



# Thinking outside the box

**G**reat ideas unfold as they are developed and, together with time to market pressures, demand that the all phases of the design progress in parallel.

But as designs become more complex, designers have always struggled to solve the problem of meshing together data from different parts of the process. Unfortunately, tool providers have tended to take the easy option and 'stick' the design together with tools that create intermediate files to transfer design data from, for example, the placed and routed fpga across to the board design. Unfortunately, electronics design is not a simple, linear process.

"To tackle this challenge, we need to take a step back and look at the bigger design picture," explained Altium Europe's vp sales and support, EMEA, Frank Hoschar. "PCB design cannot be considered independently. We need to look at hardware design, programmable hardware design and software development as a

How a unified design environment frees the designer to innovate at the system level.

By **Mike Richardson.**

whole and provide a design environment that unifies these traditionally disparate design disciplines. This requires more than passing intermediate files back and forth between separate design programs. It requires real, platform level unification of all the processes involved."

As an example, Hoschar says board designers need to be able to use the reprogrammability of fpga pins to untangle the routing challenge associated with high pin count devices. To do this effectively, the pcb editor must be aware of the constraints imposed from the fpga realm in relation to physical and timing issues of the programmed device. And if you add a proces-

sor function into the fpga, the embedded software developer needs to keep his code in sync with the rest of the system.

"The challenge of meshing data extends beyond the electronics too," continued Hoschar. "Connecting from the components on the schematic to the company database, passing the completed board to the mechanical engineer and generating pick and place files in the assembly shop's preferred format are long standing problems that require a comprehensive and flexible electronic development solution."

The only way to address these issues is to provide a design system that brings together hardware, programmable hardware and software design within a single, unified design environment.

Hoschar feels that, in general, pcb implementation technology is mature and well understood. Device switching speeds and newer signalling technologies, the wide I/O capabilities of modern fpgas and the ready availability of high capacity pro-



programmable devices at low costs are all changing the board design process.

“However, the biggest development driving pcb design software is the change in the design paradigm made possible by large scale programmable hardware, such as fpgas,” Hoschar stated. “No longer are they simply a niche solution for implementing fast hardware; they are capable of housing an entire processor based digital system. Indeed, fpgas allow the complete ‘intelligence’ of a device – embodied in both hardware and software – to be fully implemented in a ‘soft’ environment.”

### Breaking the shackles

As far as future developments, Altium is helping electronic product developers break the shackles of a design methodology rooted in yesterday’s implementation technology.

“The age old approach of solving bigger problems by dividing them into different design areas is failing us now,” Hoschar continued. “The complexity of the problems, combined with time to market pressures, calls for a new solution. We are seeing a move away from custom, application specific development. Companies are either working with the component developers to help them create off the shelf solutions, or moving to programmable hardware solutions like fpgas, instead of developing asics.

“We see a similar change in the electronic product development arena. Time to market pressures, pushed by implementation complexities like multimillion gate fpgas in thousand pin packages, mean that throwing more resources at the design is failing to deliver the product. A new paradigm is needed, one which abstracts away a great deal more of the low level implementation detail and frees the designer to create, to think, to explore, to design and innovate, at the system level. This shift to a system level way of designing can only happen in a unified design environment.”

Another common theme among the electronics design software community is increasing

integration within the tool environment and within third party environments. From Zuken’s perspective, it’s looking to increase the integration between its analysis and design tools so that data can be moved easily and graphical user interfaces from different parts of the tools can open up in different aspects of the environment. In fact, 70 to 80% of product cost is determined at the design phase. Integrating this information throughout all the different organisational departments allows you to minimise the cost as much as possible.

“Optimising integration within our analysis and design environment is on a priority for Zuken,” stated company general manager engineering Europe, Werner Rissiek. “This relates to having a seamless data transfer between schematic, layout and constraint management.”

Zuken’s partnership with Altera has seen the provision of free footprint downloads, so that when pcb designers work on a board they can use a Altera fpga, instead of having to manually set the footprint parameters. Now, they download a design kit and put it straight into their library ready for use.

“We do everything we can to improve the adoption of new technology for our customers,” he continued. “Through partnerships with companies like Altera, we are continuing to provide the integration needed within the electronics industry for our customers to remain competitive in the marketplace.”

Priware develops CircuitWorks, which is designed to take data from ECAD systems in the common IDF

and PADS formats to build automatically a full detailed 3d model of the board, holes, components and keep out/keep in areas in the SolidWorks 3d cad system. This offers mechanical engineers an detailed model of the populated pcb in their design environment in a matter of minutes. Once in SolidWorks, the model can be used to check space constraints, generate detailed product images for marketing purposes, or as a basis for thermal or electromagnetic analysis.

Company technical director Rob Lacey outlines a typical customer demand. “We’re seeing an increasing



trend for more functionality, but also a need to keep the software as simple to use as possible – a difficult balance to get right. People simply don’t have the time to learn the wide range of software products they’re expected to use, so keeping products as intuitive as possible is vital. On a technical level, we’re keeping an eye on emerging formats such as IPC-2581, which could replace IDF as the standard interchange format between ecad and mcad.”

With a final nod toward future requirements, Lacey sees a growing demand for CircuitWorks. “Linking the ecad and mcad worlds is becoming more important for consumer electronics manufacturers. New formats like IDF 4.0 and IPC-2581 will allow us to bring much more data from ecad to mcad and vice versa, with less data loss between the systems.”

