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Pegatron and Cadence

"The AiDT feature in Allegro PCB Designer ended our frustrations over all of the time we were spending on routing and tuning. All of the hours we're saving as a team can be directed toward new project requests for the business."

Sky Huang (Yu-Jen Huang), Deputy Director of Computer-Aided Engineering, Pegatron

The Customer

Headquartered in Taipei, Taiwan, Pegatron Corporation is an electronics manufacturing company that develops computing, communications, and consumer electronics products for branded vendors. The company also designs, develops, and manufactures computer peripherals and components. Its diverse product line includes motherboards, desktop PCs, notebooks, wireless systems, game consoles, networking equipment, and set-top boxes.

Pegatron is a spin-off of ASUSTeK Computer Inc., more commonly known as ASUS, a multinational computer hardware and electronics company that's also based in Taipei. As deputy director of computer-aided engineering (CAE) at Pegatron, Sky Huang leads a team that develops PCBs and design tools that support Pegatron's R&D units for tablets, notebooks, and servers. Like ASUS, Pegatron is a longtime user of the complete set of Cadence® Allegro® PCB and IC packaging design and OrCAD® PCB design tools.

The Challenge

Huang and his team became frustrated at how much time they were spending to manually route and tune the traces on PCBs they developed for notebook, tablet, and server products. Their customers previously asked only for rough evaluations of whether the trace on the boards could be completed; now, they request 100 percent routing, including the tuning. A ball-grid array (BGA) package might have up to 1,000 pins, so having to route such a BGA pin by pin was a painfully slow process.

Business Challenges

- Free up resources to support more project requests
- Enhance productivity of layout team

Design Challenges

- Faster routing and tuning process for boards

Cadence Solution

- Allegro PCB Designer plus High-Speed Option (Auto Interactive Delay Tuning feature)

Results

- Up to 67% faster routing process
- 75% reduction in engineering resources required for routing and tuning, freeing engineers to work on new projects
- Faster tuning time
- Increased customer satisfaction
- Decrease in errors due to 300 utilities developed in Allegro PCB Designer

"In the beginning, it might have taken 10 layers to complete the job, but then later, we'd add layers to finish the board," said Huang. "Since our customers began requesting 100 percent routing, our layout engineers were spending up to 50 hours on a server board and up to 12 hours on a tablet, tuning the trace manually."

To move through each job faster, and be able to take on more projects, Huang and his team needed a way to automate the routing process.

The Solution

Familiar with Cadence tools and pleased with a close relationship with the company, Huang and his team shared their challenge with their Cadence applications engineer. The engineer told the team about a unique feature in Allegro PCB Designer, a tool they were already using – the High-Speed Option (Auto Interactive Delay Tuning, or AiDT). The team got early access to a prototype version of AiDT.

Based on electrical and physical constraints, AiDT adds tuning to selected sets of signals (byte lane or an entire interface). The feature has three auto tuning modes:

- Single cline tuning
- Cline segment tuning
- Tuning of entire match group

The Pegatron team used the Timing Vision feature of Allegro PCB Designer to gain a sharper view of the constraint condition of its design. The Timing Vision feature shows timing information on the PCB Editor canvas, eliminating the back-and-forth time between the Constraint Manager and the PCB Editor.

" We've received very good support and response from Cadence. Our requirements and feedback are met with quick responses. Cadence is our strategic partner."

The team initially used the AiDT feature in Allegro PCB Designer on two designs:

- A server extend board with 10 layers (6 for routing), 12 DDR chips, DDR3 routing constraints, 1,780 components, 1,271 nets, 4,850 pins, and PCI Express and SAS interfaces
- A tablet PC board with 10 layers (6 for routing), 2 low-power DDR chips, DDR3 routing constraints, 1,186 components, 1,338 nets, 5,411 pins, and USB 3.0 and HDMI interfaces

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The Results

By automating its routing process using the AiDT feature, Pegatron reduced the amount of time spent on routing by roughly 67 percent. This efficiency improvement has helped free up layout team resources to take on more projects than previously possible.

"Cadence tools have very high customization ability, so we can develop a lot of in-house functionality with Cadence. It's much more open than other tools on the market," said Huang.

Huang added, "We've received very good support and response from Cadence. Our requirements and feedback are met with quick responses. Cadence is our strategic partner." Since Pegatron's suppliers also use Cadence tools, the company, when the main chip placement is similar, can reuse functions such as CPU, DDR, and PCH fan-out.

The Pegatron team has, thus far, developed more than 300 utilities in Allegro PCB Designer—for routing, placement, post-process checks, and other functions that enhance the overall design flow. "These utilities have helped minimize errors on the RD/layout engineering side," said Huang.

Before using the AiDT feature, the layout team met its project requests through the efforts of multiple people. It often took anywhere from one to four people to work on routing. Today, one engineer can handle routing and tuning on a project.

Pegatron expects all employees to work passionately and positively to inspire each other to reach his or her potential. By working closely among teams with different functions, employees are able to create market-leading products that maximize benefits for customers.

Summary and Future Plans

The Pegatron team will continue to evaluate new Cadence tools that become available. "We appreciate that Cadence continually enhances its tools to satisfy customers' needs," said Huang. "We have a close relationship with our local applications engineer, so we enjoy the advantage of getting early access to information about new tools, and also opportunities to try them out to further enhance our design process."

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