PRODUCT DATA MANAGEMENT:
THE FOUNDATION OF THE DIGITAL THREAD AND DIGITAL TWIN

Fact-based, data driven decisions every single day

windchill®

This ebook introduces how to enable global collaboration across concurrent design environments with a secure and tightly integrated multi-CAD and product data management system.

Introduction

Are your design teams unable to collaborate effectively? Is it taking too long to get to market due to duplication of work? With competition catching up, there is more pressure than ever to deliver products faster. Product data management (PDM) supports different languages and cultures, bringing together disparate teams and tools with harmonized end-to-end processes. The days of double work (duplicating designs through lack of re-use), systems that are not integrated (duplicating work inside the same system unable to build associative BOMs), and daily / weekly meetings (in all the time zones) are over. Now they are replaced with a single authoritative and secure source for product data. Engineering information, along with its derivatives, needs to be leveraged bidirectionally across teams, and systems, including manufacturing, quality, and service among others. Continue reading to learn how your organization can adopt a smarter way of working and begin increasing efficiency, improving collaboration, and laying the foundation for your digital transformation journey.

PRODUCT DATA MANAGEMENT BENEFITS

INCREASED		DECREASED	
	Efficiency		Search Time
	Collaboration		Duplicate Effort
	Data Quality		Errors
	Doc Control		Rework
	IP Protection		IP Theft
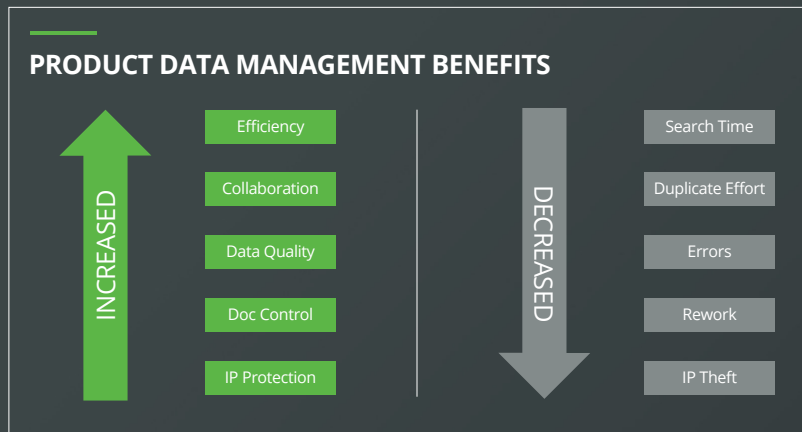
01. Drive Engineering Efficiencies

It's complicated. Users across R&D work at different velocities and have their own strategies. There are real or perceived reasons for differences in process and systems based on specific scenarios. Engineers don't understand why they must standardize when what they are currently doing is working for them. They must be convinced that IT can support them better with standardized processes. Ultimately everyone makes different decisions, comes with different goals, and are from different teams. Here is how to ensure success and build champions for your PDM implementation.

Improve search and reusability

To be agile, engineers and non-engineers need easy and fast access to relevant information and expertise to help them make decisions in real-time. They must work collaboratively with all teams sharing the same information. Everyone everywhere must create and capture the organization's knowledge in a proactive manner. But standing in their way are too many disconnected systems and processes.

Product data management is the use of software to help organizations connect and communicate product information across globally distributed teams where multiple CAD tools may be used.

Engineering   IT   Manufacturing   Quality   Service

It guarantees that every model, drawing or document is secured and easily found in a central repository. Part and document searches leverage the entire history and associated relationships of each piece of content. Every version and revision are tracked, required approvals are captured, and manual tasks are automated. PDM makes it possible for users to easily answer questions such as "Who accessed this content?", "What changes were made?", and "Which products use a particular component". In addition, authors can easily assign classification criteria as parts and documents are developed and system-generated names are assigned based on the classification and attribute values. Classification both helps users find and reuse content (standardized names make it easy to read, translate, and search) as well as ensure adoption of company policy.

Establish a complete bill of information

The bill of information, the single authoritative source of truth for product parts, structure, and change history, is the core concept of Product Lifecycle Management (PLM) and is key to a digital thread and digital twin. To get to a full bill of information for a product, there are processes that must be part of every product development project. Windchill, PTC's PDM solution for enterprise PLM, has powerful tools for organizing / classifying, lifecycle managing, and controlling access to documentation containing critical engineering data (mechanical, electrical, software, requirements, systems models, certifications, simulations, connected product and machine data, and more). By managing and linking all product related data, Windchill ensures only correct versions of documents are distributed to responsible personnel at the right time. Highly tailorable out-of-the box workflows guide the approval and release of that bill of information. Windchill further provides a pre-configured best practice quality system for document control that includes employee read & sign training, electronic signature, controlled printing, configurable watermarks and more.

Enhance data and design quality

If you have a multi-CAD environment, Windchill PDM helps you manage all the different CAD tools, ensuring that there is no missing or misinterpreted information. With Model Based Definition (MBD) / Model Based Systems Engineering (MBSE) / Model Based Enterprise (MBE) built into its core, Windchill helps break the barrier from simple document management. MBD helps designers move away from practices which rely on delivery of content in a 2D format, towards a set of practices which are built with the intent to deliver a 3D annotated model that includes key control characteristics in a machine-readable format.

MBSE delivers a holistic, multi-disciplinary and collaborative approach to designing and maintaining complex systems. This visual modeling approach improves communication, clarity, and maintainability of all product data, enabling early stakeholder buy-in. MBE goes beyond the MBD / MBSE tenants to address the entire lifecycle management of that information. Quality and regulatory compliance are improved as design issues and risks are discovered and mitigated sooner. MBE ensures that teams are both building the right systems and products as well as understanding and managing the potential impact of change.

What is MBD, MBSE and MBE?

MBD stands for Model Based Definition

Model Based Definition is a development model based on a full and rich definition of a product and / or system. Generally, it relies on 3D models augmented with rich text and 2D layers – annotations, schematics, diagrams, etc.

MBSE stands for Model Based Systems Engineering

Model Based Systems Engineering is the application of modeling to support system (whole product) requirements, design, analysis, verification, and validation activities beginning in the conceptual design phase and continuing throughout development and later life cycle phases

MBE stands for Model Based Enterprise

Model Based Enterprise goes beyond MBSE & MBD and implies use of all model-based information. It relies on a complete digital thread with information transferred or centralized throughout the company departments

windchill®

Visualize designs in context

A fundamental companion to all product data integrations is the ability for all enterprise contributors to visualize and engage with that product data. Windchill facilitates cross-discipline collaboration with robust, lightweight product visualization (MCAD and ECAD), mark-up, design reviews and validation of work-in-progress across the enterprise and supply chain. Users can also see enterprise PLM attributes, including material, cost, or defect information overlaid on top of the model to help inform change process decisions and accelerate product improvement initiatives. For improved visual decision making, reviewers easily see side by side comparisons of the most recent change plus any historic modifications made. Non-technical stakeholders can consume and manipulate the CAD model using augmented reality.

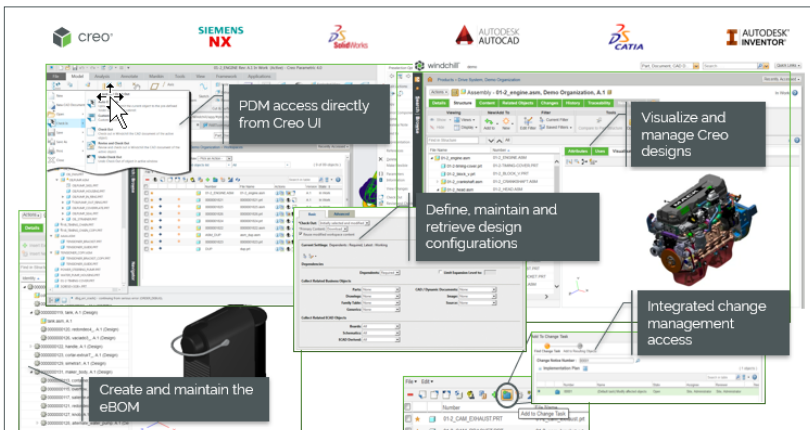## 02. Concurrent, Agile Ways of Collaborating

The main point of effective PDM is efficiency. Project oriented development often results in a mess of information across siloed systems, making it difficult to work concurrently. Time consuming, non-value add feedback loops are often caused by difficult to find information related to a product or part. Windchill is a web-based collaboration platform where internal and external teams can provide product development updates, submit ideas, and receive feedback in real time. ThingWorx Navigate further expands PLM participation and decision making by providing role and task-based apps. With little to no training, everyone across the extended enterprise (including suppliers, regulators, and customers) can access the information relevant to them and participate in PLM processes.

Stakeholders are also engaged through requirements and graphical systems design. Finding and resolving problems at these early engineering stages dramatically reduces costs, and strengthens stakeholder buy-in. Windchill supports the Open Services for Lifecycle Collaboration (OSLC) standard to ensure end-to-end traceability. Digital product traceability reduces errors from unexpected impacts of changes and provides proof that you are building the right products in the right way. Involve everyone in the extended enterprise and efficiencies are achieved.

windchill®

Enable ECAD and MCAD design collaboration

Drive re-use of intellectual property (IP) using libraries and standardization. Allow developers to synchronize 3D and 2D product designs across teams with bi-directional communication of product data, design changes, etc. Windchill's PDM capabilities, including direct access to PDM actions and status from inside the native CAD environments, are embedded in most major CAD tools (Creo, SolidWorks, Inventor, NX, Catia, and more) delivering ease of use and enabling secure concurrent data sharing. Windchill allows the CAD tool to interact with data using its native commands, providing support and reuse of design library components managed by Windchill. Based on ECAD integrations (Cadence, Zuken, Altium, Mentor, and more), electronic components can be synchronized / tracked for compliance across electric / electrical designs and downstream processes. The complexity of different disciplines working with multiple ECAD or MCAD tools is significantly reduced because product data is automatically converted to neutral, shareable formats and linked correctly to the product structure, providing clarity on the intended purpose of all data in the system.

Capabilities

- Direct MCAD tool access to Windchill PDM & workspace actions

- Secure file management

- Full management of all MCAD tool file types and relationships

- Creation and retrieval of design baselines and configurations

- Easily share critical design attributes with enterprise

- Full support for the creation of the visual BOM

Benefits

| PLM access without leaving the CAD tool | Improved data and design reuse | Efficient support for design collaboration | Fully integrated with downstream PLM processes |

Engage the extended enterprise

Invest in the people who innovate. Drive change by providing teams the information they need with technology that enables cross-division and cross-functional collaboration. ThingWorx Navigate is a suite of task-based apps that enable all stakeholders to get the product related information they need without the difficulty of an expert UI. Production planners can see data coming from Windchill enriched with ERP data and / or manufacturing execution systems, for example. Shop floor workers can replace printouts and paper plots by accessing the data on-line. Quality engineers can focus on test and validation procedures. If they find an issue, they can immediately report it back to engineering with a ThingWorx Navigate problem report. Sourcing managers can now work with engineers in the design process. And service technicians can access drawings and documents that were updated a millisecond ago by engineering.
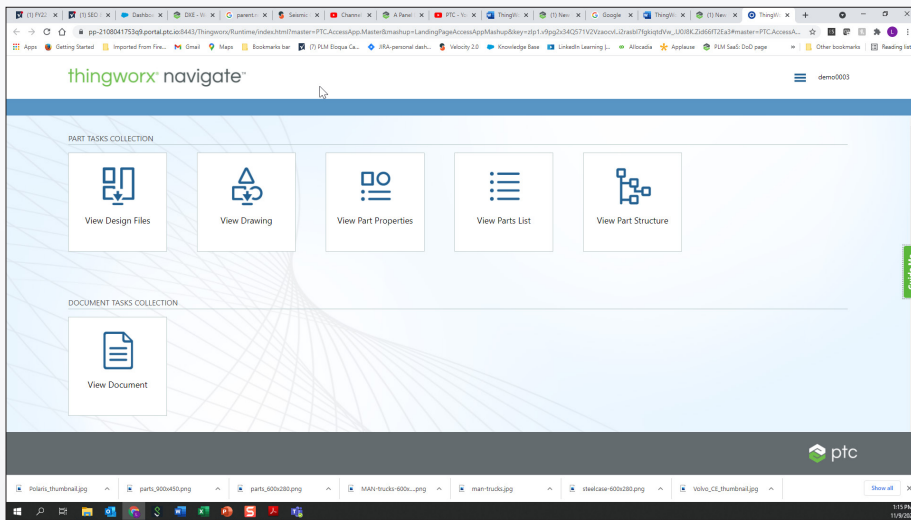
ThingWorx Navigate View Apps

Orchestrate design and manufacturing partners

Work globally with your partners 24X7. With Windchill, engineers can work transparently but only share externally what is needed (documents, CAD, change objects, manufacturing process data, requirements, etc.).

3D CAD designs in Windchill can be "stripped down" to remove valuable IP before securely sharing with a subcontractor or design partner. OOTB tools in Windchill can optimize 3D visualization data, removing analytical and process manufacturing information to help protect your sensitive data.

Windchill technical data packages are used to provide suppliers, manufacturers, and / or customers technical product information that can be sent in an "export-only" format or in a format that can be imported into another Windchill installation. Objects are automatically added to the package using collection rules.

Windchill Project Management enables external real-time collaboration by providing a secure space where design data is shared and deliverables tracked to multiple projects (concurrent supplier interaction) around the globe (multi-language) with automation of key business processes (NPI / NPD, change, quality, etc.).

windchill®

Ensure service documents are ready

Documentation teams rely on critical information and feedback from subject matter experts (SMEs) and other review teams across the enterprise to ensure the accuracy and quality of the product and service information they produce. With Arbortext Web Editor and Reviewer, it is easy for contributors to collaborate with the documentation team quickly and effectively. Contributors, authors, and reviewers rely on the workflow automation, component content management and collaboration capabilities of Windchill to ensure all aspects of the content management process are streamlined.

03. Modernize

As your organization finds its way out of legacy systems, there must also be a recognition of the potential risks and disruptions resulting from the introduction of new technology. Moving to a more secure, simple, faster, and easier to deploy IT environment must be part of every product data management initiative.

Protect your IP

Windchill provides multiple levels of security controls; simple access control lists, explicit denial of control through security labels to ensure no accidental access is provided, and even temporary access based on signed agreements. Modern authentication protocols are configured across system integrations. Objects are access controlled to authorize internal and external users' rights to view and edit data. For advanced IP protection, objects are tagged using security labels (ex. ITAR clearance) with further control established using temporary agreements for specific participants.

Security Labels can be used alongside Windchill access control policies to determine if a user and / or organization is authorized to access an object in the system. Companies can leverage security labels to cover needs, such as identifying legal information, export-controlled data, or protecting proprietary information.

Go SaaS and out-of-the-box

Windchill can be deployed on-premises or in the cloud. SaaS (Software as a Service), however, provides the best value, lowest risk, and fastest time to market. Share consistent data and insights across disciplines, divisions, and with external partners with pre-configured secure instances ready to jump start collaboration needs. PTC's economies of scale (that support a world-wide customer base) reduce total cost of ownership, program risk (Windchill experts are managing / optimizing your system and protecting your data) and support risk (software, hosting, managed services are wrapped together). Shed your customizations and realize value quickly through out-of-the-box configurable best practice processes.