



SIEMENS DIGITAL INDUSTRIES SOFTWARE

# Get started with PLM to accelerate product development

## Key capabilities and benefits of a PLM system

Automotive companies implement product lifecycle management (PLM) systems to provide their diverse and widely dispersed enterprises with access to a single source of product and process knowledge. Once a PLM system is in place, companies can leverage this knowledge to improve productivity, reduce product lifecycle costs, facilitate global collaboration and provide the visibility needed for better business decision-making. This white paper identifies the best-practice capabilities that a PLM system should provide to facilitate these fundamental business needs.

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# I Overview

Creating the next generation of autonomous, electric, connected, and shared vehicles requires companies to address a wide variety of issues and business challenges. A key challenge is meeting the demands of developing software-defined vehicles while marshalling the resources of the extended enterprise and efficiently using these assets to deliver innovative products that satisfy customer and stakeholder demands, at the right time to the right markets.

Product and process knowledge is recognized as a key resource in achieving business success. But even in today's digital age, most companies still struggle to utilize this knowledge as a manageable asset from one business opportunity to another.

Companies are in need of a solution that allows them to accelerate product design in a creative, secure, affordable, and efficient way, and get it right the first time.

Product lifecycle management (PLM) enables companies to manage all of their product and process-related knowledge in a single secure but accessible system that can be used by multiple applications and teams across an organization. With a PLM system in place, product information assets can be coordinated and synchronized, enabling companies to:

- Improve productivity and reduce cycle time
- Reduce development errors and costs
- Facilitate collaboration with anyone, anywhere
- Improve value chain orchestration
- Provide greater visibility so people can make better business decisions

To deliver these advantages, companies need a PLM system that is able to support their business-specific needs. At its foundation, this system must be able to provide best-practice solutions for:

- Secure data management
- Process enablement
- Bill of materials management

Choosing the right PLM system provides companies with a solid foundation that can be easily expanded at their discretion into a full product lifecycle management (PLM) platform.



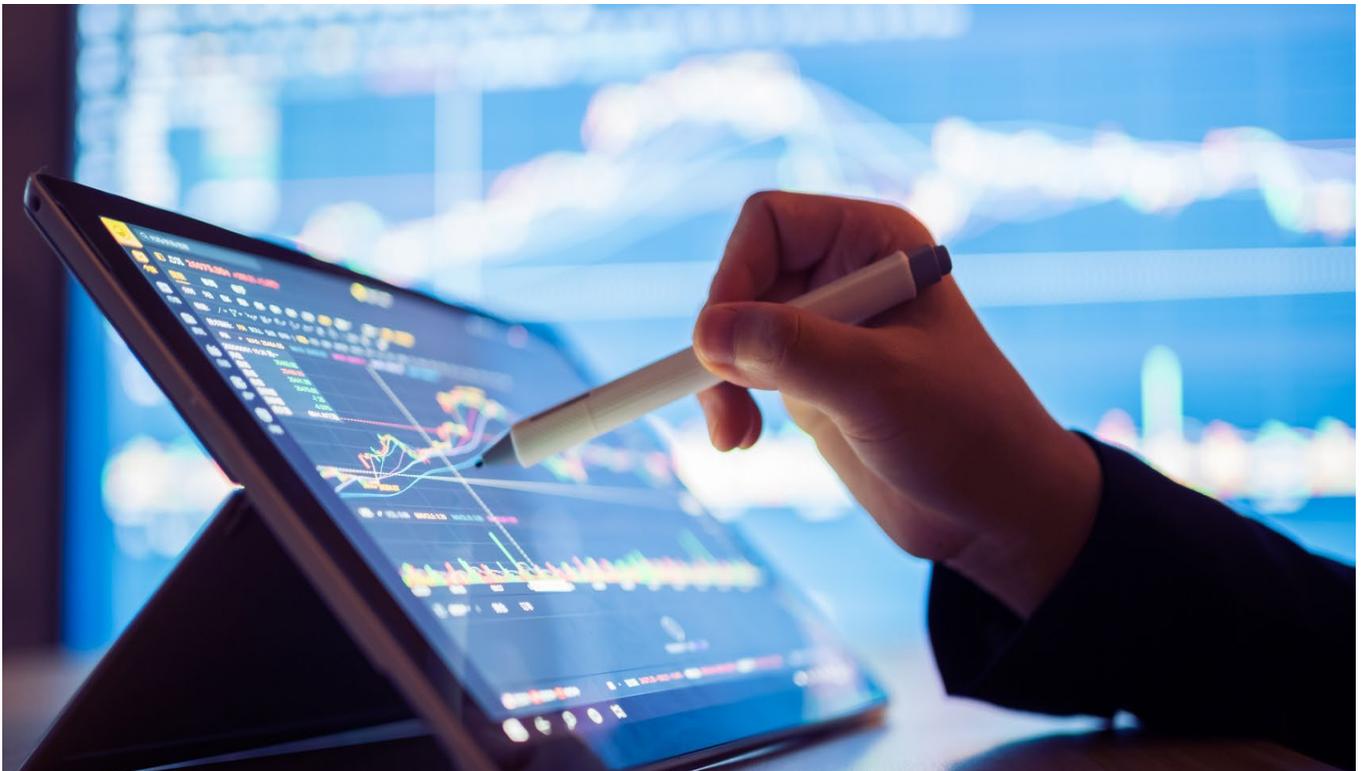
# Business challenges

Companies are facing new design challenges while under constant competitive pressure to improve their top-line business results, realize bottom-line efficiencies and accommodate continually changing market demands for more innovative products. In addition, they are asked to meet increasingly stringent regulatory and homologation requirements. All of these challenges require companies to take full advantage of their product and process information.

Yet, in many of today's companies, product and process knowledge is still spread across multiple systems, databases and desktops. A wide variety of tools and software applications are used to create this knowledge initially. Equally important, little or no connectivity is in place to tie these information assets together – it is still commonplace to develop mechanical, electrical, electronic and software systems independently, with different disciplines using different applications to create information in multiple formats.

The result is a lack of integration between domains that causes late discoveries of problems and design flaws, inhibiting companies from reaching their productivity, cost-reduction and time-to-market goals. Because it is difficult to coordinate and synchronize the information that is used to define the company's product offerings and their related systems, assemblies, parts, and components, development is often based on incorrect information.

Everyone involved in the project needs access to this information in formats they can understand so they can leverage it as early in the product lifecycle as possible. Seamless access to product requirements, designs, documents and 3D models enables all decision makers, stakeholders and lifecycle contributors – not just engineers – to make better decisions.



# I Best practice solutions

As the accompanying table indicates, a PLM system enables companies to address a variety of fundamental business needs.

## Business needs addressed by a PLM system

### Fundamental business need

**Improve productivity and reduce cycle time**

### How a PLM system addresses these needs

- \* Ensures that every participant in a lifecycle process has access to the current requirements, specifications, and feedback in real time.
- \* Synchronizes product and process information across multiple organizations, linking an enterprise's silos and dramatically improving access to accurate and up-to-date data.
- \* Merges an enterprise's product and process knowledge in a single highly accessible and secure source that eliminates time-consuming information searches while facilitating information re-use and better decision-making.

**Reduce lifecycle errors and costs**

- \* Provides visibility to accurate, up-to-date information in a meaningful context, which reduces errors and lowers the cost of change.
- \* Enables enterprises to manage and reconcile multiple application systems more efficiently with a single, secure source of knowledge.
- \* Eliminates the costly and error-prone process of manually duplicating information between different applications, reducing the need to redesign, rebuild, and retest.

**Facilitate collaboration with anyone, anywhere**

- \* Ensures that product teams and their individual members are working with the right version of the right product information in a meaningful context, seamlessly connected by a digital backbone.
- \* Enables dispersed teams, departments, suppliers and partners to seamlessly share diverse types of product and process knowledge without regard to geographic, organizational or technical boundaries.

**Improve value chain orchestration**

- \* Provides enterprises with a way to consistently manage processes that involve the participation of both internal users and external partners, as well as product and requirement changes that affect these participants.
- \* Enables companies to align the work of otherwise isolated lifecycle participants and reduce errors caused by miscommunications.
- \* Ensures regulatory compliance with auditable traceability throughout development.

**Provide greater visibility to products and processes**

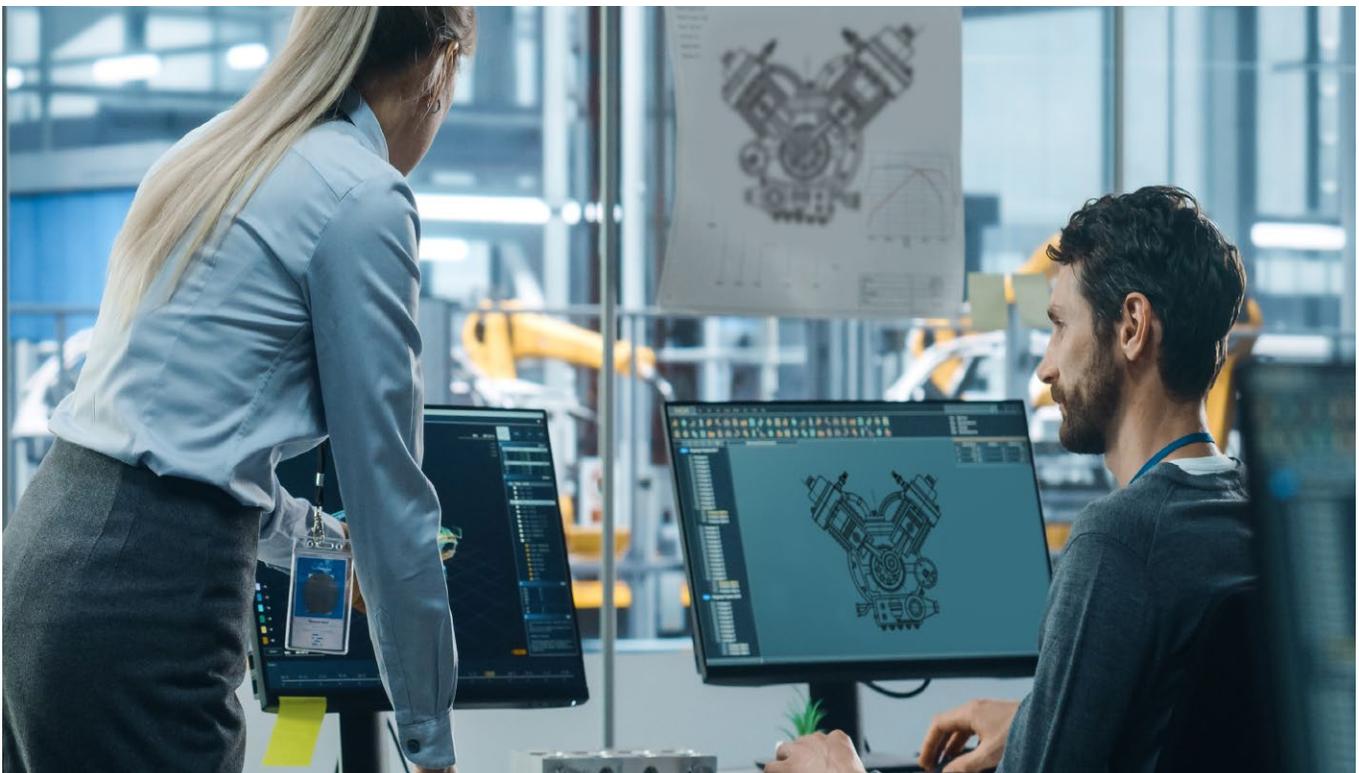
- \* Enables enterprises to comprehensively manage their product and process data, including CAD data, parts information, documents, requirements, 2D and 3D data and other intellectual assets.
- \* Provides users throughout the enterprise with visibility to accurate, up-to-date information in a context that is meaningful to them, where the impact and status of product changes, requirements changes and other decisions can be clearly understood by everyone.

Essentially, a PLM system must be able to manage product knowledge and development processes in local, as well as global, environments. Individual companies make their own unique PLM decisions about the applications they deploy, as well as whether they want to enable their workflow-driven processes to span all or only selected aspects of their value chain. Regardless of what decisions are made, the selected PLM system must be able to provide best-practice solutions for:

**Secure data management**, which enables the PLM system to address multiple end user needs and experiences. A PLM system should be able to capture and manage all the information required to design, develop and produce today's products. Users across every stage of the product lifecycle need to be able to easily locate, understand, and work with the information required to get their jobs done, including parts, documents, requirements, electrical drawings, manufacturing instructions and other meaningful data. This access must respect the entitlements that protect the intellectual property rights and security needs of the enterprise. The PLM system should facilitate the digital documentation of targets and requirements that companies need to guarantee regulatory compliance and auditability.

**Process enablement**, which provides the PLM system with workflow and process capabilities needed to enable both internal product teams and external partners to participate in the product lifecycle. A PLM system should ensure that all processes are consistently managed through best-practice rules and conventions. A rules-based engine is especially valuable since it can be used to easily capture best practices and process knowledge and allow consistent execution with appropriate participants and data.

**Bill of materials (BOM) management**, which enables the PLM system to manage product information from wherever it is created while allowing it to be used wherever it is needed. A PLM system should be able to manage information across an entire product lifecycle and bridge the gap between the upstream stages of the lifecycle and its downstream phases, to offer data traceability from concept through production. The system also should enable participants in each stage to visualize and share information without requiring them to purchase or learn how to use special software. Just as importantly, the PLM system should provide total BOM visibility, which includes being able to see the bill of materials before and after changes are made, as well as from different points of view, including promoting understanding by non-technical users by enabling them to visualize the product's parts in 3D.



# I Key capabilities

While the general requirements discussed in the preceding section are helpful in conceptualizing the best practice solutions needed by a PLM system, the following table describes detailed capabilities required by these solutions.

## A PLM system's key capabilities

### Best-practice solution

#### Secure data management

### Required capabilities

Provides the PLM system with key data management capabilities to capture, retain, communicate, and validate up-to-date product information and ensure that the right information is delivered to the right users in a correct context. This single source of product and process knowledge can manage and provide seamless access to all of an enterprise's related designs, parts, documents and requirements. The PLM system also should facilitate:

- Management of multiple CAD tools and formats
- Authoring coordination (check-in, check-out)
- Version and revision control

Document management that provides product teams with appropriate document templates, auto-rendering and markup capabilities, as well as support for desktop tools such as Microsoft Office.

Search functionality that includes quick search, detailed search and graphical search capabilities for enabling widely dispersed and diverse users to access the PLM system's product and process knowledge "anytime, anywhere".

Security and administrative functionality that protects the intellectual property rights of all lifecycle participants through:

- Role management
- Program-based security
- Access privileges

#### Process enablement

Provides the PLM system with key process management capabilities to ensure that product and process information is delivered to the right person at the right time, including:

Workflow capabilities that enable enterprises to establish, manage and execute automated and orchestrated workflow-driven processes that reflect company-specific best practices.

Change and revision management that enables enterprises to implement best practices consistent with conventions such as the Institute of Configuration Management's CMII standards for:

- Change planning (what-if analysis)
- Change incorporation (execution)
- Change verification and communication

A PLM system should also support other established processes, including phase-gate standards.

A PLM system's key capabilities (continued)

### Best-practice solution

#### Bill of materials management

#### Required capabilities

Provides the PLM system with the visibility necessary for managing and presenting bill of materials (BOM) information from wherever it is created to wherever it is needed. Key capabilities include:

BOM management that enables enterprises to accurately represent and efficiently manage a complete BOM in all of its lifecycle stages. The PLM system also needs to facilitate:

- Complete, multi-domain BOM that can include mechanical, electronic/electrical, software, and simulation parts, components, and assemblies
- Integrated configuration management (change management)
- Alignment and synchronization of all sources of BOM data, as well as all lifecycle phases, including the as-designed, as-planned, as-built and as-maintained states
- Open applications and systems integration

#### Visualization and digital mockup

Enables lifecycle participants to share and visualize on-demand representations of the product and its underlying assemblies and parts in a secure portable format without the need for a CAD authoring tool.

The PLM system also needs to provide:

- Digital mockup capabilities that significantly reduce the need for costly physical prototyping
- JT™ support, the common 3D language for PLM visualization



## | Next steps

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