AUTODESK UNIVERSITY

CS21178-L

Introduction to Navisworks

Lee Mullin
Autodesk

Twitter: @leeroyb
LinkedIn: https://uk.linkedin.com/in/lrmullin
See below for more links!

Learning Objectives

- You will learn what is Autodesk Navisworks
- You will learn methods to navigate around a model
- You will learn about what each key tool does
- You will learn some of the principle of how to use Navisworks well

Description

This session will cover the basics of Navisworks software, why it's an important piece of software for every construction company, and many design disciplines from one of the original Navisworks Ltd Teams. You'll be given a high-level overview of what each of the key tools does and how you could use the tools in your firm. This session features Navisworks Manage and BIM 360 Glue. AIA Approved

Your AU Expert(s)

Lee Mullin is the construction technical specialist for Autodesk, Inc., in Northern Europe and he leads the European Construction Virtual Team. Mullin looks after Navisworks software, BIM 360 Glue software, BIM 360 Layout app, BIM 360 Field software, Point Layout software, and workflows extending from Revit software, AutoCAD Civil 3D software, InfraWorks software, and ReCap software. With over 10 years' experience in BIM and preconstruction workflows, Mullin's current role is multifaceted, with public speaking engagements, product testing, development, and workflow investigation, which requires understanding of interoperability workflows across the Autodesk portfolio. Mullin also helps to build up the Autodesk construction user community through the Beyond Design Blog and various social media.

Navisworks fundamentals

Navisworks is used widely across AEC from buildings to infrastructure projects to manufacturing. This is not a comprehensive list and you will see looking at the file formats supported why it is such a flexible tool.

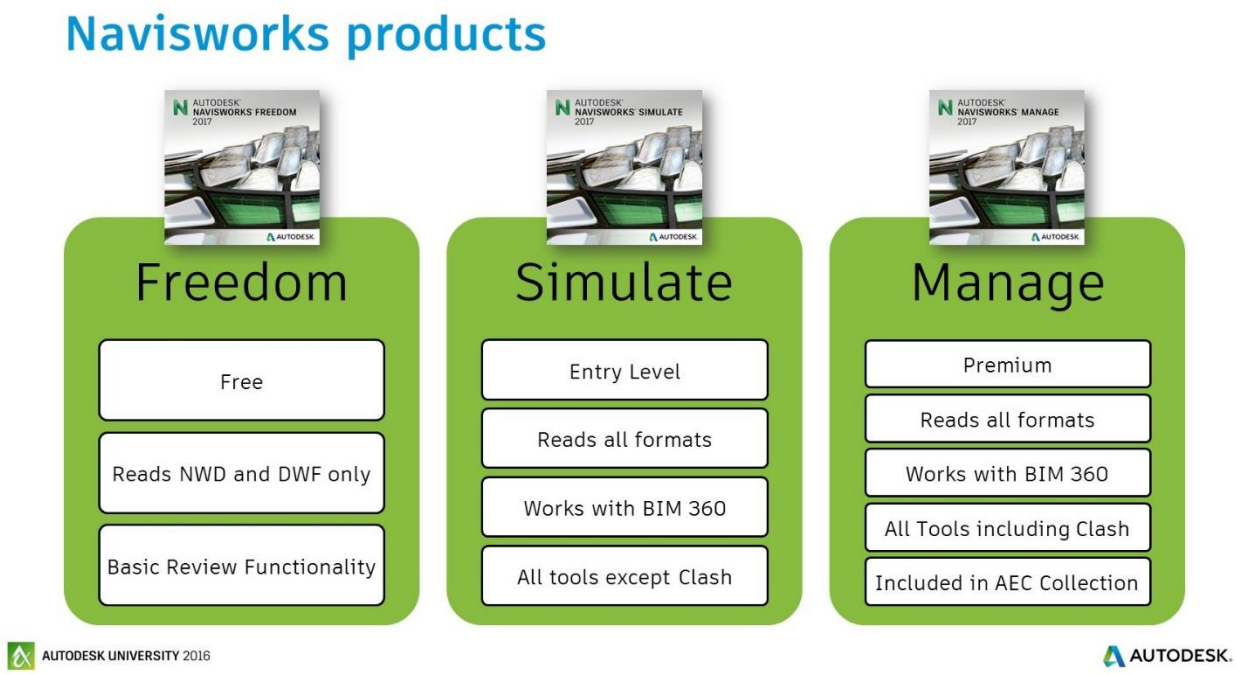
- Architecture
- Building Structure
- MEP Services
- Sports Stadia
- Multidisciplinary coordination
- Landscape Architecture
- Road Projects
- Rail Projects
- Bridges
- Oil and Gas Platforms
- Water Treatment Works
- Dam Projects
- Ship Building
- Factory Layout
- Airplane coordination

Key Functionality

The main functions Navisworks is used for includes but not limited to: -

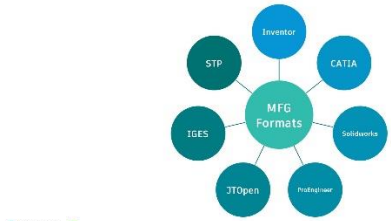
- Design Review
- Clash detection
- Construction Simulation
- Quantification
- Rendering
- Animations

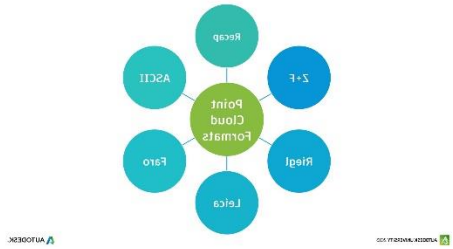
Navisworks products and functions



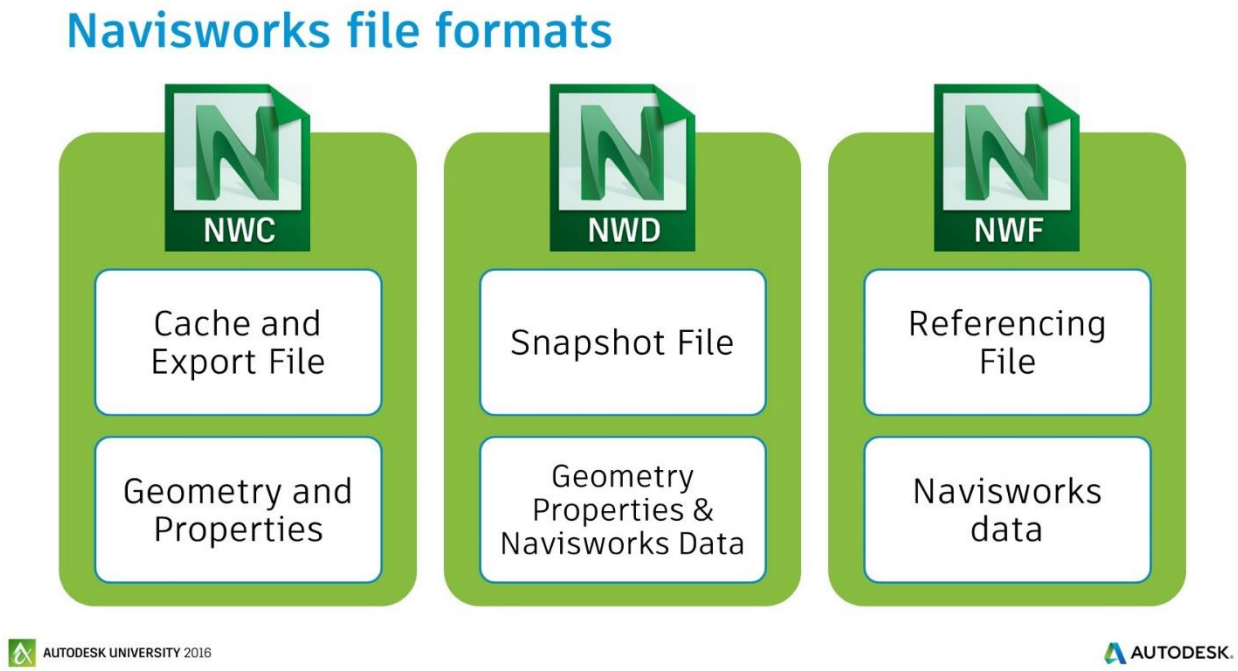
Navisworks Manage now comes with the AEC and Product Design Collections.

File Formats



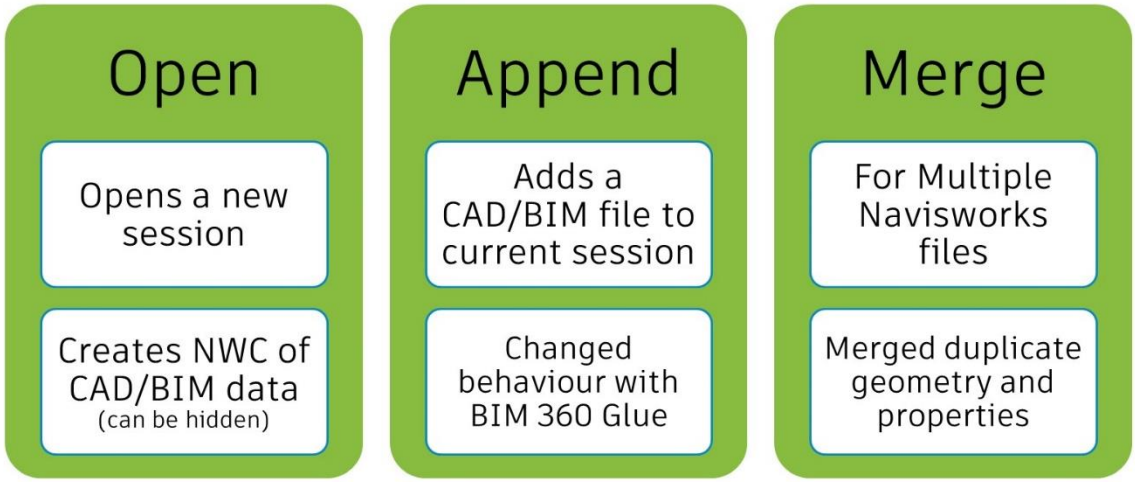


A full list of file formats supported by Navisworks can be found online
https://knowledge.autodesk.com/support/navisworks-products/troubleshooting/caas/sfdcarticles/sfdcarticles/Supported-file-formats-and-applications-for-Autodesk-Navisworks-2009-to-2012.html

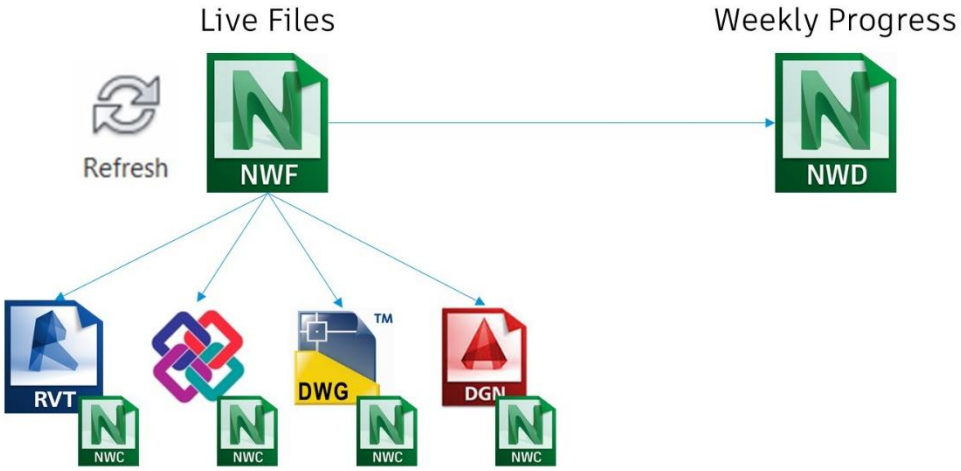


Workflows and opening files

Open / Append / Merge



Typical workflow



Class Instructions

Use standard Settings

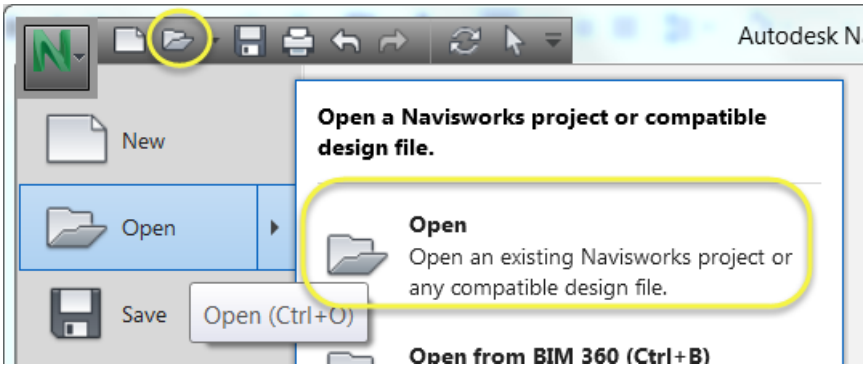
- Select the N in the top left corner and then Options.
- In Options find Import on the bottom right corner
- Browse to the datasets folder, Settings and select AU_Settings.xml
- This should give you the standard settings for this session.

Workspaces

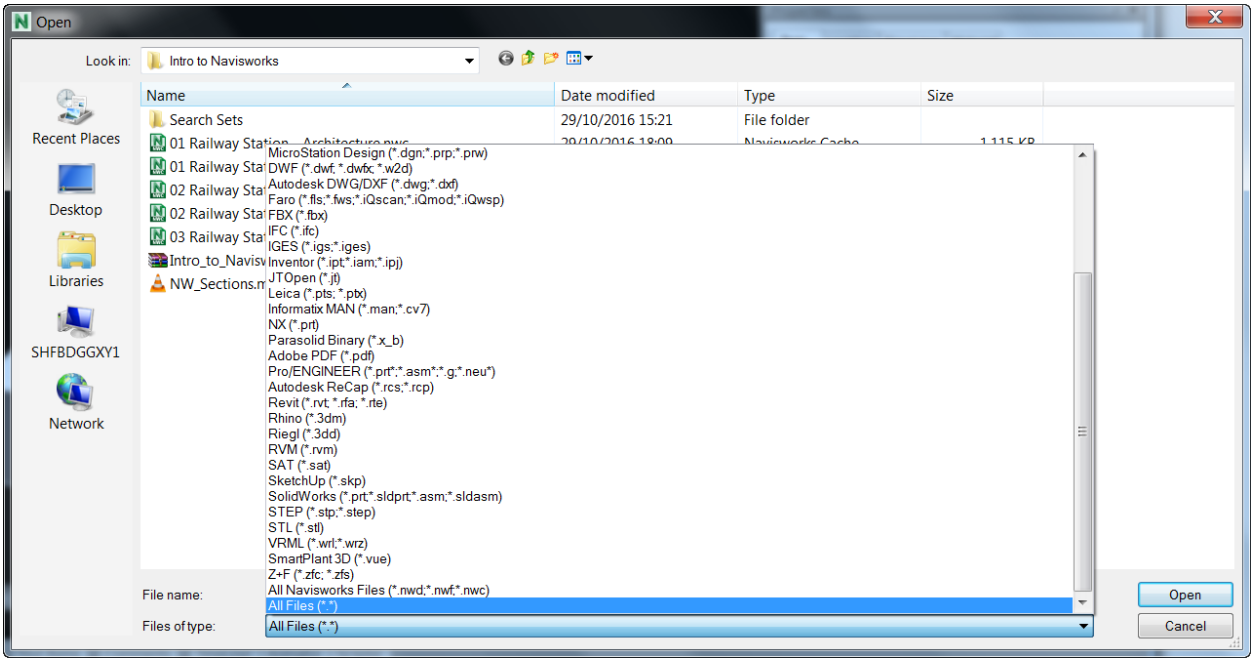
- Select the View tab in the ribbon
- Select Load Workspace > More Workspaces
- Browse to the datasets folder, Workspaces and select Minimal.xml
- This will load a minimal workspace with no extra toolbars

Opening files

You can Open a file with the folder button in the top left corner, or selecting the large N then Open, or using the shortcut Ctrl+O, Use one of these three options to get the Open Dialog



In the Files of Type box you should be able to see the files Navisworks directly loads, select 'All files' and then navigate to "**C:\Datasets\Lab01 San Polo 3401A\CS21178-L"** and open "01 Railway Station - Architecture.nwc"



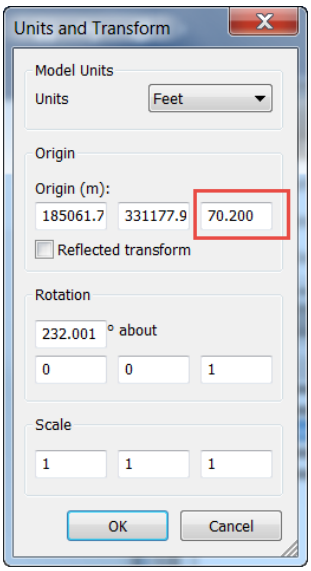
This should open a single architectural file in the scene

Appending Files

You can now add additional files to the scene, on the Home tab select Append, you should then select all the other files (not architecture), and then Open.

Moving a file

- You should see that all the files are aligned except the structure of the platform, you can either correct the coordinates in the design file or you can move the file in this session, this override will remain on that file
- Open the Selection Tree on the left side, then use the pin to hold it in place
- In the Selection Tree select “02 Railway Station - Structure - Platform.nwc”, it should highlight blue.
- Right click the file in the Selection Tree and open Units and Transform
- In the third box change the figure to ‘70.2’ and press ok



- This should line the files up together
- Press the N in the top left corner and Save the file, this will save as NWF

Navigation

- Save a home view by right clicking viewcube and save as home view
- Select the different sides of the cube to move around the model
- On the View menu select the orbit tool
- Hold left mouse button and move around the model
- Press the home button by the viewcube
- Use the scroll button to zoom in and out
- Orbit around the station and zoom in to move near the station
- In the View Menu select the Third person mode

Sets

Sets are groups of items, think of them as favorites in the model. You have Selection Sets which are static and need to be manually updated if you want to add or remove anything, and Search Sets which are dynamic and do not need to be updated.
I strongly recommend you use Search Sets as often as possible

- To create a search set, look for something in Find Items, and in the Sets dialogue select the binoculars, you can then rename this set (F2 can be used to rename a selected item)
- To create a selection set, select a number of items in the scene or selection tree (use Shift to select multiple items), and select the first button in the Sets dialogue

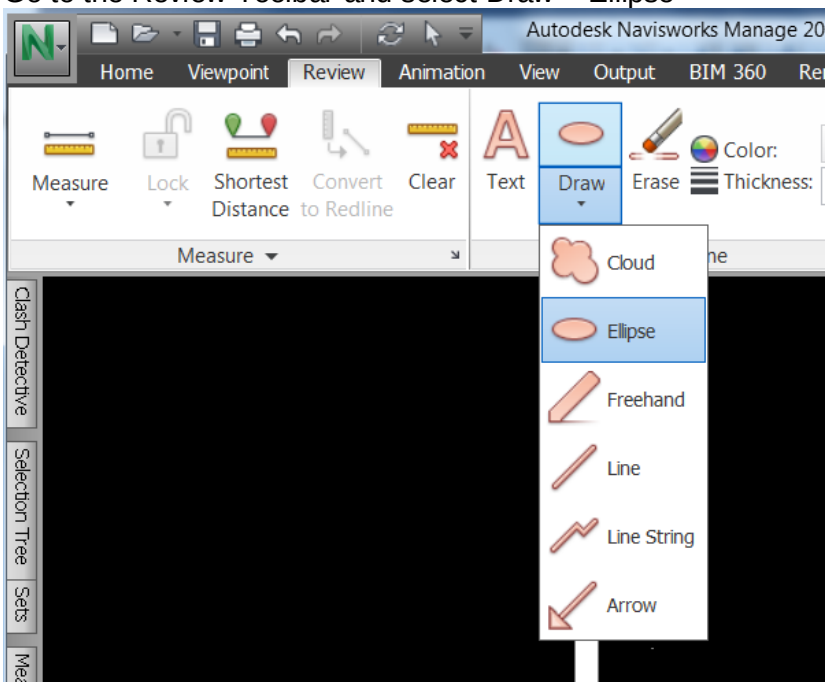
Import sets

- You can import and export sets by selecting the Import button on the Sets dialog
- Select the Datasets > Search Sets > and select “Revit Categories in Folders.xml”
- This will import a number of standard Revit Category Sets, there are also some IFC sets in this same folder
- Expand the Revit Architecture folder and select Doors
- When you select Hide Unselected on the Home tab you should only see the doors in model, press Hide Unselected again to show the rest of the model

Viewpoints

Create some viewpoints

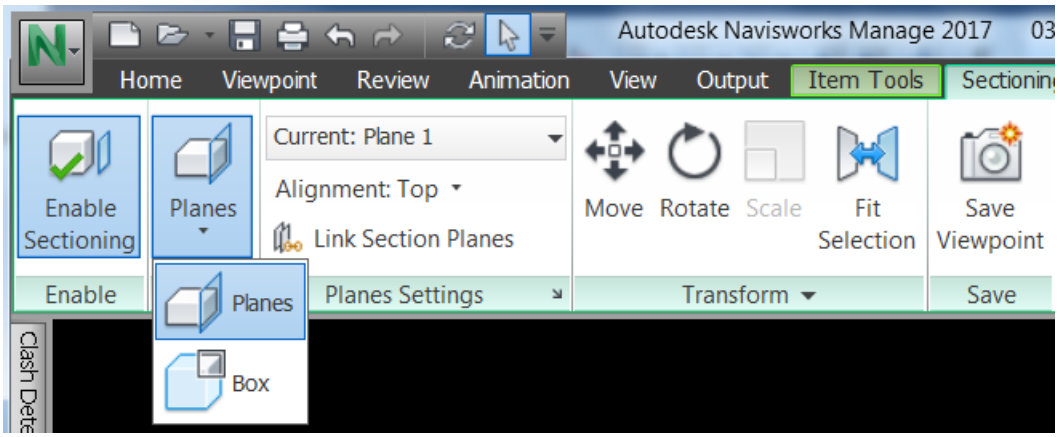
- Go to the View tab > Load Workspace and select Navisworks Standard
- On the right side select the Saved Viewpoints dialog and pin it
- Using Navigation move to in front of the building
- In the Viewpoints tab Select Save Viewpoint, you can now rename this ‘Front’
- Move around the model to another location
- Go to the Review Toolbar and select Draw > Ellipse



- You can now draw an Ellipse and this will save as a Viewpoint (select it and F2 to rename)
- Right Click the second Viewpoint and select 'Add Comment'
- Make a comment about the area you circled and press OK

Add a section

- Press PageUp show the whole model
- Go to the Viewpoints window and select Enable Sectioning, this should open the Sectioning Tools tab
- You can add section planes or boxes, we will add a box
- Select the arrow under Planes and then select Box



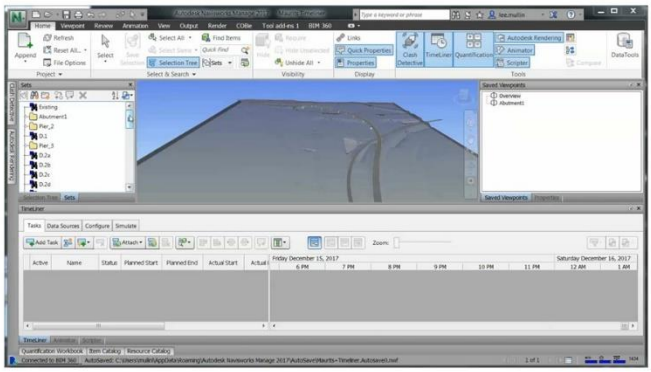
- This will add a box that you can move around the model, select the Move button and use the gizmo to move the box
- You can then press Save Viewpoint and this will retain the section box
- If at any point you get lost you can select the Front Viewpoint from earlier, or the home button on the Viewcube

Timeliner

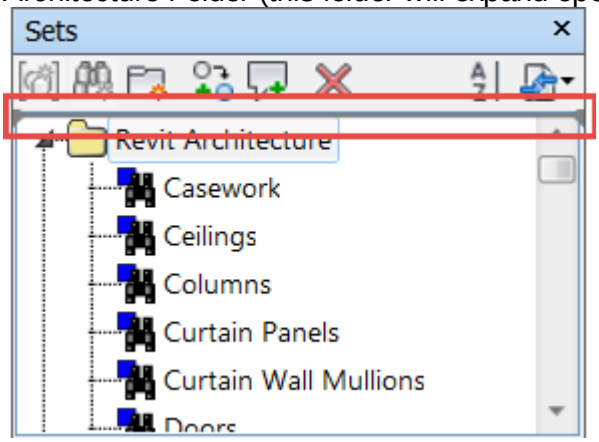
Make a quick Timeline from Sets

Timeliner

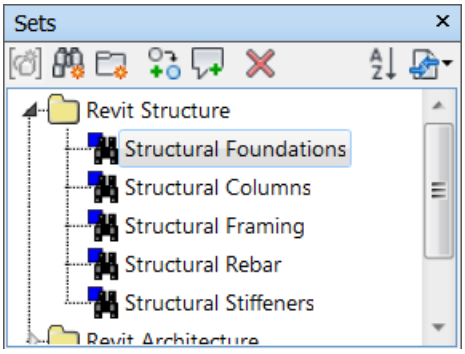
- Construction Simulation
- Link to MS Project, Primavera P6 and Asta Powerproject
- Check Costs, planned & actual schedules



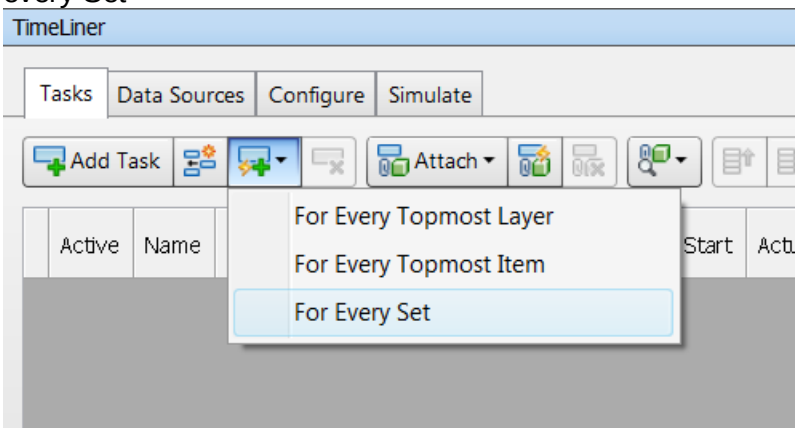
- Go to the View tab > Load Workspace and select Timeliner
- You should still have the Revit Search Sets available
- Select and hold down the Revit Structure Folder and move it above the Revit Architecture Folder (this folder will expand open, that's ok)



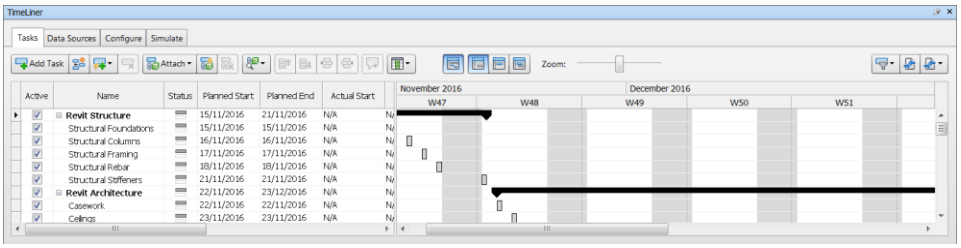
- Expand the Revit Structure folder
- Select and hold down the Structural Foundations Set and move above the Structural Columns as below



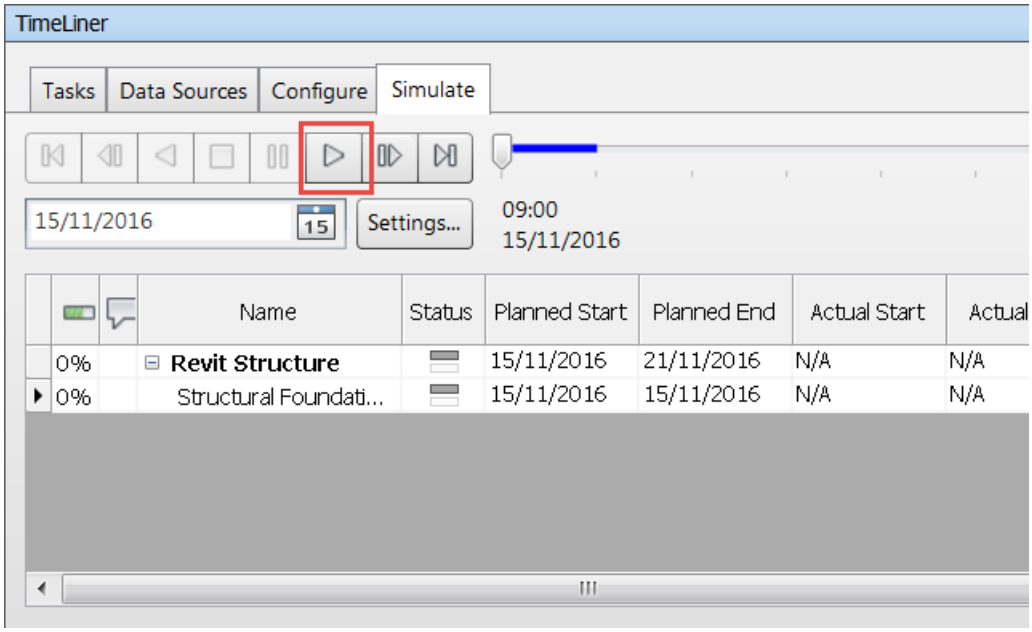
- In the Timeliner Window select the third button to Auto-Add Tasks, then select for every Set



- This should add a timeline with all the sets in the same order as they were in the Sets window

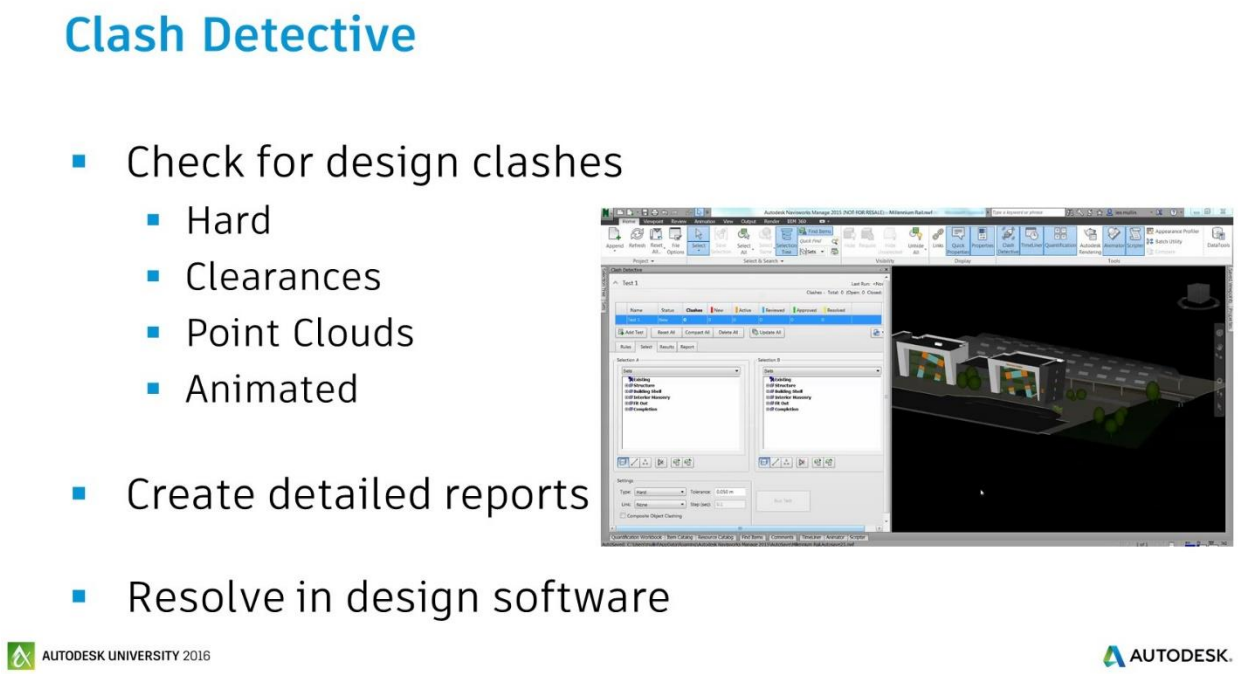


- You can now export this initial list to a project planning tool, and add dates and resources, use the Export button on the far right of the Timeliner window
- For now, we will just show the construction sequence, select the Simulate tab and press Play, this will run the whole sequence of the simulation, this can be exported to video or used to analyse the sequence and correct it


TimeLiner
Tasks
Data Sources
Configure
Simulate
15/11/2016
Settings...
09:00
15/11/2016
Name
Status
Planned Start
Planned End
Actual Start
Actual
0%
Revit Structure
15/11/2016
21/11/2016
N/A
N/A
0%
Structural Foundati...
15/11/2016
15/11/2016
N/A
N/A

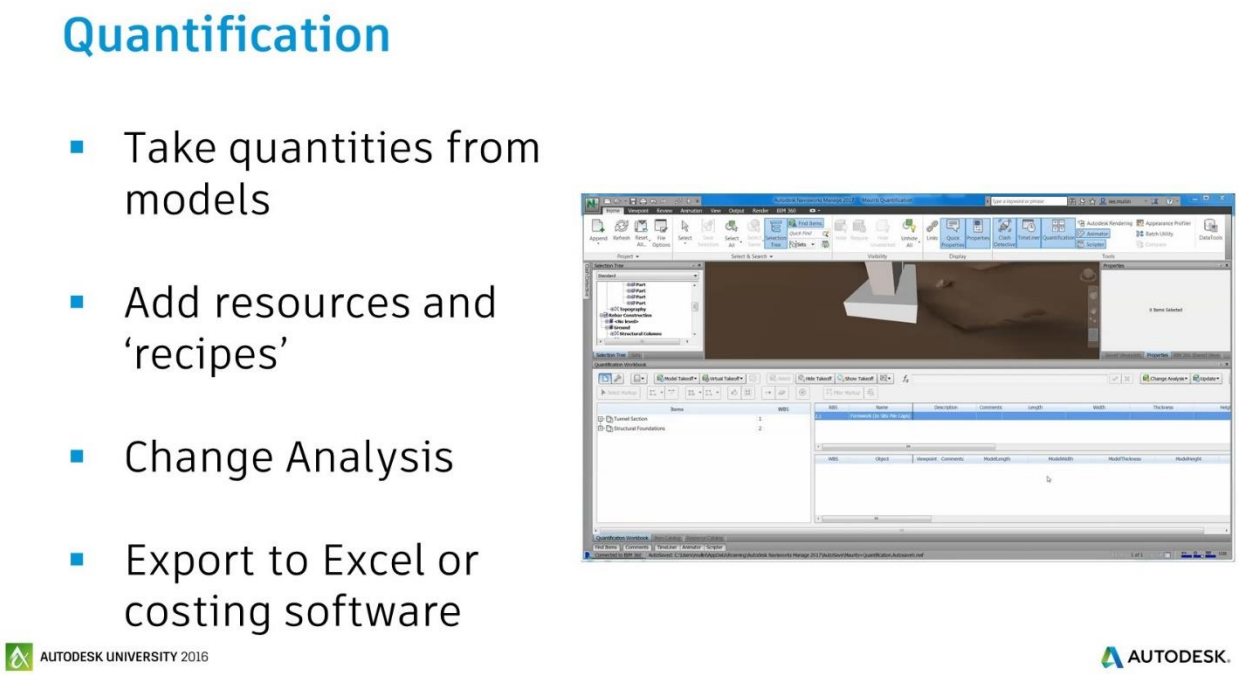
Clash Detective

Create a clash test



- Go to the View tab > Load Workspace and select Clash Detective
- Select the Add Test button on the top right corner of the Clash window, and name to MEP vs Structure 5cm
- In the Select tab on the left side select the MEP model, on the right side select the Structural Model
- Ensure the Type of Clash is set to Hard (you have the ability to do clearance clashes and check for duplicates here too)
- In the tolerance set a distance of 0.05m
- Press Run Test
- You should now see the results of the test, from here you can move through the results, assign people to fix them, view them in different ways and change their status
- Go to the Report tab, ensure the Report Type to Current Test and HTML and select Write Report
- Create a folder on the desktop and save in that folder
- You can now open that report and share with other users.

Quantification



Do a quick drag and drop quantification

- Go to the View tab > Load Workspace and select Quantification
- In the Quantification pane select Project Setup
- Select None on template (you can load your own in here for full takeoffs)
- Select Next, Select your units, Next then Finish
- Select the 3D architecture file from the selection tree
- Select Model Takeoff > To New Catalogue Item
- You can now scroll down to see how many you have of everything in the Model.
- Move around the model and select a wall
- Right Click > Quantification > Select Corresponding Takeoff Objects
- This will show the quantities for that wall in the lower pane, the top pane will show a rollup of the totals for all those types of walls

Add resources to the walls

- Go to the Item Catalog along the bottom on the Quantification Panel
- Scroll until you get the highlighted wall
- We will now add resources to this wall
- Select Use Resource > Use New Master Resource
- In Name call this Bricks
- In Count change from =1 to =ModelArea*66
- This will add 66 bricks per square meter
- Add Primary Quantity to =Count and Each
- Select Use Resource > Use New Master Resource
- In Name call this Blocks
- In Count change from =1 to =ModelArea*22
- This will add 22 blocks per square meter

- Add Primary Quantity to =Count and Each
- Select Use Resource > Use New Master Resource
- In Name call this Insulation
- In Area change from =ModelArea to =ModelArea*1.05
- This will add 5% waste to the insulation per square meter
- Add Primary Quantity to =Area and square meters

Recommended tools to look at

Tool	Purpose
Appearance Profiler	Quick repeatable color overrides
Selection Inspector	Quick Property Viewing and export
Review tools	Mark-up, comments and tags
Sectioning Tools	Powerful Section Planes and boxes
Measure Tools	Measurements, areas, angles and move objects
Rendering Cloud Rendering	Add materials & rendering of aggregated models Create panoramas and keep working
Animator	Animate objects
DataTools	Link to databases

Tips and tricks

Shortcuts

https://knowledge.autodesk.com/support/navisworks-products/learn-explore/caas/CloudHelp/cloudhelp/2017/ENU/Navisworks-Manage/files/GUID-E5041421-ADEA-4FB8-88FF-D59860A8E826-htm.html

Easy Search Sets

https://www.youtube.com/watch?v=6429c0BOn7o

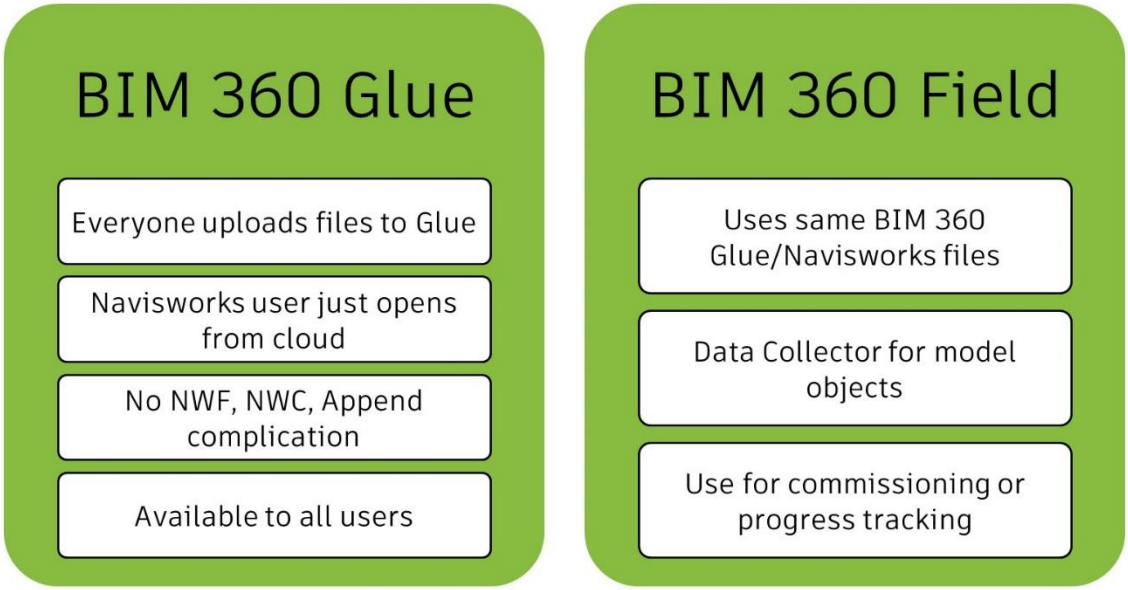
Compare 2D and 3D

https://www.youtube.com/watch?v=ORruUE1nYxA

Quick Quantification, resources and Change Analysis

https://www.youtube.com/watch?v=0FFi6LLHdLA

BIM 360


BIM 360 Glue
Everyone uploads files to Glue
Navisworks user just opens from cloud
No NWF, NWC, Append complication
Available to all users
BIM 360 Field
Uses same BIM 360 Glue/Navisworks files
Data Collector for model objects
Use for commissioning or progress tracking

What next?

Autodesk Knowledge Network

- Fantastic starting point pulling together help guides, blogs, online videos, Screencast training (advanced videos showing the exact processes)

https://knowledge.autodesk.com/support/navisworks-products

Beyond Design Blog

- This is my blog that I've been running with colleagues for over 5 years, there's a lot of useful information, workflows and tips and tricks there. Use the search tools to see if we've already covered it!
  http://beyonddesign.typepad.com/

YouTube

You know where YouTube is!!

Here's a playlist I have of Construction Videos from Autodesk Products with useful tips and tricks
https://www.youtube.com/playlist?list=PLmnt1sWPHsAs_SDmgnaj0Qu7FXAgm8heI

Autodesk University Online

- Autodesk University Online is a great place to watch classes from previous years going back to AU 2012
  http://au.autodesk.com/au-online/classes-on-demand/search?full-text=navisworks
- My three previous classes are all online and 2 have a fun Star Wars theme, well worth an afternoon of your time
  - CR2165-P: Building The Death Star The Autodesk Way
  - MSF7155-L: Utilizing the Cloud
  - CO6968: The #EmpireBIMcrew Strikes Back
- I'd also recommend these classes around workflows although there's many many more discipline specific ones: -
  - CO5945: Introduction to Project Reviews Using Navisworks
  - CS9905-L: Takeoff to the Next Level with Navisworks 2D and 3D Quantification
  - CO5249: Building Information Modeling on a Smaller Scale

Books

This Mastering book may be from the 2013 release but is still very relevant and explains key concepts really well. Very good too for looking at concepts like linking databases, color overrides and more.
https://www.amazon.co.uk/Mastering-Autodesk-Navisworks-Official-Training/dp/1118281713/ref=pd_ybh_a_3?ie=UTF8&psc=1&refRID=3YKB9V4TAESP21NXWHJV
This book is updated to 2017 releases so explains concepts around BIM 360 integration and the use of Quantification pretty well

https://www.amazon.co.uk/Autodesk-Navisworks-2017-Essentials-Authorized/dp/1943184844/ref=pd_ybh_a_2?ie=UTF8&psc=1&refRID=3YKB9V4TAESP21NXWHJV
I personally haven't seen this book but Ascent are very professional with all their materials
https://www.amazon.co.uk/Up-Running-Autodesk-Navisworks-2017/dp/1532815107/ref=pd_ybh_a_1?ie=UTF8&psc=1&refRID=3YKB9V4TAESP21NXWHJV

Formal Training

If you can spare the time and money then formal training is a great way to get up to speed quickly on a product as well as ask those 'how do I' type questions

Resellers

- Find a reseller http://www.autodesk.com/resellers/locate-a-reseller
- Certification http://www.autodesk.com/training-and-certification/overview

Online Training

- Lynda - https://www.lynda.com/Navisworks-tutorials/Navisworks-Essential-Training/154421-2.html
- uDemy https://www.udemy.com/autodesk-navisworks/
- Global eTraining http://www.globaletraining.ca/etraining-courses/product/autodesk-navisworks-manage-2017/