Seven parameters for more cost-effective product development in industry

Cutting-edge technology has become fast-moving and is subject to complex requirements. An interoperable system landscape with comprehensive, clearly structured product data and digitally controlled processes helps you to adapt flexibly to new market conditions. This is because intelligent multi-CAD system and process solutions make integrated systems engineering with a limitless exchange of electronic data and information possible. The reward is shorter project runtimes and lower costs – in other words, higher earnings and increased competitive strength. Does this sound both possible and a good strategy? That's because it is!

At technology companies, numerous areas of expertise contribute to new products and their improvement, both internally and externally through partners and customers. Every project involves numerous rounds of coordination. The amount of time and effort involved can be reduced if your development teams no longer work sequentially and independently of each other but digitally instead, working closely with each other and in parallel to the greatest extent possible. This enables them to recognize a needed change of course early. Product data that has a transparent structure and is logically linked across different domains makes this coordination easier. The amount of time and effort spent on making changes is reduced and sources of error disappear. In addition to a higher level of product and process quality, a digital value-added network also provides the basis for new business models and an expanded range of services.
The specialist departments are well versed in their processes and requirements. It therefore makes sense to launch digitalization here, then expand it and finally link it with the processes in other departments to create an enterprisewide network.

PARAMETER 1: DIRECT INTEGRATION OF CAD PRODUCT LIFECYCLE MANAGEMENT (PLM)

Every day, your design engineers have to spend valuable time performing routine tasks. Engineering standards and automated processes relieve them of these tasks, thus freeing up capacity. One approach is to directly integrate the tools you use for mechanical, electrical and electronic engineering in a product lifecycle management (PLM) solution. The integration then takes over numerous time-consuming administrative tasks. It also supports simultaneous engineering and the end-to-end exchange of data and information with other departments, partners and customers.

Experience shows that there is a high level of system acceptance because the developers perform all the actions in the PLM system from their familiar system environment. This results in simplified, secure processes that give them more time for their actual work.

New project

If you are launching a new project, the direct integration creates the entire project environment, including all templates. The directories and files are named automatically or automatically renamed if an existing file or directory is copied for use in the new project.

Logically linked, traceable information

Even complex deliverables with complex structures can be linked logically to all the associated data and information within this architecture. This ensures that interrelationships can be traced at any time. All project data can be accessed and saved, checked out and checked back in again in a controlled manner, even during concurrent engineering.

Rapid search in the component database

Sophisticated functions help your design engineers quickly locate information in projects or in the component database. If, for example, a discontinued component has to be replaced by its successor, the „where-used" function in PLM and the ability to adapt mass data in a single step are both very useful.

Traceable change management

The drawing management capability is also a real timesaver. It not only organizes design templates for knowledge-based engineering but also minimizes the amount of time and effort needed to maintain all the metadata across all versions. Information such as date, status, change history, original author, linked design templates and documents like test reports are automatically entered in the title block. Even information about materials can be transferred from the corresponding PDF to the title block. There is no longer any need to search for or enter information manually.
Various BOMs are automatically extracted in line with the stored logic without any effort on your part. The PLM integration creates the desired variants, such as the engineering BOM, including auxiliary and phantom parts, and BOMs for costing, procurement, manufacturing or quality assurance. Different versions can easily be compared.

The integration also supports workflows. Defined events can trigger a process, for example saving the last version in the release process. The release team is informed and provided with all relevant information. Development teams from different domains use different tools and data models, methods and processes. Each of our direct CAD/PLM integrations takes account of these differences and provides your employees with exactly the support that they need.

PARAMETER 2: MULTI-CAD PLM

The trend towards functionoriented development of mechatronic solutions is increasing. If your research and development is already PLM-based, the synergy effects resulting from cross-domain collaboration will allow you to recoup your investment.
Are your coordination processes mainly performed manually? Direct PLM integration offers you the opportunity to digitally enhance the exchange of information between your development teams and externally, for example with your technology partners. The greater the number of development domains that manage their product data in the PLM system and link them at an interdisciplinary level, the greater the insights and understanding among the design engineers. The more complex the mechatronic structures of your products are, the more important this transparency becomes.
The electronic design engineers, for example, see the mechanical housing with its available installation space and the location of the openings, interfaces, drill holes and installation and fastening solutions for the PCB. The mechanical engineers, on the other hand, see the contours of the PCB with the components that have been placed, their dimensions and the distance between them. If, according to current plans, a component is too close to a housing bushing, this will detected at an early stage and corrected, thus eliminating the need for reworking entirely.

Direct integration also supports cross-domain plausibility checks, for example by making it easier to compare BOMs. If the different departments use one and the same component a different number of times, this is immediately apparent.
The PLM environment also makes it easier to feed information from downstream processes back into development. Information like a design change made by manufacturing or identical components preferred by purchasing is fed back digitally. This ensures that it remains transparent and enhances your best practices.
During the entire product development process, the integration‘s change and version management capability ensures that the new mechatronic assembly and its BOMs only include components that have already been released by the individual departments.
Other tasks can be completed in parallel instead of sequentially, which means that quality gates such as simulation and prototyping can be scheduled earlier.

PARAMETER 3: DIRECT INTEGRATION OF PLM SIMULATION DATA MANAGEMENT

The simulation of functional and product models early in the development process provides valuable insights, makes decisions easier, avoids adaptations being needed later in the development process and makes your product more competitive.

Are your calculation tasks too complex for the simulation functions inherent to CAD? Then the direct integration of the systems used for PLM and simulation data management not only makes the transfer of design data and 3D models easier, but also makes it possible to create a central experience and knowledge base by linking the simulation results to the corresponding product version.

PARAMETER 4: DIRECT PLM/ALM INTEGRATION

Do you consider Tesla a carmaker that also develops software or a software company that also makes cars? Elon Musk at any rate sees numerous similarities between his company and Google. [Fußnote Source: www.teslamag.de] This question highlights the extent to which hardware and software are now being merged in mechatronic systems. The significant value that software adds to products enables it to make a valid contribution to value creation at almost all manufacturing companies.
This makes it all the more important that software be included in product lifecycle management. Since software engineering is subject to different processes than hardware development, it makes sense to continue using application lifecycle management (ALM) to manage software development. ALM/PLM integration however facilitates the exchange of data and information. It also makes it obvious which software deliverables belong to which hardware versions and which dependencies, e.g. between different software, between software and hardware, etc., exist in the overall mechatronic system. Processes such as change and release management incorporate both hardware and software development.

PARAMETER 5: CREATION OF A FEDERATED SYSTEM LANDSCAPE

Efficient product development means that design engineers and software developers also need information such as requirements, change orders or compliance and quality management specifications, which they cannot find in their base systems.
A federated system landscape, in which any data system in your IT landscape can establish a client connection to other systems, makes direct access to this information easier. From their base application, users can view, track or edit the data objects relevant to them and the data objects‘ relationships in other systems without having to copy, synchronize or convert them beforehand.
XSPHERE makes it possible to create this kind of federated system landscape.

PARAMETER 6: PLM INTEGRATION IN OTHER ENTERPRISE SYSTEMS

Further significant business value is also generated by closed loop data communication between PLM and ERP systems. It has a positive impact on your business departments, but in particular on materials management as a whole, on manufacturing and on service.
Up-to-date, synchronized component databases avoid duplicate components and point up price advantages. Components with long lead times are identified early and ordered in good time; discontinued components are reported back to design engineering and replaced. Procurement and manufacturing receive valid documents from development promptly soon after release. Errors caused by the manual entry of BOMs or the comparison of different versions are eliminated. If manufacturing is involved in your projects at an early stage, it will be well prepared and can launch production without problem soon after release. Adherence to schedules increases and delivery cycles can be shortened.

PARAMETER 7: INTEGRATED CROSS-DEPARTMENTAL PROCESSES

Lean, secure processes within organizational business units are good. But you can only achieve real improvement in performance with bidirectional, cross-divisional processes that make all the relevant data and information available in the respective context. Without data silos, intelligently controlled, unambiguous information provides clarity, even with complex tasks.

In addition, state-of-the-art technologies reduce the workload placed on your employees and help you to fully exploit potential process synergies. You gradually and pragmatically develop a high-quality, partially automated value-added network that digitally links people, processes, your products and best practices. You automatically improve productivity and project margins and increase your employees‘ motivation.

CONCLUSION

If, in the future, you want to hold your own in the market, you need to actively and strategically shape your digital transformation. And not only with the aim of improving efficiency at your company but, more importantly, with a view to potential business development. What will count in the near future are data-driven business models with networked products and digital services that are supported by platform economies, artificial intelligence and machine learning. A well-prepared infrastructure facilitates the introduction of these new technologies.

ABOUT XPLM

XPLM is a globally operating PLM solution provider specializing in integrating applications, processes, data and information for optimum cross-domain collaboration between engineers. With its unique portfolio, XPLM integrates leading PLM, MCAD, ECAD, SysML, ERP, Office, Requirements Management and ALM/software tools.

For more information, visit **www.xplm.com**.

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