

This tutorial will lead the TRNSYS user through the process of adding a new window technology to Prebid for use with Type56.

Obtaining the software:

TRNSYS relies on a free program from the Lawrence Berkeley National Labs Windows and Daylighting division for generation of new windows. To get a copy of the program, contact

Windows and Daylighting Group
Building Technologies Program
Energy and Environment Division
Lawrence Berkeley National Labs
Berkeley, CA 94720 USA

Alternatively, the software and manual may be downloaded from the LBNL website at:

<http://windows.lbl.gov/software/window/window.html>

The first section of the tutorial shows the user how to access the default window library.

1. Run Prebid either from the start menu or from Explorer and create a project by clicking on **File: New**.
2. Make sure that the American window library is being used by selecting **Options: Settings**. Enter the pathname `\trnsys15\Prebid\lib\American` under "Path for Libraries"
3. Create a temporary zone by selecting **Zones: Add Zone**. You will be prompted for a zone name, type in "TEMP." A screen will come up with information about the new zone. The left hand side of the screen contains information about walls. The right hand side contains information about windows.
4. Click "Add" under the windows section and then select "Library" from the upper pull-down menu. This will display all the window types that are available to TRNSYS in the American window library. The five default window types are single pane, double pane, triple pane, double pane with low-e glazings, and double pane with low-e glazings and an argon filled gap. However, we'd like to add a vinyl framed, double pane window backfilled with argon gas but without the low-e glazings.
5. Exit Prebid by clicking "Cancel" in the current window and then by selecting **File: Exit**. There is no need to save the project.

The second section of this tutorial deals with the Window 4.1 software used to create new glazing systems for use with TRNSYS. Window 4.1 is available for free from its creators Lawrence Berkeley National Labs

1. Launch Window 4.1 by double clicking on the `\w4\w4.exe`. W4 is a DOS program. Once the initial screen comes up, press the space bar to access the window library.

2. The cursor should be blinking on the window ID number. To create our new window, augment whatever the ID number is by one, press return and then “Y” when the program asks you if you want to create a new window.
3. Tab to the next field and give the new window a descriptive name such as “Vinyl,Doub,Ar” and press Return.
4. Tab through the next two fields (Design and EnvCode) until you arrive at the window Type field. In this field, we are able to select from a number of different window types such as sliding glass doors, picture windows, skylights, casement windows etc. We will select a casement window by continually pressing the “+” key until the field name says “Casement.” As the window systems scroll by, a representative picture appears in the frame to the right of the screen. For future reference, the file system used to provide window data to TRNSYS is the same as for DOE-2. This file system does not support windows with multiple glazing systems such as vertical sliders, double doors etc.
5. Tab down to the bottom field on the left and switch the system of units to SI (if it is not there already).
6. Now, you need to navigate through the fields using the arrow keys. Press the right arrow to select the bottom most FrID field. Each of the FrID fields allows the user to specify the frame material by specifying an ID number from a preexisting library.
7. Press F7 to access the frame material library, note that vinyl is material ID 5 and press ESC to return to our window.
8. Type “5” into the FrID field and press return. Use the arrow keys to navigate through the rest of the FrID fields and change all of their ID numbers to 5. You must press return after each change.
9. Next, we have to modify the glazing system (GlzSysID). However, in this case, the option that we want does not exist, so we need to add it to the library of glazing systems. Press F5 to access the glazing system library.
10. Type “A” to add a new glazing system, followed by “N” to indicate that this is a new window and then Return to accept the new glazing system ID number proposed by Window 4.1. You should make note of this number for later use.
11. With the cursor on the “Name” field, type in “Dbl,Ar” for our glazing system’s name.
12. With the cursor on the “#Lay” field, type in “2” indicating that our glazing system will have 2 layers in it. Air gaps do not count as layers.
13. Press Return until you end up in the lower window where the individual layers are specified. Some default values will come up here and it turns out that all we need to do is change the gap gas from air to Argon.
14. Navigate to the “Air” layer entry using the arrow keys and then press the “+” key until Argon comes up as the gas. It is possible to create your own backfill gas but you must do this from the main window by accessing the gas library. Press Return.
15. Modify the thickness of the gap if you want to and then press the Space bar to calculate all the information for the glazing system that you have just created.
16. Press “Esc” to exit the editing mode. Press “Esc” a second time to return to the main window.

17. Navigate to the GlzSysID field and change it's ID number to the number that corresponds to the glazing system that you noted in step 10.
18. Once these changes have been made, you are ready to save the window. Press the space bar to update all calculated values. At this time, you should make note of the "Total Window Results" in the lower left hand corner of the screen. These will be used later.
19. Press Alt-S to save your work. Window 4.1 may ask you whether you want to overwrite a current window. Type "N" to select no and then return to accept the proposed new number.
20. Next, you need to save your window to a file so that it can be accessed by TRNSYS. Type Alt-P and then "D" to specify that you want to file in DOE-2 format.
21. Give the window file a name such as "mynewwin.prn." The file extension must be .prn.
22. You can now quit Window 4.1 by pressing Alt-Q. There may be a number of questions concerning whether you want to save your glazing system, window etc. You should answer "Yes" to all of them in case you want to modify your window later.

The last section of the tutorial will step you through adding the newly created window file to the TRNSYS library.

1. Open the .prn file containing the new window data with a text editor.
2. Change the text at the top of the file from "Window 4.1 DOE-2 Data File..." to Window 4.1 TRNSYS 15 Data file
3. Copy the text of the window data file and paste it into the file \trnsys15\Prebid\lib\American\W4-lib.dat below the rest of the windows but before the line that reads *** END OF LIBRARY ***
4. Modify the Name of the window to read "TRNSYS 15 Window Lib"
5. Modify the Window ID to read "x001" where x is the next available number following the other TRNSYS windows. If you are starting from the default library, the window ID would be 6001.
6. Lastly, you need to add a brief description of your window in two places. The first is at the bottom of the W4-lib.dat file. The line you should add follows:

6001 Double,Ar 2.5/12.7/2.5 2.6 0.777 0.727 0.129 0.817

The fields are described in the following table:

Value	Description	Source
6001	TRNSYS ID	Next sequential value (user selected)
Double,Ar	Description	Unique identifier (user selected)
2.5/12.7/2.5	Layer Thicknesses	Layer and Airgap information (from .prn file)
2.6	Overall U Value	Window 4.1 "total window results" field
0.777	Solar heat gain factor	SHGC at angle 0 (from .prn file)
0.727	Tsol	Tsol at angle 0 (from .prn file)

0.129	Rfsol	Rfsol at angle 0 (from .prn file)
0.817	Transmittance of visible energy	Tvis at angle 0 (from .prn file)

7. The second place you need to add information is to the file `\trnsys15\Prebid\lib\American\prgwin.dat`. The information is much the same as in step 6 above. This information is used as default values in Prebid. The Prebid user can modify them from within Prebid by accessing the Windows Type Manager.

DBLBEAR : Double Pane, Argon ; 6001 , 90.000 , 2.63 , 0.777 , 11.000 , 64.000 , 0.150 , 8.170 , 0.600 , 0.000 , 0.000 , 0.500 , 0.100 , 0.500 ,

The fields are described in the following table:

Value	Description	Source
DBLEAR	Prebid ID	Unique identifier (user selected)
Double Pane Argon	Description	Unique identifier (user selected)
6001	TRNSYS ID	Next sequential value (must correspond with w4-lib.dat)
90.000	Window Angle	Window 4.1 "total window results" field
2.63	Overall U value	Window 4.1 "total window results" field
0.777	Solar heat gain coefficient	SHGC at angle 0 (from .prn file) also called g-value
11.000	Inside convective heat transfer coef.	User selected (units are kJ/h m ² K)
64.000	Outside convective heat transfer coef.	User selected (units are kJ/h m ² K)
0.150	Ratio of (frame area)/(window area)	User selected (units are dimensionless)
8.170	U-Value of frame	User selected (units are kJ/h m ² K)
0.600	Solar absorptance of frame	User selected (dimensionless)
0.000	Additional heat resistance (inside)	User selected (units are h m ² K/kJ)
0.000	Additional heat resistance (inside)	User selected (units are h m ² K/kJ)
0.500	Reflection coef. of internal device (towards window)	User selected (dimensionless)
0.100	Reflection coef. of internal device (towards zone)	User selected (dimensionless)
0.500	Fraction of absorbed solar	User selected (dimensionless)

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8. Repeat steps 1-5 of the first section of this tutorial to verify that your window has been added properly and can be accessed by Prebid.

For more information:

<p>On adding new windows to TRNSYS contact:</p> <p>TRNSYS Coordinator 1500 Engineering Drive Madison, WI 53706 USA Phone: (608) 263 – 1589 Fax: (608) 262 – 8464 Email: trnsys@sel.me.wisc.edu</p>	<p>On the use of Windows 4.1 software, contact:</p> <p>Windows and Daylighting Group Building Technologies Program Energy and Environment Division Lawrence Berkeley National Labs Berkeley, CA 94720 USA</p>
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