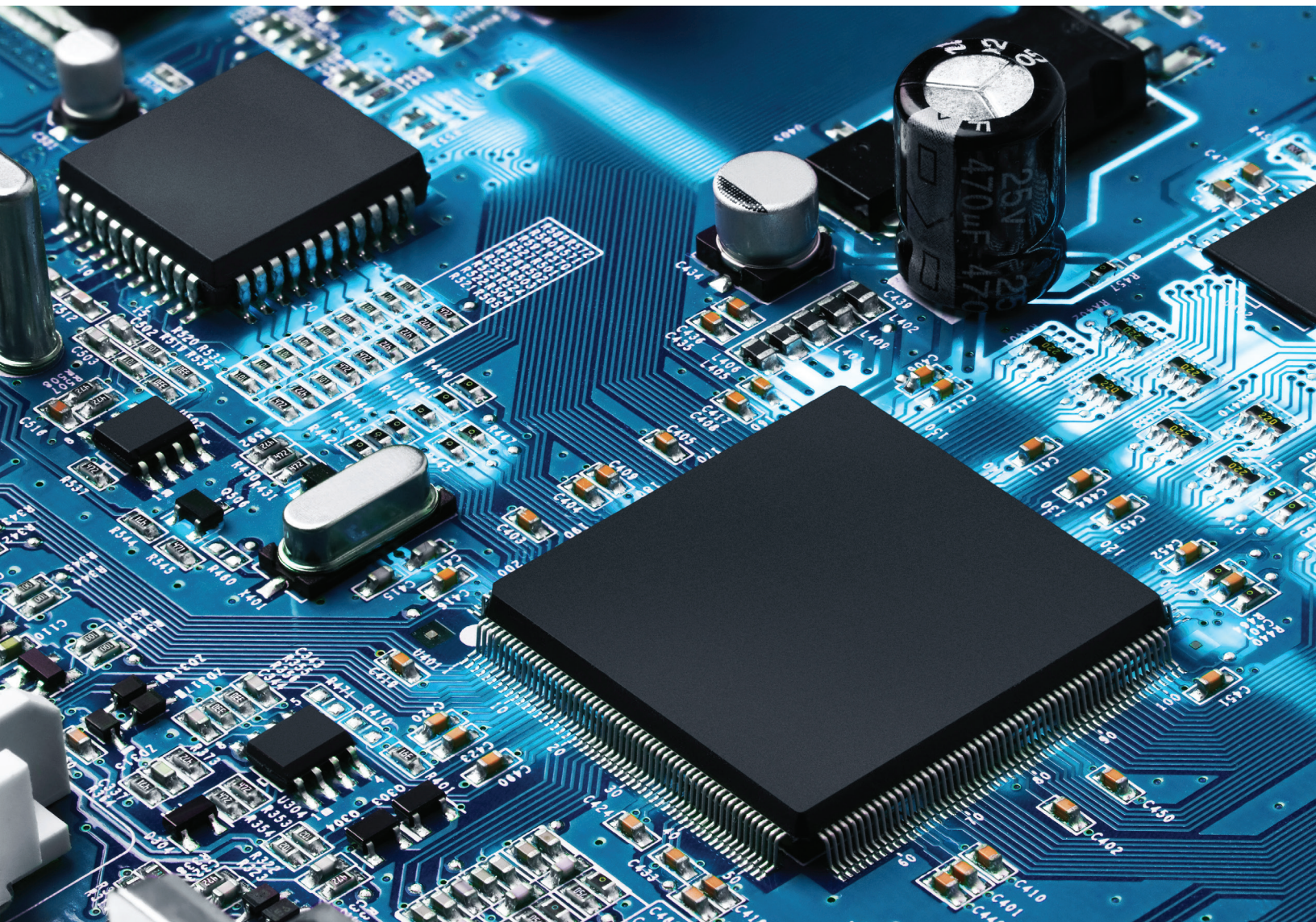


DIGITAL INDUSTRIES SOFTWARE

Unlocking the power of **Xpedit**

Twelve differentiators that enable a fully integrated electronic
systems design flow

[siemens.com/eda](https://www.siemens.com/eda)



Leveraging Xpedition for high-performance electronic system design

Xpedition™ Enterprise software is used to deliver the printed circuit board (PCB) design software functionality you're used to, such as for layout and schematic. But it goes beyond that to enable a fully integrated electronic systems design flow that bridges the gap from integrated circuit (IC) and PCB to fabrication with integrated verification at every step. How does it do this?



There are 12 differentiators that drive the advantage of Xpedition for high-performance electronic system design:

1. Constraint-driven design
2. Design capacity
3. Team design concurrency
4. Analog/mixed signal simulation
5. Signal integrity/power integrity/electromagnetic interference (EMI)/thermal
6. Schematic analysis
7. Design for manufacturability (DFM)
8. Process preparation for PCB assembly and test
9. Field-programmable gate array (FPGA) PCB input/output (I/O) co-design
10. IC packaging
11. Full ecosystem including IC, FPGA, PCB, analysis, product lifecycle management (PLM), mechanical computer-aided design (MCAD)
12. First pass design success

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FEATURE ONE

Constraint-driven design

Set up technology or requirement-driven constraints that are followed throughout design

Creating an automated way to manage design constraints allows you to control your electrical and/or physical rules and hardware requirements. This way, you’re going to design quality into your board and not simply check for quality after the fact.

By using a constraint-driven design approach, you’re going to have confidence that you’re meeting your requirements because you eliminate the human factor of having to go back and manually check and validate your design.

Using Xpedition key features for constraint-driven design

Easy constraint entry

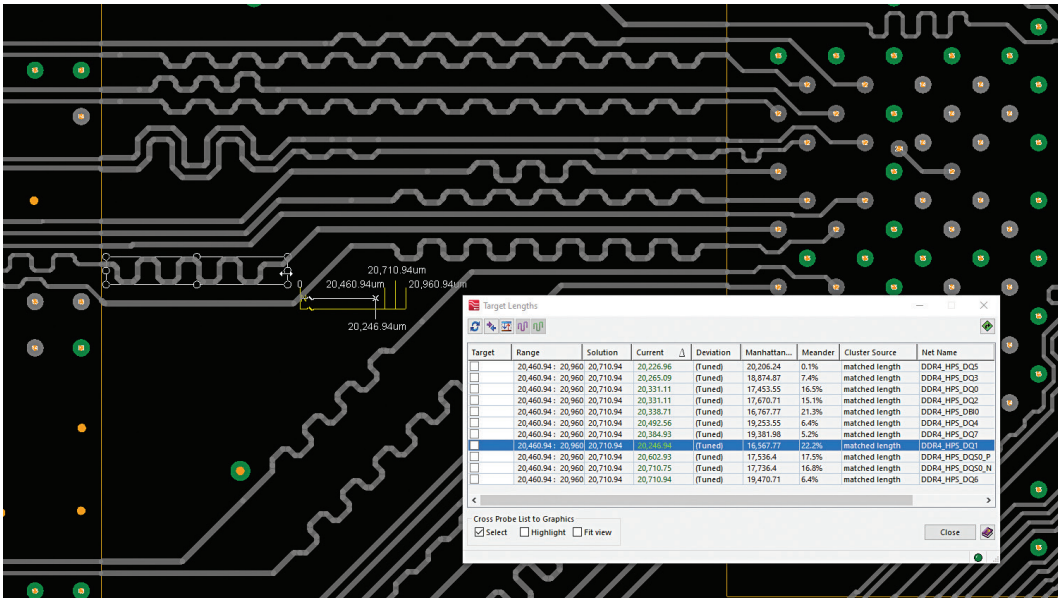
Constraint entry for a design in Xpedition is done in an easy-to-use spreadsheet, which allows cross probing of the applications like schematic and layout.

Built-in automation

Simplify tasks such as finding and assigning differential pairs by using automation.

Constraint re-use

Constraints from one design are available in other areas of Xpedition.



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FEATURE TWO

Design capacity

Capable of handling the largest, most complex designs

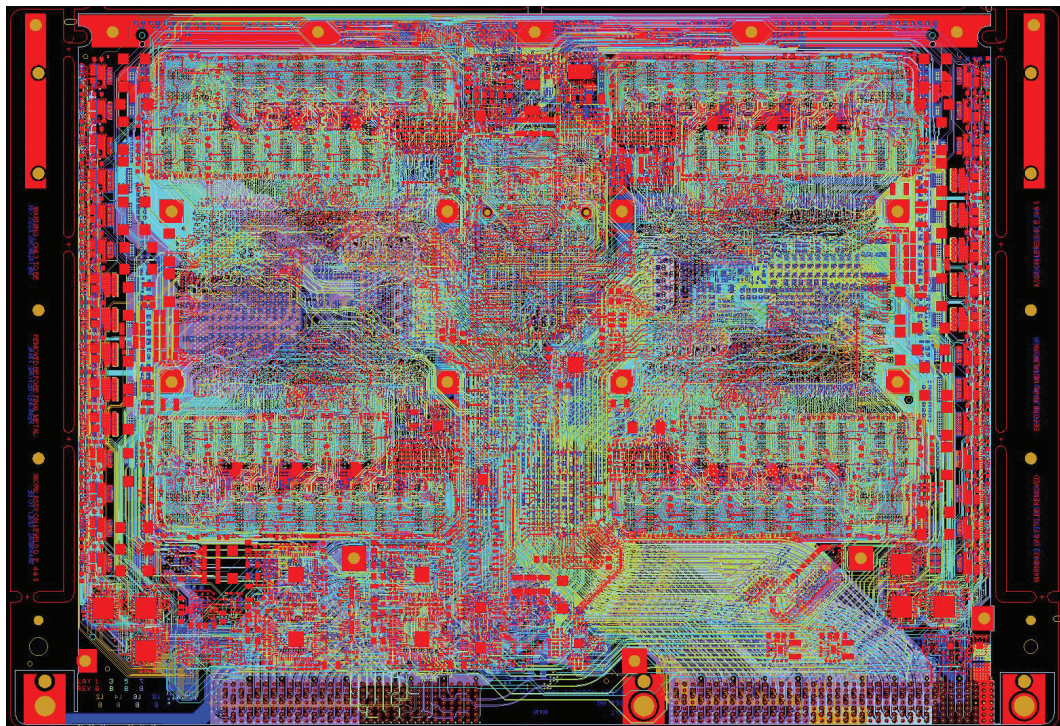
When it comes to designing PCBs, circuit engineers must meet three competing criteria for success:

- **Layout solvability** – A skill set to solve the place and route of all parts and connections, often with complex high-density interconnect (HDI)
- **Performance** – Signal integrity/EMC, power delivery and thermal
- **Manufacturability** – Design for manufacturing (DFM) all considerations producing high yield and lower cost

The intended result: maximum placement and routing density, optimum electrical performance and efficient, defect-free manufacturing.

As you strive to master these perspectives, having the right tool for the job makes a difference. From minimal design requirements to the industry's most complex design constraints, Xpedition provides the capacity and advanced feature capabilities to offer great potential for success.

When we talk about a full PCB design tool from an ecosystem perspective, Xpedition checks all the boxes in meeting or exceeding your needs and enables you to achieve PCB design success.



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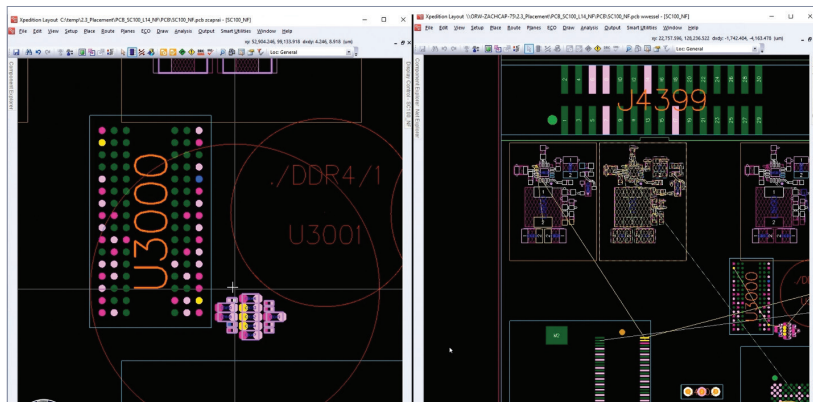
FEATURE THREE

Team design concurrency

Multiple team members can work on the same design at the same time thereby truncating design time

With concurrent design you can have several electrical engineers (EEs) working in the schematic and multiple PCB designers working in the layout all at the same time. Think about how many hours you can save by attacking your design with multiple users at the same time.

Concurrent design allows you to optimize multidiscipline integration in the design database as well as improve project team resource use. By working concurrently, you can produce better quality designs at potentially lower overall project costs.



Using key features of Xpedition for concurrent design

Schematic design

Using Xpedition supports multiple engineers simultaneously designing the same schematic. All edits appear dynamically to all concurrent users.

Constraint management

Work concurrently with other users who are editing the same constraint set, whether on the front end or back end.

PCB layout

Teams of layout designers can simultaneously edit the same printed circuit board and work in a collaborative manner. There is no need to partition and reassemble the PCB.

Concurrent verification

Virtually prototype a design in process with concurrent verification of performance and manufacturability. Results are visible in the authoring tool for faster review and design updates.

System design concurrency

Concurrently define a multi-board system with multiple engineers and start defining individual associated boards while the system definition is still in process.



Using Xpedition, we were able to successfully shorten design time while maintaining uncompromised quality.”

Markus Vällky

Squad Group Lead, PCB Technology
Nokia

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FEATURE FOUR

Analog/mixed signal simulation

Simulation is right in the schematic environment, including HDL blocks

With Xpedition, there is no more drawing a schematic in a simulation tool, then redrawing the same schematic in a PCB schematic tool. With Xpedition, the schematic you create for simulation is the same schematic you use to drive board layout.

Using Xpedition also supports standard SPICE models directly and PSPICE models with a fast and simple conversion process. Beyond standard SPICE modeling, the IEEE standard VHDL-AMS modeling language is supported for added flexibility in modeling and analyzing component and design behavior.

Key features of Xpedition for analog/mixed signal simulation

One schematic drives everything

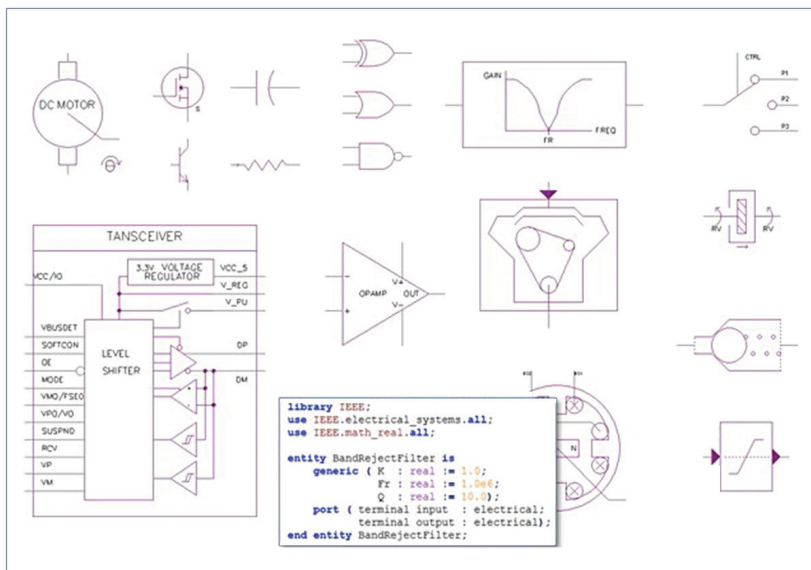
Why draw circuits twice? Analog/mixed signal simulation (AMS) is tightly integrated with the Xpedition design flow so the schematic used to drive simulation also moves your design seamlessly to layout.

Advanced design simulation

Extend standard time and frequency domain analysis to explore design sensitivities, sweep circuit parameters, determine manufacturing yields including corner-case behavior, and analyze worst-case performance. Verify design performance using a virtual prototype of the target system.

Device modeling choices

Leverage the wide range of component vendors' SPICE models. Extend your modeling and analysis capabilities with VHDL-AMS, the IEEE industry-standard language for modeling AMS and mixed-technology design behavior.



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FEATURE FIVE

Signal integrity/power integrity/ EMI/thermal

Full analysis with native integration

Shift-left design methodology integrates design verification tools throughout the PCB design process to let designers find and fix errors where they happen, instead of waiting until later.

Thermal analysis: Simcenter™ Flotherm™ XT software is computer-aided design (CAD) centric electronics cooling simulation software that connects MCAD and ECAD workflows to significantly shorten the thermal design process using analysis.

HyperLynx™ software signal integrity analysis:

Generates fast, easy and accurate signal integrity analysis in PCB systems design. Engineers can efficiently manage rule exploration, definition and validation, making sure that engineering intent is fully achieved.

HyperLynx power integrity analysis: Lets users maximize design performance and minimize costs by analyzing DC and AC behavior of their PCB's power delivery network in an easy-to-use, what-if environment.

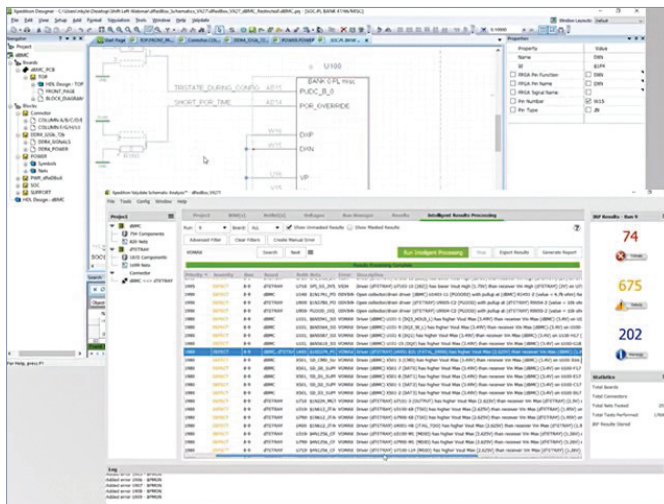


6 FEATURE SIX

Schematic analysis

Eliminates mistakes from hard-to-find schematic errors like bus flips or capacitor derating failures

Using Xpedition schematic analysis enables you to fully inspect all nets using an extensive, intelligent model component library and supports performing schematic analysis in parallel with design capture.



Using key features of Xpedition for schematic analysis

More than 150 built-in schematic design rule checks

Save hundreds of hours of manual and visual inspection and leverage a large library of validated models to accelerate time to results.

Multi-board interconnect analysis

Validate signals across multiple boards in a system.

Fully inspect all nets in a schematic

Full schematic screening ensures design quality. Results of the analysis are grouped after processing to make it easier to find and fix problems.

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FEATURE SEVEN

Design for manufacturability

Verify and address manufacturability issues during design

Valor™ software for DFM analysis technology can help you identify manufacturing issues without ever leaving Xpedition or halting your PCB design process. Concurrent DFM checks can be run from parts placement to release-to-manufacturing, and DFM reports save time by automating design reviews.

Key features of Xpedition for DFM

Concurrent design for manufacturability saves time and cost

Run concurrent DFM analysis within Xpedition. More than 1,000 checks are built in for full coverage.

Design for manufacturing for flexible and rigid-flex circuits

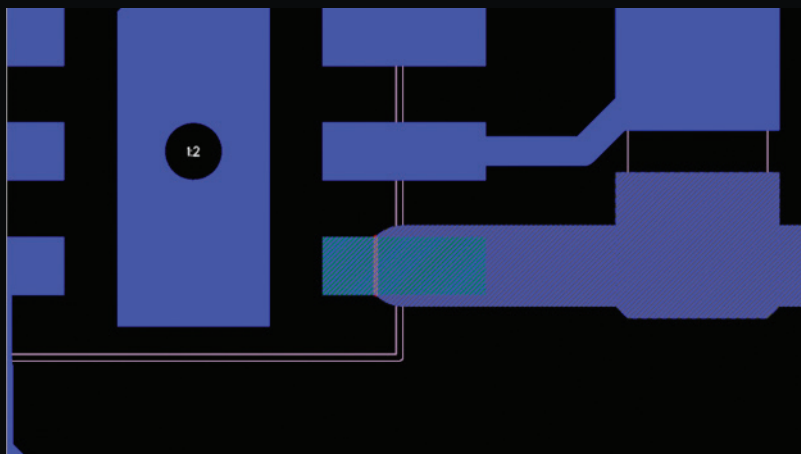
Because nearly 30 percent of all electronics companies have flex and/or rigid-flex circuits within their product portfolios, it is important to include them in DFM.

Automated DFM analysis

Valor NPI software from Siemens Digital Industries Software uses expert system logic to automate DFM analysis. High-quality automated DFM analysis is based on a combination of PCB technologies and manufacturing constraints. PCB technology can be automatically determined with intelligent design data.

Accurate and validated data for PCB fabrication

Intelligent data formats such as ODB++ and 2581 enable efficient data exchange.



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FEATURE EIGHT

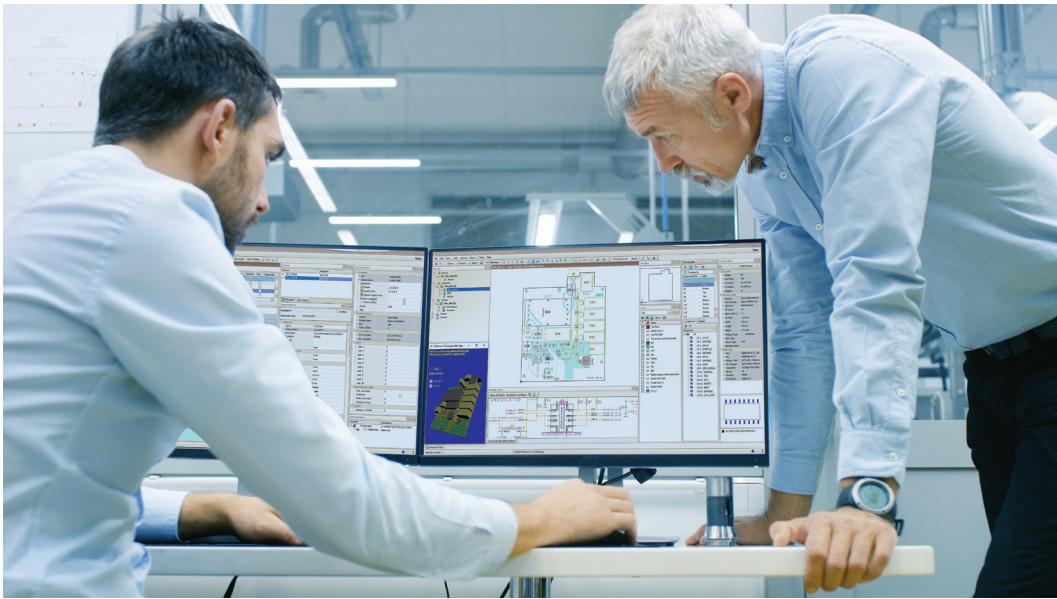
Process preparation for PCB assembly and test

Optimize in-house surface-mount technology lines for assembly

With a single environment for all stages of the manufacturing process, including assembly, test and inspection, changes made during these stages are updated into a centralized location, ensuring data is

constantly up to date while delivering an error-free manufacturing process.

Improving performance requires automation. After trying out many software tools – some of them unstable and crash-prone – Phuntronix installed Valor Process Preparation software at its production site in May 2018.



Valor Process Preparation provides us with organized, efficient workflows. It is flexible, allowing us to multitask multiple projects and swap between templates – which is crucial in our high-mix environment.”

Minno de Roo
Founder and Director
Phuntronix

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FEATURE NINE

FPGA-PCB I/O co-design

Automated unraveling of complex high pin count FPGAs to cut down routing time

Bridge the field-programmable gate array (FPGA) and PCB design domains for automated, fast and error-free bidirectional data exchange that reduces PCB layer count, product cost and design time. Xpedition FPGA I/O Optimizer provides correct-by-construction FPGA I/O assignment, allowing pin swapping and layout-based I/O optimization within the PCB design process.

With Xpedition:

- Quickly convert an FPGA design into a PCB schematic that is ready for layout
- Reduce board layers, shorten traces, reduce vias

Using Xpedition key features of FPGA-PCB I/O co-design

Optimize FPGA I/O for PCB placement and routing

Using Xpedition FPGA I/O Optimizer provides correct-by-construction FPGA I/O assignment, allowing pin swapping and layout-based I/O optimization within the PCB design process.

Fully optimizing for concurrent design

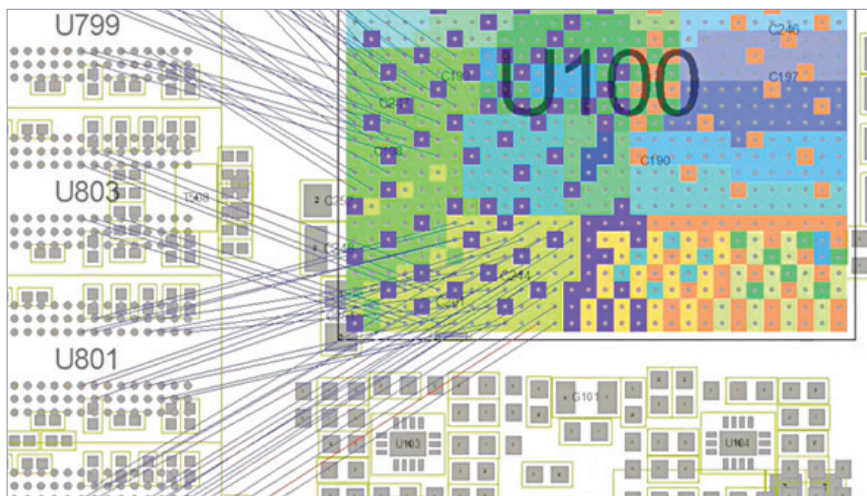
Enables FPGA/PCB co-design processes.

Create PCB parts and symbols rapidly, easily and error free

Quickly convert an FPGA design into a PCB schematic that is ready for layout.

Improve I/O accuracy

Reduce board layers, shorten traces, reduce vias.



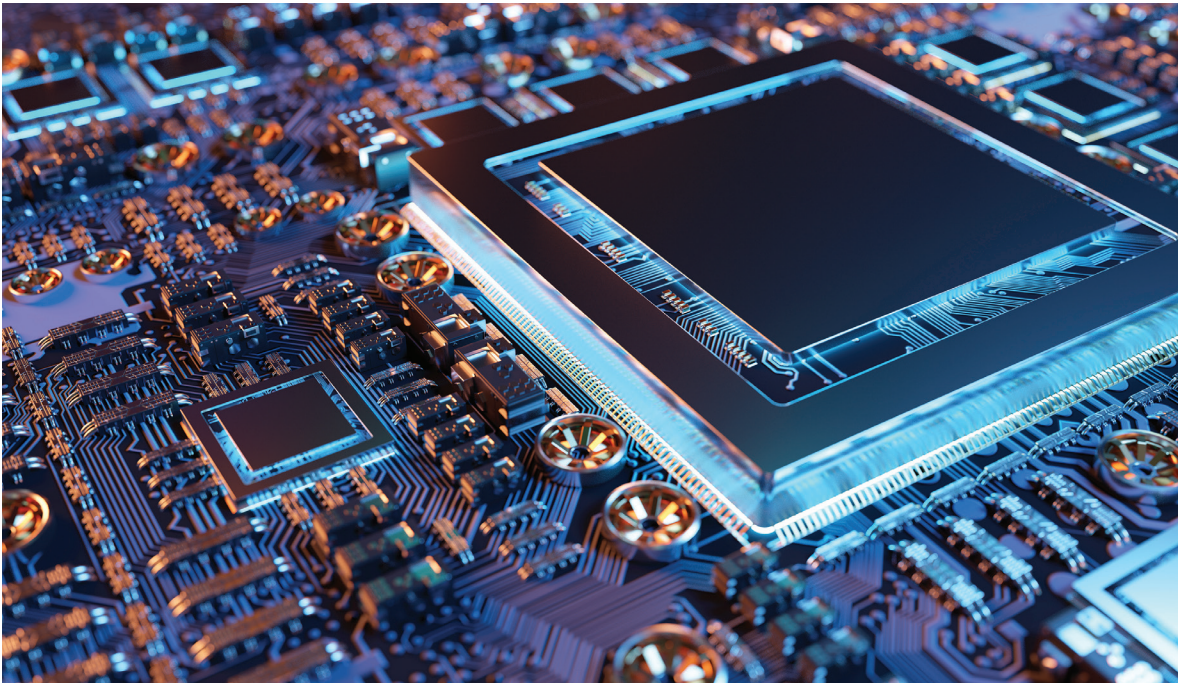
10 FEATURE TEN IC packaging

An industry-leading technology, including 3D IC

The Siemens integrated IC packaging flow addresses prototyping/planning through to signoff for FCBGA, FOWLP, 2.5/3D IC and other emerging integration technologies.

To get ahead in advanced semiconductor packaging, companies need to consider six key pillars for success:

- Integrated system-level planning and prototyping
- Manufacturing quality throughout the design process
- Efficient integration of High Bandwidth Memory (HBM)
- Designer productivity and efficiency
- Design capacity support and performance
- Explore and deliver product differentiation faster using 3D heterogeneous integration of node and performance-optimized chiplets with Siemens EDA's 3D IC technology solution



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FEATURE ELEVEN

Full ecosystem including IC, FPGA, PCB, analysis, PLM, MCAD

Siemens has a self-contained design system enabling a seamless digital thread

Other PCB design tools cannot compete against the full Siemens ecosystem. Go from IC to PCB to fabrication with integrated verification at every step, all connected by a continuous design data digital thread.

Capture of all data relationships to establish the full product digital thread with:

Single source of data

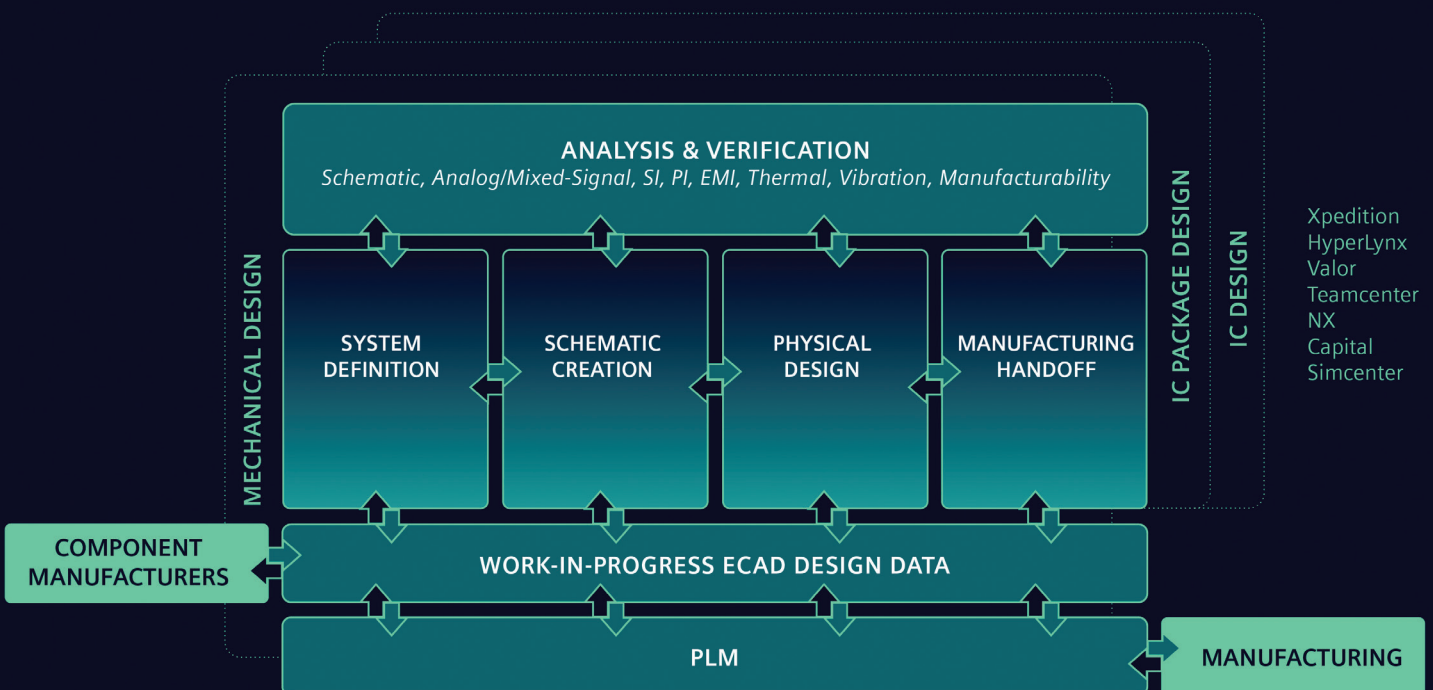
Integrated collaborative environment.

Requirements-driven design

Connect decision makers.

Breaks down silos

Captures data linkages across domains.



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FEATURE TWELVE

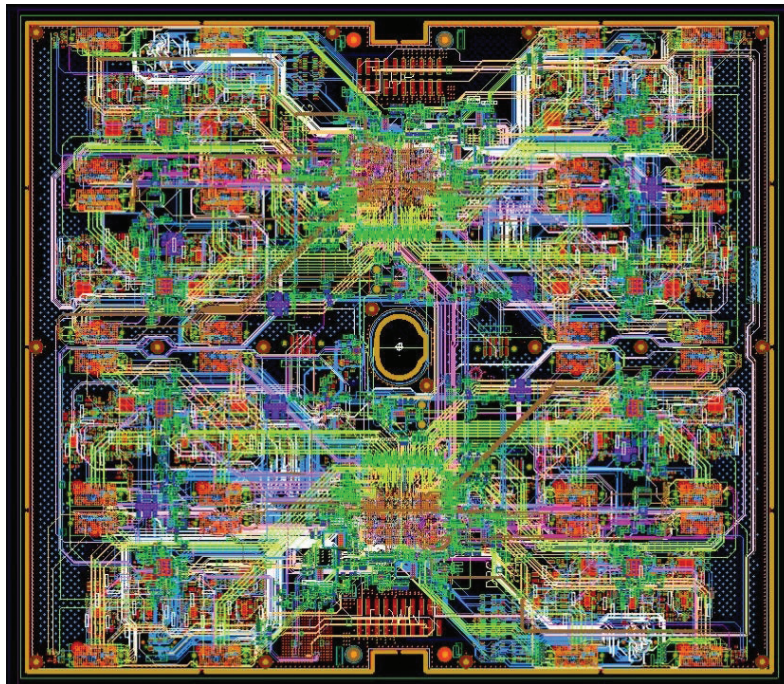
First pass design success

Verify and optimize designs early, eliminating costly and time-consuming issues late in the design cycle

While product and design complexity increases, the same is true of associated tools and processes. By integrating verification throughout PCB design – starting early long before physical prototypes –

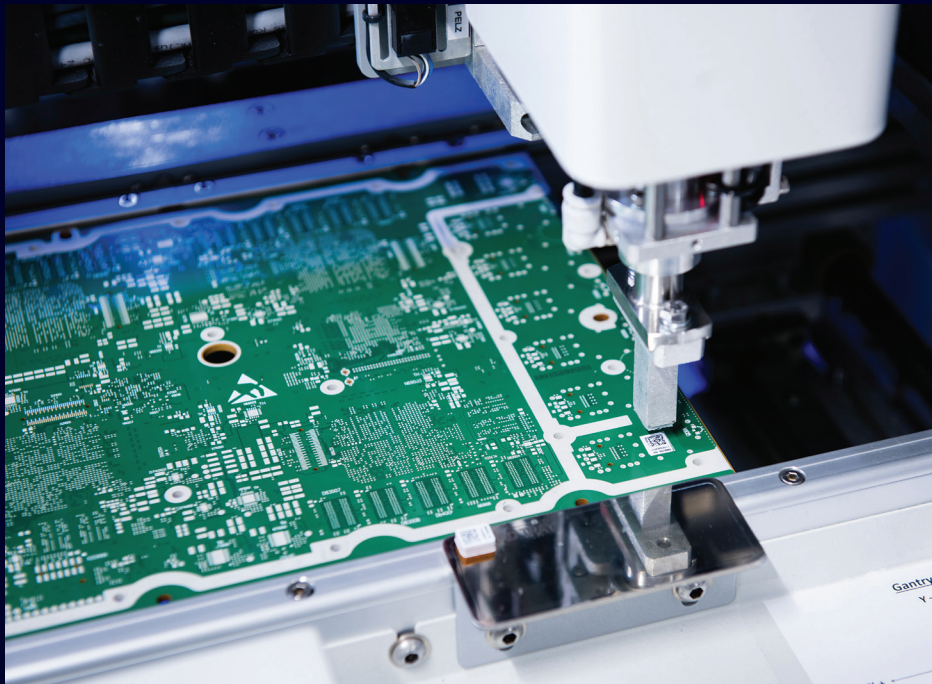
engineering teams can smooth the entire electronic systems design process and increase quality with digital prototype-driven, shift-left verification and cross-domain modeling.

Shift-left verification in the design flow eliminates the specialist bottleneck by using automated, integrated tools. Cost and time are saved by finding problems early during design, minimizing design iterations and manufacturing respins.



Siemens Xcelerator bridges the gap

Xpedition Enterprise delivers a fully integrated electronic systems design flow that bridges the gap from the IC and PCB to fabrication with integrated verification at every step. Xpedition as well as Simcenter, HyperLynx and Valor are part of the Siemens Xcelerator portfolio of software, hardware and services.



Siemens Digital Industries Software helps organizations of all sizes digitally transform using software, hardware and services from the Siemens Xcelerator business platform. Siemens' software and the comprehensive digital twin enable companies to optimize their design, engineering and manufacturing processes to turn today's ideas into the sustainable products of the future. From chips to entire systems, from product to process, across all industries, [Siemens Digital Industries Software](#) – Accelerating transformation.

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