

ECAD Design Data Management - An Inventory

Data management has always been a cumbersome and less popular part of developing an electronic assembly. However, neglecting the management of design data inevitably leads to increased expense, inconsistent design data and not least to incomplete manufacturing data. Electronics developers tend to focus on the constructive aspects of a design, often forgetting the small details that make a product possible.

The real problem with data management is that developers have limited visibility, control, and even organisation of the important parts of a design. The basic elements of an electronic circuit, the components, are often unrelated, unmanaged and stored without real intelligence. Developers are confronted daily with the following issues in the management of design data and components:

VISIBILITY



In many cases, the perspective of how data is routed through the design and product flow is limited. But what happens if important information, such as market availability or price information for components, is not available?

CONTROL



Often, a project will only be completed and the production passed on at the last minute. Were only authorised components actually used in the BOM? And do they meet the necessary certifications of the industry?

ORGANISATION



How is a design change handled? More importantly, how are these changes tracked? Most developers still manage their design data with spreadsheets and folders on the computer.

The interesting aspect of engineering problems in development is that all are universally similar. There is one common answer for their solution: to meet all the requirements for managing development and manufacturing data of electronic assemblies, there is no way around a PLM integration of the PCB design environment.

Developing an electronic assembly is a collaboration in which multiple developers from different teams work towards the same goal. It is therefore important to have centralised data management that everyone involved works with. However, there is often a lack of motivation for implementation, since projects are usually time-critical and central data management does not visibly speed up the process at first sight. Additional steps can actually slow down the process of making data available to the rest of the team in the system. However, in the long-term, centralised data and process management can eliminate a number of common problems that are responsible for delaying the employment of design projects.

LIBRARY MANAGEMENT FOR ECAD COMPONENTS

The component library is the source of work for the electronics developer. A component typically consists of a logical and physical representation of an electronic or electromechanical part. However the most important element of a component is its properties. These describe a component in detail. Typical electrical properties include, for example,

value, tolerance and temperature range. Logistical properties such as item number, price and availability are important procurement properties and equally important for component selection by the developer.

Very often, developers also use the opportunity to build their own library, which is not accessible to other developers. This usually means that components can be found multiple times in various libraries and are also provided with different properties. It is also clear that every component introduced twice in a company is associated with high costs and no reusability is possible.

A centrally managed library, classified in component categories, as well as a comparison of the item properties managed centrally in the PLM system, enables every electronics developer access to checked and released component data and ensures a consistent bill of material for purchasing.

INADEQUATE SEARCH AND REUSE FUNCTIONALITY

The data generated during project work with an authoring system is, in many cases, stored on a local computer or, at best, on a public server. In most cases, a version control of the data is omitted. This can have far-reaching consequences.

Imagine for example the case in which one developer is on holiday and another employee has to make corrections to an important PCB design; the other employee is often confronted with an impenetrable jungle of files. It is not uncommon for files containing cryptic additions like '_old' or '123_new' to be saved, and it takes a long time to find the current state of a design.

Data centrally registered in a PLM system of a PCB design not only facilitates the search and pinpointing of a project, but also provides traceability of the individual states of a data set. In addition, existing project data can be used as a starting point for a new project so as not to have to recreate certain circuit parts.

ERRORS AND INCONSISTENCIES THROUGH MANUAL DATA MAINTENANCE

When creating an electronic assembly, the circuit diagrams and PCB design are created primarily as a locally stored data set on a computer. Assuming a company has a PLM system, even in this case, management data must be manually transferred to this system and linked to other product information.

In principle, this is a possible way. However, there is a risk that the locally stored data will not be synchronised with the PLM system due to a small change of time pressure and thus is stored in an old state with a non-current bill of materials. Thus, other employees of the company rely on outdated data. The manual method also offers another source of error. Nobody can guarantee that the manufacturing and design data as well as the parts list are linked to the right product data from other disciplines. In the end, fixing errors can take a significant amount of time, or lead in the worst case to an incorrect product definition.

An automated synchronisation of design data and its link to product data from other design disciplines in the PLM system is an essential requirement for consistent data management. Producing the structure and creating and comparing the parts list is an important part of an integration into the processes of a company.

INCOMPLETE OR INACCURATE MANUFACTURING DATA

A common phenomenon is that individual PCB designers generate manufacturing data in different formats and create manufacturing drawings in freely interpreted templates. To make matters worse, not every circuit board is manufactured by the same manufacturer and so the manufacturing information may vary under certain circumstances.

In practice, the handover of the manufacturing data to the manufacturer usually happens by conventional means, as a packed file and by mail. This approach presents a design environment as an isolated solution within the infrastructure

of a business and often leads to queries and time-consuming additional explanations.

Using an integrated approval process directly from the development tool in a PLM system, electronics developers have the opportunity to transfer their design data as well as production data directly to the leading system of a company at the touch of a button. The resulting improved data consistency leads to more reliable information in the production and thus fewer errors.

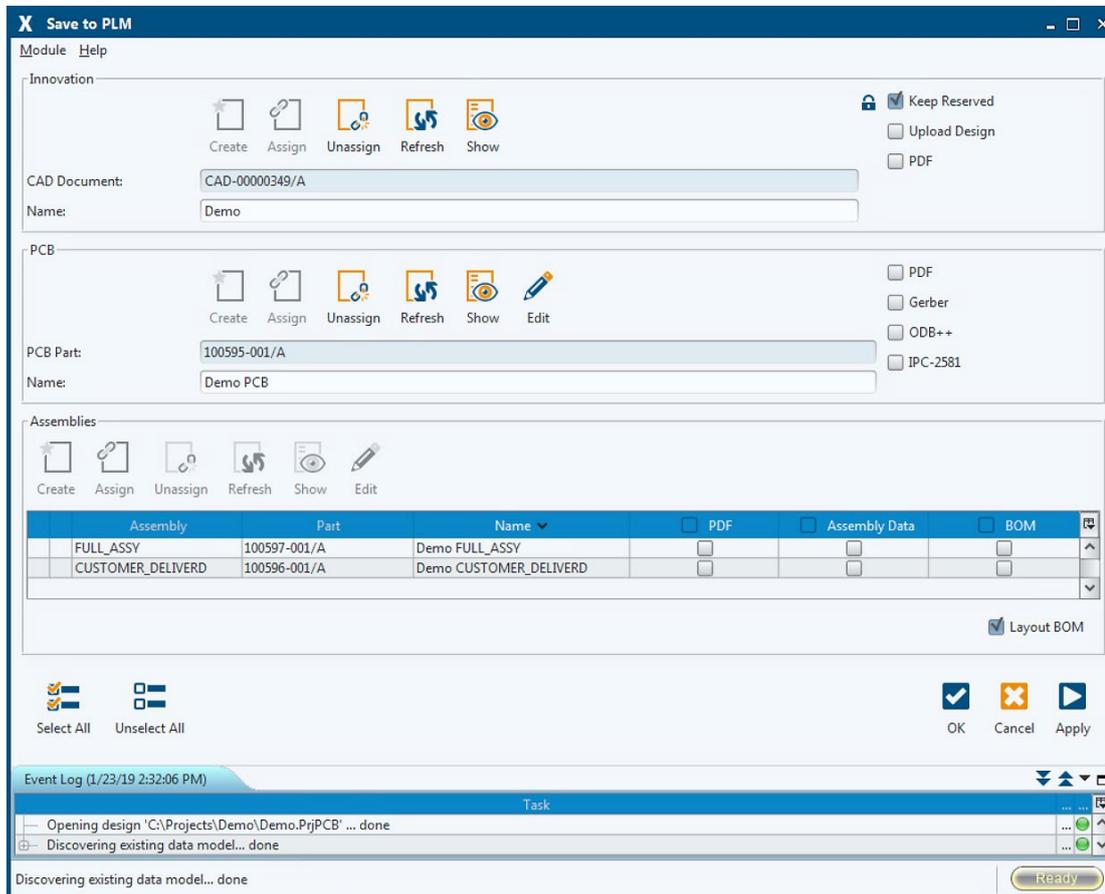


Figure 1: Creation and seamless transfer of production data to the PLM system

DIFFERENT DEVELOPMENT METHODS HINDER COOPERATION

Electronics developers and PCB designers tend to view their work as works of art and therefore often have individualised trademarks. This often begins with the use of drawing frames that are not company-compliant, missing labels in the drawing headers, to idiosyncratically defined rule specifications.

Unfortunately, missing standard definitions lead to misinterpretations of documentation or circuit boards that cannot be manufactured. Revising a design not only delays the schedule of a product, but also leads to financial losses for a company.

Fehlinterpretationen der Dokumentation oder zu Leiterplatten, die nicht gefertigt werden können. Eine Überarbeitung eines Designs verzögert nicht nur den Zeitplan eines Produktes, sondern führt auch zu finanziellen Einbußen eines Unternehmens.

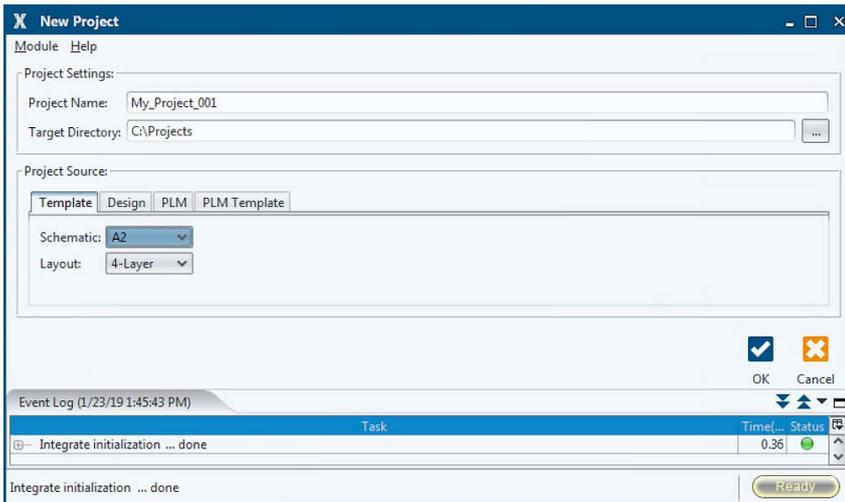


Abbildung 2: Nutzung von Templates direkt aus dem PLM-System

Using templates and project templates directly from the PLM system for design data, and ideally also for generating manufacturing data, ensures consistent development processes and enhances collaboration within the design team and the organisation.

CONCLUSION

The points illustrated above are certainly not the only challenges in the management of ECAD data. When talking to electronics developers, they usually complain about having to look for information in too many different places. Once these are found, the question still arises as to whether the information and data is up-to-date. They are in a constant conflict between shifting requests, change of schedules, updating and managing design data, component qualifications, and coordinating tasks with internal and external partners.

It should be noted that a considerable part of the costs are accrued in electronics development and that the most complex data is generated there. The pressures of customers demanding lower prices, faster delivery and more competitive products will not diminish but rather increase. And the already limited time to respond to BOM changes, accelerate production, meet deadlines, and increase quality will continue to shrink.

In order to get a structure into all these requirements, the necessity and importance of managing a complex design environment has to be recognised and the initiative has to be taken for integration into the company-wide PLM platform. An integration of the ECAD environment is a strategic project that needs to be tackled today.

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