# THE MOTHERHOOD AND APPLE PIE OF MANAGING ECAD DESIGN DATA THROUGHOUT ITS LIFECYCLE

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WHITEPAPER

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## INTRODUCTION

PCB design tools continue to evolve to support the growing challenges faced by technology companies. Most top companies add tools to the basic PCB design flow, from the standard schematic capture and layout tools, to more advanced tools such as system planning, 3D, DFM, and simulation/analysis tools. As more tools are added to the overall design flow, the data management challenges become greater — from managing overall work-in-progress, to sharing information on design status, to collaborating with multi-functional and multi-national concurrent teams, and coordinating reviews during the design cycle.

Today's primary solutions are offered by Product Lifecycle Management (PLM) suppliers, who have typically managed mechanical data throughout the product life cycle, but only have basic capabilities for managing PCB design data. In fact, for the PLM solutions, PCB design data is really seen as flat files and are managed as more static objects for check-in and check-out… But the overall PCB design process has many more dynamic requirements than this.

In this paper we delve into the 'motherhood and apple pie' truths of design data management, and the quintessential challenges of work-in-progress data management that we can all agree on. Then a new solution offered by Mentor Graphics to provide a complete data management solution for work in process PCB design data is explored.

## THE PCB DESIGN DATA MANAGEMENT CHALLENGE

At first glance, managing PCB design data seems rather simple — bundling a released design, its BOM, and the viewable files for restoring later doesn't sound difficult. Yet this is only one small aspect of the process.

For example, knowing the authoring product and its version is essential when you restore this PCB design later to make changes. What about ensuring the front end of the design has been synchronized with the back end, and all layout changes have been annotated to the front end? And, that the released design was actually the most recent version? Or how about capturing the design constraints? Or, making sure any design constraints have been incorporated into the design? And, of course, are the viewables or manufacturing files are generated from the most recent design files?

These questions take the data management challenge a bit deeper. But now, let's take those same complexities, and add in the layer of managing all of these facets during the work in progress (WIP) phase of the design, not just at the end when the design is released.

This means the data management solution needs to support concurrent access by project teams, yet consistently and accurately manage the version and history of all of the design files. True data management of PCB WIP also requires support of various related project objects (such as functional specifications, test documents or FPGA files) and project milestones (i.e. a functional design review, or a pre-release final design review).

A good data management tool also provides metrics for tracking project status and facilitates web access for the team.

So, with these added considerations, the PCB data management challenge is clearly much more than capturing a released design, it's BOM, the viewable files.

## SOLUTIONS OFFERED TODAY (PLM VS ECAD)

Today's primary solutions are offered by PLM vendors, who have typically managed mechanical data throughout the product life cycle, but only have basic capabilities for managing PCB design data. In fact, for PLM solutions, PCB design data is typically seen as flat files that are managed more as static objects , which are checked-in and checked-out.

This 'flat file' representation means that there is basically no intelligence within the files, and that they are just objects with no real inherent relationships among them. Consider the viewable files for the schematic or the PCB layout: can you ensure the latest design files were used to create these viewables within a PLM environment? Can you tie in library changes and checks so that you know if a design is affected by an obsolete part or can you ensure that your design constraints have been implemented? These conditions can only be managed by having a design data management solution that inherently understands the data structure of the design and library files.

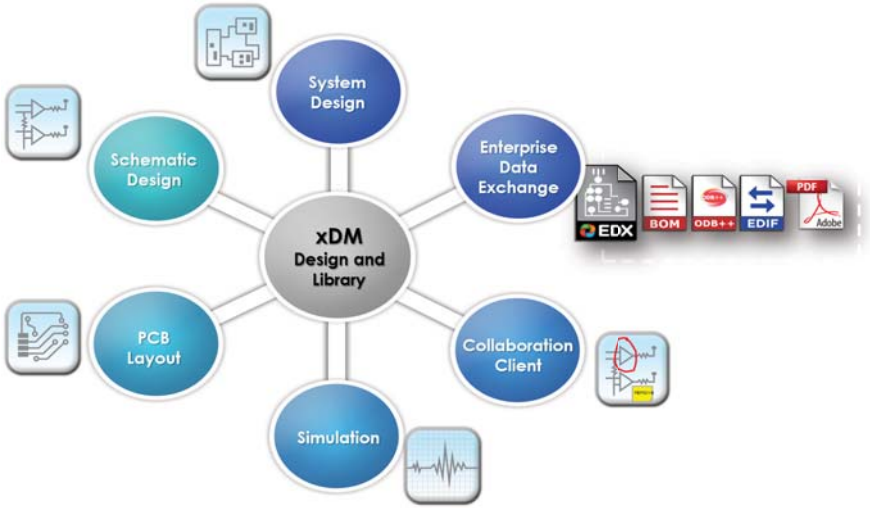
The PLM solutions gather their required PCB files into a *tar* ball or *zip* file for storage. The files typically included would be the native design files, the PCB BOM, and the viewable files for the schematic and the layout. Sometimes the manufacturing files are also included in this bundle. This *tar* ball or *zip* is a capture of the files at the time of the snapshot or release, again a flat set of files.

A newer alternative is to leverage the design data management solution of the ECAD vendor from PCB design creation to PCB release. The ECAD WIP solution is not typically used as a replacement for the PLM storage of the released design for enterprise customers, as the PLM solution manages the entire end-product design files. The difference lies in the ability to truly manage all of the PCB design data during the work in progress stages.

## WORK IN PROCESS DESIGN DATA MANAGEMENT WITH XPEDITION XDM DESIGN

ECAD vendor Mentor Graphics provides PCB design data management capabilities with the Xpedition xDM Design product which is part of the overall data management suite, xDM. xDM Design manages all aspects of work-in-progress for design data within the PCB design flow, including support for:

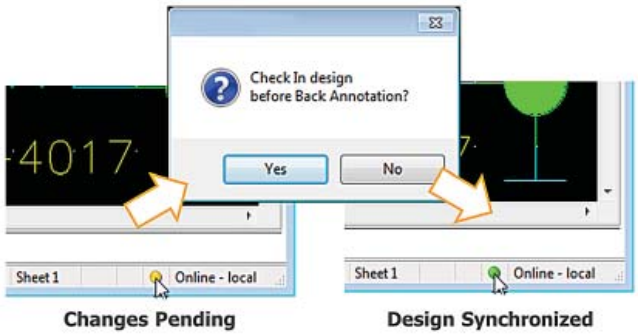
- Team collaboration and concurrent design, allowing approved users to access and edit the design at the same time
- Check-in and check-out for all design tools incorporated into your Xpedition-based design flow including Systems Designer, Dx Designer, Xpedition, and HyperLynx providing a centralized cockpit for engineers
- Managing versioning and history of the design and design related objects




*Xpedition xDM Design handles all management aspects for PCB data in an enterprise environment.*

- Design review collaboration with red-line and markups, with team notification and approval emails
- Access to internal metrics about the design or project progress, including key statistics and data points taken from the design itself (i.e. FPGA vendors and usage, constraint information, part placement and percent routed)
- Tracking of annotation, with reminders if the design is out of sync
- Generating manufacturing files.

xDM Design brings a new dimension and depth to data management of PCB design data. The PLM vendors cannot support this level of data management for the PCB environment.

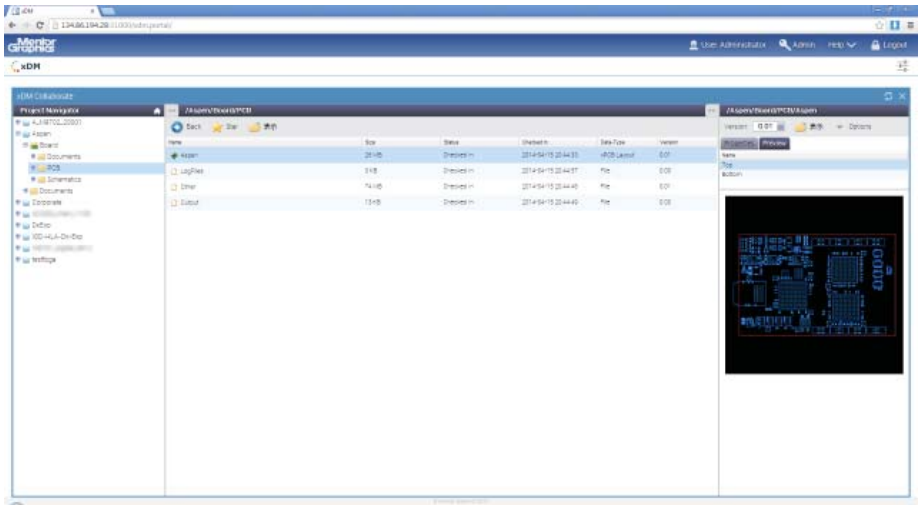



*Annotation is tracked and users are reminded if a design is out of sync.*

## BENEFITS

The full design flow integration that xDM Design provides is an out-of-box solution that can only be established by understanding and managing design objects and their native dependencies. xDM Design enables users to reduce design cycle times through effective collaboration and integrated design reviews. By having ready web access to review and approval teams, direct incorporation of redline and markups to provide feedback to engineering, and email notifications and reminders, xDM Design can greatly reduce the time required for major milestone reviews.

Another way that xDM Design can impact design cycle times is by ensuring the engineers and designers are always working from the latest version. Without a data management tool, it is easy to get lost every once in a while and not open the latest design version, losing important design edits and costing design time in redoing and rechecking the work. xDM inherently provides the guidance to the latest version, but also provides ready access if a previous version is needed.

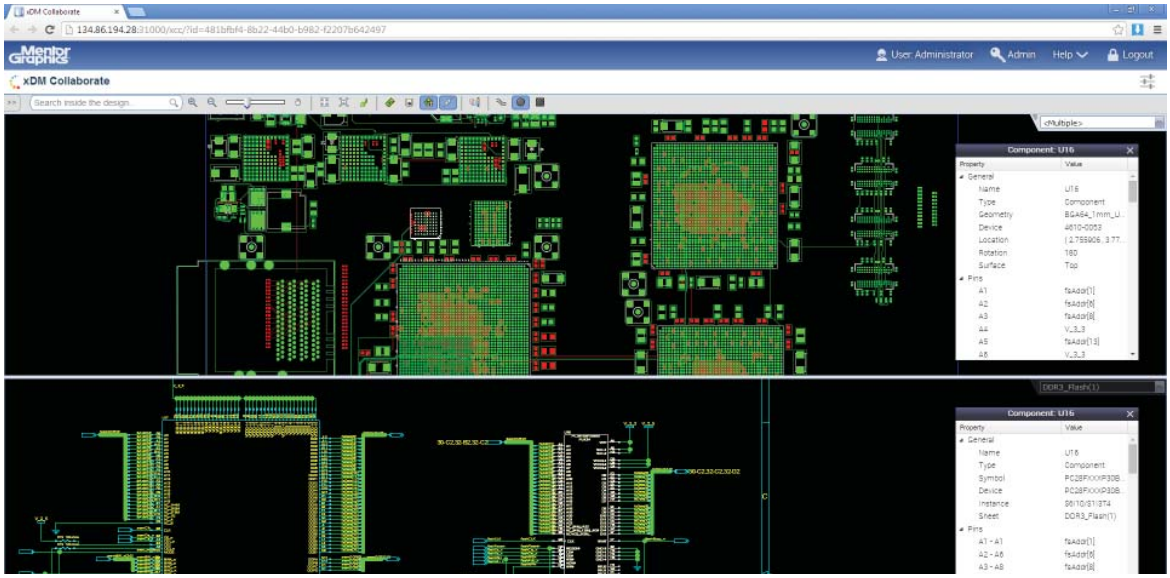


*xDM Design provides a complete data management solution for PCB work-in-process design data.*

xDM Design also minimizes the risk of production errors through built-in synchronization and manufacturing data set validation. Immediate visual feedback to the engineer or the PCB designer helps to ensure the most recent updates are annotated into the design. Warnings are also issued if the design release process is initiated without full

synchronization, helping to ensure all final design edits are included in the released PCB and minimizing downstream rework.

xDM Design can aid in reducing project costs with simplified design reuse, providing simple make-from functionality. This allows the designer to get a significant head-start from existing design work reducing overall design time.




*Concurrent design is supported in the design data manager, easing user's adoption of concurrent design methods.*

## SUMMARY

Today's primary PCB data management solutions are offered from the PLM teams, who have a strength in managing mechanical data throughout the product life cycle, but only have basic capabilities for managing PCB design data. In fact, for the PLM solutions, PCB design data is really seen as flat files and are managed as more static objects for check-in and check-out… But as described above, the overall PCB design process has many more dynamic requirements than this.

This solution by Mentor Graphics provides a complete data management solution for work in process PCB design data, supporting the dynamic and diverse requirements for PCB design.

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