

Transit Cooperative Research Program, Project: C-22

Bus Operator Workstation Design for Improving Occupational Health and Safety

Bus Operator Workstation 3-D Universal Model User Guide

The National Academies of
SCIENCES • ENGINEERING • MEDICINE



TRANSPORTATION RESEARCH BOARD

Do you have the required program?

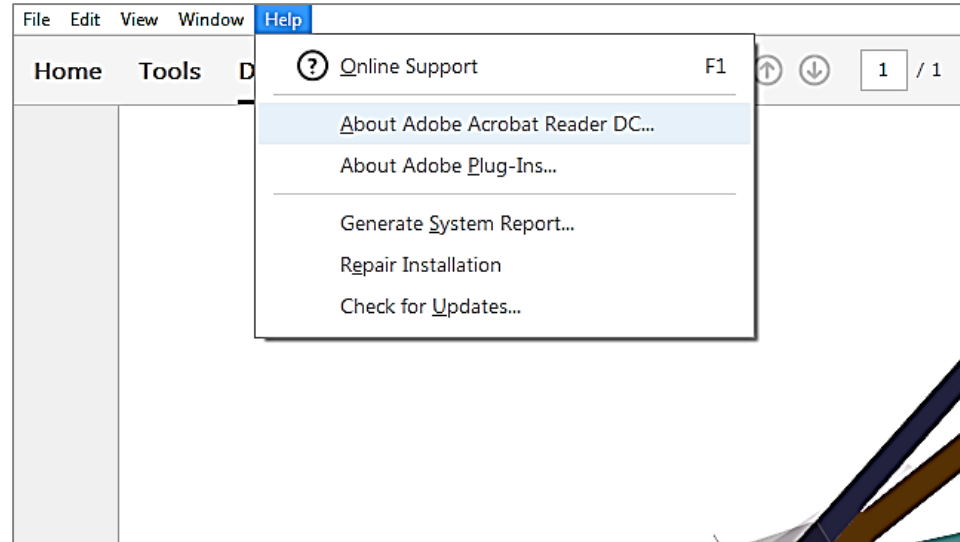
If you have adobe already installed please confirm that you are using an up to date version following the guide to the right of the images. If not, please installed using the website provided.

<https://get.adobe.com/reader/>

Required program:
Adobe Acrobat Reader
 (Tested on Versions 10 through current)

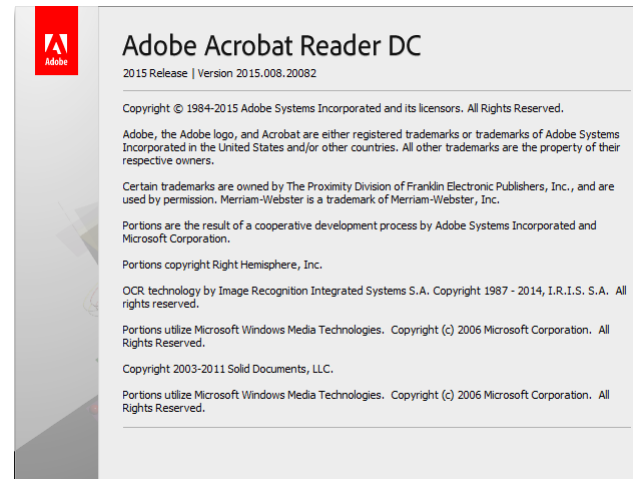
System requirements for Adobe:

- Windows OS
- 1.5GHz or faster processor
- Windows Server - 2008 R2 (32 bit and 64 bit), 2012 (64 bit), or 2012 R2 (64 bit); Windows 7 (32 bit and 64 bit); Windows 8 (32 bit and 64 bit); Windows 10
- 1GB of RAM
- 380MB of available hard-disk space
- 1024x768 screen resolution
- Internet Explorer 8, 9, or 10, 11; Firefox Extended Support Release



1. Open Adobe Reader
2. Click “Help” along the top of the window
3. Select “About Adobe Acrobat Reader”
4. Confirm that you have version 10 or newer

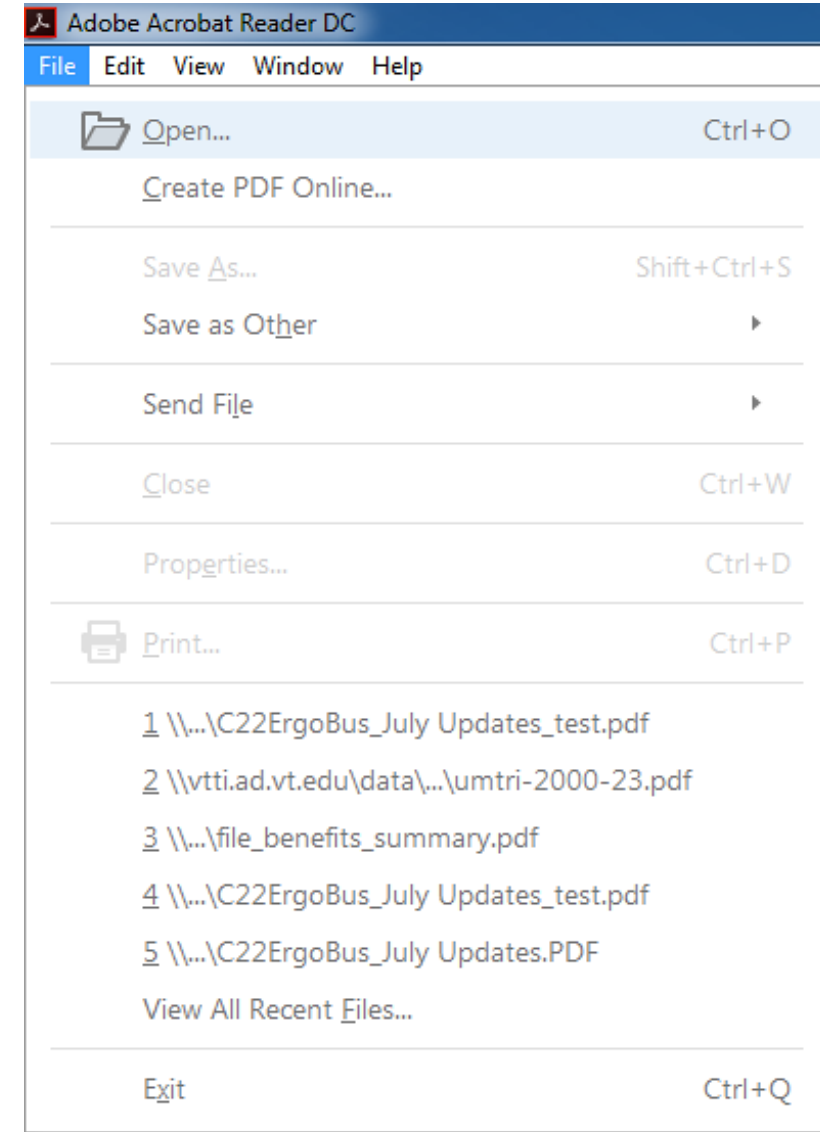
Note: The model may work properly in older versions of Adobe, but it has not been tested.



Opening the File

1. Open Adobe Reader
2. Click “File” and then “Open”
3. Navigate within your individual file system to locate and select the pdf file.
4. Click file name and select “Open”

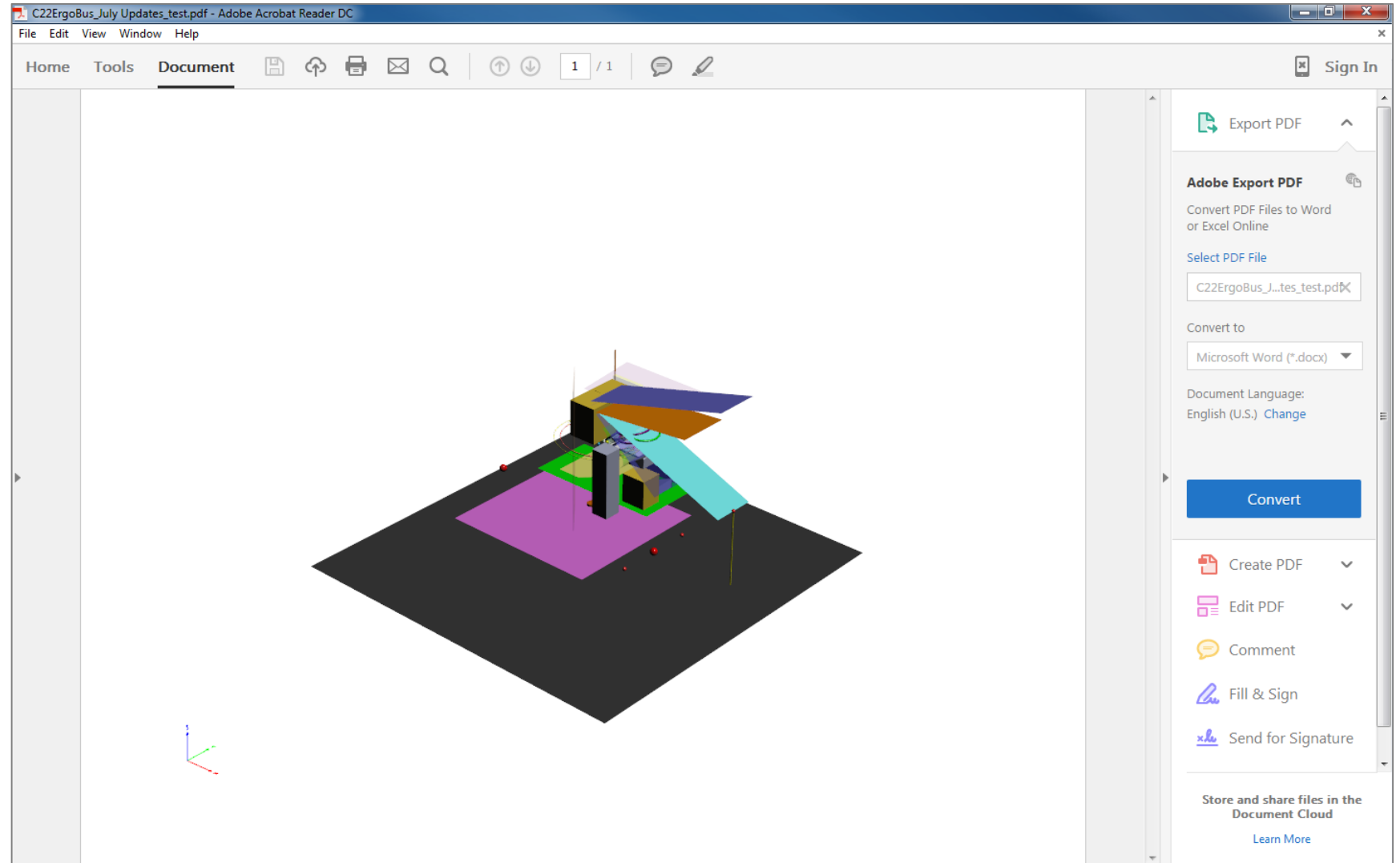
Image on the next screen is what will display once the file has opened.



Opening View

This is the view of the Bus Operator Workstation PDF Model is as it should open for the first time.

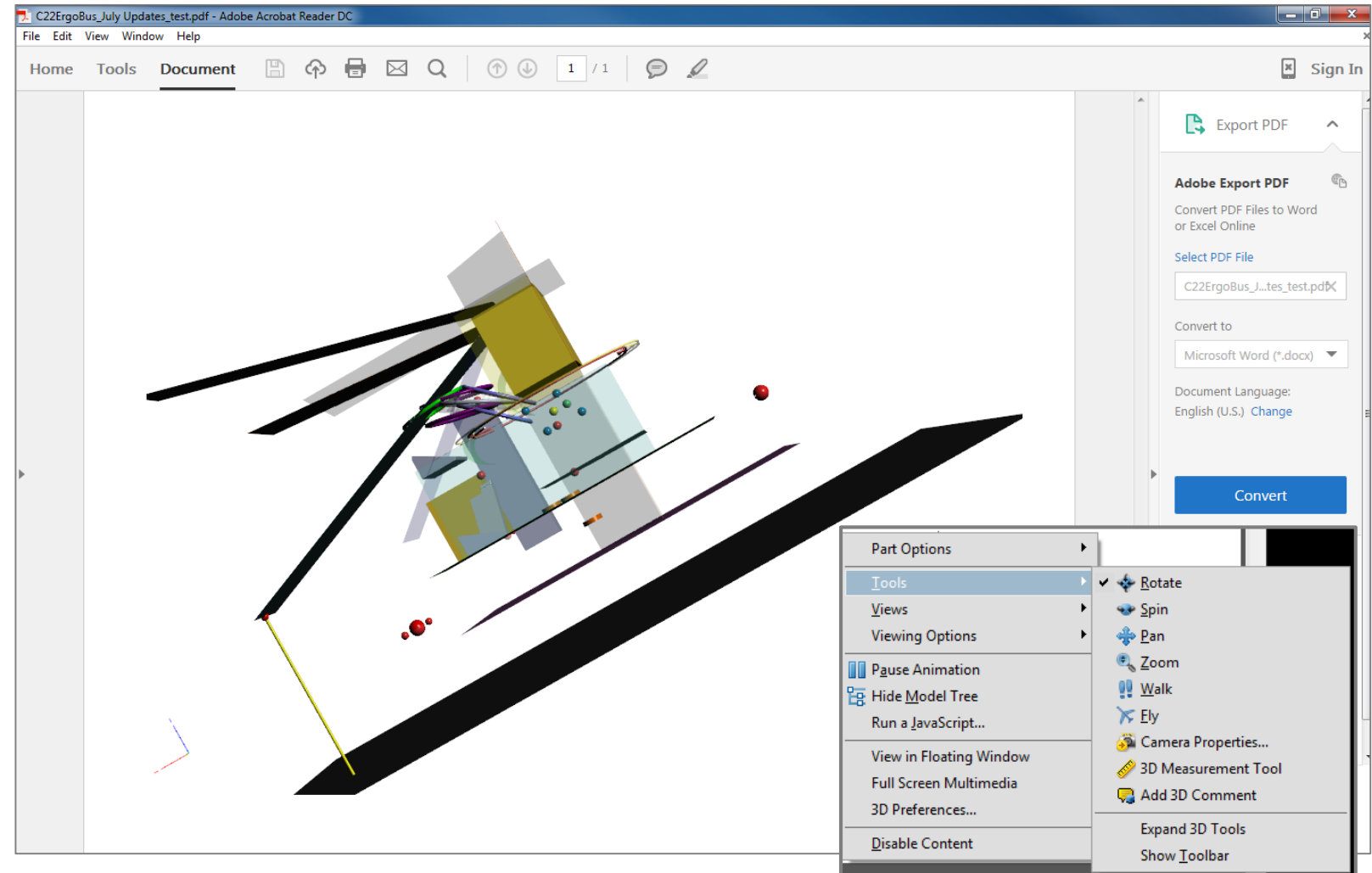
- The shapes represent the clearance envelopes for the range of bus operators' body sizes for clearance, visibility, and reach.
- Workstation component recommendations (e.g., steering wheel, pedals, seat h-point range) are included.
- International workstation design elements are included (e.g., APTA visibility target and limits).
- Vehicle references such as ground, passenger floor, bumper, and front axle are also provided.



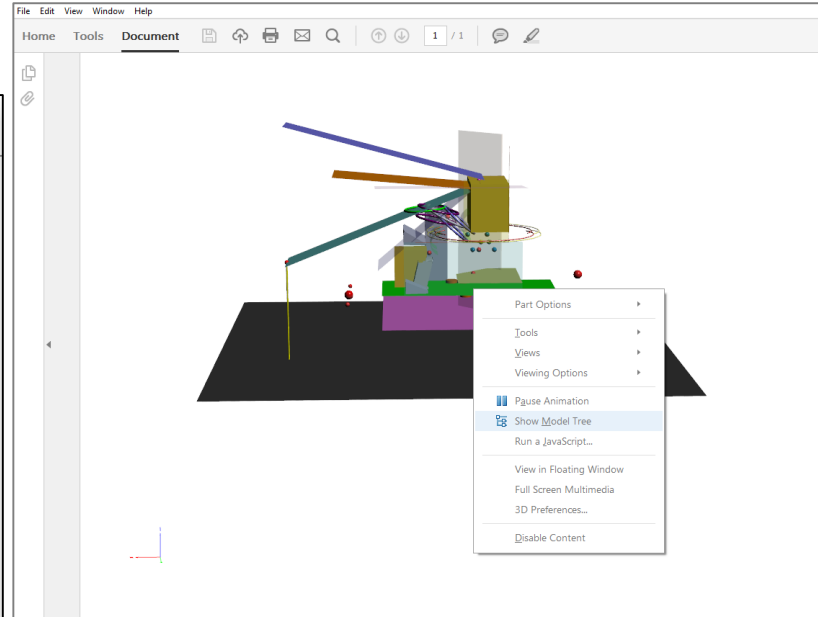
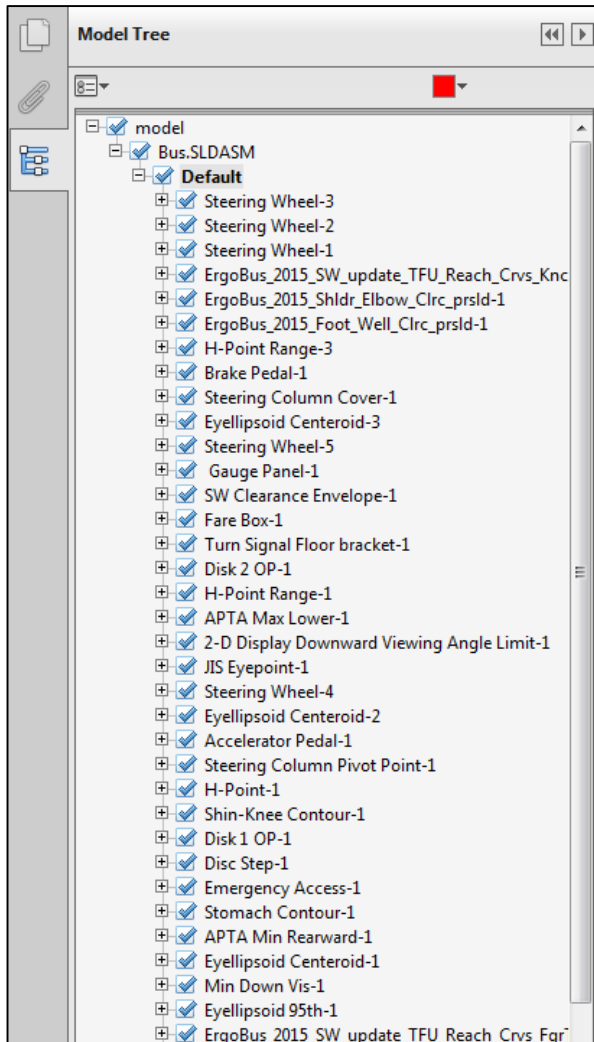
Manipulating the Model

Model Rotated to Side View

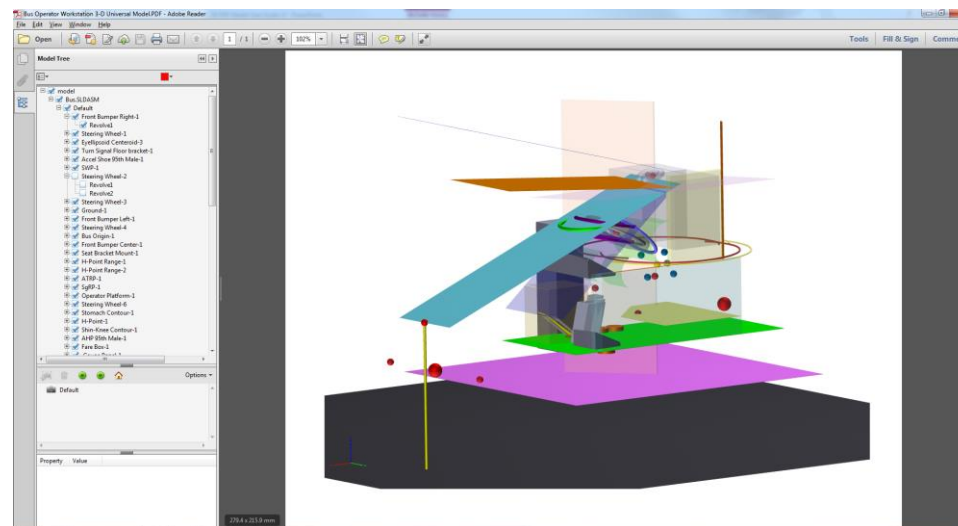
- The model can be easily manipulated and turned in all directions by mouse left-clicking and holding anywhere on the image.
- Other view tools are available by mouse right-click on the model and selecting “Tools > Rotate, Spin, Pan...”.
- And example of the turned image is shown:
- Note: You can zoom in and out with the mouse wheel.



Model Tree



1. Mouse right-click on model.
2. Select “Show Model Tree”.
3. The panel (zoomed in on left) will appear on your screen.
4. From here, you can expand the tree all the way out to view all components by click the “plus” marks.



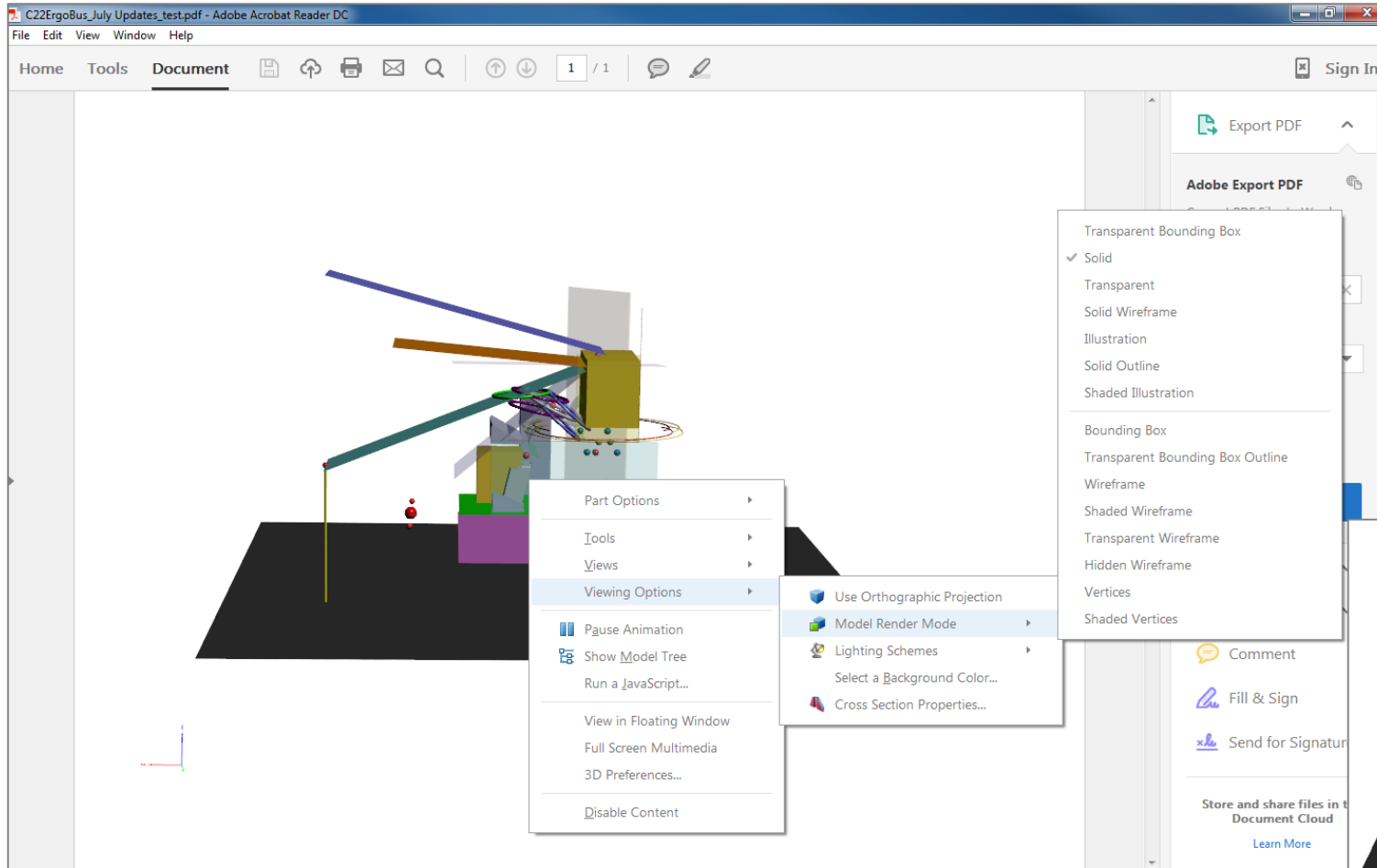
This image is an example of hiding a part (steering wheel) in the model – this is done by “unchecking” boxes within the model tree.

Note: You can locate a part in the model tree by mouse left-clicking that part on the model.

Note: Some construction surfaces (child parts) will appear in model tree with generic names after clicking. Look to their parents for clarification.

Changing the Model View, Render Mode

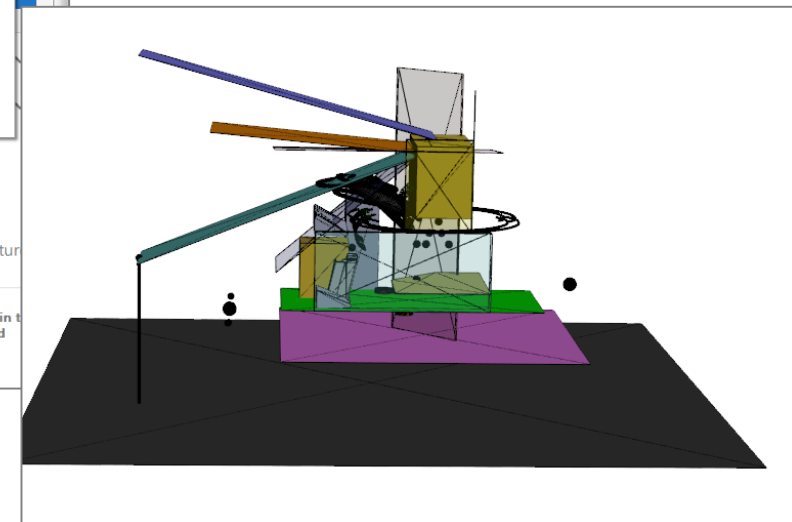
“Solid” View Mode



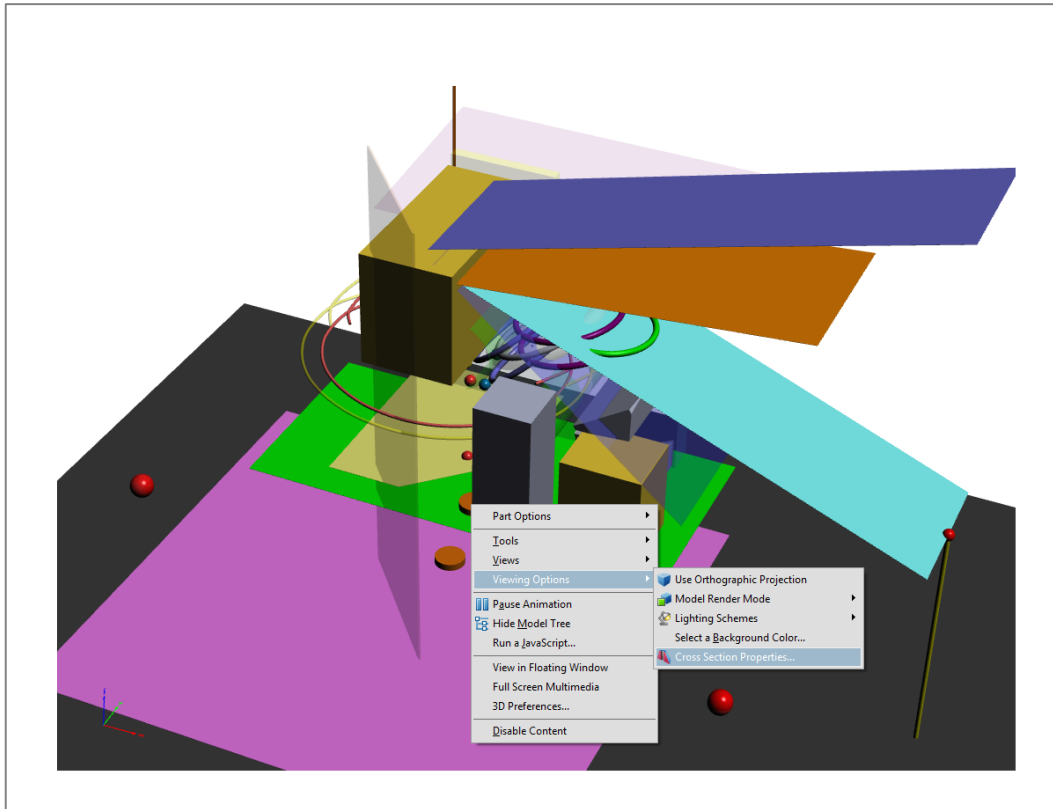
1. Mouse right-click on the model
2. Highlight viewing options
3. Highlight Model Render Mode
4. Select mode you would like to use
 - “Solid Wireframe” example below

Note: This process can be used continuously to switch between different views.

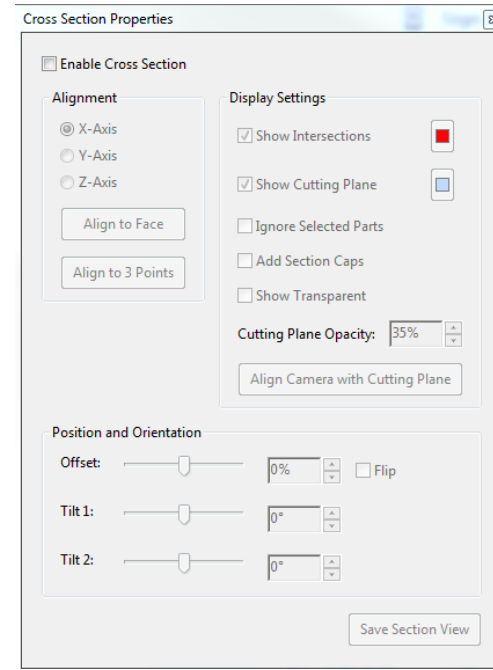
“Solid Wireframe” View Mode



Using Cross Sections to Investigate Parts

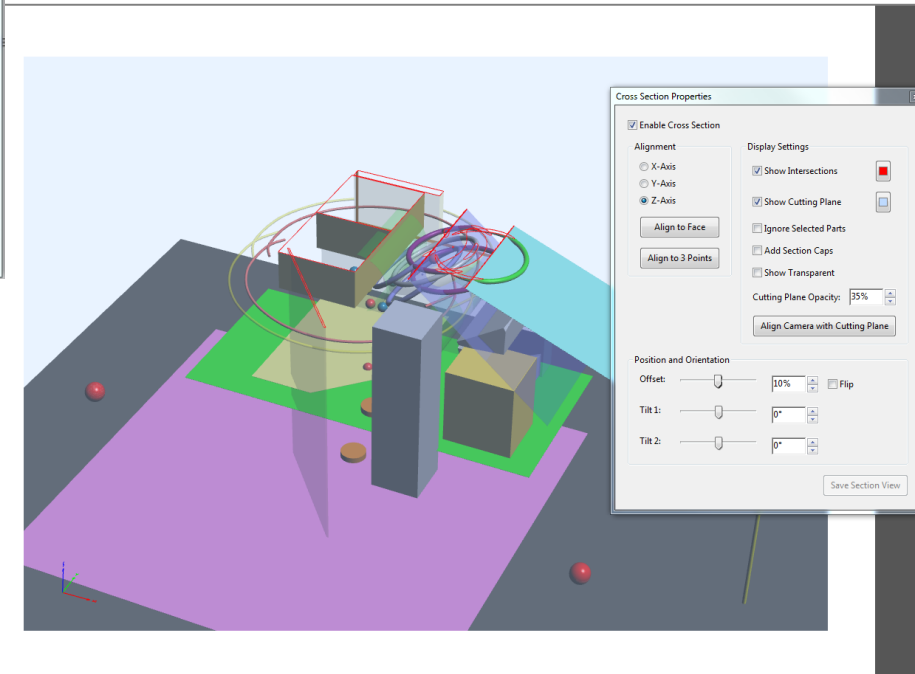


1. Mouse right click on model
2. Highlight viewing options
3. Highlight and select “Cross Section Properties...”

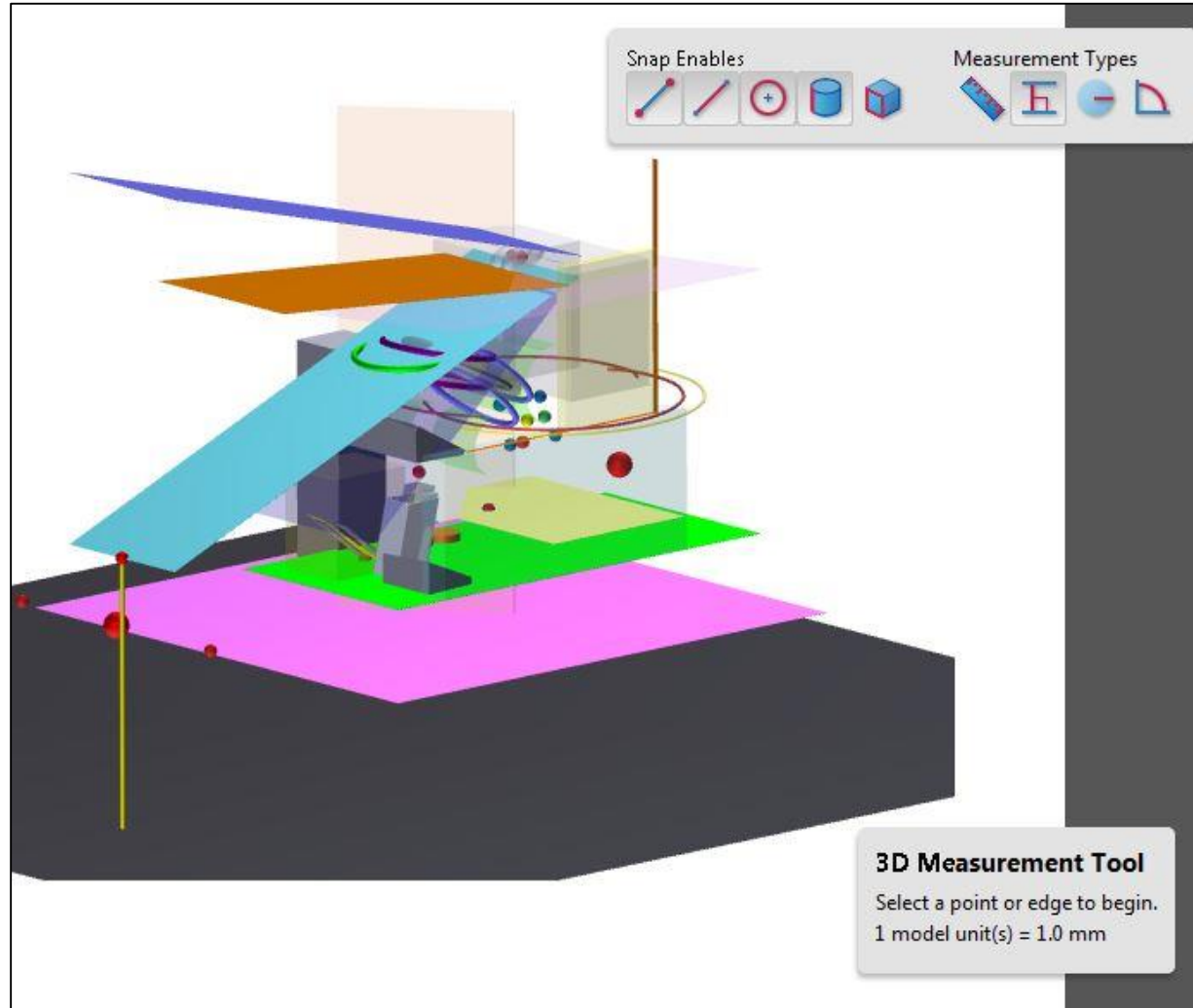


- After following steps 1-3 the “Cross Section Properties...” box will appear.
- Clicking “Enable Cross Section” will allow for alignment, display, and position adjustments.

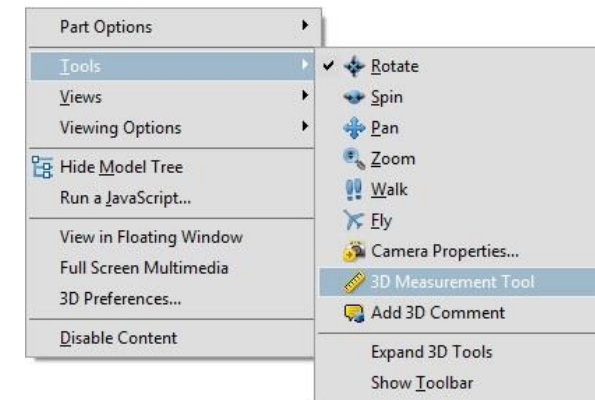
Z-Axis Section Example



Dimensioning

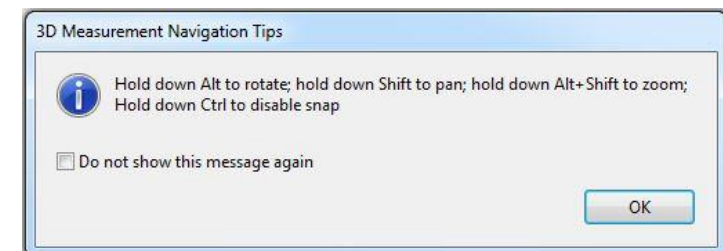


1. Mouse right-click on model.
2. Select “Tools > 3D Measurement Tool”.
3. The measurement feature bar will appear at top of window and scale at the bottom.

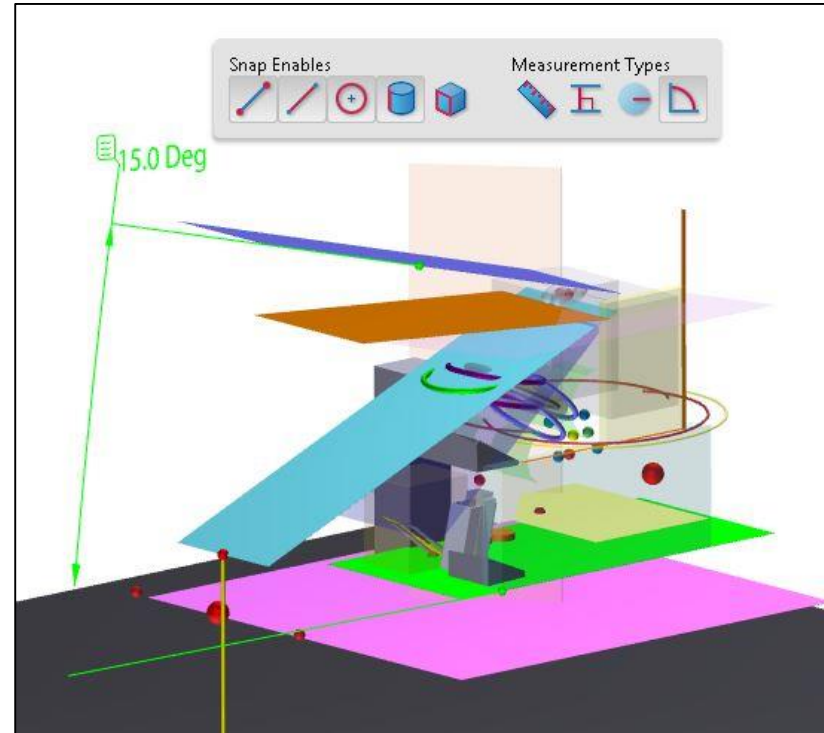
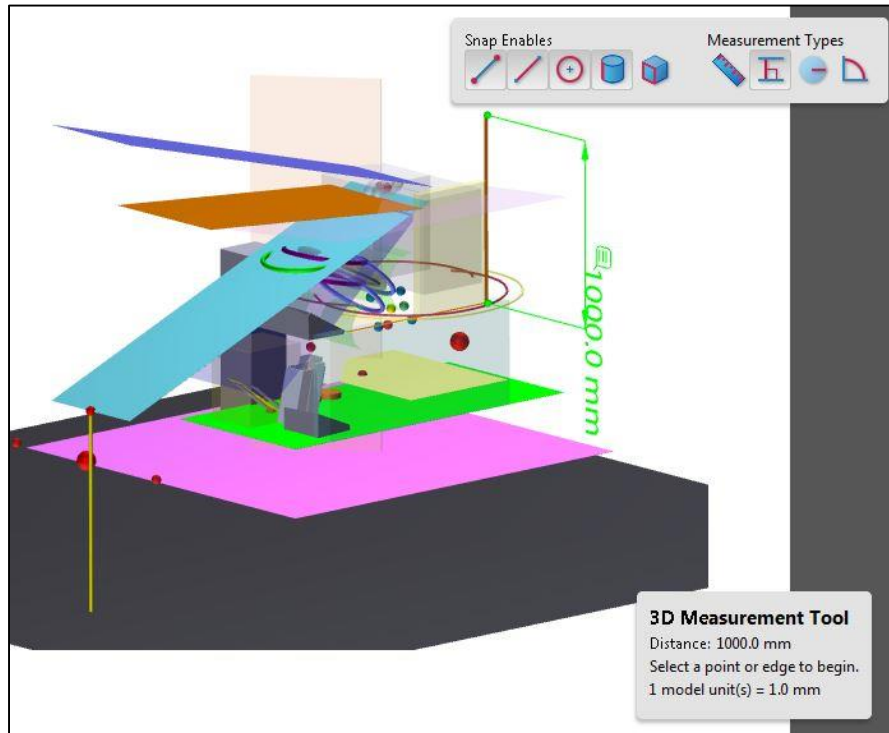


Note: A navigation tips window will appear over the model.

Use these quick keys to help move model while measuring.

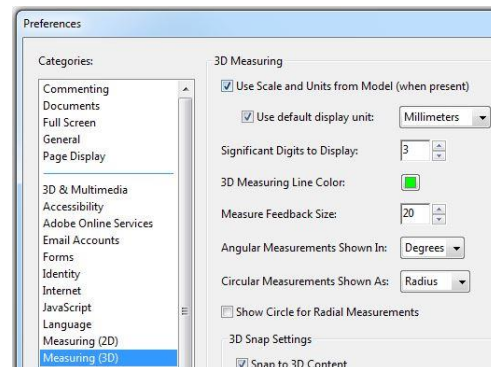
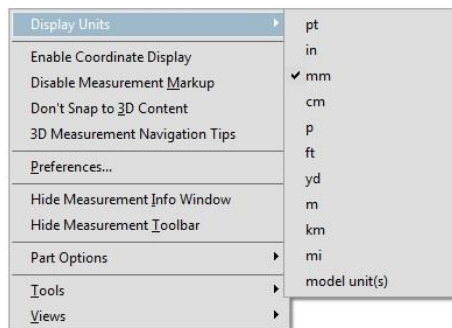


Dimensioning (continued)



Listed here are two examples of model measurements, linear and angular.

Many other features are available.



Note: Dimensions should be set to default metric (millimeters) and degrees when the file opens. However, they can be adjusted to other metric or english units.

To adjust units, mouse right-click on the model and select "Display Units" for individual measures. The default can be adjusted using the same mouse right-click and selecting "Preferences... > Measuring (3D)" and adjust settings.