

# Making Use of Substation Design Models for Scheduling

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# Class summary

In this class, we show how we used Autodesk® Navisworks® Manage software and Microsoft® Project to combine a substation project schedule and a 3D substation Autodesk® Inventor® software model to help visualize and adjust the construction of a station.

# Key learning objectives

At the end of this class, you will be able to:

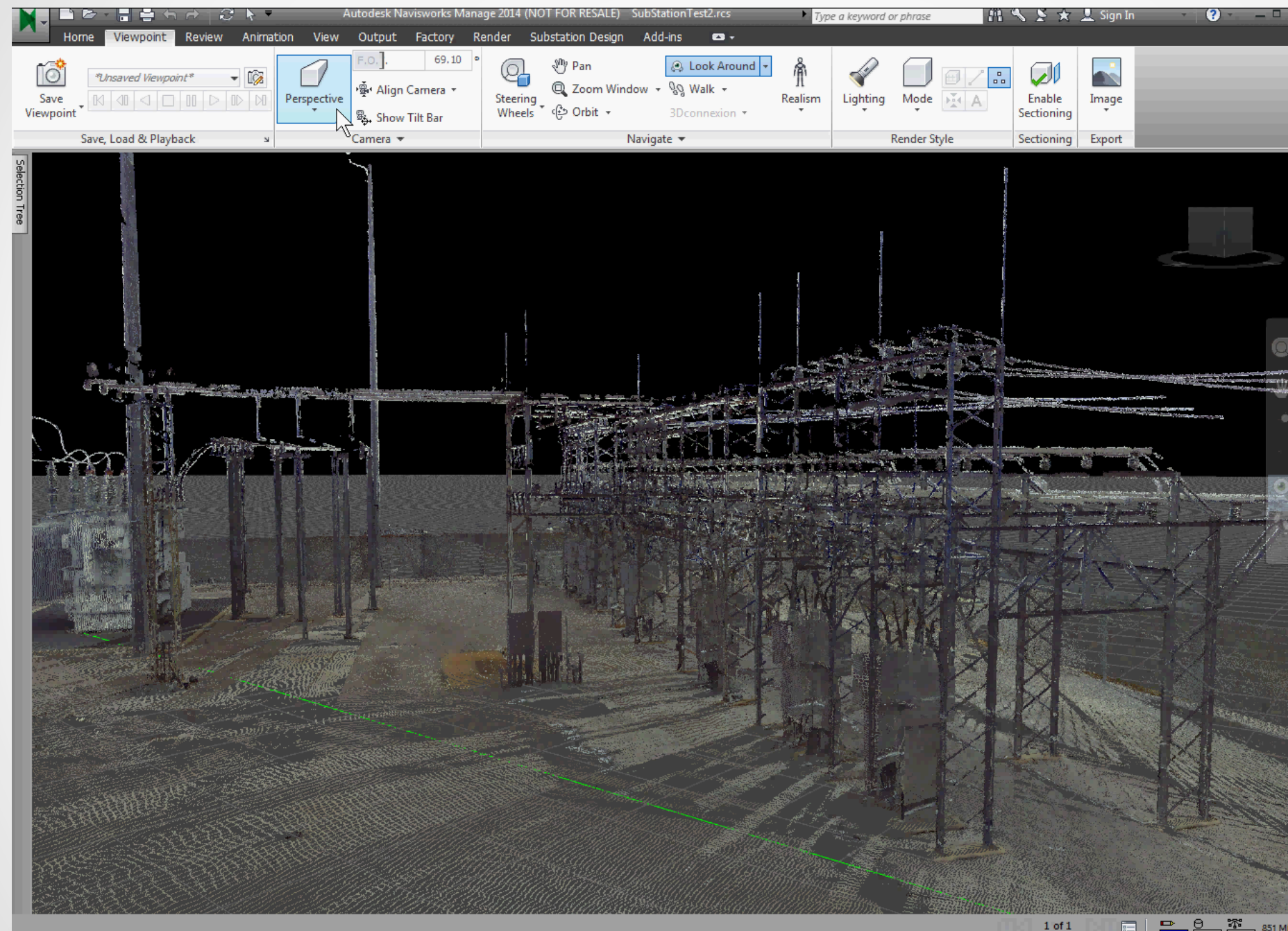
- Leverage your existing Autodesk Inventor Models for Scheduling
- Integrate a Microsoft Project and an Inventor assembly
- Assign scheduling tasks to Inventor components
- Simulate Project builds
- Export simulations

# Why?

- Visualize Project Workflow
- Visualize Changes
- Provide to Planning Process



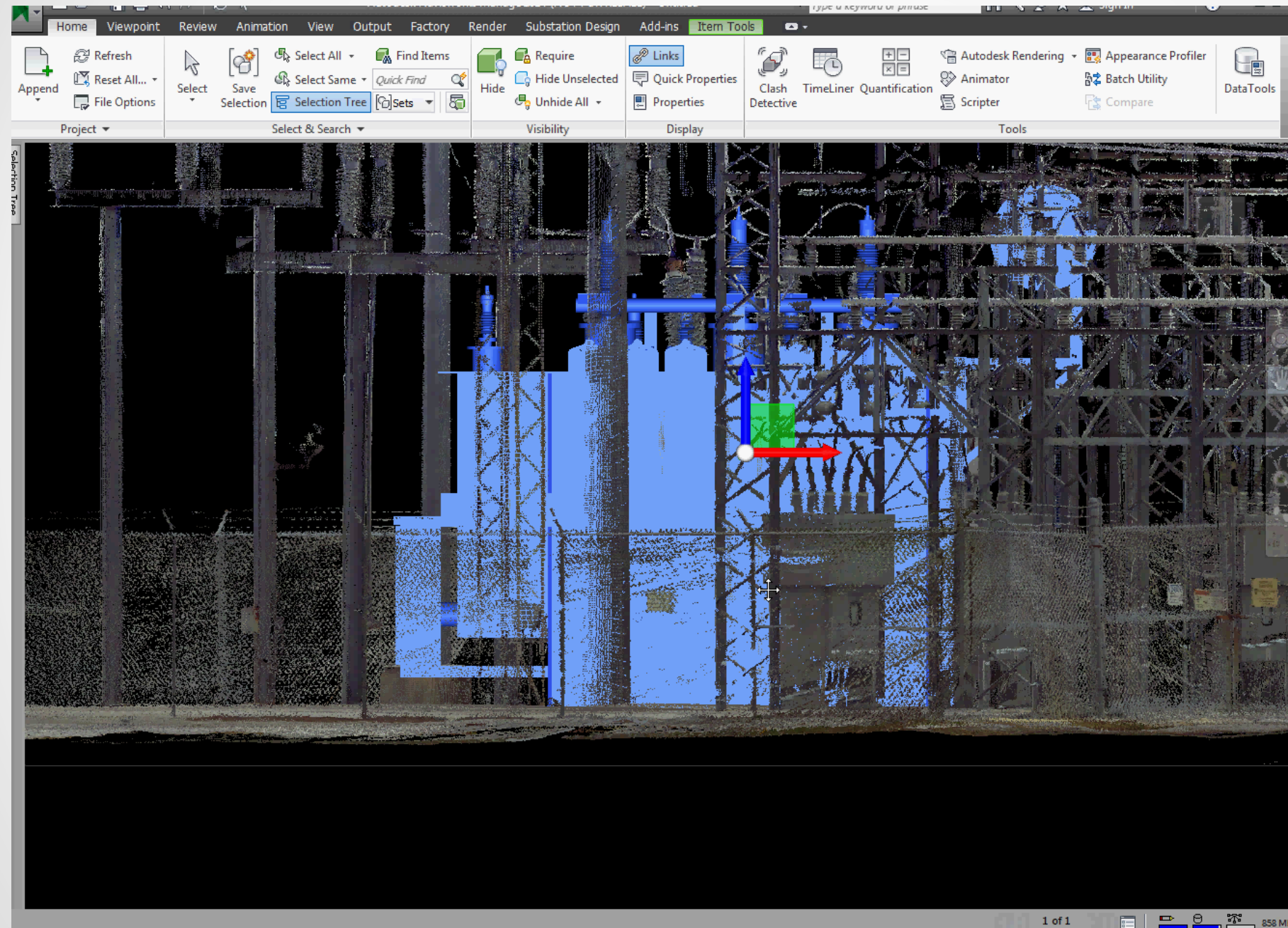
# Navisworks Overview



Demonstration



# Navisworks Overview



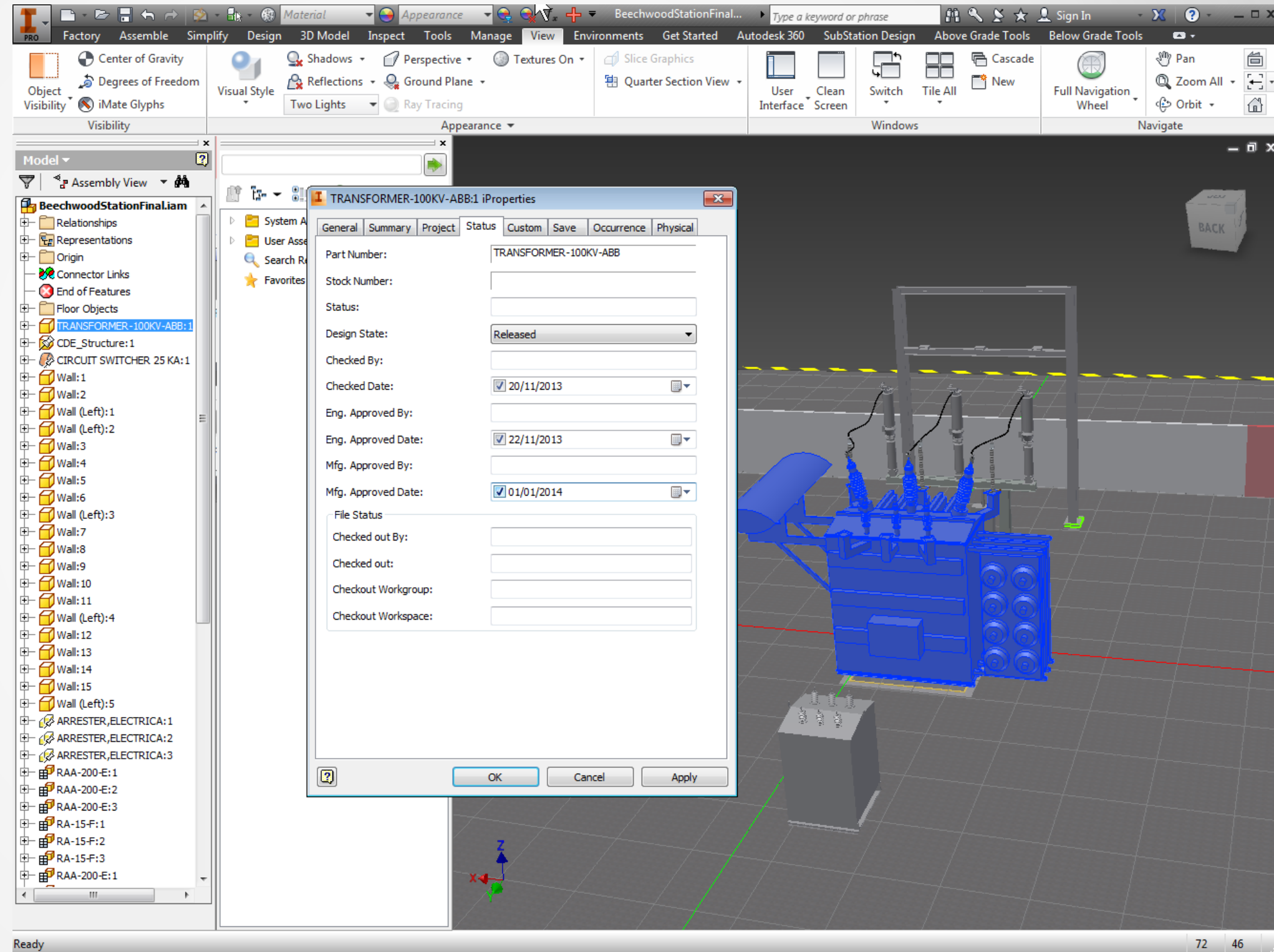
Demonstration

# Setting up

# Inventor Setup

## ■ Properties

demonstration





# Project Setup

		Task Mode ▾	Task Name ▾	Duration ▾	Start ▾	Finish ▾	Predecessors ▾	Res Nan ▾	Add New Column ▾
1			[-] Sample Substation 69Kv	1085 days	Mon 15/02/1	Fri 11/04/14			
2			[-] General Conditions	17 days	Wed 04/12/1	Thu 26/12/1			
3			Receive notice to proceed and sign contract	3 days	Wed 04/12/1	Fri 06/12/13		G.C. C	
4			Submit bond and insurance documents	2 days	Mon 09/12/1	Tue 10/12/1	3	G.C. P	
5			Prepare and submit project schedule	2 days	Wed 11/12/1	Thu 12/12/1	4	G.C. P	
6			Prepare and submit schedule of values	2 days	Fri 13/12/13	Mon 16/12/1	5	G.C. C	
7			Obtain building permits	4 days	Mon 09/12/1	Thu 12/12/1	3	G.C. P	
8			Submit preliminary drawings	2 wks	Fri 13/12/1				
9			[-] Long Lead Procurement	70 days	Wed 04/12				
10			Submit Vendor drawings and order long lead items - Switch	2 wks	Wed 04/12				
11			Submit shop drawings and order long lead items - Breaker	2 wks	Fri 27/12/1				
12			Submit shop drawings and order long lead items - Transfo	2 wks	Fri 27/12/1				
13			Submit shop drawings and order long lead items - Structu	2 wks	Fri 27/12/1				
14			Detail, fabricate and deliver steel	12 wks	Wed 18/12				
15			[+] Mobilize on Site	10 days	Mon 09/12				
21			[+] Site Grading and Utilities	21 days	Mon 23/12				
27			[+] Foundations	33 days	Wed 04/12				
39			[-] Steel Erection	41 days	Mon 15/02				
40			Erect steel columns, beams and joist	2 wks	Wed 12/03				
41			Install miscellaneous iron and bracing	2 wks	Wed 04/12				
42			Install supports and miscellaneous guards	2 wks	Wed 18/12				
43			Touch-up finish on steel	1 wk	Wed 01/01				
44			[-] Grounding Work	47 days	Wed 04/12				
45			Rough-in ground grid	4 wks	Fri 10/01/1				
46			Lay grid connections or clamps	4 wks	Wed 18/12				
47			Run Ground Leads	5 wks	Wed 04/12				
48			[-] Bus work	6 days	Wed 08/01				
49			Install bus lengths	4 days	Wed 08/01				
50			Clamps	2 days	Tue 14/01/				
51			[-] Protection & Controls Wiring	60 days	Wed 08/01				
52			Install window wall aluminum and glass	5 wks	Wed 08/01				
53			Install interior stud walls and drywall	5 wks	Wed 12/02				
54			Install interior doors and hardware	2 wks	Wed 19/03				
55			Install store front doors and hardware	15 days	Wed 08/01				

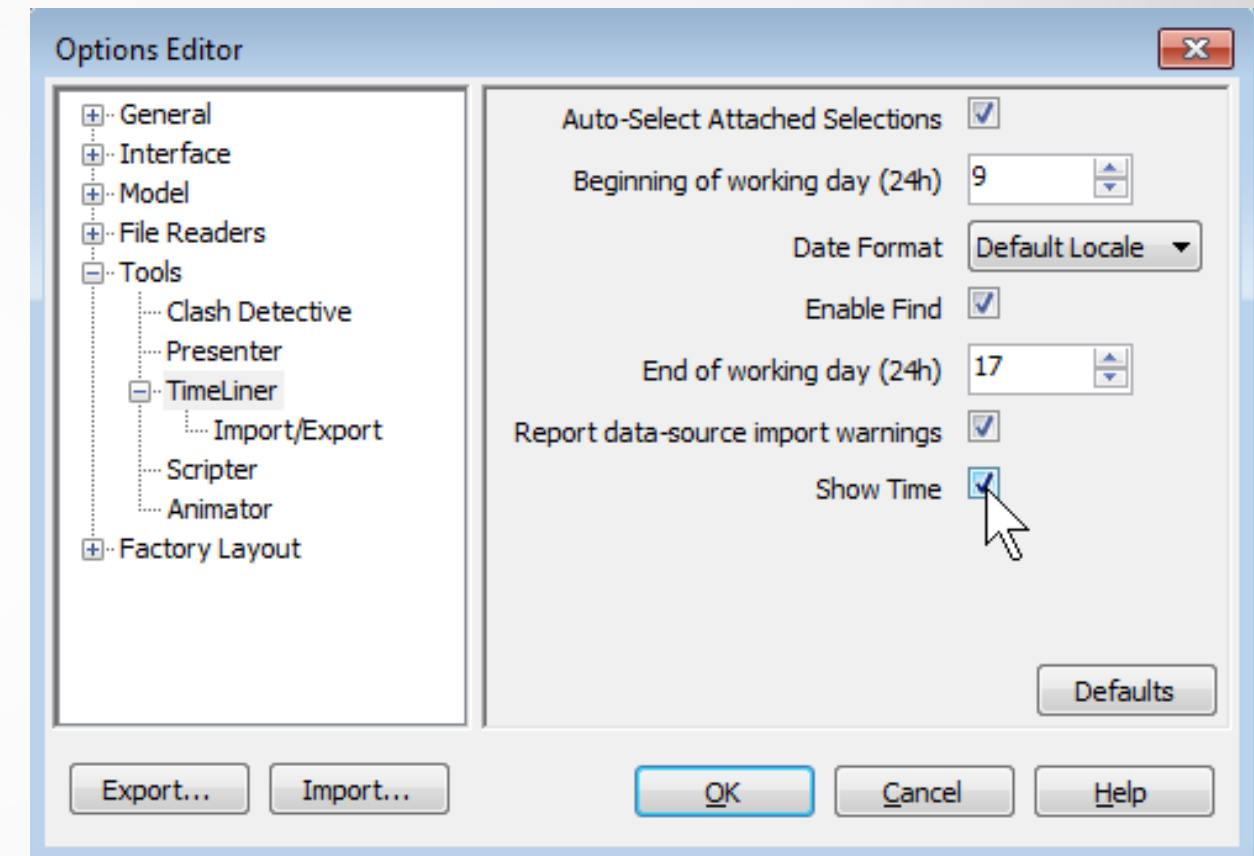
## Demonstration

		Resource Name ▾	Type ▾	Material ▾	Initials ▾	Group ▾	Max. ▾	Std. Rate ▾	Ovt. Rate ▾	Cost/Use ▾	Accrue ▾	Base ▾
1		G.C. General Management	Work		G		100%	\$100.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
2		G.C. Project Management	Work		G		100%	\$75.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
3		G.C. Procurement	Work		G		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
4		G.C. Scheduler	Work		G		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
5		G.C. Accounting	Work		G		100%	\$60.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
6		G.C. Superintendent	Work		G		100%	\$105.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
7		G.C. Survey Crew	Work		G		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
8		G.C. Rough Ground Crew	Work		G		100%	\$35.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
9		G.C. Labor Crew	Work		G		100%	\$25.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
10		G.C. Concrete Crew	Work		G		100%	\$25.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
11		G.C. Welding Crew	Work		G		100%	\$45.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
12		Site Grading Contractor	Work		S		100%	\$55.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
13		Concrete Contractor	Work		C		100%	\$65.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
14		Plumbing Contractor Management	Work		P		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
15		Electric Contractor	Work		E		100%	\$55.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
16		Electric Contractor Management	Work		E		100%	\$65.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
17		P&C Contractor	Work		P		100%	\$75.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
18		Steel Contractor Management	Work		S		100%	\$80.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
19		Transformer Contractor	Work		T		100%	\$65.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
20		Switchgear Contractor Management	Work		S		100%	\$55.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
21		Steel Erection Contractor	Work		S		100%	\$48.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
22		Steel Erection Contractor Management	Work		S		100%	\$65.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
23		Landscape Contractor	Work		L		100%	\$55.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
24		Masonry Contractor	Work		M		100%	\$35.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
25		Finish Contractor	Work		F		100%	\$45.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
26		Engineering Contractor	Work		E		100%	\$35.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
27		Engineering Contractor Management	Work		E		100%	\$30.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
28		Fence Contractor	Work		F		100%	\$25.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
29		Control house Contractor	Work		C		100%	\$20.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
30		Landscape Contractor	Work		L		100%	\$18.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
31		Paving Contractor	Work		P		100%	\$16.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
32		Painting Contractor	Work		P		100%	\$22.00/hr	\$0.00/hr	\$0.00	Prorated	Standard

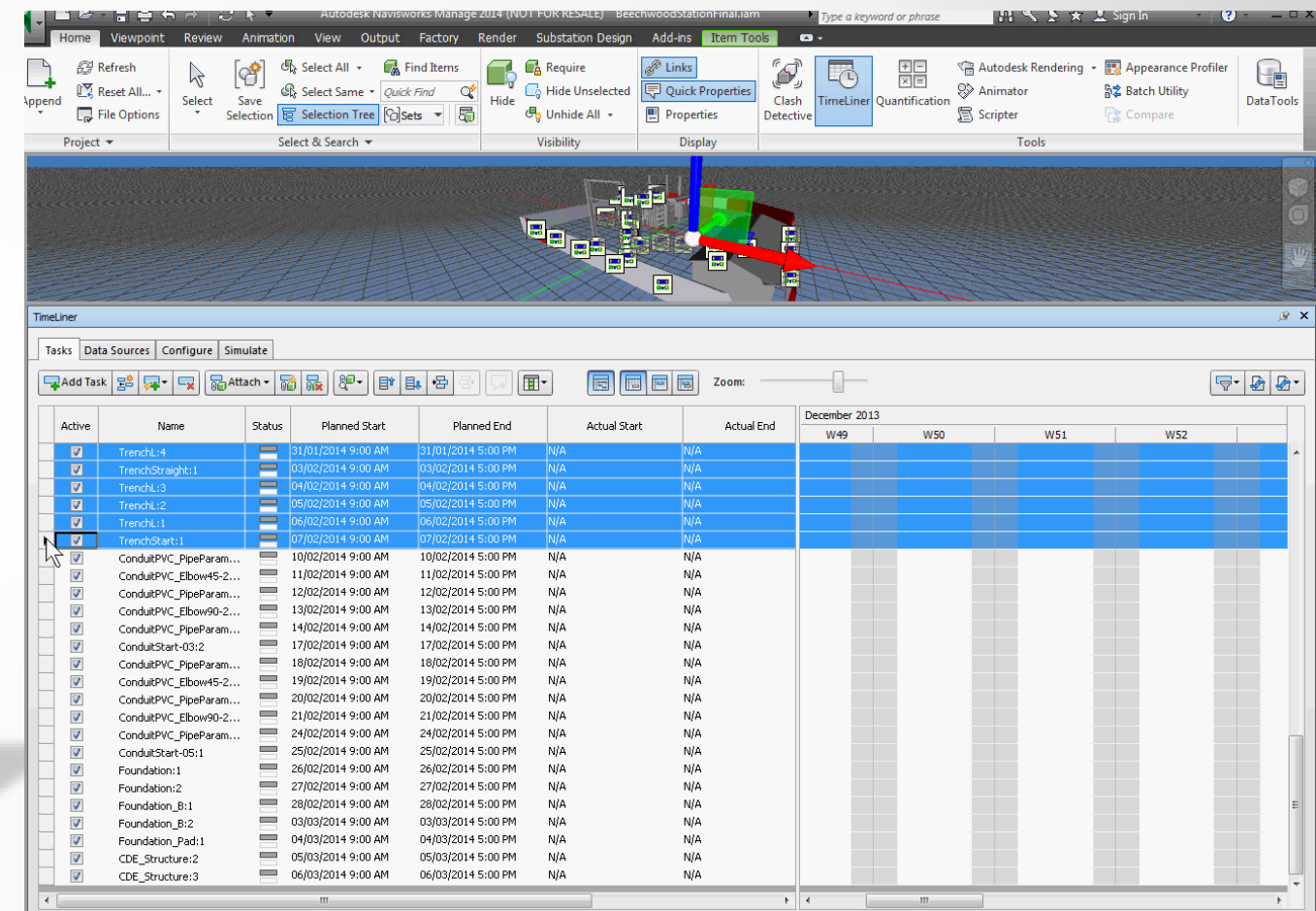
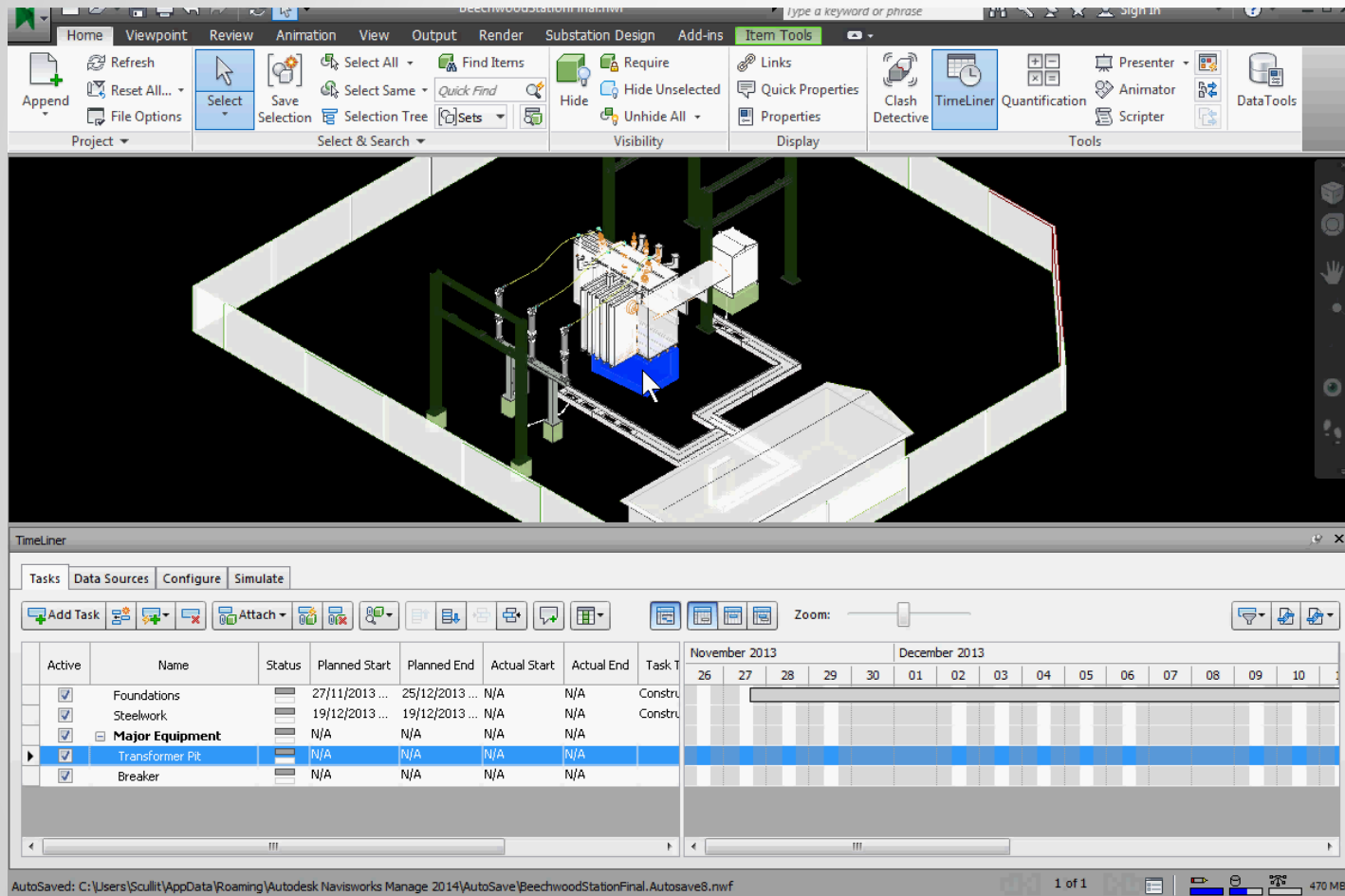


# Navisworks Setup

- Add Tasks Manually
- Import Project File
- Substation Wizard

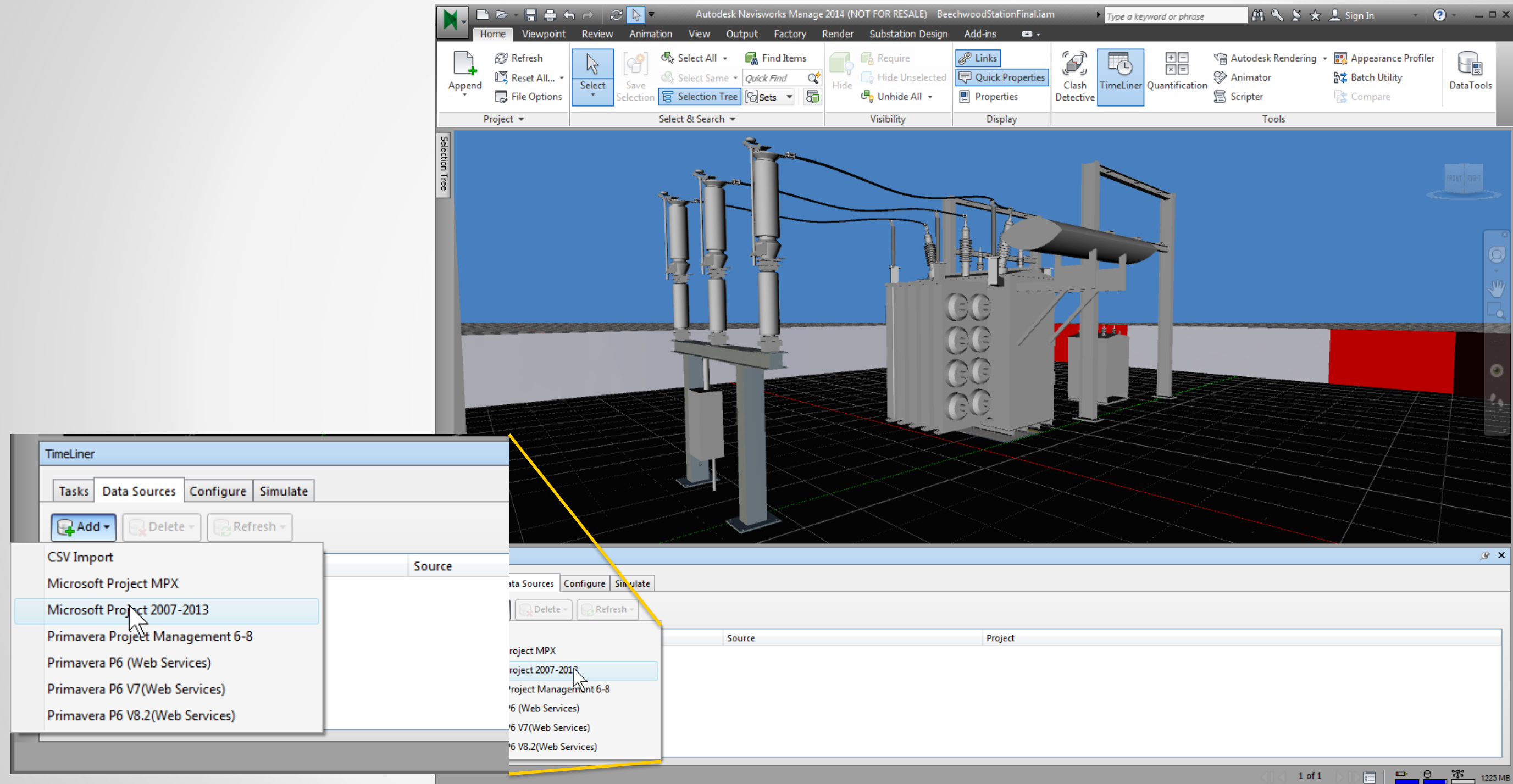


# Navisworks Timeline – Adding Tasks Manually





# Navisworks – Import Project File



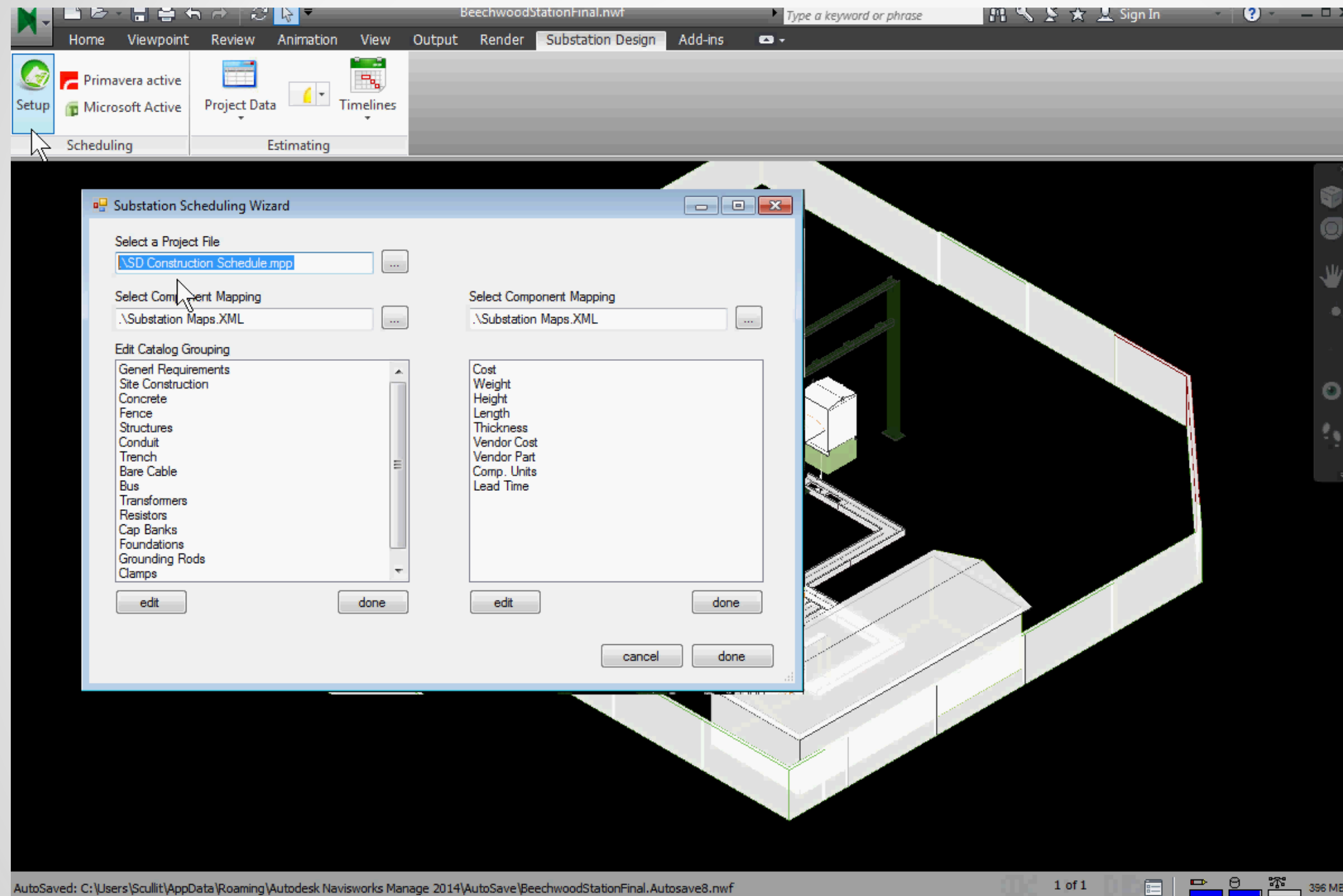
# Navisworks Timeline – Import Project File

The screenshot displays the Navisworks software interface. The top ribbon includes tabs for Home, Viewpoint, Review, Animation, View, Output, Render, Substation Design, and Add-ins. The main 3D view shows a wireframe model of a building structure. Below the 3D view is the Timeline window, which is currently active. The Timeline window has tabs for Tasks, Data Sources, Configure, and Simulate. The Tasks tab is selected, showing a list of tasks with columns for Active, Name, Status, Planned Start, and Planned End. The tasks are listed in a table format, with the first task, 'Excavate foundations', highlighted. The timeline bar at the bottom shows a Gantt chart view of the tasks, with the first task, 'Excavate foundations', highlighted in blue.

Active	Name	Status	Planned Start	Planned End
<input checked="" type="checkbox"/>	Excavate foundations		27/11/2013 8:00 AM	10/12/2013 5:00 PM
<input checked="" type="checkbox"/>	Excavate transformer pit		27/11/2013 8:00 AM	28/11/2013 5:00 PM
<input checked="" type="checkbox"/>	Form column piers and foundations		11/12/2013 8:00 AM	16/12/2013 5:00 PM
<input checked="" type="checkbox"/>	Form transformer pit walls		27/11/2013 8:00 AM	02/12/2013 5:00 PM
<input checked="" type="checkbox"/>	Set reinforcing and anchor bolts		17/12/2013 8:00 AM	20/12/2013 5:00 PM
<input checked="" type="checkbox"/>	Pour column piers and foundations		23/12/2013 8:00 AM	27/12/2013 5:00 PM
<input checked="" type="checkbox"/>	Pour concrete transformer pit walls		03/12/2013 8:00 AM	03/12/2013 5:00 PM
<input checked="" type="checkbox"/>	Cure transformer pit wall concrete		04/12/2013 8:00 AM	12/12/2013 5:00 PM

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# Navisworks Timeline – Substation Wizard





# Join the Conversation

- Join us at [www.substation360.com](http://www.substation360.com)
- Discussions on
  - Industry standards
  - Mappings
  - Categories
  - Content
  - Techniques
  - Tools



