ACCELERATE PRODUCT REALIZATION WITH REAL-TIME ECAD-MCAD COLLABORATION

JOHN MCMILLAN, MENTOR GRAPHICS

Mentor®
A Siemens Business

ABSTRACT

Printed circuit board designs, mechanical enclosures, and related components need to mate, fit, and be correct by design to eliminate re-spins, get designs to market quicker, and minimize production costs. To make that happen, it's critical that ECAD and MCAD engineers collaborate throughout the entire product design cycle, regardless of the design tools they use.

Xpedition® includes a unique integrated ECAD-MCAD collaboration environment that enables Electrical and Mechanical design teams to work together throughout the entire design process in real time.

This paper describes how the consistent and continuous communication channel created by Xpedition keeps design teams synchronized as they work. By keeping ECAD and MCAD engineers working within their own systems' comfort zone, Xpedition ensures that designs are up-to-date and accurate and that time-consuming rework and re-spins are avoided, thus optimizing time to market.

INTRODUCTION

A degree of ECAD-MCAD interaction has always been required in electronics design, but the days of handing off drawings of the board outline and providing the mounting hole locations are long gone. Generic and error-prone "one-way" file transfers that don't provide direct design feedback, like IDF and DXF, etc., are no longer acceptable options.
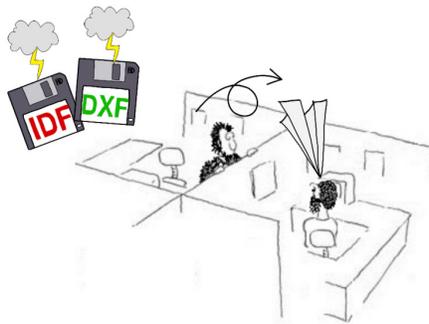
One-way, over-the-wall file transfers prevent communication and lack opportunity for feedback or collaboration.

Next came file formats through which entire databases could be transferred between environments. Those were certainly better than paper but they had limitations too, such as lack of change control; either side could make any change they wanted without validation from the other. In addition, you didn't know what had changed since the entire database came flying across the last time, so you'd have to delicately merge the new design with the updates you'd made since the last revision. Because of these limitations full database transfers were only used at the beginning and end of electronics design.

3D visualization was next, enabling PCB layout designers to see what the mechanical guys were complaining about when they said the board outline didn't fit or a component was too tall. Unfortunately, they could only make changes to the layout; visualization didn't enable them to propose changes or collaborate effectively with MCAD engineers.
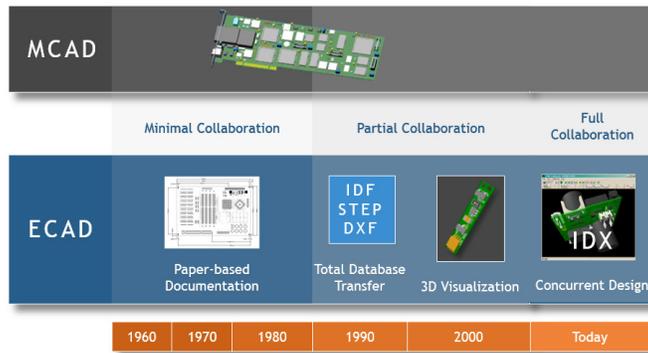
The evolution of MCAD-ECAD collaboration.

WHY XPEDITION IS DIFFERENT

Xpedition utilizes the ProSTEP iViP data transfer standard IDX (Interdomain Design Exchange) XML schema. This data exchange format was developed specifically to enable ECAD and MCAD teams to collaborate in real time and to propose, preview, accept, reject, and counter-propose design intent from the earliest stages of PCB design and component placement.
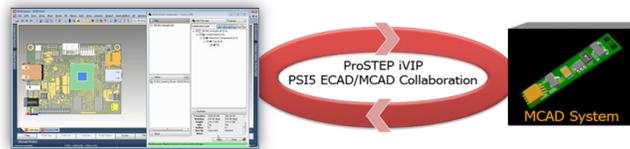
A high-level look at the Xpedition ECAD-MCAD flow.

Mentor, a Siemens business, worked with industry-leading ECAD and MCAD tool vendors such as Siemens® PLM, PTC®, and Dassault Systèmes® to implement and facilitate this industry-standard ECAD-MCAD collaborative solution.
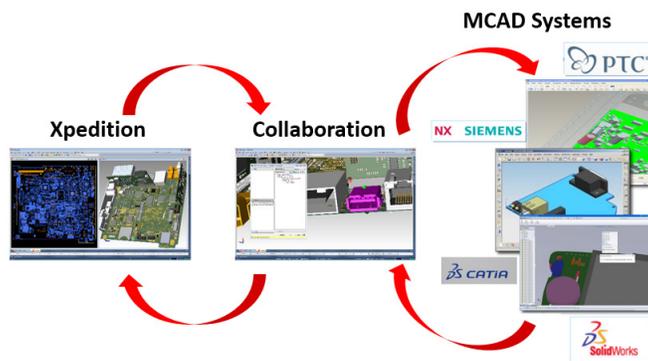
Xpedition collaborates with all major MCAD systems including Siemens PLM, PTC, and Dassault Systèmes.

TYPICAL USE CASE

Xpedition utilizes the 3D layout design environment as the portal to view, preview, and review design intent before committing it to the design.

Imagine collaborating in real-time with your MCAD counterpart. With the click of your mouse you're able to preview the project's PCB outline along with all the cutouts, cavities, and mounting-hole locations in 3D as designed by the MCAD engineer to fit the end product. You simply accept what you agree to and you're ready to begin component placement.

Next, imagine that, during component placement, you discover that the MCAD engineer was overly optimistic that the end-product's enclosure would fit the PCB design from the board outline provided. Using Xpedition, the ECAD engineer can make changes, additions, and even deletions and then propose those design changes back to the MCAD engineer. For example, by adding some length to the board outline, sliding over one of the mounting holes, and deleting another – perhaps so that a BGA can be optimally placed to meet the PCB's SI and constraint rules – changes can easily be proposed back to MCAD for consideration.

The process of proposing and counter-proposing can take place between ECAD and MCAD engineers continuously and in real time until a final agreement is reached. Collaborative agreements such as these ensure that both the PCB and the mechanical design will be correct by design and that no unexpected surprises will be encountered when assembling the end product.
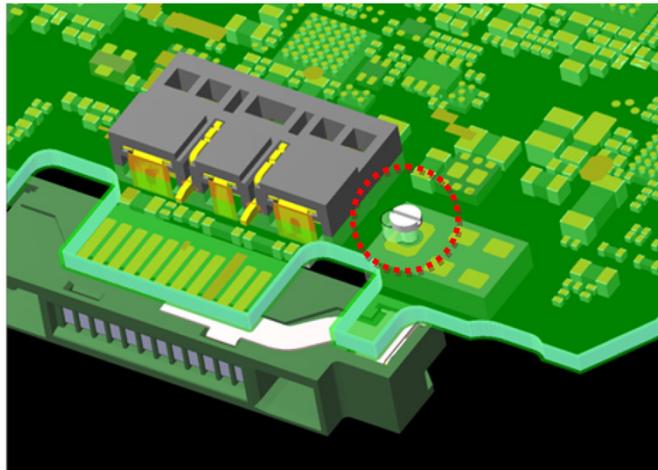
Inspect designs in 3D to ensure that physical interferences are detected and avoided. In this example, an incorrect mounting hole location is identified and can be corrected prior to fabrication, avoiding a costly re-spin.

Early detection of interferences between items, such as the following, can be fixed by the ECAD and MCAD design teams prior to final placement and routing to ensure that fit, access, and/or desired tooling room are achieved:

- Daughter cards and mezzanine cards

- Mechanical components such as hardware, heat-sinks, and stand-offs

- Interferences between mechanical sub-assemblies and enclosures

- Mating electrical components such as connectors and cables.

CONCLUSION

MCAD collaboration can be used throughout the design process, beginning as early as you like. With Xpedition, regardless of which MCAD tool you use, you'll achieve the many benefits of effective ECAD-MCAD collaboration, including the ability to:

- Determine PCB real estate when minimal environments are required.

- Eliminate costly design re-spins of printed circuit designs and mechanical enclosures through virtual prototyping and early detection of interference issues.

- Provide ECAD and MCAD teams with a consistent and continuous communication channel that keeps design teams synchronized, even as they work in their own systems' comfort zones.

- Achieve fast, real-time collaboration on "what-if?" scenarios and evaluations that provide immediate feedback and prevent time-consuming re-dos.

- Ensure that quality, reliability, and performance are optimized within tight form-factor constraints.

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