



## CADENCE AND LIQUID COMPUTING CORPORATION

Liquid Computing Leverages Allegro System Interconnect Design Platform to Complete Complex Printed Circuit Board Design

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**Tim Kent**, *Vice President of Engineering, Liquid Computing Corp.*

### CORPORATE PROFILE

- Liquid Computing is producing highly available and scalable servers that can dynamically change to deliver any computing or communications task at best lifecycle economics

### DESIGN CHALLENGE

- Accelerate design schedule for complex high-speed board design to meet critical market window
- Adopt a front-to-back high-speed board design methodology to maximize productivity

### CADENCE SOLUTION

- Deployed the Cadence® Allegro® system interconnect design platform
- Enabled a high-speed board design methodology that allowed the Liquid Computing team to accelerate their process to meet their schedule

### CADENCE PRODUCTS AND SERVICES

- Cadence Allegro system interconnect design platform, including Allegro PCB SI GXL, Allegro System Architect, Allegro PCB Editor, and Allegro Constraint Manager

## SCALABLE COMPUTING WITHOUT COMPROMISE

Some things go together naturally – race tracks and fast cars, scalability and high performance in computing systems. Wait a minute, something isn't quite right here. With high-performance computing comes trade off and compromise, not scalability and flexibility. Right? Not according to Ottawa, Canada-based Liquid Computing Corporation. Since 2003, they have been applying their collective computing and telecommunications wisdom to create a new class of scalable and flexible high-performance computing systems. The company has developed a revolutionary Interconnect Driven Server (IDS) architecture that is bringing disruptive change to the industry. This new HPC server is set to fundamentally alter the form, function and economics of computing within the HPC market. Their goal is to achieve world-leading bandwidth and low latency for processor-to-processor interconnect.

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*Sylvio Bisson, Director of Hardware Development, Liquid Computing*

To achieve these breakthrough performance goals, the Liquid Computing design team was faced with a very complex, high-density board design with tight timing constraints. “We were looking at a very complex, high-layer-count printed circuit board, and from an engineering perspective, we had to get it right the first time to achieve our time-to-market goal,” said Tim Kent, vice president of engineering at Liquid Computing.

## INTEGRATED BOARD DESIGN PROCESS REQUIRES COMPLETE SOLUTION

The Liquid Computing design team had created a highly integrated process for their complex board design, and they needed a tool flow that would take them from the specification phase through samples and verification. “Finding the right tools to allow us to achieve our goals was critical,” continued Kent. “The Cadence Allegro system interconnect design platform was the only solution that could address the full scope of our design challenge, with functionality to take us seamlessly from one end to the other.” Kent points out that a solution includes more than a set of tools. “Partnering with Cadence gave us access to expertise and support that empowered us to achieve our initial design goals, and positioned us for future success.”

## TABLE-DRIVEN FEATURES IN ALLEGRO SYSTEM ARCHITECT CUT DESIGN TIME IN HALF

The Liquid Computing design team adopted the Cadence Allegro design platform throughout their complex board design flow. “Right after our specifications were completed, the Allegro tools enabled us to work very quickly with the net list and schematic generation,” said Kent. “We’ve utilized new functionality, such as the table-driven design features in Allegro System Architect, for the layout of our mid-plane. This has really sped up our process by letting us capture the design and take a look at what-if scenarios without creating a lot of rework.” Sylvio Bisson, Director of Hardware Development at Liquid Computing agreed. “Allegro System Architect was a key factor in cutting our design time in half,” said Bisson. “The table-driven features enabled us to converge quickly in our initial feasibility study, allowing us to start layout much sooner.”

In addition to the table-driven feature, the Liquid Computing design team was able to leverage other time-saving functionality in Allegro System Architect. “We really like the stability of the tool,” said Bisson. “One of our engineers was able to touch more than 25,000 signals and connections in the design in just a few weeks, which would have been impossible without Allegro System Architect. In addition, the copy and paste function is extremely useful for changing connections, allowing the engineer to change one slot and then copy the change to all the other slots.”

## INTEGRATION OF ALLEGRO PCB SI GXL ACCELERATES MULTI-GIGAHERTZ INTERCONNECT DESIGN

When it came time to address signal integrity, the Liquid design team was able to dramatically speed their design time for multi-gigahertz interconnect by creating a virtual prototyping environment with Allegro PCB SI GXL. “In just a couple of days, we were able to complete a complex interconnect design,” continued Bisson. “This was another major time saver for us.”

## LEVERAGING ALLEGRO CONSTRAINT MANAGER ENABLES DESIGN TEAM TO ACHIEVE TIMING GOALS

As the Liquid design team moved into the layout phase, using the Allegro platform allowed the schematic team to work together with the layout team to ensure that they created a layout that would meet their design goals. “The Allegro PCB Editor and the Allegro Constraint Manager allowed us to be sure that our layouts would meet the tight timing constraints that we needed to achieve,” said Kent.

Using a constraint-driven layout methodology that is exclusive to the Allegro platform provided the Liquid Computing design team with a real-time display of high-speed rules based on the current state of the design, eliminating the need for constraint translation, forward and backward annotation, or static design rule checking.



## LIQUID COMPUTING DRAMATICALLY IMPROVES BOARD DESIGN PROCESS USING ALLEGRO PLATFORM

The Liquid Computing team was able to meet all of their design goals by partnering with Cadence. "The Cadence Allegro system interconnect design platform has significantly changed our high-speed board design process," said Kent. "Our partnership with Cadence has allowed us to decrease our time to market and increase our confidence in first pass success for our designs. Projects that used to take quarters to complete now take only months, and we trust that the first spins will come back functioning as intended."

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