MULTIPLE COORDINATE SYSTEMS IN STAAD(X) V8*i*

Structural Team Screencast 006

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INTRODUCTION

Hello, and welcome to the **Bentley Structural Team** screencast. I'm *Jason Coleman; a Senior Technical Writer* with Bentley Systems.

In this screencast, I'm going to show you one way to make use of multiple coordinate systems in **STAAD(X) V8*i***.

NEW PRODUCT

STAAD(X) V8i is an entirely new product from Bentley Systems. It is the next generation of the world-leading STAAD line of structural analysis and design products. Not a new version, but rather an entirely new product. STAAD(X) introduces physical modeling to STAAD; along with improvements to workflow, user interface, generating reports, and more.

INTEROPERABILITY

STAAD(X) can import and export model files from STAAD.Pro. And the physical modeling capabilities found in STAAD(X) allow for a more accurate exchange of data with BIM programs such as Bentley Structural or fabrication software such as ProSteel.

EXAMPLE

I'll use the following model as an example of how to make use of multiple coordinate systems.

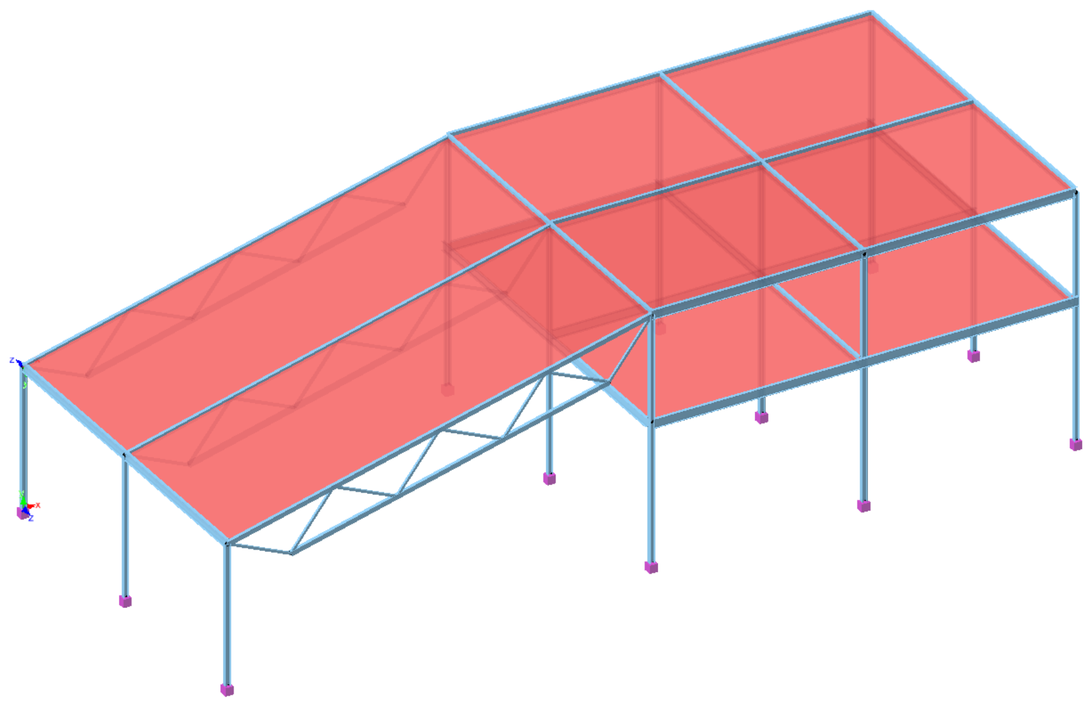

Figure: Engineering truss modeled in STAAD(X) V8*i*

The structure I am modeling has an engineered truss spanning between supports of different elevations.

ADDING THE COORDINATE SYSTEM

Here we see the physical model containing most of the structural steel framework. To help make adding the truss clearer, I'll first create a new view with the two supporting columns. I'll use this view as a workspace. This is done by selecting the two columns and then selecting **Create New View** from the context menu of either member.

Now, I'll add a new coordinate system in the Model Navigation Window. Then I'll move over to the Properties Window to orient the new UCS. I'll use the top of the lower column as my origin. STAAD(X) allows me to simply click the point I want to use.

Now, I will orient the axis in space. Since I know the two end points of my truss chord, I'll align the X-axis to pass through them. I've already set one point and I'll set the other by selecting the **By Reference** option. Now, I'll click the top of the taller support column. Lastly, since I've aligned the x-axis along the top chord – and therefore the web members will be below – I will rotate the coordinate system 180° about the x-axis. This will place my positive XY grid system below the top chord in the plane of the truss.

USING A GRID TEMPLATE

I'll add a new grid to the Model Navigation Window This will serve as a template for my truss. I'll name the grid Truss and then move over to the Properties Window to add dimensions. However, I first need to re-assign the grid to my new coordinate system.

Since I know my truss is eight even panels and is six feet deep, I want define my grid as such. Ordinarily, this is where the engineer might check end-point coordinates and pull out a hand calculator. STAAD(X) can take care of all the measurements for us, though. I select to define my grid by lengths. Then, by clicking the cursor define button, I will click the start and end points to provide the length I wish to use. In this case, that is as easy as clicking the tops of the lower and upper columns. I will now specify that this grid line has eight divisions.

For the Y length, I'll input my truss depth of six feet and specify one division. This, too, takes advantage of setting up a local coordinate system as there is no need to calculate the depth or relative panel point locations in the global coordinates.

ADDING TRUSS MEMBERS

Now my truss template is in place. I'll first need to add a couple of cross sections to my model for chord and web members. I'll launch the Section Explorer window. I'll add an HSS 8x6x1/2 for my chord members and an HSS 4x4x1/4 for my web members.

Once these are added to the model, I'm ready to begin drawing in the physical members which make up the truss. I'll select the chord section in the Add

Members parameters and then click the Add Member button to begin drawing. I'll draw in the top and bottom chords. Next, I'll go back to the Add Member parameters to select the chord section. Then, clicking the Add Member button again, I can proceed to draw in those members.

Now, to make the truss behave as desired, I need to specify that all of the web members are axial-only members. In other words, the members do not carry any moment. If the top or bottom chords are not expected to carry any load between panel points, these too can be specified as truss elements. In my case, I'll just specify the ends of the top chord as pinned (i.e. – not capable of transferring moment).

Select all of the web members. From the Properties Window, select the box for Truss specification. This will designate the analytical members as axial-only when the model is decomposed for analysis.

Now, I'll select the top chord member and specify the start and end conditions as fully released for moment on both the strong and weak axis.

Let's say that in the case of my truss, I have to meet an architectural requirement that the bottom chord be no wider than six inches. So, I'm going to rotate this member about the local x-axis. In STAAD, this angle of rotation is known as the Beta angle. I quickly change this by double clicking on the member to show the Member Head-Up Display (or, HUD). Selecting the blue button displays a field for the Beta angle as well as a dial control. Here, I can quickly rotate the member and view the results in real-time. This allows me to be certain that the value specified for the Beta angle produces the desire result in the physical model.

CREATE A LIBRARY OBJECT

To save modeling time, I can group the truss members together as a Library Object. This will allow me to place the entire truss assembly as a single model entity.

To do so, I'll window select all of the truss members. Then from the context menu of any of these members, I'll select **Add to Object Library**. I'll name the new library object Truss.

Note that the default anchor point of a library object is the point nearest the global origin. This anchor point can be edited by dragging it to any node on the library object. But for now, the default will be fine as this corresponds to my lower truss support.

I'll switch back to the **Model View** tab in the View Window to display the entire physical model. I'll select my Truss object and then, from the context menu, select **Insert Copy**. I can now click the tops of the two other columns carrying similar truss to place copies of the truss object.

SUMMARY

Let's review what was shown in this screencast. I have been able to accurately construct and place multiple copies of a truss structure into my larger physical model. We used a separate view window to create a clean workspace. A local coordinate system and grid was employed to draw in the truss based on geometry that STAAD(X) calculated for me. I was able to use the supporting structure to define all measurements. Specific member parameters were set and edited after placement of physical members. Further, I was able to save the truss as a library object for reuse.

This has been a screencast of demonstrating how to use multiple coordinate systems in **STAAD(X) V8*i***. If you'd like to get additional information, sign up for training courses, or learn more about our licensing programs, please visit Bentley.com. Thank you for watching.