

Board Station XE

The next generation of the Board Station flow

Mentor
Graphics



A Tightly Integrated Systems Design Flow

The Board Station® design flow is well known for its ability to help companies create leading-edge, complex PCB designs in large enterprise environments. The Board Station XE flow is a new platform for Board Station customers to meet the increasing technological and time-to-market demands of today's electronics market.

Board Station XE is the next major upgrade – or evolution - of the Board Station flow. It delivers the highest level of layout design productivity in the industry and does so by using AutoActive® – a modern software technology for PCB layout. Board Station XE enables customers to design today's most complex electronic products. Board Station XE delivers innovative technologies, such as XtremePCB™, to improve design productivity while minimizing the costs and risks normally associated with adapting new technology.

Board Station XE does this by coexisting with the current Board Station design flow. It uses a common library and front-end tools for both flows.

Board Station XE is based on a single, modern PCB design architecture. It utilizes existing Board Station libraries and existing front-end tools including: Librarian, Design Architect® or Board Architect™ and LMS.

There are a number of benefits of using Board Station XE, including:

- Protects customers investments by allowing them to continue using their data, libraries and existing front-end and library management tools
- Delivers improved design productivity through the AutoActive environment used in Board Station XE and FabLink XE
- Mitigates the risk of changing flows by providing access to more functionality and productivity faster
- Provides dramatic improvements, such as better front and back-end integration, ease of use and increased performance
- Makes it easy to adopt since it uses current Board Station licenses

Systems Design with Board Station XE

When you're designing a product, you need more than just a great PCB layout tool - you need a tightly integrated design system. Board Station XE provides this high level of integration, enabling all members of the design team to work more efficiently, thereby speeding up the design process.

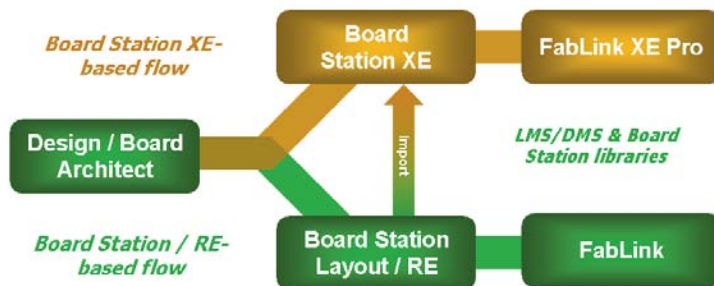
Integration of Board Station XE for layout with Board Architect facilitates a seamless transfer of rules and data between the schematic and layout environments. As a project evolves from concept through to finished product, the database is always kept in synchronization, notifying the engineer and designer of changes as they occur and eliminating unnecessary and costly design iterations.

Board Station XE is integrated with DMS (Data Management System), providing a central infrastructure for component libraries, design data versioning and management, design reuse, where used, and integration with corporate PLM systems. Once the design is complete, integration with manufacturing output tools ensures that the integrity of the design is maintained.

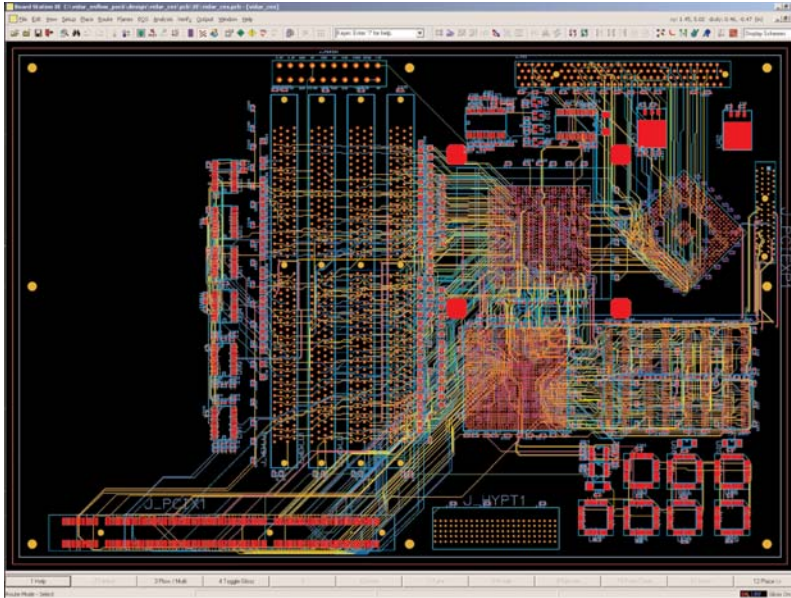
System Definition

With the rapid rate of technology change occurring today, you have an ever-shrinking window of opportunity. You must squeeze every penny out of every design to ensure maximum profits. You have to deliver the best products in the least amount of time at the lowest possible price and this is the only way to survive in this world of rapid change. Last minute requirement changes are a designer's worst nightmare but fortunately we have the solution to integrate and manage the whole PCB design process.

Board Architect is an advanced schematic design entry tool for the



The new Board Station XE flow coexists with the Board Station/RE flow.



Board Station XE is simply the most productive solution available for the creation of dense, difficult, high technology PCB designs.

PCB design process. Based upon the time proven Design Architect, Board Architect enhancements allow the seamless integration with the whole PCB design process and provides for the ultimate control in simultaneous and synchronized PCB design when coupled with Board Station XE. Board Architect was designed with built-in features to support on-the-fly packaging, simultaneous design, design reuse, advanced variant support and the creation and management of documentation.

FPGA-On-Board Design Collaboration

To help with the growing demands of FPGA and PCB design, Mentor Graphics® offers I/O Designer™, a fast and efficient solution for assigning the I/O of your FPGA to device pins in the PCB layout. I/O Designer integrates the FPGA and PCB design flows to provide top-down concurrent design of the FPGAs and the PCB so design teams can reduce design cycle time and optimize performance at the

system level. By maintaining a library of parts for FPGAs from major vendors, I/O Designer supplies all of the important information about each pin of the selected device. Using this information, users can choose to assign all of the signals to pins on the device or only those signals deemed critical to the design. They can also assign I/O standards for those critical signals. In this way, the FPGA pin-out can be optimized prior to PCB layout to insure the best system performance, reduced PCB routing congestion and design cycle time. Do you need to swap pins on the PCB to improve the layout further? I/O Designer knows which pins are swappable and which are not.

I/O Designer also manages the consistency between the FPGA and PCB flows by acting as a data management tool, monitoring each flow and managing any changes that occur. Pin swaps carried out on the PCB are picked up by I/O Designer and the necessary files updated. I/O Designer

then generates FPGA place and route constraints, based on the HDL design and pin I/O assignment process, and creates the necessary symbols, schematics and hierarchical associations based on the "post route" pin data.

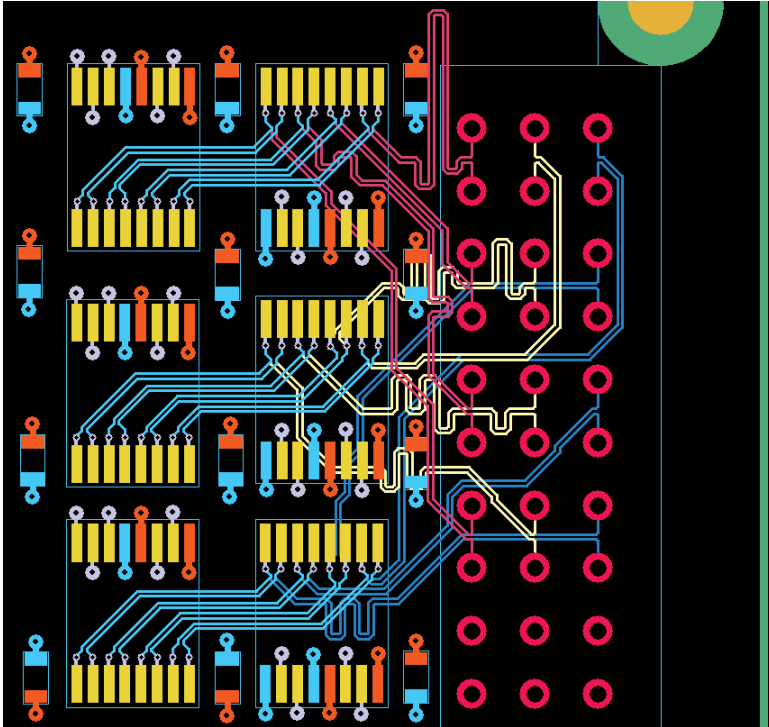
PCB Layout

Board Station XE for layout, powered by AutoActive technology, is an integral part of the tightly integrated flow. By combining ease-of-use with advanced functionality, Board Station XE offers designers the leading technology for the creation of today's most complex designs. It includes interactive and customizable multi-pass autorouting controls for design challenges, such as differential pair routing, net tuning, manufacturing optimization and microvia and buildup technology.

AutoActive - The Technology Leader in PCB Design

AutoActive technology represents a revolutionary step forward for PCB design. The power of industry-leading autorouting technology is combined with interactive editing capabilities to produce a single, powerful and easy-to-use design environment. This environment eliminates the burdens of jumping between tools to get the job done and managing differences between the constraints on the autorouter and on interactive editing.

AutoActive provides designers with greater control than ever before, with the ability to easily switch between automatic and manual editing as needed. From simple tasks, such as defining board areas, to complex procedures that involve maintaining high-speed signal conditions, all objectives are accomplished with the system and the designer working together in real-time. The net result of AutoActive technology is reduced design times, increased productivity and unmatched design quality.



Routing and editing differential pairs with Board Station XE is accomplished with speed and ease that will change your view of high-speed design.

What is AutoActive?

- A single, integrated, place and route editing environment that reduces total design time and increases productivity.
- All physical rules and high speed rules are maintained.
- Correct-by-construction design that produces high-quality results with clean-up time eliminated.
- Shape-based, true 45 degree routing.
- The most advanced autorouting technology ever. Stop and start the autorouter at any time and all results will be correct-by-construction.
- Dynamic clean-up of traces through the reduction of segments, prevention of acute angles, and application of pad entry rules.

Dynamic Area Fills

Board Station XE automatically clears area fills around traces, vias and pads as the board is edited. Dynamic area fills are so fast, it allows users to keep their area fills turned on while they are doing all necessary edits. Moving a via pushes and shoves other vias, traces and area fills and connectivity is automatically maintained.

Rules By Area

The rules by area functionality greatly improves routing around BGAs and other fine-pitched parts. Rule areas represent complete rule sets that are obeyed by online and batch DRC and in interactive and automatic routing. Rule areas may be defined by layer and can be assigned to any polygon, rectangle or circle. Trace widths and clearances automatically change when traversing into or out of the rule area. Designers may also change via sizes

and spans in a rule area to maximize route completion.

Multiplow With Variable Via Patterns

Board Station XE's multiplow functionality allows designers to simultaneously route multiple nets, including differential pairs, with true 45 degree routing. It can even handle routing through areas of staggered pins. Traces being routed push and shove the other vias and traces out of the way and automatically clear area fills as needed. Changes can be easily made to a variety of selectable via patterns at the touch of a button, allowing enhanced flexibility for routing into dense areas of a design.

Flex Circuit Design

Meet the challenges of flexible circuit design with advanced arc routing and teardrop handling capabilities in Board Station XE. Easily create complex nested trace patterns with arcs using the multiple hug trace command. Select a trace or board outline profile and quickly create traces that hug the twists and turns of your flexible circuit. Improve your manufacturing yields with customizable teardrops, trace tapers and teardrops at t-junctions. Edit traces easily by plowing aside arced traces to make room for new traces. Enhance the quality of your manufacturing output with true arc definition - not many segmented arcs.

Dynamic Hazard Review

Design hazards are dynamically displayed and may be individually selected and colored for easy identification. When a hazard is fixed, it is dynamically removed from the hazard list.

Circuit Move & Copy – Informal Physical Design Reuse

The new Circuit Move and Copy command brings the ability to move or copy just about any layout data on the board. Not only is it possible to copy layout data from within the same design but also across designs, thereby providing an informal physical design reuse. Utilizing advanced selection filters, it's possible to accurately define exactly what items in the design get selected, and then pasted into the final design. Furthermore, copied circuits cannot only be copied, but moved, rotated or mirrored. Pasted circuits can also be mapped to a different layer stackup than the copied circuit.

Engineering Change Orders

ECOs can cause delays and introduce errors in the design process. The Board Station XE flow makes ECOs less painful and more accurate than ever before. In addition, Board Station XE's powerful automation and tight system integration drastically reduces ECO completion times and eliminates

synchronization errors. Designers can change rules, replace parts and reroute automatically with no rule violations, all in real - time.

High-Speed Layout

Designers today are increasingly challenged by the need to manage signal quality in order to achieve system performance and reduce prototype iterations. High-speed design with Board Station XE is an integrated part of the AutoActive design environment.

Constraint Definition

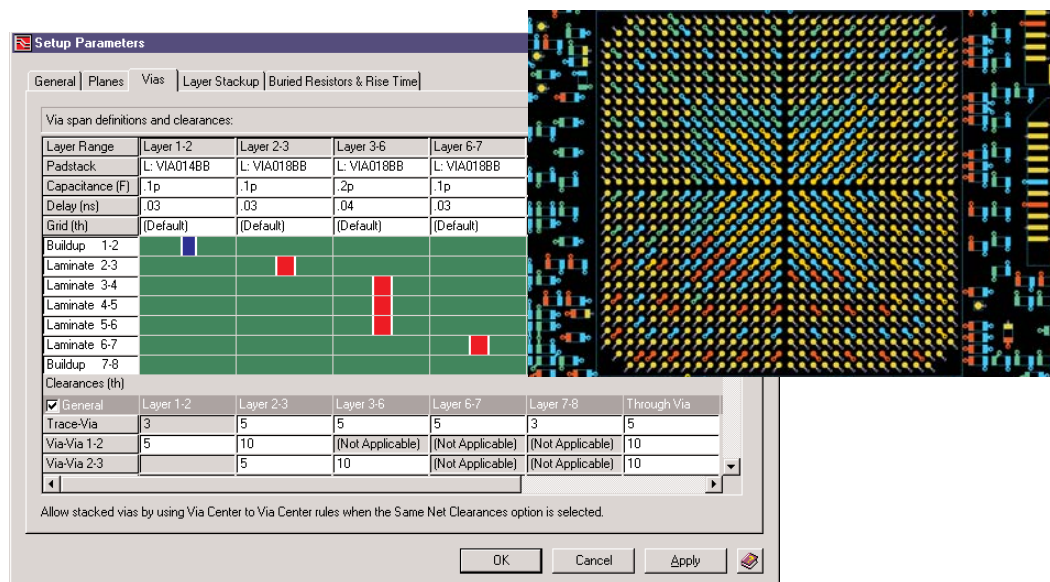
Board Station XE for layout handles an extensive set of constraints to meet high-speed performance requirements whether they're routed interactively or automatically. The Constraint Editor System (CES) provides a fully integrated, constraint-driven design methodology that reduces design costs and time-to-market by automating the communication of design rules and simplifying the entry of complex, high-speed design rules. CES provides common constraint entry for electrical and physical high-speed rules. CES has

an easy-to-use spread-sheet-like GUI guided by the design database with cross probing to the schematic and layout.

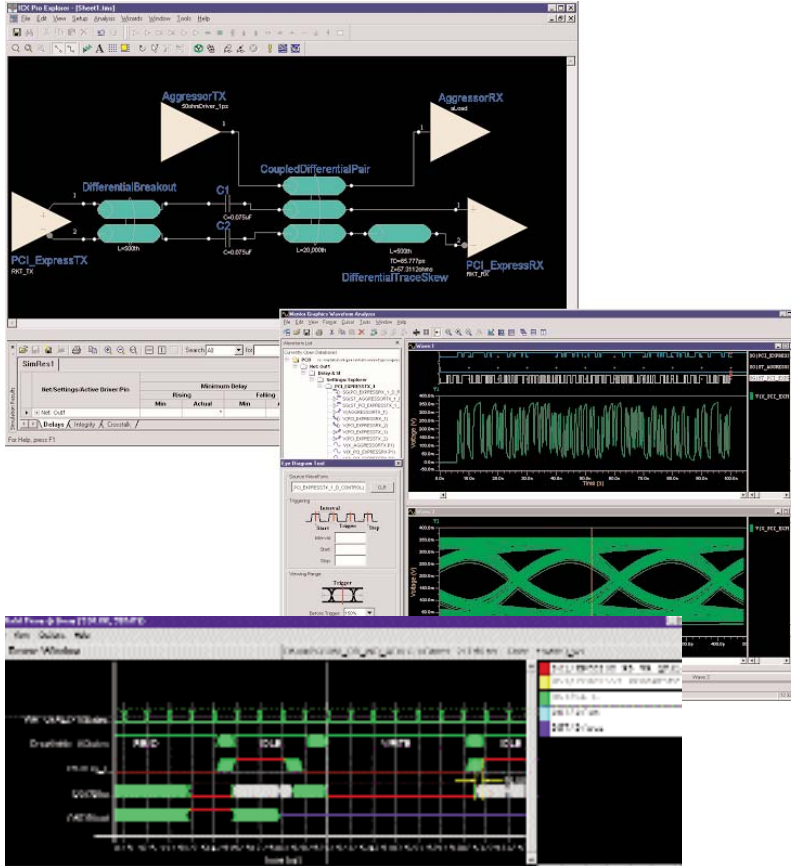
- Rules are preserved on net names, connectivity additions/removals, pin and/or gate swaps and stackup changes.
- The GUI offers easy differential pair creation, parallelism rules entry and pin-pair creation.
- Hierarchical constraint entry enables simple assignment of complex topologies with filtering and sorting.

Net Tuning

While routing interactively, graphic tuning aids are displayed for guidance. Nets modified out-of-tune during edits are automatically re-tuned. The Hazards dialog box dynamically updates as users edit nets, providing instant feedback relative to their constraints. Nets can also be tuned automatically within an autoroute pass. Tuned nets are automatically maintained as the designs are completed.



Board Station XE offers the leading technology for the creation of advanced interconnect designs.



With Board Station XE, timing and signal integrity issues can be addressed and corrected throughout the design process rather than just at the end.

Differential Pair Routing

Routing and editing differential pairs with Board Station XE for layout is accomplished with speed and ease that changes the view of high-speed design. Pair spacing rules can be established by both layer and net class. If one trace is edited, the other trace in the pair automatically moves with it. Adjacent layer differential pair routing capabilities add another valuable option for routing critical signals on a dense PCB.

Simultaneous Design

XtremePCB is a revolutionary and exciting new technology that enables multiple PCB designers to work on a single design database simultaneously over LAN or WAN networks. Unlike

traditional team design methodologies that employ a split-and-join approach to design collaboration, XtremePCB requires no physical partitioning and every designer sees all other client edits in real-time. Because no further training or complex setup is required, designers can be brought in at any time and from anywhere in the world to collaborate on time-critical projects, dramatically shortening design cycle times. It is ideal for large, complex designs or PCBs with mixed technology where specialists need to focus on their part of the design.

The Xtreme technology can also be leveraged to distribute an auto-routing process to multiple CPUs, significantly reducing completion times.

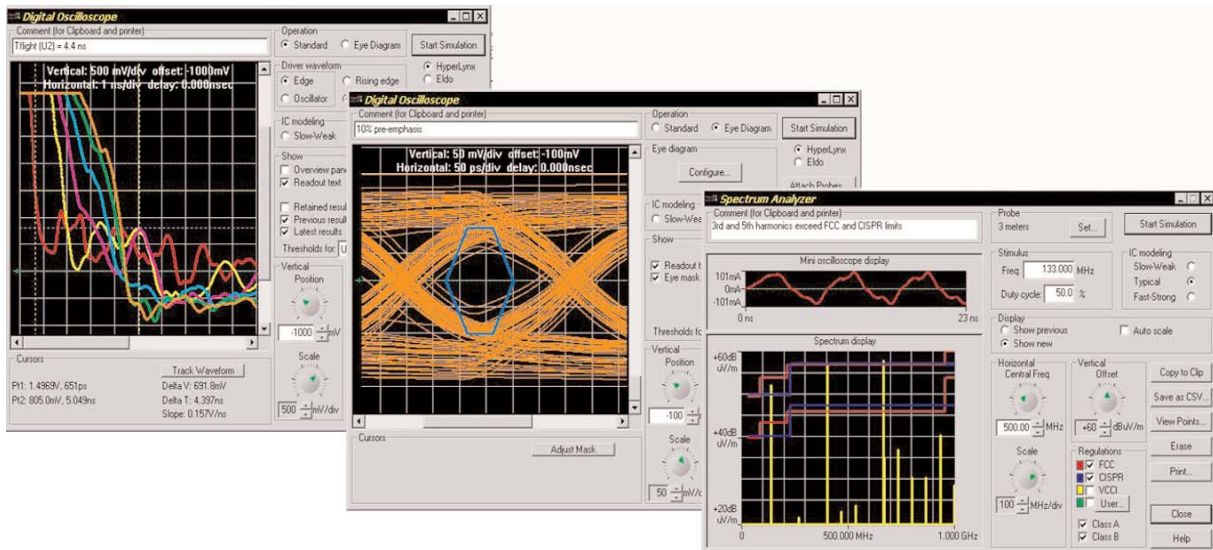
Team Design

TeamPCB™ also allows multiple designers to work on the same PCB layout design. Through a process of partitioning in the layout design phase, today's design teams can "divide and conquer" projects in a fraction of traditional schedules. Traditional team design and concurrent design methods relied on logical partitioning or design reuse blocks, which often involved the error prone manual editing of ASCII files and databases. TeamPCB eliminates many problems associated with other team design processes, through an automated design methodology that manages all edits and keeps design files synchronized.

Advanced Interconnect Routing

The challenges and solutions of advanced interconnect are prevalent today with BGA, CSP, COB and DCA packages increasing board density. Build-up and microvia structures used in these board designs further complicate routing. Board Station XE offers the leading technology for advanced interconnect designs.

It supports the definition of complex via structure rules and the routing of microvia geometries, including routing under pads. Via spans between any two layers are possible. By moving beyond traditional laminate layer pairing, Board Station XE facilitates the design of build-up structures on laminate to enable escape patterns from dense, high pin count devices. Build-up areas typically have a smaller clearance than the laminate beneath them. Board Station XE can establish delay values and clearances per via span to address these issues. Additionally, it features true 45 degree routing for BGA fanout and staggered connectors, enabling localized rule definition to facilitate escape paths from dense areas.



HyperLynx enables powerful, easy to use signal integrity, crosstalk, and EMC analysis prior to layout, after component placement, and after a board has been fully routed.

Signal Integrity, Timing Analysis and EMI

With the Board Station XE flow, timing, signal integrity and electro-magnetic interference (EMI) issues can be addressed and corrected throughout the design process rather than just at the end. This ensures that designs are correct the first time, effectively reducing design iterations and creating the opportunity for optimum system performance.

The enterprise high-speed solution is centered around the common CES and ICX™ powerful simulation technology. ICX Pro™ Explorer and ICX Pro Verify allow users to evaluate high-speed requirements, produce constraints to drive the design flow and validate that the design meets the constraints. The flexible model support (IBIS, SPICE, S-Parameter and VHDL-AMS) allows users to simulate both traditional parallel buses and the evolving high-speed serial architectures. The schematic-like view of the design data simplifies the task for the electrical engineer and allows constraint templates to be generated for use on both current and future designs.

ICX Pro Verify is a unique tool in that it is tightly integrated in the AutoActive environment and run directly from the AutoActive database.

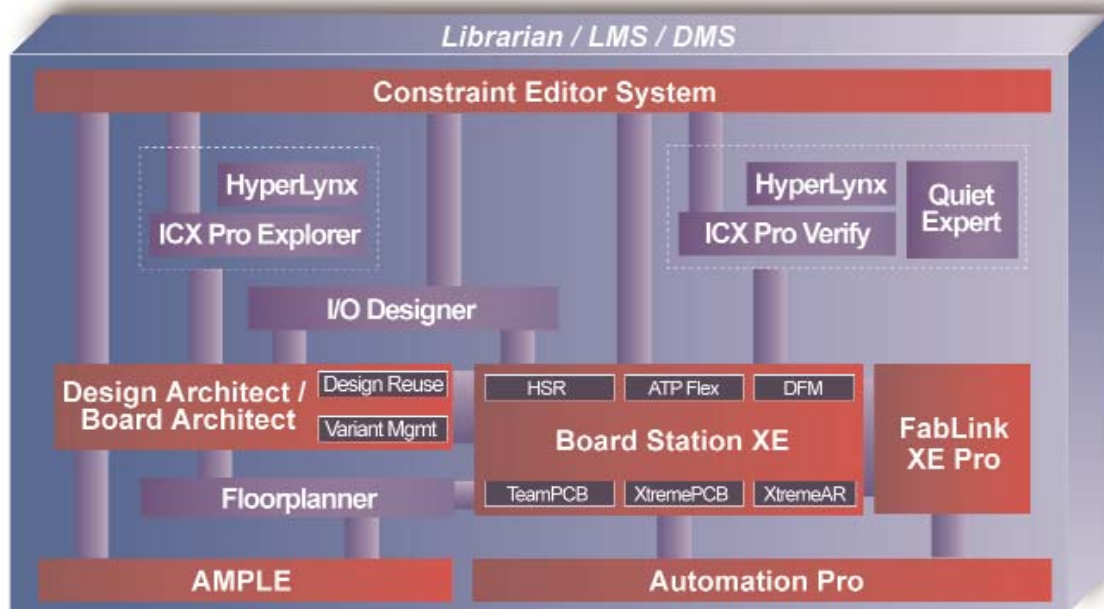
Constraints generated from ICX Pro Explorer are used within the Board Station XE flow to drive the placement and routing of the design. The same constraints and model information used in ICX Pro Explorer are used at both the design and system level for exhaustive, final electrical verification in ICX Pro Verify. The combination of both electrical and physical constraints driving layout with access to common model information and advanced simulation technology provide a best-in-class, integrated high-speed design flow.

In addition to the enterprise high-speed solutions, HyperLynx® provides pre- and post-layout signal integrity, crosstalk and EMC analysis for traditional high-speed interconnects, as well as the emerging serial and multi-gigabit-per-second SERDES technologies. HyperLynx's easy to learn analysis environment makes it an every-desktop standard for Board Station XE.

Of increasing importance due to higher frequencies and government regulations is the elimination of electromagnetic interference. This normally required the production of a prototype board, testing in a shielded chamber and re-design. Now with Quiet™ Expert, the causes of EMI can be highlighted and eliminated during the design layout thus significantly reducing design iterations and saving valuable time-to-market.

System Verification

ModelSim® is the world's most popular and widely used VHDL and mixed-VHDL/Verilog simulator and the fastest-growing Verilog simulator. ModelSim products are uniquely architected using technology such as Optimized Direct Compile for faster compile times and simulation performance, Single Kernel Simulation (SKS) and Tcl/Tk for greater levels of openness and faster debugging. Exclusive to ModelSim, these innovations result in leading compiler/simulator performance, complete freedom to mix VHDL and Verilog and the unmatched ability to customize the simulator.



The Board Station XE flow addresses the needs of the mid-sized to large enterprise electronics company.

Manufacturing Preparation

Manufacturing and fabrication have always been an extremely integral part of PCB design. Previously, designers had to use multiple applications to create schematics, layouts and prepare designs for manufacturing. To make the process easier, Board Station XE has Fablink XE™ Pro, an integrated manufacturing data creation, generation and verification environment powered by AutoActive. Fablink XE Pro was created specifically for designers to control their fabrication data at either the board or panel level, thus ensuring design and manufacturing data integrity.

Fablink XE Pro provides a stand alone panel creation and editing environment for creating manufacturing data at the panel level that operates on a panel design database. In addition, it provides additional board level functionality, including detailed data views, searchable PDF output, copper balancing, various data outputs and Gerber In/Drill In capabilities.

Included with Fablink XE Pro is the Drawing Editor which eliminates the need for 3rd party tools. The Drawing Editor helps automate typically manual operations. It helps create comprehensive and detailed documentation that helps reduce all the associated manufacturing costs as well as the overall design cycle time.

The Design for Fabrication (DFF) functionality performs critical fabrication rules checking during the design process to eliminate costly design re-spins due to last minute errors discovered in manufacturing.

Library, Design Data Management and Enterprise Integration

Board Station XE customers can continue to use the LMS to handle their current libraries or upgrade to a truly enterprise capable data and library management system: DMS.

DMS brings the electronic design process to the supply chain, and brings the supply chain to the designer's

desktop. It ensures complete data consistency, accuracy and availability throughout the design enterprise. Additionally, DMS consolidates multiple data systems, enabling collaboration and life cycle management across multiple team members, disciplines and sites.

It does this by integrating design data management with component information so that corporate component procurement policies (approved parts, preferred vendors) are easily available on the desktop. This helps designers to make optimum component choices and to manage parts lists during the design process so they can be released as accurate BOM's that meet corporate policies for cost, reliability and regulatory compliance. At the end of the project, DMS manages the release process so that accurate product documentation can be transferred to enterprise manufacturing, PLM and ERP systems, and supply chain management systems.



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