



Saber integrated in E³.series Better simulation of wire harnesses, hydraulics and pneumatics

I N T E R V I E W



Zuken has linked E³.series, its electrical CAD software for cabinet layout, electrical and wire harness design to the Saber Simulator from Synopsys for even faster development of high-performance wire harnesses, hydraulics and pneumatics.

The new solution also takes into account the quality and cost requirements that development teams are expected to meet.

Martin Santen, application engineer at Zuken, talks about E³.Saber Frameway.

About E³.series

E³.series is a Windows based modular, scalable and easy to learn and serve system for the engineering of electrotechnical, wiring, wiring harness, pneumatics and hydraulics applications.

The sharing of a singular core object-orientated database that supports the entire engineering flow from concept creation to manufacturing, eliminates the need for data transfer between the different modules.

This reduces errors, increases quality and allows engineering changes to be completed much more quickly and efficiently.

E³.series can also be smoothly integrated with existing applications and processes through standard and customizable bi-directional programmable interfaces circuit diagrams for hydraulics and pneumatics.

Over 2000 customers worldwide enjoy the benefits of E³.series.

Why did Zuken integrate the Saber Simulator from Synopsys in the E-CAD system E³.series?

Martin Santen: Primarily, we wanted to provide better support to wiring developers, whether they work in the automotive industry, aircraft design or mechanical engineering.

In the case of mechanical engineering there are other technologies that are used in conjunction with electrical systems, namely hydraulics and pneumatics.

For these different technologies, you have to design the systems and then see if they work. The conventional approach is to build a real prototype, but making modifications is time-consuming and expensive. That's why manufacturers are eager to be able to perform checks during the virtual phase, using the technique of simulation.

But the question is: Which simulator can do this while handling all the different technologies? Zuken found that the Saber Simulator from Synopsys is exactly the right tool, which is why we integrated it in our existing electrical-CAD system as E³.Saber Frameway.

Why choose this old tool (Saber)? Aren't there more modern tools available?

Martin Santen: You're right in that Saber has been around for several years. But Synopsys has done a lot of work to keep the simulator in line with the latest technology. Saber gives the simulation system a whole new look. Users will notice a change before the year is out.

How is the tool (E³.Saber Frameway) intended to be used in practice?

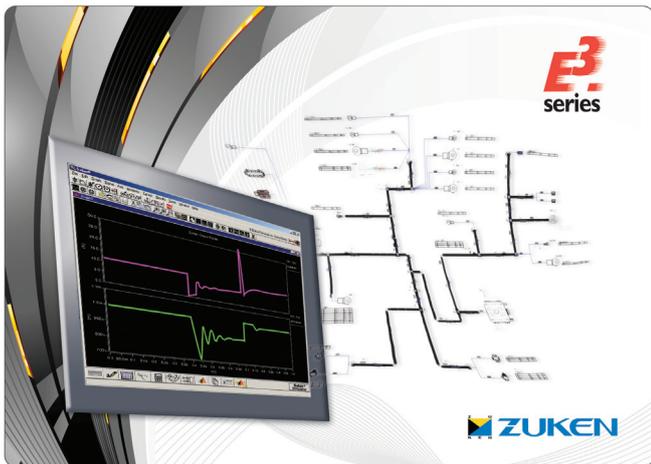
Martin Santen: The intention is not to simulate an entire machine including the mechanical, electrical, hydraulic, pneumatic and software components because you would have the problem of acquiring the necessary models and validating them, and you would also need the right kind of specialist who can use such an extensive tool.

The actual purpose of E³.Saber Frameway is firstly, to perform functional checks of wiring and fluid designs.

Secondly, it is designed to optimize existing circuits.

We also have a third group of users, who require a tool like this to perform scatter analysis. With volume- and mass-produced products there is obviously a certain degree of scatter in quality and therefore in later behavior.

To avoid system failures, we use worst-case simulation. In other words, we ask: What needs to be done to make sure the product still works in the worst-case scenario? Things like this can only be worked out mathematically, because it would be impossible to build the necessary number of prototypes.



Schematic design and simulation in a standardized environment

To return to the question of combined modeling and simulation of different technologies, what libraries does Saber offer?

Martin Santen: The main focus is still on electrical engineering. But as I mentioned earlier there are also models for hydraulics, pneumatics, and even optics and thermodynamics.

But in some cases these might prove insufficient?

Martin Santen: Yes, that is quite likely. For cases like these, Synopsys has application engineers who can design appropriate library elements or work directly with the customer to do this.

Zuken issued a press release on this topic stating that an E3 project can be used for actual simulation purposes. Does that mean the wiring diagram becomes the model?

Martin Santen: No, it means that the schematic doesn't have to be created from scratch in Saber anymore, because it can be transferred from E³.series instead. This saves time and avoids mistakes. The model is then built on this basis.

You also have to look at how companies typically work. You usually have electrical engineers who design the electric schematics and then specialist simulation engineers who prepare and perform the simulations. Users don't want to abandon this duality. So we need optimum tools for both groups that are effectively linked to enable them to share their results. That's exactly what E³.Saber Frameway does.

It may sound simple, but in fact it's far from easy to achieve.

Martin Santen: Absolutely. In order to achieve this integration you first have to understand how both groups work. You have to understand the physics and then map it in the software.

If I as a user were to install this environment, what process would I then follow?

Martin Santen: It all starts with the schematic. As I already mentioned, productive designs will continue to be produced by the same people. However, the actual process may vary in the details. E³.series is available as both a single-user and multi-user solution. In the first scenario, the project is handled entirely by one developer. In the second scenario you have several people working on the same project simultaneously. This is what would happen if other systems, such as the hydraulics, which are also being developed in E³.series in addition to the electrical design. This has a major benefit because everyone is working with the same data and change data is available to everyone at the same time.

The simulation engineer can also, with a slight time delay, start building the model by accessing the original data. Here there is another difference depending on whether an E3 multi-user or single-user system is being used.

In a multi-user system the simulation engineer can work on the data simultaneously. With the single-user solution, he has to wait until the schematic is ready or at least at a stage where he can simulate it.

And what happens then?

Martin Santen: The engineer studies the schematic and selects the components to be simulated. This is done by simply clicking on them. Then Saber comes in. At this point the engineer can actually start the simulation as long as the library knows the PIN mapping. This is the ideal scenario - otherwise this has to be remedied first.

Additionally, E³.series stores all the simulation-relevant data so it doesn't need to be entered again for the next simulation. Then the actual simulation can be performed. Because Saber is a multi-domain simulator, all physical effects – electrical, hydraulic, pneumatic, and so on – are simulated concurrently. The behavior of the designed circuits is now known and can be accepted or modified if necessary.

What about other conditions such as forces and masses?

Martin Santen: We incorporate these into the schematic as "reserve elements": elements that we draw in but don't appear in the parts list, etc. Another way of handling it is to "package" these conditions in the parameters. That means the parameter is embedded in the model and is given as a numerical value when required.

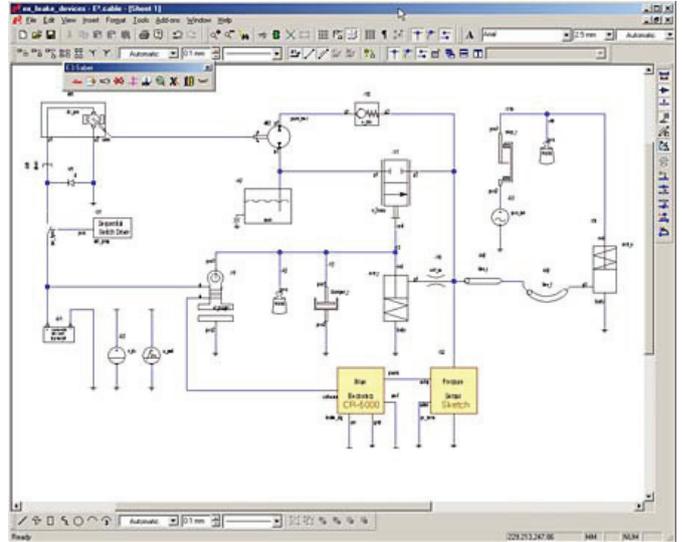
What happens once a schematic has been simulated and accepted?

Martin Santen: Then you move on to the usual standard processes: the production of nailboard drawings for wire harnesses, assembly drawings, calculating length information, cabinet design and so on.

How do you roll out a development environment like this?

Martin Santen: We use a carefully structured process, usually starting with a meeting with a customer who drove the initial demand, together with colleagues from Synopsys. We ask them exactly what they need from a technical point of view and also obtain an understanding of their organization and how their

processes work. There is always more than one department involved, and they sometimes have divergent requirements that need to be harmonized. Once this has been done we can build a pilot project of a suitable system. If this pilot works as the customer wants it to, the system is rolled out across all the relevant departments and workstations.



View of a schematic that includes mechanical components on the right-hand side (conductors, ground, control element) with the E³.Saber Frameway toolbar.

That sounds more like the rollout of a PDM solution than the acquisition of single CAD workstations?

Martin Santen: Yes, you could look at it that way. Because there are so many different employees and departments in a company, this kind of roll-out project is necessary.

This means that there are more costs involved, besides the software and maintenance costs?

Martin Santen: Yes, the customer must take into account additional costs for the roll-out project and possibly for the development of libraries.

And availability...

Martin Santen: ... is no problem. A customer who needs to perform tasks like those we've described can contact us at any time to discuss an actual rollout project.

Thank You!

For more information, visit www.zuken.com