SERVICES & SUPPORT

PROCESSES & INITIATIVES

INDUSTRIAL

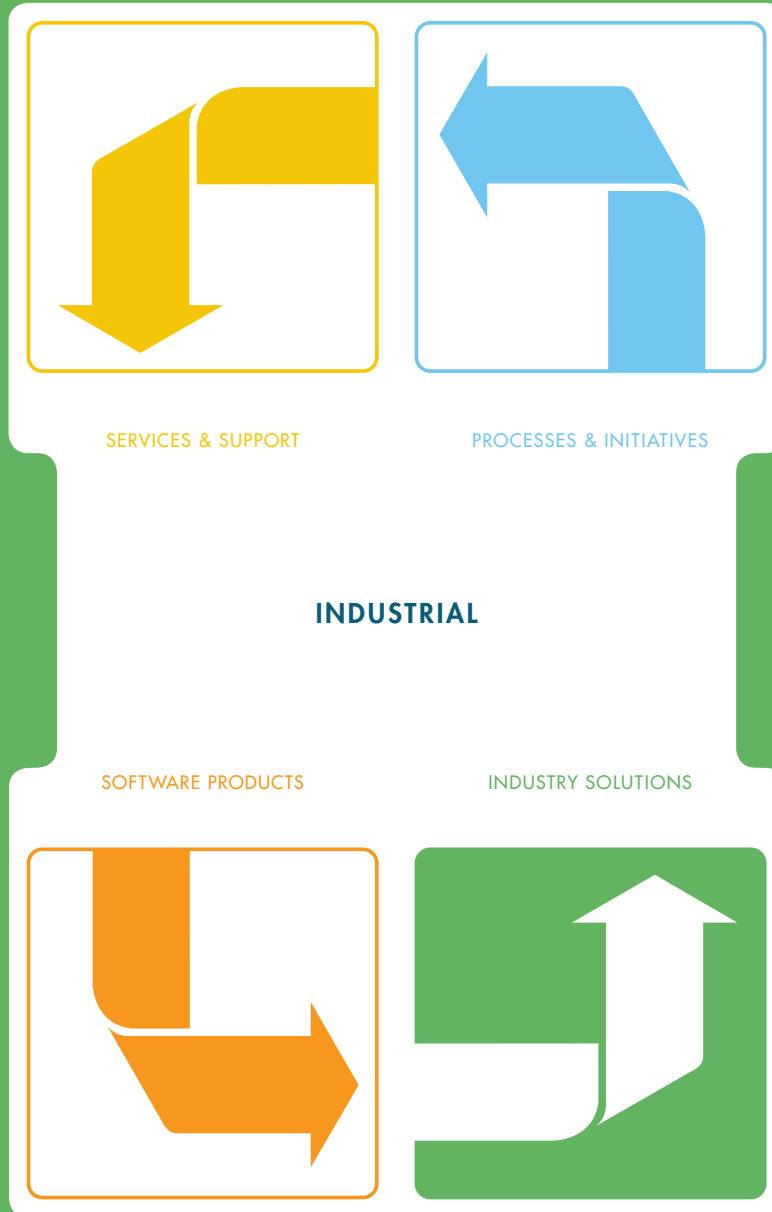SOFTWARE PRODUCTS

INDUSTRY SOLUTIONS

PTC®

SERVICES & SUPPORT

PROCESSES & INITIATIVES

INDUSTRIAL

SOFTWARE PRODUCTS

INDUSTRY SOLUTIONS

**Improving Collaborative Industrial Design
and Custom Product Configuration**
Through an Integral Product Development System

Designing Complex Products for a Global Market

Developing winning products is becoming more daunting by the day – even for the most successful industrial manufacturers. You are managing an increasingly distributed workforce and expanding into international markets, while facing fierce competition and growing regulation.

At the same time, you must continue to respond to the relentless demand for innovative, high-quality, custom-designed products – and deliver them to market faster, at an ever-lower cost. Considering these challenges, what are the key factors for your success in the future?

Top companies will have efficient program and project management, effective collaboration between internal teams and partners, and integration of Mechanical, Electrical and Software design disciplines in a single, streamlined process.

The Solution: An Integral Product Development System

By optimizing your key industrial development processes–such as system design, variant design, and change and configuration management – in an integral product development system, PTC puts you in a position to extend your competitive advantage and achieve your goals. Ask yourself:

> How can I reduce development times while increasing product quality?

> How can I take a total-system approach when designing new products?

> How can I innovate while minimizing my risk to development schedules?

> How can I comply with a proliferation of global safety and environmental regulations?

> How can I reduce the number of physical prototypes?

> How can I manage the integration of mechanical, electronic and software modules?

These are just a few of the challenges PTC is solving with our Product Development System for Industrial Manufacturers.

PTC Solutions – Preferred by the World's Industrial Leaders

PTC's Product Development System (PDS) gives you all the digital design, global collaboration, and process and project management tools you need to implement a highly efficient Product Lifecycle Management (PLM) solution.

Key capabilities of the PDS include: a holistic, systems approach to product development; a front-loaded development process; synchronized processes for simultaneous execution; and rigorous standardization for strategic flexibility. No other company offers the PLM solutions you need to create innovative products that meet your stringent quality, regulatory and profitability goals.

PTC's Product Development System for the Industrial market is built around six key initiatives:

- Global and Distributed Collaboration
- System Design and Mechatronics
- Modular, Configurable Design
- Environmental Sustainability and Regulatory Compliance
- Manufacturing Process Management
- Service Manuals and Aftermarket Documentation

Customers include:

- ABB
- Agco Fendt
- Caterpillar
- Dana Limited
- DEK
- Festo
- Gildemeister AG
- Ideal Standard International
- Ingersoll Rand
- ITT Fluid Technology Corporation (FTC)
- Kuhn
- MAN Diesel SE
- Milacron Incorporated
- Nypro Inc.
- Polaris
- Proliance
- Robert Bosch GmbH
- Schindler
- Schnider Electric
- Siemens AG
- SMS Demag
- Sulzer Pumps Ltd.

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Meeting the Critical Product Development Needs of Industrial Manufacturers

Global and Distributed Collaboration

Under ongoing pressure to reduce operating costs, accelerate time-to-market, and increase innovation, industrial manufacturers are learning to capitalize on global talent pools for increased efficiency in your operations. Through geographically distributed development teams and third-party suppliers, companies have the opportunity to leverage the best and brightest resources across a worldwide network for increased innovation and flexibility. The key to success is effective, efficient collaboration and secure knowledge transfer.

The collaboration and process management capabilities of the PTC Product Development System (PDS) optimize global collaboration, supplier communication, and design and manufacturing outsourcing processes. Use of project templates, along with the execution of project plans, deliverables and action management, are necessary to ensure optimal process control. The PDS provides an integral connection to Pro/ENGINEER® CAD data, as well as integrations with other MCAD and ECAD tools, enabling an environment that's ideal for working with many partners. The PDS visualization and markup capabilities, combined with workflow-driven process automation, deliver the perfect collaboration environment for successful global networking.

Supported Processes:

- System Design
- Detailed Design
- Manufacturing and Design Outsourcing
- Verification, Validation and Prototyping
- Change and Configuration Management

Key Capabilities and Benefits:

- A secure collaboration environment fully protects your intellectual property while fostering effective cooperation
- Project task and milestone tracking ensures team members know what's expected of them, and provides management with insight into project progress
- Check-in /check-out functionality eliminates redundant modification of designs by multiple parties
- A consistent change management process, across all sites and data, eliminates design inconsistencies

System Design and Mechatronics

Industrial product development, in the past dominated by mechanical engineering principles, is undergoing massive changes, with electronics and software engineering playing an ever more significant role in product development.

System design processes can be improved dramatically through increased collaboration between the individual development disciplines. PTC's holistic approach to product development minimizes inconsistencies by ensuring multi-discipline collaboration – with all developers sharing a common process and information environment for the synchronization of design data.

Supported Processes:

- System Design
- Concept Development
- Detailed Design
- Change and Configuration Management
- Verification, Validation and Prototyping
- Quality Management

Key Capabilities and Benefits:

- A single product structure spans mechanical, electronic, and software components, thus supporting cooperative design
- Integrated change management processes connect all product information, regardless of discipline
- Collaboration capabilities integrate leading MCAD, ECAD, and software development tools, and enable the exchange of geometric information between electronic and mechanical applications

"We strive to repeatedly and continuously develop innovative products with higher quality and lower costs. Our product lifecycle management process, enabled by PTC's Windchill content and process management software, allows us to identify and execute the most promising ideas generated from both inside and outside our organization. Through this process, key participants around the world from all functions work together collaboratively to turn great ideas into delivered solutions."

Dominic Hand,
Manager, PLM Applications
Ingersoll Rand Climate Control Technologies

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Modular, Configurable Design

Faced with increasingly complex products, as well as customer demand for tailored, unique designs, industrial manufacturers are feeling the pressure to quickly create very specific products in a profitable, high-quality way. A Modular Product Architecture is the key to managing this complexity with acceptable cost. Configuring products from modular "building blocks" speeds time-to-delivery by allowing manufacturers to use existing components to meet specific client needs — and frees designers to focus on innovation and new capabilities.

In addition, by integrating product documentation with these modular building blocks, manufacturers can quickly and dynamically create custom documents — whether sales proposals, manufacturing instructions, or service manuals — that are specific to the configured product and its components.

PTC's Product Development System helps customers develop and manage a single configurable BOM that integrates all product elements (electrical/mechanical/software) — while its part classification and search capabilities encourage and support component reuse. Lead times for key manufacturing and service deliverables for new variants can be drastically reduced by adopting flexible, reusable Pro/ENGINEER CAD models, and configurable Arbortext® technical publications.

Supported Processes:
- System Design
- Variant Design Generation
- Technical Publications
- Proposal Response

Key Capabilities and Benefits:
- Advanced configuration management process capabilities provide end-to-end continuity and traceability in a single, web-based infrastructure
- Configurable change management processes for BOM views, options and variants support management of products and product structures as they evolve over the product development lifecycle
- Controlled process and infrastructure integrates global product development partners in real time, for advanced configuration management

Environmental Sustainability and Regulatory Compliance

Often called one of the "five facets" of contemporary industrial design, environmental sustainability is a necessity in modern product development. Regulatory directives can profoundly impact the way organizations design their products, and require careful management of all environment-related product development data, including regulations and requirements, compliance tests and results, and supplier compliancy. Ongoing changes and new policies can demand redesign of new and/or existing products, impacting cost and time-to-market.

PTC's Product Development System (PDS) offers a comprehensive solution for design for sustainability. With PTC's PDS, engineers can rapidly (re)design products to meet tighter environmental standards. Engineers have access to critical compliance information, so they can select compliant parts during the early design stages, preventing costly rework later. The PDS offers analytical tools that test designs against multiple regulations, and track their success. The PDS also improves the ability to meet recycling mandates, with high-performance collaboration and visualization tools that enable early identification of disassembly and recycling issues.

Supported Processes:
- Requirements Management
- Detailed Design
- Regulatory Compliance
- Quality Management

Key Capabilities and Benefits:
- Enables rapid reengineering of products, to increase environmental friendliness
- Advanced documentation management captures all environment-related documentation, including regulations, standards, procedures, test specs and test results, throughout the development process
- Workflows ensure that environmental compliance processes are followed during all steps of design
- An audit trail of decisions and changes regarding environmental topics ensures that regulations are properly addressed

"Instead of starting from scratch each time a new product is conceived, our engineers work to assemble new configurations from existing building blocks that have already been validated in prior designs. This modular approach has enabled us to launch more than 40 validated models in a single year. The most we could do under our old approach was three"

John Kolb,
Vice President of Engineering,
Proliance

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Manufacturing Process Management

Transforming engineering designs into manufacturing bills of materials (mBOMs), work instructions, and manufacturing processes has typically been a cumbersome process that's launched only after the design was completed. Consequently, design and manufacturing engineers face daily challenges ensuring that manufacturing data in use accurately reflects the current engineering model, and that design decisions follow manufacturing best practices.

PTC's Product Development System (PDS) streamlines the transition from engineering to manufacturing. Early in the design process, critical manufacturing information is captured in the 3D product model. The manufacturing BOM is derived from the engineering BOM, with changes dynamically propagated from engineering to manufacturing as they are made.

This method enables true concurrent manufacturing process management with simultaneous product and manufacturing process development.

Supported Processes:
- Manufacturing Process Management
- Change and Configuration Management

Key Capabilities and Benefits:
- Leverage 3D designs, both downstream into the manufacturing domain and across organizations
- Embed manufacturing operations knowledge directly into 3D product designs and components
- Create and manage process plans as a sequence of operations, simulating line balancing and integration, and providing shop floor feedback
- Implement Design Anywhere / Build Anywhere initiatives by providing a multi-plant process planning environment that integrates heterogeneous CAD/PDM/ERP systems

Service Manuals and Aftermarket Documentation

When building complex products, such as industrial equipment, plant machinery, and industrial engines, turbines, and generators, accurate technical and service documentation is an essential element of the overall product delivery. In many cases, the technical documentation process is only partially automated. Changes to the original product require that manual changes be made to illustrations and documentation, costing time and money. The problem is further compounded when documentation must be published in many languages, as every product change ripples through multiple documents in numerous languages.

As well, inaccurate field service information can be tied directly to the exploding costs of delivering fast, efficient service to customers. Out-of-date, inaccurate, and irrelevant service information has a negative effect on the quality and cost of service, delaying response times and reducing first-time fix rates. By replacing traditional publishing applications with an automated publishing solution, organizations not only improve information quality, but also reduce the cost of producing that information.

Supported Processes:
- Technical Publications

Key Capabilities and Benefits:
- Improve information quality and accuracy by working from a single source of product information
- Make technical documents available, as early as possible, by largely automating the documentation and illustration process
- Tailor service manuals to reflect the specific product purchased, thus reducing repair time and accuracy
- Increase the frequency of publication updates from every few months to every few days
- Improve process efficiency by reusing modules of text, thus eliminating unnecessary authoring, editing and translation

"Opportunities to improve our products for improved performance or lower cost may arise from the assembly floor or from a customer. The engineering change process is vital to capturing the value of these changes and to ensure the change is completed in an efficient, but controlled manner."

Ray Schussler,
Business Analyst,
ITT Fluid Technology Corporation (FTC)

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The PTC Product Development System: Not Just Another Enterprise Application

To be competitive, industrial manufacturers and suppliers must continually provide the market with innovative, high-quality products at the right price. Over the past 10 –15 years, to increase competitive edge, the industry has focused on improving manufacturing and supply chain processes. However, a company's ability to execute against these business objectives and drive corporate value is dependant upon its proficiency in product development. Today, industrial companies are turning their attention to the dramatic cost and innovation improvements available in upfront product development.

To deliver new models and products to market more quickly, it is imperative that processes be redesigned to effectively resolve problems early in the development process, at the point where quality, costs, and release deadlines are at risk. To make this happen, key development processes, such as concept development, detailed design, and verification and validation, must be reengineered. In doing so, cross-discipline issues, such as MCAD-ECAD-Software integration, must be addressed.

Industrial companies must focus on giving their designers the tools needed to make better decisions up front, enabling true "Design for X" capabilities, such as design for manufacturing.
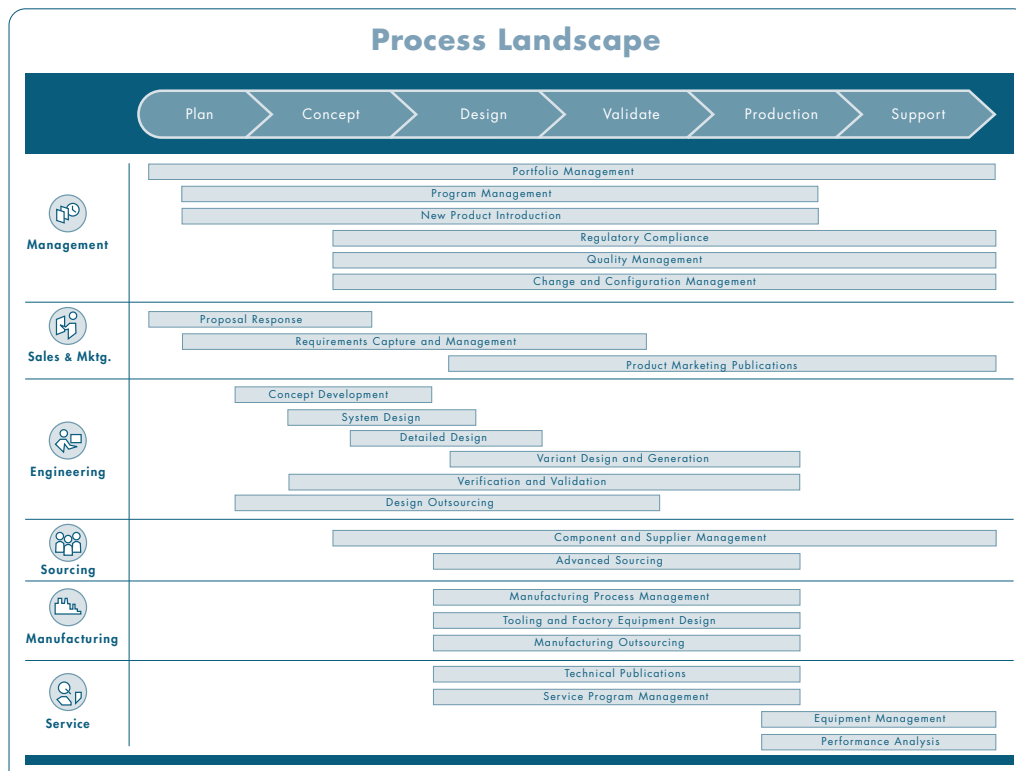
PTC Value Roadmap Charts the Course

Based on decades of customer experience in the industrial market, and an unparalleled body of intellectual property, PTC has developed the PTC Value Roadmap – a tool that is now helping industrial manufacturers to identify and realize value from PLM.

Using this roadmap and its associated, industry-specific information about typical product development processes, PTC helps industrial companies align and prioritize their business goals with their process improvements. The result is a clear, rational path toward technology adoption that's tailored to each individual organization's objectives, and delivered via a comprehensive report that is specific to the customer's unique needs.

To schedule a PTC Value Roadmap consultation, please go to:
www.PTC.com/go/roadmap

PTC's Process Landscape for Industrial: A Comprehensive View of Critical Development Processes

Process Landscape

Plan › Concept › Design › Validate › Production › Support

Management
- Portfolio Management
- Program Management
- New Product Introduction
- Regulatory Compliance
- Quality Management
- Change and Configuration Management

Sales & Mktg.
- Proposal Response
- Requirements Capture and Management
- Product Marketing Publications

Engineering
- Concept Development
- System Design
- Detailed Design
- Variant Design and Generation
- Verification and Validation
- Design Outsourcing

Sourcing
- Component and Supplier Management
- Advanced Sourcing

Manufacturing
- Manufacturing Process Management
- Tooling and Factory Equipment Design
- Manufacturing Outsourcing

Service
- Technical Publications
- Service Program Management
- Equipment Management
- Performance Analysis

The Power of PTC

PTC provides leading Product Lifecycle Management (PLM), content management and dynamic publishing solutions to more than 50,000 customers worldwide.

Software Products

- Broadest integral suite of solutions that enable companies to:
  - Create product information
  - Collaborate in a globally distributed environment
  - Control product development processes
  - Configure product content
  - Communicate product information to multiple systems and audiences
- Rigorous testing to ensure that products work together – and work for you
- Designed for incremental deployment to ensure successful adoption

Product Development Processes and Initiatives

- Unique process-oriented approach to product development to deliver maximum value
- Technology-enabled process optimization to advance defined customer business initiatives
- Product Development System supports end-to-end processes to accelerate deployment time and reduce cost

Industry Solutions

- Extensive expertise across a broad range of industries
- Demonstrated customer success in providing tailored solutions for specific industry needs
- Solutions support industry-specific business processes both within the enterprise and across the supply chain

Services & Support

- Product development consulting to define and develop best-in-class processes
- Assessments and implementation services to deploy technology with minimum disruption
- Education curricula to accelerate adoption and boost productivity
- Global maintenance support that delivers the right team, tools and technology – available anytime, anywhere you need them for product development success

Complete Product Development System

PTC's integral Product Development System delivers the key capabilities manufacturers need to realize more value from product development. And our proven, incremental implementation approach can help companies of any size accelerate adoption, minimize risk, and speed time-to-value.

Pro/ENGINEER®
Integrated 3D CAD/CAM/CAE Software

Windchill®
Content and Process Management Software

Arbortext®
Dynamic Publishing Software

Mathcad®
Engineering Calculation Software

ProductView™
Visual Collaboration Software

CoCreate®
Explicit CAD, PDM & Collaboration Software

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To learn more about how PTC's Product Development System creates value for some of the world's most innovative companies, please visit our website at:
http://www.single-sourcing.com/

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