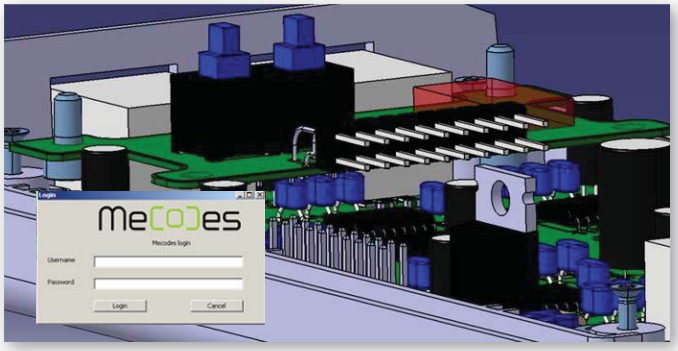
MeCODES

CADCAM GROUP

MECODES CATIA V5 – Mentor Graphics Expedition Enterprise / PADS Integration

Bringing together the different worlds of MCAD and ECAD
in collaboration for an integrated product design

In conventional design approach using ECAD and MCAD authoring tools, electro-mechanical product are designed with many separate rework iterations in each tool. When the design is finished, independently in each tool, the process continues to the common design phase where the MCAD and ECAD designers collaborate to produce the final electro-mechanical product. The mechatronic approach is quite different since there are no separate design phases in each of the authoring tools, instead there are many common rework iterations with no distinct boundaries between electrical and mechanical design. The nature of common rework iterations implies that real mechatronic collaboration must be integrated into the CAD tools to enable engineers to work across boundaries of their working domain. MECODES is introducing a new methodology for multi-domain collaboration during the design of electro-mechanical products.



MECODES working principles

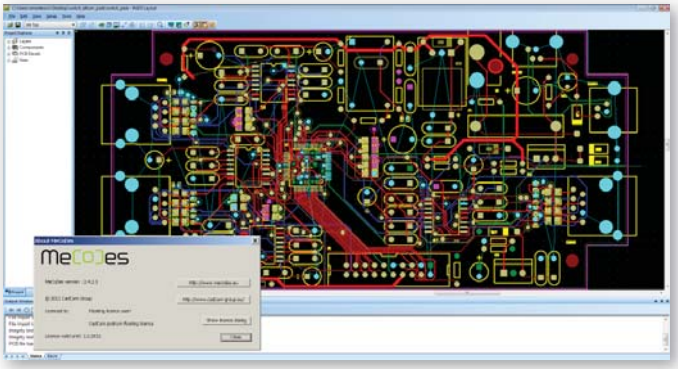
MECODES is integrating the mechatronic approach into the two most frequently used CAD tools. The common tasks in each CAD tool are tracked at appropriate steps in multi-domain collaboration. To establish an efficient collaboration environment it is necessary to introduce a version control system which is specific for the process of multi-domain collaboration. Since the mechatronic products are usually made out of components which have to be represented in both CAD systems, there is a common integrated library where such components are stored and which can be manipulated and synchronized. The common electro-mechanical tasks depend on the model exchange protocols which are based on standard industry protocols and they contain different model related information. In spite of common understanding between engineers it was also necessary to introduce a communication environment for efficient message exchange.

The essence of this approach is to facilitate collaboration between the ECAD and MCAD domains in such a way that the users in one domain have access to all relevant information in the other domain. The improved flow of information means that iteration loops can be avoided, and thus the product development can be accelerated. Scope is to support an interactive procedure that is characterized by informal collaboration processes.

Managing of product data in MECODES

Central point within the MECODES environment is the Mechatronic Repository. This repository is used to store collaboration and CAD project specific data. The repository is supporting standard project oriented check-in/check-out functions and common document management options. The standard information unit stored in the repository is a document, like the project, collaboration or exchange documents. Each document stored in the repository can have different versions and revisions, which are accessed through the project version/revision number. Technically the MECODES mechatronic repository is a collaboration repository with document management capabilities, which is ready for connecting to customer's PDM/PLM system.

The interoperability in terms of a collaboration process on selected ECAD and MCAD objects that might be originally created either in the one or the other CAD environment is an essential feature. The collaboration process must embed both the creation of a baseline and the common collaborative work on the collaboration model proposing changes where the baseline has been created earlier in the design process. To exploit the most benefit it must be possible that not only the whole data model but also selective parts of it are exclusively usable.



MECODES Collaboration environment

As the functionalities are integrated within the CAD tools, the MECODES clients are becoming an integrated part of the native CAD environments. This makes them easy to use and familiar to the users since MECODES commands use common interface paradigms supported by these two CAD tools. The MECODES clients have built-in user level security environment which requires a user validation to make the commands available, which is common practice in a multiuser environment. To begin using MECODES there is a login process which is introducing the user to the collaboration environment. After a successful login the user is recognized by the system and is visible in the communication subsystem (presence detection system), and as such he can continue to work in collaboration projects.

Value-added functionality in MECODES

Typical examples of advanced functionalities available in the MECODES are:

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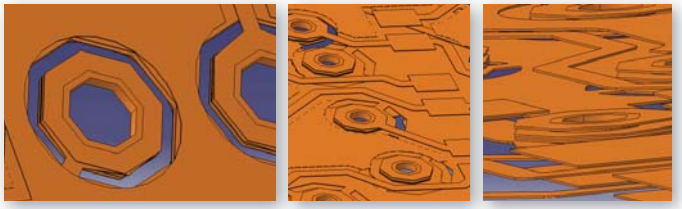
- Incremental change management – engineering change orders based on incremental changes made within the appropriate CAD system
- Component change within MCAD followed by design synchronization with ECAD up to the schematic level
- PCB library management – preparation and customization of the common components used within the collaboration system
- PCB routes in MCAD – different types of electrical routes visible in the MCAD model
- Multiple PCB board design – engineers can work on several PCB boards within the same project

The listed functionalities of MECODES are helping designers to perform the collaboration tasks faster and easier.



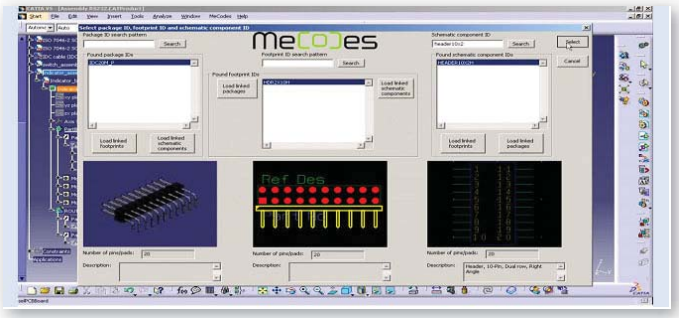
MECODES transfered multiple copper layers

MECODES communication environment

The MECODES communication environment is an open and standard based XMPP protocol messaging system, and as such is supporting integration to the other messaging environments like IBM SameTime messaging system or Google Talk. Within the communication environment the user has the ability to chat with other users, transfer files back and forth and even to talk to other users if the sound equipment is available.

Common library management

One of the central points in the MECODES collaboration suite is the common PCB library system. The PCB library has a management feature and the users can insert new components and modify them within the library. One of the most important features is the link between 3D component representation (MCAD) and electrical component representation (ECAD) which includes a schematic symbol for each component. The common library can store the transformation matrix which is controlling the component placement into the MCAD model; thereby reducing the risk of misplacement of components.



Cross domain features of MECODES

The usual collaboration between CAD engineers is only by model exchange between the tools they are working in. MECODES made a step further where the model exchange is enhanced with features which make the collaboration much easier. The common process of design synchronization is guided and further enhanced that the data from the logical model is transferred correctly. Such synchronization allows the engineers to see detailed data from opposite domains which are used and are important for design. For example, electrical data is visible in a familiar way and in the same way MCAD data is visible in ECAD. The environment is enhanced with supporting functions which help engineers to execute their tasks faster and more precise. Examples of such functions are: incremental change management, footprint change, generation of Mechatronic BOM and others.

Floating licensing

The MECODES environment relies on a floating license principle. In a networked collaboration environment with many working stations, the license is selected based on real customer usage, which means that the license is retrieved from the server when the client is using it, not before. In this way the client's collaboration environment is using only as many licenses as they need. For example, the customer has bought 10 licenses and is using them in a network of 30 working stations; this means they can use at most 10 licenses on 10 working stations at the same time. Other stations will not use up the licenses if they are not working.

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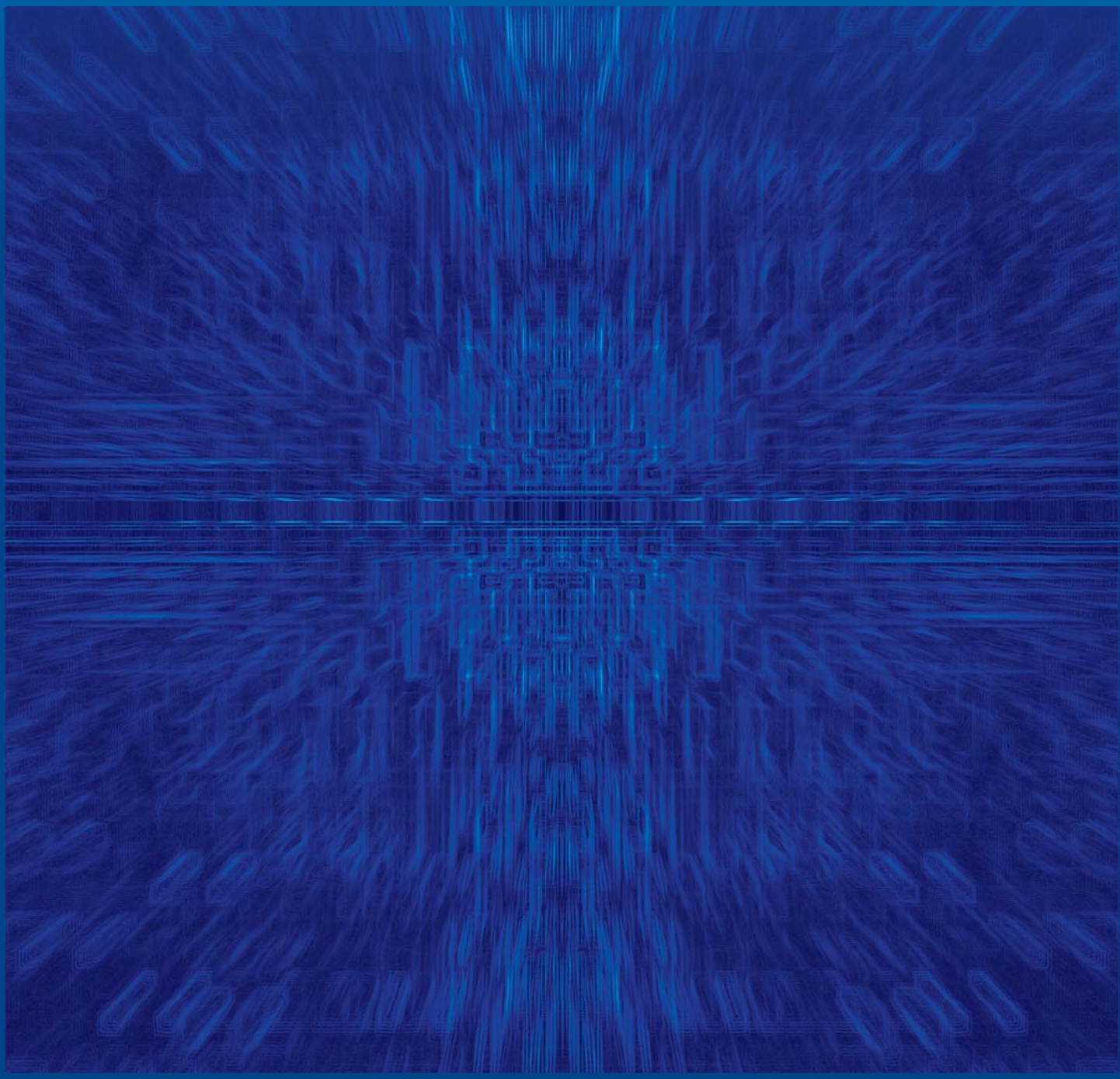

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