

4D SCHEDULING WITH SYNCHRO PRO

User Manual Guide

Table of Contents

Legal and Liability Statement	1
Getting Started.....	2
Product Description	2
Conventions Used in This Manual	3
Computer Requirements	3
Partner Applications	4
Revit	4
Primavera P6	4
MS Project	4
Cost.....	4
Installations.....	5
Installing Synchro Pro.....	5
To Download Synchro Pro	5
To Install Synchro Pro.....	8
Installing the Synchro Revit Plugin	10
To Download the Revit Plugin.....	10
To Install the Revit Plugin	11
Exporting.....	13
Exporting from the Revit Synchro Plugin	13
To Manage Settings.....	13
To Export a File.....	14
Exporting from IFC	15
To Overview IFC Options.....	15
To Export from Revit to IFC.....	16
Importing.....	18
Importing the 3D Model	18
To Import from Revit to SPX	18
To Import IFC to Synchro Pro	21
To Select 3D Object Options.....	24
Importing the Schedules and Plans	25
To Import a Schedule from MS Project XML	25

To Format the Date Display Options	28
4D Linking Process	29
Creating a Selection Set from a 3D Filter.....	29
To Create a Selection Set from a 3D Filter.....	29
To Create a Selection Set from a 3D Object	32
Linking a Selection Set with a Task	36
To Link a Selection Set with a Task	36
Creating an Animation.....	40
To Create an Animation	40
To Define the Start and End of your Animation	41
To Define the Camera Angles	41
Exporting an Animation	42
To Export an Animation.....	42
To Format the Resolution Properties.....	43
To Format the Video Content Properties.....	44
Subdividing 3D Objects	45
To Subdivide 3D objects	45
Troubleshooting	46
Importing and Exporting	46
Animating	47
Subdivision.....	48
External Resources.....	49
Appendix A – 4D Scheduling Process Map	50
Appendix B – Partner Applications	51
Design Interoperability with CAD Systems.....	51
Scheduling Interoperability with Project and Programming Management Software.....	52
Appendix C – Glossary	53
Index.....	55
Works Cited	56

Legal and Liability Statement

Your legal and liability statement here. To be filled in by Megan's technical writing team.

Getting Started

The purpose of this user manual is to provide users with a comprehensive guide to 4D scheduling using Synchro software. Although, Synchro Pro is a multifunctional tool for Building Information Modeling (BIM) that can perform a variety of different tasks, such as cost analysis, mixed reality interaction, and safety planning this user manual will only focus on 4D scheduling.

This manual is ideal to guide the following clients: software vendors for use cases, Construction Research Centre (CRC) for the showcase of Applied Research, for student portfolios, Public Service Procurement Canada (PSPC), and project managers who are new to Synchro and may not be aware of all the procedures involved in 4D scheduling.

This section consists of the following subsections:

- [Product Description](#)
- [Conventions Used in This Manual](#)
- [Computer Requirements](#)
- [Partner Applications](#)
- [Cost](#)

Product Description

Synchro Pro is an advanced software [1] tool to plan, coordinate and manage construction projects in a 4D environment ([see Appendix A: Process Map](#)). Synchro links to four types of 3D resources including human, material, equipment, and location to the assigned associated schedule tasks.

Synchro Pro's user interface design can be used as a stand-alone scheduling tool or can synchronize with other project and programming software's your organization may use. Such as: Revit, Primavera, MS Project and many more. Synchro Pro's versatility in being able to integrate, synchronize and accurately calculate short to long stretches of dependent activities is impressive.

The software allows the user to evaluate and foresee whether the project's critical path will succeed or be thwarted by unexpected circumstances. Having this foresight allows civil engineers, architects and contractors to respond and make attainable decisions quickly, saving stakeholders both time and money. This has allowed Synchro Pro to be a leader in the building information modelling industry.

Conventions Used in This Manual

**Note:**

Notes signify addition information.

**Tip:**

Tips signify an alternative procedure for completing a step.

**Caution:**

Cautions signify that danger or data loss may occur.

**Result:**

Examples provide a visual reference of how a procedure could be carried out in the real world.

Computer Requirements

There are certain system requirements that must be met in order for Synchro Pro to run smoothly and efficiently. You can find the minimum system requirements in the table below.

- | | |
|-----------------------------|---|
| • Operating System | Microsoft Windows 7 (x64), 8 (x64) or 10 (x64) |
| • Processor | Intel ® Core ™ i7-3840QM CPU @ 2.80GHz 2.80 GHz |
| • Installed memory (RAM) | 16GB (x64) |
| • System type | 64-Bit Operating System |
| • Pen and touch | Not required |
| • Display adapters | 1 GB graphics card (DirectX compatible) |
| • Display adapters driver | Supported graphics card and drivers for HOOPs 20.x are at:
http://developer.techsoft3d.com/hoops/hoops-visualize/graphics-cards/ |
| • Disk drive (program file) | 1.3 GB hard disk space for installation files |
| • Display | 1 Colour display |
| • Screen Resolution | 1280 x 1024 screen resolution |

Partner Applications

This user manual will look over three legacy software's: Revit, Primavera P6, and MS Project. For a full list of interoperable software and applications used in Synchro Pro ([see Appendix B](#)).

By integrating previous scheduling and construction software Synchro Pro has saved their clients both time and money. The associated costs include having to:

- Upgrade software.
- Replace the previous system and its components.
- Recertify new components.
- Overlap systems to make sure scheduled tasks can continue to operate.
- Retrain users in how to operate a new system.

Since Synchro Pro's advanced technology allows for backward compatibility, their users can continue to use familiar tools that are already used in their workplace, while at the same time offer the system tools required to upgrade and use current technology.

Revit

Revit is a highly popular building information modeling (BIM) software, especially useful for big scale projects. This software is equipped with multiple tools that allow users to design a building and its components in 3D and access building information from the building model's database. Revit supports 4D building information modeling which makes it a perfect partner in collaborating with Synchro Pro software.

Primavera P6

Primavera is an enterprise project portfolio management software. It includes project management, scheduling, risk analysis, opportunity management, resource management, collaboration and control capabilities, and integrates with other enterprise software such as Oracle and SAP's ERP systems [2].

MS Project

MS Project is a simple, yet powerful project management software designed to help managers keep track of all the work that must be done in order to successfully accomplish a project. The documents created in MS Project, such as the Gantt chart, can be easily exported to Synchro Pro platform and used for further implementation.

Cost

Synchro Pro is available through annual subscription (approximately CAD\$4000). The upfront cost is offset by multiple services offered in the package, such as access to latest versions, one-on-one technical support, customer support as well as free access to SYNCHRO Academy online training resources. For referential purposes, Synchro Pro also offers a free trial version.

Installations

Synchro Pro can be either installed directly on a user's computer or can run on a cloud-based virtual server.

This section consists of the following subsections:

- [Installing Synchro Pro](#)
- [Installing the Revit Plugin into Synchro Pro](#)

Installing Synchro Pro

To Download Synchro Pro

1. Go to the website, apps.bentley.com/studentserver/home/index
2. Select the **Sign In** button.

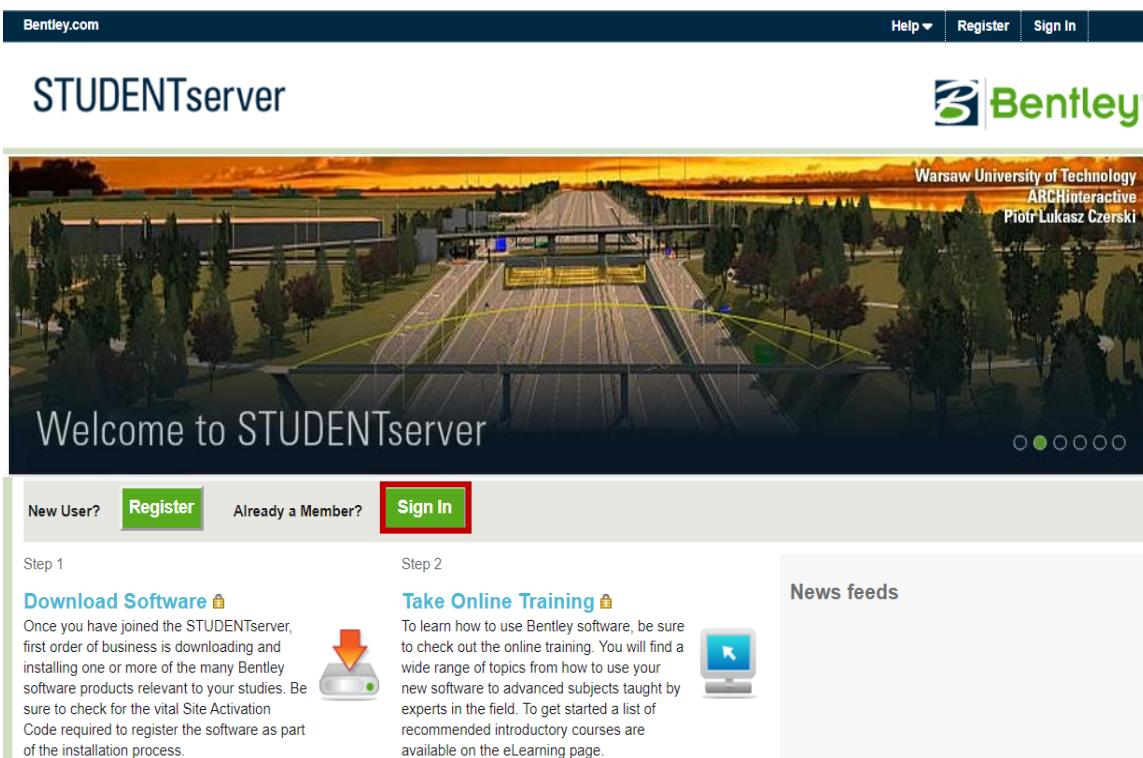


Figure 1: Installing Synchro Pro with Bentley.com.

3. To login to your account enter your student **Email** address.
4. Enter your security **Password**.
5. Select the **Sign In** button at the bottom left corner to access the websites student resources.

Sign In

Access your Bentley Services

Email

0001@algonquinlive.com

Password



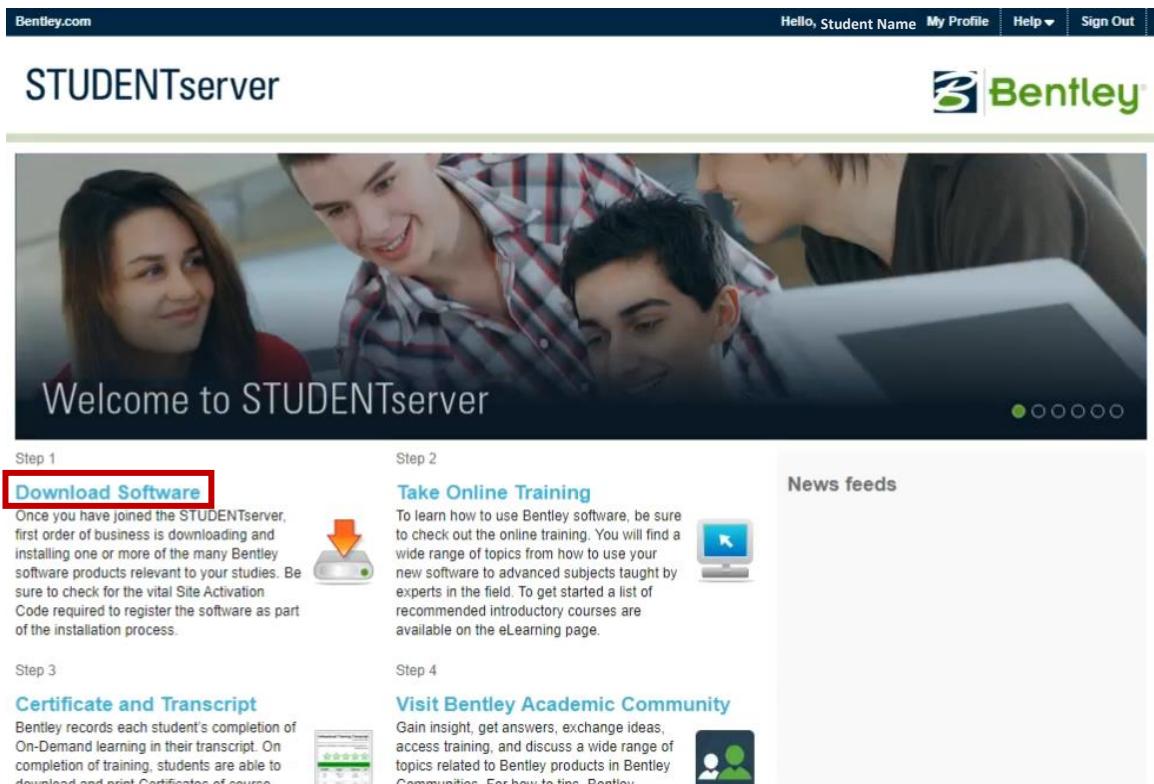
[Forgot password?](#)

Sign In

Don't have a profile? [Register](#)

Figure 2: Signing into the Bentley.com Student Server.

6. Under Step 1, select the blue **Download Software** text link.



The screenshot shows the Bentley.com STUDENTserver homepage. At the top, there's a navigation bar with 'Hello, Student Name' and links for 'My Profile', 'Help', and 'Sign Out'. The main header says 'STUDENTserver' and features a 'Bentley' logo. Below the header is a large banner image of students working together. The page is divided into four main sections:

- Step 1:** A section titled 'Welcome to STUDENTserver' with a red box around the blue 'Download Software' link. Below it, text explains the importance of downloading Bentley software products relevant to studies.
- Step 2:** A section titled 'Take Online Training' with a red box around the blue link. It describes online training options and includes an icon of a computer monitor with a download arrow.
- Step 3:** A section titled 'Certificate and Transcript' with a red box around the blue link. It explains how Bentley records student completion of On-Demand learning in their transcript and includes an icon of a certificate.
- Step 4:** A section titled 'Visit Bentley Academic Community' with a red box around the blue link. It describes the community where students can gain insight, exchange ideas, and discuss topics related to Bentley products. It includes an icon of two people.

On the right side, there's a 'News feeds' section with a small icon of a person.

Figure 3: Step 1 to Downloading the Software.

7. Select the **Synchro Pro: Get Software** link in the second row to open the Synchro Pro's: 4D Virtual Construction Scheduling and Simulation page.

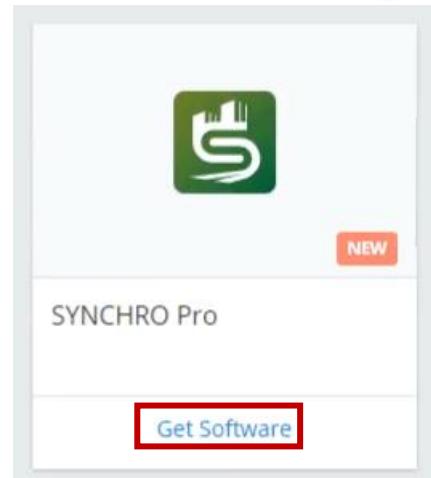


Figure 4: Getting Synchro Pro's Software.

8. Select the blue **Download** button to download the Synchro file extension.

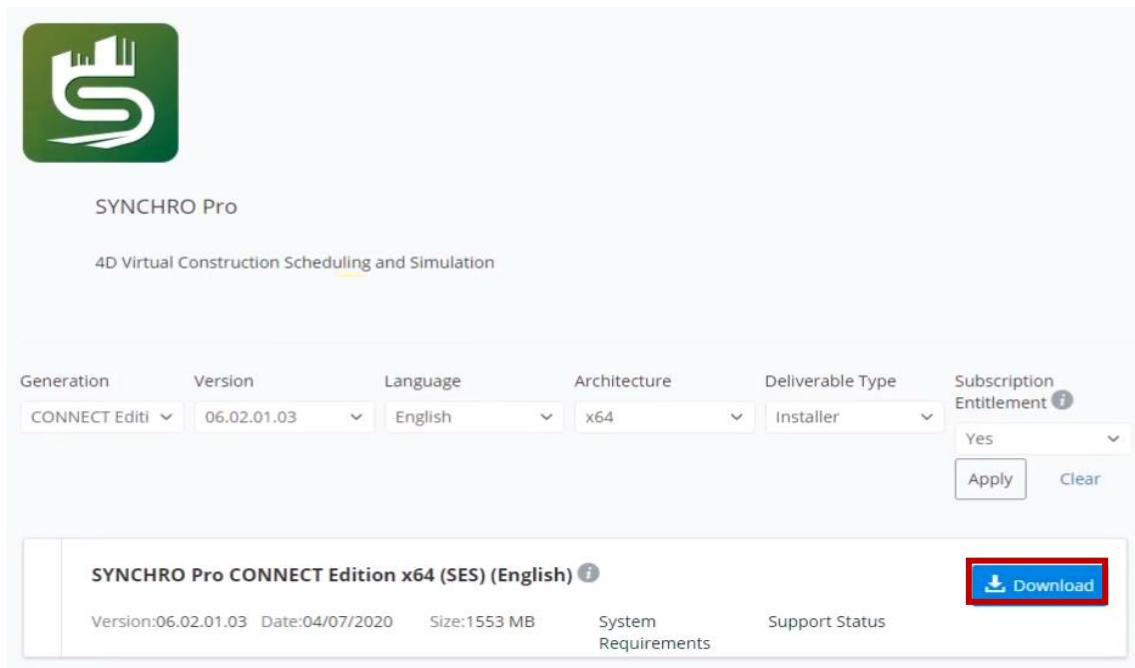


Figure 5: Downloading Synchro Pro.

9. Select the **Synchro Pro** file extension from your computer to launch **the Synchro Pro InstallShield Wizard**.



Tip:

For an alternative downloading method visit the following link to request a demo at
<https://www.bentley.com/en/Products/Product-Line/Construction-Software/SYNCHRO-PRO>

To Install Synchro Pro

1. On your desktop, select the  **Synchro Pro icon Shortcut** to launch the Synchro™ Connect Edition.



Figure 6: Launching the Synchro Pro Installation.

2. Select **Next >** to open the **Program Maintenance** dialog.



Figure 7: Proceeding with the Synchro Pro Installation Wizard (a).

3. Select **Modify** from the button list.
4. Select the **Next >** button to open the **Setup** dialog.

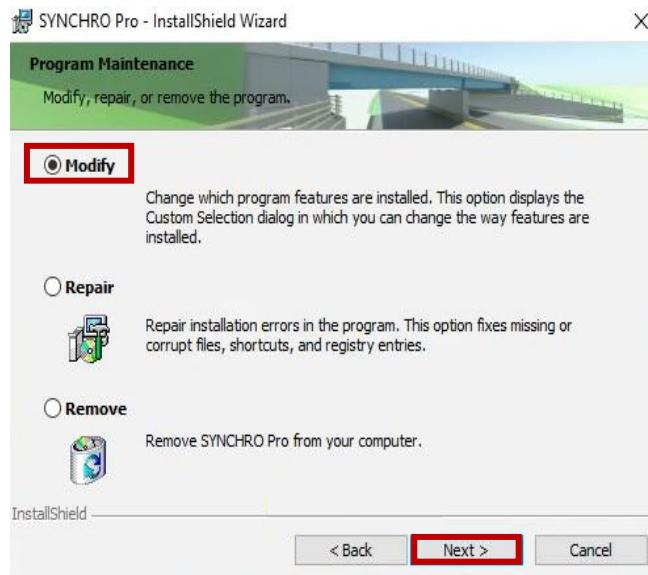


Figure 8: Proceeding with the Synchro Pro Installation Wizard (b).

5. Select **Additional Synchro Plugins** down menu.
6. Select **[X] This feature will not be available** at the bottom of the list of options.
7. Select the **Next >** button at the bottom of the dialog to open the **Select Graphic Driver** dialog.

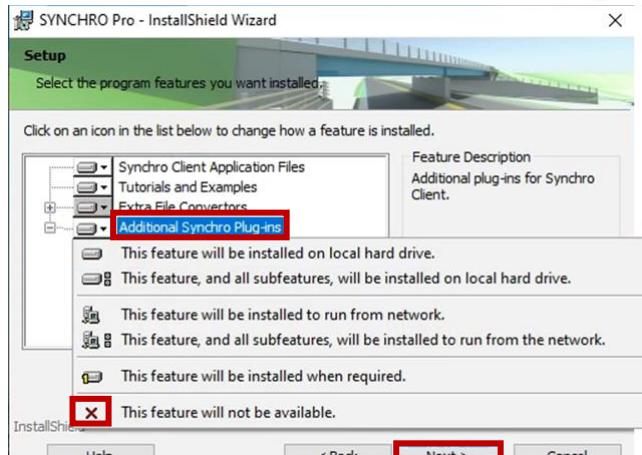


Figure 9: Proceeding with the Synchro Pro Installation Wizard (c).

8. Select the **Next >** button to open the **Ready to Modify the Program** dialog.

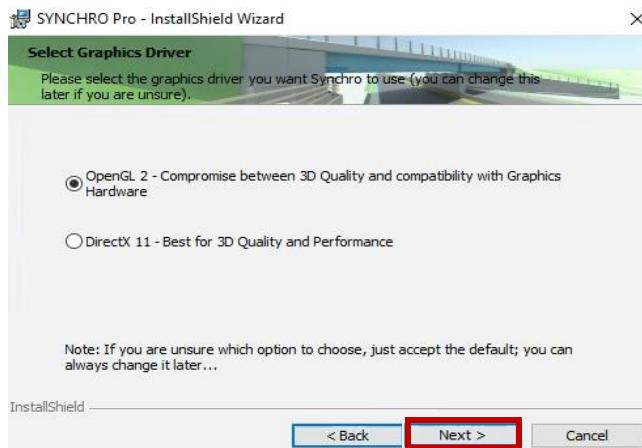


Figure 10: Proceeding with the Synchro Pro Installation Wizard (d).

9. Select the **Install** button.

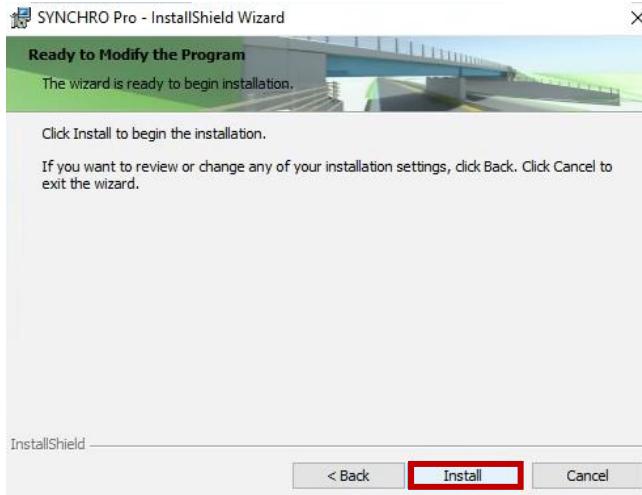


Figure 11: Proceeding with the Synchro Pro Installation Wizard (e).

10. Select the **Finish** button to complete your install.

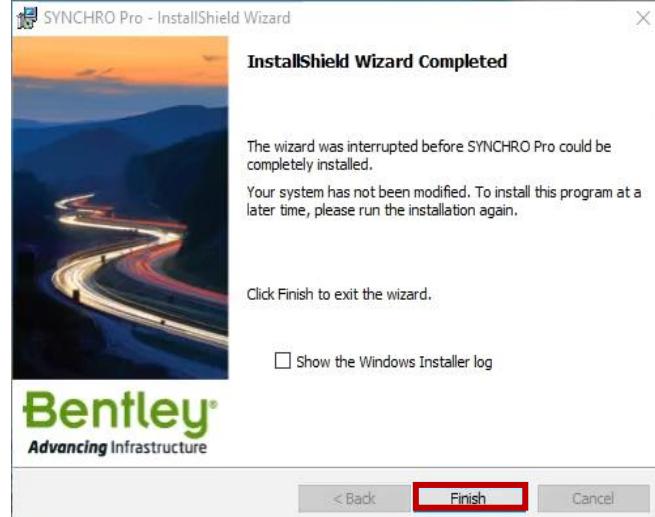


Figure 12: Proceeding with the Synchro Pro Installation Wizard (f).

Installing the Synchro Revit Plugin

Synchro Pro has a Revit plugin which allows the user to export directly from Revit. There are multiple file formats that can be exported using Synchro. The Revit plugin allows the user to export from Revit to the Synchro SPX format for data exchange with Synchro Pro.

To Download the Revit Plugin

1. Select this link, <https://www.synchrotd.com/plugins/> to access the Revit Plugin.
2. Select, **Revit Plugin, SYNCHRO pro version 6** to open the **Install Shield Wizard**.

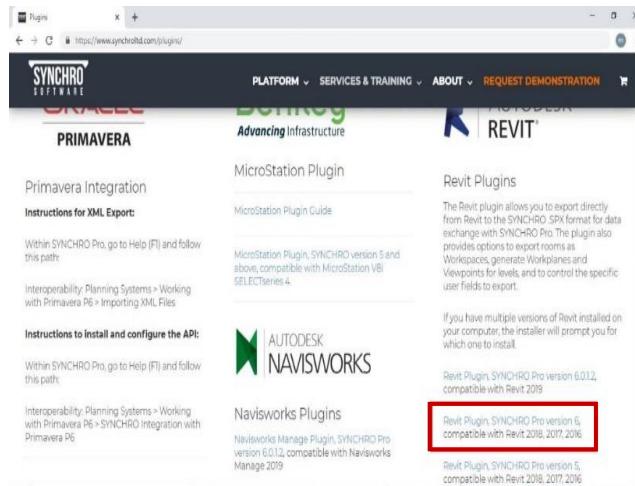


Figure 13: Installing the Revit Plugin from Synchro's Website.



Note:

Here is a list of Synchro Pro alternative Revit Plugin's that are currently available to download. [Date: March 2020]

[Revit Plugin, SYNCHRO Pro version 6.0.1.2, compatible with Revit 2019](#)
[Revit Plugin, SYNCHRO Pro version 5, compatible with Revit 2018, 2017, 2016](#)
[Revit Plugin Guide, SYNCHRO Pro version 5](#)

To Install the Revit Plugin

1. Select the **Next >** button to open the **Install Shield Wizard**.



Figure 14: Proceeding with the Revit Synchro Pro Installation Wizard (a).

2. Select **I accept the terms in the license agreement** radio button.
3. Select the **Next >** button.

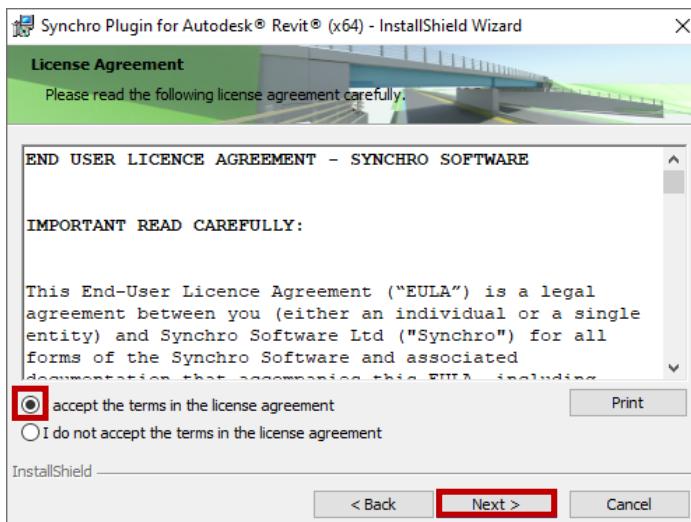


Figure 15: Proceeding with the Revit Synchro Pro Installation Wizard (b).

4. Select the option **Revit 2017** in the radio button list.
5. Select the **Next >** button at the bottom of the dialog.

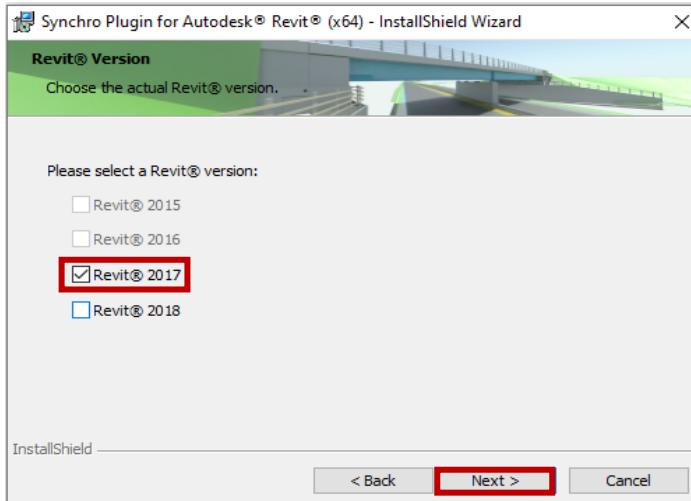


Figure 16: Proceeding with the Revit Synchro Pro Installation Wizard (c).

6. Select the **Next >** button to install the **Synchro Pro for Autodesk Revit plugin** in the default folder.

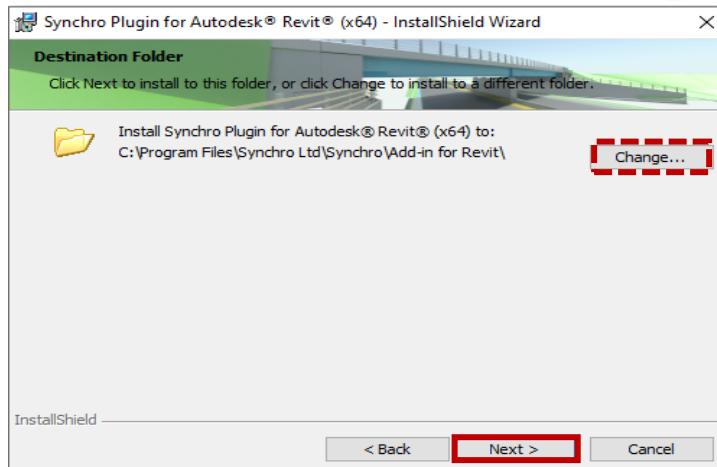


Figure 17: Proceeding with the Revit Synchro Pro Installation Wizard (d).



Note:

Select the **Change** button to install **Synchro Pro for Autodesk Revit plugin** in a different folder on your computer.

7. Select the **Install** button to complete the **Synchro Pro for Autodesk Revit plugin** installation.

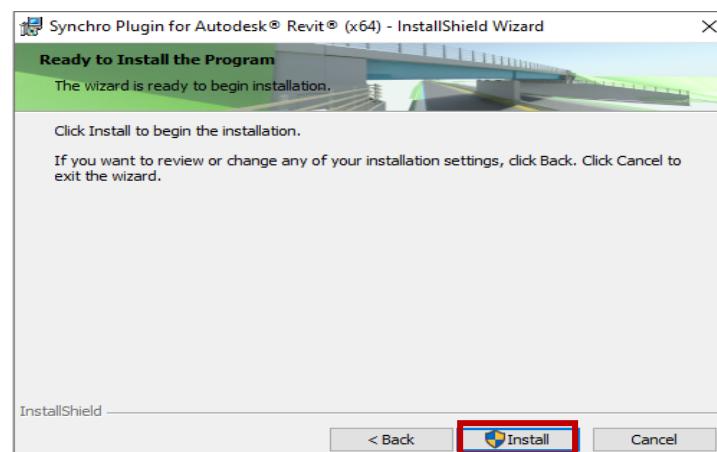


Figure 18: Proceeding with the Revit Synchro Pro Installation Wizard (e).

8. Select the **Finish** button to close the **Install Shield Wizard** window.

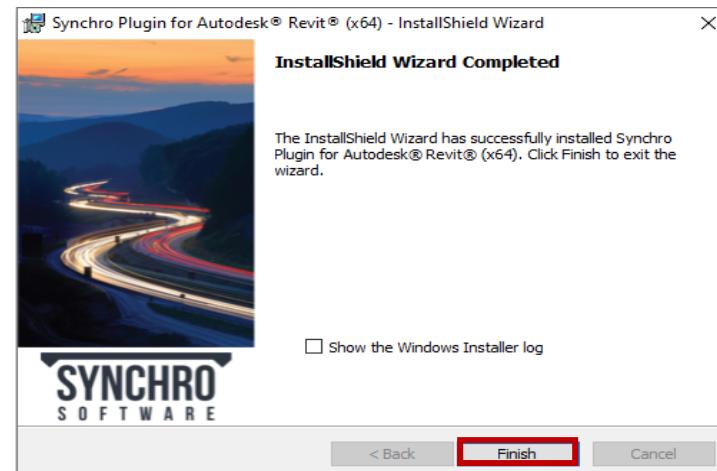


Figure 19: Proceeding with the Revit Synchro Pro Installation Wizard (f).

Exporting

Synchro Pro has a Revit plugin which allows the user to export directly from Revit. There are multiple file formats that can be exported using Synchro Pro ([See Appendix B: Partner Applications](#)) This section will demonstrate how to export a file from the Revit plugin [3] and from Industry Foundation Classes (IFC).

This section consists of the following subsections:

- [Exporting from Revit to Synchro Plugin](#)
- [Exporting from IFC](#)

Exporting from the Revit Synchro Plugin

The Revit Plugin for Synchro exports RVT files as a Revit Synchro Project (.spx) file. This section will demonstrate how to export your Revit Rooms into your Synchro workspace and to create your resources into 3D.

To Manage Settings

1. Select the **Add-Ins** tab.
2. Select the **Synchro Export Settings**

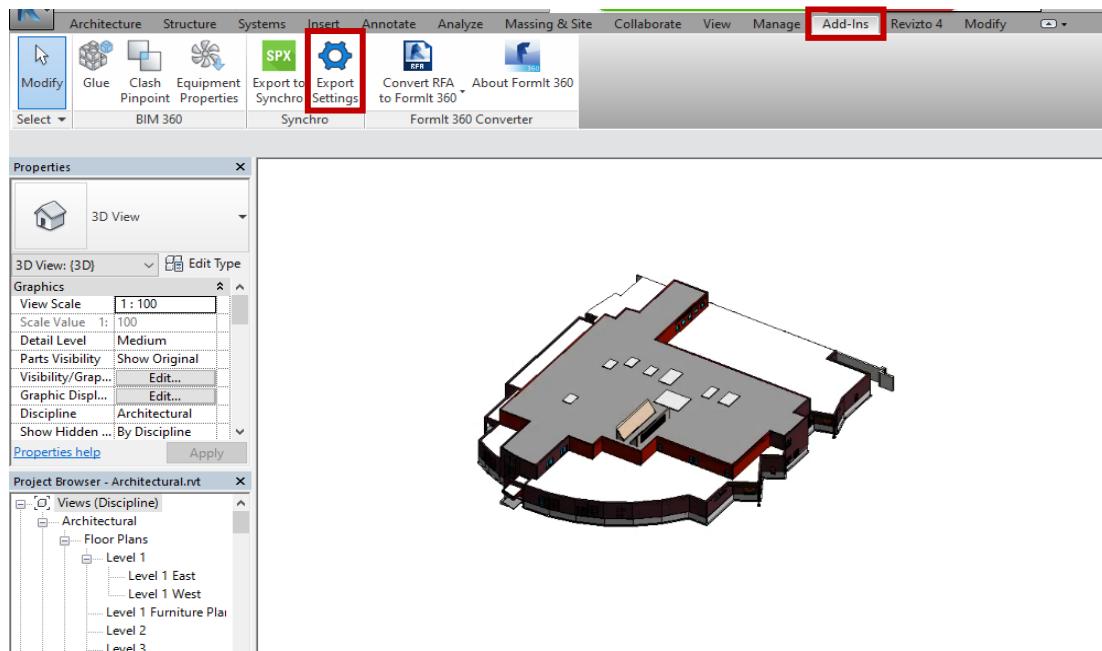


Figure 20: Managing your Export Settings (a).



Note:

Whatever you can view in your **Revit 3D Project Browser** panel is what will be exported.

3. Select the default radio buttons **Export Workspaces** and **Create Resources from Sheets** in the dialog.
4. Select the **Close** button.



Figure 21: Managing Synchro Export Settings (b).

To Export a File

1. Select the **Add-Ins** tab.
2. Select the **Export to Synchro**

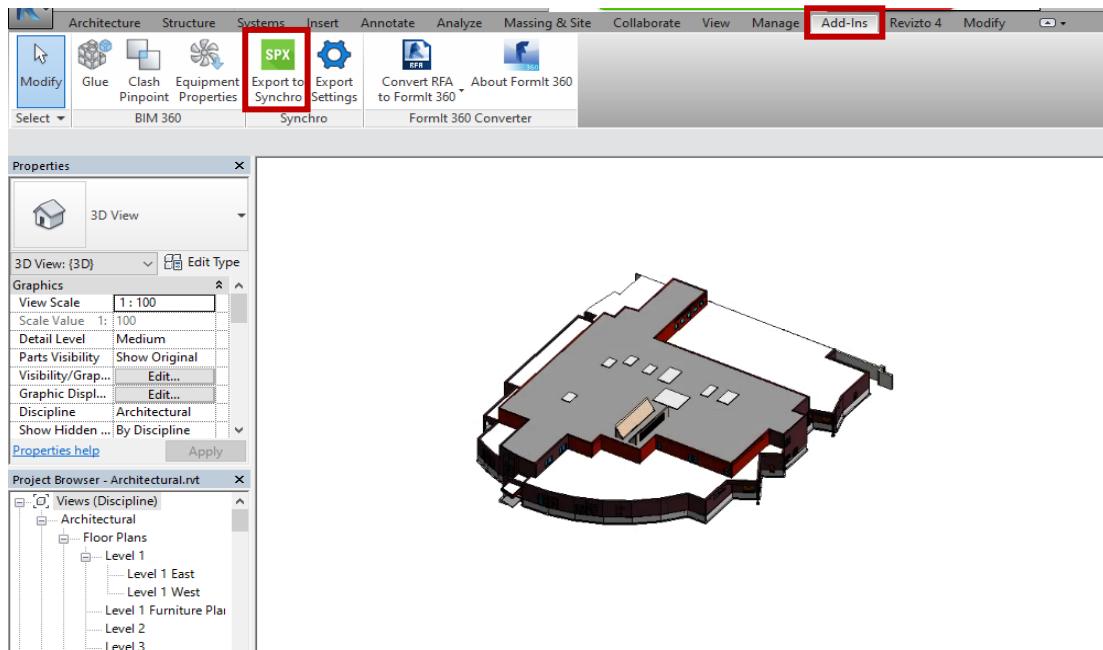


Figure 22: Managing your Export Settings (a).

3. Select the **source file location** and write your **File Name** in the field box.
4. Select the **Save** button and wait as your file exports.

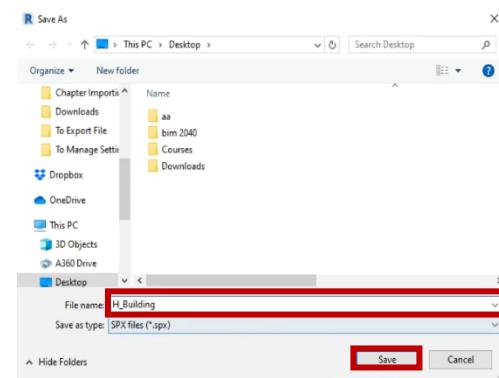


Figure 23: Saving the Revit File.

Exporting from IFC

Revit supports and can export .rvt files using the IFC format. This enables other building specialist, such as structural or building service engineers to use the information in other IFC-certified applications [3].

To Overview IFC Options

1. Select the  Revit down menu button in the top left corner.
2. Select **Export** in the menu panel.
3. Select **Options** in the submenu panel.
4. Select **IFC Options** at the bottom of the submenu panel.

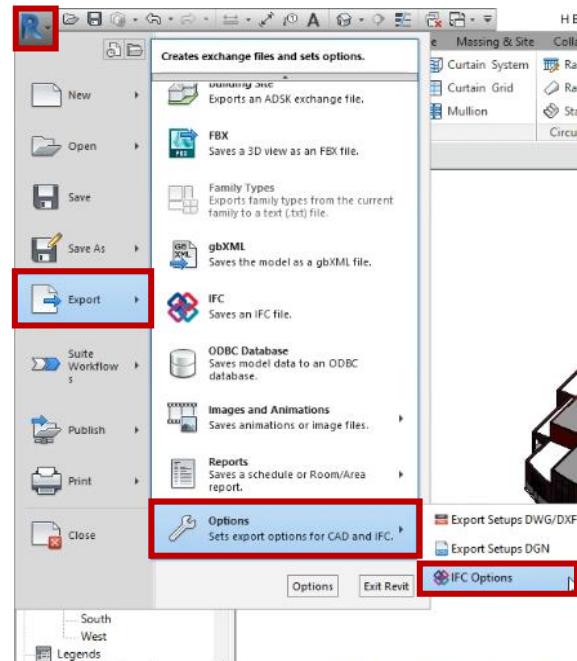


Figure 24: Configuring IFC Options (a).

5. Modify the **IFC Class Name** that will be exported.
6. Modify the **IFC Type** files that will be exported.

Revit Category	IFC Class Name	IFC Type	
Air Terminals	IfcAirTerminal		<input type="button" value="Load..."/>
Analytical Beam Tags	Not Exported		<input type="button" value="Standard"/>
Analytical Beams	Not Exported		<input type="button" value="Save As..."/>
Analytical Brace Tags	Not Exported		
Analytical Braces	Not Exported		
Analytical Column Tags	Not Exported		
Analytical Columns	Not Exported		
Analytical Floor Tags	Not Exported		
Analytical Floors	Not Exported		
Analytical Foundation Slabs	Not Exported		
Analytical Isolated Foundation	Not Exported		
Analytical Isolated Foundations	Not Exported		
Analytical Slab Foundation Tag	Not Exported		
Analytical Wall Foundation Tag	Not Exported		
Analytical Wall Foundations	Not Exported		
Analytical Wall Tags	Not Exported		
Analytical Walls	Not Exported		
Area Polylines	Not Exported		
Area Tags	Not Exported		
Areas	IfcSpace		
Color Fill	Not Exported		
Instance Fill	Not Exported		

Figure 25: Configuring IFC Options (b).

7. Select the **Standard** button to synchronize the **IFC Class Name** list and to upload the models standard default list.
8. Select the **OK** button.

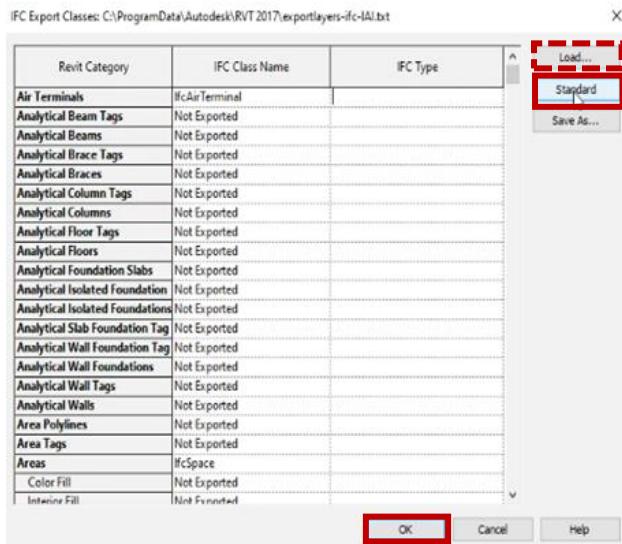


Figure 26: Configuring IFC Options (c).



Note:

You can use your company standards or organization list here as well by using the **Load** button.

To Export from Revit to IFC

5. Select the **File** tab at the top left corner of the window.
6. Select the **Export** menu option.
7. Select the **IFC** submenu option to open the **3D Window**.

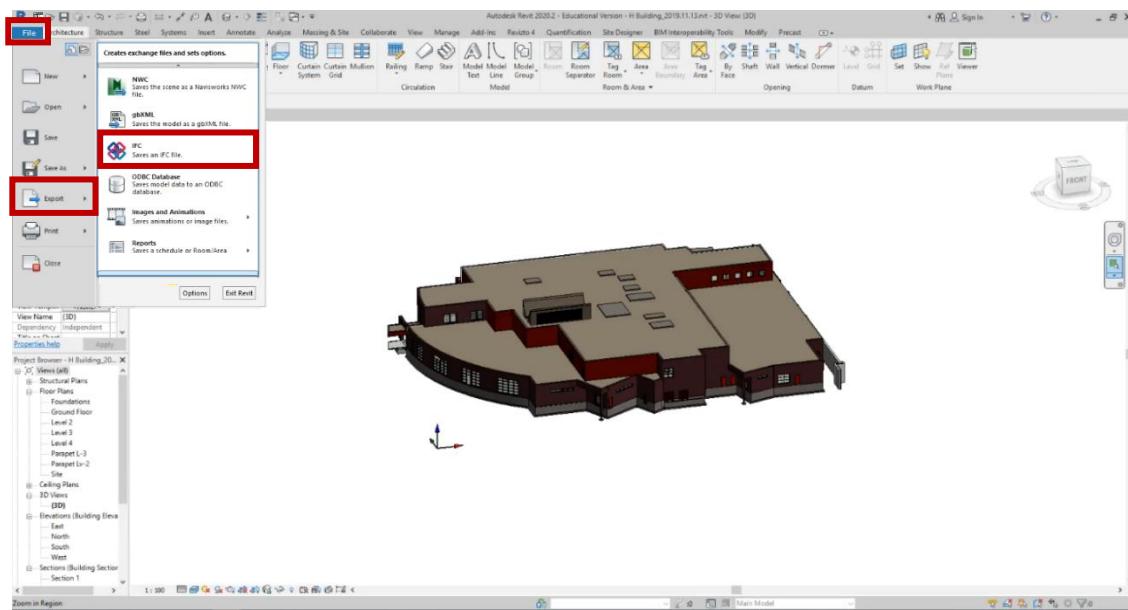


Figure 27: Exporting from Revit to IFC (a).

8. Select the **Browse** button.

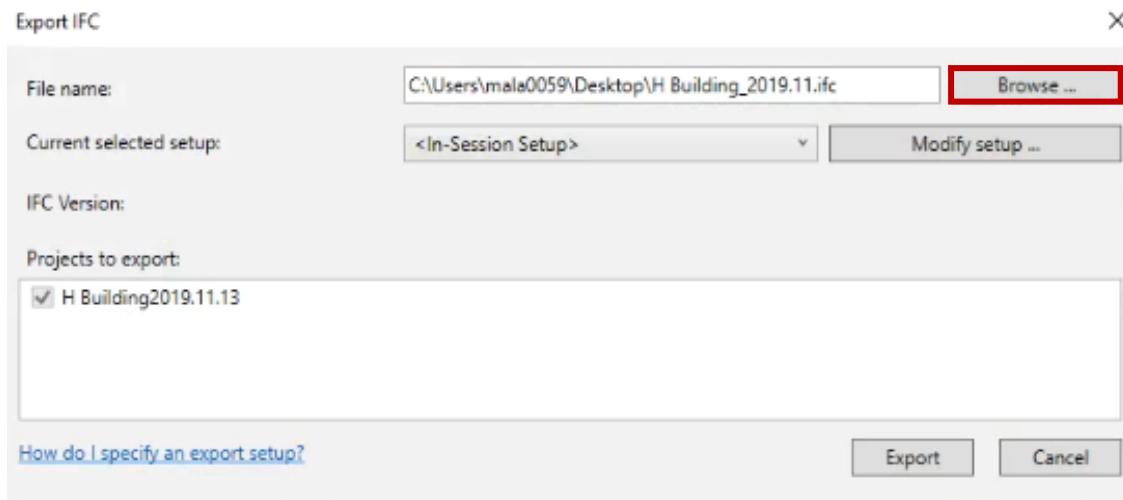


Figure 28: Exporting from Revit to IFC (a).

9. Select your **file source location**.

10. Select the **Save** button.

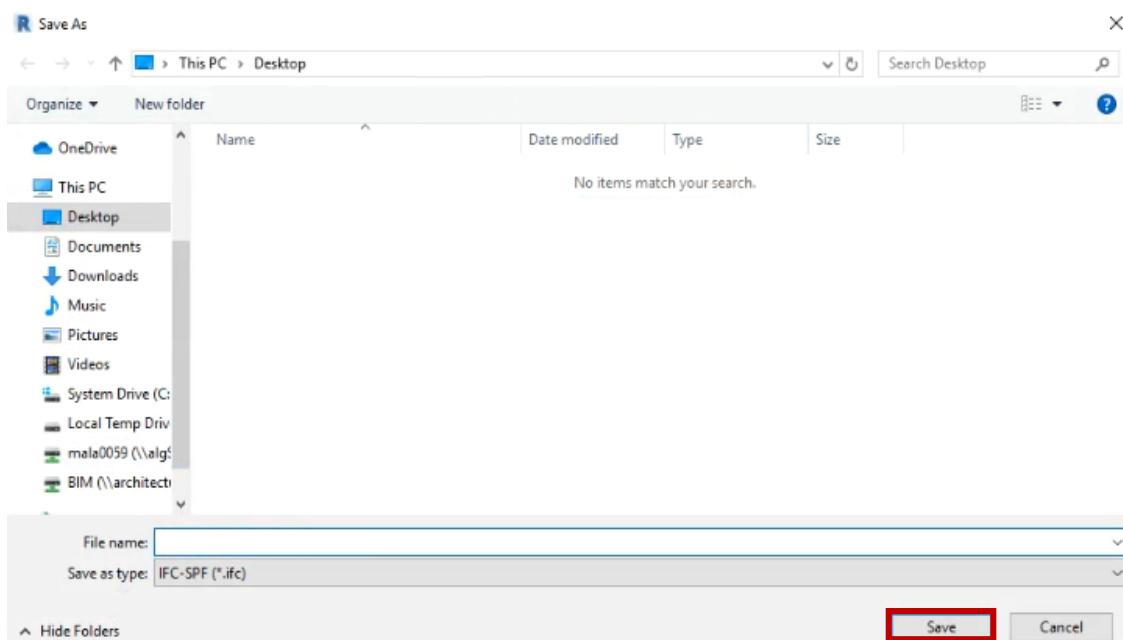


Figure 29: Exporting from Revit to IFC (c).



Note:

You can modify your file names or load company standards.

Importing

Synchro can interoperate with all major 3D modelling technology and scheduling applications ([see Appendix B: Partner Applications](#)). The software can import your 3D model and track milestone dates and provide a probable-based simulation to determine the project's critical path optimizing your project's time and financial resources.

This section consists of the following subsections:

- [Importing the 3D Model](#)
- [Importing a Schedules and Plans](#)

Importing the 3D Model

This section, you will learn how to import your 3D Model from Revit to Synchro project.

To Import from Revit to SPX

1. Select the  Synchro Pro icon to open the software.
2. Select the **File** tab at the top of the menu.
3. Select the **Import** from the dropdown menu.
4. Select **Synchro project** from the sub-menu.

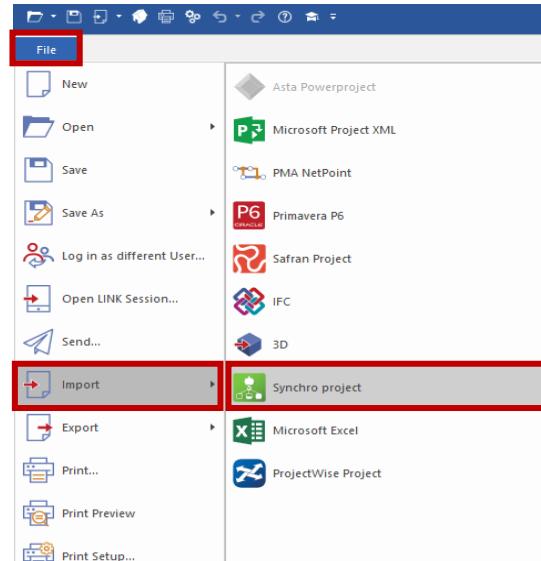


Figure 30: Importing from Synchro Project SPX (a).

5. Select the **file source location** from your computer.
6. Select the **SPX file, "H Building.spx"**.
7. Select the **Open** button on the bottom-right of the dialog.

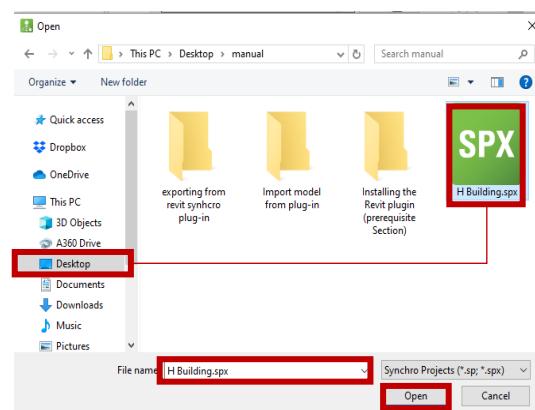


Figure 31: Importing from Synchro Project SPX (b).

8. Select the **Next >** button at the bottom of the dialog.

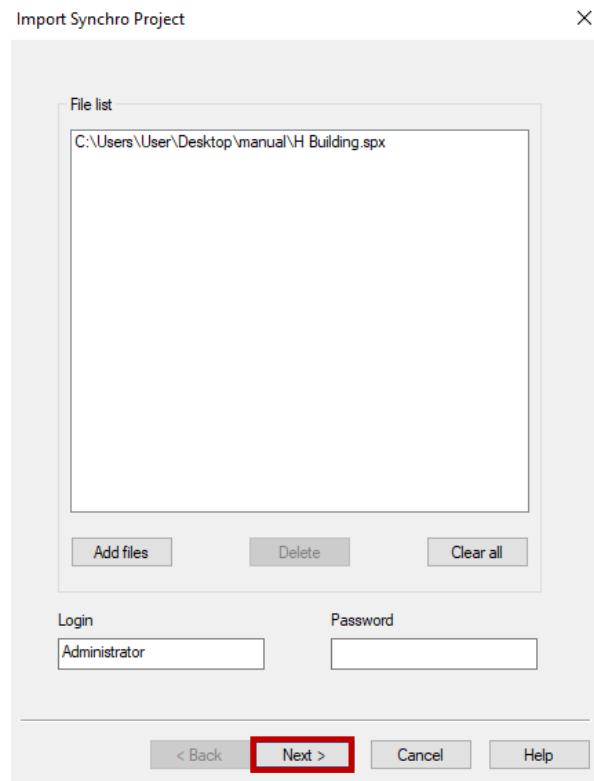


Figure 32: Importing from Synchro Project SPX (c).

9. Select the **Import** button at the bottom of the dialog.

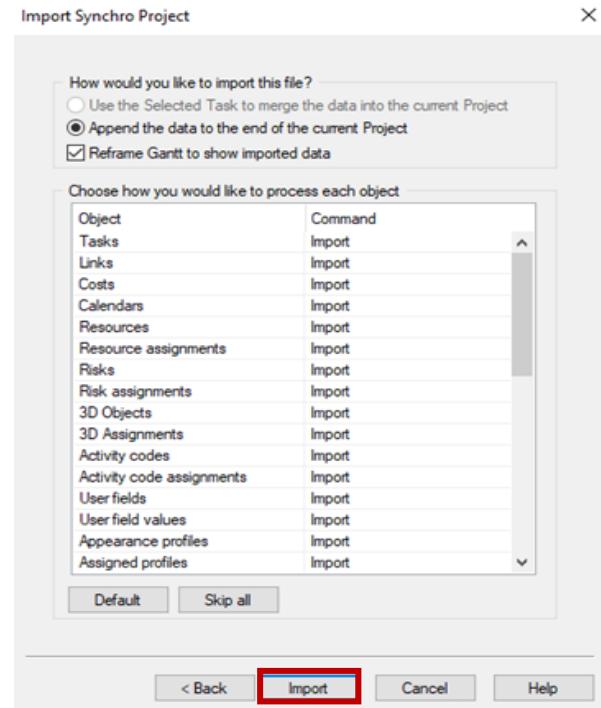


Figure 33: Importing from Synchro Project SPX (d).

10. Select the **Finish** button at the bottom of the dialog.

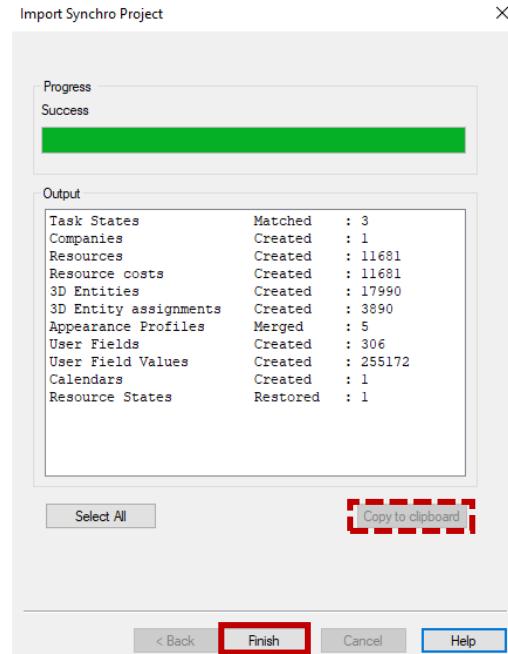


Figure 34: Importing from Synchro Project SPX (e).



Note:

The **Import Synchro Project** dialog will display the items that were imported and any relevant notifications in the **Output** panel. These items can be copied and pasted into Notepad to use for future reference by selecting the panels contents and selecting **Copy to clipboard**.



Result:

The model will be imported and visible in **Synchro Pro's 3D Window**.

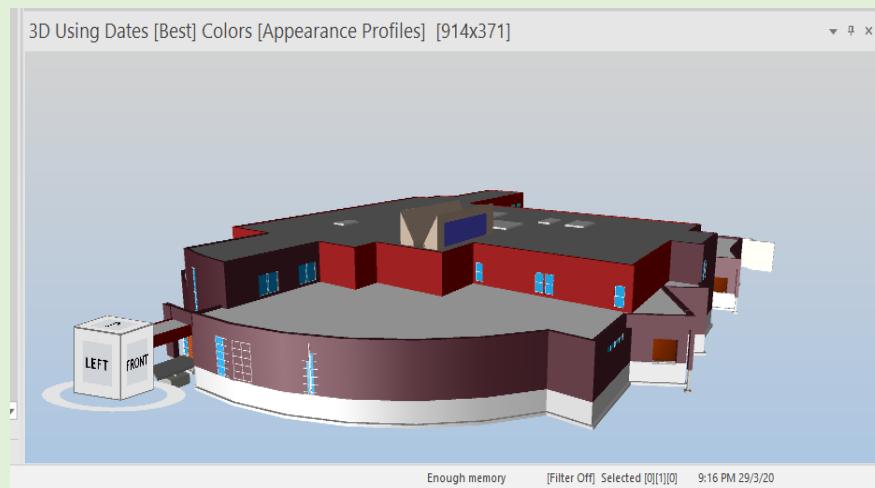


Figure 35: H Building's 3D Model.

To Import IFC to Synchro Pro

1. Select the **File** tab in the far-left corner.
2. Select **Import** from the menu panel.
3. Select **IFC** from the submenu panel to open the **IFC Import** dialog.

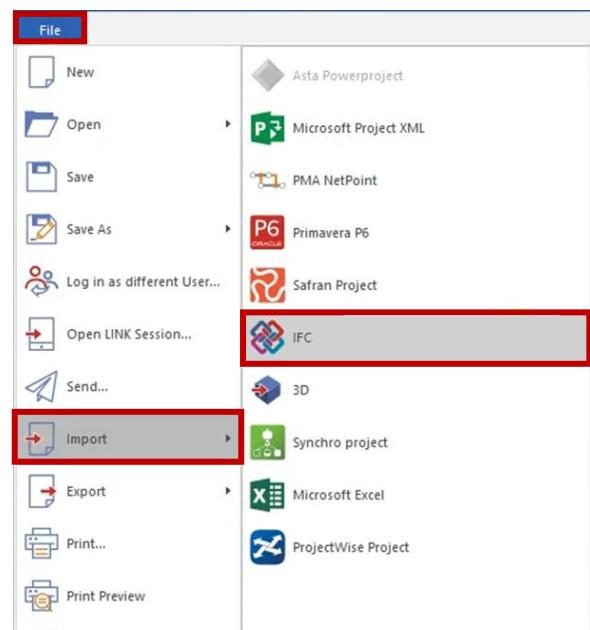


Figure 37: Importing IFC to Synchro Pro (a).

4. Select the **Browse** button to find the **source file folder** on your computer.

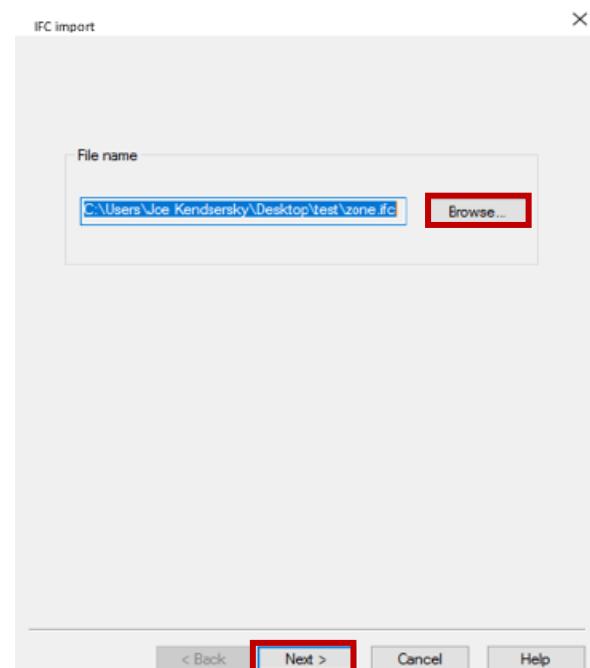


Figure 38: Importing IFC to Synchro Pro (b).

5. Select the source file **H_Building_2019.ifc**
6. Select the **Open** button to open the **IFC Import** dialog.

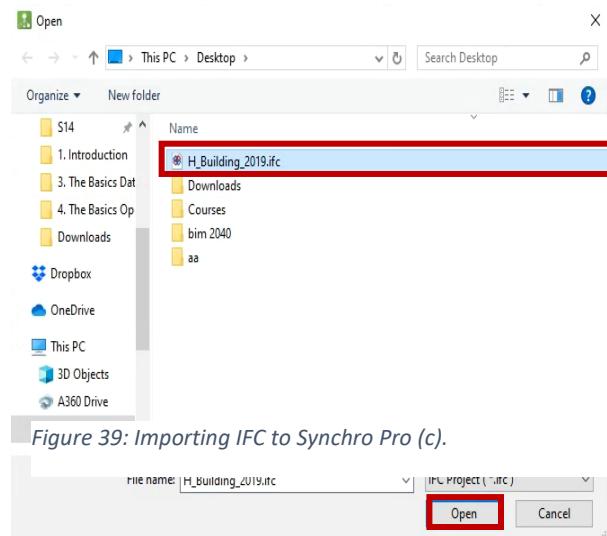


Figure 39: Importing IFC to Synchro Pro (c).

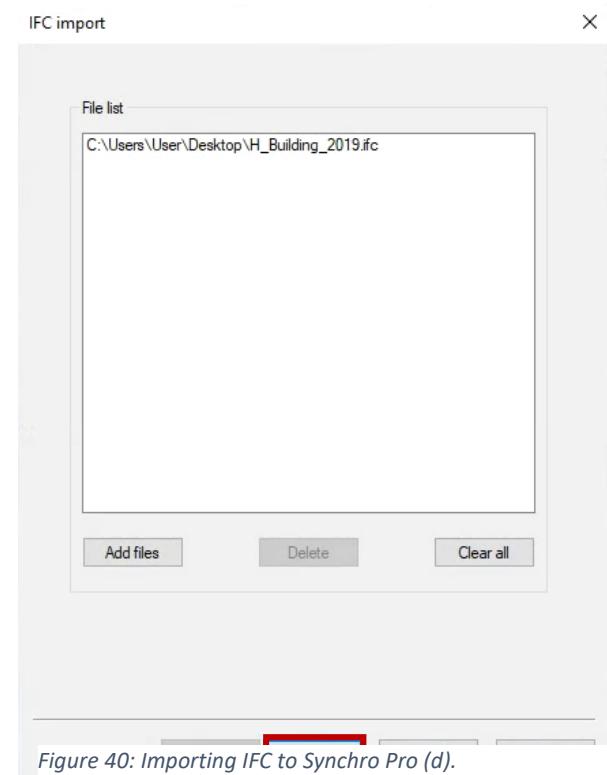


Figure 40: Importing IFC to Synchro Pro (d).

8. Select the **Import** button to process your IFC data **Output**.

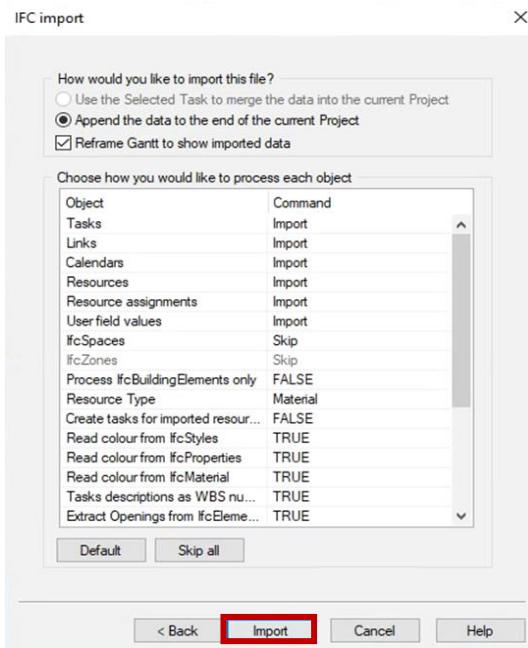


Figure 41: Importing IFC to Synchro Pro (e).

9. Select the **Finish** button.

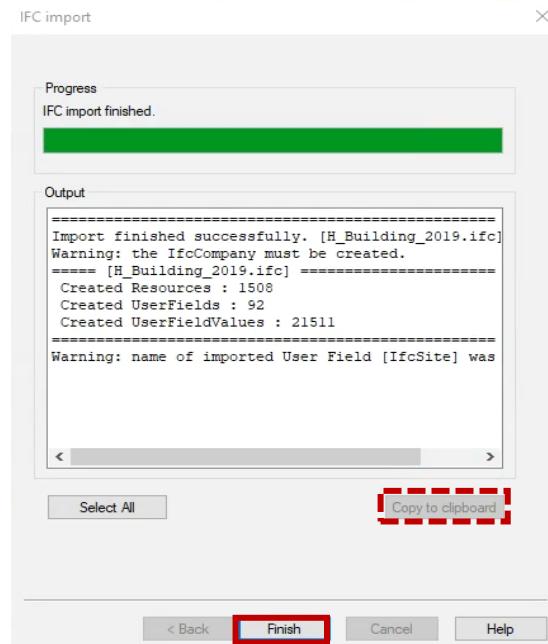


Figure 42: Importing IFC to Synchro Pro (f).



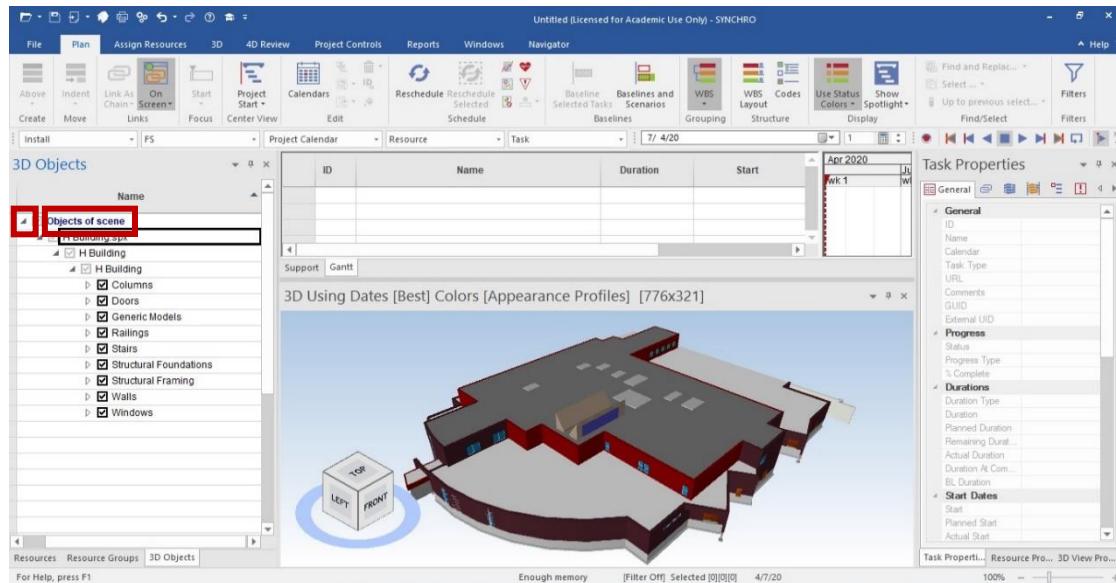
Note:

The **IFC Import** dialog will display the items that were imported and any relevant notifications in the **Output** panel. These items can be copied and pasted into Notepad to use for future reference by selecting the panels contents and selecting **Copy to clipboard**.



To Select 3D Object Options

1. Select the next to the **Objects of scene** panel on the left side to view the 3D model in the window.
2. Select the **nested select list** next to the **Objects of scene** panel to view the buildings high and lower level structures and materials.



Importing the Schedules and Plans

Synchro Pro allows you to assign resources with your list of actions. The software will provide you with a probability-based simulation to help you organize and manage the best critical path outcome for your project [4]. This section will demonstrate how to import a schedule from Microsoft Project XML.

To Import a Schedule from MS Project XML

1. To import a schedule, select the **File** tab from the menu.
2. Select **Import** from the menu panel.
3. Select **Microsoft Project XML** from the submenu panel.

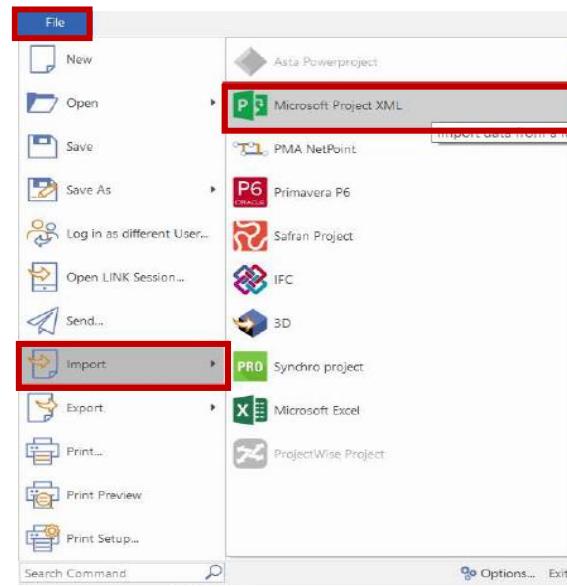


Figure 45: Importing a Schedule from MS Project XML (a).

4. Select the **Browse** button to locate the file source name and then select the **Open** button.

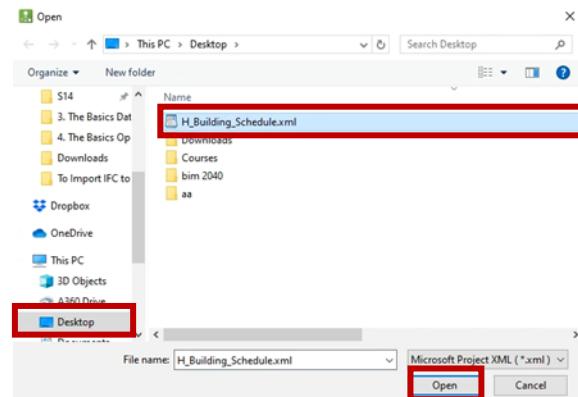


Figure 46: Importing a Schedule from MS Project XML (b).

5. Select the **Next >** button to open **the Microsoft Project Import** dialog.

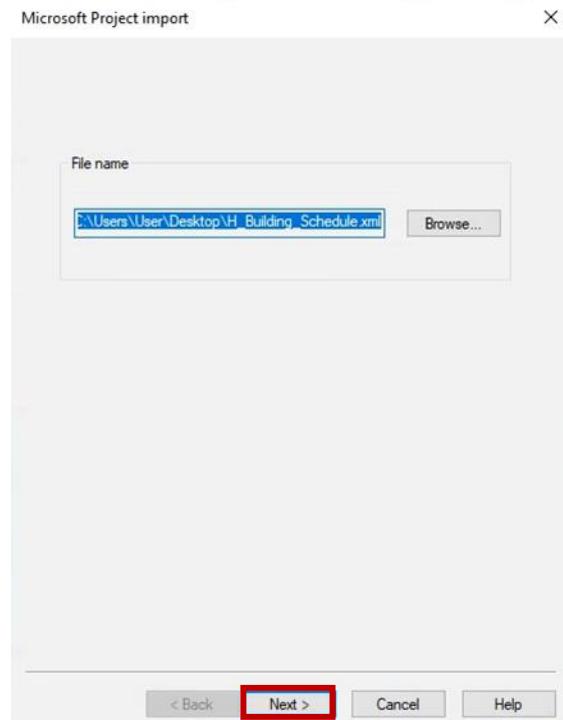


Figure 47: Importing a Schedule from MS Project XML (c).

6. **Command** which **Object** you would like to **Import** or **Skip** in the list of attributes.
7. Select the **Import** button.

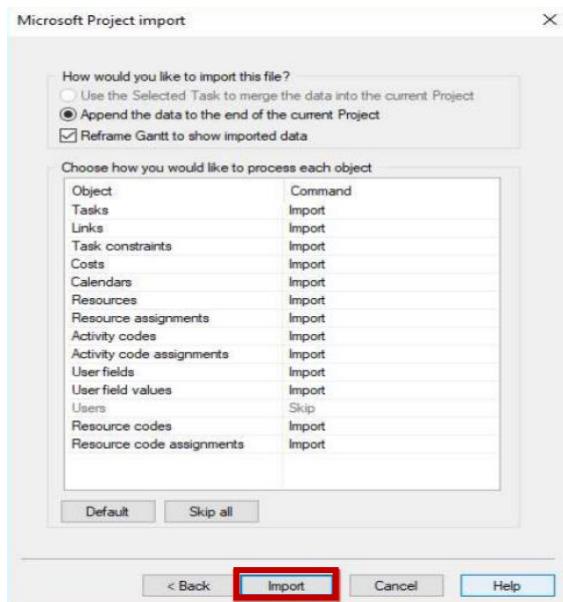


Figure 48: Importing a Schedule from MS Project XML (d).



Note:

Keep the **Microsoft Project Import** default settings.

8. Select the **Finish** button to complete your import.

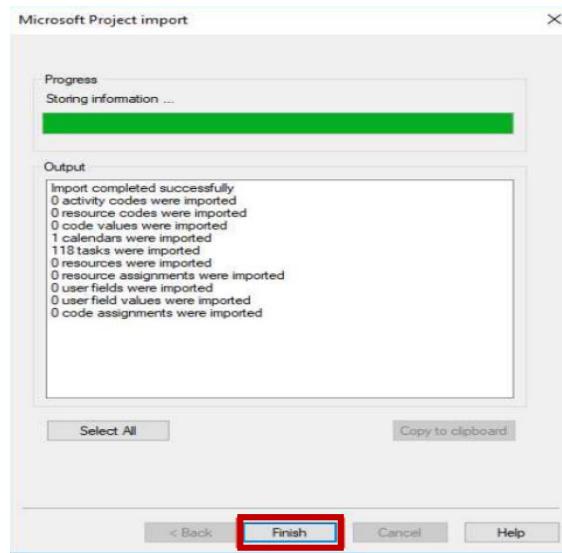


Figure 49: Importing a Schedule from MS Project XML (e).



Note:

The **Microsoft Project Import** dialog will display the items that were imported and any relevant notifications in the **Output** panel. These items can be copied and pasted into Notepad to use for future reference by selecting the panels contents and pressing CTRL-C to copy onto your clipboard.

Result:

Viewing your 3D Model, **H_Building_Schedule.xml** in the 3D window

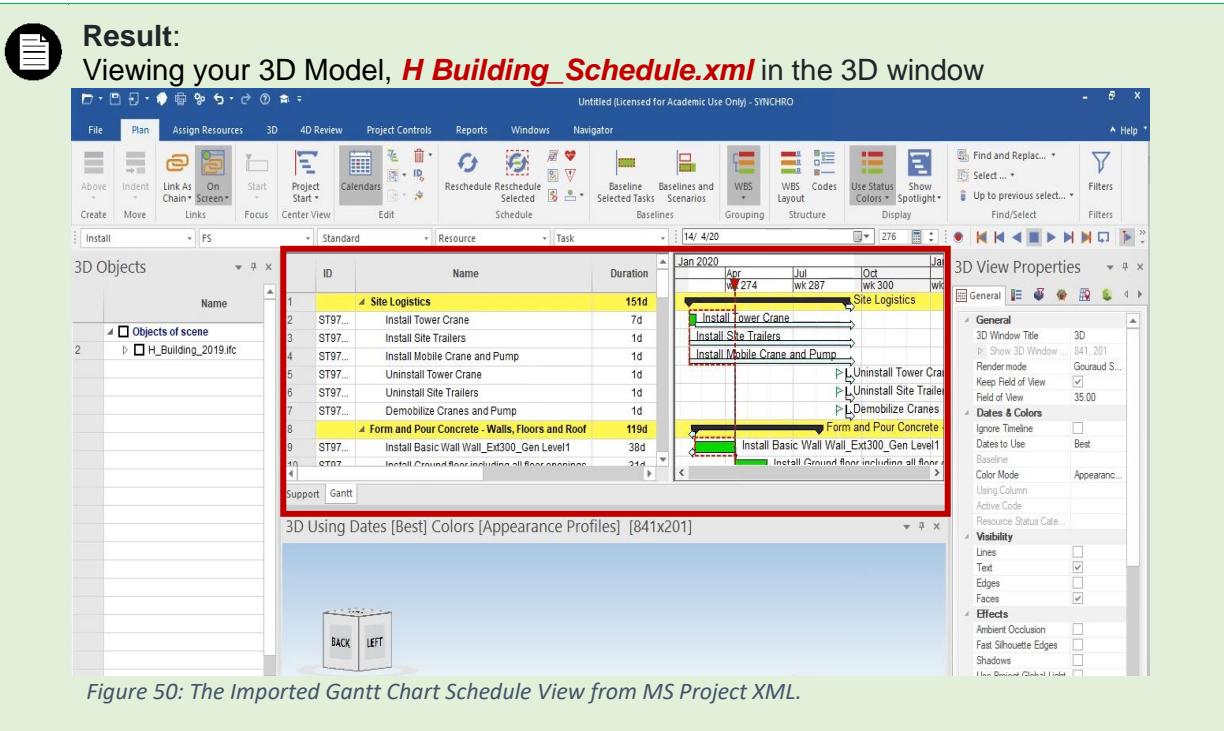


Figure 50: The Imported Gantt Chart Schedule View from MS Project XML.

To Format the Date Display Options

1. Select the  **Options icon** in the **Quick Tools Menu** at the top of the window to open the **Option** dialog to set your synchronization and scheduling preferences.
2. Select the **General** tab heading located at the top of the panel to expand the menu.
3. Select the text **Time Display Format** below.
4. Unselect the **Display Time of Date** check.
5. Select the **Use System Settings** down menu and select **24H Clock (HH:MM)
DD/MM/YY**.
6. Select the **OK** button.

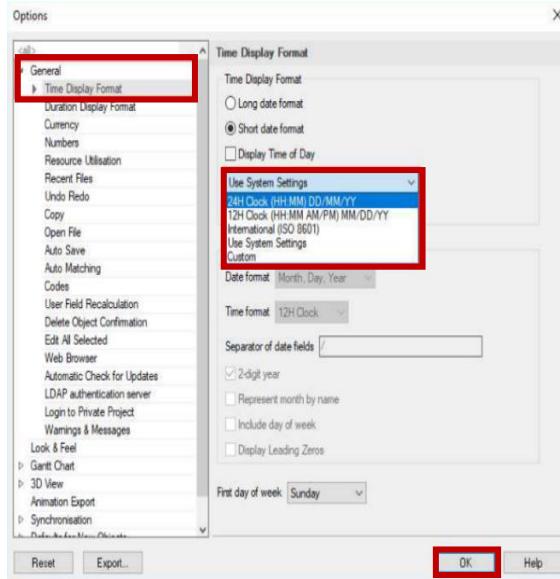


Figure 51: To Format the Date Display Options.



Note:

The **Options** dialog lists many settings, including the customization of the **Gantt Chart** and **3D View**.

4D Linking Process

Synchro Pro can combine the 3D models with the schedules using the resources (3D model objects) assigned to the tasks in the schedule. The linking process will result in creating a 4D model that enables a sequence of activities to be depicted visually on a timeline that has been populated by a 3D model.

This section features the following subsections:

- [Creating Selection Sets](#)
- [Linking Selection Sets with Tasks](#)
- [Animating](#)
- [Subdividing 3D Objects](#)

Creating a Selection Set from a 3D Filter

Knowing how to create selection sets will allow users to choose the objects or filters visible in the 3D window which will facilitate the working flow. This section explains how to create selection sets both from 3D filters and 3D objects.

To Create a Selection Set from a 3D Filter

1. Select the **3D Filters** pane on the left side of the panel and right-click

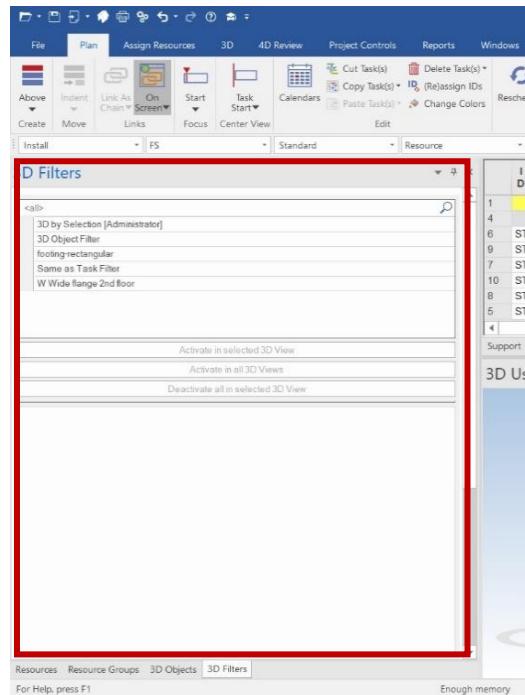


Figure 52: 3D Filters Pane.

2. Select **Add** in the pop-up window.

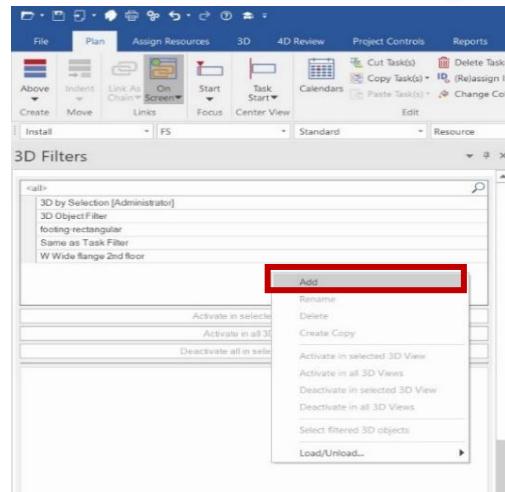


Figure 53: Adding 3D Filters.

3. After typing the name of the filter, select the **Enter** button.

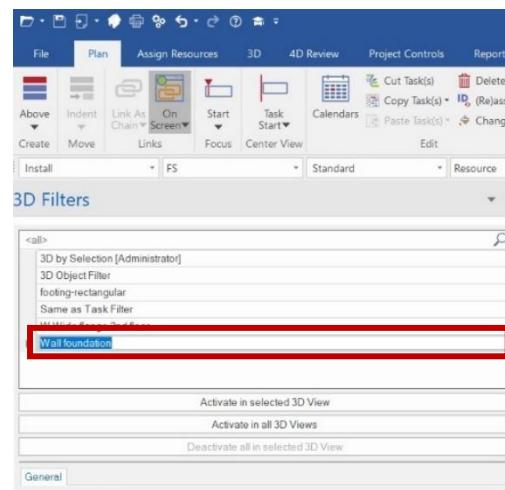


Figure 54: Adding a Filter Name

4. Select the **3D** check box.



Figure 55: Enabling the 3D Check Box.

5. Select the **Objects of scene** and right-click.
6. Select the **Find 3D Object** in the menu.

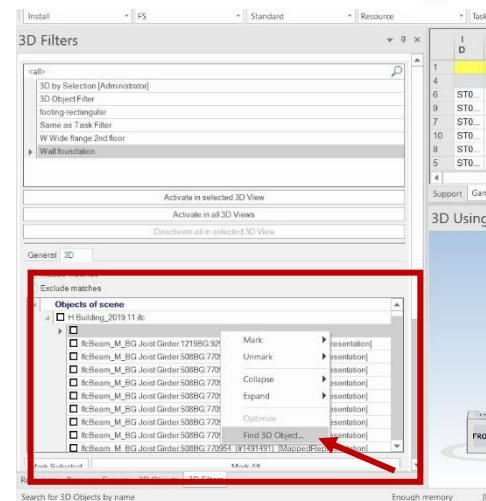


Figure 56: Objects of Scene Section.

7. Select the **Find what:** field and type the name of the 3D object.
8. Select the **Find All** button.

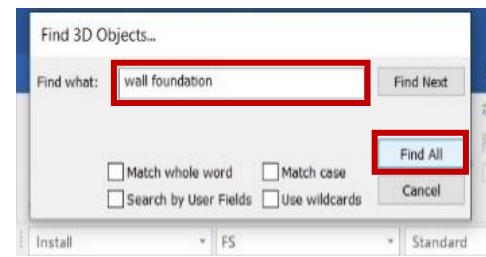


Figure 57: Find 3D Objects Window.



Note:

All the results matching the criteria of your search will be highlighted in Grey.

9. Select the **Mark Selected** button located at the bottom left corner of the screen.
10. Select the **Activate in selected 3D View** button.

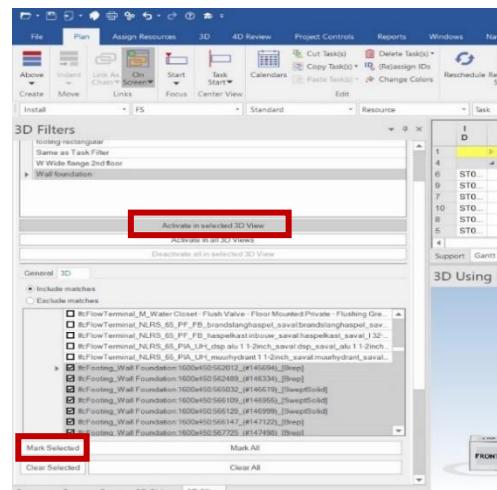


Figure 58: Activating in Selected 3D View



Note:

As a result of the previous procedural steps, all the filtered objects will be displayed in the 3D window (See **Figure 18** below.)

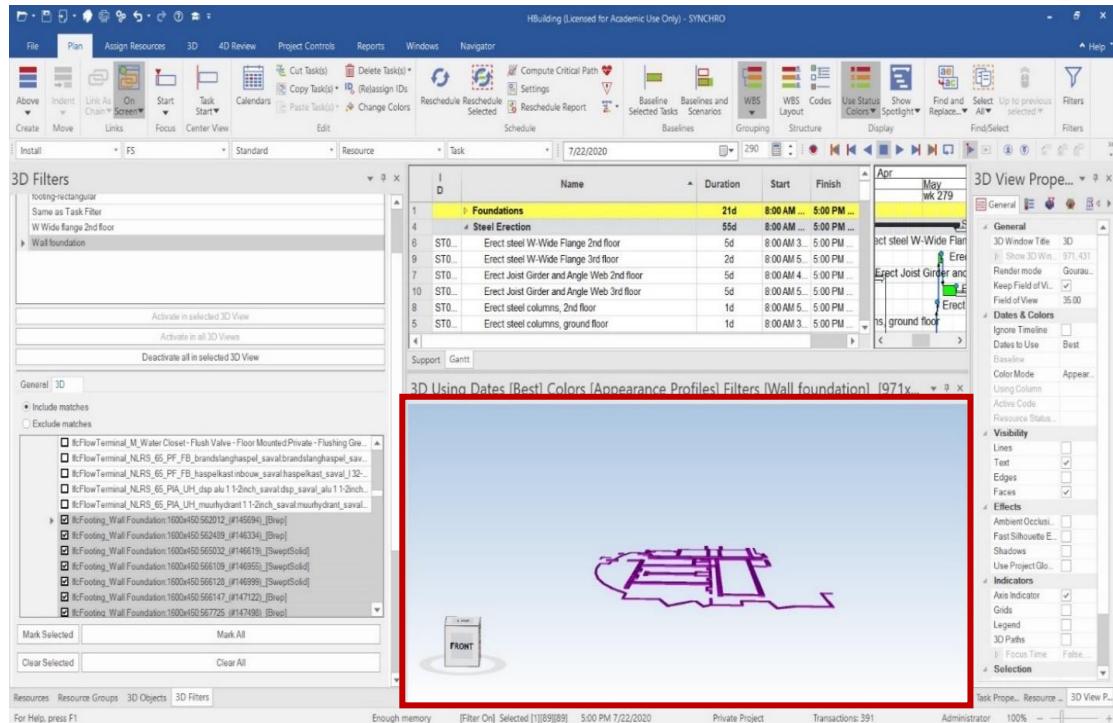


Figure 59: Filtered Objects in the 3D View Window.

To Create a Selection Set from a 3D Object

1. Select the **Plan Tab** at the top of the **Quick Menu Toolbar**. Select the **3D Objects** button located in the bottom left corner of the screen.

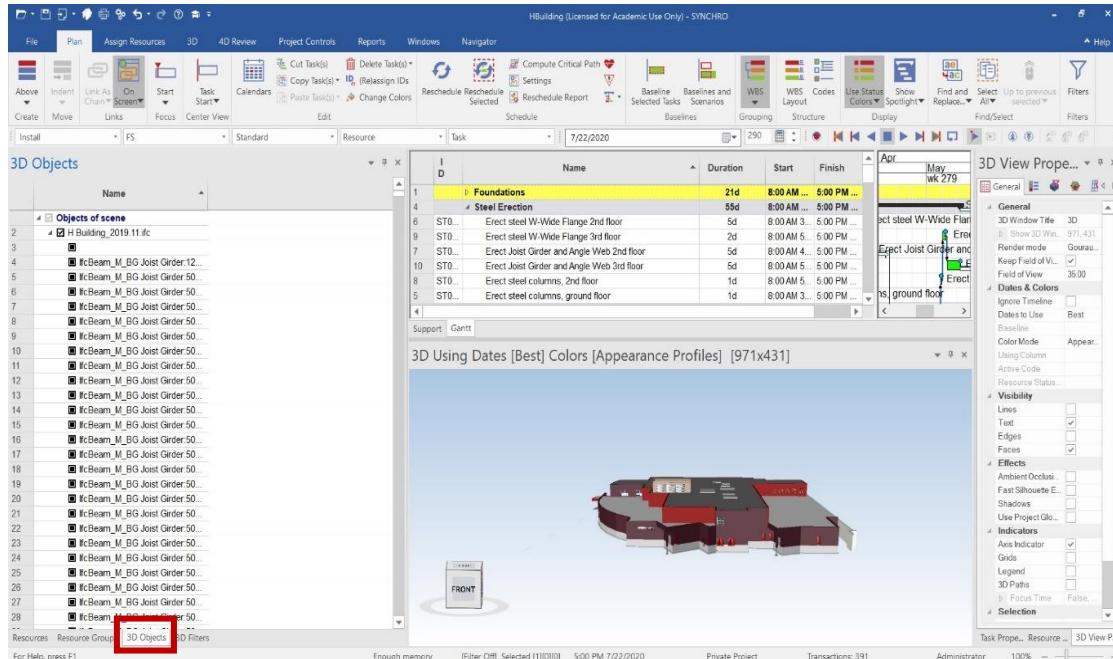


Figure 60: Selecting the 3D Object Display.

2. Select the **Objects of scene** and right-click.
3. Select the **Find 3D Object** from the menu.

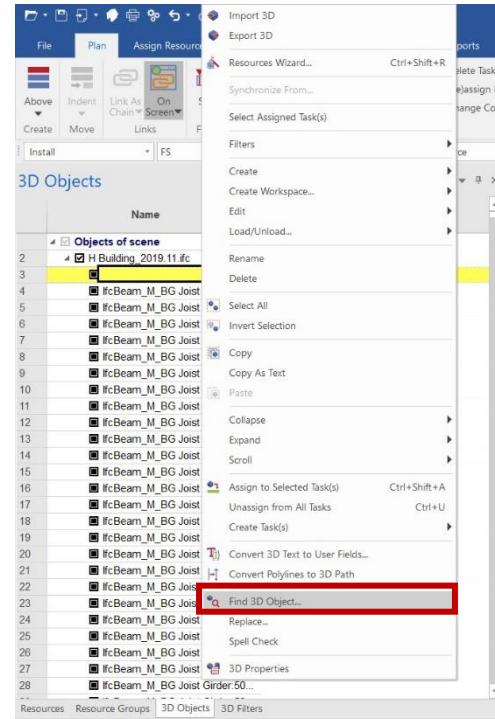


Figure 61: Finding 3D Object.

4. Select the **Find what:** field and type the name of the 3D object.
5. Select the **Find All** button.

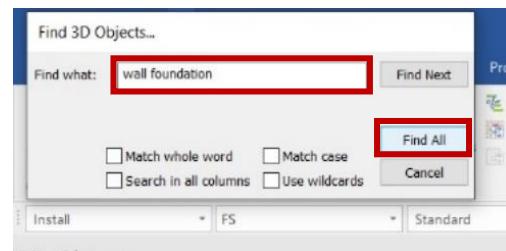


Figure 62: Find 3D Object Window.



Note:

All the found objects will be highlighted in **Yellow**.

1. Select the highlighted objects and right-click to open the menu panel.
2. Select the **Filters** option near the top of the panel.
3. Select the **Create Selectable Set from Selected** from the submenu.

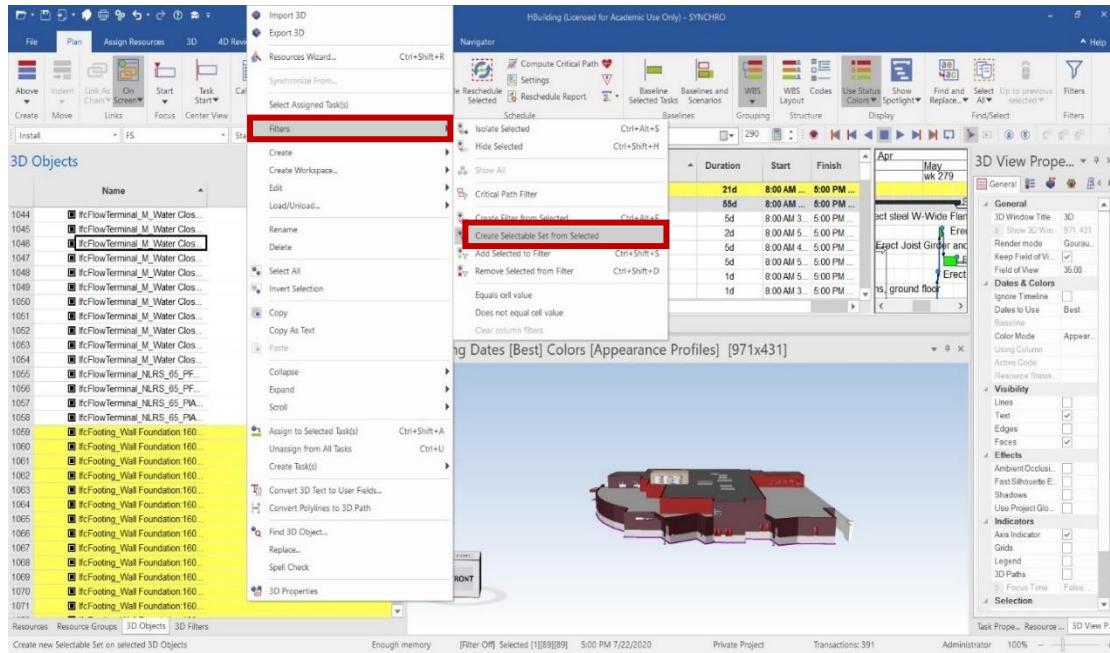


Figure 63: Filters Menu.

4. Select the **Name:** field and type the name of the **3D Filter**.
5. Select the **OK** button.

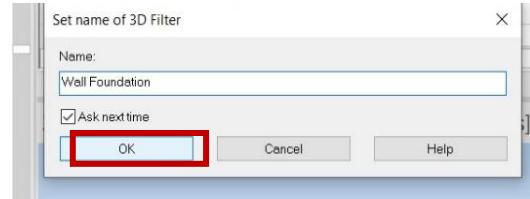


Figure 64: Setting Name of 3D Filter.



Note:

After completing all the steps, the selected (not filtered) objects displayed in the 3D window will be highlighted purple. (See **Figure 65** below).

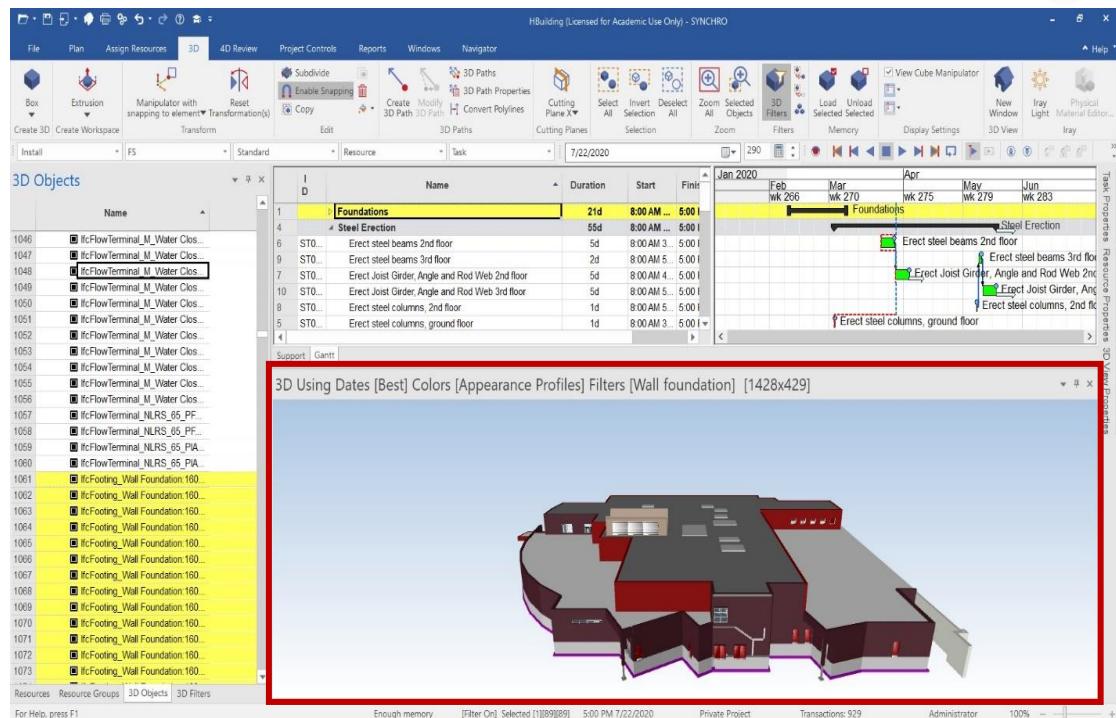


Figure 65: 3D Window with the Highlighted Selected Object.

Linking a Selection Set with a Task

Linking object resources allows you to schedule tasks in Synchro Pro. This section will guide you through the steps required to link a 3D Selection Set with a task.

To Link a Selection Set with a Task

1. Select the **3D Tab** in the **Quick Toolbar**.

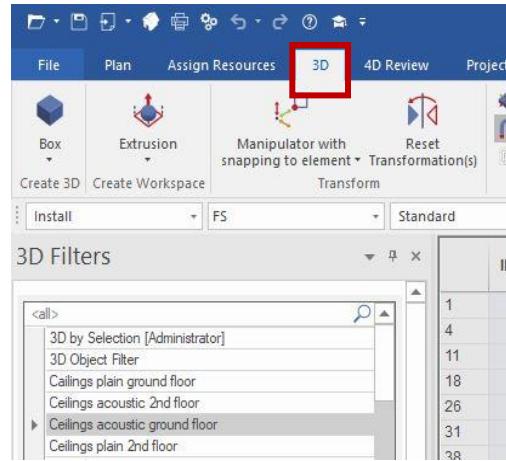


Figure 66: 3D Tab.

2. Select the **3D Filters** tool button.

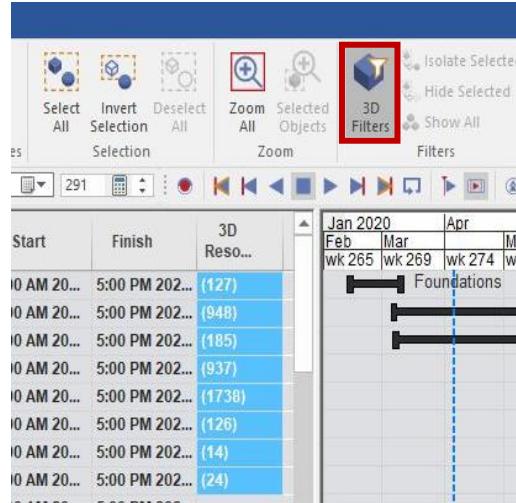


Figure 67: 3D Filter Tab.

3. Select any **task** (for the purpose of training we chose **Ceilings acoustic ground floor**) in the **3D Filters** pane.
4. Select the **Activate selected in 3D View** button.

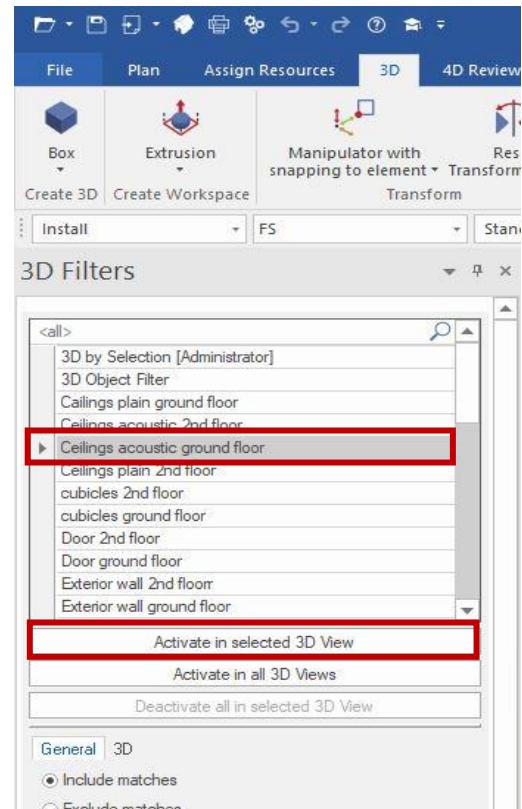


Figure 68: Activating in 3D View.



Note:

When the selected sets have been activated, the **3D View in the 3D Window** will start to change with only activated sets being displayed.

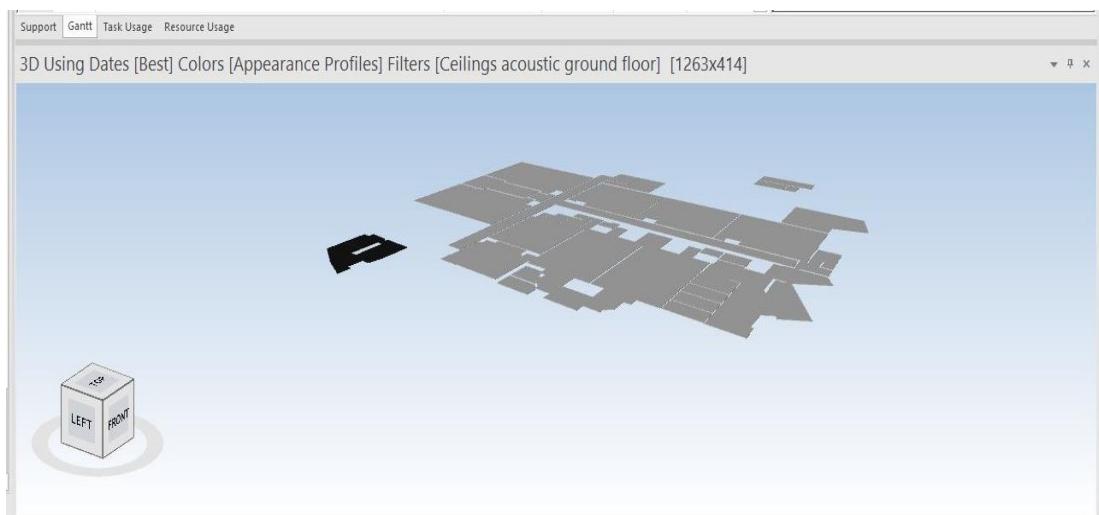


Figure 69: 3D View with Activated Sets Displayed.

5. Select the upper left-hand corner of the model area that you want to trace, while pressing the SHIFT key on your keyboard and holding the left-click button on your mouse to trace your object.
6. Release the mouse button to select the object.

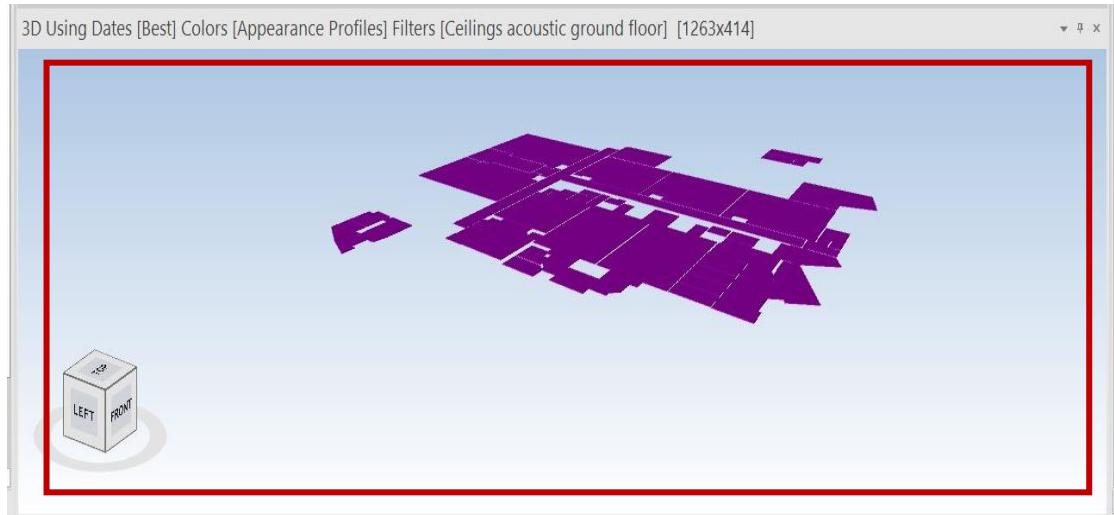


Figure 70: Selecting the Object.



Note:

The colour of the selected resources in the 3D View window will change.

7. Select a **task** in the schedule that you want the designated resources to be linked with.

ID	Name	Duration	Start	Finish	3D Reso...
1	▷ Foundations	21d	8:00 AM 20...	5:00 PM 202...	(127)
4	▷ Steel Erection	55d	8:00 AM 20...	5:00 PM 202...	(948)
11	▷ Form and Pour Concrete - Walls, Floors and Roof	80d	8:00 AM 20...	5:00 PM 202...	(185)
18	▷ Masonry Work	47d	8:00 AM 20...	5:00 PM 202...	(937)
26	▷ Doors, Window wall and store front closures	39d	8:00 AM 20...	5:00 PM 202...	(1738)
31	△ Building Finishes	33d	8:00 AM 20...	5:00 PM 202...	(126)
34	ST00... Install compound ceiling acoustic tiles, 2nd floor	10d	8:00 AM 202...	5:00 PM 202...	56
32	ST00... Install compound ceiling acoustic tiles, ground floor	15d	8:00 AM 202...	5:00 PM 202...	42
35	ST00... Install compound ceiling plain, 2nd floor	2d	8:00 AM 202...	5:00 PM 202...	8
33	ST00... Install compound ceiling plain, ground floor	5d	8:00 AM 202...	5:00 PM 202...	8
37	ST00... Install cubicles, 2nd floor	1d	8:00 AM 202...	5:00 PM 202...	4
36	ST00... Install cubicles, ground floor	1d	8:00 AM 202...	5:00 PM 202...	8
38	▷ Stairs	5d	8:00 AM 20...	5:00 PM 202...	(14)
40	▷ Plumbing	29d	8:00 AM 20...	5:00 PM 202...	(24)
43	▷ Heating and Ventilating - AC	5d	8:00 AM 20...	5:00 PM 202...	

Figure 71: Selecting the Task.

8. Right-click to **Assign Selected Resource(s)** to the task.

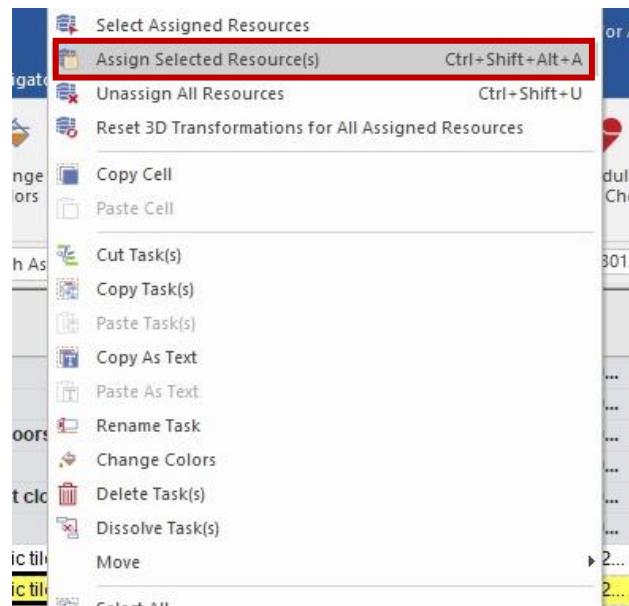


Figure 72: Assigning Selected Resources.



Note:

You will notice that a **3D Resources** column in the **Task List** will turn blue for that task, indicating that a 3D Resource has been assigned.



Tip:

You can assign selected resources with this shortcut **Ctrl+Shift+Alt+A**

Creating an Animation

After creating a schedule within Synchro, you can then create an animated representation of your schedule that can be exported and used as presentation material. Exporting your video into a different format enables your animation to be presented from a computer that does not have Synchro installed. You can create an animation representing the entire project, or one that focuses on a specific task or series of tasks [5]. This section explains how to create a new animation, how to define the beginning and end of the animation, and how to define the camera angles.

To Create an Animation

1. Open the **4D Review** tab in the top left.
2. Open **Animations** and **Animations Editor**.



Figure 73: 4D Review ribbon, Animations and Animations Editor

3. Right-click in the **Animations** section and select **Add**.
4. Select the new **animation** and ensure it is highlighted.

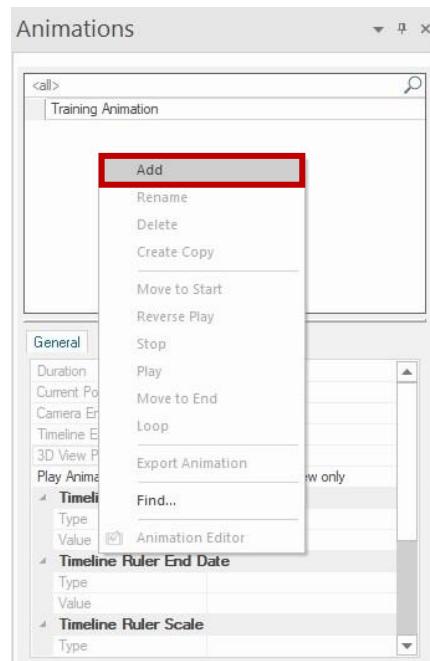


Figure 74: Adding an Animation

To Define the Start and End of your Animation

1. In the **Gantt chart**, move the **Focus Time** to just before the start of the project.
2. Left-click in the **Focus Time channel** in the **Animation Editor** at the beginning of your animation (0 sec)
3. In the **Gantt chart**, move the **Focus Time** to just after the end of the project.
4. Left-click in the **Focus Time channel** in the animation editor at the end of your animation.

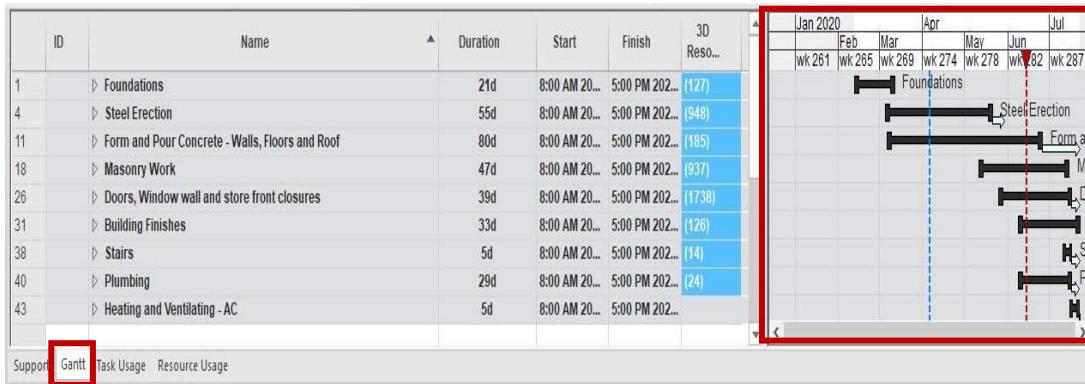


Figure 75: The Gantt Chart

To Define the Camera Angles

1. Use the **3D View** to adjust the camera angle to the desired starting position.
2. Left-click in the **Camera channel** of the **Animation Editor** at 0 sec.

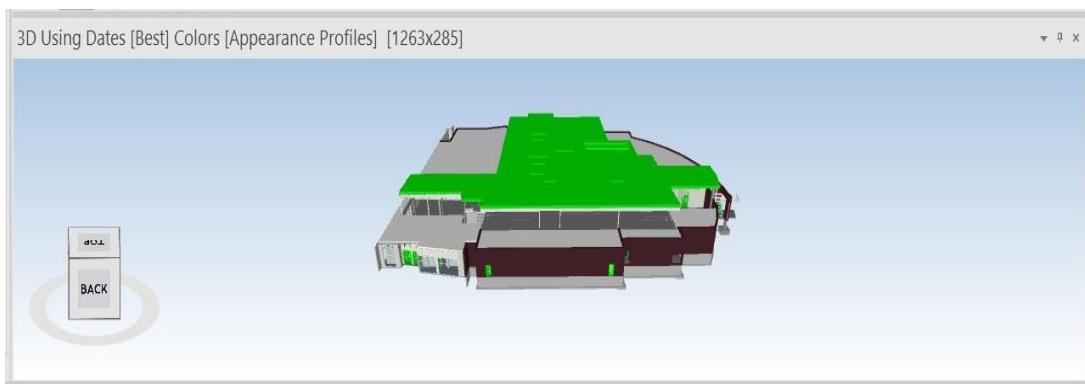


Figure 76: The 3D View Window.

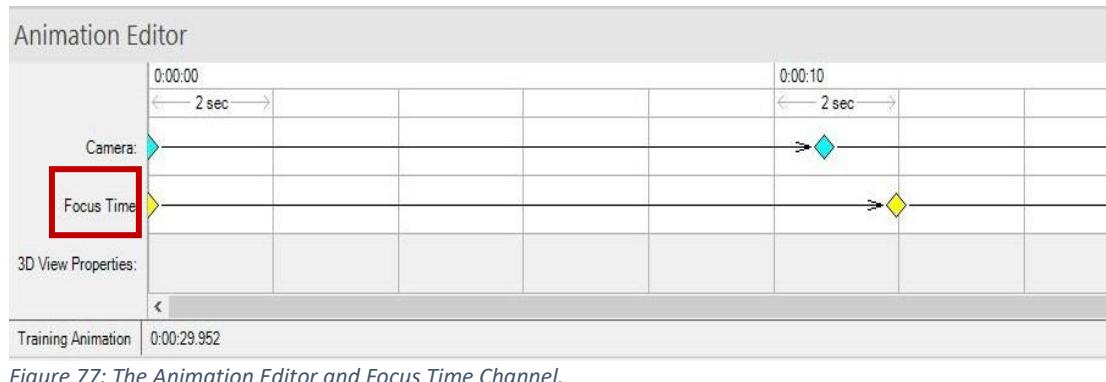
3. Move the **Focus Time Marker** in the **Animation Editor** forward by the desired length of time.



Example:

Move the Focus Time Marker forward by 5 seconds.

4. Use the **3D View** to adjust the camera angle to the new desired position.
5. Left-click in the **Camera channel** at the same point in time that you moved the **Focus Time Marker** to (5 sec).



6. Repeat steps 3-5 as many times as necessary until you have recorded the 3D model from all your desired angles.

Exporting an Animation

This section explains how to export an animation. It also offers additional information regarding the resolution and content properties of your video.

To Export an Animation

1. In the **Animations** section, right-click on your animation.
2. Select **Export Animation**.

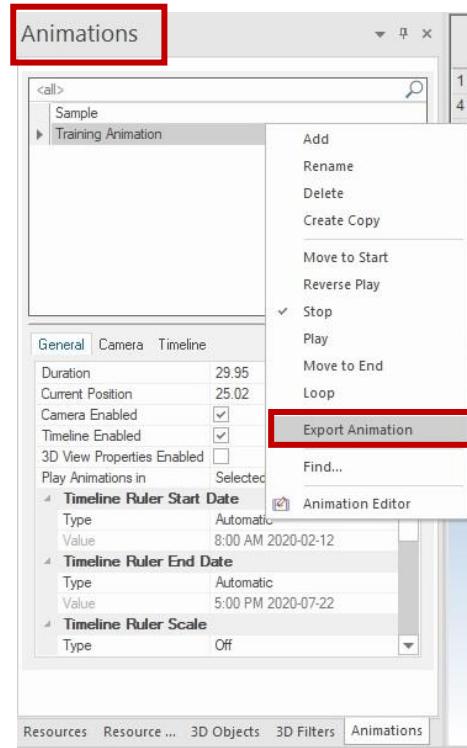


Figure 78: Exporting an animation

To Format the Resolution Properties

1. Select the **Save** button to open the **Export Animation** where you can view and adjust different video options.

Note:

- **Resolution** – You can adjust the quality of the video in terms of how many pixels it displays.
- **Frame rate** – You can adjust the number of frames displayed per second.
Note: Setting the frame rate higher will result in a smoother video, but it will take longer to export.
- **Duration** – You can adjust the length of the video and also split the video up into sections. This ensures that you can export the entire video without exceeding Synchro's 2 GB maximum file exporting size.
- **File for Export** – You can browse your computer's folders and select the one you want to save your video in.

Export Animation...

Resolution	Content	Images	Soundtrack	Gantt Chart	Focus Time	Timeline	Textual Frames
Resolution <div style="border: 1px solid #ccc; padding: 5px;"> Width: 1080 Height: 540 Frame Rate: 25 </div>	Duration <div style="border: 1px solid #ccc; padding: 5px;"> Start (sec): 0 Finish (sec): 29.952 Speed: 100% Split every (sec): 0 </div>						
Compression <div style="border: 1px solid #ccc; padding: 5px;"> Codec: default <div style="float: right;">Change</div> </div>							
File for Export <div style="border: 1px solid #ccc; padding: 5px;"> <input type="text" value="C:\Users\hmala\Desktop\HBuilding.mp4.avi"/> Browse... <div style="margin-top: 5px;"> <input type="checkbox"/> Export the animation as a sequence of images with given quality Good <input type="checkbox"/> Skip existing frames <input type="checkbox"/> Open animation location when complete </div> </div>							

Figure 79: Resolution Settings.

To Format the Video Content Properties

The **Content** tab in the **Export Animation** window can be used to add or remove optional content from your video. You can include the date or time, a legend, tasks, resources, and choose where to position the content within the animation's frame as well as adjust the size of the optional content.

- Once you have selected all the content you want to display in your video, click **OK** to export your video.

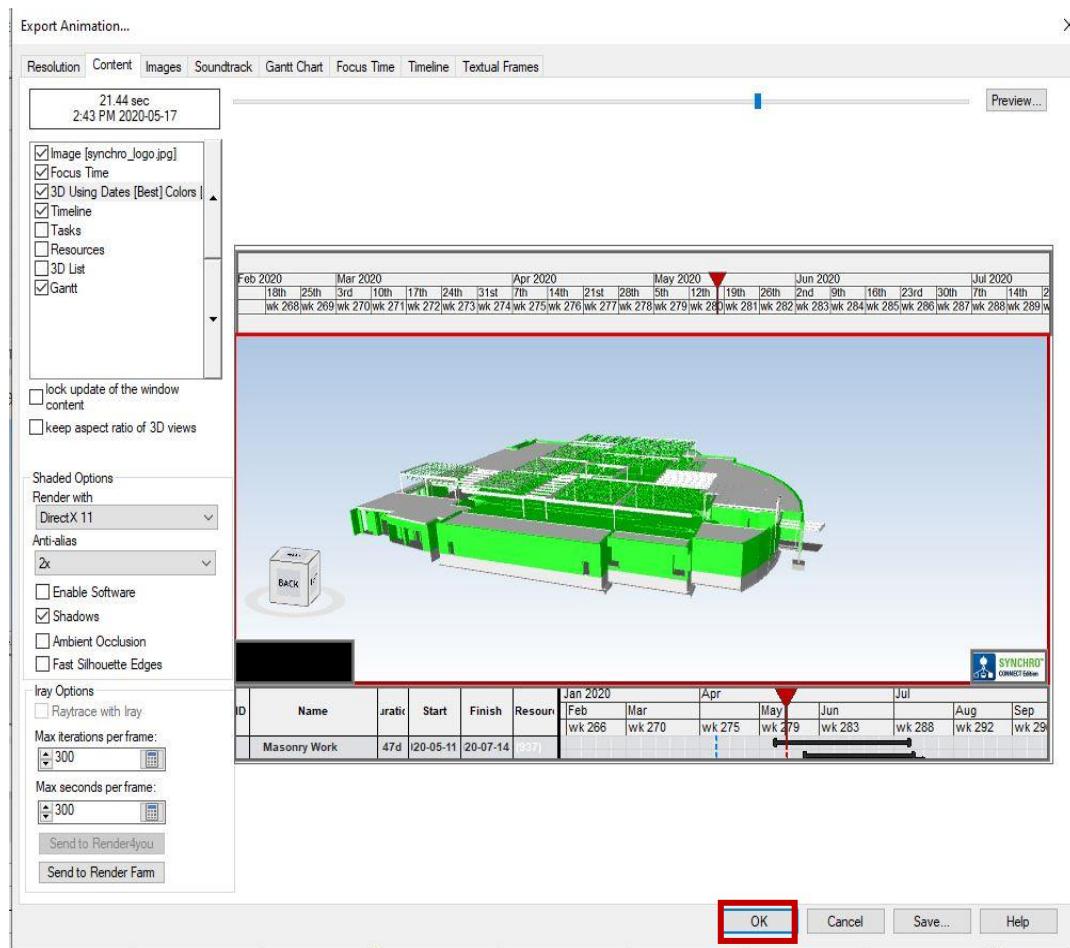


Figure 80: Content Settings.

Subdividing 3D Objects

The 3D Subdivision tool is used to divide an object into sub-parts. The sub-parts can then be selected individually and assigned different tasks and resources.

To Subdivide 3D objects

1. Open the **3D** tab.
2. Select the **Subdivide** button to open the **3D Subdivision** window.

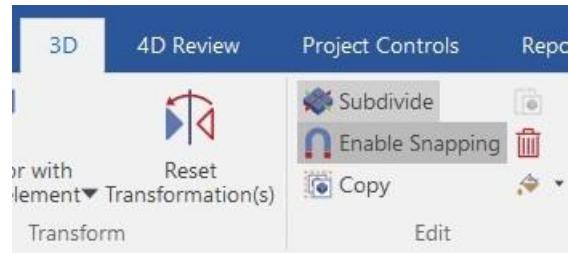


Figure 81: 3D ribbon and Subdivide option

3. In the **3D View** window, highlight the **object** you wish to subdivide.

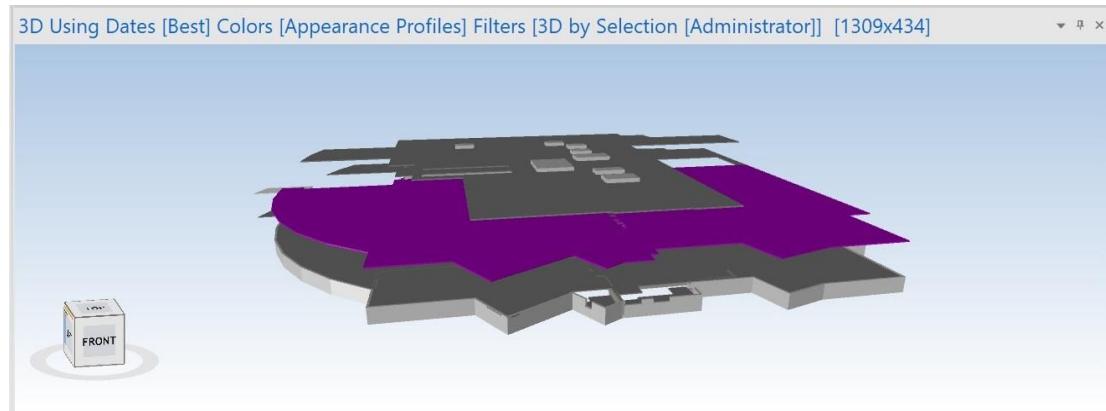


Figure 82: 3D View Window with Selected Object.

4. In the **3D Subdivision** window, select **Slice** as the **Subdivision type**.
5. Select how you want to divide your object by changing the values in the **Columns** and **Rows** fields [6].

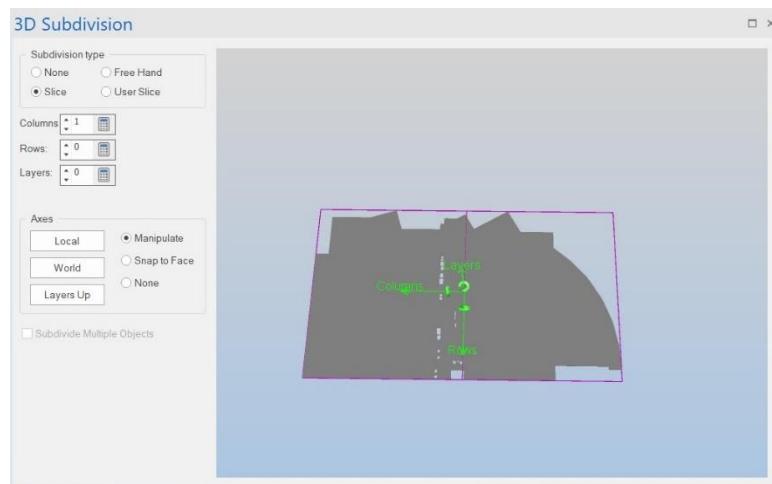


Figure 83: 3D Subdivision Window.

Troubleshooting

This section contains information about problems you may encounter while using Synchro Pro and addresses these problems. This includes solutions for if: Synchro crashes, you cannot see your 3D models, your screen is blank when you try to export your animation to AVI, your video compression, or if you experience your display behaves oddly upon subdivision.

This section consists of the following subsections:

- [Importing and Exporting](#)
- [Animating](#)
- [Subdivision](#)

Importing and Exporting

If Synchro crashes before opening.



Caution:

Be careful when editing the **Registry**, or you may damage your Windows installation and may remove your license information. Only **Modify** or **Delete** the keys described below.

Reason for Problem	Solution
Your Synchro Registry folder need cleaning.	<ol style="list-style-type: none"> 1. Save all necessary files and close Synchro Pro. 2. In your Start menu type regedit. 3. Select regedit to open the Registry Editor. 4. Inside the Registry Editor expand HKEY_CURRENT USER 5. Inside HKEY_CURRENT USER, expand the Software folder. 6. Inside the Software folder, expand the Synchro folder. 7. Delete the following: <ul style="list-style-type: none"> ▪ HKEY_CURRENT_USER\Software\Synchro\Synchro\Default Layout State ▪ HKEY_CURRENT_USER\Software\Synchro\Synchro\GUI Layout x (x can be 1-4) ▪ HKEY_CURRENT_USER\Software\Synchro\Synchro\Settings 8. Open HKEY_CURRENT_USER\Software\Synchro\Synchro\ProjectConfig 9. DO NOT DELETE (Default) and Anything starting with FNL!!! 10. Delete everything in else in ProjectConfig. 11. Close the Registry Editor and re-open Synchro.

<https://synchrohelp.zendesk.com/hc/en-us/articles/360018815754-Synchro-crashes-before-opening>

If I cannot see my 3D models after import.

Reason for Problem	Solution
Objects could be unloaded or hidden.	1. Open the 3D Objects window and left-click to enable the checkbox next to the <input checked="" type="checkbox"/> imported file name.
Objects may be set of 2D rather than 3D objects and the visibility of lines is disabled.	1. Open 3D View Properties . 2. Select the General tab. 3. Under Visibility , select the Lines box.
Nothing was imported. The model objects may be filtered in the BIM file or the file contains only 2D geometry.	1. Try import the models with Ignore Hidden 3D Objects and Ignore Wireframe 3D Objects unchecked. 2. Select Import .
One of the models may contain a reference object that is placed very far away from the main model and is causing bounding box issues.	1. You can select a leaf level 3D object. 2. Right-click in the 3D window. 3. Select Zoom and Selected Objects .

<https://synchrohelp.zendesk.com/hc/en-us/articles/360016145894-I-cannot-see-my-3D-models-after-import>

Animating

If my screen is blank when I try to export my animation to AVI.

Reason for Problem	Solution
The order of the enabled windows in the list determines the back to front priority of the window in preview. If your 3D window is at the bottom of the list, means that it's behind all the other windows.	In the Content tab in the upper right corner, select the 3D Using dates [Best] and use the up arrow to move it above the Timeline and Gantt. Note: You may also need to resize the 3D view in the preview once you have moved it forward. Note: The 3D Synchro window could also be hidden behind the Timeline. If this is the case, grab the top edge of the window and drag up.

https://issuu.com/iuidesign/docs/4d_synchro_animation_avi_export_f

If my video compression is unsuccessful.

Reason for Problem	Solution
Frame rate is unsuccessful.	1. Maintain your video's native frame rate when compressing your video. 2. If Keyframes is an option, choose the same value you used for frame rate. 3. Select Constant frame rate instead of Variable frame rate.
Bit rate/Data rate is unsuccessful.	1. To improve your visual quality of the video and its file size choose Variable Bit Rate and select a value from the ranges below. ▪ SD 2, 000 – 5, 000

	<ul style="list-style-type: none"> ▪ 720p 5, 000 – 10, 000 ▪ 1080p 10, 000 – 20, 000 ▪ 2K 20, 000 – 30, 000 ▪ 4K 30, 000 – 60, 000
Resolution is unsuccessful.	<ol style="list-style-type: none"> 1. Most common formats: <ul style="list-style-type: none"> ▪ 720p HD 16.9 aspect ratio. ▪ 1080p HD 16.9 aspect ratio.

Subdivision

If the object disappears or displays other unexpected behaviour upon subdivision.

Reason for Problem	Solution
<p>You may need to adjust your subdivision settings.</p> <p>Note: You many also need to adjust the Triangulation Type setting to enable/disable Try sewing to solid.</p>	<ol style="list-style-type: none"> 1. Select the  Options icon from the Home ribbon Expand 3D View and select 3D Subdivision 2. Within the Toolkit for Subdivision Operations change the Used Toolkit from Advanced to Simple 3. Select OK. <p>Note: Some files may require the Advanced Toolkit.</p>

Section 11.4 of the Synchro Pro Basic Training Manual [4]

External Resources

For More Information Contact

Bentley Systems, Incorporated
685 Stockton Drive
Exton, PA 19341, United States

Telephone: 1-800-BENTLEY (1 800 236 8539)
Outside the United States: +1 610 458 5000
Email: support@synchroLtd.com
Bentley Website <https://www.bentley.com/en/about-us/contact-us>
SYNCHRO Website: <http://www.synchroLtd.com>
Support Website: <https://www.synchroLtd.com/contact-us/>

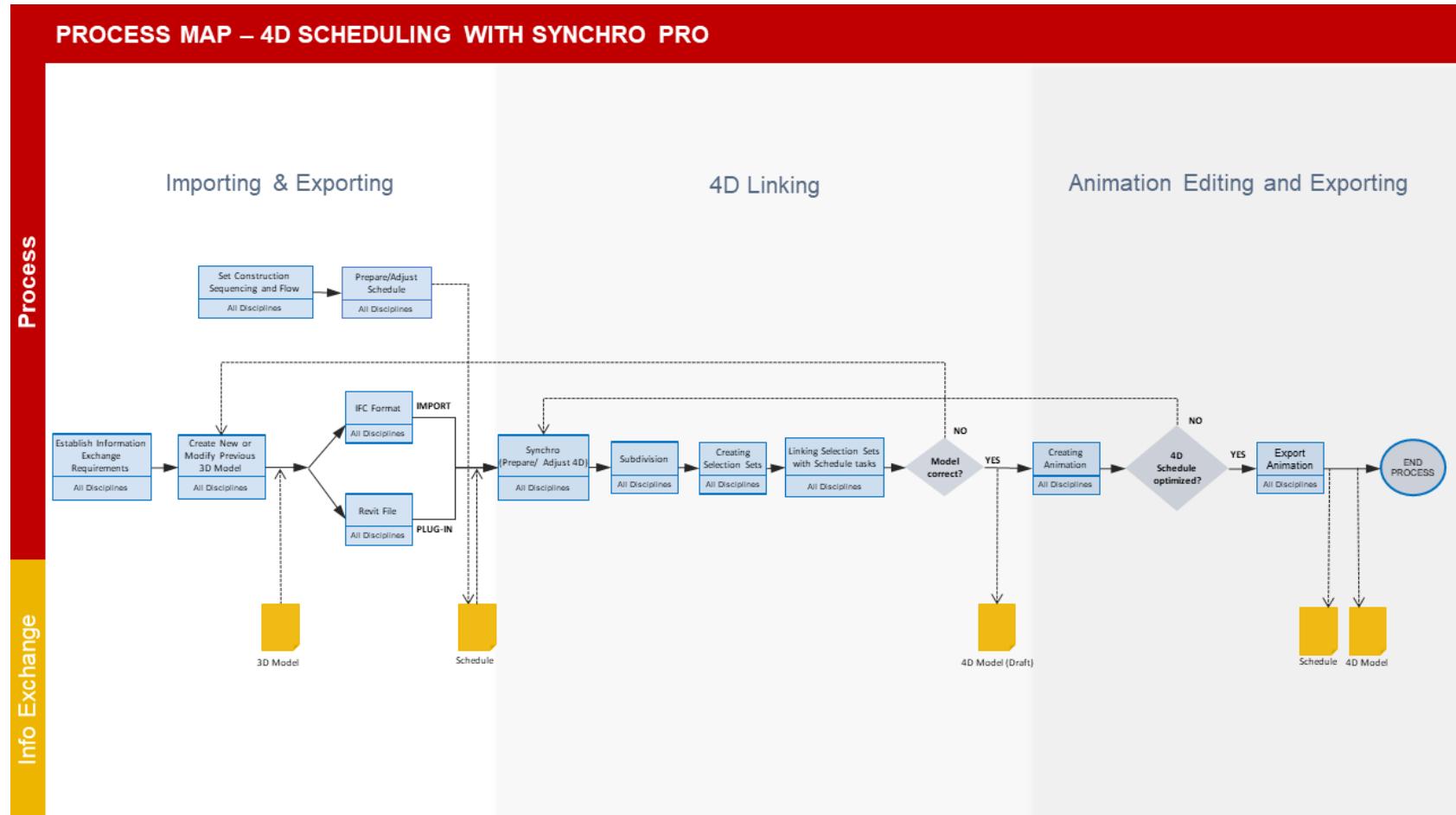
For Online Training and Other Resource Information

- Synchro Pro (Main Website). <https://www.bentley.com/en/Products/Product-Line/Construction-Software/SYNCHRO-PRO>
- Bentley Construction Academy Online Resources.
apps.bentley.com/studentserver/home/index
- Synchro Software Plugin Downloads. <https://www.synchroLtd.com/plugins/>.
- Computer Requirements: Display Adapter Driver Card
<http://developer.techsoft3d.com/hoops/hoops-visualize/graphics-cards/>
- Autodesk Revit® 2018. <http://help.autodesk.com/view/RVT/2018/ENU/>
- Synchro Construction: Training by Topic.
<https://www.youtube.com/channel/UCfYJYymZLuS2orahu-0UneA>

For Technical Support

- <https://www.bentley.com/en/support>
- <https://www.synchroLtd.com/contact-us/>

Appendix A – 4D Scheduling Process Map



Appendix B – Partner Applications

Additional information about Synchro Pro's seamless design and scheduling integrations can be found at: <https://www.synchrotd.com/integrations/>

Design Interoperability with CAD Systems

The following 3D file formats can be IMPORTED into Synchro Pro 2018:

Product:	File Extension(s):	Version(s):	Note(s):
ACIS	SAT, SAB	up to 2017.1 (R27)	
Alias Wavefront	OBJ	All Versions	
AutoCAD	DWG, DXF	R14 - 2018	
Autodesk	DWF, DWFX	up to 2012	
Autodesk FBX	FBX	6.0 - 7.5	
Autodesk Inventor	IPT, IAM	Up to 2018	
Bentley I-Model	I.DGN	1.0	
Bentley Microstation	DGN	V7, V8, V8 XM, V8I, V8i (SELECTseries 2), V8i (SELECTseries 3)	Plug-in module is available for Microstation V8i (SELECTseries 2 and 3)
CATIA V4	EXP, DLV, MODEL, SESSION	up to 4.2.5	
CATIA V5/V6	CATProduct, CATPart, CATDrawing, CATShape, CGR	R4 - V5-6 R2017 (R27)	
Collada	DAE	up to 1.5	
Dassault Interchange Format	3DXML	2011 – 2013	
HOOPS stream file	HSF		
I-deas	MF1, ARC, UNV, PKG	up to 13.x (NX 5), NX I-deas 6	
IFC	IFC	2x, 2x2, 2x3, 4	Geometry only for 4 (beta version)
IGES part files	IGES, IGS	5.1 - 5.3	
Navisworks	NWF, NWC, [NWD]*	2015, 2016, 2017, 2018	via plug-in module for Navisworks. *IMPORTANT: NWD can be exported to SPX, but does not support future model updates via Synchronise From
Parasolid	xmt_bin, x_b, x_t, xmt_txt	up to v30.0	
ProE/Creo	PRT, ASM, NEU, XAS, XPR,	ProE up to Wildfire 5, Creo Elements/Pro 5.0, Parametric 4.0	
Revit	RVT	2015, 2016, 2017, 2018	via plug-in module for Revit

Rhino	3DM	4, 5	
SketchUp	SKP	v7, v8, 2013, 2014, 2015, 2016, 2017, 2018	
Solid Edge	ASM, PAR, PWD, PSM	V19 - 20, ST - ST10	
SolidWorks	SLDASM, SLDPR	up to 2018	
STEP part files	STEP, STP	AP203, AP214, AP242	Geometry ONLY
Stereo Lithography	STL	All versions	
UGS JT	JT	up to 10, ISO 14306:2012	
Unigraphics NX	PRT	11 - NX11	
Universal 3D	U3D	ECMA-363, 1st, 2nd & 3rd editions	
VDA-FS	VDA	1.0 - 2.0	
VRML files	VRML, WRL	V1.0 and V2.0 (VRML'97)	
3D PDF, PRC	PDF, PRC	All Versions	

Scheduling Interoperability with Project and Programming Management Software

The following industry standard technology can be INTEGRATED into Synchro Pro 2018:



Appendix C – Glossary

This section contains a list of terms used in this manual and their short definitions.

Term	Definition
Audio Video Interleave (AVI)	A multimedia file format that can contain both audio and video data allowing synchronous audio and video playback. The filename extension is .avi .
Building Information Modelling (BIM)	An intelligent 3D structural model which allows an integrated approach to construction. All phases of the design (infrastructure, architecture, structure design, mechanical, electrical, plumbing) are modelled within the virtual 3D model so the construction team can see how the building will work as a whole [7].
Cloud-based server	A virtual infrastructure hosted and delivered via the Internet that can be accessed remotely.
Construction Research Centre (CRC)	A Canadian organization (part of the National Research Council), focused on the construction sector, that supports the technological development of business environments. Their expertise also covers other sectors such as aerospace, transportation, and information and communications technology.
Critical Path Method (CPM)	An algorithm for scheduling a set of planned activities, used to determine the duration of the project.
Gantt chart	A type of bar chart that outlines the tasks involved in the project, the order of the tasks and their duration.
Industry Foundations Classes (IFC)	A standardized data model designed to describe and share architectural, building and construction industry data.
MS Project	Project management software designed to help managers keep track of all the work that must be done in order to successfully accomplish a project.

Primavera

Enterprise project portfolio management software that handles project management, scheduling, risk analysis, opportunity management, resource management, collaboration and control capabilities.

Public Service Procurement Canada (PSPC)

The department of the Government of Canada that plays a key role in providing internal services for federal departments and agencies.

Revit

A BIM software, mostly used for big scale projects, equipped with multiple tools that allow users to design a building and its components in 3D and access building information from the building model's database.

Synchro Pro

Construction management software that manages complex residential, industrial, commercial and public projects.

3D

Three-dimensional representation (width, height and depth) of the object used for its visualization.

4D scheduling

A process of bringing together a 3D model and a project schedule (Gantt Chart). This term is widely used in the Computer-aided design (CAD) industry, particularly in the BIM.

Index

To be filled in by Megan's technical writing team.

Jim took this section out of our project requirements.

Works Cited

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- [9] S. Software, "cdn2.hubspot," Synchro Software: Scheduling Pro: 4D Scheduling and Construction Project Management, 2018. [Online]. Available: <https://cdn2.hubspot.net/hubfs/209864/Synchro%20PRO%202018%20-%20technical%20overview.pdf>.