



Alliance Guide to Workflow Enhancements

Autodesk® Building Systems 2005 software provides new tools for compatibility with third-party analysis applications. Eliminate tedious manual data transfer by directly accessing engineering data in your Building Systems models for design calculations and analysis. Extract engineering design data from your models in standard file formats, such as gbXML (green building XML), ddXML (duct design XML), and application programming interfaces (API), for interoperability with third-party analysis applications to ensure the accuracy of your designs and streamline the design process. This document introduces the select group of third-party application developers with which Autodesk has collaborated to provide interoperability with Autodesk Building Systems 2005.

With Autodesk Building Systems, unify your drawing, designs and analysis in one comprehensive solution.

NOTE: Be sure to install Service Pack 1 (SP1) for Autodesk Building Systems 2005 to work collaboratively with third-party analysis applications. For more information about downloading the service pack, see www.autodesk.com/buildingsystems.



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Overview

Autodesk has worked closely with a group of third-party software developers to provide a better workflow process that enables the digital transfer of data from today's building information models into "best of breed" engineering analysis applications. Providing a way to exchange data between Autodesk® Building Systems 2005 and third-party analysis applications enables the sharing of digital design data helping to improve the accuracy of the building design. Reducing the costly process of analysis, this improved workflow offers the ability to provide more design options in less time to meet the performance requirements needed for sustainable design. Drive down the costs of building design, speed time to project completion, and improve model accuracy by taking advantage of working collaboratively with Autodesk Building Systems 2005 and the following design and analysis applications:

§ GeoPraxis® Green Building Studio

GeoPraxis, an industry leader in providing building energy analysis tools and web-based solutions, now provides architects and engineers access to the simplest most powerful energy analysis solution from Autodesk solutions. Use Green Building Studio to quickly perform energy analyses that provide annual energy consumption and costs, in addition to a wide range of data on the building heating and cooling loads, spaces, and systems. The Green Building Studio (GBS) web service dramatically changes the way buildings are designed by relieving the pain associated in early building energy design decisions and data exchange saving design teams \$5,000 or more per project. GBS is one of the first engineering analysis tools to deliver true interoperability between CAD drawings, energy models such as DOE-2, and load analyses like Trane TRACE 700.

§ Trane® TRACE™ 700 and VariTrane™ Duct Designer

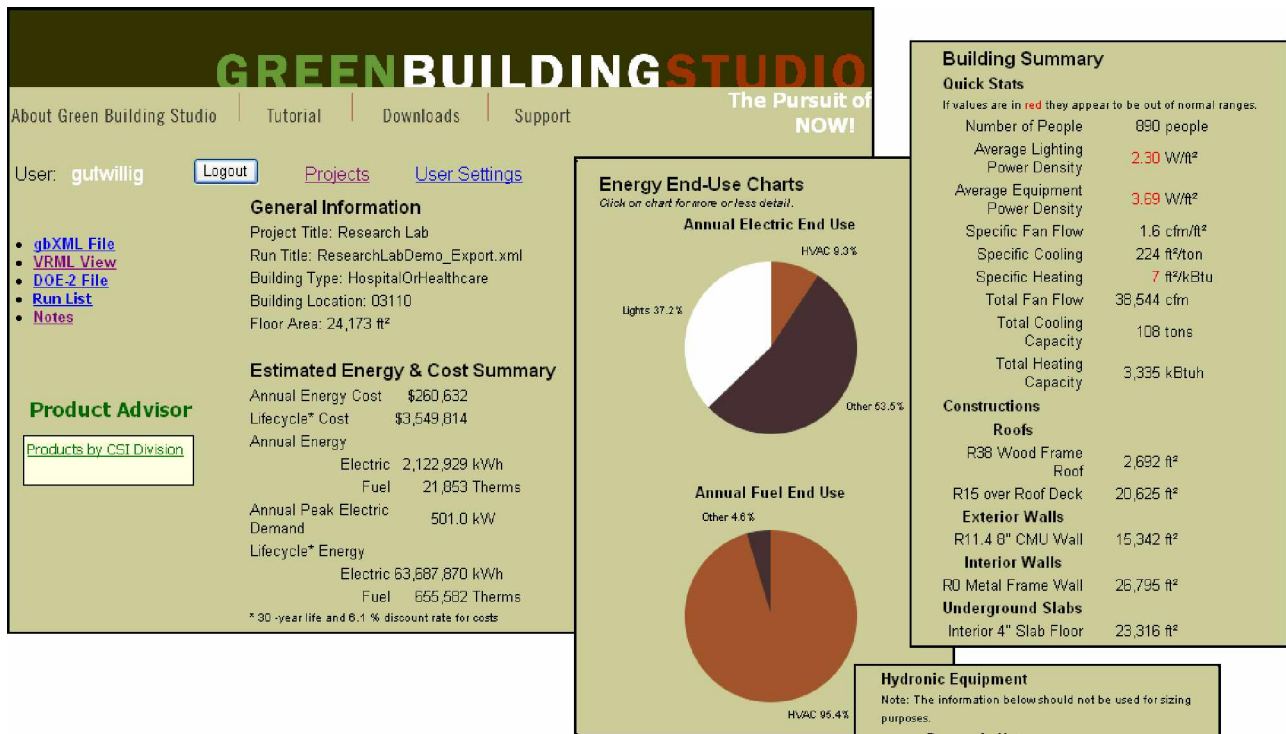
Trane, a leading global provider of indoor comfort systems and comprehensive facility solutions, now provides engineers access to Autodesk Building Systems 2005 models from their analysis and design applications. Use TRACE 700 to quickly perform heating and cooling analyses, and VariTrane Duct Designer for equal friction and static regain sizing calculations. Through standard file formats, specifically gbXML and ddXML, Trane® products streamline duct design and building analysis, while improving calculation precision, by providing a direct import of Building Systems design data in TRACE 700 and VariTrane Duct Designer.

§ Elite Software Ductsize and FIRE

Elite Software, an industry leader in software development for HVAC, electrical, plumbing and fire protection design software, now provides engineers access to Autodesk Building Systems 2005 models from HVAC duct sizing and fire protection analysis solutions. Use Elite's Ductsize program to quickly perform equal friction and static regain duct sizing calculations, and Elite's FIRE program for hydraulic calculations required by the National Fire Protection Association (NFPA 13 1996 Edition). Through the Autodesk Building Systems 2005 ActiveX® API, Elite Software eliminates the need for manual data entry by taking design data directly from the Building Systems models inside Elite's Ductsize and FIRE Programs.

Building Energy Analysis

GeoPraxis Green Building Studio (GBS) provides whole building energy analysis and offers project information sharing with your extended design team and manufacturers. Through a GBS client interface building design information exported from an Autodesk Building Systems model, in gbXML file format, is used to create a geometrically correct thermal model of the building, with appropriate zoning and orientation. This model is developed using regional building standards, and codes for intelligent assumptions for the appropriate space type. The building is then run through the DOE 2.2 hourly simulation model using typical year weather data for the building's location. Annual energy consumption, costs, and a wide range of data on the building heating and cooling loads, spaces, and systems is summarized and can be presented within the Building Systems environment.



Every building project is given the ability to “opt in” and share detailed project and building data with other team members and building product manufacturers at the earliest stages of design. This means that information including detailed data about constructions, geometry, and spaces in the building is available at the right time in the decision cycle, well before plans are finalized and bid packages prepared. GBS removes major barriers to energy efficient and sustainable green building design as well as streamlining everyday engineering tasks. It provides whole building energy analysis using the widely accepted building analysis program, DOE-2, at no charge to the design team. For more information about GeoPraxis Green Building Studio, see www.greenbuildingstudio.com.

HVAC Heating and Cooling Load Analysis

Trane TRACE 700 is a complete load, system, energy, and economic analysis program that compares the energy and economic impact of such building alternatives as architectural features, HVAC systems, HVAC equipment, building utilization or scheduling, and economic options. The TRACE 700 program enables engineers to optimize the building, system, equipment designs on the basis of energy utilization and life-cycle cost.

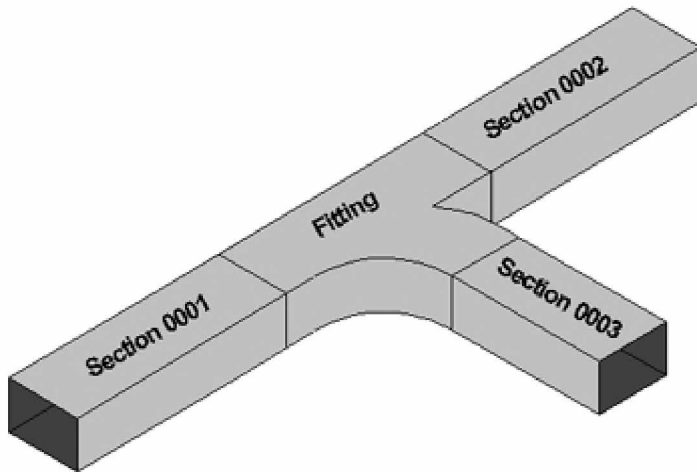
The image displays three windows from the Trane TRACE 700 software interface:

- Top Left:** A floor plan view showing a room labeled 'LAB 248' with dimensions and surrounding 'LAB SUPPORT' areas.
- Top Right:** The 'Engineering Space' properties panel. It shows 'BASIC' information like Component Dimensions (A: 9'-0", B: 6", C: 2", D: 3'-4") and 'Actual Dimensions' (Area: 1885.69074, Volume: 16971 CF, Length: 73'-1 1/8", Width: 26'-4 3/16").
- Bottom Left:** The 'Create Rooms - Single Worksheet' dialog. It shows room description 'Lab 248', templates, wall details, and internal loads (People: 12, Lighting: 1.5500, Misc loads: 5.3031).
- Bottom Center:** The 'Create Rooms - Rooms' dialog. It shows design parameters such as Length (1885.69 ft), Width (1 ft), Height (10 ft), and various thermostat and scheduling settings.

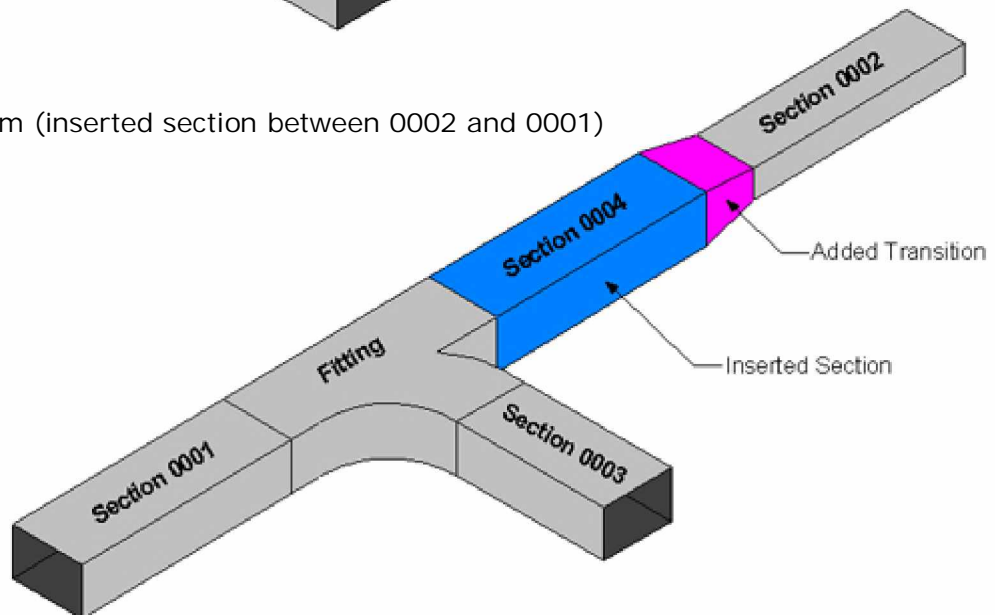
Through a standard file format, specifically gbXML, engineering design data extracted from an Autodesk Building Systems model can be imported into TRACE 700 to populate a new project complete with rooms, zones, and specific design information. A load analysis can be performed and the results exported to be presented back in the Autodesk Building Systems model. For more information about Trane TRACE 700, see www.trane.com/commercial/software/trace.

Duct System Design and Analysis

Trane VariTrane Duct Designer helps to optimize supply duct design while obtaining a minimum pressure system. The application is based on engineering data and procedures outlined in the ASHRAE Fundamentals Handbook, and consists of three subprograms: Duct Configurator, Ductulator, and Fitting Loss Calculator. Each of these subprograms can be used individually or combined to provide a complete duct analysis. Duct Configurator sizes and analyzes supply duct systems. Use Ductulator to quickly size system components and determine the appropriate nominal duct size for equal friction applications. Fitting Loss Calculator lets you quickly identify the optimal fittings and sizes for each duct section by comparing their efficiency and cost. These subprograms, combined with an integral database of accurate performance data for hundreds of ASHRAE and United McGill fittings, allow you to confidently model new or existing supply duct systems, whether round, rectangular, or flat oval. Once you complete your design, print reports with detailed information about all aspects of the duct system, including bills of material.



Modified Duct System (inserted section between 0002 and 0001)



Through a standard file format, specifically ddXML, an Autodesk Building Systems model can be extracted and directly imported into VariTrane Duct Designer to provide the duct system model to be sized using the Duct Configurator. Once the system has been sized appropriately, you can export the results back into the Autodesk Building Systems model and use the "Resize System" tool to automatically update and redraw the supply duct system based on the sizes that VariTrane Duct Designer calculated. For more information about Trane VariTrane Duct Designer, see www.trane.com/commerical/software/duct.

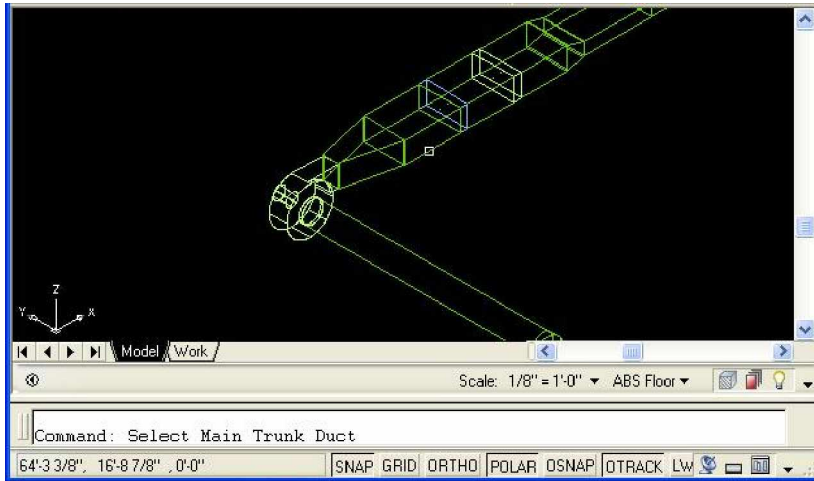
Duct Sizing

Elite's Ductsize application quickly calculates optimal duct sizes using the static regain, equal friction, or constant velocity method. Duct sizes can be calculated on a round, rectangular, and flat oval basis for both supply and return systems. Ductsize allows an unlimited number of duct sections, and is suitable for both constant volume and VAV systems. The Ductsize application is based on the design procedures given in the ASHRAE Handbook of Fundamentals and the SMACNA HVAC Systems Duct Design Manual. Four basic output reports are provided: general project data, trunk and runout sizing information, noise analysis, and a bill of materials with complete cost data. In addition to these reports, available built-in library data for duct materials, fans, fittings, and costs can be printed.

Ductsize - HVAC Duct Sizing		Elite Software Development, Inc.					
Elite Software Development Bryan, TX 77802		Lakeside Office Complex Page 4					
<i>System 1 Trunk Input Data - Supply</i>							
Trunk	Dia	Length	Fit 1	#Fit	Shape	Active	Material Ref.
Ups.	Hei	Max.Vel	Fit 2	#Fit	Abs.Loss	Take Off	Roughness
SM	Wid		Junc fit	#Fit	R-Value	Per.Div	
T-9	0.0	15.00	CR3-1	1	Rect.	Yes	Galv (approx)
FAN	0.0	3,000.0	No Fitting		0.00	0	0.00050
CV	0.0		SR5-5	1	4.00	0	
T-19	0.0	10.00	CR9-5	1	Rect.	Yes	Galv (approx)
T-9	0.0	3,000.0	No Fitting		0.00	90	0.00050
CV	0.0		SR5-15	1	4.00	0	
T-29	0.0	8.00	No Fitting		Rect.	Yes	Galv (approx)
T-9	0.0	3,000.0	No Fitting		0.00	0	0.00050
CV	0.0		SR5-5	1	4.00	0	
T-39	0.0	9.00	CR9-5	1	Rect.	Yes	Galv (approx)
T-29	0.0	3,000.0	No Fitting		0.00	90	0.00050
CV	0.0		SR5-5	1	4.00	0	

Ductsize - HVAC Duct Sizing		Elite Software Development, Inc.	
Elite Software Development Bryan, TX 77802		Lakeside Office Complex Page 8	
<i>System 1 Output Summary - Supply</i>			
Number of active trunks:			4
Number of active runouts:			5
Total system weight (lb./sq.ft.) - fittings:		195.87	
Total outlet flow			1750
Total outlet flow after heat gain			1919
Size of largest trunk:			12.0
Size of smallest trunk:			8.0
Size of largest runout:			10.0
Size of smallest runout:			8.0
Max SP loss occurs in route to runout:		R-110	
Cumulative static pressure loss at above runout:			1.82
Available static pressure at above runout:			0.00

Ductsize can import duct systems from a drawing file created with Autodesk Building Systems 2005 (SP1 or later). You simply click on the main trunk of the system you want to import from the drawing, and Ductsize then imports all the duct information from that system of duct objects. Next, Ductsize will calculate duct sizes and pressure loss information and automatically assign this data back to the objects in the drawing. You can then click "Resize System" in Autodesk Building Systems to automatically update the drawing and redraw the ducts and fittings with the sizes that Ductsize calculated.

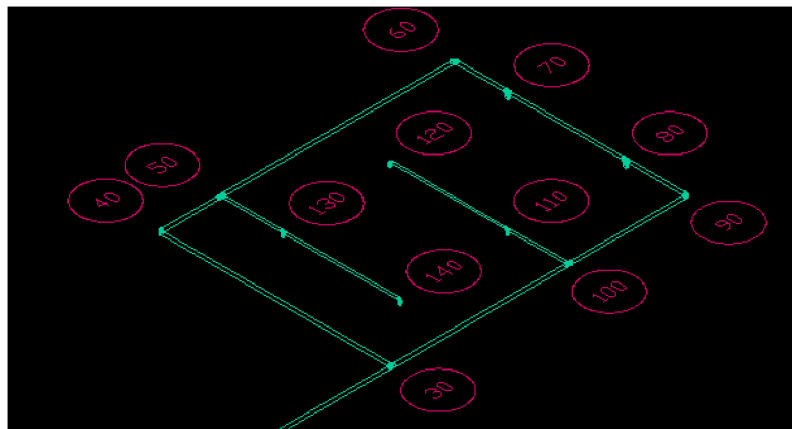


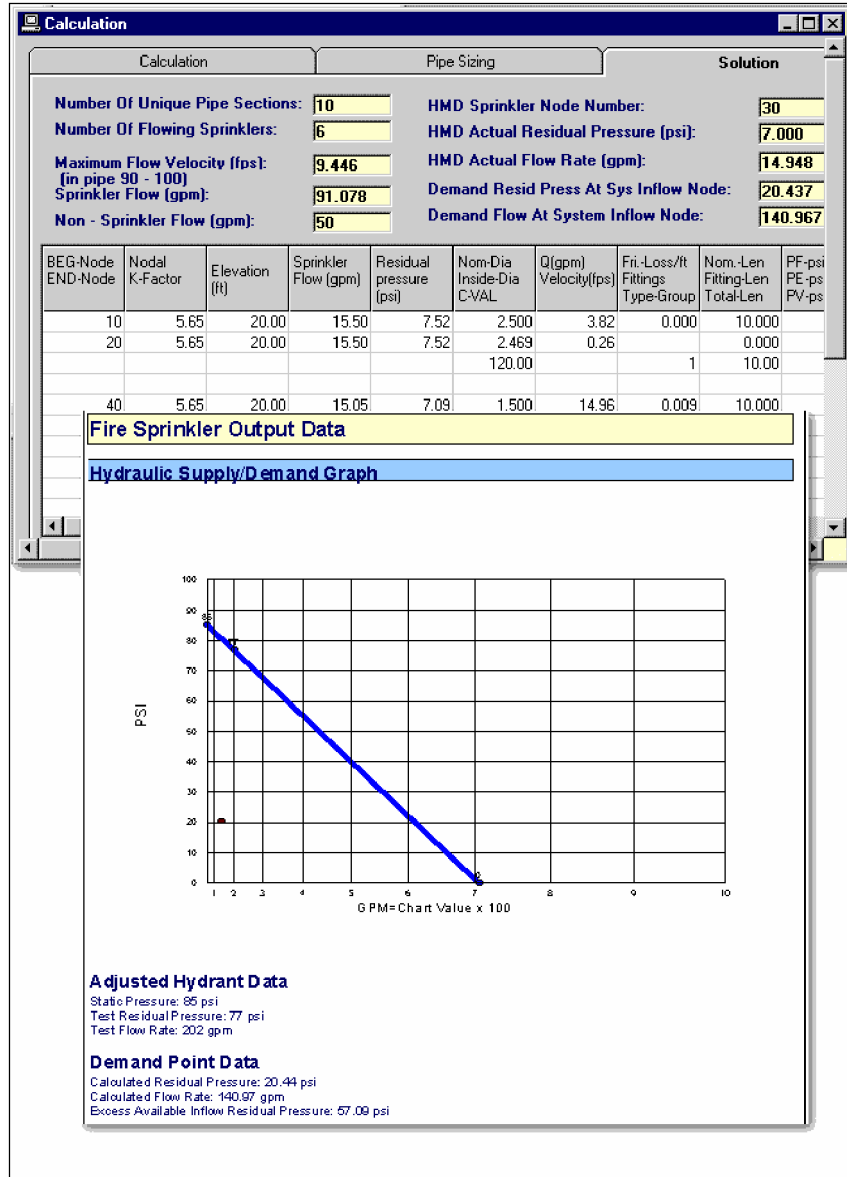
This powerful and easy-to-use feature is only fully enabled in the Static Regain level of Ductsize, but is included with the Demonstration and Equal Friction versions as well in a limited form so you can try it out.

For more information about Elite's Ductsize application, see www.elitesoft.com.

Fire Protection System Sizing

Elite's FIRE application quickly performs all necessary hydraulic calculations as required by the National Fire Protection Association (NFPA 13 1996 Edition). FIRE also estimates sprinkler head requirements, calculates optimal pipe sizes, and automatically performs a peaking analysis. To ensure that velocities and desired pressure drops per 100 feet of pipe aren't exceeded. FIRE can handle all types of sprinkler systems (trees, grids, and hybrids) with up to 1,000 or more sprinklers and pipes. Meters and standpipes can also be analyzed. FIRE calculates the gpm water flow and velocity through all pipe sections, the gpm flow and residual pressure at each sprinkler head, the pressure losses incurred in each pipe section due to both friction and elevation changes, the maximum system demand pressure, and the total water gpm demanded by the system, and provides a report designed to aid both the designer and the plan reviewer.





Elite's FIRE can import pipe systems from a drawing file created with Autodesk Building Systems 2005 (SP1 or later). You simply click on the main run of the system you want to import from the drawing, and FIRE then imports all the pipe information from that system of pipe objects. Then FIRE will analyze the flow and pressure information to verify the critical path of the system according to the imported design data. For more information about Elite's FIRE application, see www.elitesoft.com.

Key Benefits

Your use of Autodesk Building Systems 2005 (SP1 or later) in conjunction with third-party design and analysis applications may manifest the following key benefits:

- § Driving down the costs of building design and whole building energy analysis, thus helping increase overall project profit
- § Speeding time to project completion, eliminating time-consuming plan take-offs and analysis
- § Improving model accuracy, sharing digital design data between engineering programs
- § Identifying appropriate equipment for the building early in the design cycle
- § Improving productivity, streamlining design and improving calculation precision letting you optimize your designs
- § Verifying design early in the process, helping to eliminate costly errors downstream

Frequently Asked Questions

When will these third-party applications be available?

They are available right now! Autodesk Building Systems 2005 with Service Pack 1 enables the smooth transfer of engineering design data from a Building Systems model into these applications. For more information about the current versions of the third-party analysis applications, visit www.autodesk.com/buildingsystems-partners.

Do the third-party applications release with Autodesk Building Systems?

No. Third-party software developers have their own release schedules for their programs. See their websites for current product versions, updates, and future release schedule information.

Does Autodesk provide training and support for the third-party applications?

No. Training and support for these analysis applications is available directly for GeoPraxis, Trane, and Elite Software. See their websites for more information. However, Autodesk does provide support and documentation, including step-by-step tutorials for using the import/export tools provide in Autodesk Building Systems 2005. For more information about support and training for Autodesk Building Systems, contact your local Autodesk reseller or see www.autodesk.com/buildingsystems.

Do I need to learn how to program in order to create the links between Autodesk Building Systems and the third-party applications?

No. The links are provided for you through import/export tools in Autodesk Building Systems 2005. Additional functionality in the analysis applications is also provided that enables you to access the engineering design data from Autodesk Building System models through import/export tools and by directly opening drawing files within the third-party applications.

Are these the only analysis application I can use in conjunction with Autodesk Building Systems 2005?

No. Autodesk Building Systems 2005 supports the interoperability with third-party applications through standard file formats, including gbXML and ddXML, in addition to an ActiveX[®] API. That means that any application that reads/writes gbXML or ddXML, or can be programmed to work with an ActiveX[®] API can be used in conjunction with Autodesk Building Systems 2005. However, it is important to note that Autodesk does not provide technical support for third-party applications. For information about third-party applications compatible with Autodesk Building Systems 2005, see www.autodesk.com/buildingsystems-partners.

Are there other tools in Autodesk Building Systems 2005 for engineering calculations and design analysis?

Yes. In addition to the standard file format support, Autodesk Building Systems 2005 also provides in-the-box engineering calculation tools.

- Mechanical: Size duct automatically while laying out ductwork using a built-in duct sizing calculator based on equal friction.
- Electrical: Use circuit tools to automatically total circuit and power loads; size wires based on industry standard codes (NEC); generate circuit reports that can be directly exported to a bi-directional Microsoft[®] Excel spreadsheet; and use the Circuit Manager to automatically flag overloads based on calculated loads and circuit lengths.
- Plumbing: Size supply piping (hot and cold domestic water) and sanitary waste with automated tools based on user-customizable plumbing code and fixture unit pipe-sizing tables.

Autodesk Building Systems 2005 also provides an ActiveX[®] API and XML schemas (gbXML and ddXML) that can be used to extract engineering data from your models for use with Microsoft[®] Visual Basic[®], Microsoft Excel, and Microsoft Access applications.

Can I still use my own spreadsheets for my calculations and analysis?

Yes. Through standard file formats and an ActiveX[®] API, engineering data can be extracted from Autodesk Building Systems 2005 models for interoperability with Microsoft Visual Basic, Microsoft Excel, Microsoft Access, and Visual Basic for Applications (VBA).

Where is the design data stored and how are reports generated?

The engineering design data is stored on the objects in the Autodesk Building Systems model and is directly extracted from the objects for use in the third-party applications. The data, whether directly entered or imported from third-party analyses results, can be viewed through the objects properties inside Autodesk Building Systems 2005, in addition to inside the third-party analysis applications. Reports of the design data can be generated from the analysis applications or by extracting the data for use with spreadsheet programs such as Microsoft Excel and Microsoft Access.

Will there be more analysis applications that are interoperable with Autodesk Building Systems in the future?

Autodesk is working with industry leaders to provide interoperability with a variety of third-party design and analysis applications. To find out more information about what's planned in the future, visit www.autodesk.com/buildingsystems-partners.

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