4ME simulation software, is in the process of integrating all its simulation products directly into Excel so that plant floor engineers who aren't trained in simulation can also employ the solutions.

It works like this: an expert builds the simulation model and creates an Excel interface using the SIM4ME portal and then sends the simulation to an operator. Once the operator has the model, he or she can use Excel to check performance or determine the results of changing process variables.

"[An operator] could enter any



Autodesk

**FIGURE 3.** Recently launched AutoCAD P&ID 2008 software addresses industry challenges including a shortage of staff with specialized skills, time pressures to complete projects quickly and the need to share data across multiple engineering disciplines

changes into Excel, and with the simulation running in the background, see how it impacts the whole operation," explains Joseph McMullen, SIM4ME product manager. "This enables operators to run different case scenarios, change variables and, over time, understand the process better without affecting plant performance."

Rather than using an Excel spreadsheet, Engineered Software (Lacey, Wash.) added a drawing interface to its hydraulic-analysis software tools to accommodate plant floor engineers. This

allows users to look at a drawing of piping schematics and make a change, such as isolating a pipe, by closing a valve on the model on the computer screen. The program automatically shows users how it will operate with that valve closed.

"People can visualize what's happening in the system using our drawings, which are more intuitive than spreadsheets," says McMullen. "This allows end users to get an engineer who is more familiar with the process to look at results, rather than someone who is more familiar with a computer program."

Some software providers, such as Cutler Technology Corp. (San Antonio, Tex.), are developing easy-to-use simulation software specifically for plant floor operators. The company's CTC-Sims runs 100 to 200 times faster than real time and uses live data from the controller. This means that an operator will know what the results of his or her actions will be 12 to 36 hours into the future, all in a matter of seconds. "This is critical because many disturbances can take over a day to settle out," says Jimmy Cutler, spokesperson for the company. "Most operators work eight to ten hour shifts and never see the true results of their actions. The live-data aspect allows the product to act as an operator advisor."

Across the broad spectrum of solutions, engineering software is making a dramatic turn for the better by encompassing easy-to-use interfaces and advanced interoperability. The overall benefit is that now everyone from plant designers to plant floor operators can access tools that can be used to design, analyze and run ever-more complicated equipment, processes and systems in a business culture that demands immediate results.

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