

CUSTOMER SUCCESS STORY



Board/Chip/Software Design
Video/Data Recording
Image Processing Solutions

Digital Design Corporation

The sheer number-crunching requirements of video image recording, processing and analysis make any system design very challenging. Now add in the physical and electrical requirements, such as noisy power supplies and the extreme temperatures and environments of military and rugged industrial applications. Complicate the design further with cramped size requirements, vibration, and high G-forces and you get a sense of what the designers at Digital Design Corporation (DDC) face on a daily basis.

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Mike Cortopassi, Principal Staff Engineer, Digital Design Corporation

Meeting all these constraints requires close collaboration among many design disciplines including system, schematic, board, mechanical, chip, firmware and software. This is especially so with modern high speed digital designs, where the high frequencies on a board require a broad experience base and high powered tools. The design process may require many iterations to settle upon an optimum system. That’s why DDC gives its hardware designers an integrated design environment based on Altium Designer. Relying on its comprehensive libraries, smart automation, and crossdiscipline integration, DDC can quickly balance all the design tradeoffs within its most demanding products.

One hardware engineer tackles a 22-layer board

The DDC Video and Advanced Data Recorder (VAADR) provides real-time recording and playback of highresolution imagery in ruggedized applications. The system captures and generates multi-gigabit I/O streams of high-frame-rate 16-bit video. Initially designed for military avionics applications, most of the functionality resides on one controller board that interfaces with removable storage modules.

DDC leveraged its deep experience with the latest, densest FPGAs to implement the controller board’s processing and storage capabilities in a compact package. While the FPGAs

make it easier to fine-tune system hardware and software, their large sizes (well over 1,000 pins) introduce a huge board design and layout challenge. In addition, the military and industrial applications that the system works within are notorious for poorly regulated power sources. The system’s functional, thermal, and electrical constraints drove DDC to create a 22-layer board, produced by a single hardware engineer working on Altium Designer.

Integration and automation work for DDC

Mike Cortopassi, Principal Staff Engineer, explains: “At DDC, the hardware engineer builds the schematics and the board layout. I’ve done the design; I know the architecture, so I know how the routing needs to perform. Altium Designer is perfect for the way we work.”

Altium Designer’s built-in component libraries make it much easier for Mike to create schematics, with even the large Altera and Xilinx FPGAs that DDC depends on. Mike explains: “Trying to build a library model of a part with 1,800 pins and not make a mistake is a tremendous effort.”

Automation of data-intensive steps accelerated Mike’s design and helped lock out errors. That freed Mike to concentrate on tweaking critical paths. “Automated pin-swapping during routing was a big plus to ensure critical routes,” he says. “I can quickly make changes to the FPGA pinout and push the netlist back to the FPGA designer as often as I need to.”

The integration of schematics and board design worked well in the other direction too. “If I needed a new power supply rail, I just put another part on the schematic, push it into the PCB design, and completed the route.” Being able to switch between schematic and board design was important for an efficient, errorfree design cycle—especially since it could happen multiple times in an hour.

Preventing errors and improving processes

Upon design completion, Altium Designer automatically generated the manufacturing output files. The first revision came back and DDC hooked up the power supplies. Within an hour, the board was operational and the FPGA designer was beginning evaluation of the FPGA. Mike gives the integration and automation in Altium Designer credit. “Altium Designer gives me every opportunity to catch the errors before they can be released.”

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As the VAADR was tested, revised and put through environmental testing, DDC made numerous revisions and improvements in the board. "Design spins were done very quickly, and automatic output files simplified the small design changes." The initial customer was very pleased with the system, and the resulting board is now part of DDC's standard product portfolio. Today, DDC is launching the design of a new, even more powerful version of the VAADR – using Altium Designer.

Product Information

The DDC Video and Advanced Data Recorder (VAADR) is a high-end video and data recorder for highly demanding applications in military, airborne, vehicular, research and other applications. It provides real-time recording of multiple channels of high-frame rate, 16-bit high-resolution imagery. It stores RAW or compressed imagery along with metadata such as timestamps and GPS and other metadata. Its multiple channels of record and playback support advanced image analysis and processing during playback.

About Digital Design Corporation

Digital Design Corporation (DDC) is an engineering consulting company with high-end design services and products. It architects, designs, and implements ICs (FPGAs, ASICs, etc), associated circuits and software, and the systems that encompass them. The company specializes in video (interfacing, enhancement, and recording), image processing, communications, DSP and audio in wide variety of military, automotive, medical and other industrial markets. The company has over 400 years of cumulative digital design experience, working the entire process from concept to foundry, including everything from initial architecture through complete design and verification, including the ability to provide prototype and/or production builds and support.

ABOUT ALTIUM

Altium Limited (ASX:ALU) creates electronics design software. Altium's unified electronics design environment links all aspects of electronics product design in a single application that is priced as affordable as possible. This enables electronics designers to innovate, harness the latest devices and technologies, manage their projects across broad design 'ecosystems', and create connected, intelligent designs.

Founded in 1985, Altium has offices in San Diego, Sydney, Karlsruhe, Shanghai, Tokyo, Kiev, with value added resellers worldwide. For more information, visit www.altium.com. You can also follow and engage with Altium via [Facebook](#), [Twitter](#) and [YouTube](#).