COMMENTARY

CIMdata®

Creo 11: Enabling Greater Product Diversity and Sustainability

Takeaways

Creo 11 is built on 6 themes each delivering significant functional, usability, and productivity enhancements.

Many new Creo 11 capabilities enable better design for sustainability.

New electrification design and development of electrical products and specialized capabilities for design of composites enhancements enable improved design for sustainability.

Creo+ SaaS provides fast, flexible deployment options, global user collaboration, while reducing IT infrastructure and administrative costs.

Introduction

Creo 11, released in May 2024, expands Creo's infrastructure to allow Creo to be run both on premises and in Software as a Service (SaaS) environments. Beyond this, Creo 11 emphasizes six release themes, each delivering new capabilities focused on improved usability and productivity while supporting the design of more sustainable products:

Productivity & Usability—Changes to improve operation of Creo.

Design for Electrification—Improved cabling and PCB integration.

Design for Composites—Composite ply visualization and design improvements.

Model-Based Definition—Many 3D annotation and GD&T additions.

Simulation Driven Design—New and expanded capabilities based on PTC's partnership with Ansys.

Design for Manufacturing: Additive & Subtractive—Enhancements to improve all manufacturing in both domains.

Each of these release themes are described in the following sections. Creo+, a SaaS instance of Creo, is also presented.[1]

[1] Research for this paper was partially supported by PTC.

Creo 11 Release Themes

Each of the six Creo 11 release themes provides new capabilities and benefits. CIMdata is impressed by the breadth and depth of the Creo 11 offering and the new capabilities in this release that further support product electrification and the development of sustainable products. These are two primary areas of interest and required support in the currently evolving product landscape that companies are demanding today. The following sections describe many of the new and enhanced features to be found in Creo 11.

Productivity & Usability

User interface improvements are generally included in major product upgrades and Creo 11 has many throughout the solution. New highlights are in surface design and manipulation. Quilts are available to group multiple surface patches into a unit that can be manipulated. Surfaces below degree 3 can now be defined for users who want to limit surface complexity for manufacturing or other purposes. Surface patch boundary definition and modification have been simplified. The enclosed volume of a surface can now be computed.

Shrink wrap has been part of Creo for a long time and now in Creo 11, users can select the parts in an assembly that will be encompassed. Those parts can be merged and automatically placed in one shrink wrap that remains associative to the assembly, so the shrink wrap automatically updates as the assembly is updated. This greatly simplifies managing shrink wraps.

Sheetmetal design is enhanced by allowing multi-body sheetmetal parts to be merged from multiple sheets into an assembly in which parts (sheets) can be worked on in the context of the assembly—or divided from one sheet to many sheets, improving handling of related sheetmetal items throughout design and manufacturing planning processes.

Design for Electrification

Electrification is driving many new product design projects as those products incorporate more electrical components to provide superior control over mechanical systems. Creo 11 provides improved visibility of electrical components and cables within the context of and associative to mechanical assemblies, see Figure 1. Selected components are highlighted for visual identification. PCBs in IDX format can now be directly imported into Creo and positioned in electro-mechanical assemblies. These board representations are then available for designers to perform interference analyses and to refine positioning and clearance operations.

Other new capabilities include a remove locations capability to allow elements to be moved, dynamic preview in the graphics area, expanded filtering, and Undo/Redo options for cable elements. Harness settings can now be changed during routing, and the cabling tree has been updated for greater visibility of harness structure. Improved context data visibility provides more flexibility to control the presentation of various layers in ECAD. As electromechanical products continue to transform industries, having a CAD tool that supports complex, cross discipline, design requirements ensures that teams can effectively collaborate, innovate, and bring quality products to market quickly while meeting modern standards in products containing substantial software components.

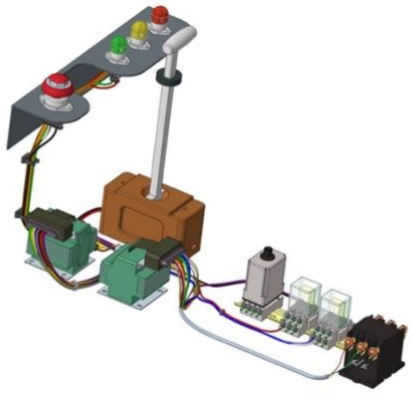


Figure 1—Wiring Harness and Electrical Components in Context of a Creo Assembly
(Courtesy of PTC)

Design for Composites

The use of composite materials is another method that advances product sustainability. Composites have a whole set of special problems around design layup to produce appropriate strength, stiffness, flexibility, and weight aspects for the design at hand. Plys may now be selected and manipulated in cross-section views to allow improved stacking transitions so that smother ply stacks can be produced—see Figure 2.

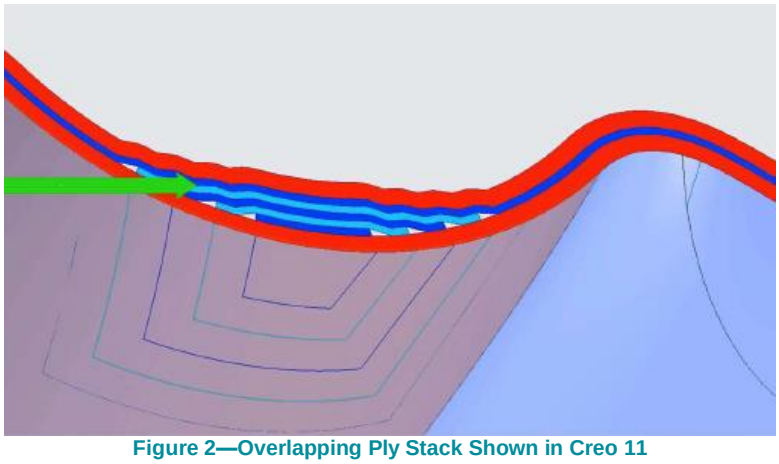


Figure 2—Overlapping Ply Stack Shown in Creo 11
(Courtesy of PTC)

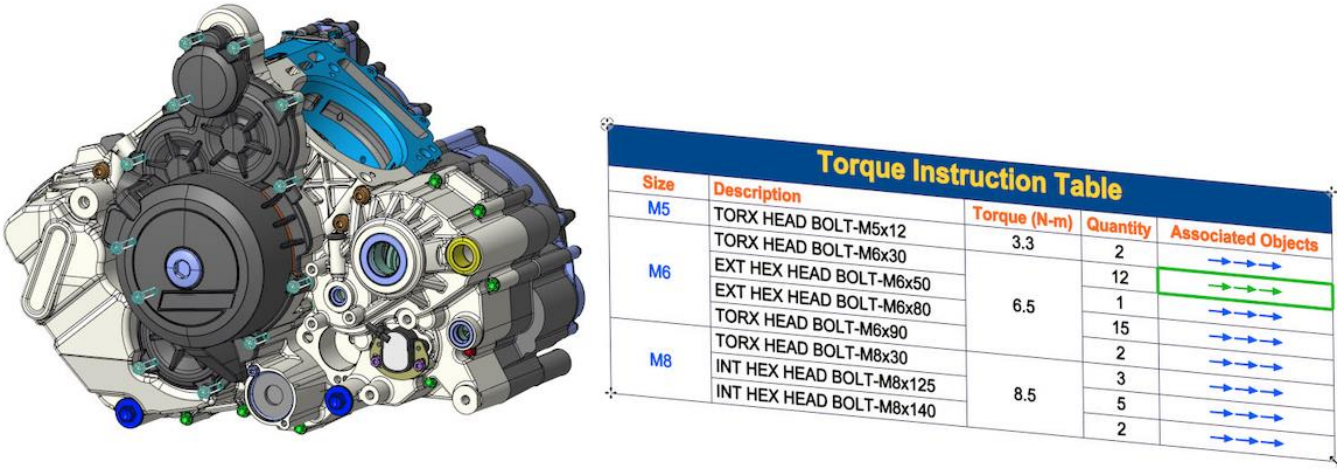
Another aspect of ply management is to allow the boundaries of the as-designed plys to be extended beyond the design space so that ply trimming operations in manufacturing can be properly planned. Laser projection to aid ply placement during manufacturing is also supported, including integration with LAP & Virtek laser systems.

Creo also simulates fabric draping and identifies wrinkles in the ply material. Ply recipes for zones can be developed—including grain orientation, material to be used, and number of plys required for each zone.

Model-Based Definition

Model-Based Definition (MBD) is a driving strategy in many product development programs today as companies adopt systems-driven product development philosophies. Thus, MBD is rapidly becoming a critical approach to designing systems that combine electrical, software, and mechanical aspects. MBD, driven by the ability to simulate designs, is an important concept. However, there remain many challenges around how to transfer model-based designs from the data rich product design world into the less well supported manufacturing environment while preserving the ability to maintain and update the MBD. PTC continues to expand its Creo and Windchill solutions to address this issue.

In Creo 11, a number of changes help communicate with manufacturing, including using model-based drawings that can contain GD&T and other annotations in the 3D model, which provides more valuable, complete, 3D views of data for manufacturing engineers and shop floor personnel. To this end, STEP AP242 Edition 3 annotations are supported. A 3D GD&T adviser guides engineers to produce valid GD&T and assure that the annotated model is completely constrained. It has been enhanced with support for ISO 22081 for application of general tolerances and combined simplified hole callouts for ISO models. Creo 11 also includes a new method of creating flat tables of related information that become part of the model, providing a simple way to organize data related to a design in an easy-to-read tabular form. See Figure 3. Semantic query for inheritance models enhances search precision and efficiency. CIMdata recognizes PTC as a thought leader for a MBD approach to modern product design.[2] This is especially significant as manufacturing organizations face challenges like time-to-market pressures, supply chain disruptions, and high costs of poor quality. There is an important strategic shift toward model-based definition (MBD) and model-based enterprise (MBE), which leverage 3D product models in manufacturing and support.



Torque Instruction Table

Size	Description	Torque (N-m)	Quantity	Associated Objects
M5	TORX HEAD BOLT-M5x12	3.3	2	
M6	TORX HEAD BOLT-M6x30	6.5	12	
	EXT HEX HEAD BOLT-M6x50		1	
	EXT HEX HEAD BOLT-M6x80		15	
	TORX HEAD BOLT-M6x90		2	
M8	TORX HEAD BOLT-M8x30	8.5	3	
	INT HEX HEAD BOLT-M8x125		5	
	INT HEX HEAD BOLT-M8x140		2	

Figure 3—Presentation of Information Related to a Design as a Table that Can Be Viewed with the Model
(Courtesy of PTC)

To meet evolving customer needs, Creo 11 continues to develop advanced features like real-time simulation and generative design, integrating them into the CAD environment to accelerate adoption.

Simulation Driven Design

PTC's partnership with Ansys provides continuing benefits for users in the areas of simulation and analyses. These are critical as more and more companies are attempting to apply systems engineering and MBD in their product design processes. Neither of these initiatives can be efficiently accomplished without early and frequent application of simulation and analysis to the problems designers are trying to resolve. Putting powerful real-time simulation tools into the hands of design engineers can help improve the quality of design and avoid costly late-stage changes.

New to Creo 11 is conjugate heat transfer—predicting heat flow between fluids and solids. This is critical for products where fluid interacts with solid objects. In addition to this, time-based transient simulations are supported that look at how a simulation varies as parameters change with time.

To better support generative shape modeling, several capabilities have been added. These include control over minimum feature size allowed during generative modeling and minimum wall thickness. These are

[2] See Model-Based Product Development - PTC's Unified Platform across the Full Product Lifecycle (Commentary) - CIMdata

good examples of features that can be controlled and maintained. New loading capabilities include those from moving components such as bearings.

Creo's generative design is AI-powered and seamlessly integrated into the design environment. Cloud-based computing enables rapid exploration and optimization of design materials and manufacturing processes. Shapes created in generative design are fully B-rep geometry so they can be used in other design methods throughout Creo.

Design for Manufacturing: Additive & Subtractive

Additive manufacturing is rapidly becoming a flexible means of production in many industries as improved "printable" materials are being engineered. To support this method, PTC has added more design capabilities that are tuned to the needs of additive processes, including more flexible lattice structures. Engineers can create blend surfaces between geometries with different lattice types and structures, then create a merged lattice across the transition as shown in Figure 4. The lattice joins can blend different latices together with node alignment to assure structural integrity.

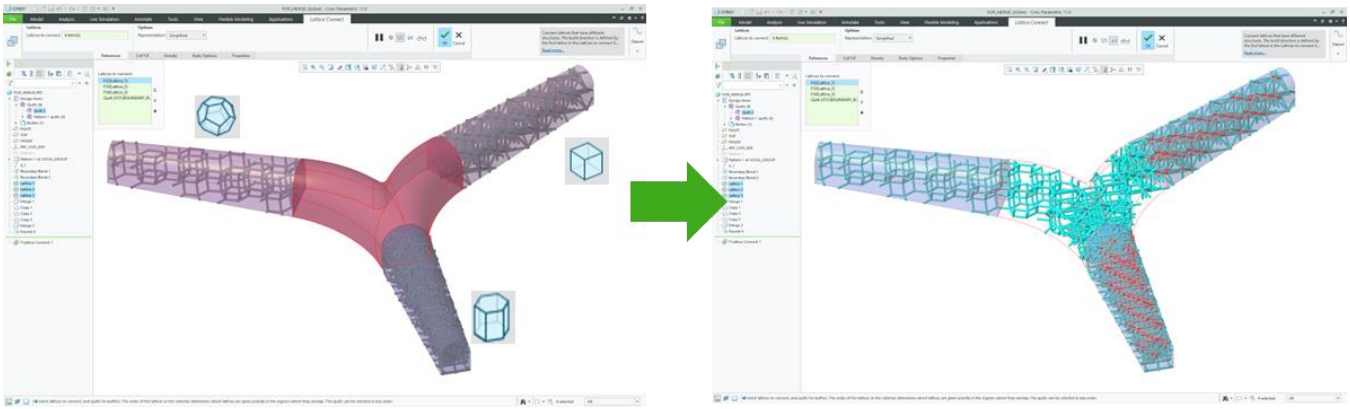


Figure 4—Different types of Latices Being Connected in Creo 11
(Courtesy of PTC)

The pore size in latices can be controlled to assure, for instance, that bone growth into the lattice is possible or to create filters for various sized particles. Creo 11 also supports more flexible stochastic (random) lattice development—both creation and modification flexibility have been increased.

For manufacturing evaluation, warp during manufacturing can be estimated and adjusted during design. To allow additive data to be shared, both 3MF and STL support are provided.

Subtractive manufacturing remains an essential capability for most manufacturing companies. In Creo 11, 4-axis rotary roughing and finishing toolpaths now support high-speed machining in roughing and finishing sequences. More tool shapes are now supported as well.

Creo+

Creo+ is a way of delivering Creo as SaaS. Creo+ has all of the same capabilities as Creo on-premises, but is delivered via the cloud so it can be automatically updated as and when needed without disrupting users.

Team collaboration using Creo+ is facilitated by enabling multiple users to work on the same items at same time and then resolve any conflicts. There is improved, real time display of what everyone is doing during a collaborative session so teams can work faster and resolve issues quickly. Mathcad (engineering calculations) is integrated in Creo & Creo+ to facilitate math-based analysis. Importantly, users can delay big activities such as an analysis when they are a remote user on a "metered" network such as a cell network—this can save significant cost.

SaaS is a model for licensing, delivering, and managing software for improved accessibility, scalability, collaboration, and security. Creo+ SaaS customers get rapid delivery of the latest CAD capabilities, access to expansive cloud-computing technologies, and real-time design collaboration facilitated by the SaaS environment. SaaS systems are easier to manage (often managed by the technology/cloud provider), with better access control, license deployment, security, and scalability upgrades that are automatically pushed to users. SaaS software is automatically updated, so the user experience is better and more consistent for all. Companies can also easily and quickly add both users and new functional software capabilities, e.g., a new CAD functional module in a flexible and scalable manner—as needed, where needed, for as long as needed.

Conclusion

Product design and development continues to grow in complexity as factors such as electrification, sustainability, and MBD become more prevalent and important. CAD solutions must evolve to support these needs. Creo 11, with its six release themes effectively addresses these requirements. Each of the themes provides new capabilities that enable Creo 11 users to be more productive, design for electrification and sustainability, support Model Based Design and Simulation-Driven Design, and improve design for manufacturability.

Creo+ provides SaaS delivered CAD compatible with on premises delivered CAD to give customers the flexibility and scalability they need to optimize their design and development environments.

This commentary only touches on some of the highlights of the Creo 11 release. There is much more detail available on the PTC website.[3] CIMdata is impressed with the enhancements embodied in the Creo 11 and Creo+ releases and looks forward to the future evolution of Creo and Creo+. CIMdata recommends that enterprises that are evaluating their requirements for CAD solutions should include PTC's Creo and Creo+ in their selection process. For additional information about Creo 11 please see: About PTC Creo.

About CIMdata

CIMdata, a global strategic management consulting firm, provides services designed to maximize an enterprise's ability to design, deliver, and support innovative products and services. For more than forty years, CIMdata has provided industrial organizations, providers of digital technologies and services, and investment firms with world-class insight, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) topics and the digital transformation they enable. CIMdata also offers research, subscription services, publications, and education through certificate programs and international conferences. To learn more, visit www.CIMdata.com or email info@CIMdata.com.

[3] See: https://www.ptc.com/en/blogs/cad/whats-new-creo-11