



Preview Guide

Autodesk Inventor® Professional is an integrated 3D design solution that combines the power of Autodesk Inventor® Series with a collection of specialized tools for electromechanical engineers and designers.

Machine design involves more than just creating parts and assemblies. You must be able to verify the form, fit, and function of all the components in the machine, including tubing and piping, printed circuit boards, wire harnesses, and cables. With the design, verification, and documentation capabilities of Autodesk Inventor Professional, you can increase the quality of your designs and get products to market faster. With Autodesk Inventor Professional you can

Validate form, fit, and function of all assembly components

- Minimize design errors and reduce costs by using a virtual 3D model instead of a physical prototype to ensure that all parts, including tubing, piping, printed circuit boards, wire harnesses, and cables, fit together.
- Increase productivity by using a single software environment to communicate all aspects of the design.
- Save time by providing all team members with easy access to a single, complete data set.

Remove communication barriers between cross-functional teams

- Reduce design errors by sharing common design data between teams responsible for different system components.
- Decrease cost of piping and wiring design changes by automatically communicating updates to extended teams.
- Gain greater efficiency by enabling consistent workflows throughout all teams.

Attain the greatest breadth of functionality for the highest possible value

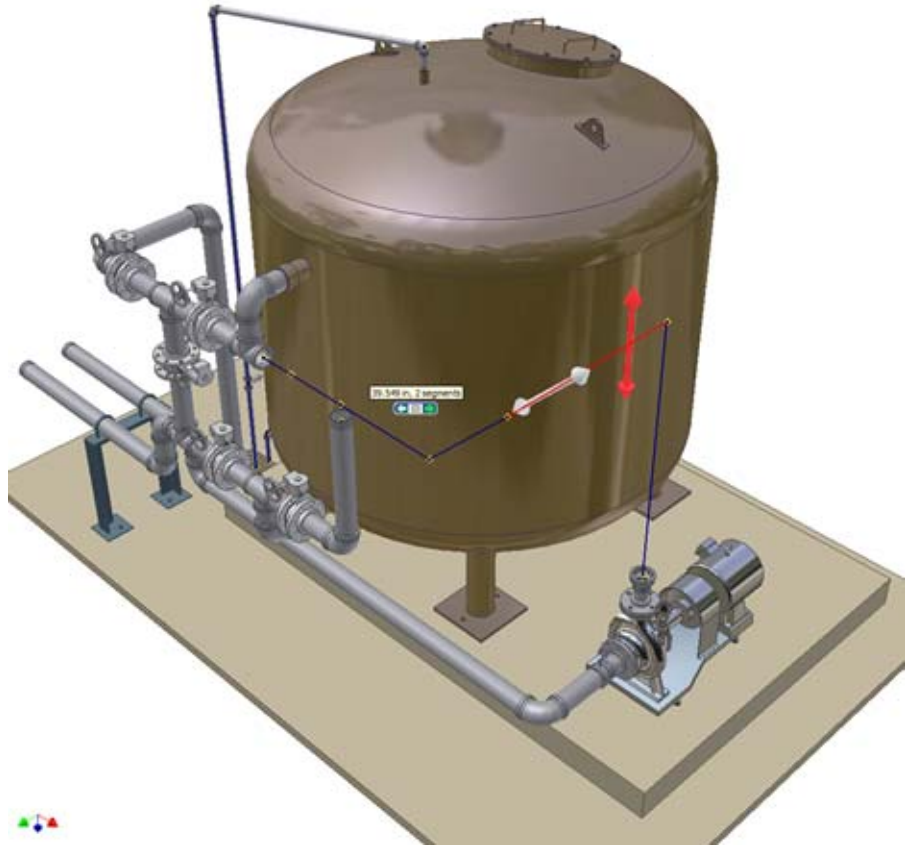
- Save time and money by acquiring a comprehensive set of functionality in one product from a single vendor.
 - Competitive offerings require additional purchase of expensive modules.
- Gain a faster return on investment (ROI) by using a familiar interface and a single package to reduce the time needed to implement, learn, and use a new application.

Accelerate Tube and Pipe Design

Manually adding tubes, pipes, and related components to a 3D model can be tedious, time consuming, and error prone. Autodesk Inventor Professional enables you to improve your tube and pipe design process while saving time and reducing errors. Fully integrated with Autodesk Inventor® software, powerful rules-based tools enable you to quickly create and edit routes, and then automatically place fittings and create pipe segments.

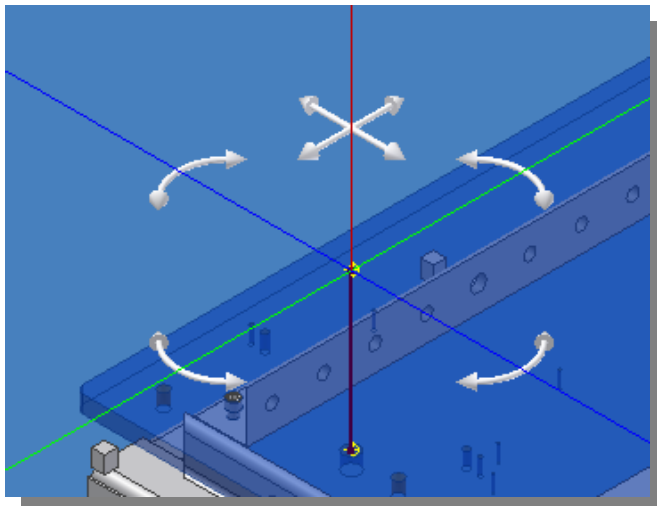
Pipe Routing

Create pipes by selecting a starting point, an ending point, and any number of intermediate points to define the route. The rules-based route tool improves quality and productivity by enabling you to automatically adhere to design rules, such as minimum or maximum length criteria, while creating and modifying pipes. When the 3D assembly updates, the pipe routes update automatically, thereby reducing errors.



Rigid Tube Routing

Create rigid tubes with an arbitrary number of bends and with variable custom bend angles and radii. You use two new sets of handles to create these bends—the radius handle and the rotation handles. These handles provide superior control over the shape of rigid tubes, so you can easily and quickly work within the confines of your model.



Auto-Route Solution Cycling

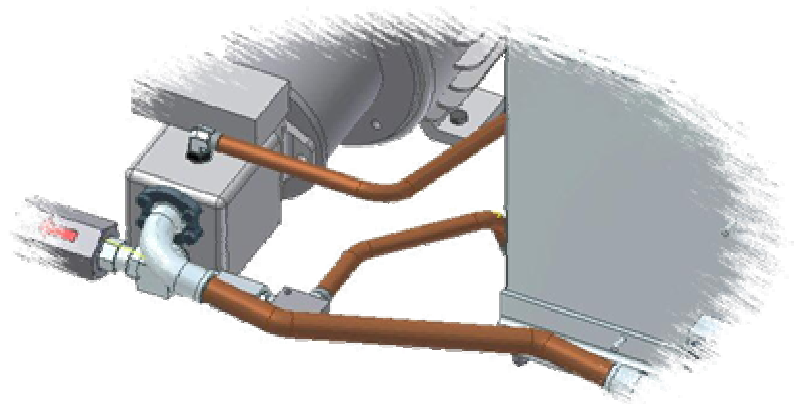
When creating tubes and pipes, if you click a point-to-point route that is not a straight vector, the Auto-Route Cycling tool appears, enabling you to cycle through multiple valid solutions that connect the two points. The software prioritizes these solutions and displays them sequentially based on the route length and number of segments. You can reduce material costs by analyzing alternate routing options and selecting the one that best meets your design goals.

254.185 mm, 4 Segments



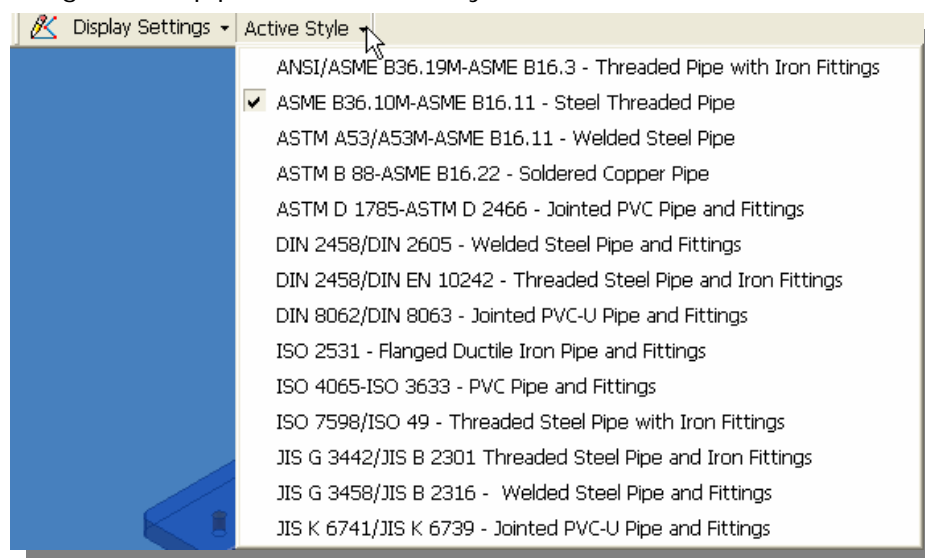
Creating Runs

The Populate Route tool turns tube and pipe routes into physical pipe runs, automatically placing fittings, pipe segments, and rigid tubes as needed. Standard Autodesk Inventor parts are created during this process, so you can perform mass property calculations and interference checks and create drawings. Couplings are automatically placed when pipes reach their maximum length, and you can specify length cutoff increments. The result is a run that adheres to your design and manufacturing standards, thereby reducing manufacturing iterations and last-minute errors found during final assembly.



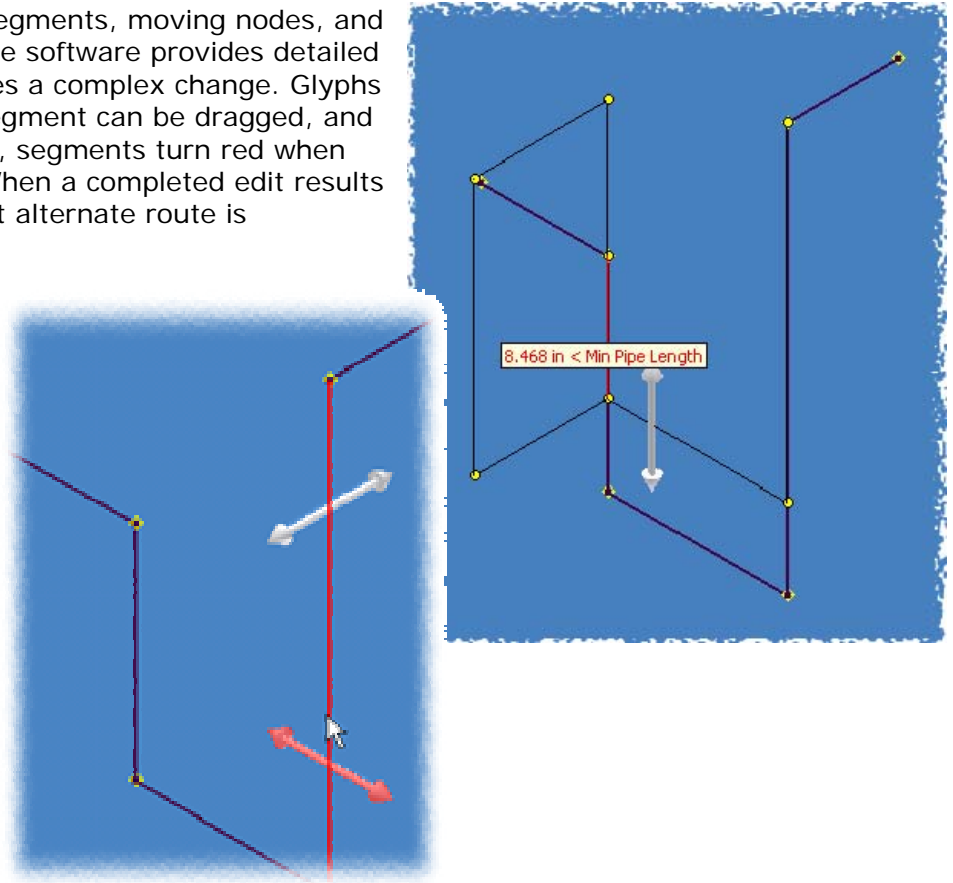
Styles

You can use styles to quickly define materials, sizes, standards, and design rules for each type of tube or pipe used in your designs. Use these styles while creating routes and runs, or to quickly change an existing tube or pipe run from one style to another. Ensure that all the components in your piping design fit together properly by defining standards up front and adhering to them throughout the design. A drop-down menu item provides quick access to the tube and pipe styles for initial creation, editing, and querying the active style.



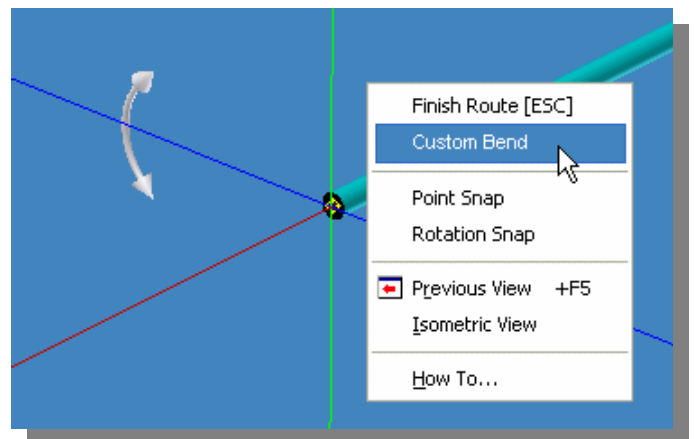
Route Editing

Edit the route by dragging segments, moving nodes, and adding or deleting nodes. The software provides detailed feedback when an edit causes a complex change. Glyphs indicate the direction(s) a segment can be dragged, and during a drag edit of a route, segments turn red when they violate a design rule. When a completed edit results in a length violation, the first alternate route is displayed, and you can cycle through previews of other available routes. The advanced feedback and control provided during editing enables you to save time by quickly and easily making changes to tubes and pipes as the design evolves.



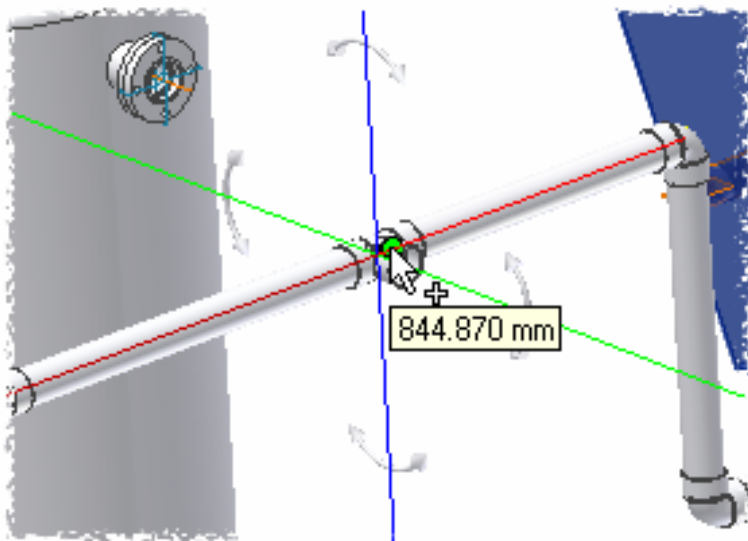
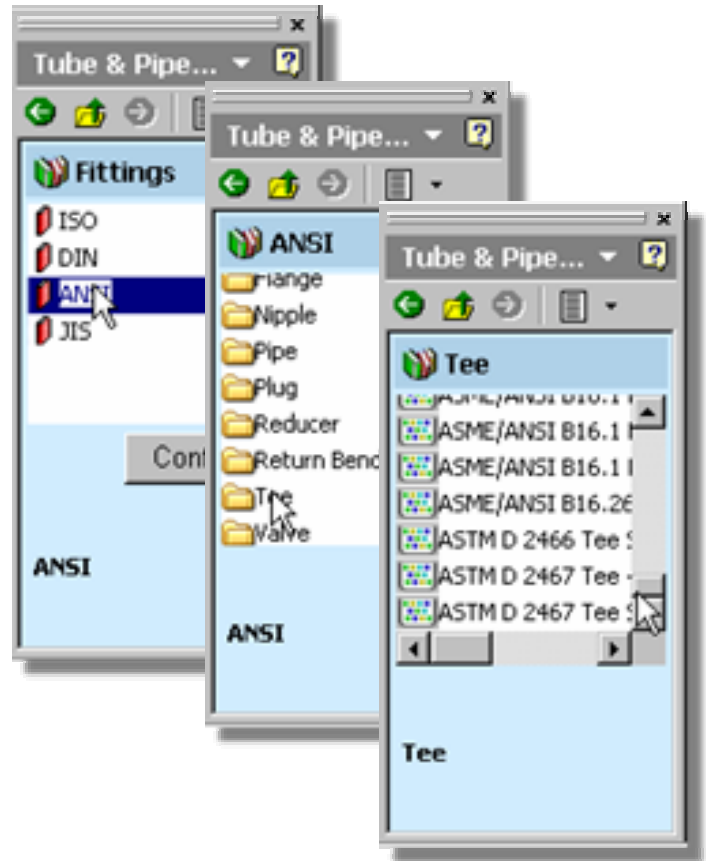
Custom Bends in Pipe Runs

In real-world piping designs it is often preferable to bend a pipe rather than insert an elbow. With the Custom Bend command, the Tube Routing tool is enabled and you can create a bend of custom radius and angle using the familiar methods available for rigid tubing. Such flexibility enables you to use automated tools even for nonstandard designs.



Fittings Library

The tube and pipe-fittings library includes commonly used, industry-standard ISO, ANSI, DIN, and JIS fittings and pipes. The library is fully extensible and can be expanded to include additional components. A Publishing wizard speeds you through the process of preparing the data for use with Autodesk Inventor Professional. The software automatically places this intelligent content into pipe runs, thus eliminating errors and making sure the proper components are used. Threaded, soldered, welded, and other fitting types are supported. This extensive library eliminates the tedious process of searching data books for piping components and makes it easy to organize all the parts you need for tube and pipe design.



Place Fitting

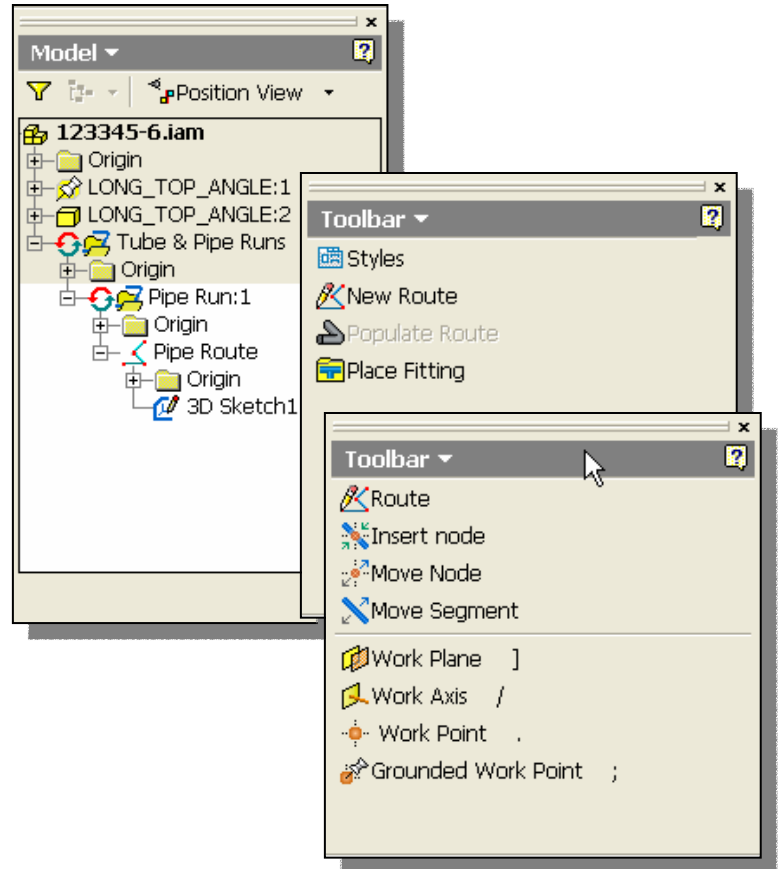
With the Place Fitting command, the familiar Autodesk Inventor i-drop[®] functionality enables you to drop fittings, valves, and other components onto existing segments. The pipe is automatically cut back, and a new pipe segment is added to complete the run.

Design Rules

User-configurable design rules assist you in creating and updating tube and pipe runs that automatically adhere to your guidelines. Determine minimum segment lengths and minimum bend radii as well as the maximum length between couplings. You can specify which fittings are appropriate for a given style of pipe, and only those meeting your criteria are inserted. Use of design rules increases the quality and manufacturability of your designs and reduces engineering changes.

Usability

The editing and creation of tube and pipe assemblies is controlled by the commonly used in-place activation paradigm supported in Autodesk Inventor software. When the piping-related assemblies are activated, the software displays only the tools appropriate for the components you are modifying. For example, a route environment provides easy access to the functions needed to create a route. Context menus on tube and pipe components provide quick access to an expanded set of functions. For example, you can easily toggle between rendered (swept or solid) display and centerline view of routes and runs. These features and others in Autodesk Inventor and Autodesk Inventor Professional make the software easy to learn and use, saving you time and money during implementation.

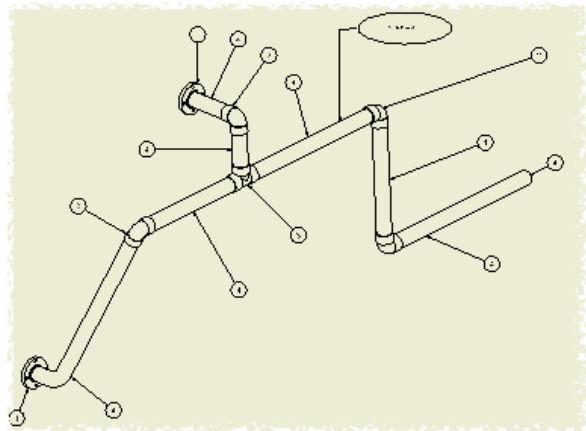


Drawing Creation

Use drawing capabilities in Autodesk Inventor Professional to create orthographic and isometric views of your tube and pipe designs. Use accurate cut-length information to drive manufacturing and prevent errors that typically occur when this information is determined manually.

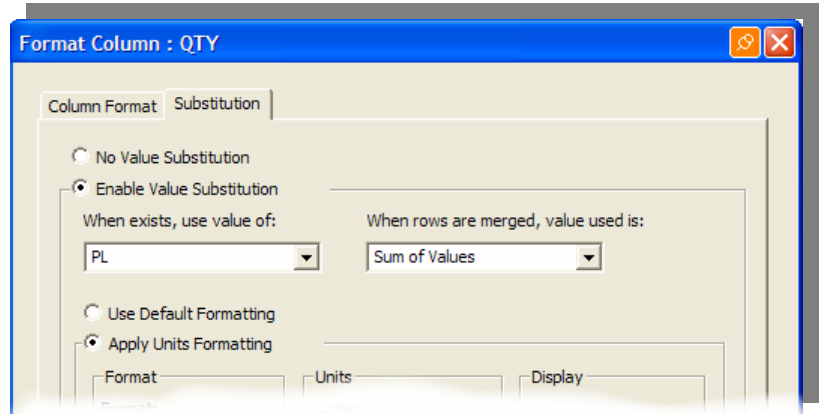
Annotate Drawings with Style Properties

You now have the ability to reference any information stored in the tube and pipe styles and use this data to annotate a drawing view. This capability provides similar property set access as is currently available for part files in the Drawing Manager. Create more accurate drawings by eliminating the need to manually reenter property data.



Parts List Length Roll-Up

You can configure the parts list to collect all common tube or pipe of a specific type and display it as a single line item with the length summed. You can use balloons to easily display the individual length of a pipe or tube segment that is part of a summed row. Each type of tube (different diameter, raw material, and so forth) used in an assembly has a unique part number and its own line in the parts list. You can easily communicate accurate data to purchasing and manufacturing with the roll-up and ballooning capabilities.

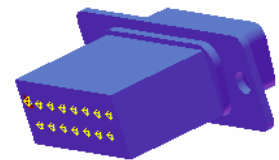


Extend 3D Modeling to Include Cable and Harness Design

Today, most companies design their wire harnesses and cable systems by waiting for a hardware prototype and then manually measuring to determine wire lengths. At best, some companies attempt to model the wire bundle path in 3D, but this is impractical for large numbers of wires and offers little intelligence. The manual nature of the wiring design process typically requires two or three iterations before an acceptable harness is manufactured. This process is time consuming and costly. Autodesk Inventor Professional automatically calculates wire lengths and bundle diameters, and automatically creates manufacturing data such as wire lists and a harness bill of materials (BOM), eliminating the likelihood of human error.

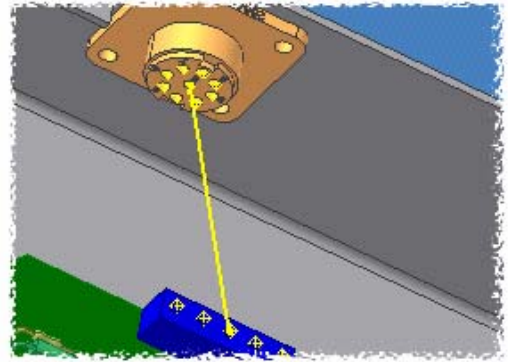
Intelligent Electrical Part Creation and Placement

Using new commands in the familiar part-modeling environment, you can add electrical pins and properties to Autodesk Inventor parts and then place them in assemblies using standard Autodesk Inventor features. When you identify each electrical part in a harness with a unique reference designator, you create a mapping back to the electrical data. You can quickly and easily identify the specific location of electrical components in the 3D model, which are then in turn used to establish the electrical connectivity.



Wire Creation

To create a wire, you simply specify two electrical points to be connected and the software automatically adds a wire. All the appropriate Autodesk Inventor geometry is created based on one simple command. The wire represents both the physical geometry (diameter, color, length) of the wire as well as the electrical data such as wire ID, signal name, and from/to connection information. These intelligent wires move with the connectors they are attached to and establish and maintain electrical intent, similar to mechanical design intent. You are ensured that as your harness design progresses, proper electrical connections are maintained.

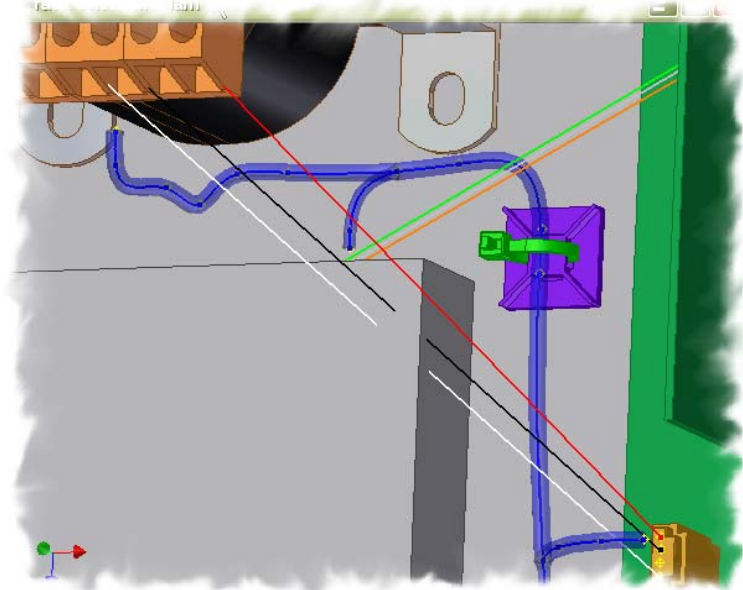


Wire List Import

Quickly import hundreds of wires using a configurable from/to list. This flexible format enables you to use existing wire lists. Because the software reports missing connectors or wire definitions, it's easy to detect errors during import. Electrical connectivity data is smoothly merged with the 3D mechanical assembly, ensuring that electrical intent is transferred to the mechanical assembly without risk of human error.

Harness Path Definition

With the 3D spline capability in Autodesk Inventor Professional, you can easily define harness and cable paths using a point and click methodology that creates 3D virtual conduits (segments) in your model. You have complete control over any associative relationships and can ensure that the harness updates when key design components change. You can add points or move existing points to refine the overall shape of the harness.

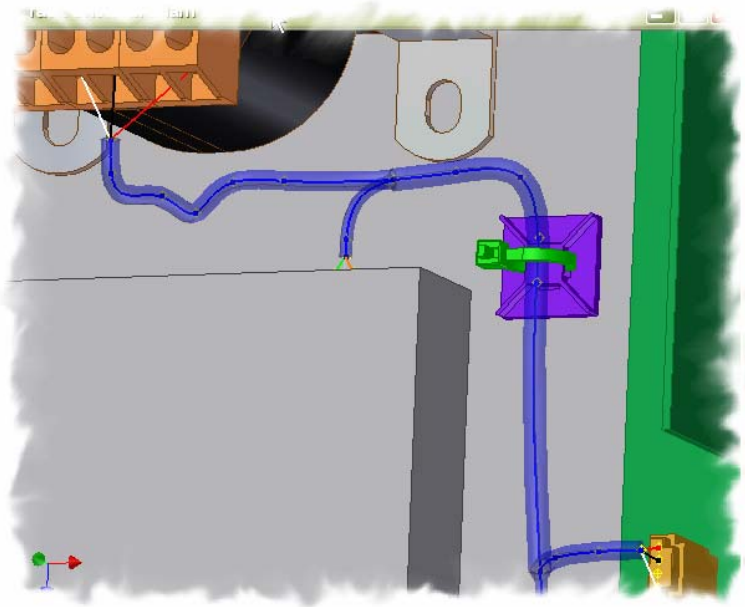


By placing segments in the assembly early in the design process, you can also reserve space for the harness before defining any electrical connectivity. Visualization of the harness in the 3D model enables intelligent design trade-offs and ensures that there is sufficient room for the electrical system.

Wire Routing

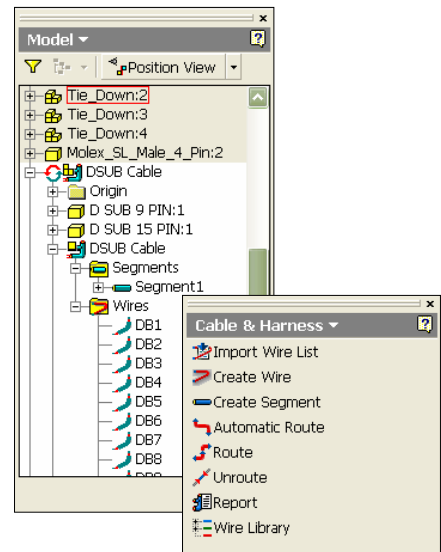
Wires are inserted into segments using three routing functions: manual, interactive, and automatic. Using manual routing, you explicitly select the wire's path. With interactive routing, the start and end point of the routed path are selected and the algorithm chooses the shortest path. And with automatic routing, the system finds the shortest possible path based on all available paths.

The three routing options provide a high degree of control over the path of critical wires and also enable auto routing of thousands of wires into the shortest possible path. You can now explore multiple paths long before committing anything to hardware.



Usability

The editing and creation of harness and cable data are controlled by the familiar in-place activation paradigm used in Autodesk Inventor. After selecting the harness you want to edit, you see a panel bar and context menu items that are relevant to the task at hand. In addition, a customized browse panel provides a tree view of the harness structure that speeds access to the harness data.



Wire Length Calculation

Wire lengths are automatically calculated whenever the wire path changes. You no longer have to rely on the time-consuming and error-prone process of manually measuring a hardware prototype to determine wire lengths. Highly accurate lengths that update as the design changes are a by-product of performing the 3D harness design.

Bundle Diameter Calculation

The software automatically calculates bundle diameters whenever wires are added or removed from the segments. The calculation accounts for actual wire diameters and air gaps between wires. Before implementation of this type of automated functionality, it was virtually impossible to accurately determine bundle diameters. Now you can easily and accurately determine if everything will fit by using visual inspection and interference detection.

Harness BOM Creation

A Report generation utility creates a complete harness parts list. You have full control over the format of this report. Report output includes all connectors in the harness as well as rolled-up totals for all the types of wire used.

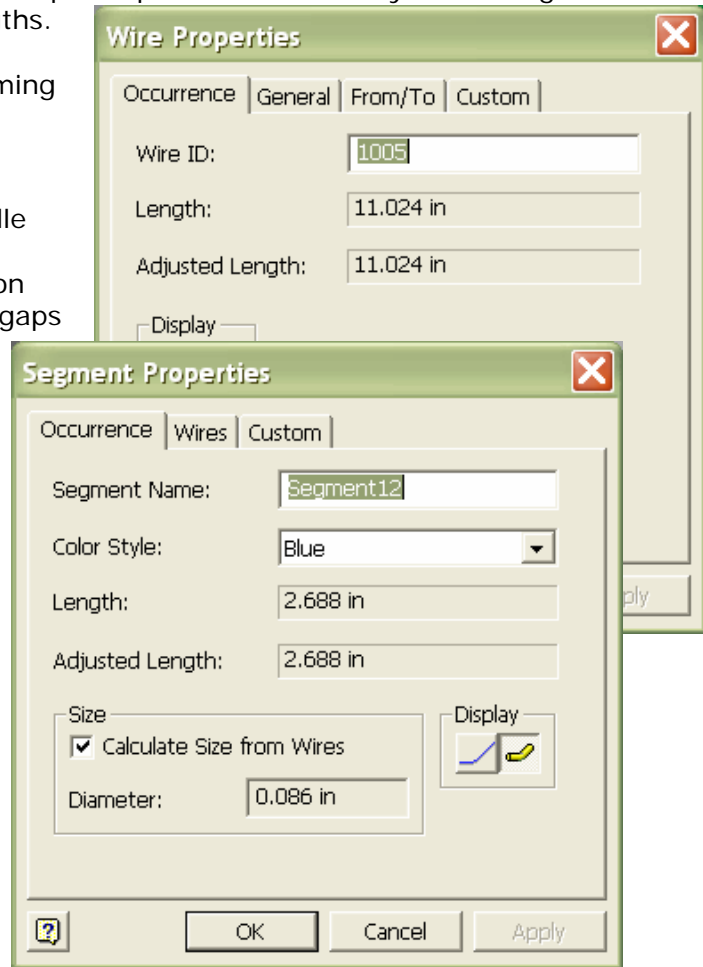
A single command generates an accurate harness BOM, eliminating hours of manual effort. When the design changes, updating the harness BOM is a simple procedure that further eliminates opportunities for human error.

Report Generation

The Report generation utility enables you to define report formats and run these reports on any harness design. Typical reports include wire run lists, termination charts, cut tables, and other reports needed for the design and manufacture of the harness.

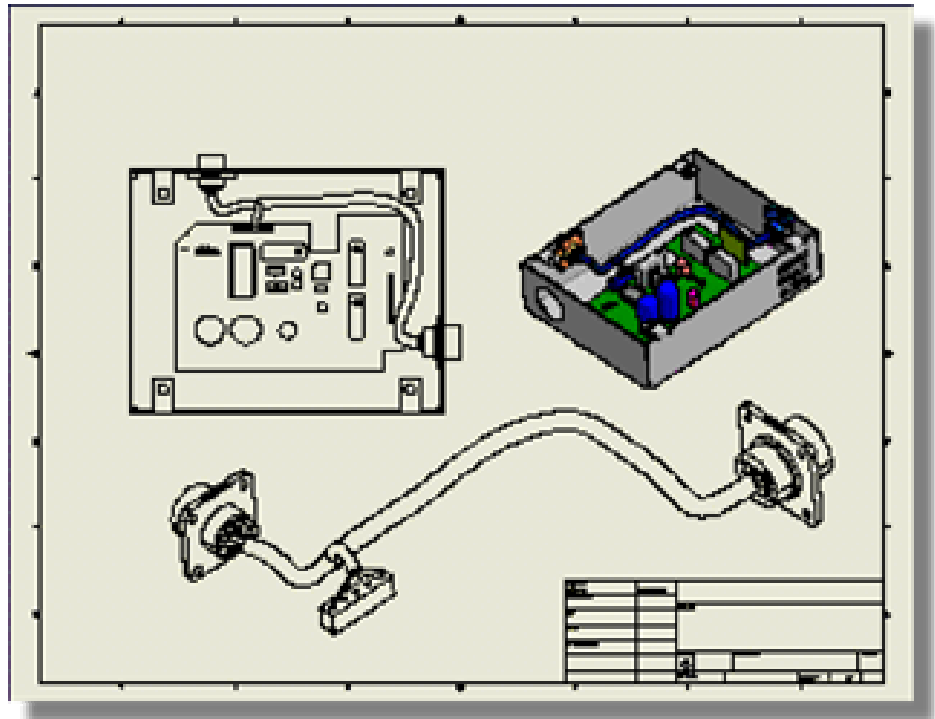
When you create a virtual prototype of the harness, all the data needed to generate the reports used for design and manufacturing is stored in a single place, streamlining and automating the creation of the reports.

Wire ID	Part Number	Length	Des1	P1	Des2	P2
2201	3053-ORG	9.84	U3	1	U7	7
2202	3053-WHT	8.79	U7	2	J12	4
2203	3053-RED	8.92	U7	4	J12	5
2204	3053-YEL	9.84	U7	9	U3	3
2205	3053/1-BLK	9.68	U3	7	U7	5
2206	3053/1-GRN	9.84	U3	8	U7	3
2207	3053/1-BLU	9.78	U7	6	U3	4
2208	20AWG-GRN	3.27	U3	9	J12	1



Assembly Documentation

Since all the cable and harness geometry is native to Autodesk Inventor, you can easily create assembly documentation using standard Drawing Manager functions. Instead of relying on digital photographs or rough sketches, you can quickly and easily include accurate details of where the cables harness reside in your assemblies.



Simplify Printed Circuit Board Translation

Just as tubing, piping, and wiring must fit within the mechanical assembly, so must any printed circuit boards (PCB). Rather than manually re-creating an Autodesk Inventor model to represent the PCB, you can import a version 2 or 3 Intermediate Data Format (IDF) file from your PCB design package.



Automatically Create Autodesk Inventor Geometry

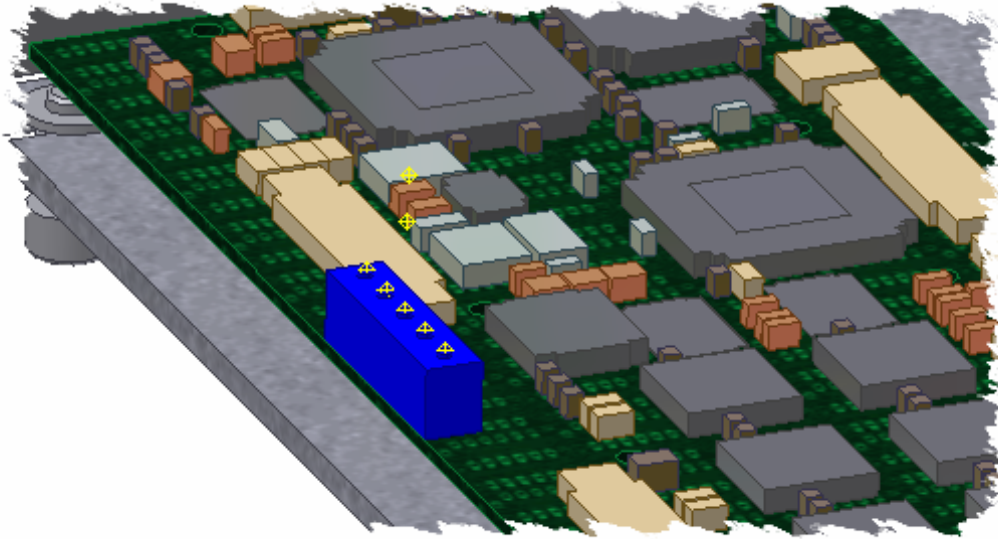
Ensure that your printed circuit boards fit in the available space and maximize space use by importing and automatically generating accurate PCB size and shape information. You can detect potential part interferences and check mounting hole locations on a virtual prototype instead of at the end of the design cycle on the physical prototype. By considering assembly and maintenance needs early in the design process, you can ensure adequate access to connectors and other components.

Import as a Single Part

You can choose to import the printed circuit board data as a single part file to minimize the number of files created and optimize large assembly performance.

Import as an Assembly File

By importing the PCB as an assembly file, you create a detailed representation of the PCB in the assembly browser and BOM. You can then use standard Autodesk Inventor functionality to control the visibility of individual PCB components.



Level of Detail Control

To further manage resources, you can reduce PCB complexity by filtering out small components such as resistors that are not important to your mechanical design.

Autodesk Inventor 8

Since Autodesk Inventor Professional is built on the foundation of Autodesk Inventor, you get all the features and built-in data management offered in Autodesk Inventor 8. See the Autodesk Inventor 8 Preview Guide for complete information on the following Autodesk Inventor 8 features.

Accelerate

Performance improvements in the Autodesk Inventor 8 Drawing Manager accelerate creation of your production drawings. With enhanced DWG interoperability you can export to AutoCAD® model space at true scale for better 2D design communication. Other enhancements help you document your designs faster, easier, and more consistently.

- **Create Production-Ready Drawings Faster and Easier**

Autodesk Inventor 8 includes significant performance improvements that help you to document your designs faster, so you can focus on creating higher-quality designs.

- **Industry-Leading DWG Interoperability**

Autodesk Inventor enhances native AutoCAD® DWG interoperability by focusing on specific user-requested areas that increase productivity by eliminating tedious and difficult tasks.

Simplify

With Autodesk Inventor 8 you can build your assemblies in half the time, visualize the mechanistic behavior of your assemblies to decrease design errors, and have faster access to your most commonly used functions.

- **Part Design Tools**

Users have asked for simpler ways to design parts and assemblies in Autodesk Inventor software. Autodesk Inventor 8 includes new design-specific tools that enable you to create your designs faster and easier, thus increasing design quality and reducing time to market.

- **Assembly Design Tools**

Assembly design tools in Autodesk Inventor 8 enable you to create complex assembly designs faster, easier, and with higher quality, helping to reduce your time to market.

Extend

Autodesk Inventor 8 includes a comprehensive set of powerful new tools that provide more flexibility and value.

- **Built-in Design Data Management**

Autodesk® Vault is an engineering data management system for workgroups that is fully integrated with Autodesk Inventor and Autodesk Inventor Professional software. Autodesk Vault helps improve engineering productivity, decrease your product development cycle, and reduce errors by ensuring access to the right data.

- **New Design Support System (DSS)**

In Autodesk Inventor 8, new DSS tools enable you to provide immediate feedback about the DSS, obtain additional help and information through Skill Builder learning modules, and benefit from an updated and simplified navigation system.

To learn about the complete set of new features and enhancements for Autodesk Inventor 8 go to:

www.autodesk.com/inventorseries

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Autodesk, Inc.
111 McInnis Parkway
San Rafael, CA 94903
USA

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