

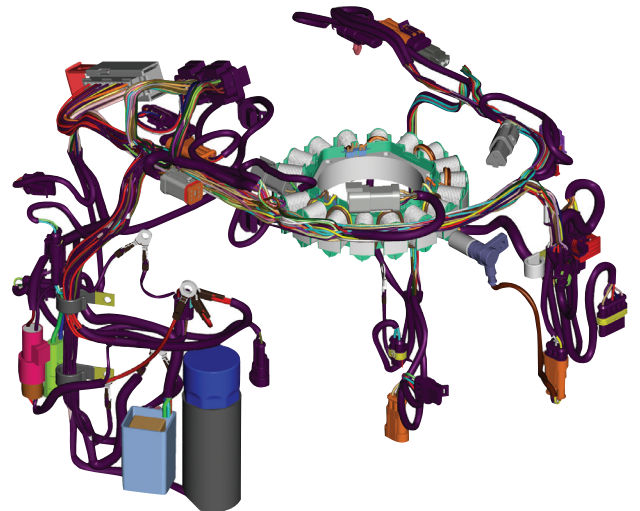
Pro/ENGINEER® Piping and Cabling Extension

ACCELERATE YOUR PIPING AND CABLING DESIGN PROCESS

Traditional mechanical products are becoming more and more complex due to their increased reliance on electrical and hydraulic technology. Control systems are also advancing at an astonishing rate, forcing product designers to pay much more attention to electrical and fluid requirements. All of this means that designers are now dealing with more complicated piping and cabling routings, which traditionally have taken a low priority during product design.

To be successful, designers must make electrical and fluid design a higher priority and a more integral part of the detailed design process. Yet, as product complexity increases and schedules continue to shrink, where will you find the time and tools to design these increasingly complex routings?

Pro/ENGINEER Piping and Cabling Extension (PCX) is the perfect 3D solution because it supports all types of industries and styles of piping and cabling—so you can streamline and accelerate the entire design process. Whether you're designing products with a complex web of cables and harnesses, hydraulic or pneumatic hoses, high and low pressure tubing, copper work, or even large bore pipes, Pro/ENGINEER PCX can handle the job, no matter how intricate.



Engineers at Bombardier Recreational Products used Pro/ENGINEER Piping and Cabling Extension to design this wire harness. Automated cabling design capabilities make it easy to move components and connectors without manually rerouting wires and cables.

Key Benefits

- Capture and document schematic information and manufacturing documentation
- Minimize errors and reduce time-consuming tasks by automating the capture of all relevant system information, such as the schematic design, virtual prototype or manufacturing documentation
- Fully automate your routing, so you can quickly determine the optimum path for manufacturing, cost and serviceability
- Ensure design rules and schematic logic rules are enforced through specification-driven design
- Increase design speed through the reuse of standard symbols, connectors and fittings contained in a customizable library
- Reduce costs and design time by eliminating the need for physical prototypes, made possible through virtual interference checking and automated manufacturability verification
- Enable cost-effective manufacturing through accurate documentation, such as isometric drawings, bend tables, and BOMs

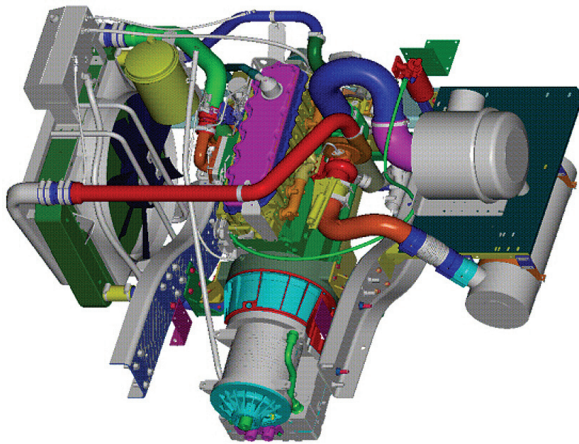
Accelerate 3D Routed Systems Design

A Time-Consuming, Error-Prone Process

Determining the routes of pipes and cables can be a difficult, time-consuming task. Beginning with the creation of a physical prototype and then manually routing the pipes through it, this long, tedious process is typically error-prone. Because of the time and effort involved, the engineer often must accept the first route that works—not necessarily the optimal one.

Even worse, when an engineering change is made to the design, it means the engineer must start over by recreating the physical prototype and rerouting the cabling or piping—thus wasting valuable time. Additionally, most companies that create the cabling prototypes don't document the cabling routes, which makes it difficult to service these products.

To solve these issues, a company will often send a service engineer to the field, which can be very costly. With Pro/ENGINEER Piping and Cabling Extension, these problems can be avoided.

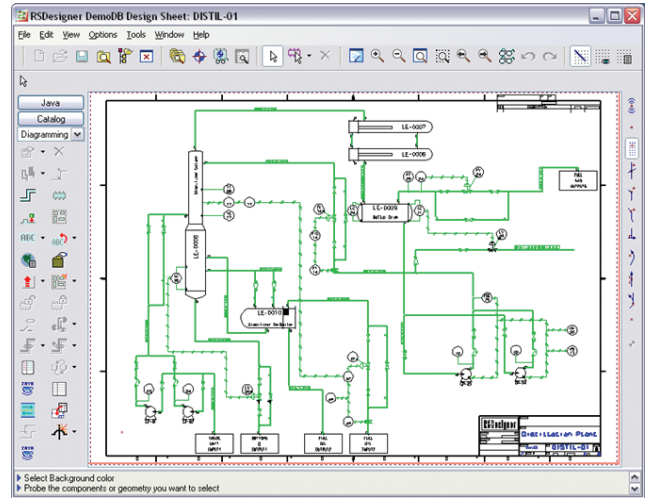


With Pro/ENGINEER Piping and Cabling Extension, you can immediately determine the best piping routes between even the most complex systems.

Pro/ENGINEER Routed Systems Designer™ Lite

Overview

Pro/ENGINEER Routed Systems Designer (RSD) Lite provides all the capabilities that designers of piping and cabling systems need to easily capture the logical connectivity information in 2D schematics. Included with Pro/ENGINEER PCX, Pro/ENGINEER RSD Lite is an introductory schematic tool that can grow with your design needs. Advanced capabilities, such as design reuse support, multi-user capabilities, customization for design automation, and central catalog, can be added optionally.



Quickly create 2D schematics for your routed systems designs.

Capabilities

Piping Diagrams

- Supports 2D pneumatic, hydraulic, process flow (PFD), PI&D and HVAC

Cabling Diagrams

- Supports 2D Block Interconnect, Circuit and Wiring Interconnect design

Design Reuse

- Central Design Catalog
- Data tables
- Import legacy Pro/DIAGRAM data

Electrical Simulation

- Seamless integration to RSD Simulate (optionally available from Virtual Interconnect)

3D CAD Support

- Drives Pro/ENGINEER 3D piping and cabling designs
- Drives other 3D CAD routed systems designs

Optimize Piping Design

Piping Design

Overview

Pro/ENGINEER Piping and Cabling Extension enables designers to fully automate the pipe-routing process. Designers no longer have to build physical prototypes and struggle through the trial-and-error process; they can determine—virtually—the optimal paths of the pipes in the model. In addition, designers can create rules that are based on company best practices or corporate policies. By establishing rules, the software can then verify that this optimal path is compliant with established manufacturing rules. Plus, designers have access to a library of standard fittings, which can be reused from product to product, reducing time-to-market and increasing designer productivity.

The fully associative nature of Pro/ENGINEER ensures that the pipe routing—and accompanying documentation—will automatically update whenever a design change is made to the model.

Capabilities

Accurate and Efficient Routing of Pipelines and Fittings

- Automate the creation of 3D routes from 2D schematics
- Leverage intelligent schematic information for design reuse
- Create piping routes faster using lightweight representations
- Automate fitting placement based on schematic information while adhering to design rules
- Concurrently route pipelines in a multi-user environment
- Asynchronous piping settings let you change the pipe shape, bend radius, corner type, or line stock on the fly
- Manipulate existing pipelines easily with an intuitive dashboard user interface, shortcut menus and dynamic dragging

Comprehensive Suite of Tools for Fitting Insertion

- Search for fittings that meet the specifications of your project, so you only work with the correct pipes and fittings
- Automatically display the correct fittings based on schematic information
- Automate the placement of gaskets, flanges, elbows and other components
- Preview the placement of the object to achieve full control over the insertion

Reinforce Predefined Rules through Violation Detection

- Maximums and minimums of the bend radius
- Minimum branch separation and branch angle
- Placement and missing fittings
- Flow violations

Complete Control Over Flow Directions

- Automatically set initial flow direction based on routing
- Easily change flow direction for a series or pipeline
- Automatically reverse directional fittings with change of flow direction

Verification of Piping Routes to Prevent Errors

- Electronically verify 3D data—compared to logical data—to detect missing fittings and other common missteps
- Check for design rules, such as missing gaskets, in the model
- Create automatic cut lists, bend tables and BOMs

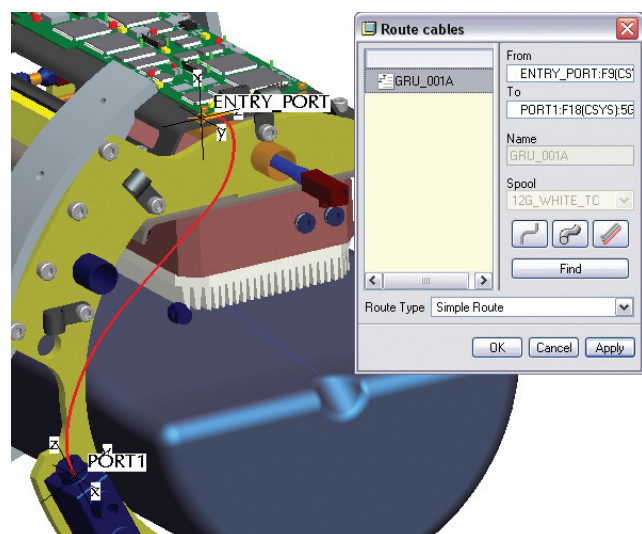
Easily Extract Information from the Design for Outputs

- Bill of Materials
- Bend machine and detailed fitting reports available
- Schematic consistency check
- Communication of piping system layout and detail in the form of isometric, installation and pipe spool drawing
- Output to CNC bending machines

Cabling Design

Overview

Pro/ENGINEER Piping and Cabling Extension gives you the power to extract logical information from 2D schematics while automating your 3D cable routing. Not only can you determine a working route quickly, but you can easily find the optimal route that won't interfere with the design. Plus, since it's a Pro/ENGINEER model, it has the advantage of full associativity; that means any change made to the model is automatically reflected in the cabling routes! With fewer (if any) physical prototypes and shorter design cycles, you'll save significant time and money.



Determine the connections either manually or from logical information. Pro/ENGINEER PCX automatically generates a simple path which then enables the user to find the optimum path faster.

Automate Cabling Routing

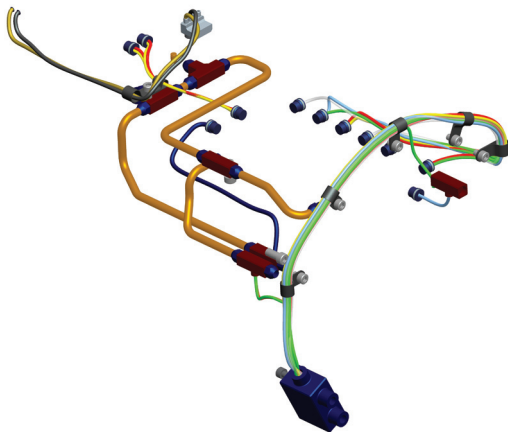
Capabilities

Electronically Document the Entire Design Process

- Automatically flatten 3D harnesses for manufacturing documentation

Automate the Creation of Fully Defined 3D Harnesses

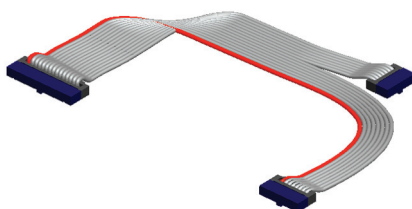
- Automate harness routing by referencing 2D logical information
- Digitally define complete 3D harnesses with connectors and components
- Modify cabling networks faster with drag handles and on the fly editing capabilities
- Automatically route ribbon cables and cable shields
- Create ribbon cables faster using automated capabilities
- Implement engineering changes to the assembly, confidently knowing that Pro/ENGINEER's associativity will automatically update the cabling routing
- Calculate mass properties and perform clearance evaluations
- Concurrently route harnesses in a multi-user environment



Pro/ENGINEER Piping and Cabling Extension helps you digitally define complete 3D harnesses with connectors and components.

Automate the Flattening of 3D Harnesses for Manufacturing

- Quickly flatten 3D harnesses to create accurate 2D harness documentation with intelligent dimension, BOMs and pinouts
- Create fully associative, customizable lists and tables containing all information necessary to create the harness
- Detail the flat harness drawing with parametric notes, dimensions, symbols and tables



Automatically create ribbon cables with Pro/ENGINEER PCX.

Enable More Effective Enterprise Communication

- Produce fully associative detail drawings for 3D and flattened harnesses
- Create complete documentation, including intelligent dimensions, BOMs and pinouts
- Share schematics, documentation, and harnesses with the entire product development team using PTC's ProductView® visualization tool

Language Support

- English, German, French, Italian, Spanish, Japanese, Chinese (Simplified and Traditional) and Korean
- Pro/ENGINEER Routed Systems Designer Lite is available in English, French, German and Japanese

Platform Requirements

- Microsoft Windows (Vista and XP)
- UNIX platforms (Solaris)
- Pro/ENGINEER RSD Lite is supported on Microsoft Windows (Vista and XP)

For the most up-to-date platform support information, please visit www.ptc.com/partners/hardware/current/support.htm

The Pro/ENGINEER Advantage

Pro/ENGINEER is simple to learn and use, and is available in a variety of packages designed to meet your company's specific needs. Whether you need a cost-effective 3D CAD system that contains all the basic design capabilities, or a comprehensive Product Development System that seamlessly connects your extended supply chain, you'll find exactly what you need in a single, fully scalable solution. Choose the package that fits your needs today, and as your needs change and grow, easily upgrade to the package that is right for you tomorrow which leverages the same powerful platform—this means no data translation and a consistent user experience.

The Pro/ENGINEER family of CAD/CAM/CAE solutions delivers a distinct advantage for manufacturing engineers because every Pro/ENGINEER application is fully associative. That means any change made to the design is automatically reflected in all downstream deliverables—without any translation of model information between applications. By eliminating data translation, you not only save time, but you also avoid the possibility of translation errors in your design. Pro/ENGINEER is the first choice for routed systems designers because no other 3D package offers more comprehensive capabilities for creating 2D and 3D piping and cabling designs, quickly and easily.

For more information on Pro/ENGINEER Routed Systems Solutions, visit www.ptc.com/go/proengineer.

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