PTC model-based systems engineering solution

DRAMATICALLY IMPROVE THE DESIGN, SPECIFICATION, AND VALIDATION OF COMPLEX SYSTEMS

Overview

The PTC Model-Based Systems Engineering solution enables a holistic, multi-disciplinary and collaborative approach to designing and maintaining complex systems. It transforms how teams capture and communicate design ideas for next-generation products through standards-based modeling of systems, components, system product lines, and systems of systems.

Offered in a convenient subscription package, the PTC Model-Based Systems Engineering (MBSE) solution combines best practices guidance with capabilities for systems modeling, model validation, model-based product line engineering, model simulation and asset reuse. It provides an advanced platform for model-based systems engineering, systems of systems design, and product line engineering with the simplicity of one toolset. It integrates with our requirements and validation solution for full lifecycle traceability and also with our product lifecycle management (PLM) solution, which enables you to jumpstart this key element of product delivery process.

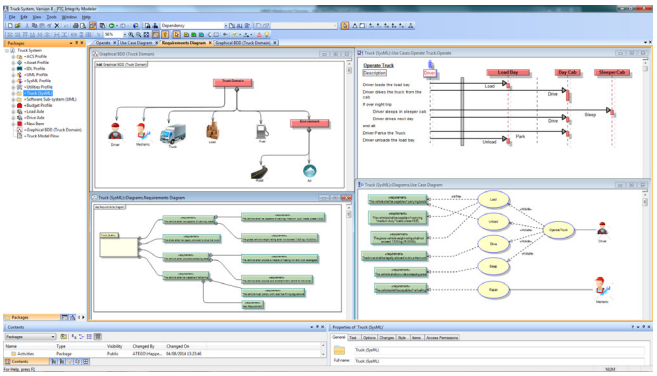
Engineering challenges of complex products

The explosive growth of smart connected products presents opportunities and challenges to organizations that want to capitalize on their enormous value. Complex products and systems are inherently more difficult to specify, design, and evaluate. The result is that organizations often face barriers to creating and validating design ideas that all stakeholders can quickly understand and agree on.

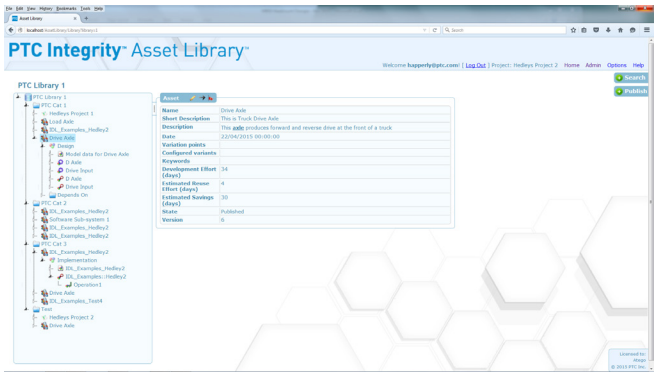
Without a common visual design approach, organizations struggle to create and improve complex products, product families, and variants across large, distributed multidisciplinary teams. Also, without a systematic way to re-use assets across systems, teams find it hard to control costs and stay on schedule. Compounding the challenge is the growing number of smart products comprised of many complex systems and subsystems.

Model-based systems engineering reduces risk and stimulates innovation

Organizations in the automotive, aerospace, defense, transportation, energy, and other sectors rely on the PTC MBSE approach to reduce the costs and risks of designing, validating, and managing smarter, more innovative products and platforms.



Get everything you need to model systems, systems of systems and system product lines.



Design the way you build with a modular, systems of systems design approach.

When compared to typical systems engineering endeavors, studies show that MBSE reduces total development cost by 55 percent.[1] The productivity, savings, quality, compliance, and time-to-market benefits multiply because a MBSE solution helps teams:

- Get up and running quickly with best practices that reflect PTC's vast experience on actual projects
- Design components, products, and product lines using industry-standard SysML in a scalable, multi-user environment
- Validate complex behavior early in the design lifecycle
- Simulate systems of systems design ideas with drag-and-play ease
- Manage multiple products, platforms, product lines, and variants more easily
- Specify, publish, and reuse systems, hardware, and software assets

Visually simulate system functionality early in the design lifecycle.

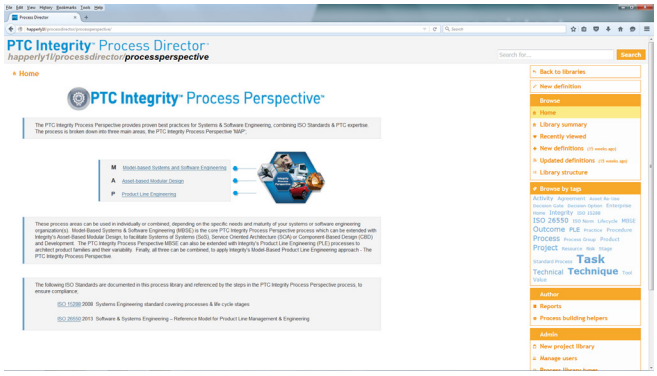
Process, knowledge, and software drives success

The PTC MBSE solution is based on proven methodologies that implement industry standards. No other vendor offers the breadth and depth of its capabilities, which include:

- Proven, Model-Based Systems Engineering Best Practices
  - Jumpstart your systems engineering transformation with rich process content that reflects PTC's vast experience implementing model-based systems engineering in live projects, including standards such as ISO 15288. Whether you adopt our Process Perspective completely or use it as a starting point to define your own process, this rich process content is flexible, scalable, and 100 percent web accessible.

[1]EMF, "How Product Development Organizations Can Achieve Long-Term Cost Savings Using Model Based Systems Engineering", October 2015.

- Collaborative, Standards-Driven Model-Based Systems Engineering Tools
  - Systems Modeling to reduce the time and effort required to engineer products, systems, and systems of systems. Standardize on an intuitive, visual design process that leads you through all appropriate industry-standard modeling techniques while automating repetitive tasks. A live, multi-user database ensures that all team members have access to real-time changes. Fully associative modeling replaces error-prone and high-risk "copy and clone" approaches to managing complex configurations. A customizable user interface allows team members to work at the right level of abstraction, while shielding them from the complexities of more advanced modeling options.
  - System Model Simulation to check complex system behavior early in the lifecycle. With a model-driven visual simulation approach, teams save time and reduce errors by eliminating the need to build prototypes and bring target environments into the loop. Drag-and-play functions simplify simulation. Teams also benefit from system-of-systems co-simulation, simulation results analysis and connections to third-party simulators including MATLAB® and Simulink™.
  - Asset-Based Modular Systems Modeling enables architected modular design with clear sub-system boundaries and high rates of reuse. Other modeling environments force you to choose between working with disconnected sub-models or overly large, complex models. Our intelligent asset library allows you to break up complex system designs into simpler, linked sub-models for dramatically improved understanding. Asset meta-data and traceable links seamlessly join your models for a design environment that is both pragmatic and powerful. Based on the OMG Reusable Asset Specification (RAS) data schema and the OSLC Asset Specification interface, the asset library offers design-time drag-and-drop ease of use and 100 percent web-based convenience. Fully indexed and searchable asset management makes the solution the perfect complement to both top-down "design by contract" and bottoms-up "asset mining" approaches.



Get up and running quickly with MBSE best practices based on deep expertise.

  - Model-Based Product Line Engineering enables a strategic approach to designing system platforms and variants for added speed and agility in the marketplace. Product line engineering is as straightforward as building an overloaded 150 percent model, graphically modeling variation, selecting the items required in any variant, then generating that variant into a product model for budget analysis and detailed design. These unique capabilities not only increase productivity but also reduce risks by reusing proven parts and letting you focus on the things which differ.

Value-optimizing integrations

Designed to serve as the hub of your systems engineering environment, the solution tightly integrates with existing lifecycle tools including PTC Integrity™ Lifecycle Manager, PTC Windchill™ PLM, MATLAB, Simulink, IBM® DOORS®, and pure-systems pure::variants. Other integrations are available through our support for the OSLC, ReqIF, and XMI standards, and through our open APIs.

Support for skills and knowledge transfer

Accelerate your team's knowledge transfer and reduce learning curves by working with skilled MBSE consultants who have deep expertise in leading organizational transformation projects.

PLM integration improves productivity

Create your system architecture and variation, and then flow it down to the PTC Windchill product environment. Tight PLM integration simplifies the complex process of generating bills of materials, options and variants. Full traceability enables you to connect system-level requirements to the original product design. As requirements continue to evolve, PTC MBSE captures these changes and communicates them to everyone in your team.

The PTC model-based systems engineering advantage

PTC is committed to advancing the state of the art of systems engineering, both through our tools and through our active involvement in the standards bodies that are defining the future of the SysML and OVM languages, and OSLC specifications for tool-chain collaboration.

To maximize value, our solution bundles product, process, and support in one convenient subscription to reduce costs. It offers transparent payment schedules to give you the predictability and flexibility to align budget to immediate benefits. For more on our subscription-based offerings, visit PTC.com/subscription.

Start your model-based systems engineering journey

The PTC Model-Based Systems Engineering solution is powered by the PTC Integrity family of software and systems engineering solutions and includes:

- PTC Integrity Modeler for scalable, multi-user SysML and variability modeling
- PTC Integrity Asset Library for modular, systems of systems design and reuse
- PTC Integrity Process Director for establishing, measuring, managing, and improving operational, engineering, and development processes
- PTC Integrity Modeler SySim for early functional design simulation
- PTC Integrity Modeler Product Line Engineering for modeling systems families and variants
- PTC Integrity Modeler Reviewer for automated design reviews
- PTC Integrity Process Perspective (Add On) for MBSE best practices

To learn more about each of these solutions, visit PTC.com/model-based-systems-engineering where you can view and download data sheets, customer success stories, and demos explaining how PTC accelerates the design and delivery of innovative products.

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