

4D

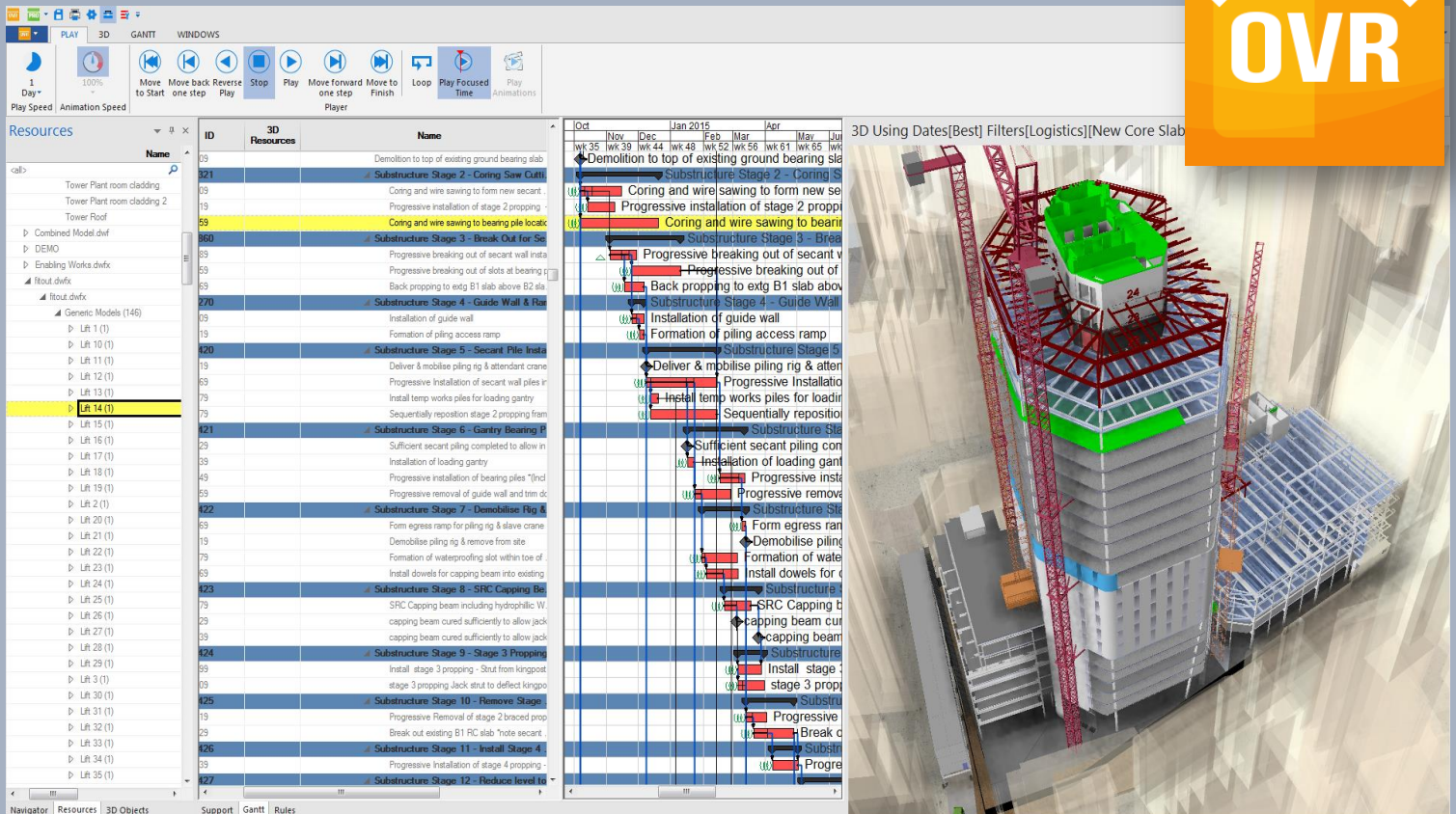
SCHEDULING &
CONSTRUCTION
PROJECT
MANAGEMENT
SOFTWARE

SYNCHRO

SOFTWARE

Open Viewer Tutorial Synchro v. 5.1

OVR



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1. Introduction

1.1. Why Synchro?

At Synchro Software, we are passionate about improving construction project performance because we understand the impact construction has on global resources and we recognize the importance of the industry to quality of life and economic prosperity. We have also experienced how significantly digital technology improves results over the tried and true methods that have been standard in the industry for generations. Imagine crystal clear communications and engaged team collaboration. Imagine the ability to easily create a shared vision of the project among your stakeholders, the ability to identify spatial and resource clashes in the planning phase rather than the costly construction phase, imagine a project schedule that gives you confidence to deliver according to plan!

1.2. Why 4D?

Scheduling and planning is critical to safe, efficient, high quality construction. While using 4D, the computer becomes a practice field where sequences, safety, spatial relationships and more can be viewed and discussed continuously before and throughout the project lifetime. Because Synchro links 3D Resources (human, material, equipment, and space) to the associated Schedule tasks, making changes and comparing baselines to alternatives is quick and easy. Testing sequencing and running “what if” scenarios is highly efficient and engaging. Communications are crystal clear, because you can see each step in the process. Cooperative knowledge sharing creates innovation and unique approaches that build competitive advantage. The result is an efficient, reliable and safe project delivery process that saves time and money.

1.3. How does Synchro Open Viewer Apply to you?

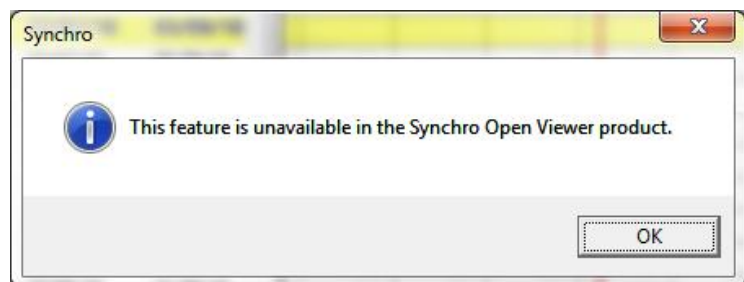
Synchro Open Viewer is our FREE software that allows all team members to participate in the 4D Project planning process. Open Viewer can open files created in both Synchro PRO and Synchro Scheduler. Open Viewer gives your entire team the ability to thoroughly visualize plans and schedules so they can better execute, quickly respond to unexpected changes, and create value for their organizations and stakeholders.

1.4. Course Description

This course will take you through the basics for Synchro Open Viewer. This course is appropriate for anyone who is involved in construction delivery, but does not necessarily require the full capabilities of Synchro PRO. This course will cover everything you need to get started working in Synchro Open Viewer.

At the end of this course, you will be able to navigate a Synchro PRO project file, review the construction sequence of the project, and produce various reports to present to stakeholders.

PLEASE NOTE: Not all Synchro PRO and Synchro Scheduler features are available in Synchro Open Viewer. If you try to use one of the restricted features you will be presented with this message:



2. The Synchro Workspace

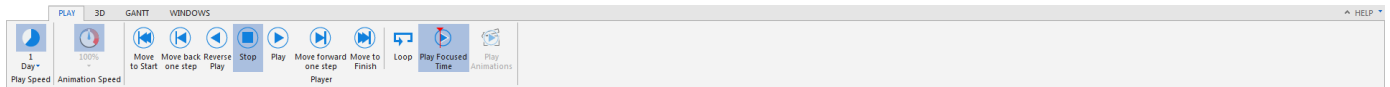
This section will present the various windows in Open Viewer and show how to reorganize and manage your workspace.

2.1. Windows in Open Viewer

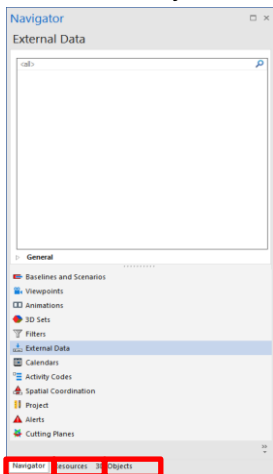
Quick Access Toolbar



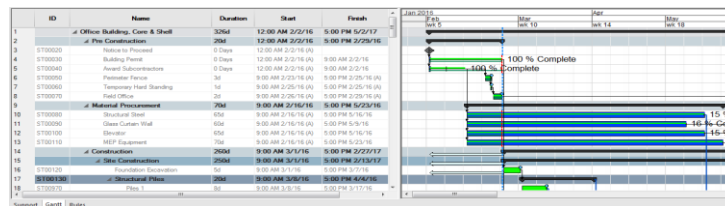
Ribbon



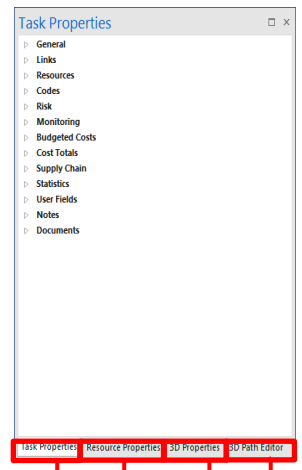
Navigator, Resources, & 3D Objects



Gantt Chart Window



Properties



3D Window



3D Objects tab


Resources tab

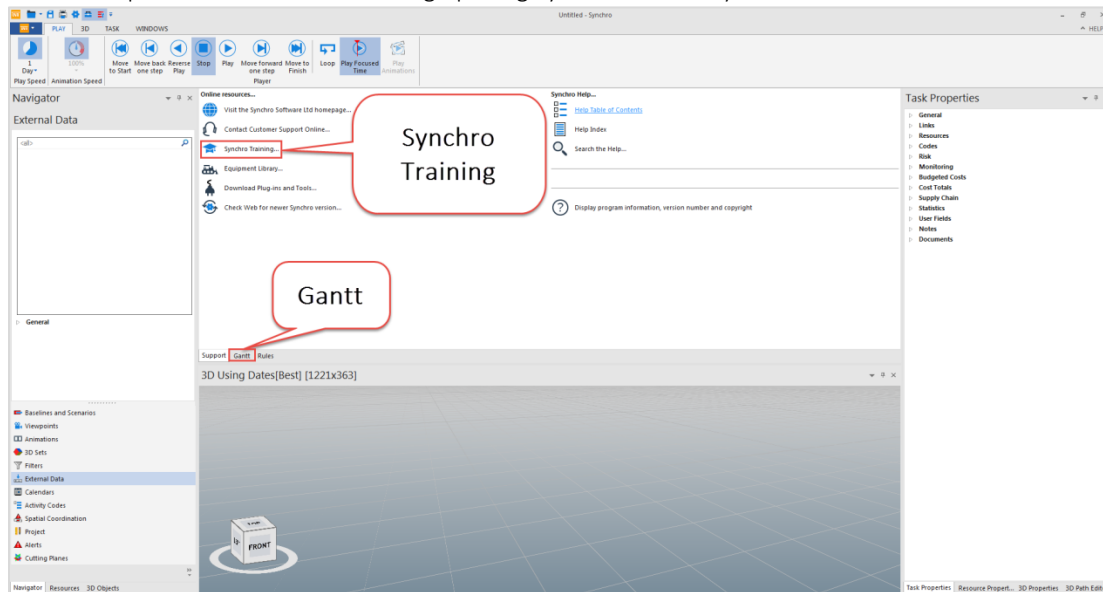
Navigator tab

Task Properties
Resource Properties
3D Properties
3D Path Editor

- **Quick Access Toolbar** contains commonly used icons. The Quick Access toolbar can be customized by left clicking on the down arrow and selecting **More Commands**.
- **Ribbon** contains commands, sorted by category. In the top right corner of the Ribbon is the Help menu which can be used to find more information about a particular feature
- **Gantt Chart** window displays the list of Tasks
- **3D Window** displays the modelled resources at any defined point in time.
- **Navigator** contains project-wide datasets logically grouped by the categories shown above; for example Project Details, Task and 3D Filters, Viewpoints
- **3D Objects** contains the list of 3D Objects and Workspaces (including those imported and those created in Synchro PRO)
- **Resources** contains the list of Resources (including those imported and those created in Synchro PRO)
- **Task Properties** contains data related to the selected Task(s) including Task Status (in the General panel), assigned Resources, and Budgeted Costs
- **Resource Properties** contains data related to the selected Resource(s) including Costs, assigned to Tasks, and User Fields
- **3D Properties** contains data related to the selected 3D Object(s)
- **3D Path Editor** contains data related to the selected 3D Path


2.2. Open Viewer Workspace

1. Start **Open Viewer** by double clicking on the icon  on your desktop.
You will be presented with the following opening Synchro screen layout:



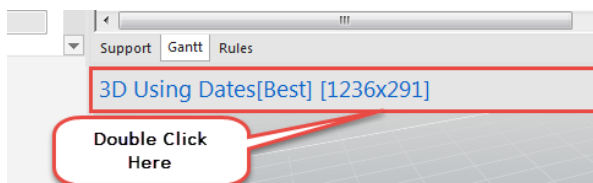
NOTE: If you need to download the training files, select **Synchro Training** and this will present you with the link to the FTP site to download the latest material.

2.2.1. Resizing Windows

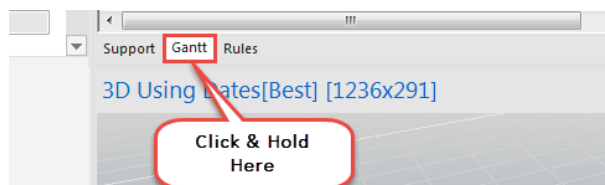
2. Place the cursor at the top of the **3D Window** so the double arrow icon  appears.
3. Select it with a left mouse click, hold down and drag the 3D window up. All windows in Synchro can be resized by this method

2.2.2. Undocking and Relocating Windows

4. To undock a window, double click in the window header.

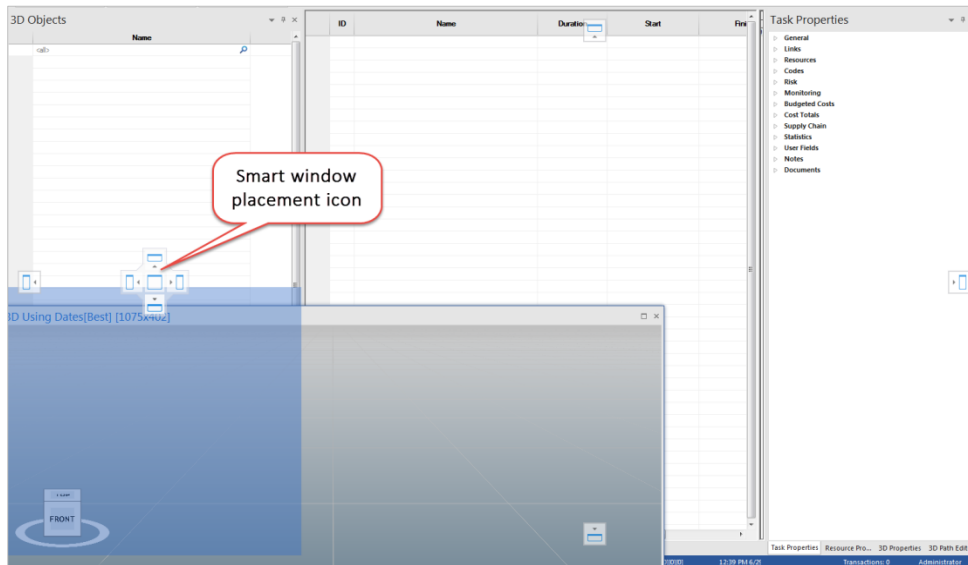


5. To undock a single tab, left click on the tab and keep holding the mouse button while moving the mouse. The tab will be undocked as a new window.



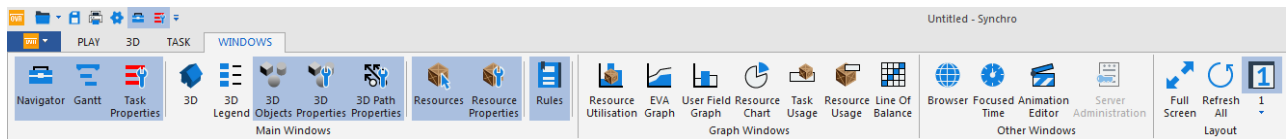
6. If you are using multiple monitors, you can then move the new window to another screen.
7. To resize the undocked window, hover over a corner until a diagonal arrow appears, then left click and drag to the desired size.
8. To re-dock the window in the previous location, simply double click the window header.

9. To re-dock the window in a different location, left click and drag in the window header. Move the mouse over another window until the smart window placement icons appears. Hover over one of the icons – a blue preview of where the window will be place will be shown. Release the mouse button to place.

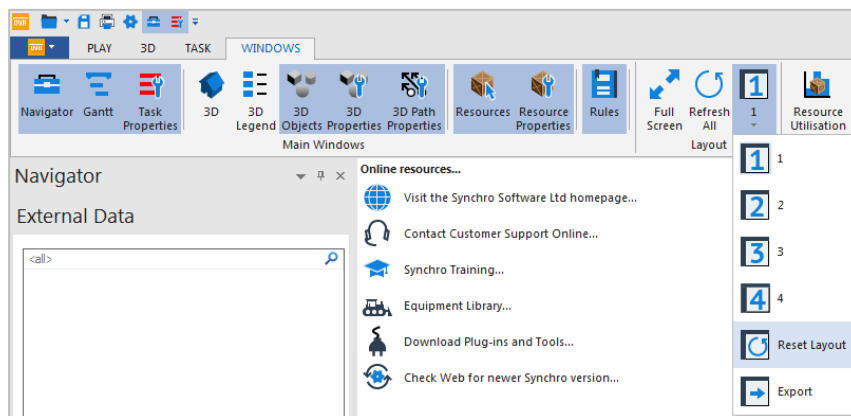


2.2.3. Reset layout

10. If you close any of these windows, you can re-open them by selecting the appropriate icons in the **Windows** ribbon



11. To reset the window layout to the default, select **Windows→Layout→Reset Layout**



This command is particularly useful if you cannot locate a particular window or the layout is changed when switching from multiple monitors to only one.

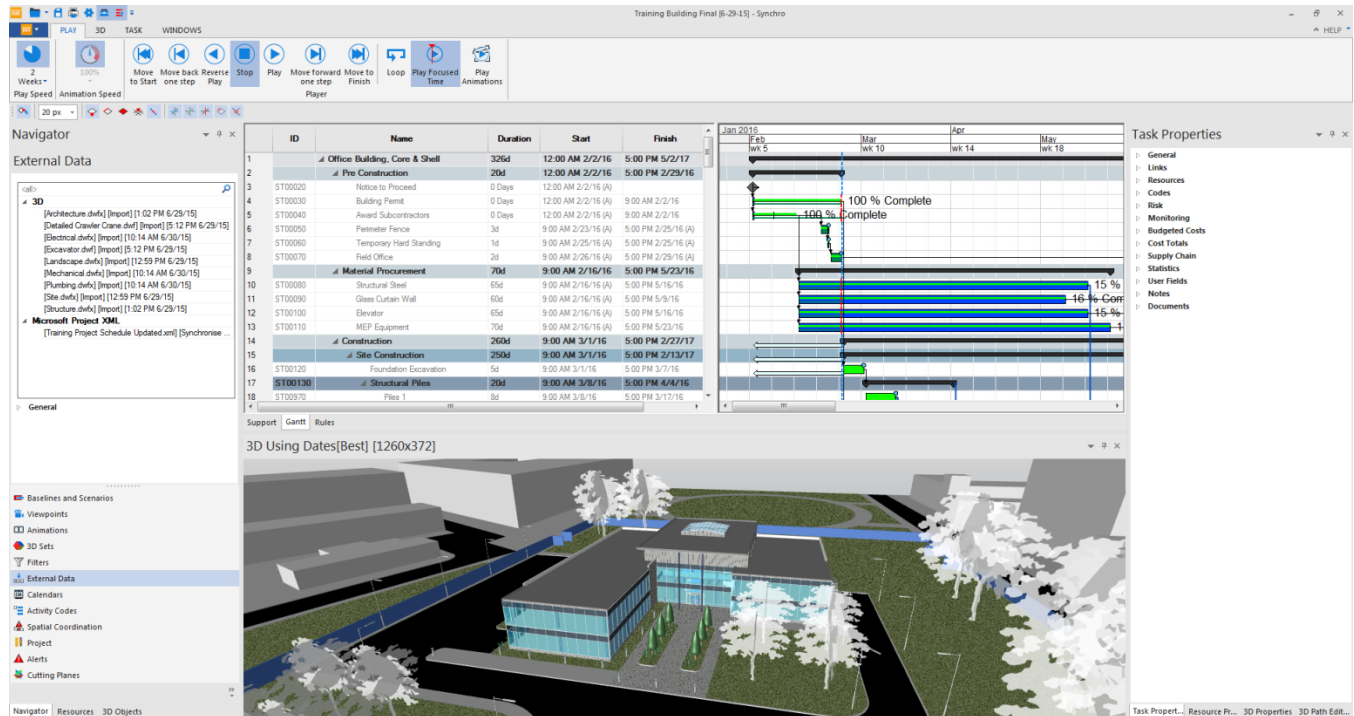
3. Opening a Synchro Project File [.sp]

This section will show how to open a Synchro Private Project file.

The Synchro Project file you will be opening has an imported XML schedule as well as 3D CAD Models. The schedule and the model are fully linked together.

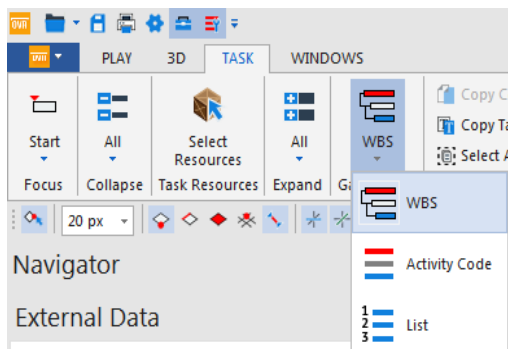
1. Select **File** → **Open** → **Private Project** then locate and select **Synchro Training Project.sp** to **Open**.
2. Select (left mouse click) the **Gantt** tab (at the bottom of the Support Panel) to display the Gantt Chart.

The Synchro Project file should look like this:



3.1. Gantt Chart Navigation

1. Move the mouse into the **Gantt Chart** area.
2. To **Pan**, hold down the middle mouse button then move the mouse up, down, left and right.
3. To **Zoom**, roll the middle mouse button wheel forward and back to zoom in and out respectively.
4. This schedule is organized by Work Breakdown Structure (WBS). In the **Task** ribbon, ensure that **Gantt Mode** is set to **WBS**. Schedules may also be structured via **Activity Codes** or **List** (no summaries or indent structure).



7. Right click again and choose **Expand** → **All** to see all the tasks again.

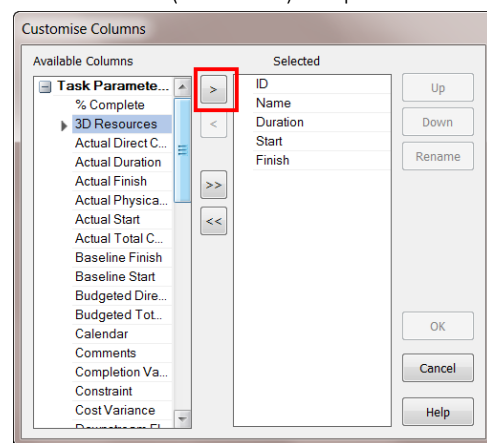
	ID	Name	Duration	Start	Finish	Jan 2016					Jan 2017	
						Oct wk -14	Nov wk -1	Dec wk 13	Jan wk 26	Feb wk 39	Mar wk 52	Apr wk 5
1		Office Building, Core & Shell	326d	12:00 AM 2/2/16	5:00 PM 5/2/17							
2		Pre Construction	20d	12:00 AM 2/2/16	5:00 PM 2/29/16							
9		Material Procurement	70d	9:00 AM 2/16/16	5:00 PM 5/23/16							
14		Construction	260d	9:00 AM 3/1/16	5:00 PM 2/27/17							
117		Project Completion	46d	9:00 AM 2/28/17	5:00 PM 5/2/17							


3.2. Customise Columns

Open Viewer gives you the option to customise the columns shown in the Gantt chart by adding or removing columns, or changing the order or names of the columns displayed. The **Customise Columns** option is useful to show various Task Parameters in the Gantt Chart.

8. Right click in the heading field of the Task List and select “Customise Columns” (below left) to open the “Customise Columns” window (right).

ID	Name	Duration	Sort
			<div> No Sorting Sort Ascending Sort Descending Ascending Critical Path Sort via WBS Level Customise Columns... Open Layout... Save Layout Save Layout As... Import Global Layouts... Export Global Layouts... </div>




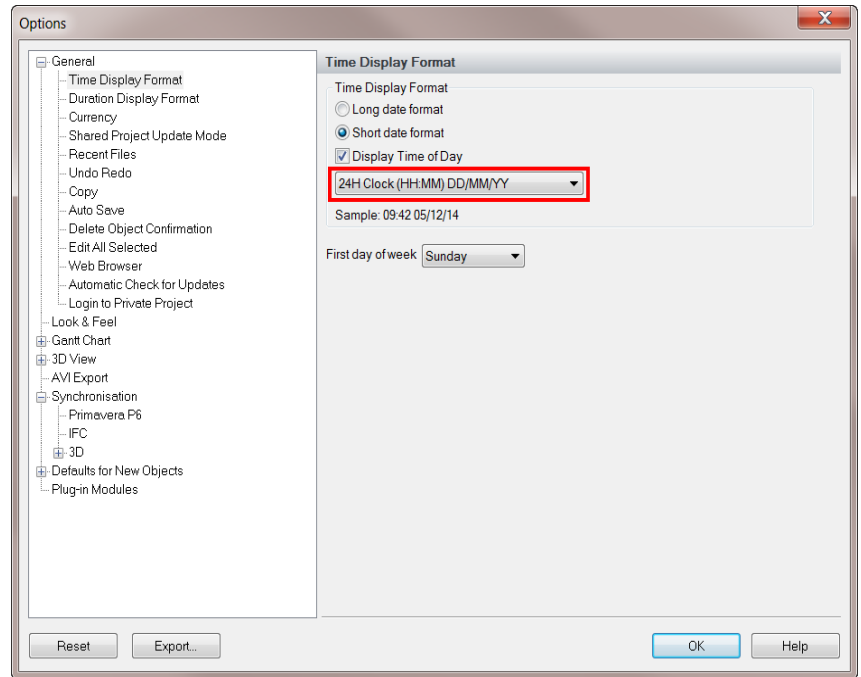
9. In the “Customise Columns” window, select a Task Parameter  on the right under “Available Columns” and press the outlined arrow (above) to move the Task Parameter to the left under “Selected”.
10. Conversely, to remove a column, highlight a Task Parameter under “Selected” and press the left arrow to move the parameter back to “Available Columns”
11. Once you have finished adding and removing Task Parameters, you can re-order the columns by highlighting a Task Parameter in the “Selected” Column and pressing “Up” or “Down”. Similarly, you can rename the Columns titles by highlighting the parameter and pressing the “Rename” button.

NOTE: The first Task Parameter in the “Selected” column is the furthest left column in the Task List.

3.3. Date Display

The time and date format can be changed to match the local convention.

12. From the **Gantt** ribbon or the **Quick Access Toolbar**, select the  **Options** icon. This will open the Options dialog which contains many settings related to all aspects of Synchro including the customization of the Gantt Chart and 3D view.
13. Expand the **General** tab, and select **Time Display Format**.
14. From the first drop down menu, select **24H Clock** for this training. This will set the date format to DD/MM/YY. There is also the option to hide the time of day.





4. 3D View

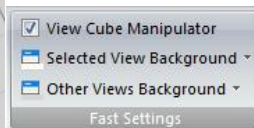
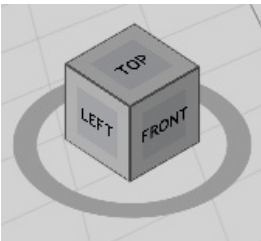
In this section, you will learn how to navigate and customize the 3D View window.

The 3D View window displays 3D CAD objects that have been imported to Synchro. During import, 3D Objects are assigned 3D Resources, which can be linked to Tasks. In Synchro PRO, when the linking process is complete, the view of the model is controlled by the schedule.

4.1. 3D Window Navigation

It is highly recommended to use a mouse with left click, middle and right click buttons, as well as a scroll wheel (that has center click capabilities).


- **Zoom All** - This will show all the objects from the front as the models have been created- it can be used if the view becomes disoriented.
 - Within the **3D window** click the right mouse button and select **Zoom** →  **Zoom All**
 - Or from the **Ribbon**, select **3D** → **Zoom** →  **Zoom All**
- **Rotate** - Hold down the left mouse button at a point in the 3D View that you want to rotate about, then move the mouse
- **Zoom** - Scroll the middle mouse button forward to zoom in and back to zoom out
- **Pan** - Hold down the middle mouse button and move the mouse left, right, up and down
- **View Cube** - Left click on points or faces on the cube and the view will rotate to that viewpoint, or hold down the left mouse button on the circle to rotate



NOTE: To enable your View Cube, please select **3D** → **Fast Settings**. Check the box next to “**View Cube Manipulator**” (shown left).

4.2. Preferences

The following custom settings are available to control the 3D View Window:

- In **3D Ribbon** → **Fast Settings**, you can change the colour of the background for the selected and other 3D views.
- The ground plane grid can be turned on and off by right clicking in the 3D Window and selecting **Visual Indicators** →  **Grid**



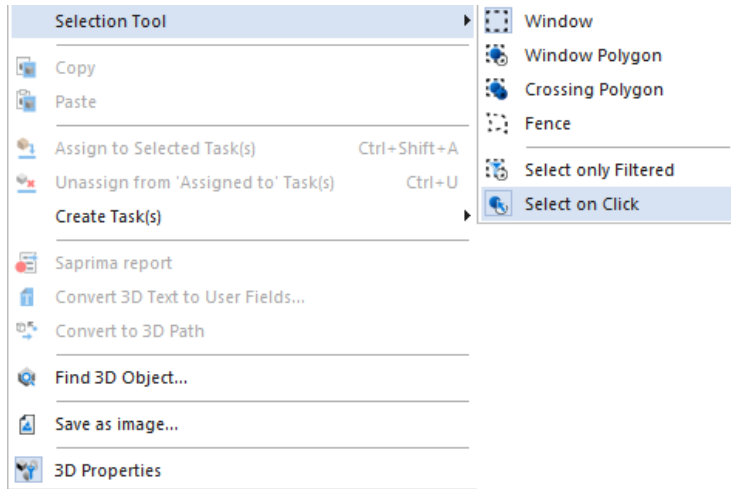
4.3. Selecting 3D Resources

This section explains the various methods to select a single (or multiple) resource. When you select a 3D Resource, it will be highlighted **purple** in the 3D window.

TIP: You can change the 3D Resource selection colour in **Options→3D View→Colours→Selection Highlighting**.

- **Left Click** -Single left click an object in the 3D window to select. Any object that you click twice will be deselected.

NOTE: If a single left click does not select an object, right click in the 3D window and enable **Selection Tool→Select on Click**



- **Shift Select** - When **Select on Click** is disabled, holding down the **Shift** button on the keyboard and single left clicking with the mouse will select objects in the 3D View. You can continue to select objects while holding Shift. Objects that you select twice will not be deselected
- **Ctrl Select** - When **Select on Click** is disabled, holding down **Ctrl** on the keyboard will work similar to using the **Shift** selection, except that any selected object that is clicked will be deselected.
- **Navigator Lists** - You can highlight the name of the 3D Object or Resource in the **3D Objects, Resources, or Navigator→3D Sets** windows

NOTE: Right click on the selected Resource in the 3D Window to Display **Assigned to Tasks...**

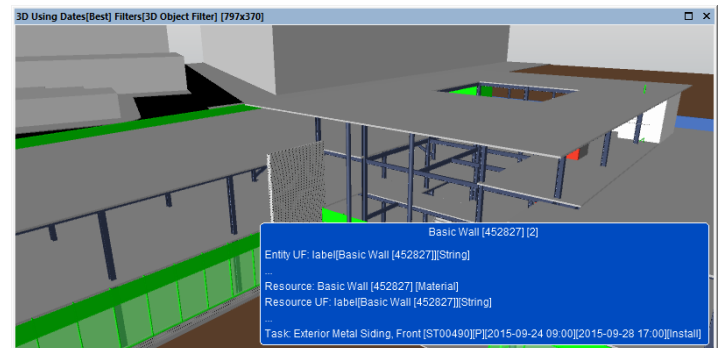
4.4. Information Balloon

As you move over 3D Objects in the 3D Window, you will see an **Information Balloon** in the bottom right corner of the 3D Window. The **Information Balloon** is especially useful in Open Viewer because it quickly identifies any object in the 3D Window and lists the tasks to which it is assigned, if any.

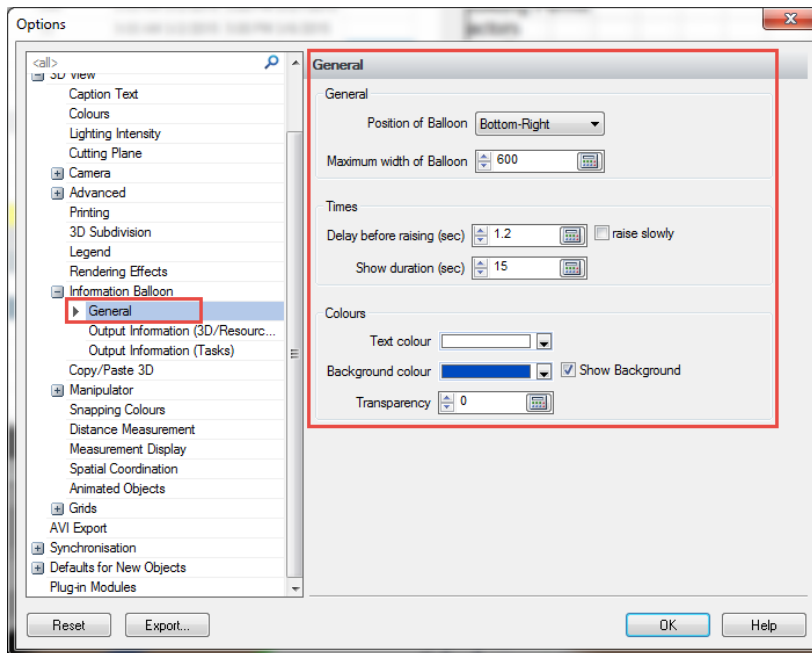
The **Information Balloon** displays:

- 3D Object Name
- 3D Resource Name
- Task(s) the 3D Object is assigned to
- Resource Appearance Profile per Task
- Resource User Fields
- Task User Fields

The information displayed in the **Information Balloon** can be customised in **Options→3D View→Information Balloon→Output Information**.



TIP: You can change the appearance and location of the **Information Balloon** under the Information Balloon→General tab (shown below).



NOTE: The **Information Balloon** can also be displayed in the Gantt Chart. To enable and customise the Gantt Chart **Information Balloon**, please go to **Options→Gantt→Information Balloon**.

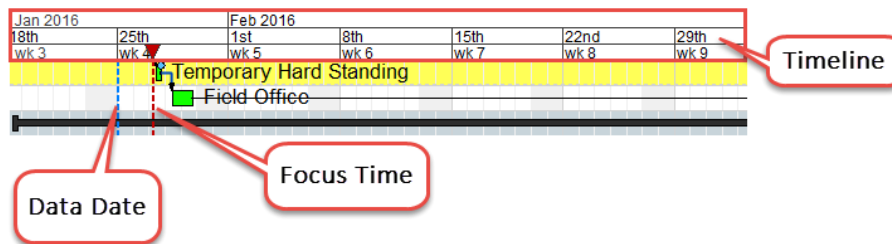
5. Reviewing a Synchro Project File [.sp]

This section will explain how to use Open Viewer to analyze and review a Synchro PRO project file.

Synchro Open Viewer is a tool for your team to fully understand and participate in all phases of the project; from pre-construction planning to completion. This section will cover various tools and functions in Open Viewer designed to optimize your project workflow.

5.1. Focus Time

The **Focus Time** of a project controls the visibility of assigned 3D Objects in the 3D Window based on time. Moving the **Focus Time** along the timeline allows you to visualize the construction sequence of the project. The **Focus Time** is indicated by the red dashed line with a triangle symbol at the top in the Gantt Chart (shown below).



NOTE: The **Data Date** is indicated by a vertical blue dashed line. This defines the project scheduling date for progress reporting and can be confirmed in **Navigator→Project→General**

1. Left click and hold the red triangle in the **Timeline** and move the **Focus Time** bar left and right. This will move the **Focus Time** to any point in time in the schedule.

TIP: You can also single left click anywhere in the **Timeline** and the **Focus Time** will jump to that point. You may do this for example, if you want to see what **3D Objects** are associated with a particular Task.

2. Move the **Focus Time** before the start of a task in the Gantt Chart.
3. Right click on the task and choose **Select Assigned Resources**.
4. In the 3D View, right click and select **Zoom→Zoom Selected**
5. Move the **Focus Time** through the duration of the task to see where, when, and what changes are occurring in the project.

5.1.1. Focus Time on a Task

In addition to dragging the **Focus Time** throughout the timeline, you also have the option to snap the **Focus Time** to the start, centre, or end of a task. Moving the **Focus Time** to a specific task allows you to visually see what and where something is occurring throughout the task.

1. Select and highlight a task in the Task List
2. Right click on the selected task to select **Focus Time→Start, Centre, or Finish** to snap the Focus Time.





5.1.2. Focused Time

Another option to manipulate the **Focus Time** is using the **Focused Time** window. This is useful if you want to look at precise date and time in the project, rather than dragging the Focus Time marker through the timeline.

1. Open the **Focused Time** window in **Windows Ribbon→Focused Time**
2. Enter any specific date and time to snap the Focus Time to that time.

5.2. Play

The **Play** Ribbon in Open Viewer contains all commands needed to automatically control the **Focus Time**. The **Play** Ribbon automatically moves the **Focus Time** at a speed of your choice to view the construction sequence.

1. From the **Play** Ribbon, select  **Move to Start**
2. Select  **Play**
3. The Focus Time will start moving through the project timeline at a pre-defined speed. To change the movement speed, select **Play** → **Play Speed** and select a time interval option, for example  **One Week**. For the time interval of One Week, the Focus Time will automatically move forward in intervals of 1 week.
4. Select  **Stop**

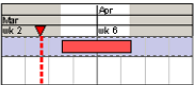
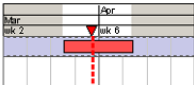
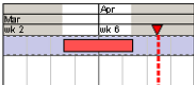

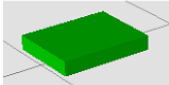
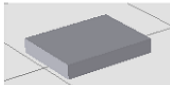
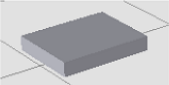
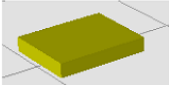
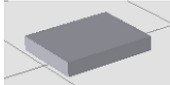
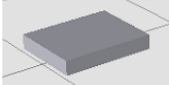
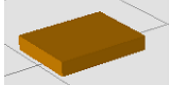


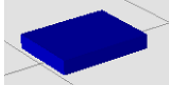

5.3. Resource Appearance Profiles

The **Resource Appearance Profile** selected when assigning a Resource to a task dictates how the Resource is to behave before, during, and after the Task. **Resource Appearance Profiles** indicate how a particular resource is used in a Synchro project. The **Resource Appearance Profile** controls:

- when the Resource is visible (before, during, and/or after) according to one of 4 Actions (Install, Maintain, Remove, and Temporary)
- the colour of the Resource in the 3D view before during and after the Task.
- any growth simulation or transparency interpolation during the Task


Select the **Navigator** →  **Resource Appearance Profiles** button

Under **System Profiles** you will see 4 predefined options which will be used when assigning to tasks. The functions of these are shown in the table below.

PROFILE	FOCUS TIME		
	 Before Task	 During Task	 After Task
INSTALL	 Start Appearance	 Active Appearance	 End Appearance
MAINTAIN	 Start Appearance	 Active Appearance	 End Appearance
REMOVE	 Start Appearance	 Active Appearance	 End Appearance
TEMPORARY	 Start Appearance	 Active Appearance	 End Appearance

NOTE: Customised user defined **Resource Appearance Profiles** may have also been created in Synchro PRO that can:

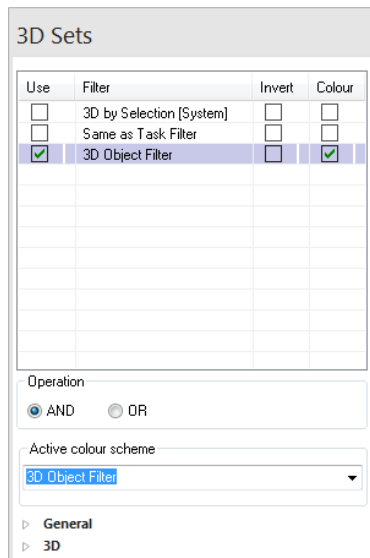
- Set the Action
- Change the Colours
- Add Transparency
- Set Different Start & Finish Transparencies
- Show Growth Simulation

TIP: Right click in the 3D Window and select **Visual Indicators** →  **Legend** to display a key that identifies the project's **Resource Appearance Profiles**. Customise what is shown in this Legend in **Options** → **3D View** → **Legend**.

5.4. 3D Sets

3D Sets, or filters, allow you to show or hide certain elements in the 3D Model. This can be useful if you, for example want to see the construction sequence of a certain file or set of objects in the 3D View. **3D Sets** can be used to isolate certain aspects or areas of the model. The most commonly used filter (the built-in **3D Object Filter**) is explained here.

- Select **Navigator** →  **3D Sets**. There are 3 built-in filters.
- Tick the box to the left of **3D Object Filter** and highlight the text as shown below:

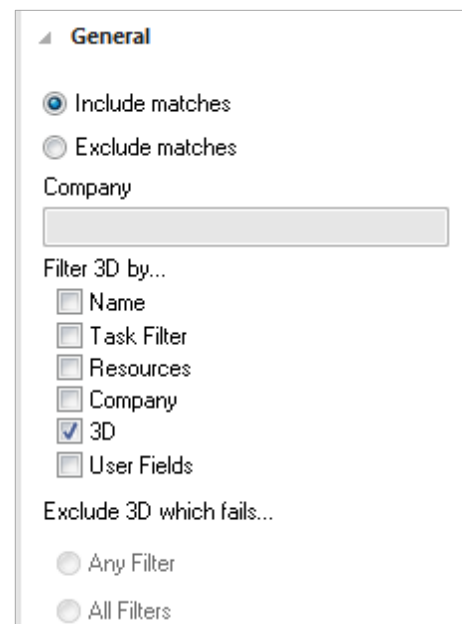


NOTE: The **3D by Selection [System]** filter is automatically enabled when using the **3D** → **Filters** → **Show Selected** or **Hide Selected** commands

The **Same as Task Filter** filters the 3D to show only the objects assigned to Tasks included in the current **Task Filter**

- Open the **3D Sets** → **General** Tab and ensure that the box is activated next to **3D**

This filters the 3D View by the **3D Objects** list. Initially everything will disappear in the 3D view since nothing is selected in the 3D tab



- Open the **3D Sets** → **3D** tab. Right click within the 3D list and select **Collapse** → **All**. Then click on the icon left of the **Objects of scene** node (circled right) to expand it.

If you expand each file, you will see that you then have the layer the items are on.

Click to expand a layer and you will see the individual items which you can hide or unhide as you so wish.

Enabling (checking) the box next to the **File Name**, **Layer**, or **Object Name** will show the objects associated with each in the 3D View (Disabling/un-checking will hide these objects the 3D View):

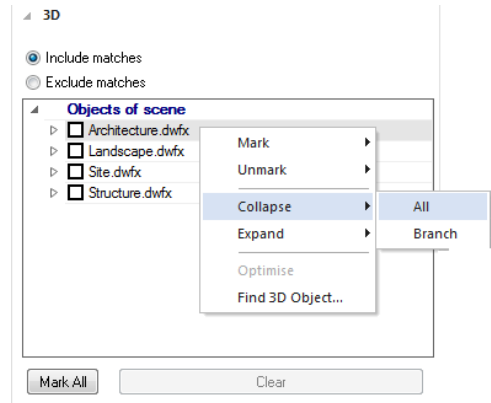
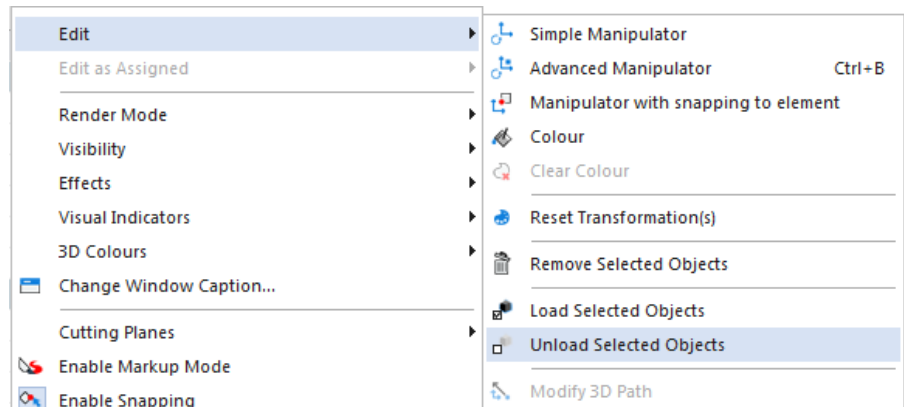
- Select **Mark All** to enable all objects or **Clear** to disable

NOTE: You can begin with all objects disabled and begin checking files, layers, or objects to add to the visible scene or you may prefer to begin with all objects enabled and uncheck files, layers or objects to hide them from the scene.

Use the **Exclude Matches** rather than **Include Matches** options to hide all objects checked in the filter – this inverts the visible and hidden objects

Filter via 3D Sets vs Load/Unload in 3D Objects window: The **3D Sets** filters control the visibility of an object only. Un-checking an object in **Navigator**→**3D Sets** hides it in the 3D window; un-checking an object in the **3D Objects** window unloads it from memory (RAM) and also hides it in the 3D window. Unloading from memory will help improve performance on large files. When an object is unloaded in the 3D Objects window, it will not be visible in the 3D view, regardless of whether it is included in a 3D Sets filter or not – it must be enabled (checked) in both the 3D Sets and 3D Objects window to be visible. For visualisation purposes and ease of sorting/assigning, it is recommended to use the 3D Sets rather than 3D Objects list. The benefits to using the 3D Sets include: can save multiple filters, can create colour schemes to affect filtered/non-filtered objects, can show the intersection (AND) or union (OR) of multiple filters, can filter by other attributes than just the 3D Objects list (eg. text or parameters), and can easily switch between multiple saved filters. For more information on 3D Sets, please see the Help Section in Synchro or the PRO Advanced training course.

TIP: You can unload selected 3D Objects from the 3D View via Right-Click→Edit→Unload Selected Objects.



6. Cutting Planes

In this section, you will learn how to use a cutting plane, which allows you to see a section or plane of your model in the 3D Window.

Cutting Planes may be used for example, to view inside of a building or underground when working in Synchro, playing the Focus Time, or playing an Animation. Cutting Planes can be created in the X, Y, or Z direction. Below are the steps required to create a cutting plane:

1. Right click in the 3D View and select **Cutting Planes**→**Cutting Plane (X, Y, or Z)**
2. Left click to place the cutting plane in the 3D Window
3. A simple manipulator will appear. Click and drag the vertical or horizontal arrow of the Manipulator to move the cutting plane along the axis of the selected direction (X, Y, or Z) to adjust the location of the **Cutting Plane**.
4. Open **Navigator**→**Cutting Planes** and you will see the **New Cutting Plane** listed.
5. Turn off/on the Cutting Plane using the checkbox next to the cutting plane.
6. The **Show Plane** and **Show Manipulator** check boxes allow you to hide these visual indicators in the 3D view while still applying the cutting plane. This may be useful when viewing an animation, for example. After changing the preferences, press **Apply**.

Cutting Planes

<all>

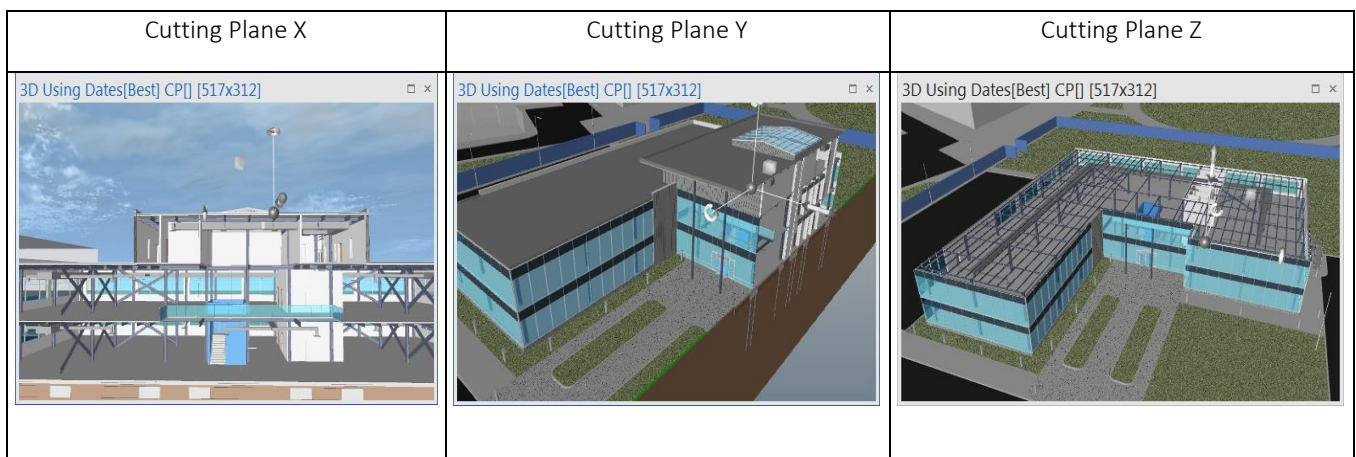
- ▶ ☒ New Cutting Plane

Point

Normalised direction

☒ Show Plane
☒ Show Manipulator

Practice creating and manipulating **Cutting Planes** in the X,Y, and Z direction to match the images below.



TIP: You can apply more than one **Cutting Plane** in the 3D View. Additionally, if you have multiple 3D Windows open, you can apply a different **Cutting Plane** to each view.

7. Viewpoints

In this section, you will learn how to create and save a Viewpoint.

Viewpoints can store **Focus Time**, **Camera Angle**, applied **3D Sets**, and **Cutting Planes**. **Viewpoints** are essentially a snapshot of a scene in the 3D Window. A saved **Viewpoint** can be reactivated at any point in one or all 3D windows. This can be useful for returning to a particular time or view after updating a schedule or model to see what has changed, or to quickly jump to points of interest when presenting to stakeholders.

1. Adjust the Camera Angle to a desired view and move the Focus Time to a particular moment in time
2. Select **Navigator→Viewpoints**
3. Right click in the top white window in **Viewpoints** and select **Add**
4. This will create a new viewpoint. Change the name to something descriptive
5. In the **General** panel, you will see that any currently activated **3D Sets** and **Cutting Planes** are saved with the Viewpoint
6. Change the Focus Time in the Gantt Chart, and then edit Camera Angle and turn off the Cutting Plane in the 3D window.
7. To return to the saved Viewpoint right click on the Viewpoint name and select **Activate in selected View**

NOTE: If you update the Camera Angle and/or Focus Time and wish to resave with the new values, select the **Set Camera/Focus Time button**. You can also enable/disable Cutting Planes and 3D Sets to be saved with the **Viewpoint** using the checkboxes.

Viewpoints

<all>

New Viewpoint - 5:00 PM 3/23/2016

General

Description

URL

☒ Camera

☒ Time

Cutting Planes

<all>

☒ OfficeZ1

Filters

<all>

☐ 3D by Selection [System]

☐ Same as Task Filter

☒ 3D Object Filter


8. Spatial Coordination

In this section you will learn how to create and run a Spatial Coordination Test.

The **Spatial Coordination** function in Synchro Open Viewer analyses the location of 3D Object in your model relative to its surrounding 3D Objects to identify any clashes between objects at any instance in time. In Open Viewer, you can create and run Spatial Coordination Tests. Spatial Coordination can be especially useful in the planning phase of your project, as you are able to identify and plan against clash occurrences before construction even begins.

8.1. Create a Spatial Coordination Test

In this section, you will learn the settings and parameters available when creating a Spatial Coordination Test.

1. Select Navigator →  **Spatial Coordination**
2. Create a new Spatial Coordination test by right clicking in the window to select **Add**.

TIP: Right click on *New Spatial Test* to rename the test.

3. Ensure that the test is highlighted to define the parameters to be tested by the Spatial Test

- **Company** - Identifies the company of the user who created the test
- **Dates to Use** – Specify which task's dates (i.e. Best, Actual, or Baseline) to run the clash test on.

NOTE: The selected **Dates to Use** must be activated in at least one 3D Window when the test is run or you will receive an error message.

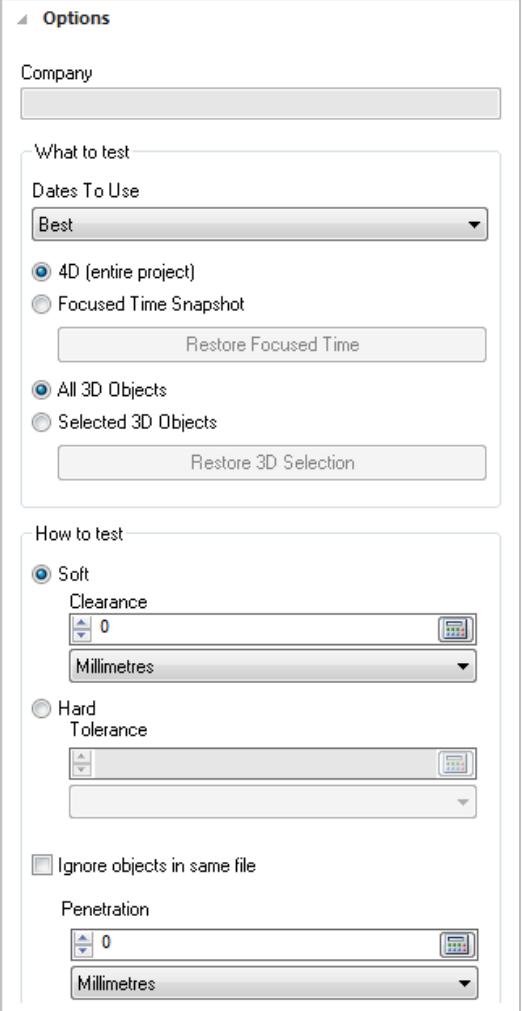
- **4D (entire project)** –Identifies clashes throughout the entire duration of the project. Also identifies the start and end time of any clashes identified.
- **Focused Time Snapshot** – Identifies clashes occurring at the set Focus Time.
- **Restore Focused Time** – Re-sets the Focus Time to the snapshot used when the test was last run.
- **All 3D Objects** –Tests all 3D Objects shown in the 3D Window
- **Selected 3D Objects** – Tests all selected 3D Objects in the 3D Window
- **Restore 3D Selection** – Selects the 3D Objects that were selected the last time the test was run.

NOTE: Restore Focused Time and Restore 3D Selection are only available when the Spatial Test has previously been run using Focused Time Snapshot or Selected 3D Objects, respectively.

- **Soft Test** – Identifies 3D Objects whose minimum distance apart is less than a user defined *Clearance* distance.
- **Hard Test** – Identifies elements which overlap by more than a user defined *Tolerance* distance.
- **Ignore objects in same file** – Ignores detected clashes that come from the same file.

TIP: Enable this option to optimize the run time of the Spatial Test.

- **Penetration**- This option is useful to check that an object on a 3D Path does not intersect with any other objects as it is moving along its assigned path



The screenshot shows the 'Options' dialog box for the Spatial Coordination test. It is divided into two main sections: 'What to test' and 'How to test'.

What to test:

- Company:** A text input field.
- Dates To Use:** A dropdown menu with 'Best' selected.
- 4D (entire project):** A radio button that is selected.
- Focused Time Snapshot:** An unselected radio button.
- Restore Focused Time:** A button.
- All 3D Objects:** A radio button that is selected.
- Selected 3D Objects:** An unselected radio button.
- Restore 3D Selection:** A button.

How to test:

- Soft:** A radio button that is selected.
 - Clearance:** A numeric input field with '0' and a unit dropdown set to 'Millimetres'.
- Hard:** An unselected radio button.
 - Tolerance:** A numeric input field with a unit dropdown set to 'Millimetres'.
- Ignore objects in same file:** A checkbox that is unchecked.
- Penetration:** A numeric input field with '0' and a unit dropdown set to 'Millimetres'.

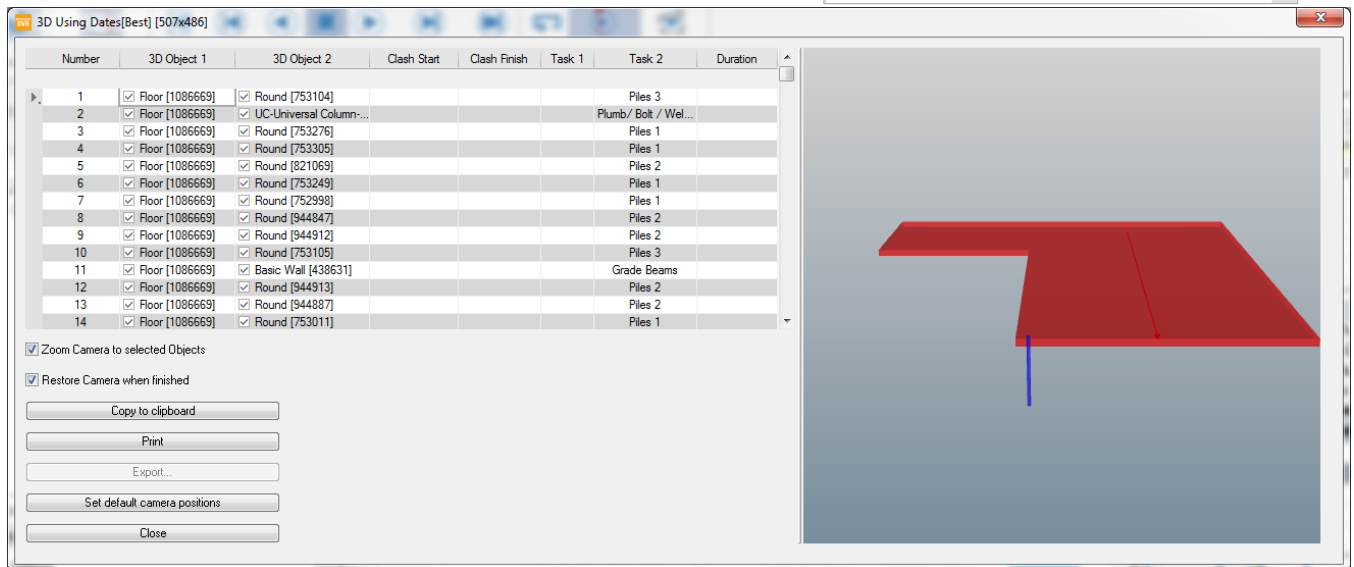
8.2. Run Spatial Coordination Test

In this section, you will learn how to run a **Spatial Coordination** test and analyse the results.

- After you have set your desired parameters, right click on the Spatial Test to select **Run Test**.

NOTE: When you select **Run Test**, Synchro will begin displaying a progress bar, displaying the % complete of the test, the number of clashes found so far, as well as the estimated time to completion. If no clashes are found during the test, this window will state “Clash Test complete. No clashes were found.”

- When Clashes are found during the **Spatial Coordination** test, the test results dialog will display:



The **Spatial Coordination** results window displays each instance of a clash identified during the test. For each instance of an identified clash the report will list the two objects that clash, as well as which Task the clash occurs during. The columns Clash Start, Clash Finish, Task 1, and Duration will only be filled out when the **Spatial Coordination** test encompasses a 3D Path motion.

- Move through each identified clash in the report window to see where the Clash occurs as well as the associated Objects.

TIP: Select **Copy to Clipboard** to paste the Spatial Coordination data into a spreadsheet or text document to perform further analysis. You can also print the Spatial Coordination test results by selecting **Print**, which will open a standard Open Viewer print dialog. For more information on printing, please see section 12.2. **Printing the Gantt Chart**.


- Select **Close** to exit the Spatial Coordination test result window.

9. Markups

The following section will teach you how to create and save a Markup in Open Viewer.










The **Markup** tool in Open Viewer allows you to create on screen notes and drawings in the 3D Window. **Markups** are useful when you want to quickly add a comment or concern while reviewing an .SP file, but you don't necessarily want to **Print** or **Save as Image**. Different types of markups can be created including various defined shapes, Notes, Arrows, and clouds.

Prior to creating a **Markup** in Open Viewer, it is useful to isolate the 3D Viewpoint. Once you select **Enable Markup**, you cannot zoom in and out of the 3D View until all **Markups** have been cleared from the 3D View. Follow the steps below once you have found an area in the 3D View to **Markup**.



1. From the **3D Ribbon** select  **Enable Markup** to display the **Markup** toolbar
2. Select which type of **Markup** you wish to make




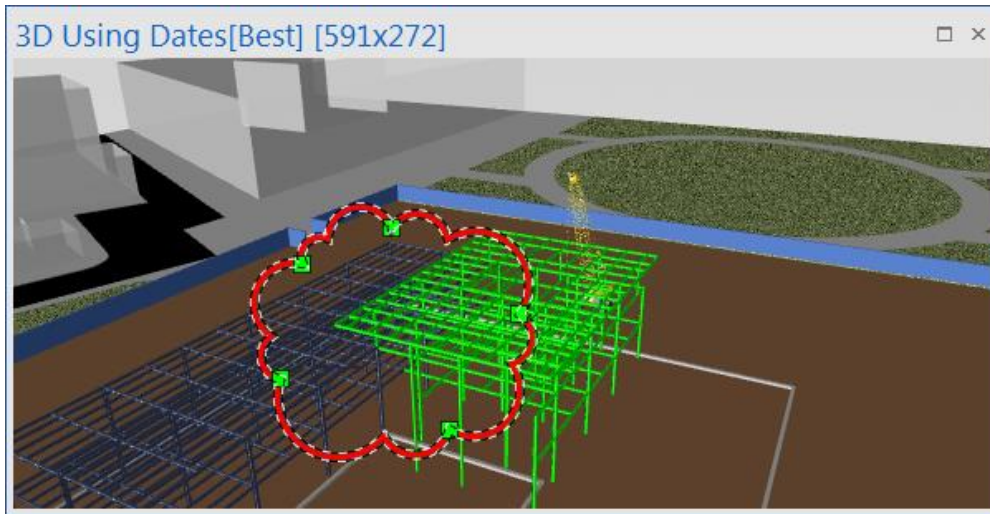
Available **Markup** options (from left to right in the toolbar): **Line**, **Polyline**, **Rectangle**, **Circle**, **Freehand**, **Note**, **Arrow**, **Double-Arrow**, and **Cloud**.

3. Once you have selected a type, follow the rules listed below to create the **Markup** in the 3D View:
 -  **Line**,  **Arrow**,  **Double-Arrow**: Left-Click to define the start and end-points of the line
 -  **Polyline**: Left-Click to define each point of the Line, press enter to end the drawing
 -  **Rectangle**: Left-Click & hold the first point, move diagonally to place the second point and release
 -  **Circle**: Left-Click & hold to define a center point, drag the mouse to define the radius and release
 -  **Freehand**: Left-Click & hold, move the cursor in the shape you wish to create, then release the mouse
 -  **Note**: Left-Click to define the central point of your text, release the mouse & edit the text accordingly
 -  **Cloud**: Left-Click to define each point of the Cloud, click the first point to complete the cloud

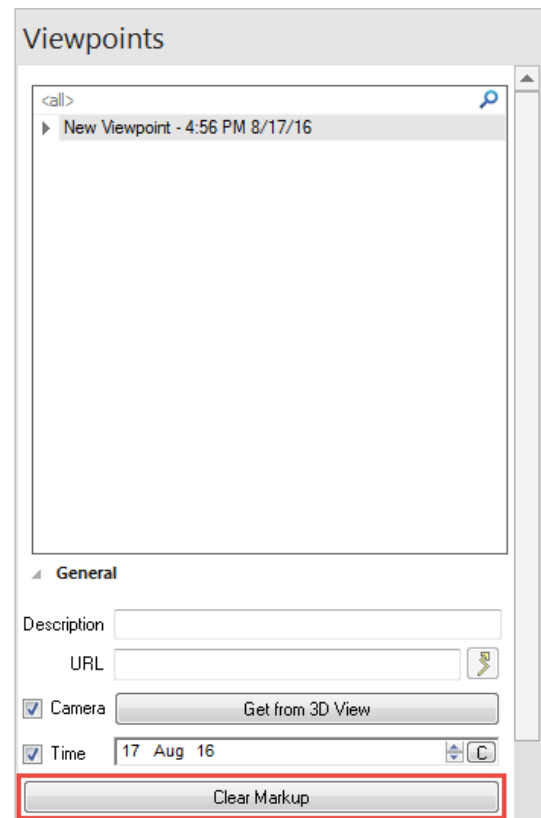


TIP: If you want to re-start your **Markup** creation, hit the  **Clear** icon. If have added multiple **Markups** in one Viewpoint and you want to delete one, select  **Erase Markups** and select which you would like to delete.

4. To edit a Markup, enable  **Select Markups** from the **Markup** toolbar and click on the shape in the 3D View. To re-size the shape, select the object in the 3D View and click and drag its points. Furthermore, you can change the color of the shape outline (if it is selected) from the color option drop-down in the **Markup** toolbar.



5. Once you have finished creating a **Markup**, a Viewpoint will automatically be created in Navigator→Viewpoints.
6. If you wish to save a **Markup** but would like to continue working on the .sp file, highlight the current Viewpoint and select **Clear Markups**. This option will save created **Markups** in the Viewpoint so they can be reviewed at a later time.



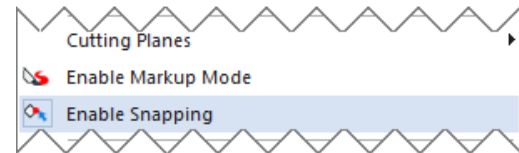
10. Measure Distance

The Measure Distance feature in Synchro can be used to measure the distance between two points. This can be useful if you are for example, trying to figure out how large a room is, or how far away two 3D Resources are.

10.1. Measurement Settings

This section will explain the settings which are useful when using the measurement function in Open Viewer.

1. Ensure the correct snapping options are enabled. **Snapping** allows for precise input of object geometry. Right click in the 3D View to select **Enable Snapping**. You will see the Snapping Toolbar appear below the Ribbon.

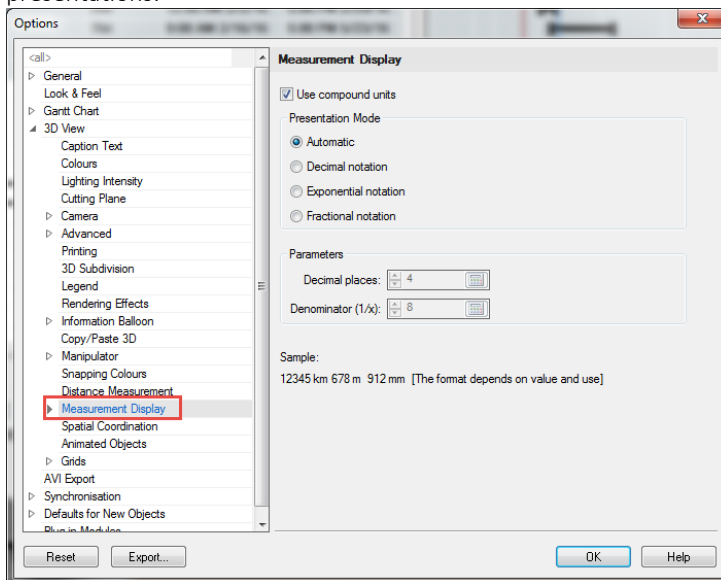


Enable Snapping

Snap to Vertex

TIP: For point-to-point measurement, disable all snapping except for **Enable Snapping** and **Snap to Vertex**.


2. Go to **Options** → **3D View** → **Measurement Display** to customize measurement settings such as parameters and presentations.

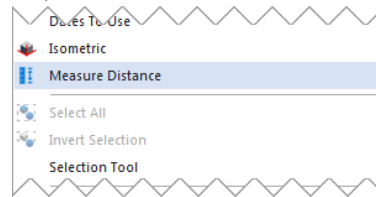


TIP: Customise the **Color**, **Projection**, and **Size of Text & Arrows** in **Options** → **3D View** → **Distance Measurement**

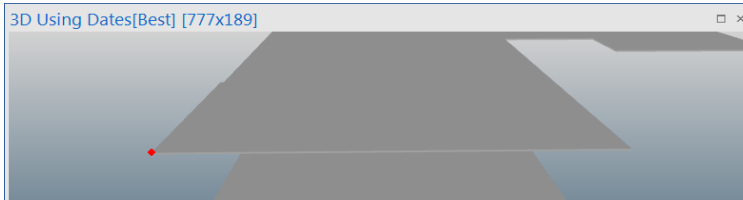
10.2. Measuring

This section will explain how to measure the distance between two points in a 3D View.

1. Right click in the 3D View and select  **Measure Distance**

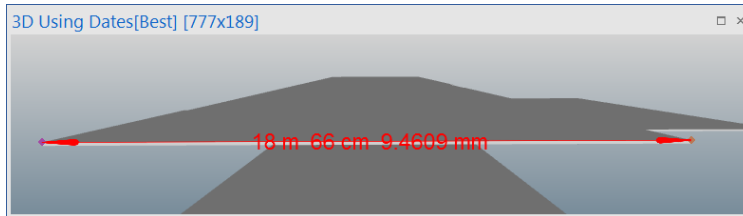


2. Move your mouse cursor to the end point of an object in the 3D View until a red dot appears. Left-Click on the red point with your mouse to place the first point of your measurement.



NOTE: A line will form between your cursor and your first measurement point, which will automatically calculate the length of the line as you move your mouse.

3. Left-Click again to place a second measurement point. The distance between the two selected points will display along the line connecting them in the 3D View.




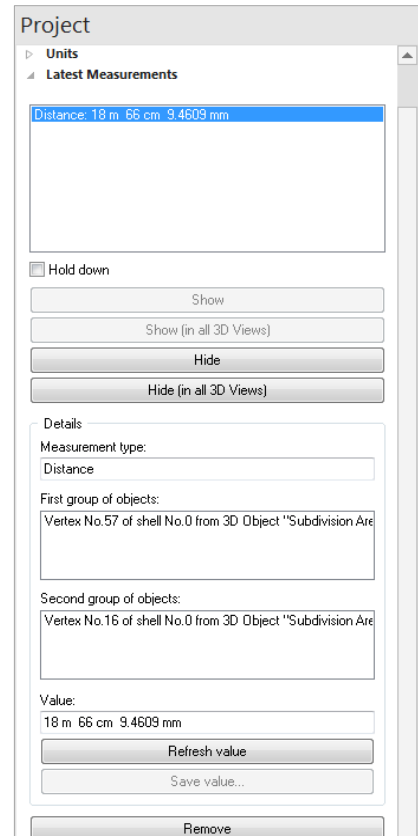
4. Open **Navigator** →  **Project** → **Latest Measurements** to view your measurement details.

NOTE: The **Latest Measurements** tab stores the most recent measurements calculated in Open Viewer. For each measurement the dialog will display a measurement type, the objects that were used to calculate the measurement, as well as the measurement value.

5. Hide the measurement from the 3D View by selecting it from the **Latest Measurements** window and selecting the **Hide**. Similarly, you can show hidden measurements by instead selecting **Show**.

TIP: To prevent an older measurement from being removed from the window, select the value and check the box to **Hold down**.

6. To turn off **Measure Distance**, right click in the 3D View and de-select  **Measure Distance**.



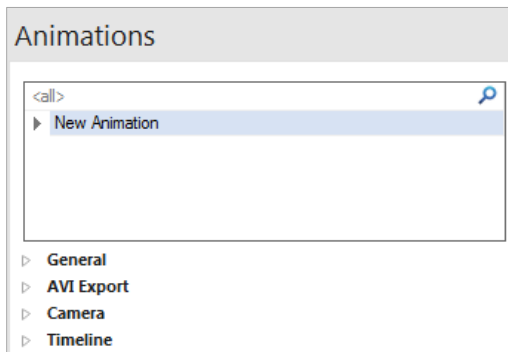
11. Animations

The following section will teach you how to play an Animation in Open Viewer.


Synchro PRO users can create a scheduling **Animation** that can be communicated to third parties or exported as an AVI and used as a presentation. **Animations** created in PRO can show an overview of the whole project, or may focus on only a few tasks of the project. Open Viewer allows you to view these animations prior to being exported from Synchro as an AVI.

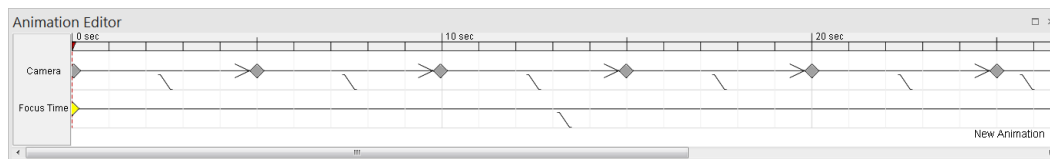
To view an Animation:

1. Select Navigator →  **Animations**



NOTE: Any animations that were previously created in Synchro PRO will be listed here.

2. Select the **Animation** you wish to view from the Navigator.
3. Open the  **Animation Editor** from the **Windows** Ribbon.



The **Animation Editor** is comprised of a timeline, Camera and Focus Time rows, as well as a Focus Time Marker. Each grey diamond in the Camera row signifies a new Camera position in the Animation. Similarly, each yellow diamond in the Focus Time row represents a saved instance of time. This is useful in PRO as it allows the user to speed up or slow down processes between two Focus Time values by lengthening or shortening the time between two Focus Time Keyframes. For more information on this topic, please see **Synchro PRO Basic Training** or **Help** in Open Viewer.

4. In the **Play** Ribbon ensure that  **Play Animations** is enabled.
5. Select  **Move to Start** then  **Play** to view the entire saved animation.

TIP: You may also the Space bar to pause and play the animation.

6. When you are finished viewing an Animation, close the **Animation Editor** by pressing **x** in the top corner of the window.

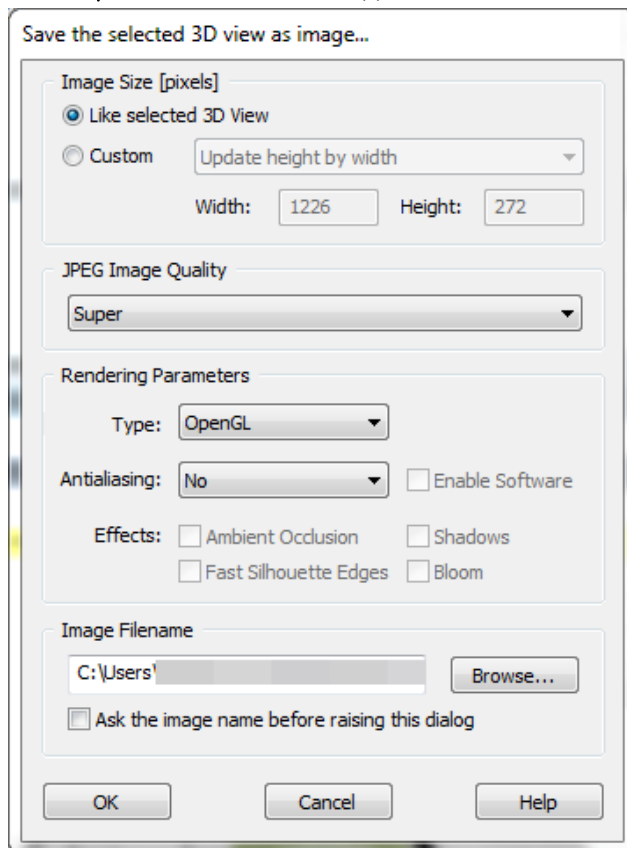
12. Output

12.1. Save as Image

You can easily save an image of the 3D window to share with others. There are 2 ways to save an image.

1. If you have a saved **Viewpoint** that you would like to export as an image, in **Navigator** → **Viewpoints**, select the Viewpoint name, right click and choose **Save as Image**
2. Name the file and choose the file type (PNG, BMP, or JPEG) from the drop-down list.
3. The **Save as Image** dialog will appear. There are options to change the image size (or keep it the same as the 3D window), set the graphics driver **Type**, **Antialiasing** (higher values improve quality), and apply **Effects** including **Shadows**.



NOTE: The **OpenGL** driver does not support **Effects**

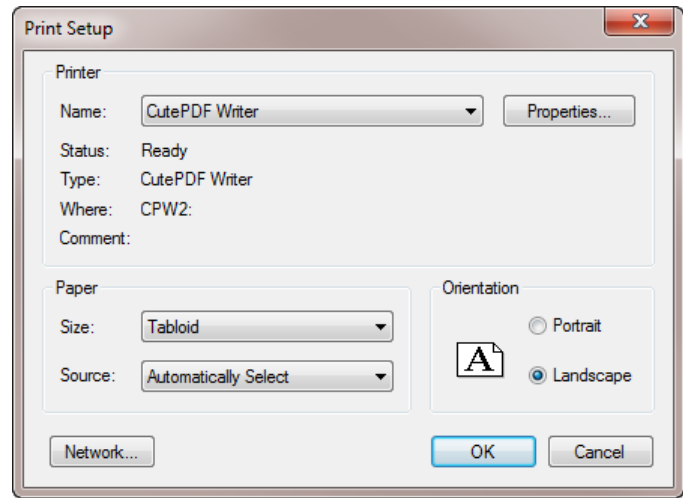


4. Set the options as desired, and press **OK** to save the image.
5. You can also save an image of the current 3D window without first creating a Viewpoint, by right clicking in the 3D window and choosing **Save as Image** from the context menu.

12.2. Printing the Gantt Chart

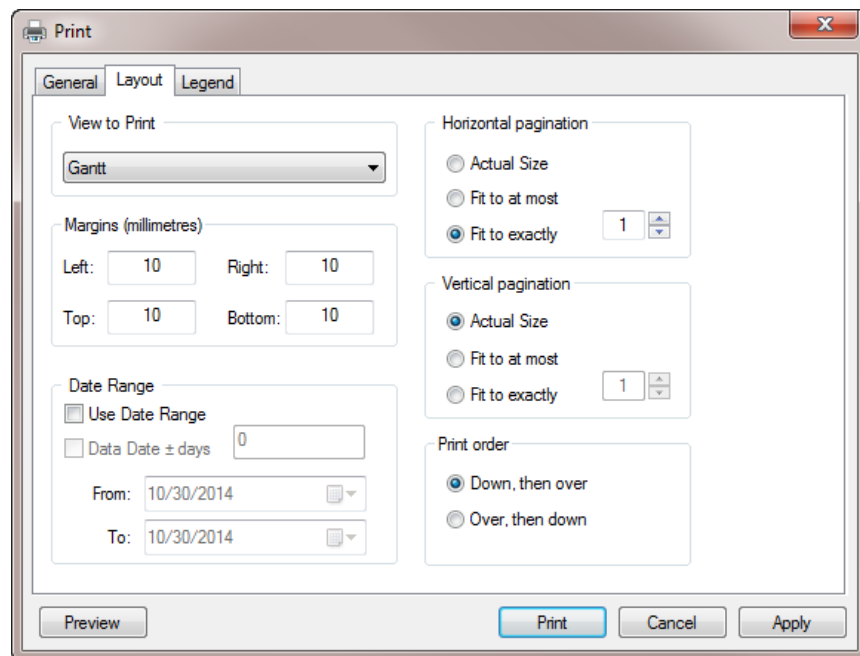
The Gantt Chart can be printed from Synchro to share with others without the need to share the SP file.

1. When printing the Gantt Chart, what you see is what you get, so use **Customise Columns** in the Task List to choose which columns to include in the printout
2. Before printing, set up the printer and page layout by selecting **File** →  **Print Setup**
3. For printing the Gantt Chart, set the **Orientation** to **Landscape**
4. A good **Paper Size** for printing the Gantt chart is **Tabloid** (11" x 17")
5. Press **OK** to finish setup
6. Select **File** →  **Print**
7. In the Print dialog, choose the **Layout** tab
8. Ensure that **View to Print** is set to **Gantt**



NOTE: From the **View to Print** drop-down you can also select other open windows to print including 3D

9. When printing the Gantt Chart, **Fit to Exactly: 1** is a good choice for the **Horizontal pagination** and **Fit to: Exactly** for **Vertical pagination**
10. A **Date Range** can be applied to the schedule if desired (eg. to export a 3 week look ahead). To print the whole schedule, leave this option disabled.
11. Select **Apply** to save changes to this dialog before previewing or printing
12. If desired, a **Legend** can be added to the printout in the Legend tab
13. Select **Preview** to view the Gantt Chart before printing
14. From the preview window, select **Print** to return to the Print dialog
15. Select **Print**



NOTE: You may also Print the view from the 3D Window as an alternative to **Save As Image**.

13. Contact Details

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