COMMENTARY

CIMdata®

Creo+ and Creo 12

Advanced CAD for On-premises and the Cloud

Takeaways

In discrete manufacturing, efficiently generating and maintaining designs and related data is critical for effective product development and realization. High quality CAD data enables advanced solutions such as composites design and advanced manufacturing and strategies such as model-based enterprise (MBE) and digital thread to function efficiently.

Creo 12 and Creo+ are the latest iterations of PTC's flagship parametric 3D CAD solution featuring improvements in design, simulation, and manufacturing enabling customers to develop virtual product models and support MBE more easily and efficiently.

New and improved capabilities in Creo 12 and Creo+ include composite design, collaboration, real-time simulation, AI powered generative design, MBD with embedded product manufacturing information (PMI), manufacturing, improved Windchill integration, and data exchange format interaction. They also include many usability and productivity enhancements.

Creo+ has all the capabilities of Creo 12 and adds improved license management and real-time collaboration at OEMs and with supply chain partners. There are a variety of Creo 12 and Creo+ packages to address user needs, from basic review to advanced design capabilities.

Introduction

The $80B PLM market contains a wide diversity of applications, from data and process management through authoring tools for requirements, systems engineering, manufacturing, and service, but mechanical CAD (MCAD) is still a significant portion of the market and critical for physical product definition even as products become electrified and software defined. From nuts and bolts to wind turbines to submarines to satellites, geometry and related data are still a core element of all physical products. MCAD is the foundation for general product modeling and for industry specific vertical solutions such as composite design, styling, simulation, machine building, and additive and subtractive machining.[1]

While product development technology trends focus on electrification and the rapid growth of software within products, MCAD challenges remain. Generating basic shapes is a solved problem, but complex geometry, configurations of geometric elements, and downstream data consumption still have many challenges. Mr. Brian Thompson, PTC's General Manager of the Creo business, stated "Faced with

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

mounting global competition, increasing product complexity, and a mandate to accelerate delivery cycles, organizations are taking every opportunity to optimize design and manufacturing processes." CIMdata hears this constantly from our industrial clients.

In the context of the digital thread, there are many gaps or breaks across the product lifecycle at least partially attributable or related to MCAD. Disconnected digital and paper models exist throughout organizations. Quality issues with models, drawings, and product manufacturing are often discovered late in the development process, impacting cost and schedule. Complex industry standards not well understood by younger engineers lead to rework and longer development timelines. And of course, there is increasing competition in all industries driving companies to do more with less.

Beyond initial creation, the ability to change CAD geometry and assembly relationships is critical. Big changes happen during the product innovation phase as physical materials, shapes, and configurations may change drastically during the steep part of the learning curve, but even in product sustainment, material, geometric and configuration changes happen due to long term learning and cost reduction pressure. Being able to adapt parts and products quickly and reliably reduces frustration and cost, ensuring that changes not only can be made, but happen quickly.

CAD data is not an isolated silo. It is determined by requirements and can be driven by or drive simulation depending on the position in the product lifecycle. CAD data is also consumed downstream in visualization, manufacturing, and service. CAD software must enable many different upstream and downstream activities. Improving CAD software both within design and across the digital thread is a never-ending challenge.

Creo 12 and Creo+

Creo 12 and Creo+ are the latest releases of PTC's flagship CAD product. Creo 12 is the on-premises version and Creo+ is the Cloud-based SaaS version. They are feature equivalent and data is forward compatible. Both solutions have a long lineage tracing back to the original paradigm shifting solution, PRO/Engineer. One of the advantages CIMdata appreciates is the investment protection the long lineage provides and the confidence it provides for the future as PTC's continued investment ensures long-term support. Additionally, as PTC incorporates customer feedback, the product receives field-driven enhancements, improved support for edge cases, and refined user interface and experience, boosting productivity alongside major innovations.

The biggest difference between Creo 12 and Creo+ is that Creo+ leverages services from its cloud implementation to enable improved team collaboration and administration. The other significant difference is the release cycle. Creo+ is released on a quarterly basis while Creo 12 releases annually and contains a rollup of the quarterly Creo+ features.

What's New?

With this release, PTC introduced over 250 updates to Creo, including new features and enhancements to existing ones. A significant advantage of a process focused tool like Creo, is it contains a broad array of capabilities to support many industries and product development workflows, and the continuous addition of new features on top of the base product accumulates into an amazing array of capabilities supporting the digital thread. Some of the highlights of the update are listed in the table below:

Feature	Description
Geometric Modeling	Feature presets, refined tree navigation, and improved tooltips enhance productivity and user experience. Upgraded volume and surface area measurement tools streamline the development of generative designs.
Generative Design	Generative design can be used to conduct thermal optimization studies, in addition to structural and modal analysis.
Multi-Body Data	The ability to create multiple bodies in a single Creo file and later combine them into a master model structure facilitates fast conceptual designs that can easily transition to production-ready designs.
Surfacing	The styling capability is a powerful feature that integrates multiple surface modeling tasks. Users can now replace or reroute references, use handles to intuitively push and pull surfaces, and reduce geometric complexity. Additionally, a new approximate surface can be created. Generating stylized surfaces within Creo enhances digital threads by eliminating the need for third-party tools and data translations, crucial for many product designs.
Model Based Definition with PMI (AP242)	GD&T Advisor now supports Datum Reference Features and intent surfaces, with improved annotation reuse. It also supports 3D PDF and STEP AP242 Edition 3. CIMdata strongly endorses the digital thread enablement offered by STEP AP242, and Creo's support for Edition 3 is a significant advancement.
Composite Design	Enhanced modeling capabilities, such as improved ply management, expanded ply transitions, and refined draping, support more effective part modeling and top-down design. Improved simulation can be based on individual plys. Precise solid geometry for composite and associative manufacturing models strengthens digital thread integration.
Simulation	Support for Ansys 2025 R1 provides continued improvements to performance, ease of use, and reporting. Simulation is a critical part of the digital thread, having the simulation process managed by Creo simplifies the creation, consumption, and management of complex simulation data.
Harness Assemblies	Branch navigation is applicable to harness design (with harness treated as assemblies), the model tree, and assembly management. It improves productivity when managing complex structures of model features, harnesses, or design exploration branches and assemblies.

Feature	Description
Manufacturing	Enhancements in both additive and subtractive manufacturing improve efficiency. Mold tooling can be produced with conformal cooling, improving production. Advanced lattice management streamlines additive part production, while refined high-speed machining controls optimize the production of machined parts and tooling.
Sheetmetal	New features, such as fully dependent mirroring, improved joins, and the ability to unbend swept flanges after splitting, enhance modeling capabilities. These ongoing improvements reflect PTC's sustained commitment to advancing this critical area of design and manufacturing.
Welding	New features, including spot weld stacking, enhanced sequencing and display, and offline programming support for groove welds, streamline processes. These capabilities improve efficiency for the many companies incorporating weldments into their products.
Windchill Interaction	Enhanced material management provides better visibility into material usage at the enterprise level, optimizing planning and costs. Creo now supports partially opening assemblies based on Windchill definitions, ensuring only relevant parts are loaded, which accelerates users' access to their data.

Creo+

In addition to the features in the table, Creo+ has several unique updates. First, it gets a new named-user entitlement or license called "Creo+ Explore" for occasional users that provides Creo-native view-only and data export capabilities at a reasonable cost. This helps ensure everyone who needs access to Creo data can get it without relying on exported data formats that may vary slightly from native Creo data. Additional differences with the on-premises version include simplified and centralized administration, embedded communication capabilities, and perhaps most important, the ability for multi-user real-time time collaboration while working on the same geometric models.

Conclusion

Effective product realization within discrete manufacturing requires an effective digital thread that spans the product lifecycle from the voice of the customer through design, manufacturing, and service. At the core of the digital thread is the MCAD data that defines the geometry of the product. Ensuring that this data completely and accurately describes the product and supports the manufacturing processes and the end-to-end business processes is critical to a company's success.

Creo 12 and Creo+ are the latest releases of PTC's flagship parametric 3D CAD solution. They are equivalent, interoperable products designed for on-premises and SaaS environments respectively. The SaaS solution enhances collaboration by leveraging the cloud and is updated with new features sooner due to its quarterly release cadence versus the annual cadence for the on-premises version.

PTC has added or enhanced over 250 features over the past year across the digital thread, including user interface and user experience, core design, composite design, real-time simulation, enhanced MBD

support, AI-powered generative design, additive and subtractive manufacturing, and Windchill interaction. These improvements and new capabilities help customers improve productivity, data and product quality, innovation, and speed to market.

Creo+ adopts a cloud-first approach, utilizing modern infrastructure to enhance collaboration and performance. CIMdata, with numerous clients using PTC solutions, commends PTC's vision and execution. With thousands of successful customers creating everyday products, CIMdata is impressed by the latest releases of PTC's flagship CAD solutions. Companies seeking to advance their product definition capabilities and digital thread should contact PTC to explore Creo 12, Creo+, and the broader PTC suite.

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.