

## Software fosters **mechatronic** research

By **Dirk Schaefer**

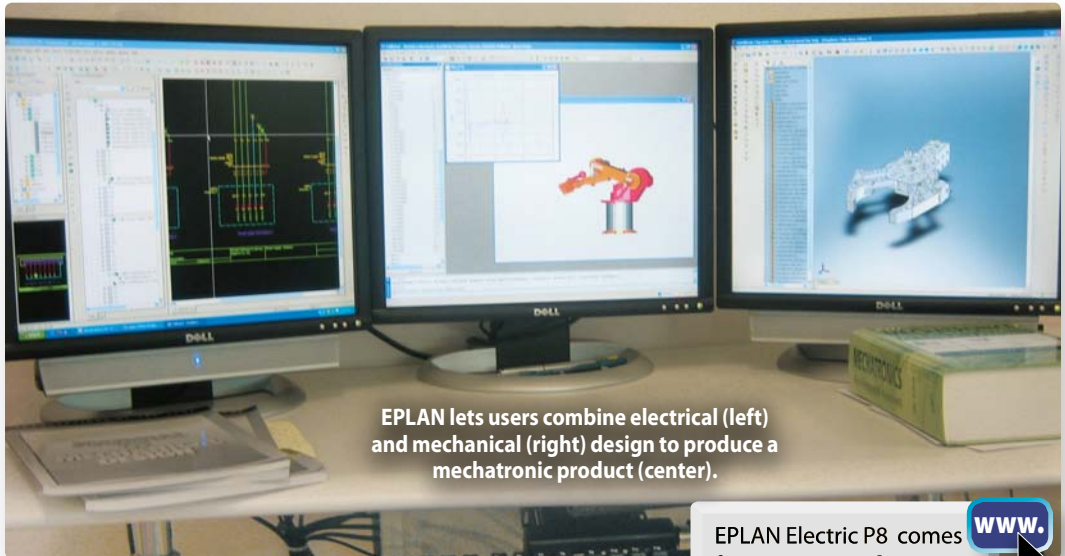
At Georgia Tech Savannah, our research group studies the best way to smooth the flow of information between electrical and mechanical design in the context of control design and plant engineering. As part of this goal, we conduct cutting-edge research in the integration of ECAD and MCAD.

To support our activities, we use EPLAN Electric P8, a system architecture that supports the philosophy of object-oriented engineering across disciplines.

Software plays a part in our research on cross-disciplinary collaborative design and the manufacture of mechatronic products. We currently focus on bridging electrical and mechanical design methods on a conceptual level. In particular, we seek to establish synchronous bidirectional communication between ECAD and MCAD systems in distributed CAE settings. Key research questions include: How can mechatronic products be designed in an integrated way as opposed to using domain-specific design approaches? And, how can separate mechanical and electrical information models be unified into an integrated mechatronic product model? Lastly, how can the unified model be used in global CAE environments to design mechatronic products more efficiently?

Notably, EPLAN makes our work easier by providing a wizard that

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EPLAN lets users combine electrical (left) and mechanical (right) design to produce a mechatronic product (center).

EPLAN Electric P8 comes from **EPLAN Software & Services LLC**, (248) 945-9204, [eplan.us](http://eplan.us)

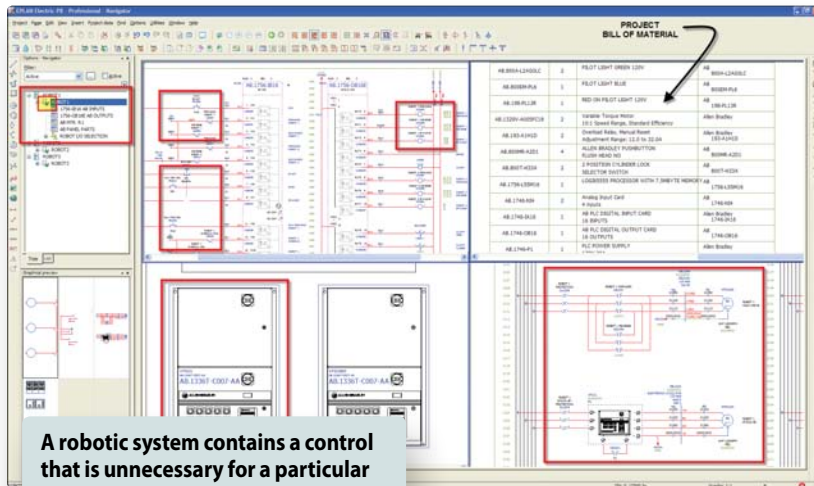
walks users through all the steps necessary to get started on a new project. In addition, the software includes a number of predefined templates for projects, pages, and macros. Users can also define their own templates, either from scratch or based on previous projects, a feature we find quite helpful.

Many of our experiments involve directly linking EPLAN to different MCAD systems. The point is to automate the updating of the electrical or mechanical data model of a mechatronic product based on a design change made on either side. To do this, it takes the capability to develop our own functions and features through the API. The EPLAN API is modular and supports VB, C++, and Java .NET, all high-level standard programming languages.

EPLAN communicates with external software through an API and by EPLAN's use of Microsoft Access for database management. This simplifies cross referencing between information categories and makes references easy to see. Also useful is the capability to create custom variants of components, to set up option lists for alternative system configurations, and customize database attribute categories.

Because many collaborative ECAD and MCAD environments are global, it also helps that EPLAN provides built-in symbol libraries covering ANSI, JIC, NFPA, IEC, and DIN standards. A highlight for our diverse group of international researchers is the capability to change between the JIC and IEC electrical standards, a feature which significantly makes us more productive. Along the same lines, we appreciate that the interface is easily customized whether it's in English, German, Chinese, or one of many other languages.

Also helpful in a global environment, EPLAN's modules readily exchange electrical, fluid, instrumentation, measurement control, and enclosure design information. The elegantly linked databases effectively handle the data. Graphical components link to specific devices as well as to internal and external industry part numbers. And, as to be expected from an object-oriented system, changes in components inherit previous part information, and changes in part information propagate



A robotic system contains a control that is unnecessary for a particular configuration.

sic design activities, we have not encountered any significant issues. Occasionally, the odd message box pops up in finest German, but that problem can be considered negligible.

Overall, we are satisfied with EPLAN because it provides a modern and innovative CAE environment in which to conduct research. The developer's service is excellent and provides advice on the best system configuration, system installation, and training. As researchers, we especially appreciate the service because we definitely are not the standard industrial customer. **MD**

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to associated components. Furthermore, links between multiple instances of a component provide valuable information from any instance of that component such as related drawings. With an option to define new categories for part information, the software lets

users store information for electro-mechanical parts to supplement MCAD models.

EPLAN targets professional engineers in industry who can quickly become familiar with using the high-end system. Novice users, on the other hand, would face quite a steep learning curve. In ba-

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