

# Creating 3D Representations

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## The Background

With Package & Display Designer you can create a 3D model for every design. Each file in the Standards Library has a predefined 3D model. Each 3D drawing is defined by the folding sequence of the panels that make up the design. The 3D model can be rotated and turned, opened and closed directly in Package Designer, and can be viewed in solid, transparent or wireframe modes. The program supports 3D PDF export compatible with Adobe Reader, version 8.0 or higher.

## Task

This exercise explores how folding sequences are created and managed. In the first part of the exercise – Aquafit – we will set a folding sequence by rearranging the default sequence of actions that appears when a 3D drawing is created. In the second part – House – we will create a folding sequence from scratch: we will create our own actions and will group them into separate steps. This will present a detailed scenario of how a folding sequence works.

## Complete Folding Box and Its 3D Representation

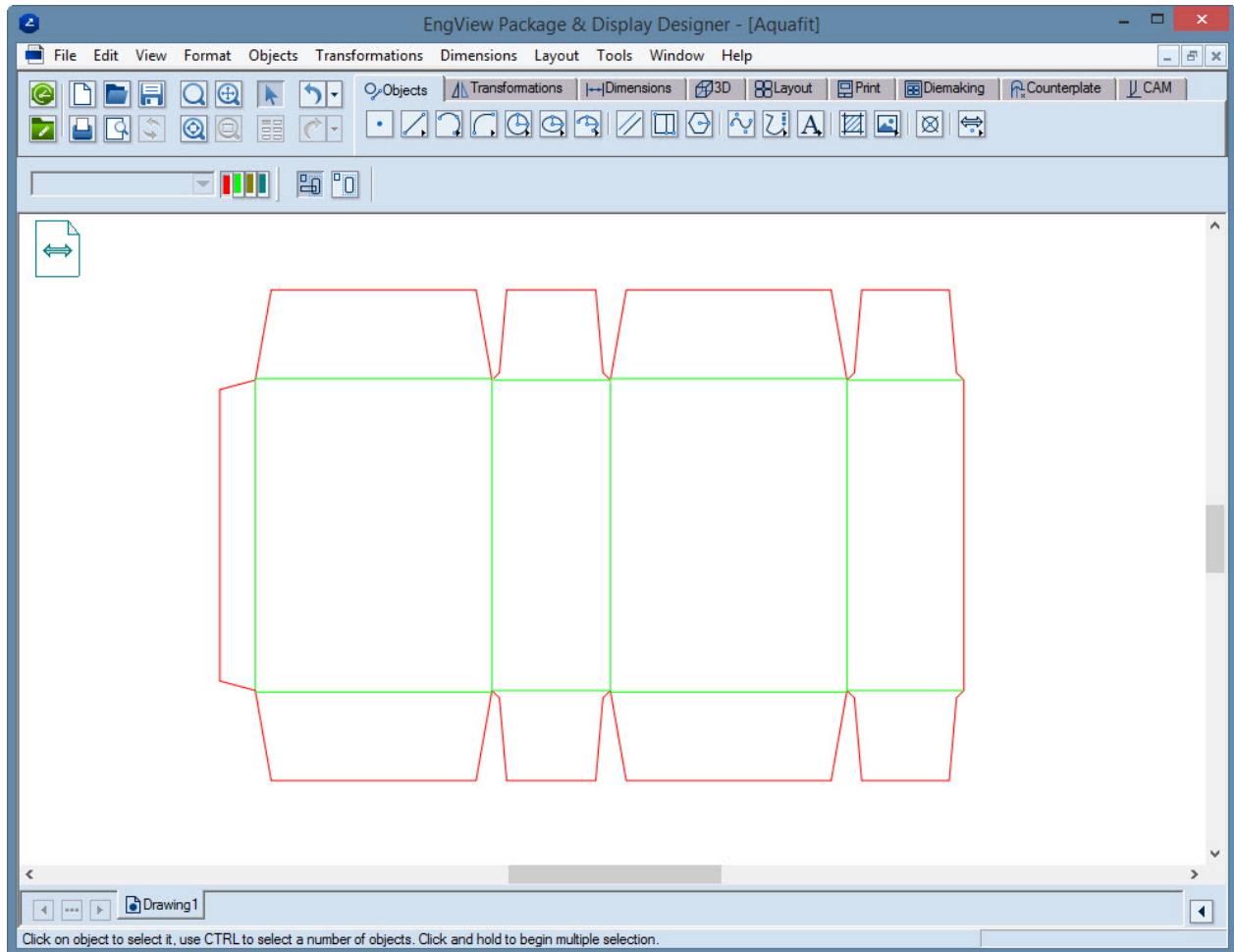




## Exercise Description

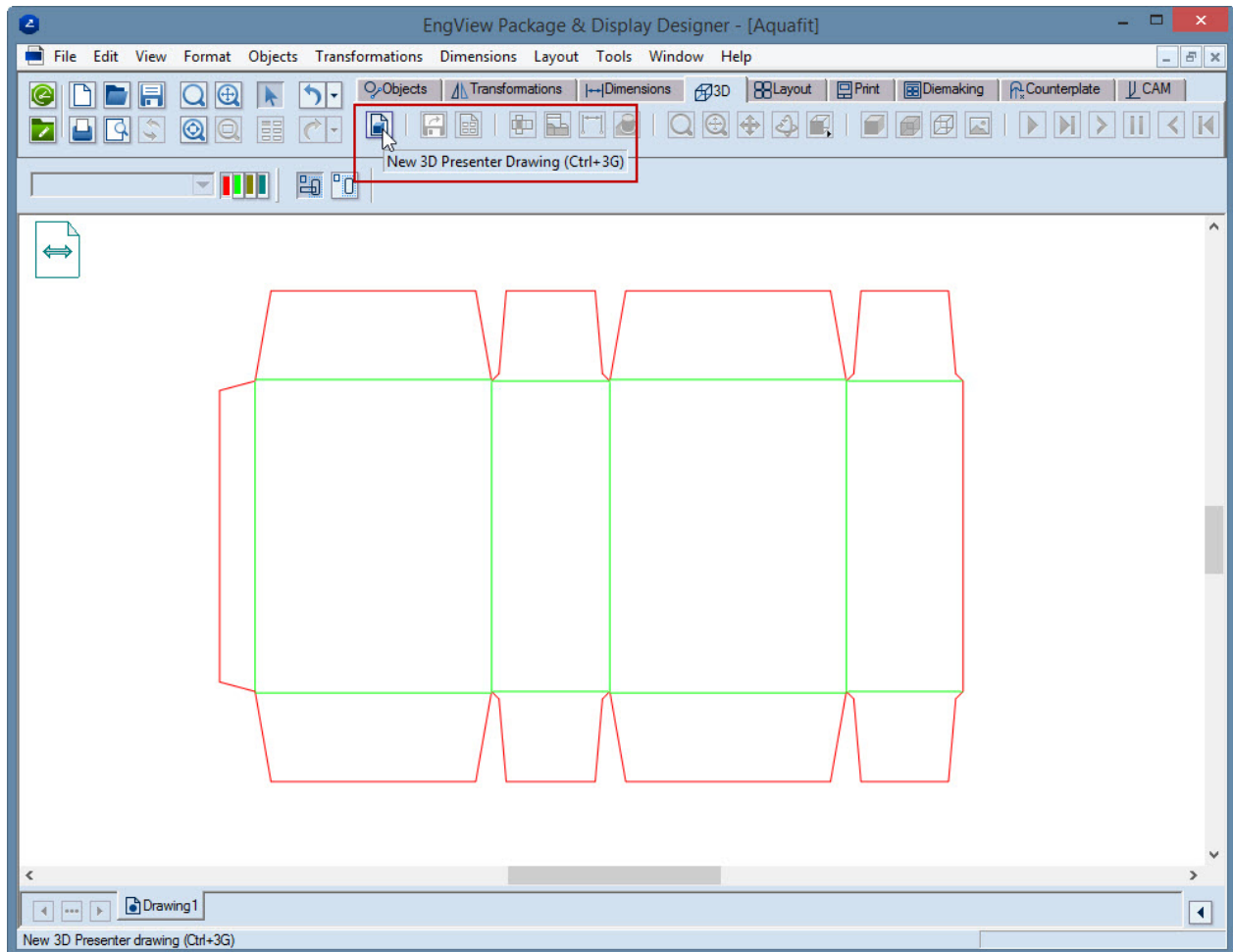
### Creating a Folding Sequence by Rearranging the Default Actions

1. From the folder C:\EngViewWork6\EngView Samples, open the file Aquafit.evd.

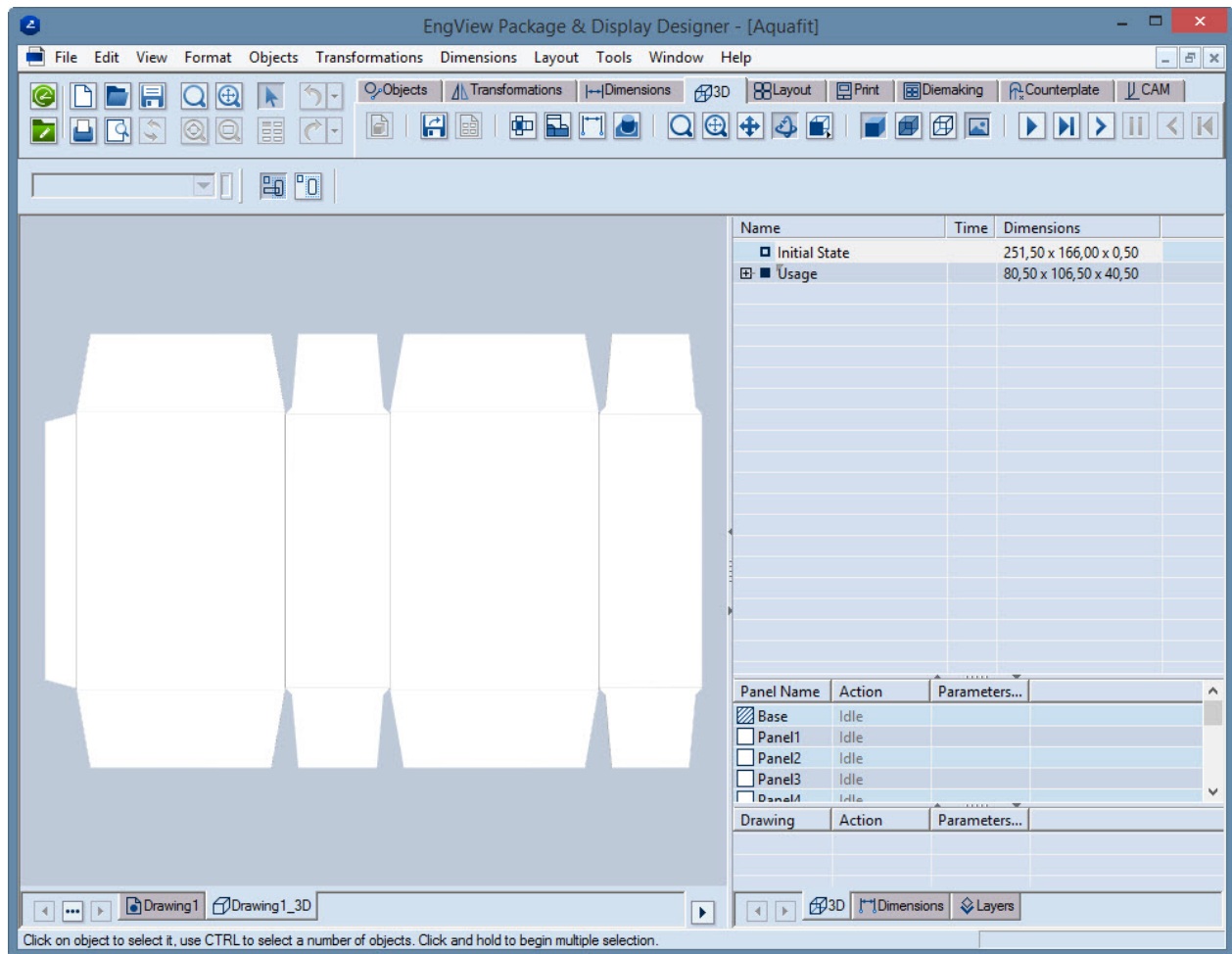


## Creating a 3D Drawing

1. On the **3D** tab, click **New 3D Presenter Drawing** .

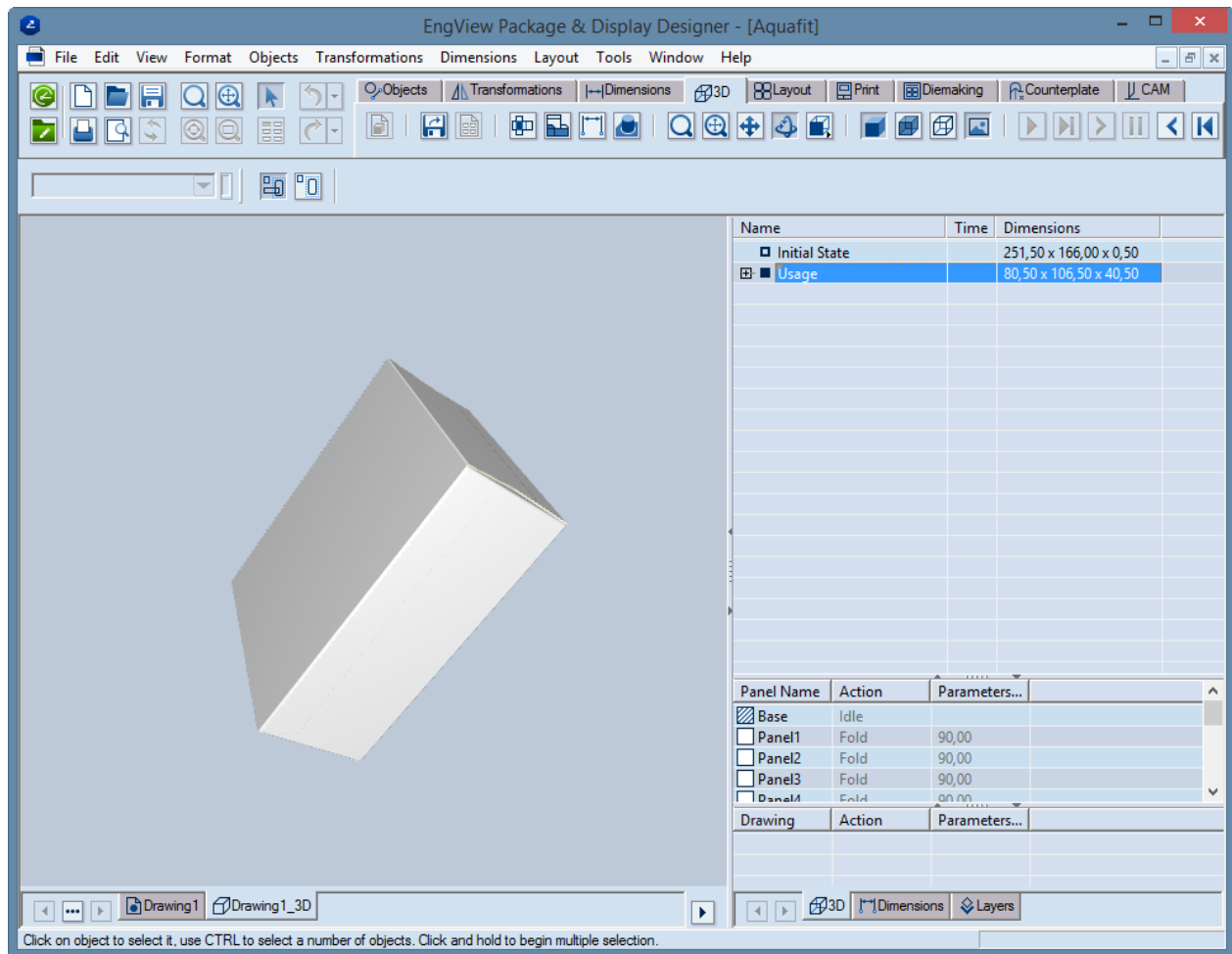


A new 3D drawing is automatically created.



2. To see the final state of the design, in the tabular area click Usage.

NOTE: The Usage phase displays the final state as defined for the structure. Normally for packaging, this is the shelf-ready state into which the product is placed.



The 3D scene control buttons are as follows (in left to right order):



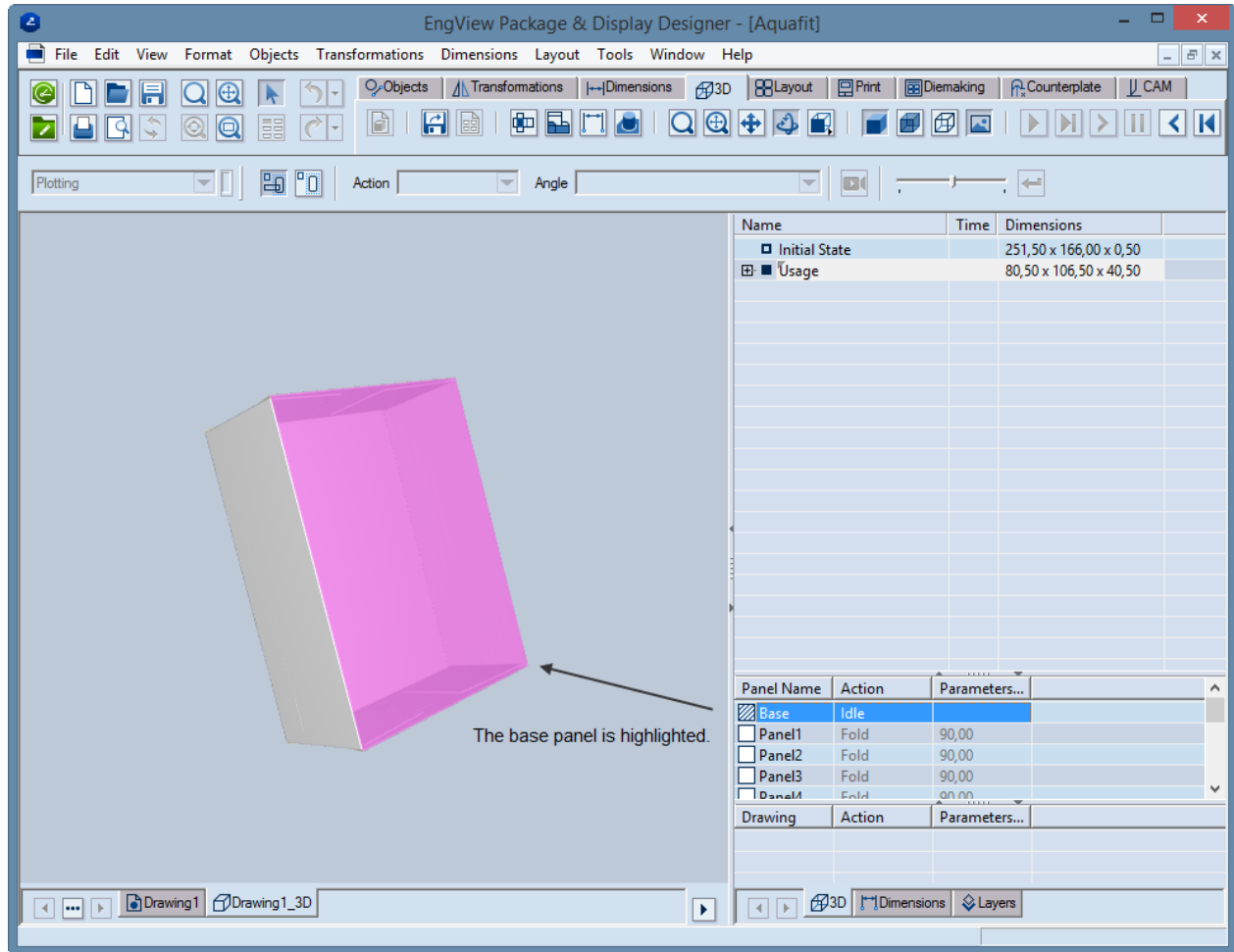
1. The zooming mode
2. Fit to graphical area
3. Pan
4. Turn
5. Frontal View (clicking the button and then dragging offers alternative fixed views)
6. Solid View
7. Transparent View
8. Wireframe View



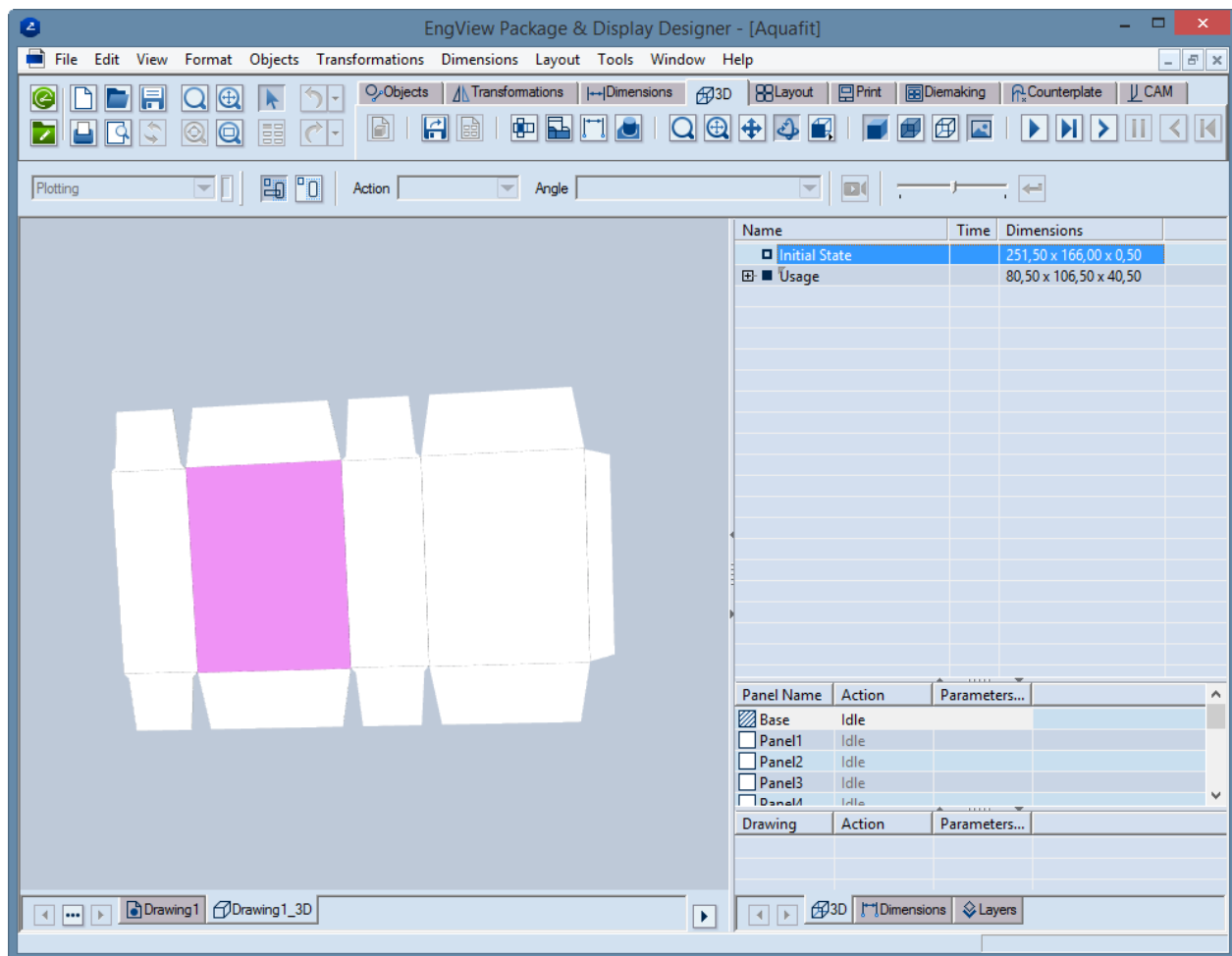
## The Base Panel


The base panel is the panel around which the rest of the panels are folded. When a 3D drawing is created, the program automatically selects a base panel, and the rest of the panels are folded around it at 90 degrees.

TIP: To see which panel is the base one, in the **Panel Name** column, in the tabular area, click Base.



TIP: To better see the base panel, in the tabular area click the Initial State phase.



NOTE: While creating the 3D representation you can choose your own base panel, which is different from the default one. To do so, click the **Set Base Panel** button , and then select the panel that you want to be the base one.

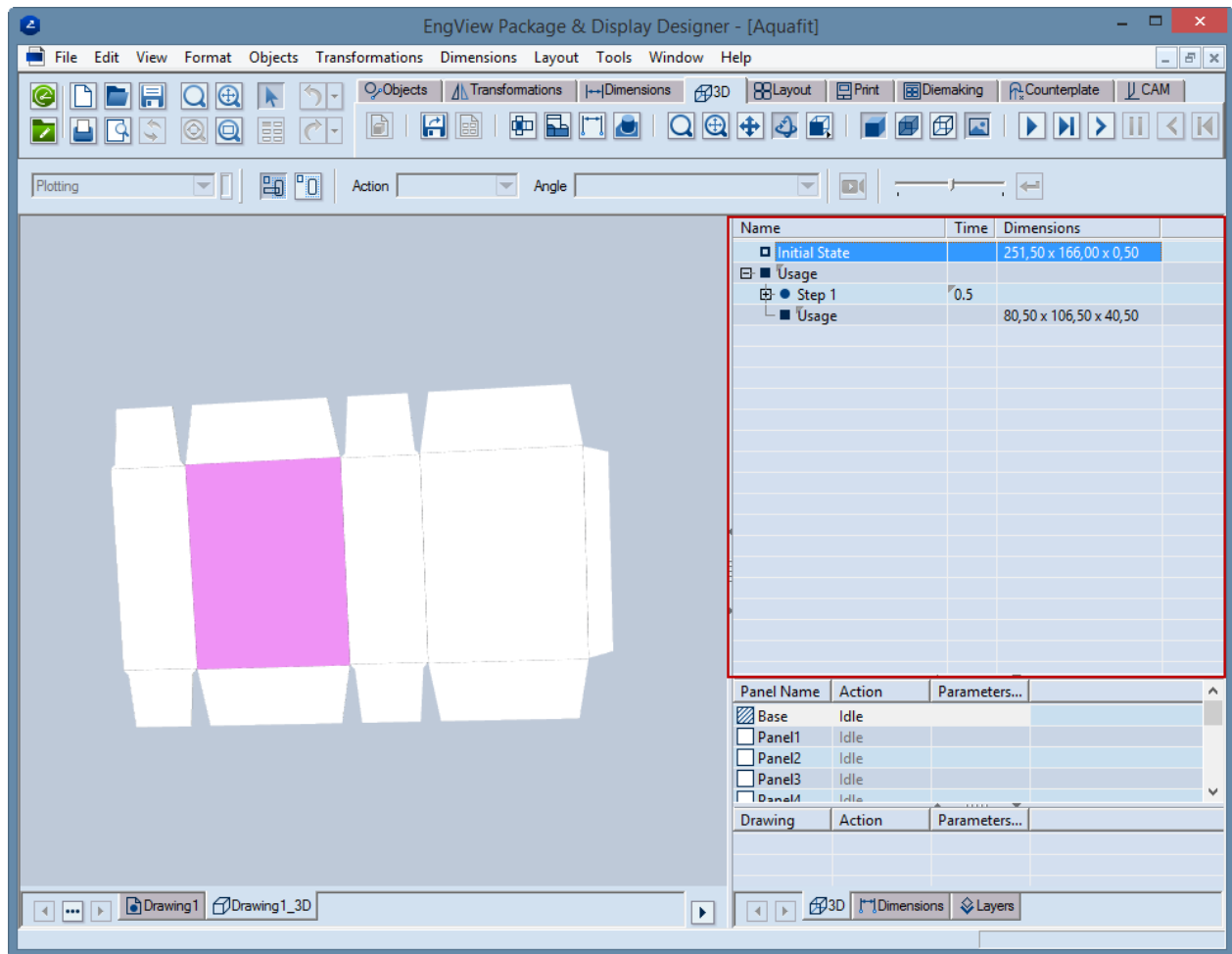
TIP: To deselect the base panel, click outside the 3D model in the work area.

Let's take a look at the tabular area. It consists of three sections: Actions, Panels, and Parts.

The Actions section contains the actions, which define the folding sequence of the 3D model. They are grouped in steps. Steps are then grouped in phases. Each time you create a 3D drawing, the program creates a phase that has one step in which all the panels are folded at 90 degrees around the Base panel.

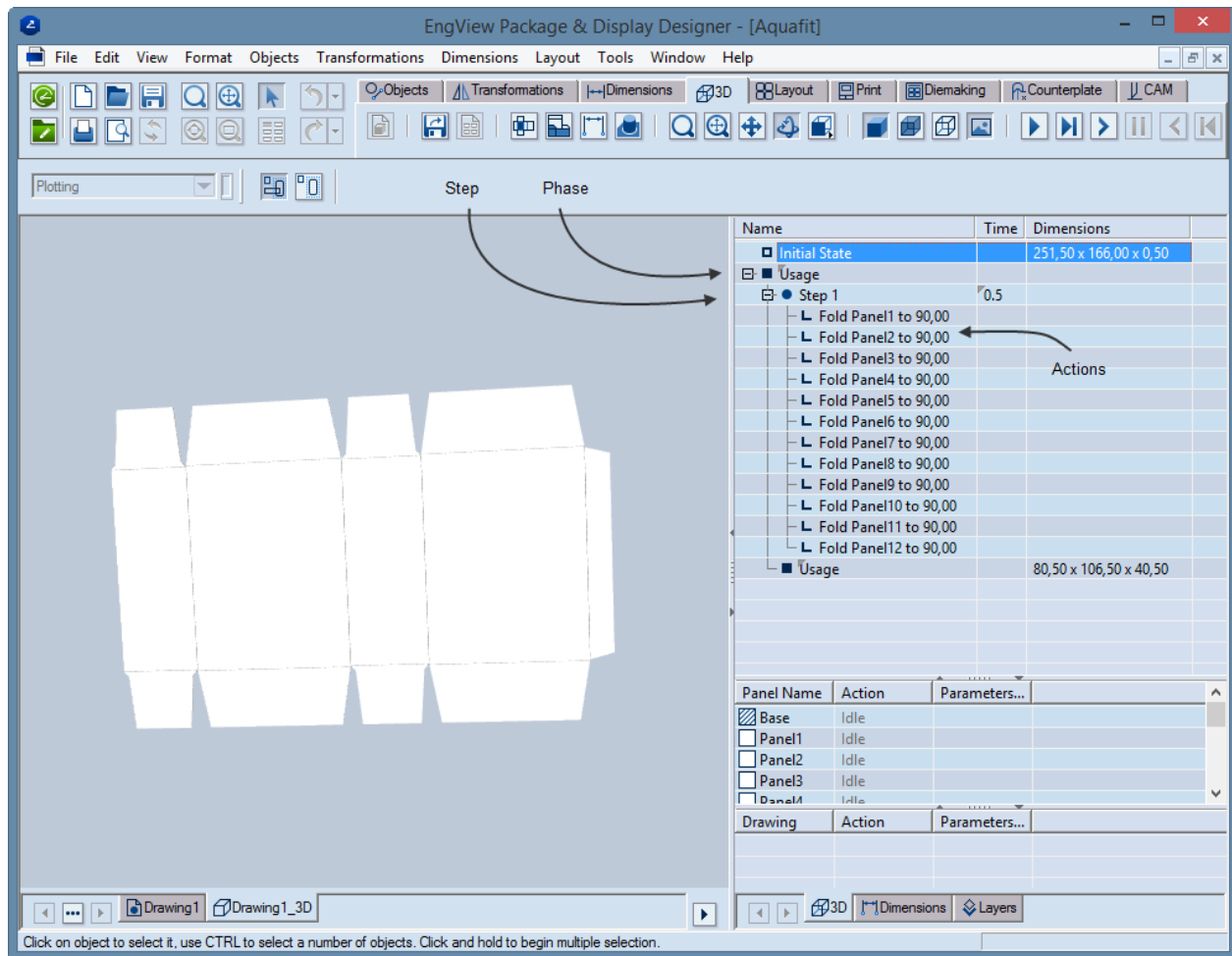
1. To open the Usage phase, click the '+' symbol.

A list of one step appears.



2. To open Step1, click the '+' sign.

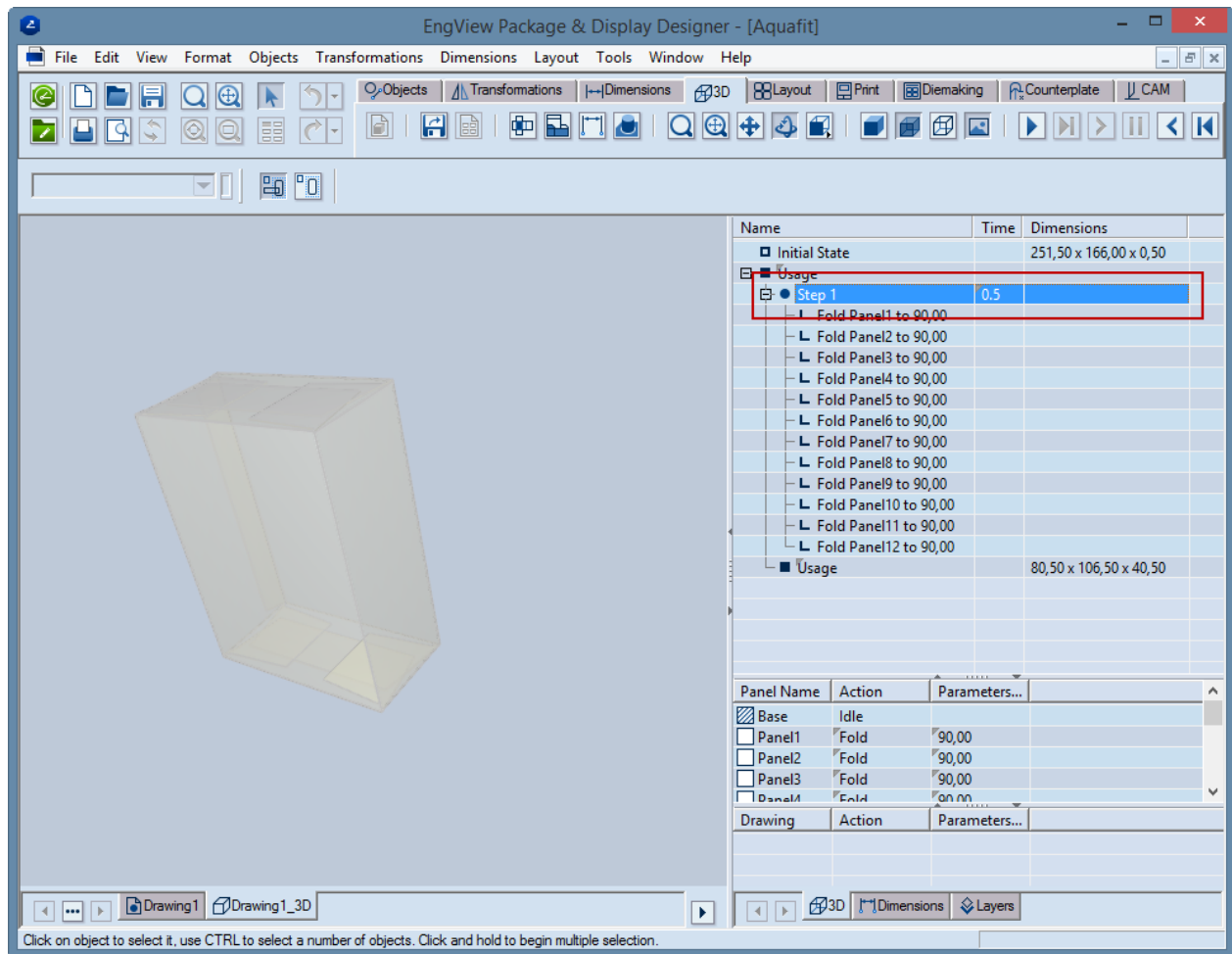
A list of actions appears.



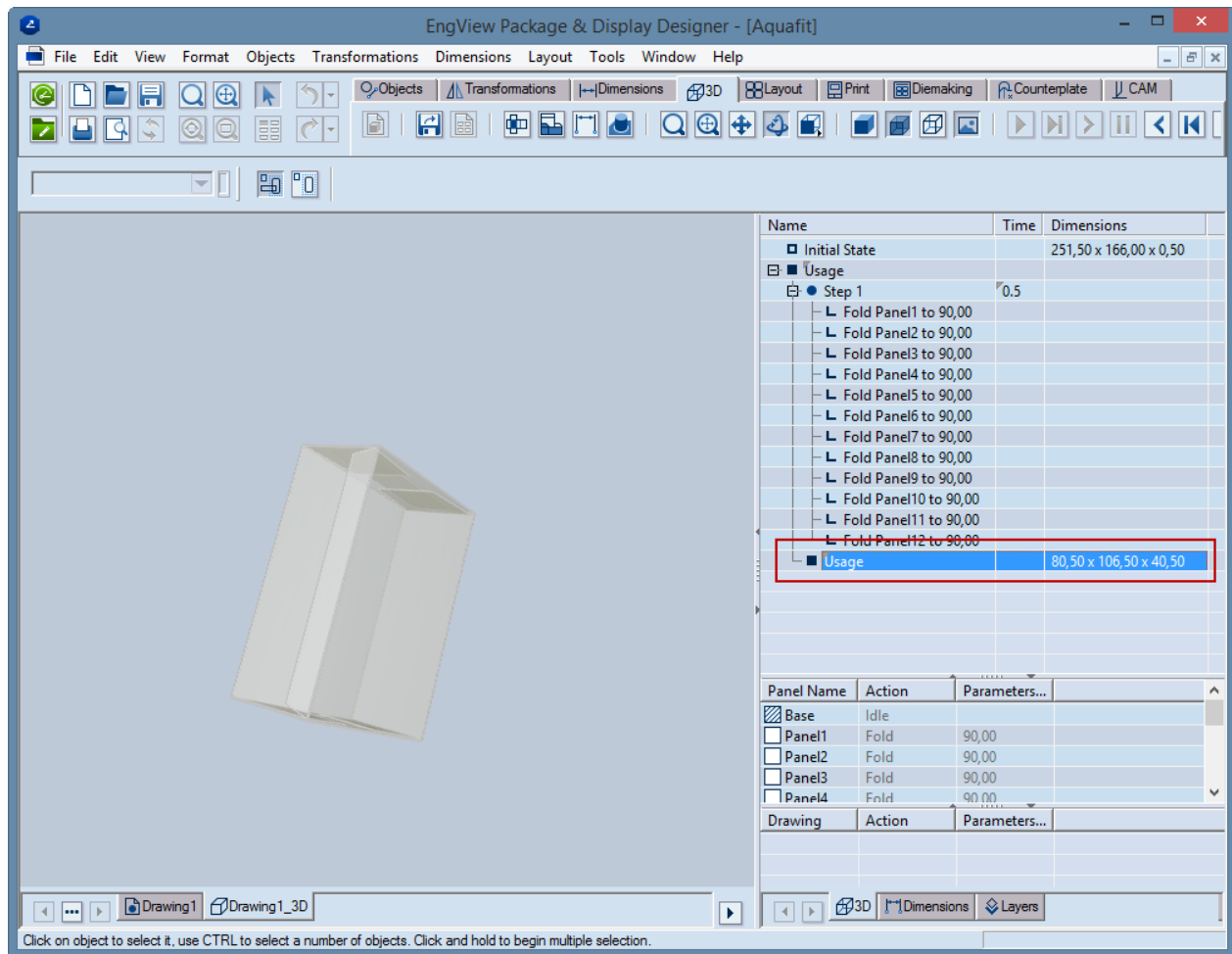
In the second section of the tabular area, the current state of the panels can be seen relative to the selected state in the first section. For example, in the above picture the Initial State phase is selected and the panels still has no actions. That is why Idle is displayed in the **Actions** field in the contextual edit bar above the 3D work area.

3. Click Step 1 to select it.

Now we can see that in the second section that all panels will fold at 90 degrees.



4. To see the final state of the design, in the tabular area, click the Usage phase.



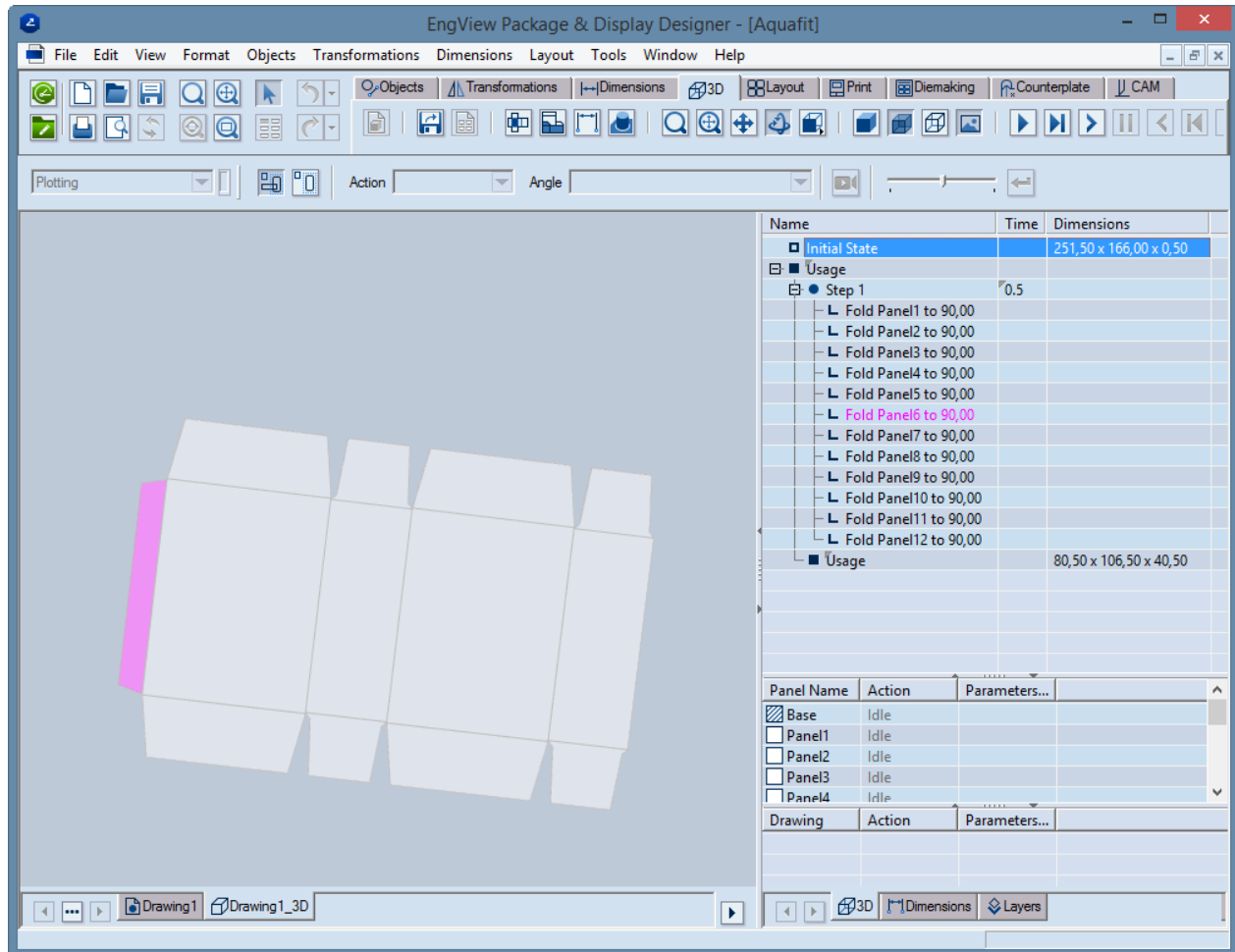
**IMPORTANT:** At the end of the Usage phase, the structure's state coincides with the state in Step 1. This is because this is the only step in this phase and it is also the last one for the phase.

## Editing Actions

We are now going to change the folding of the glue flap to 92 degrees from the default 90 degrees.

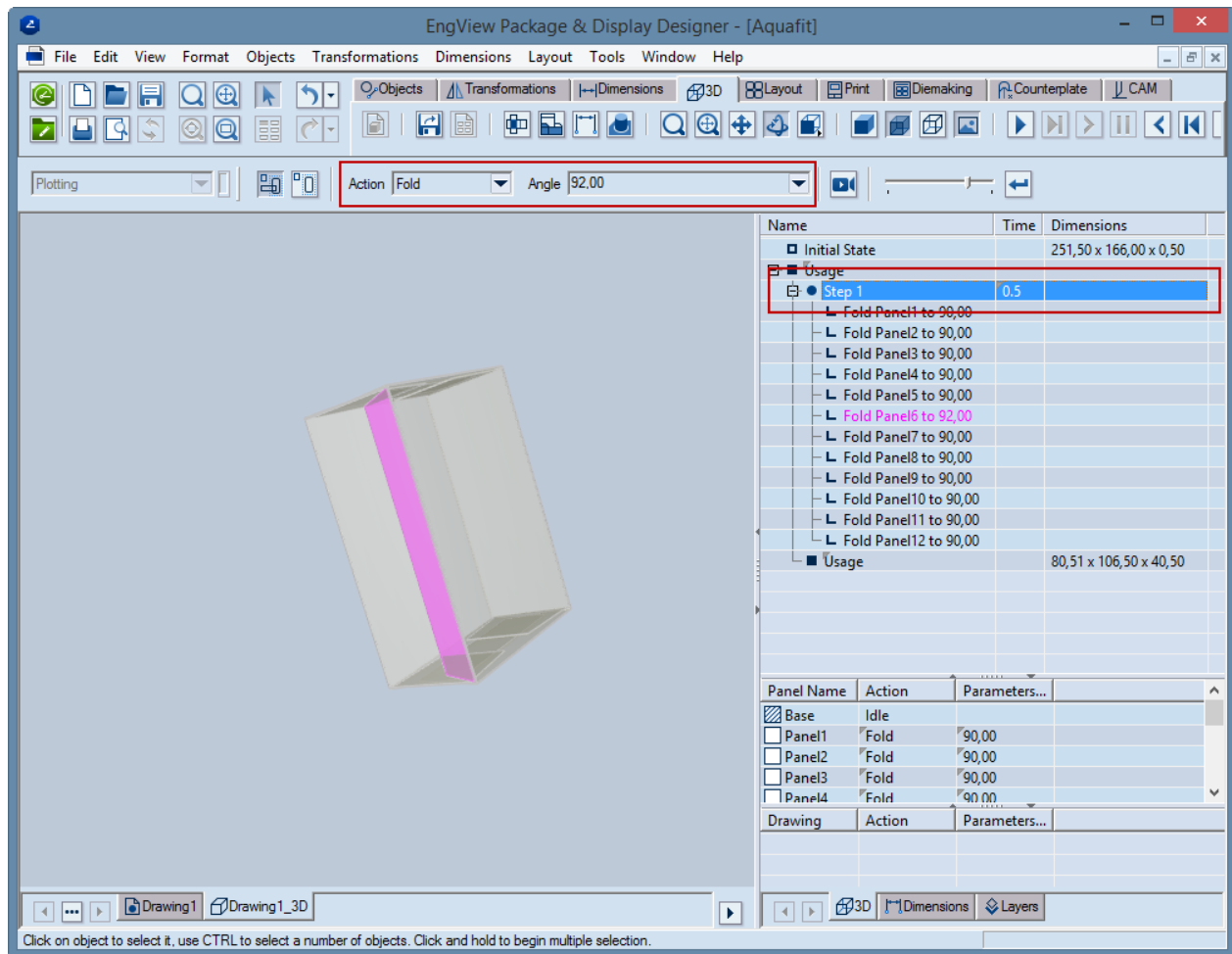
Currently there is only one action set for this panel – it is described in Step 1.

1. To easily find the action for the glue panel, go to the Initial State phase.
2. In the 3D work area, select the glue flap.



Notice that the **Action** dropdown list is not available. The reason is that actions are always part of a step. That is, we cannot set or edit an action unless we have set the step in which this will take place.

3. Select Step 1.
4. On the contextual edit bar, in **Angle** type 92, and then press ENTER.







5. Clear the selection of the glue flap: Click in a blank space in the work area.






## Folding Sequence Animation


You can animate the 3D model by using the animation buttons on the toolbar.

Use  and  to play and reverse-play the entire animation.

Use  and  to play and reverse-play a phase.

Use  and  to play and reverse-play a step.

1. To animate the folding sequence of the design from Initial State to Usage, click the Initial State and then click the Play button .

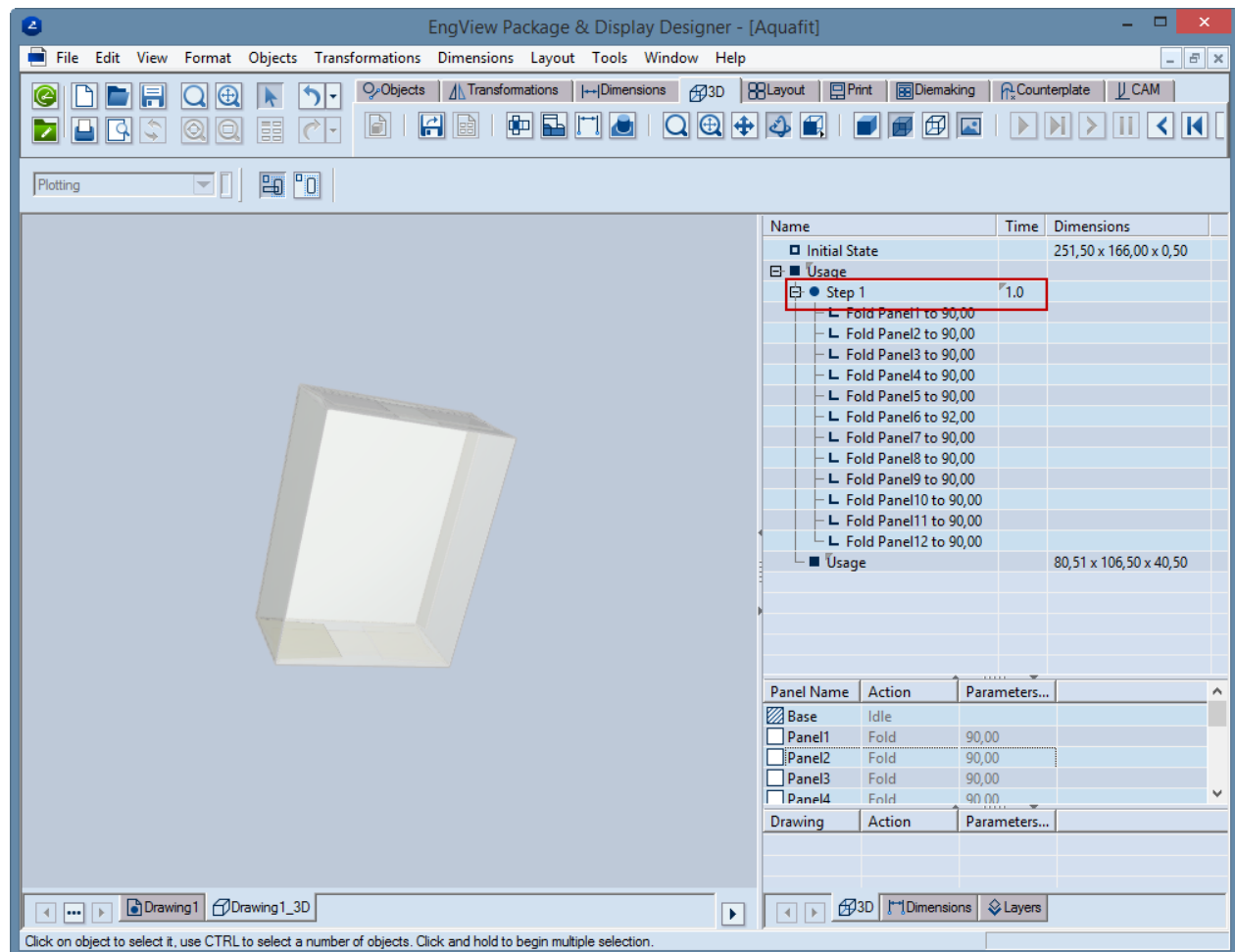
2. To reverse-play the folding sequence, click the Reverse Play button .

## Changing Steps' Folding Times

We can also change steps' folding times.

1. In a step, click the **Time** column, and then enter a new folding time (pictured).

Note that the time interval affects all the actions in the step. In our case, we will use slower animation: 1.0 sec.




## Defining a Detail Folding Sequence

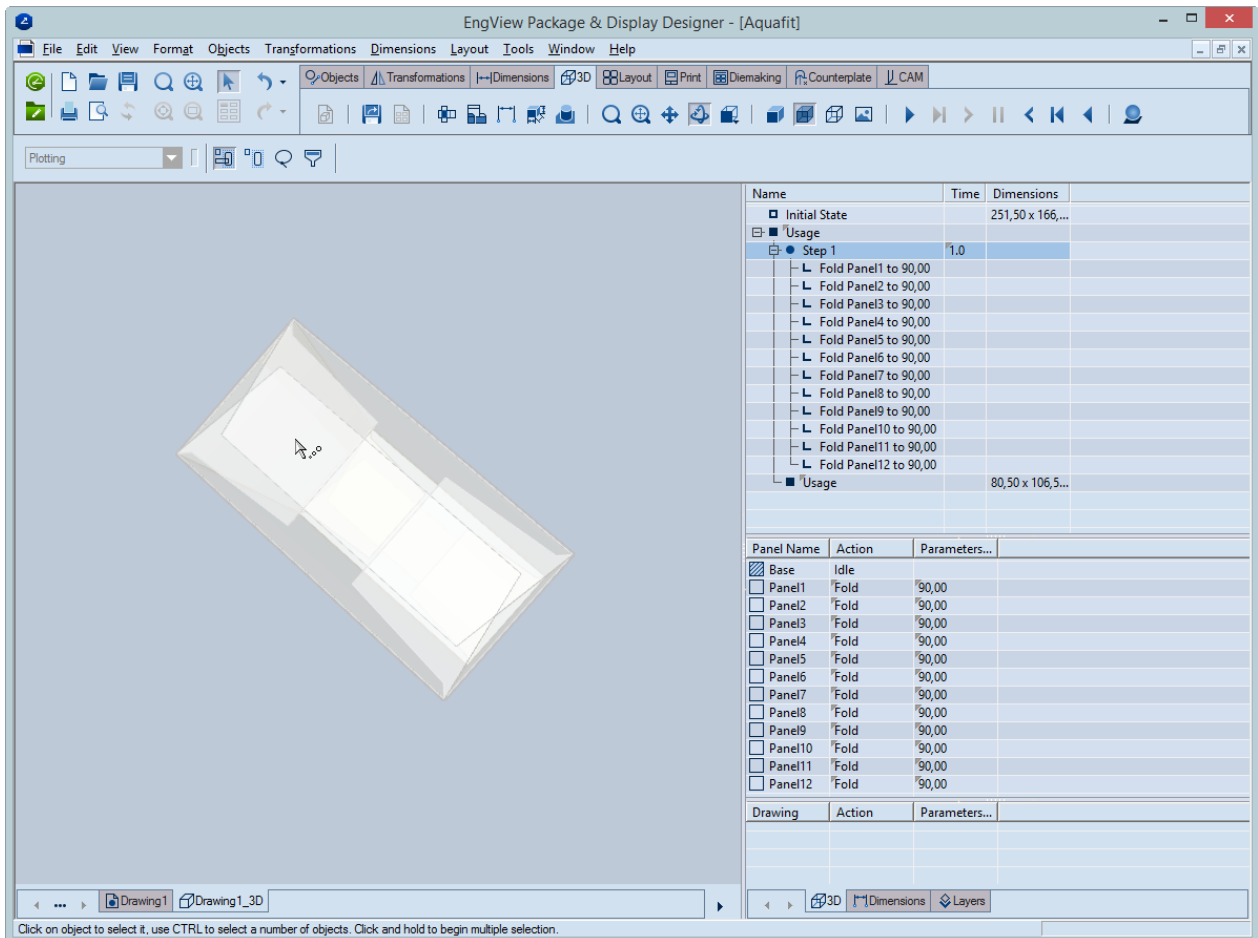
We begin by creating a new step.

1. Select one of the small flaps in the bottom.

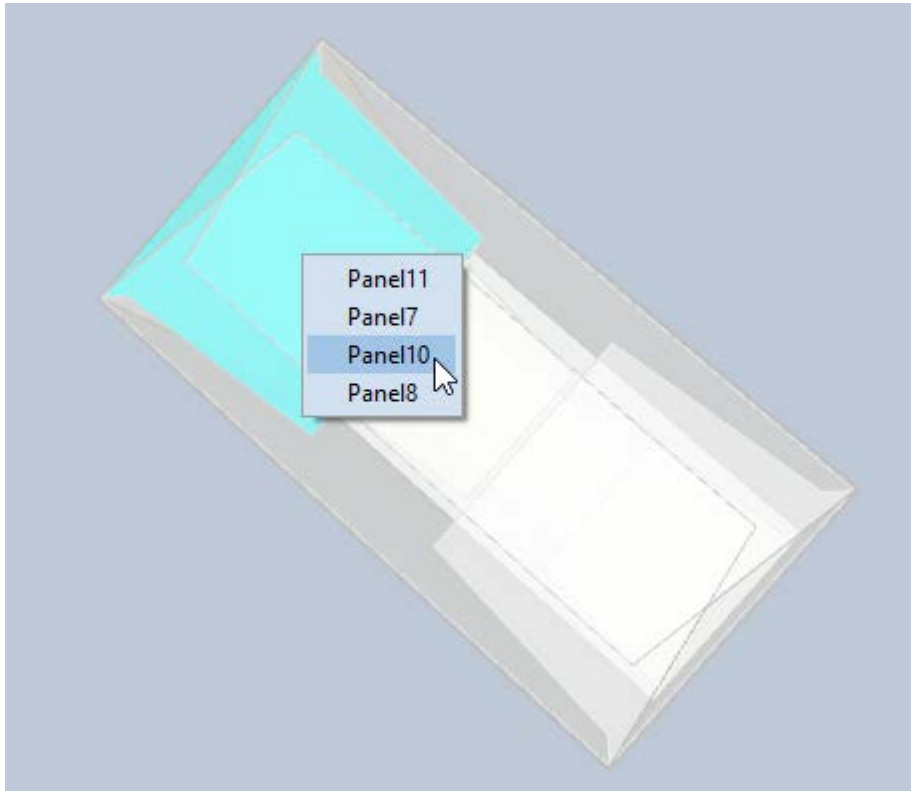
Note that because the design is folded, a number of panels are positioned one above the other. This requires a special technique for selecting the panel that we need.

2. As the design is folded, in the graphical area position the mouse pointer on one of the small flaps.

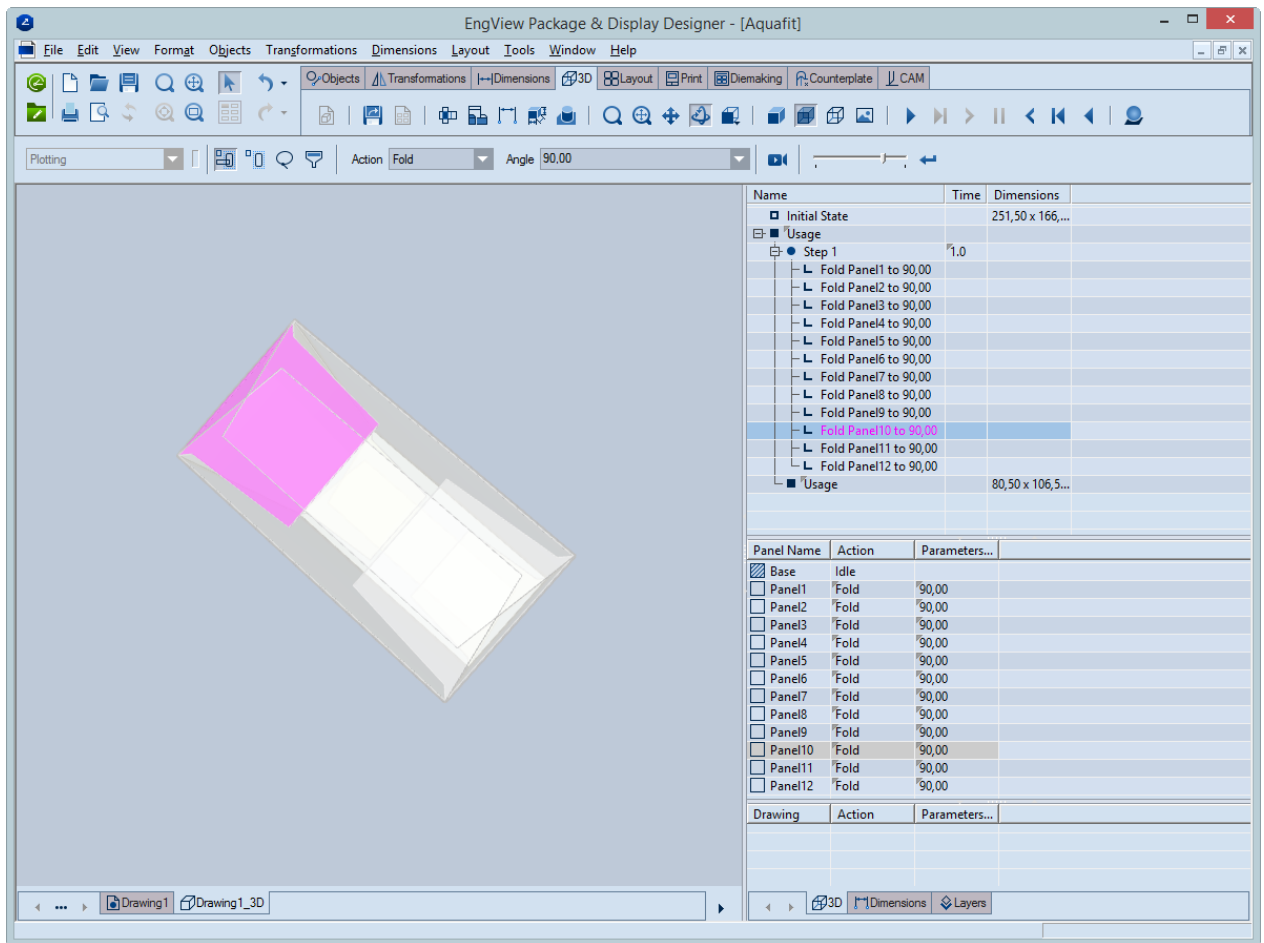
After a couple of seconds you will see the bubbles sign , which indicates that there is more than one panel at this place.



3. Click and you will see a list of the available panels (pictured). Then move the mouse over the list. The program highlights the respective panel.

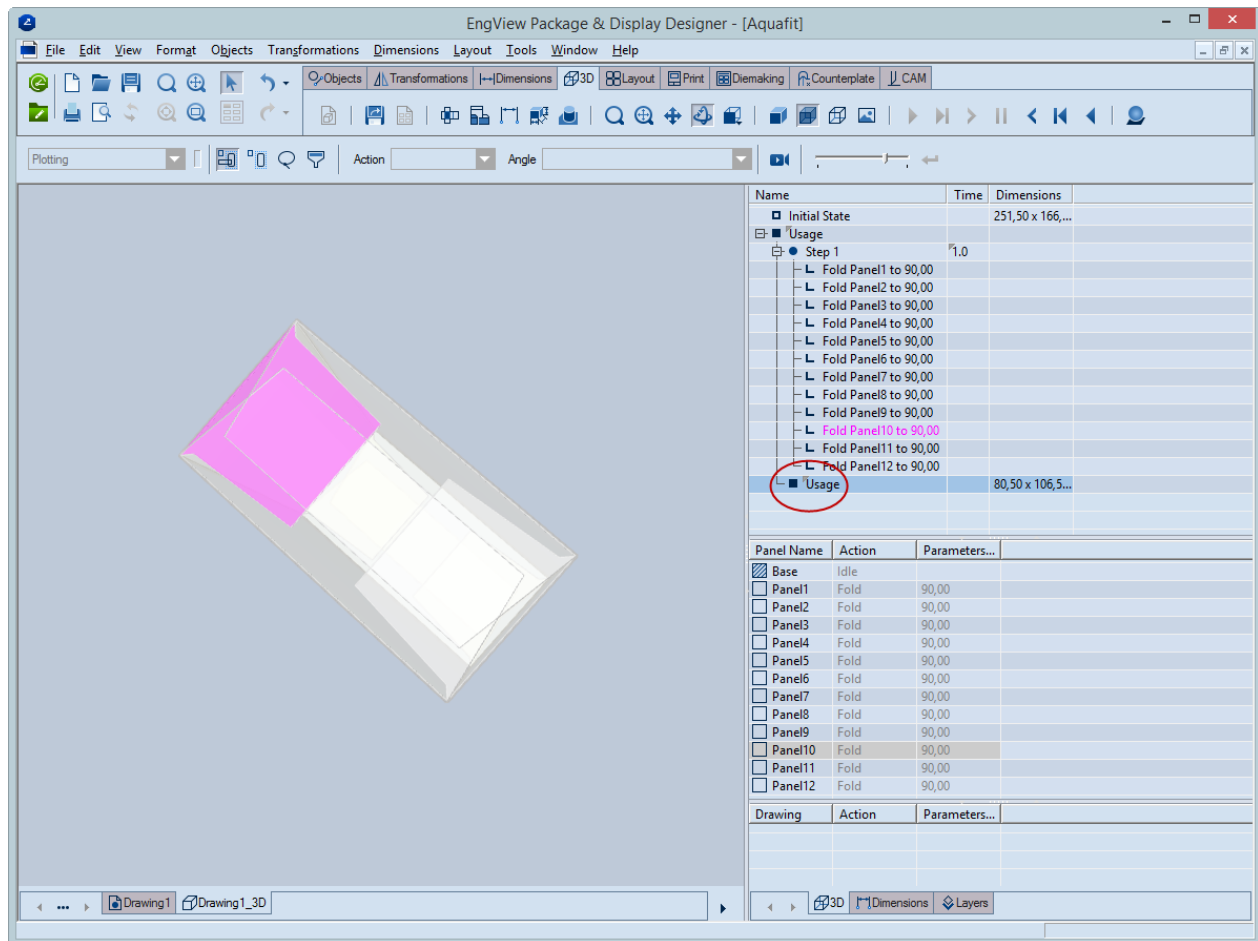


4. Click Panel10.

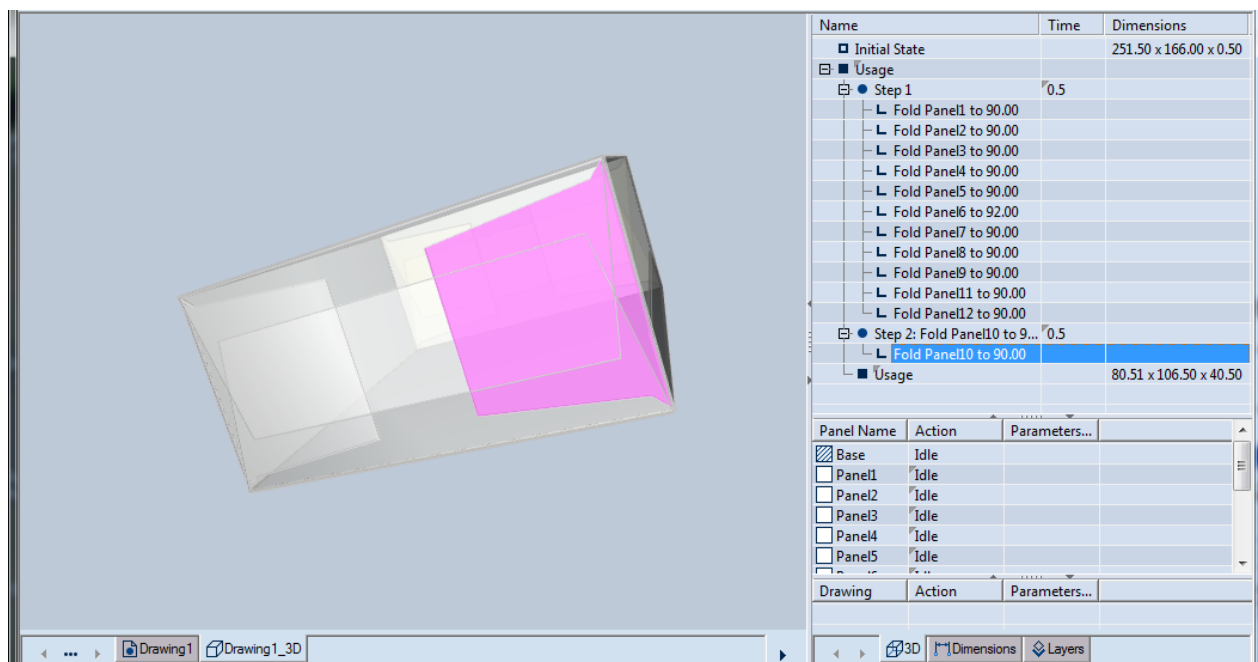


The panel is automatically selected in Step 1.

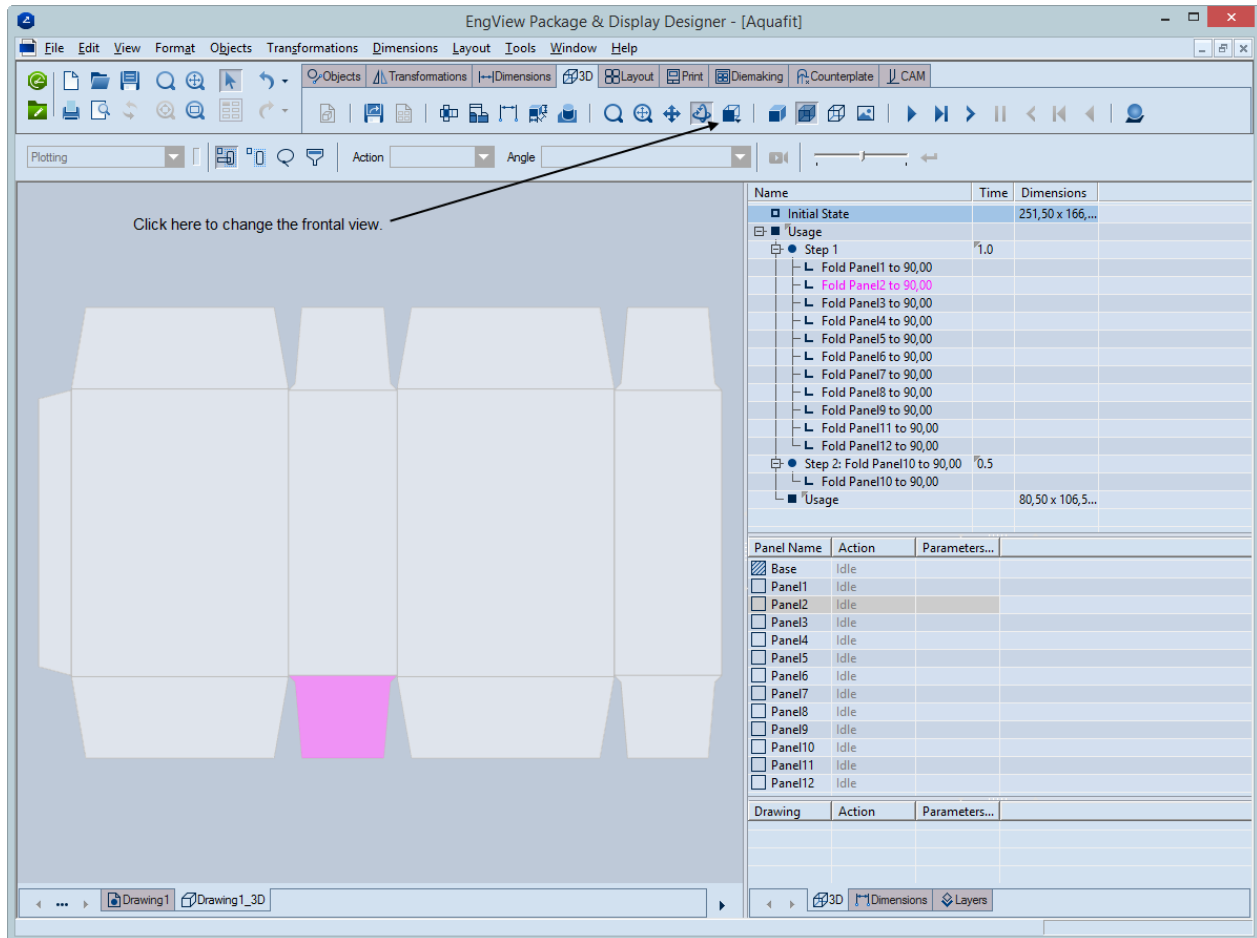
5. Drag the selected action — Fold Panel10 — down into the Usage phase (pictured).



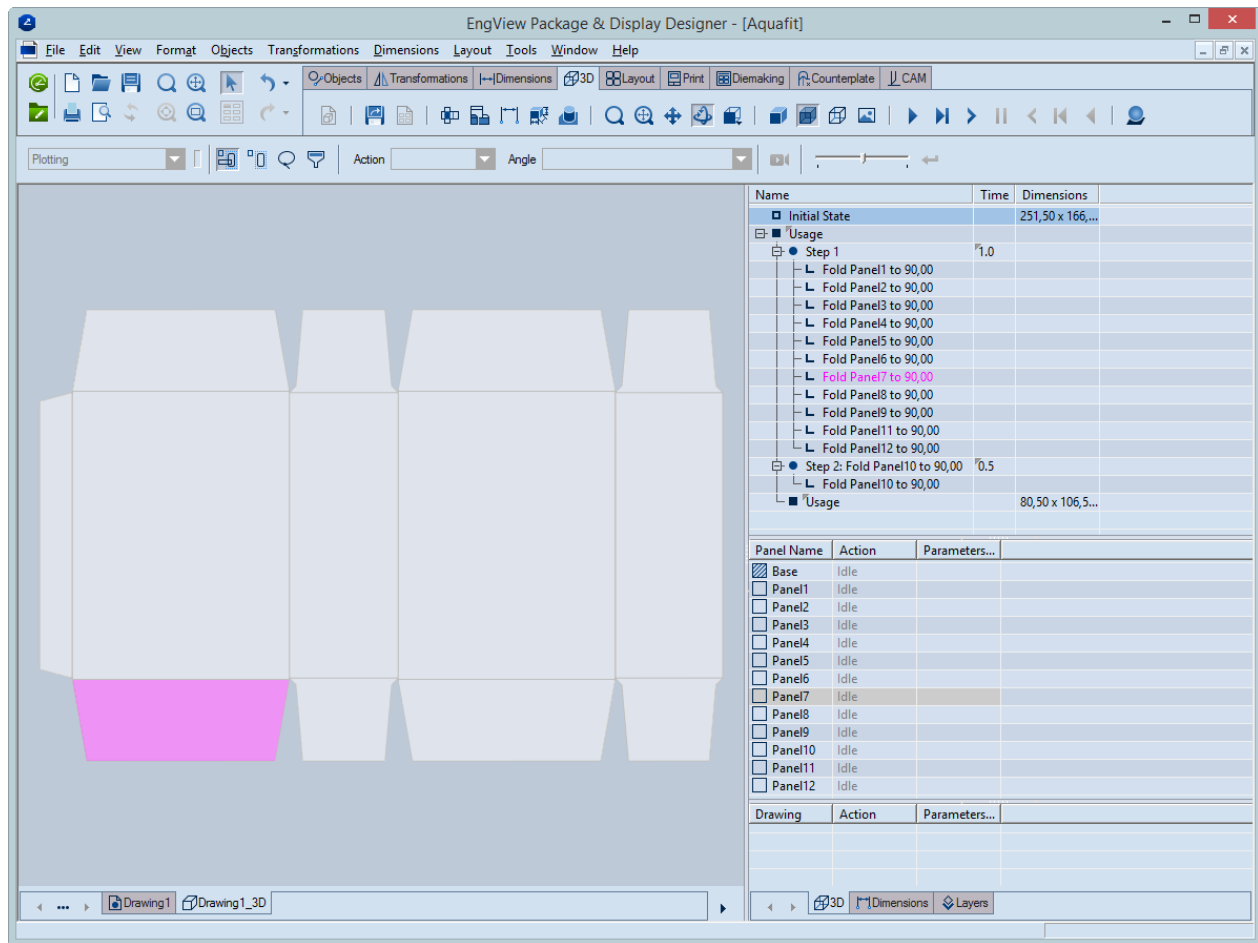
The program creates a new step below Step1 and moves the action into it.



NOTE: To see the front side of the box click **Front View** button (pictured).



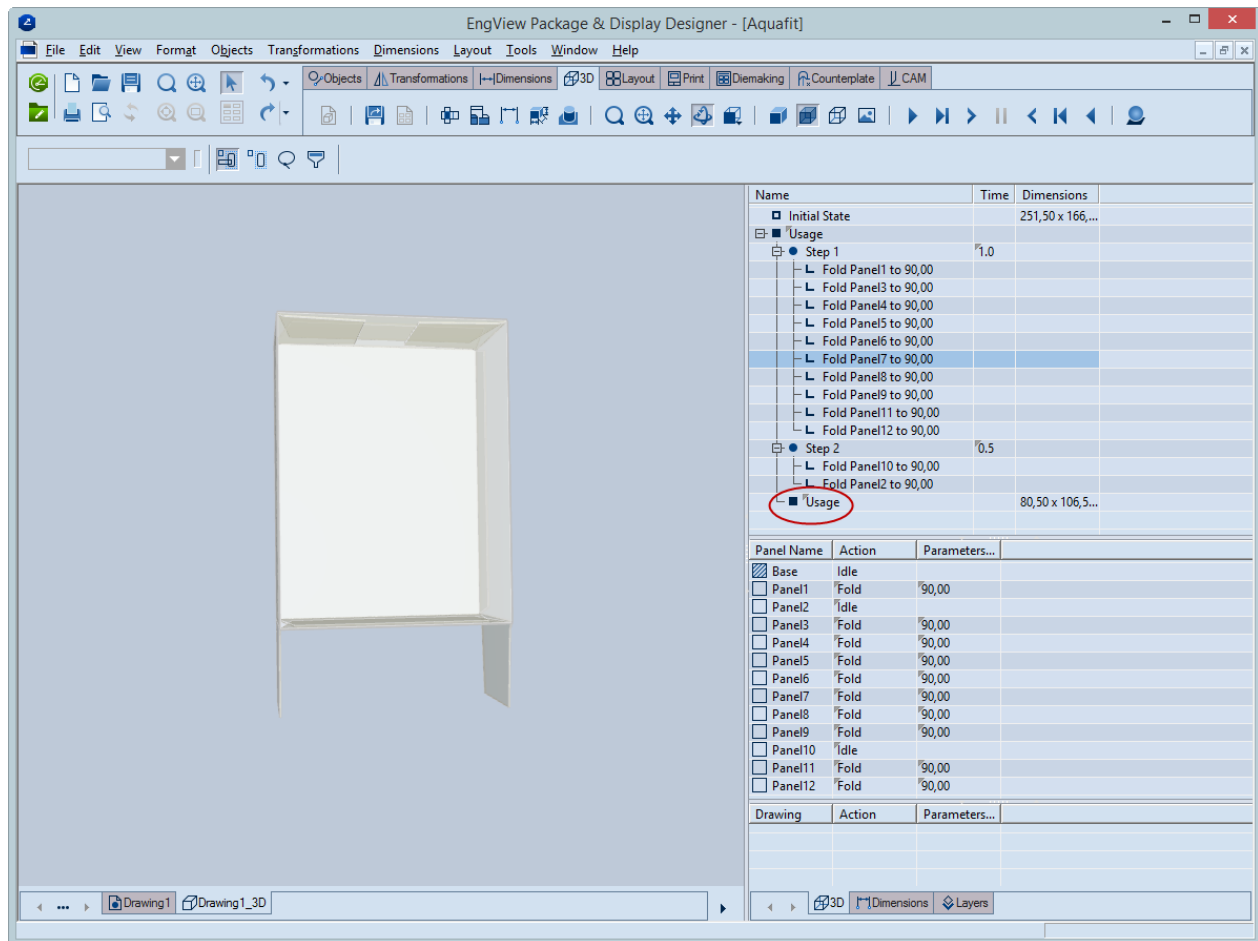
- Click the leftmost panel (Panel7). In the tabular area this automatically highlights the corresponding action.



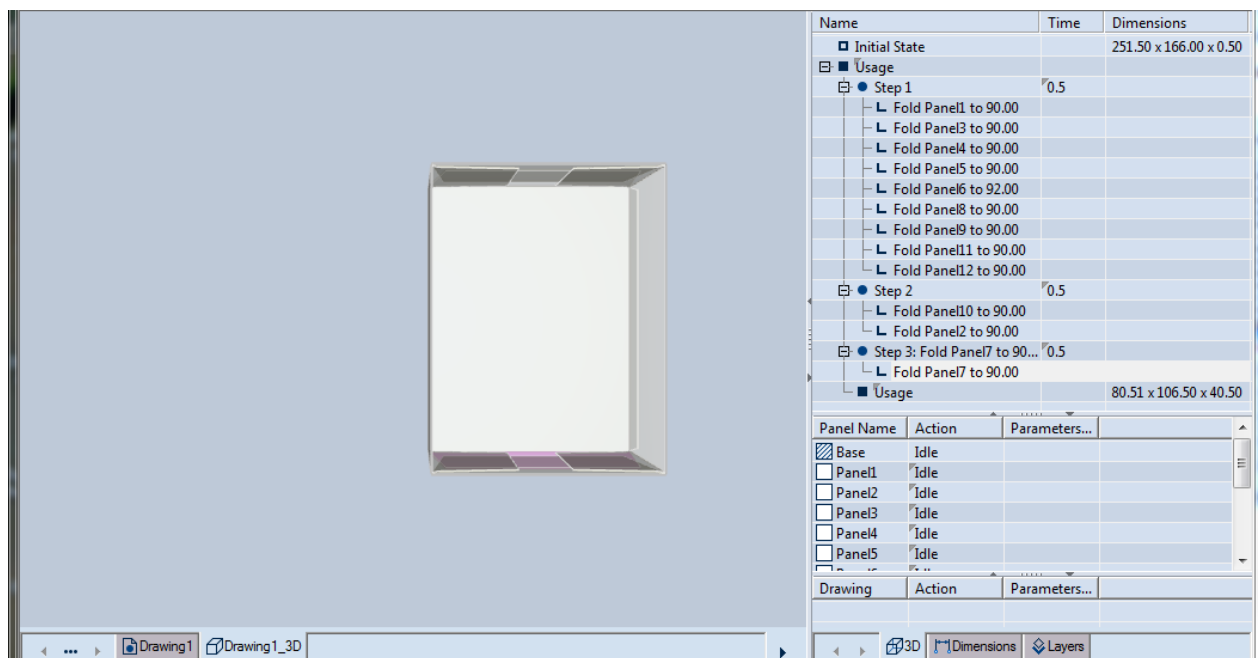
Now we are going to create a new step for this folding as we need this panel to fold after the small panels have been folded.

8. Select the highlighted action and drag it to the end of the Usage phase.



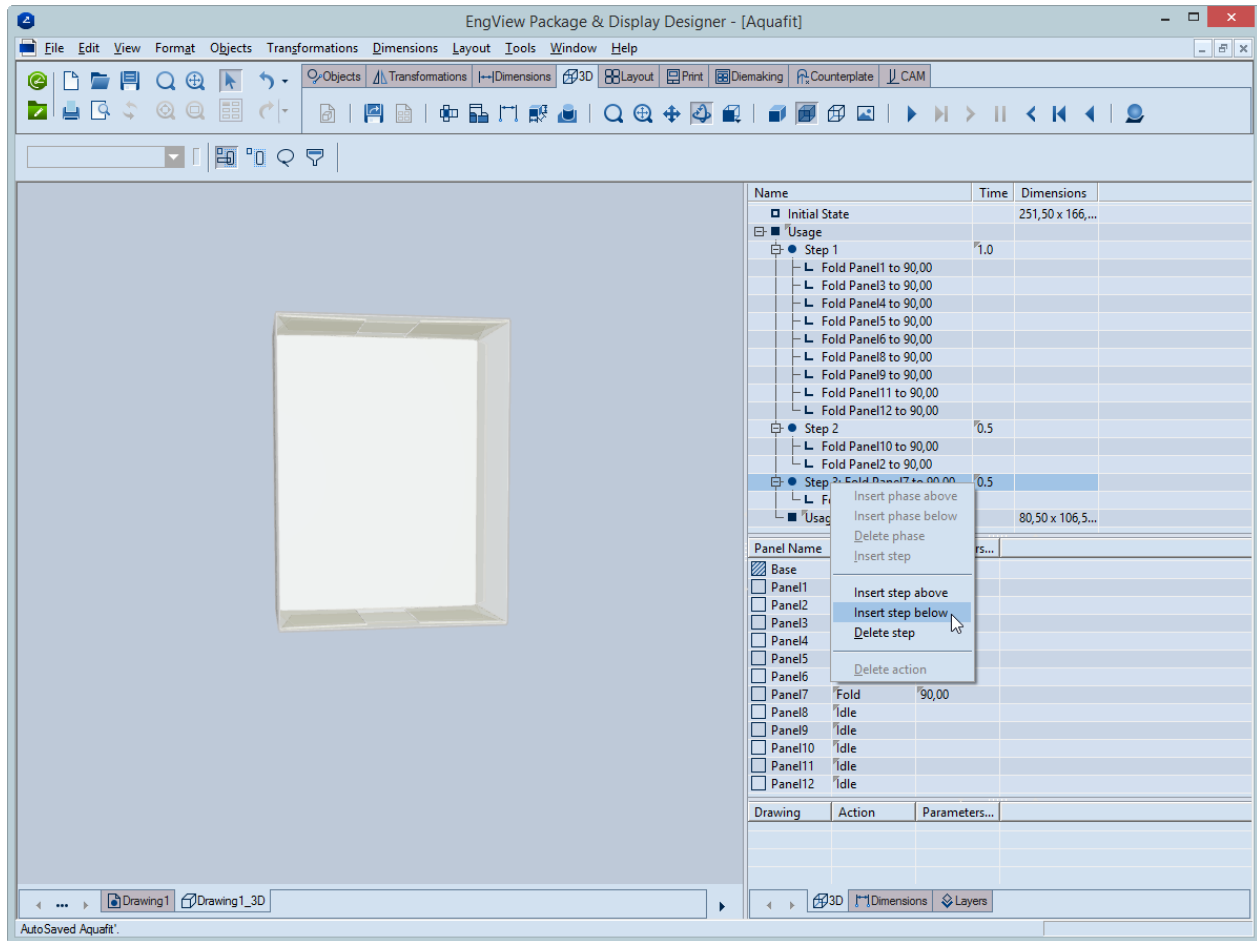


A new step containing this action has been created automatically.

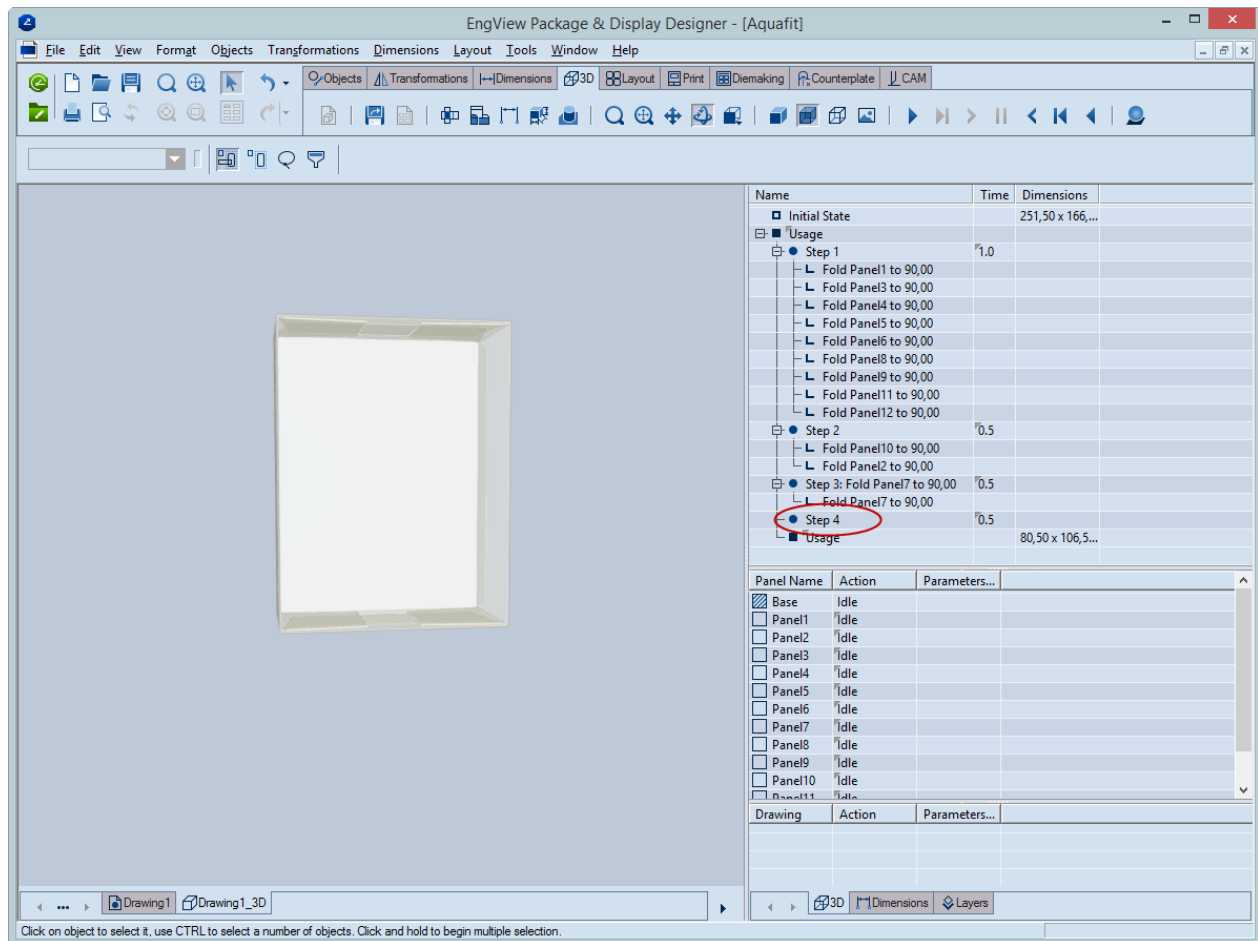


We will create a new step in a different way.

9. Right-click Step 3, and then click **Insert step below** on the context menu.

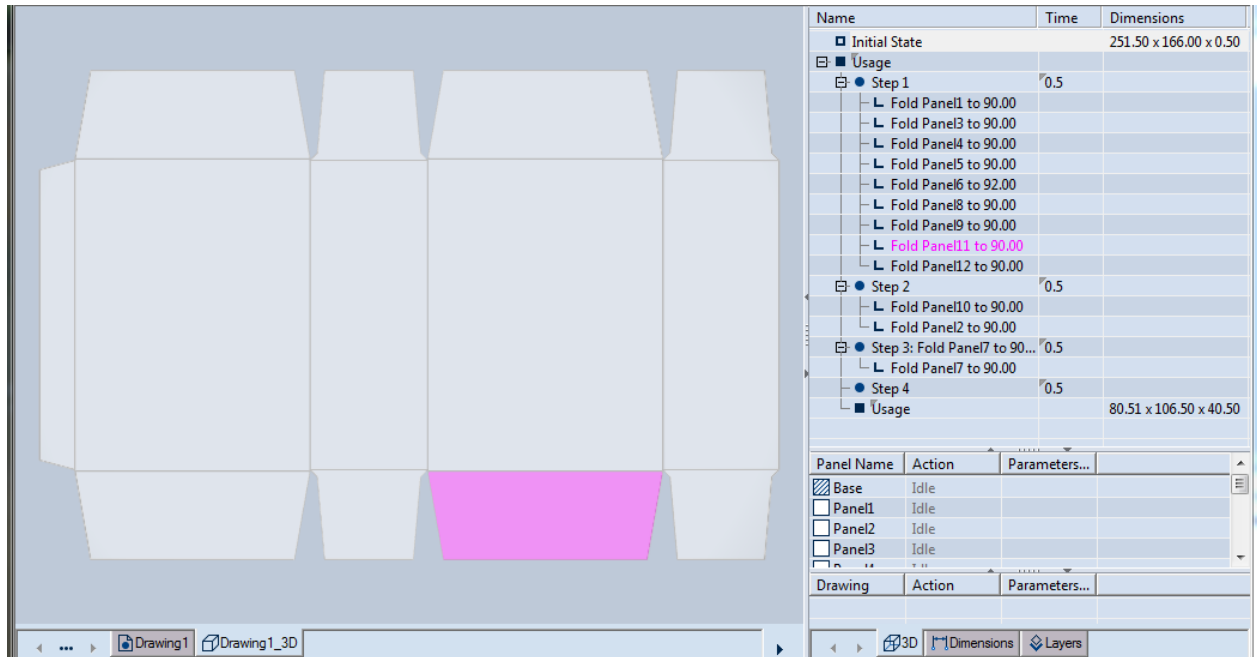


An empty Step 4 appears.

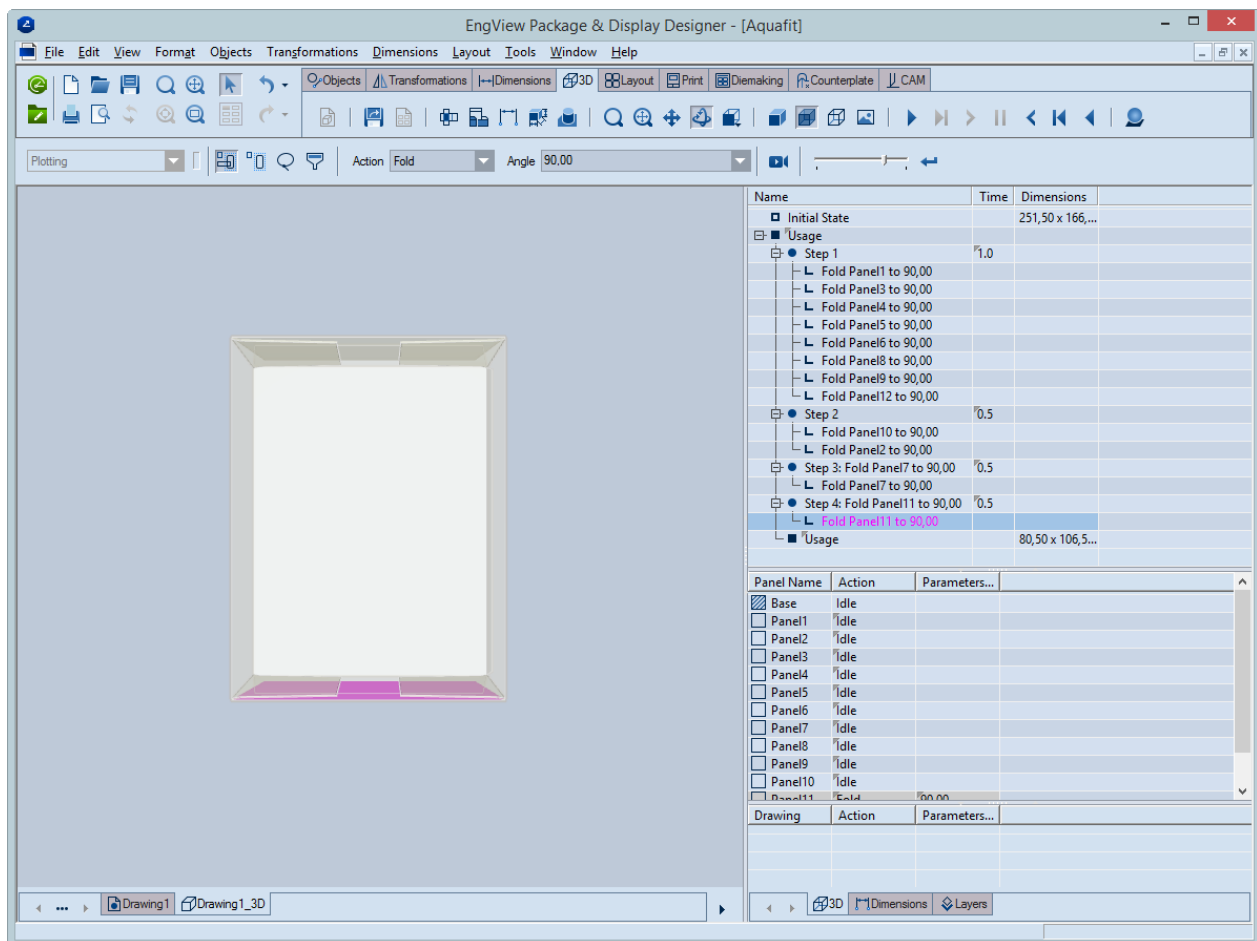


10. Select the Initial State phase, and then, in the graphical area, select the other similar panel from the bottom (to follow in the next steps).

The panel is highlighted in Step 1.

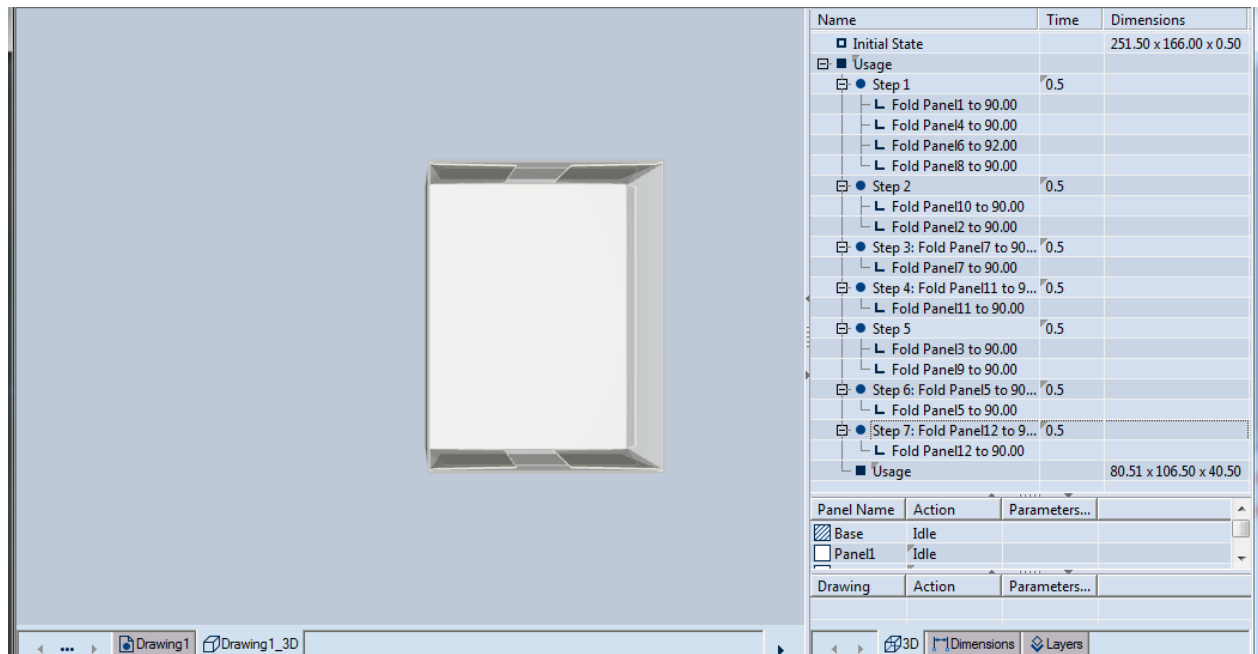


11. Drag the panel into Step 4.



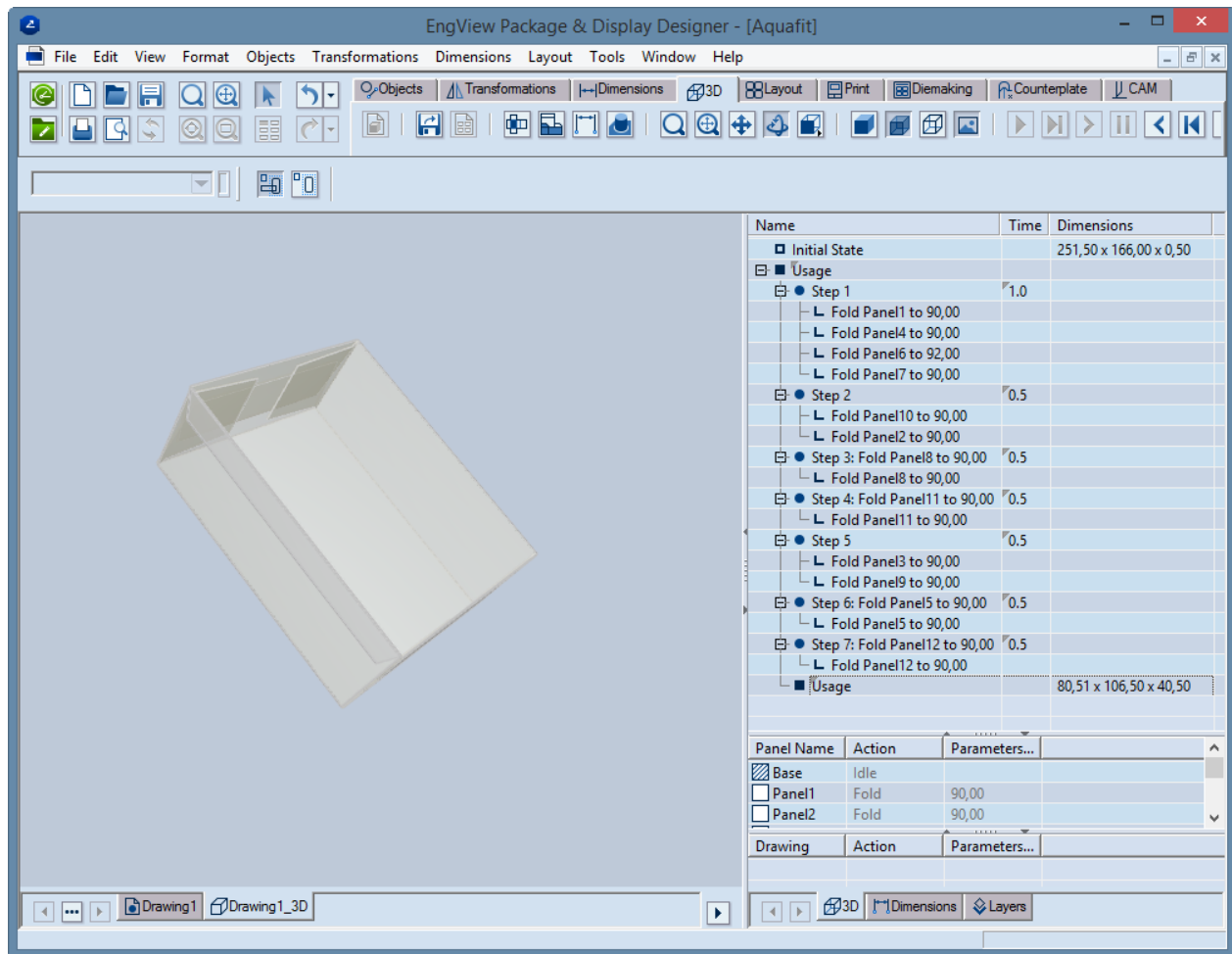
By analogy we will move the actions to the top's panels.

12. Create three new steps – numbered 5, 6 and 7 – and then move the panels into the respective steps (pictured).



NOTE: A panel can play a role in more than one step or phase. For example, we may need to fold the same panel on two occasions, so we will use it in two different steps. When you select such a panel in the drawing area, its actions appear highlighted in the tabular area in each step in which the panel plays a role.

13. We can now animate the 3D model by using the animation buttons on the **3D** toolbar.

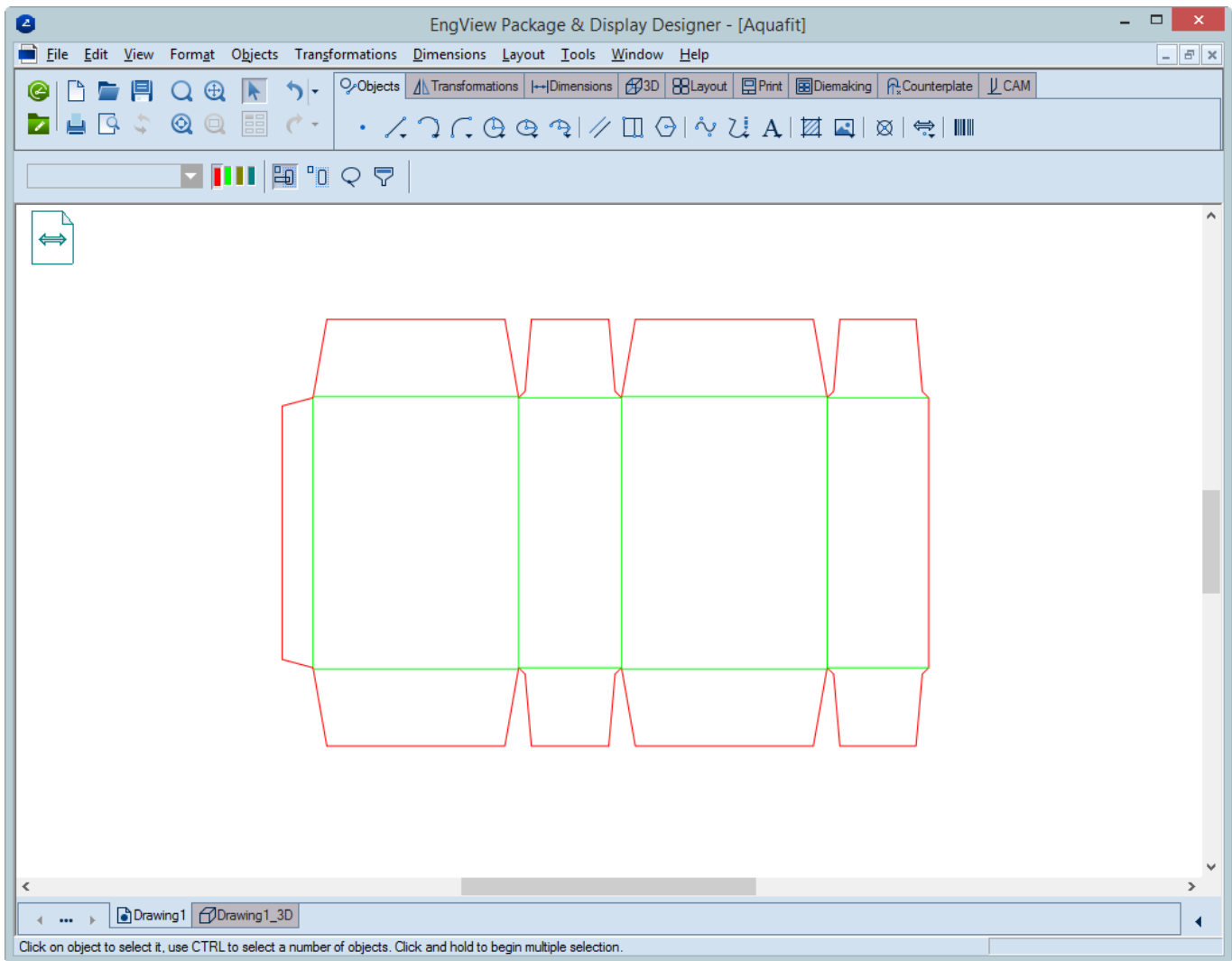


## Loading an Image

NOTE FOR USERS OF ADOBE ILLUSTRATOR: Adding artwork to structural designs is best done if you open the design in Adobe Illustrator, with which Package & Display Designer is integrated. Adding artwork in Adobe Illustrator is automatically visualized in the 3D module.

We will load an image and place it on the box to present the final box to the customer.

1. To load an image, click the **Drawing 1** tab to display the 1up, and then go to the **Objects** tab.



Pay attention to the View Side marker in the upper left corner of the graphical area.

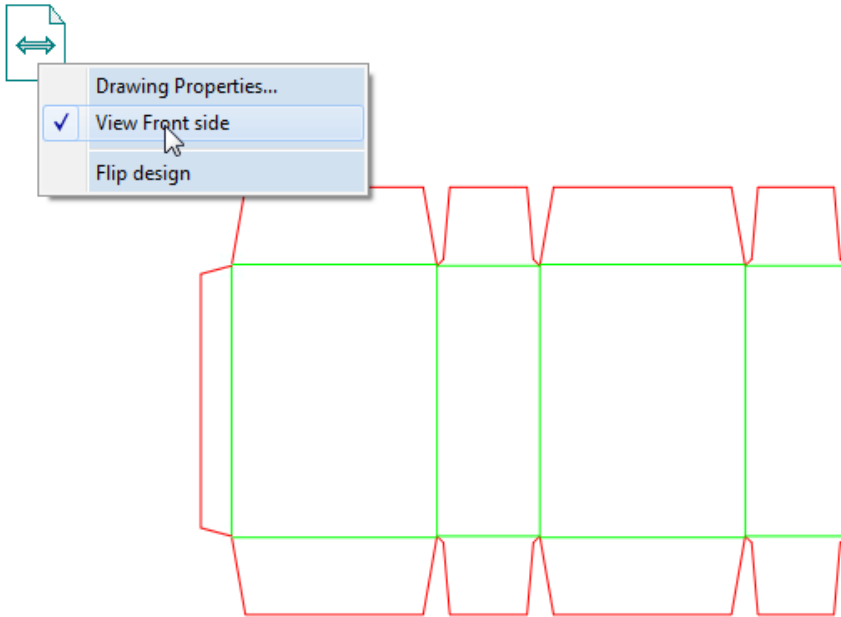


This marker indicates the current point of view of the structure and the grain direction (flute direction in corrugated materials). In the picture here the point of view is on the design's front side and the grain direction is parallel to X.

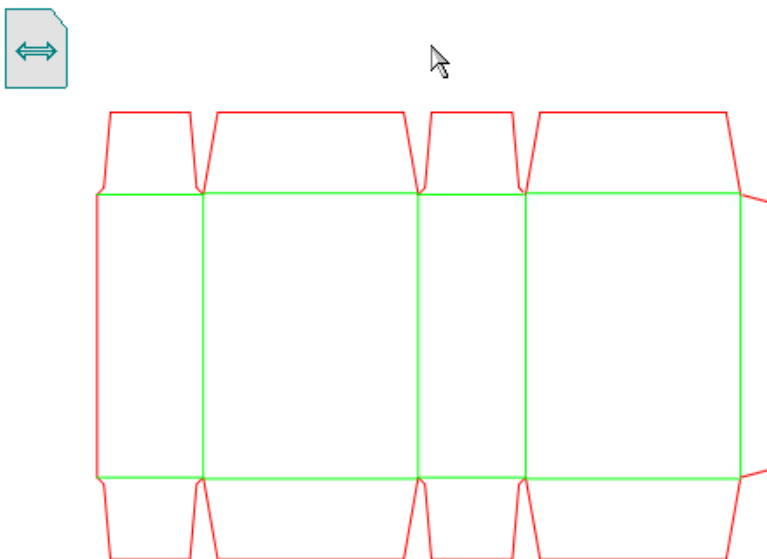
If you don't see the marker, do one of the following:

- Right-click in the graphical area (outside the image), point to **Show**, and then check **Front/Rear Side Marker**.
- On the Tools menu, click **Options**, and then click the **View** tab; then select the **Front/Rear side marker** check box. This ensures that the marker will always be visible.

To switch between the sides, do one of the following, right-click the icon, and then select **View front side**.



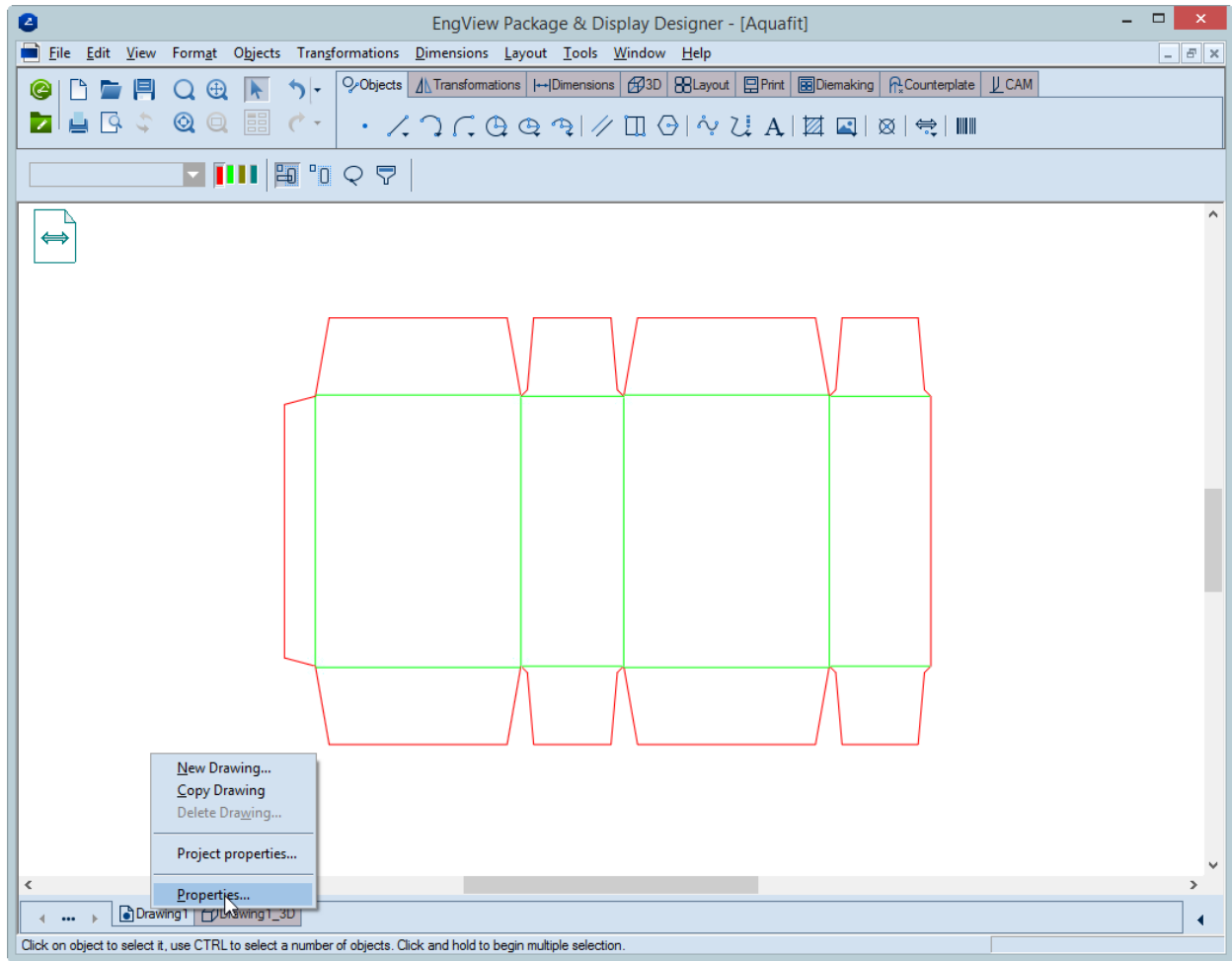
This lets us see the design's rear side.

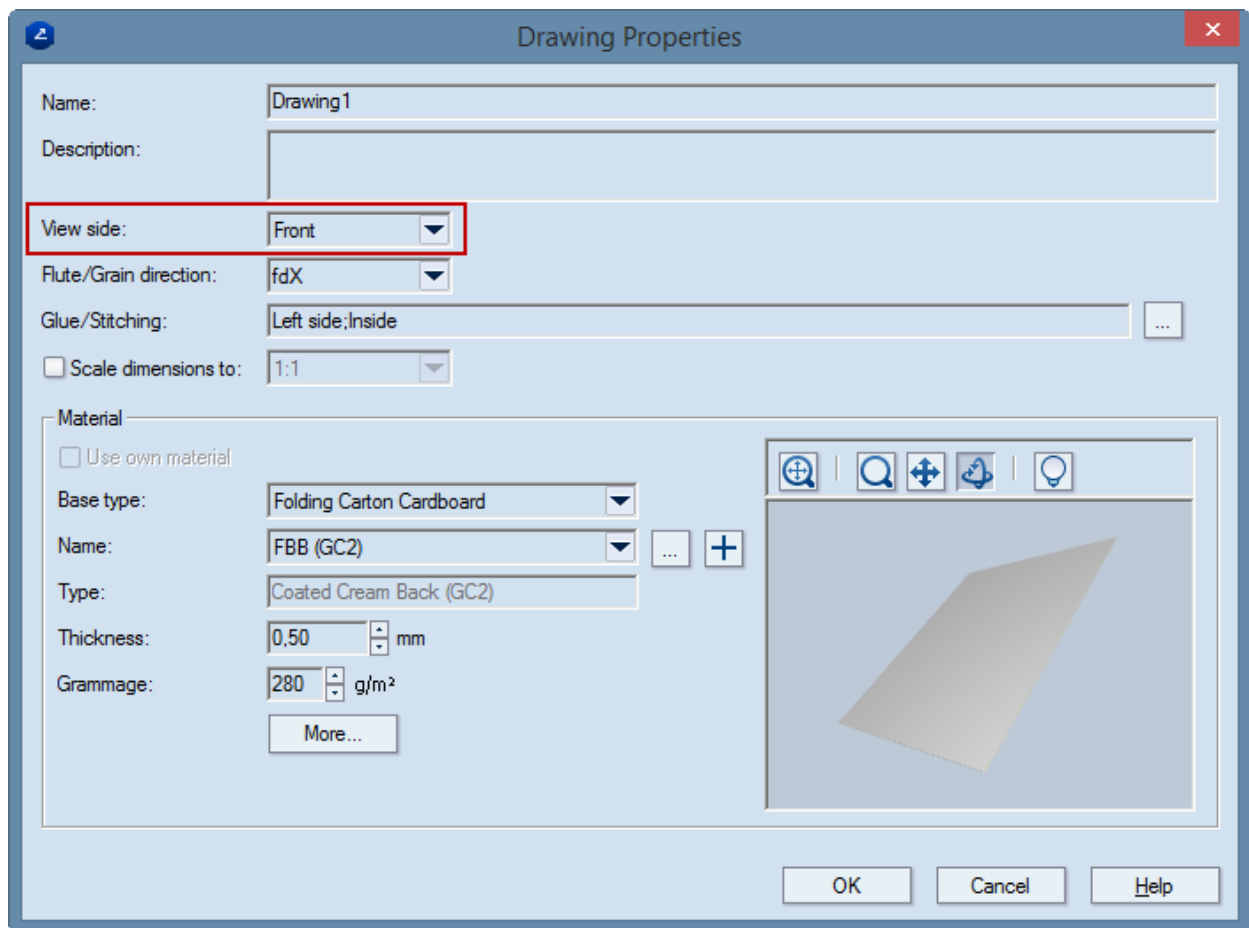





Now, let's get back to the front side. We will use another technique.

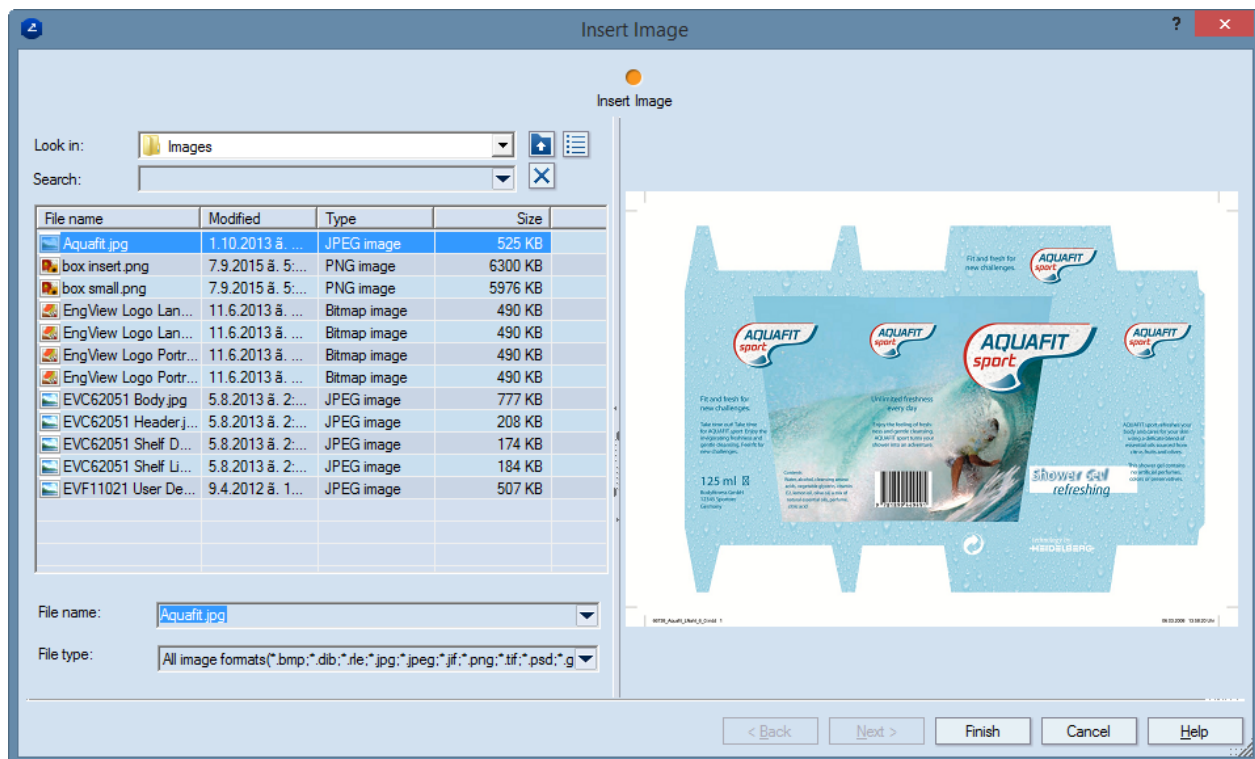
2. Right-click the drawing's tab, click **Properties**, and then, in the dialog box that appears, in View side, choose Front.



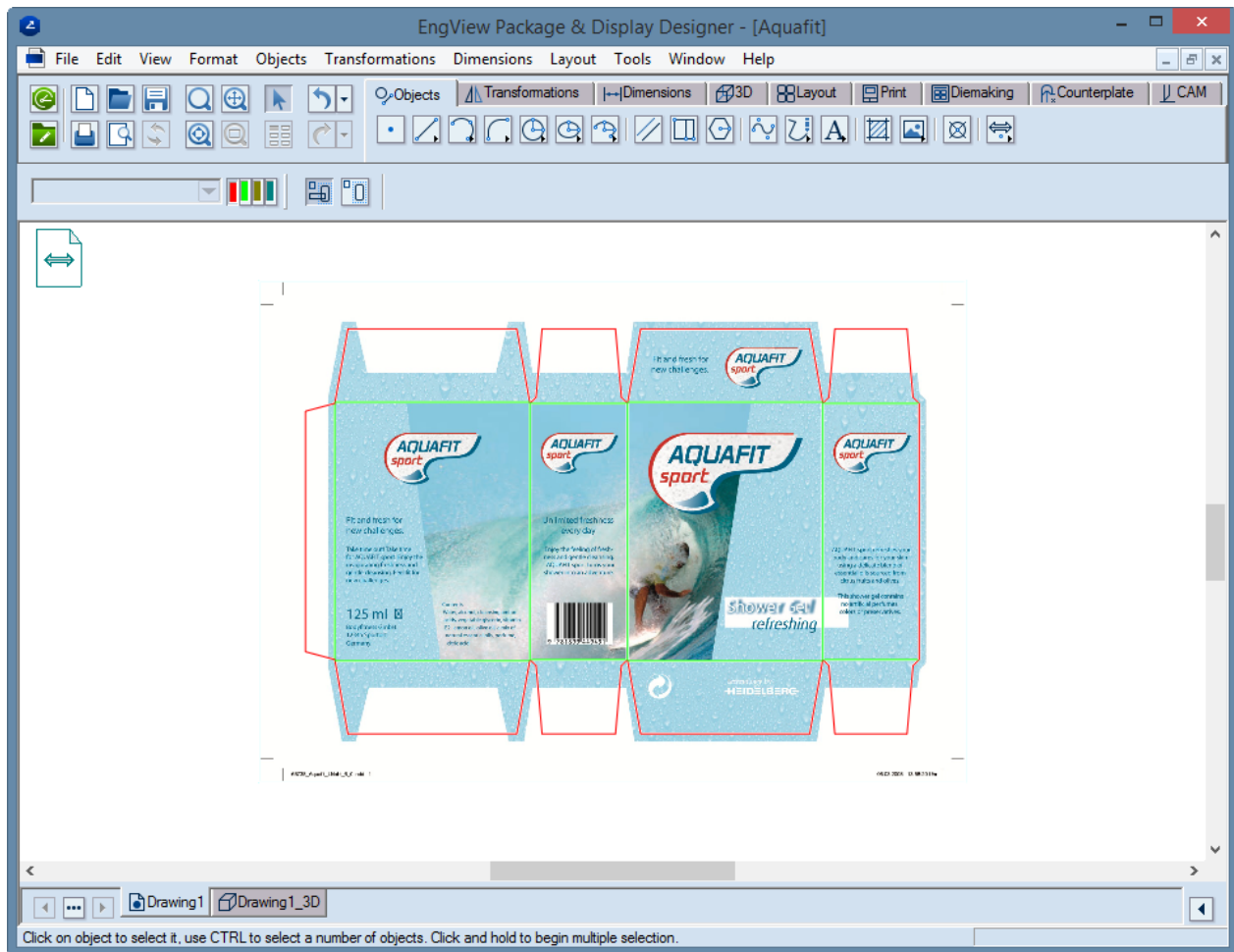


NOTE: You can place images on either side of the design.

3. On the **Objects** toolbar, click **Quick Image** .
4. In the **Insert Image** dialog that appears, browse the C:\EngViewWork6\EngView Samples\Images folder.
5. Select the file Aquafit.jpg, and then click **OK**.



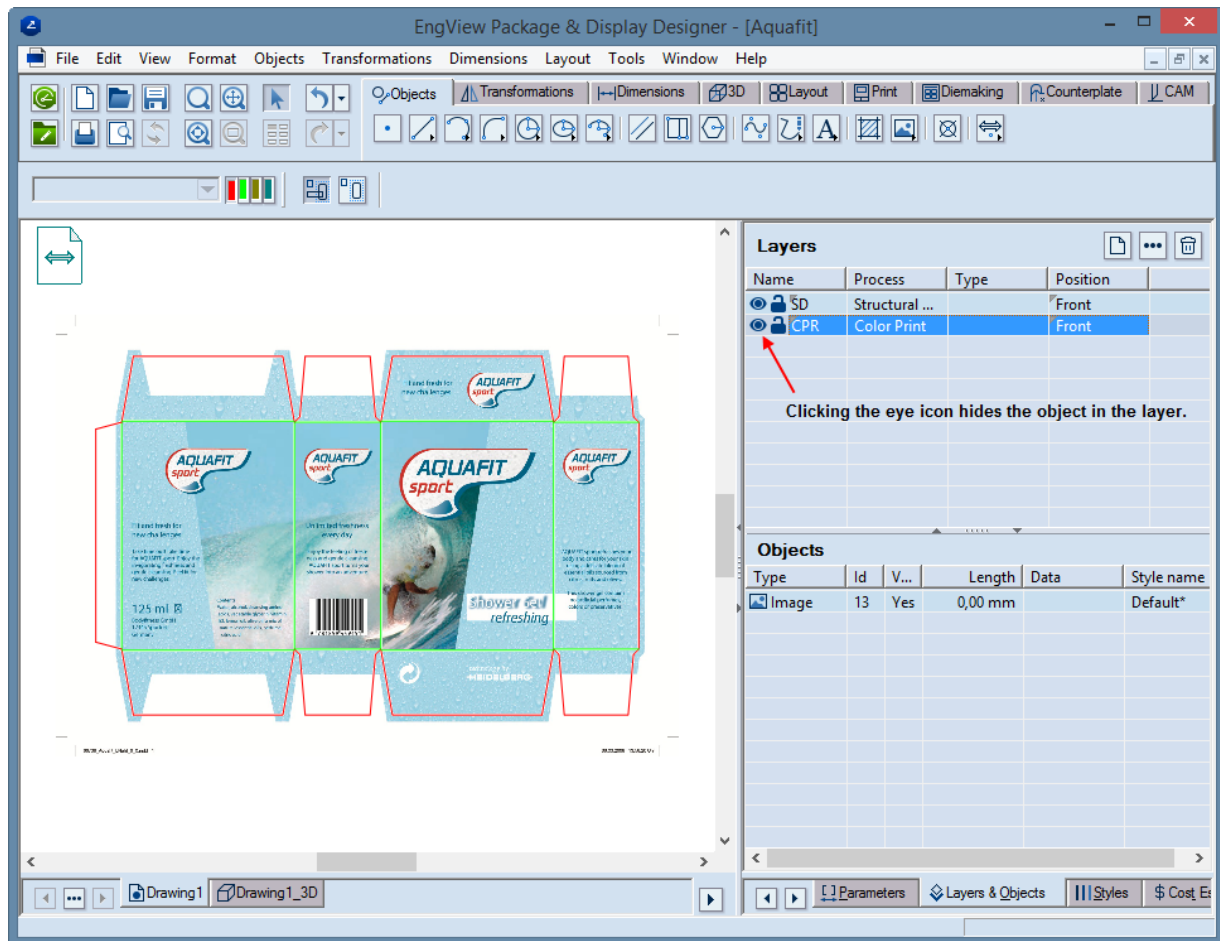
The image is automatically centered onto the design. It matches the structure of the box because it was created especially for its structure and its sizes.



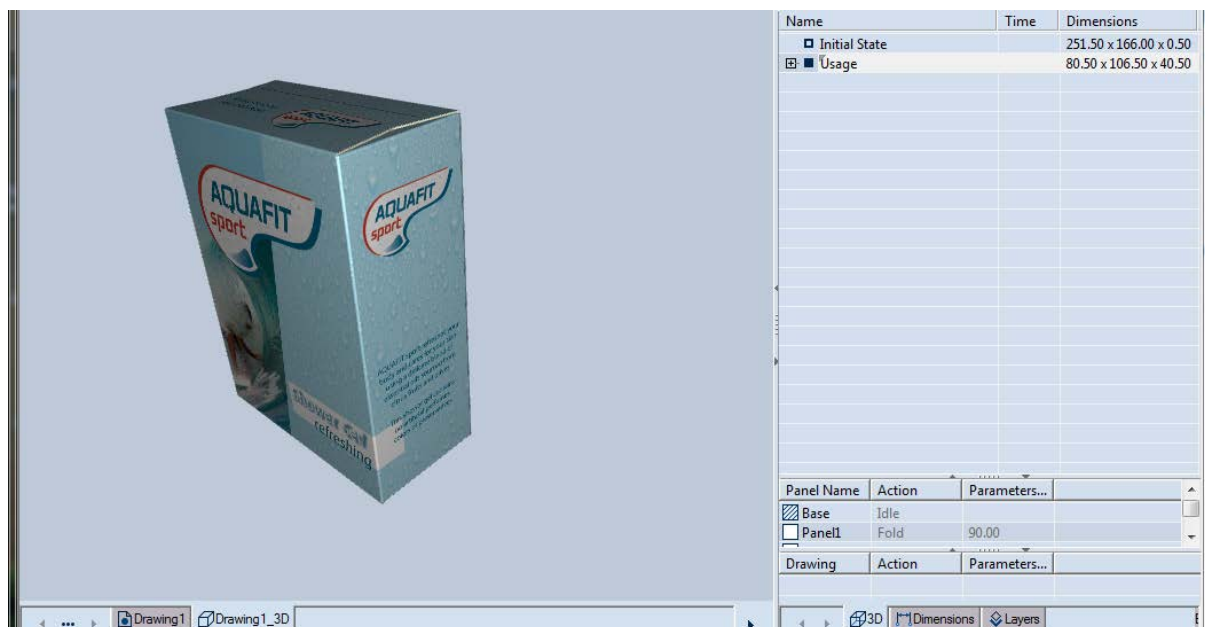
Notice that in tab **Layers & Objects** a new CPR (color print) layer has appeared for the front side of the design in which the picture has been placed.

NOTE: To see the tabular area and the tab, press CTRL + H.

In the tabular area, click the **Layers & Objects** tab, and then click the CPR layer. In the **Objects** section you can see the list of objects in this layer. In our case we see only one object – the image that we inserted into the drawing.




6. Go to the 3D drawing, and see the image onto the design.

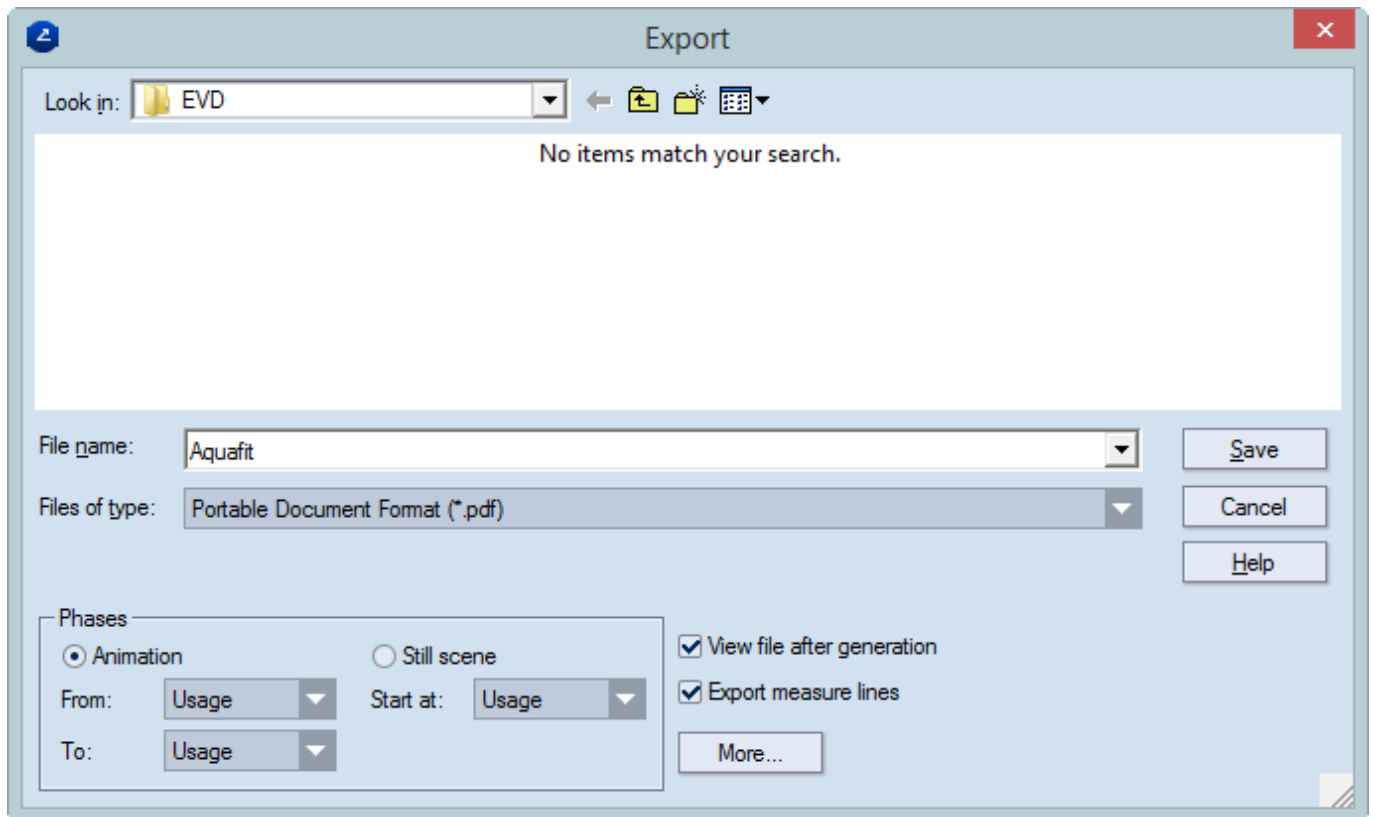


7. Save the file as Aquafit\_design.evd in the EVD folder.

## Exporting 3D Models

NOTE: You must be in the 3D tab to export a PDF file.

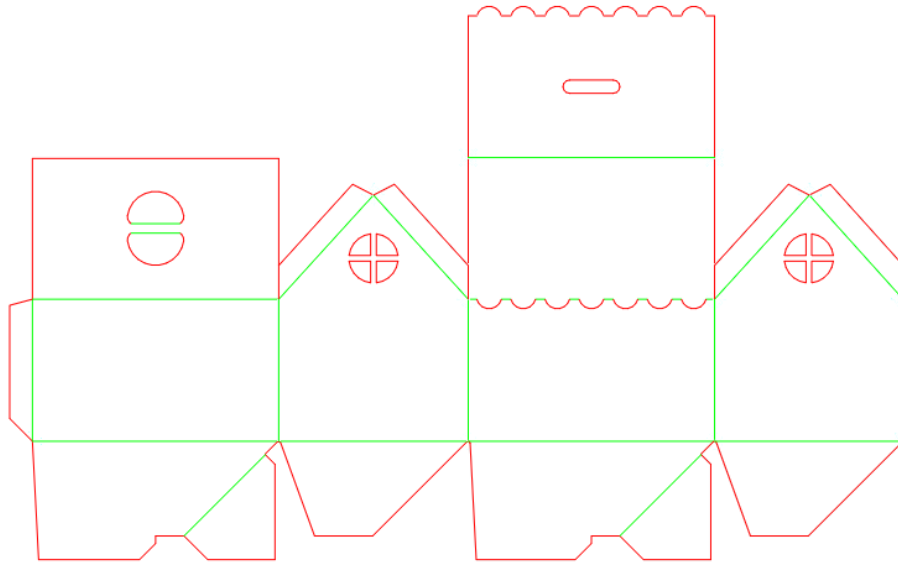
1. Click **Export** .
2. An **Export** dialog appears where you can set up the parameters for the PDF export. Define the order of the animation — starting and end phase.



3. Select the **View file after generation** check box to open the PDF file automatically after saving it.
- So far we have created a new folding sequence by shifting action in the 3D representation. Alternatively, instead of moving around the already created actions, we can create our own steps and actions.

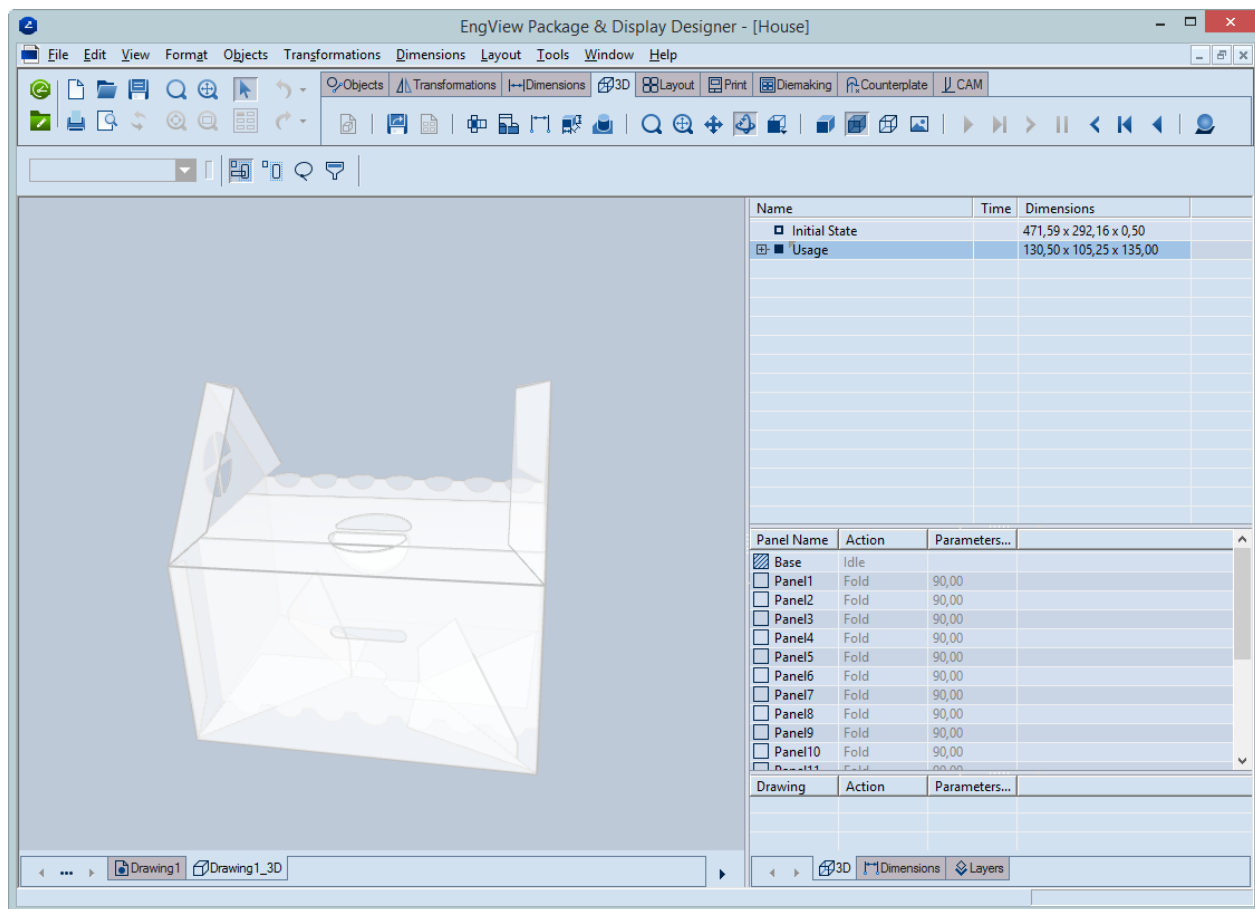
## Creating a Folding Sequence by Manually Setting Actions and Steps

1. Open the file House.evd from the EngView Samples folder



2. On the **3D** toolbar, click **New 3D Drawing** .

A one-step phase is automatically created in which all the panels are folded at 90 degrees.



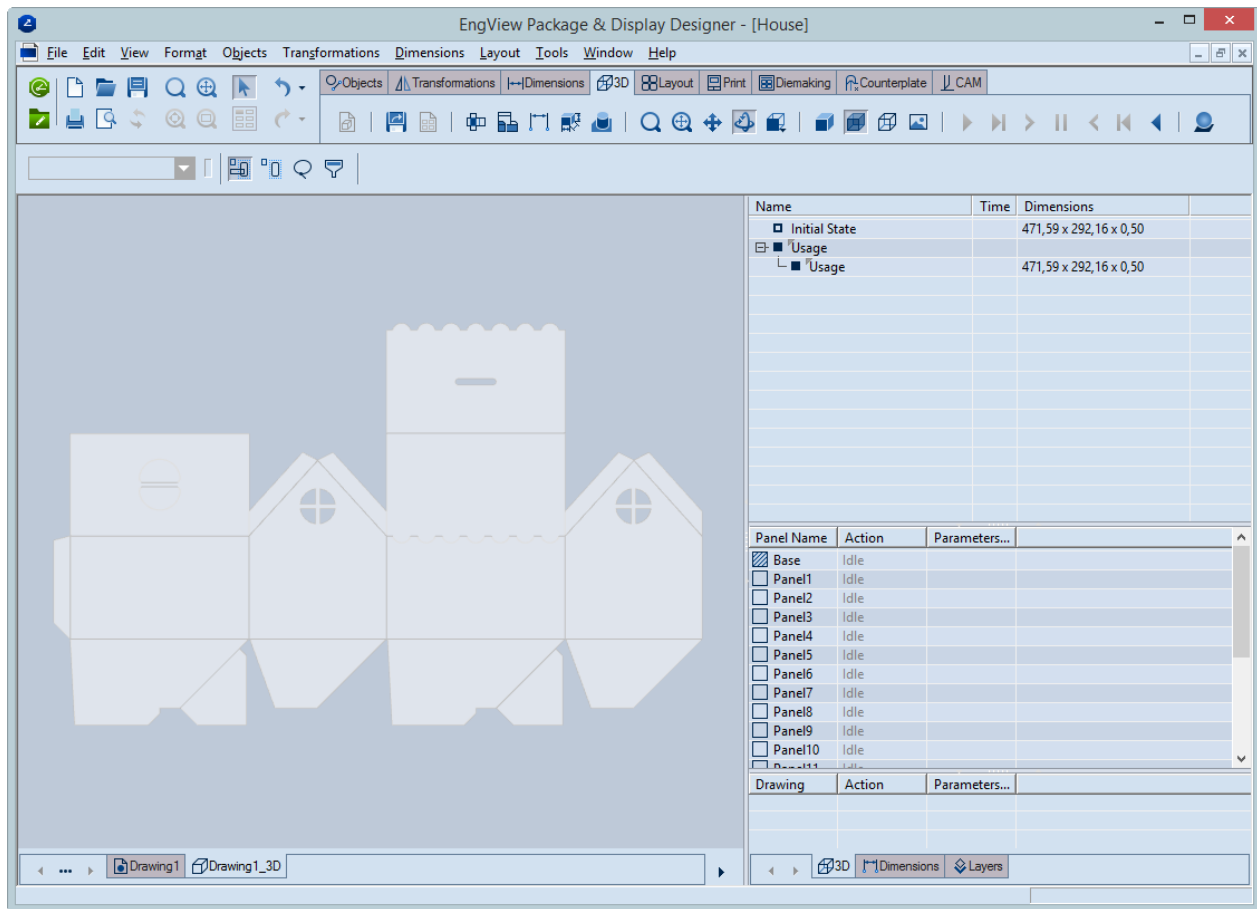
Now it's easier and faster if we delete this step, and start over.

3. To delete the step, click the Plus Sign '+' of the Usage phase.

The phase opens and its Step 1 becomes visible.

4. Right-click the step, and then click **Delete step** on the context menu.



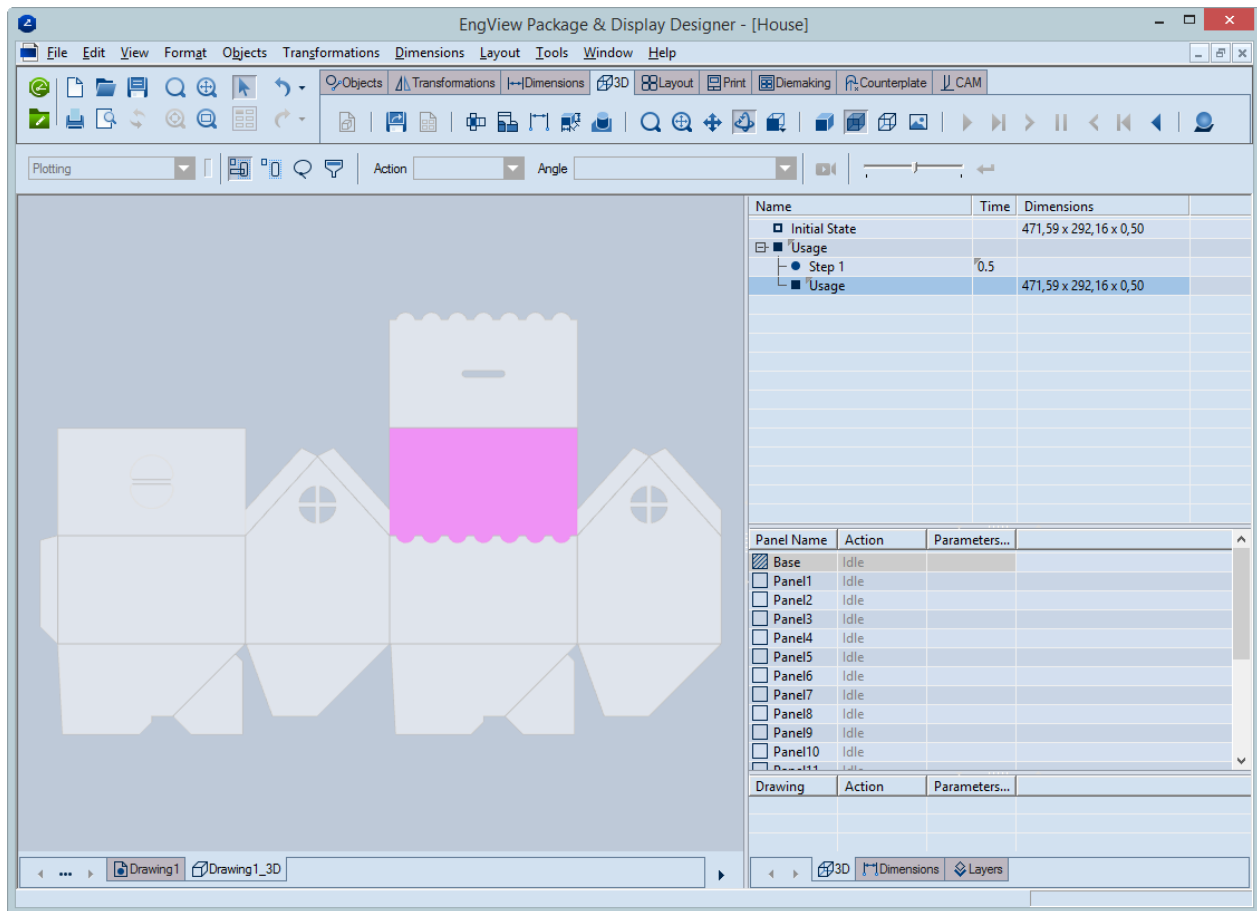


5. Right-click the phase Usage, and then click **Insert step** on the context menu.

Now let us check which panel is the default base.

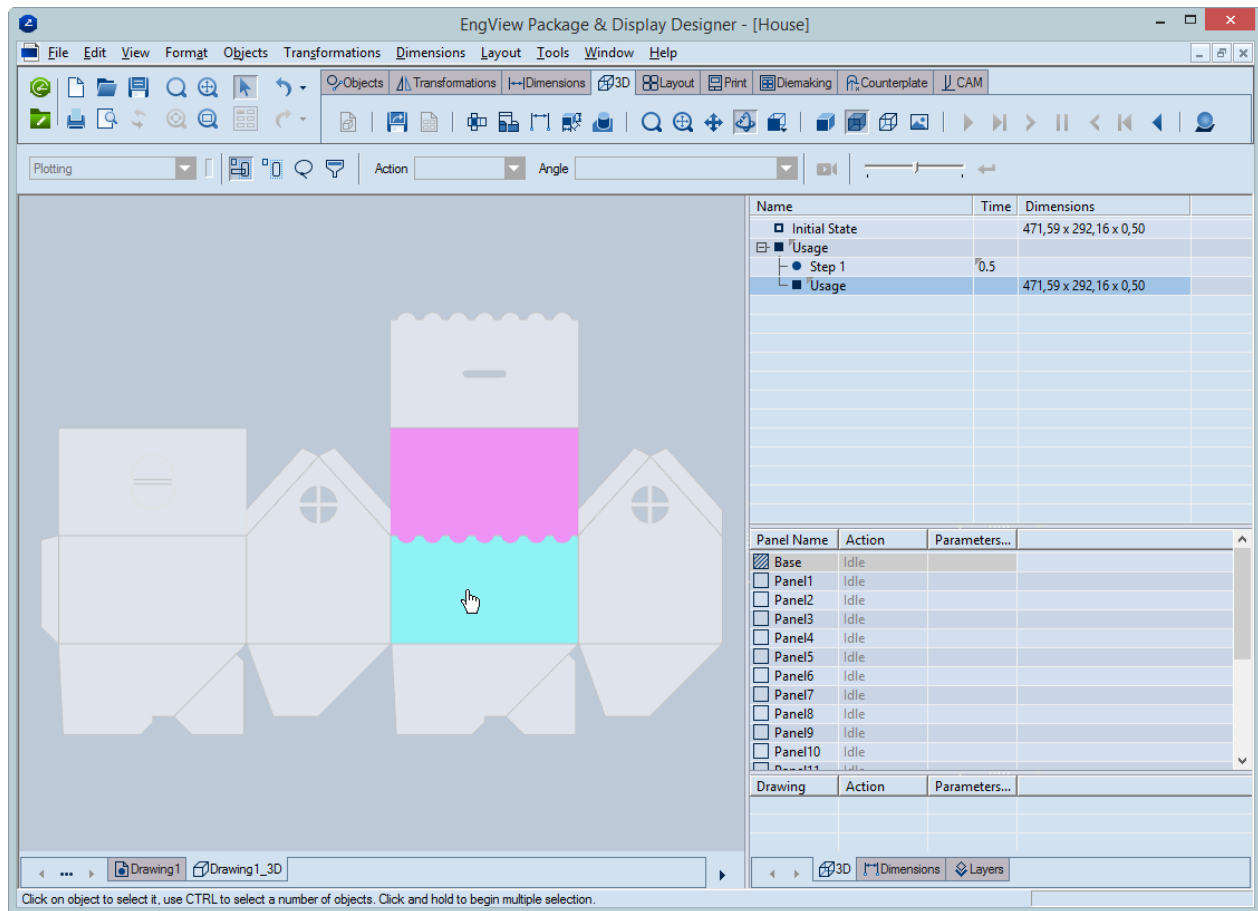
6. In the panels section, click Base.

The base panel is highlighted in the work area.



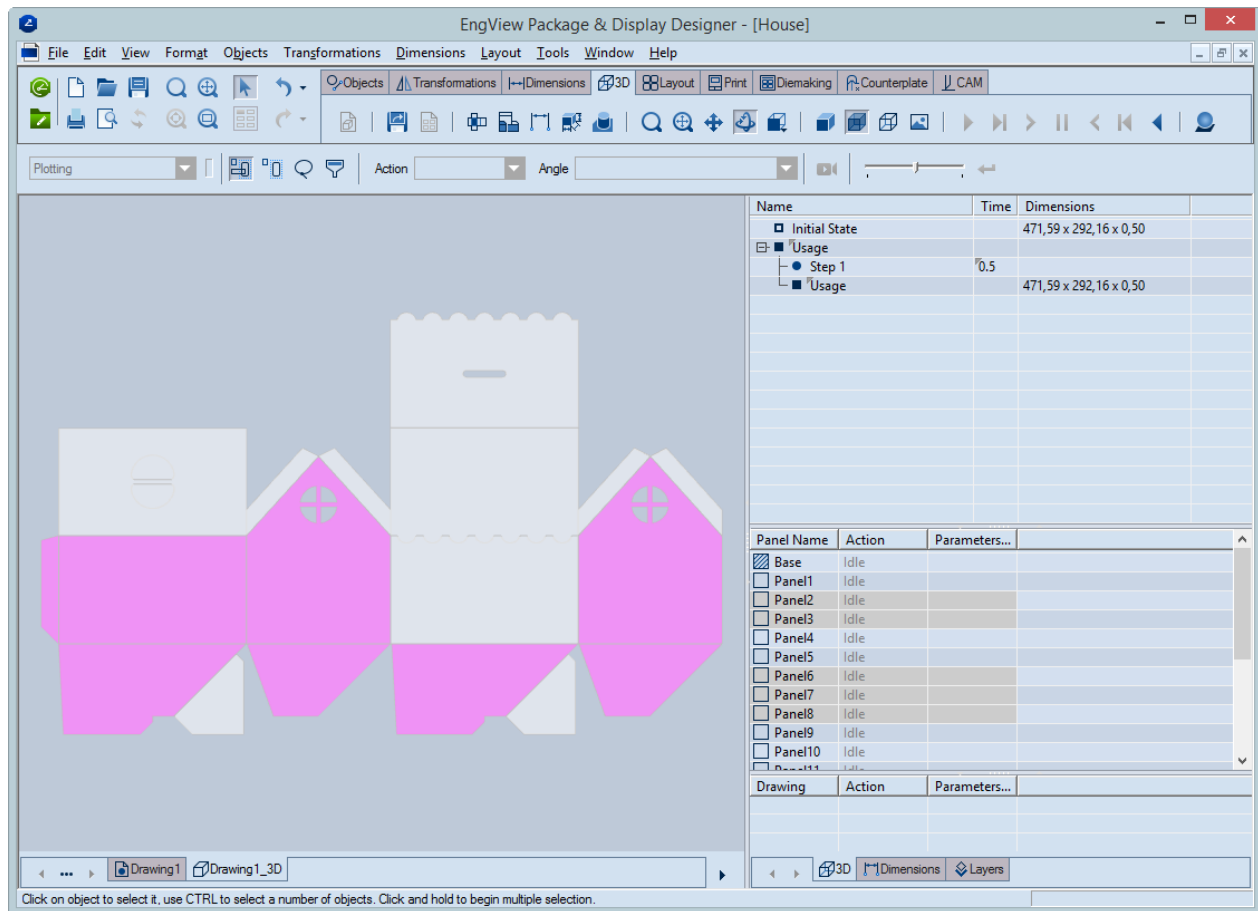
For our purposes, the highlighted panel is not good to serve as base. We will use a different panel as base.

- On the **3D** toolbar, click **Set Base Panel** , and then click the new panel (pictured).



Now we have a new base panel.



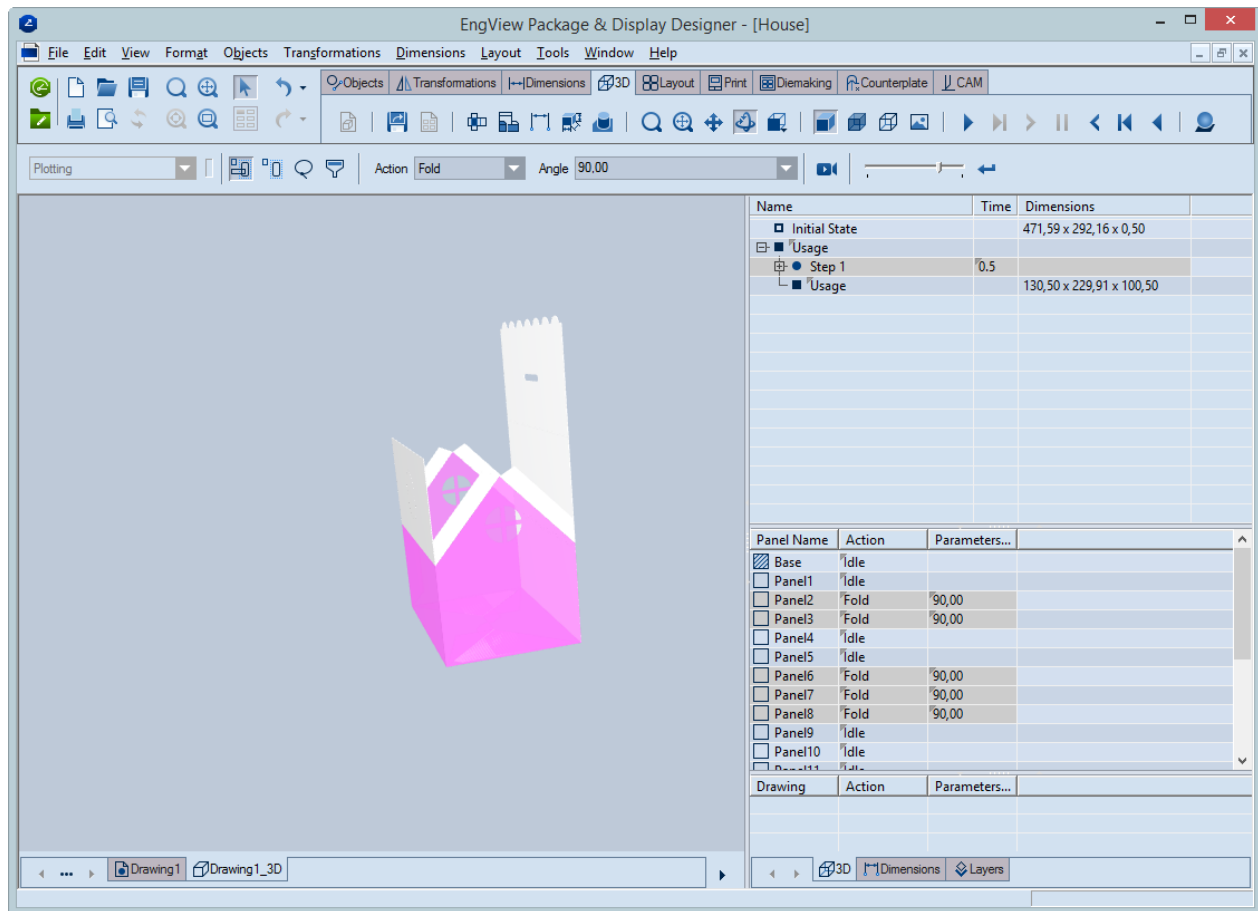


NOTE: For an action to be created, a step needs to be selected in which this action should be placed.

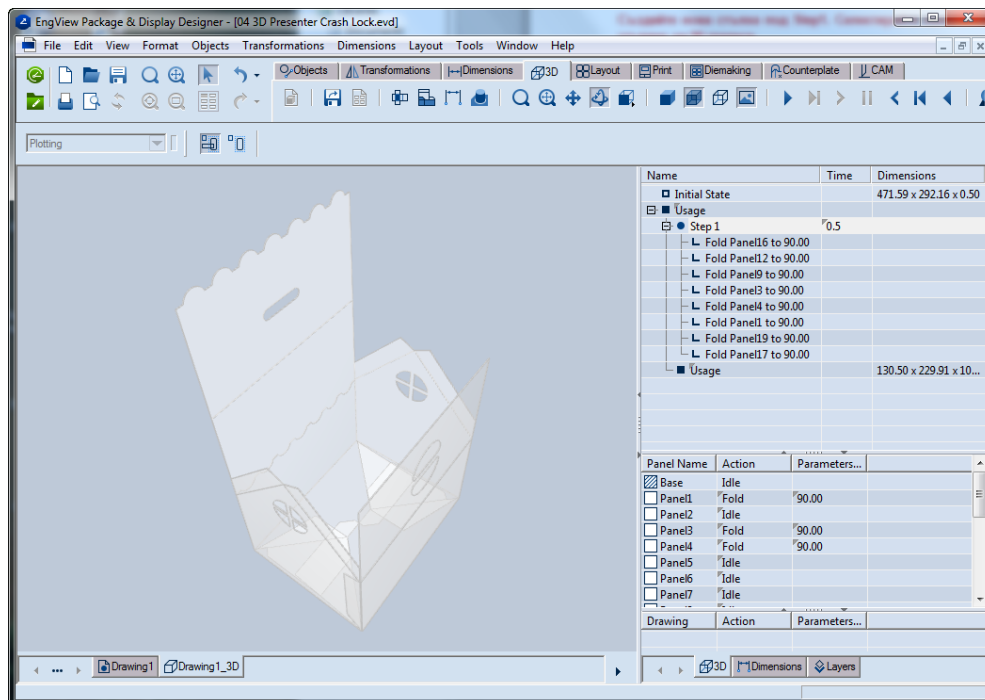
1. Click Step 1.

A contextual edit bar appears.

2. On the contextual edit bar, in **Action** choose the **Fold** option. Then in **Angle** type 90.



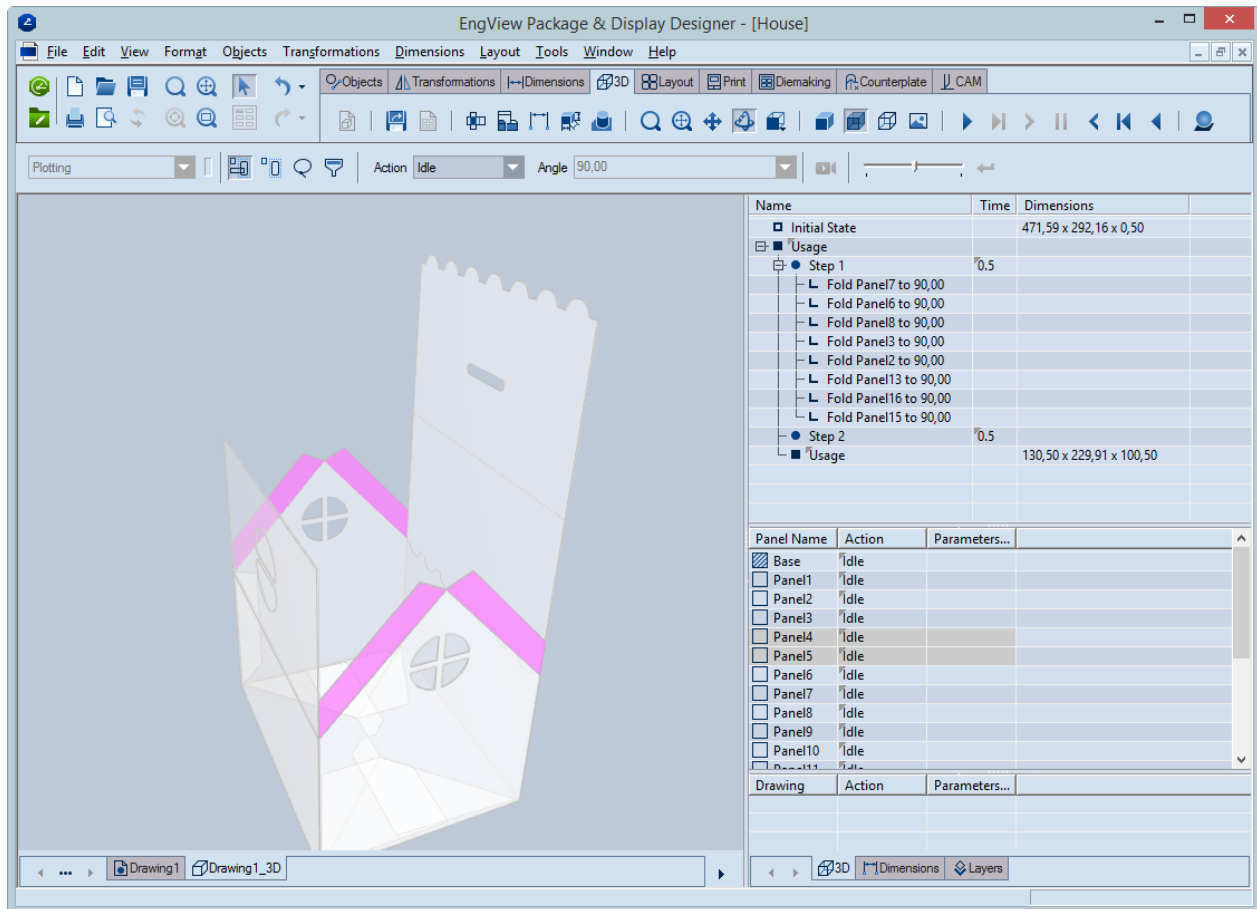
See that Step 1 now has actions in it.



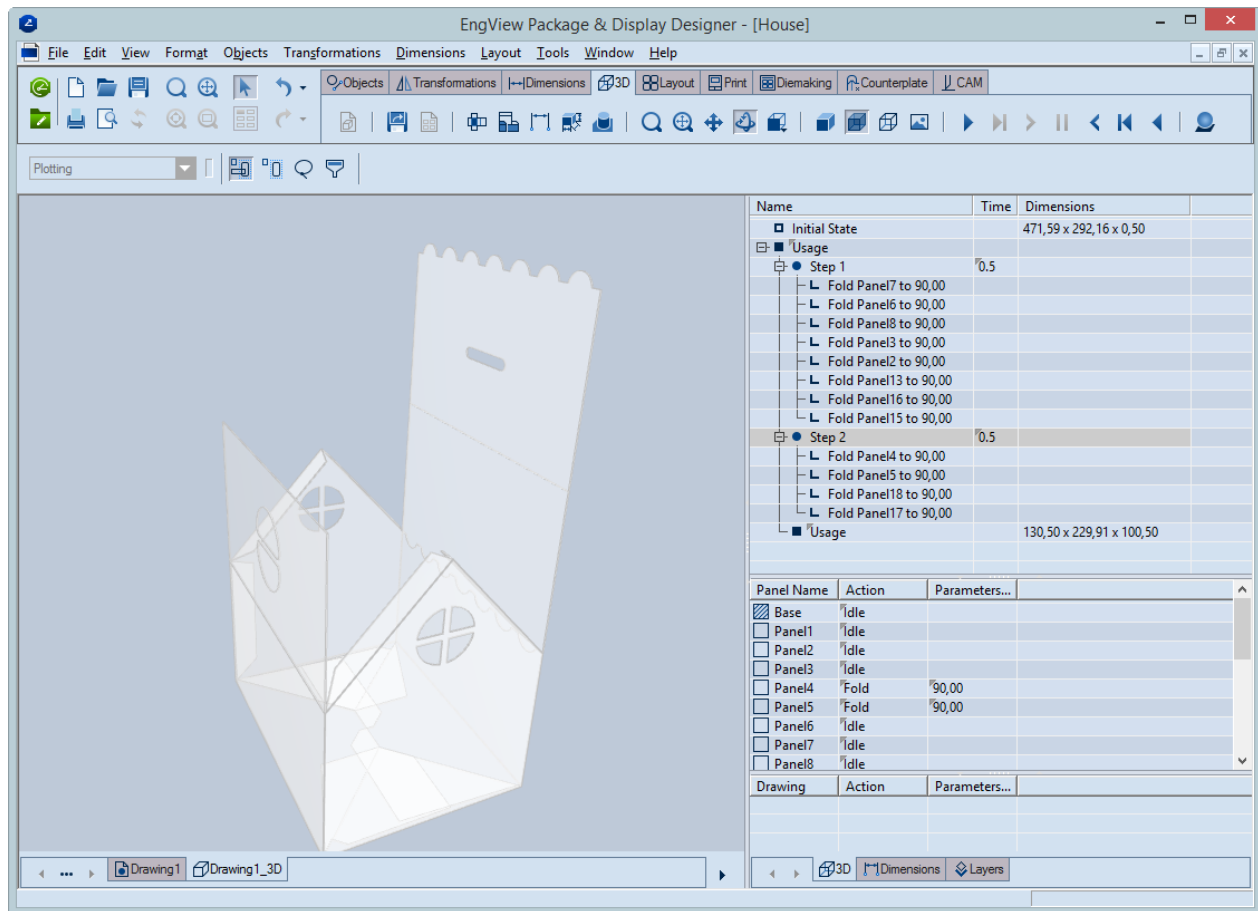
3. Click in an empty space in the work area to cancel the selection of panels.

We proceed by making another step under Step 1.

4. Select the panels (pictured), and then set for them a 90 degree folding.

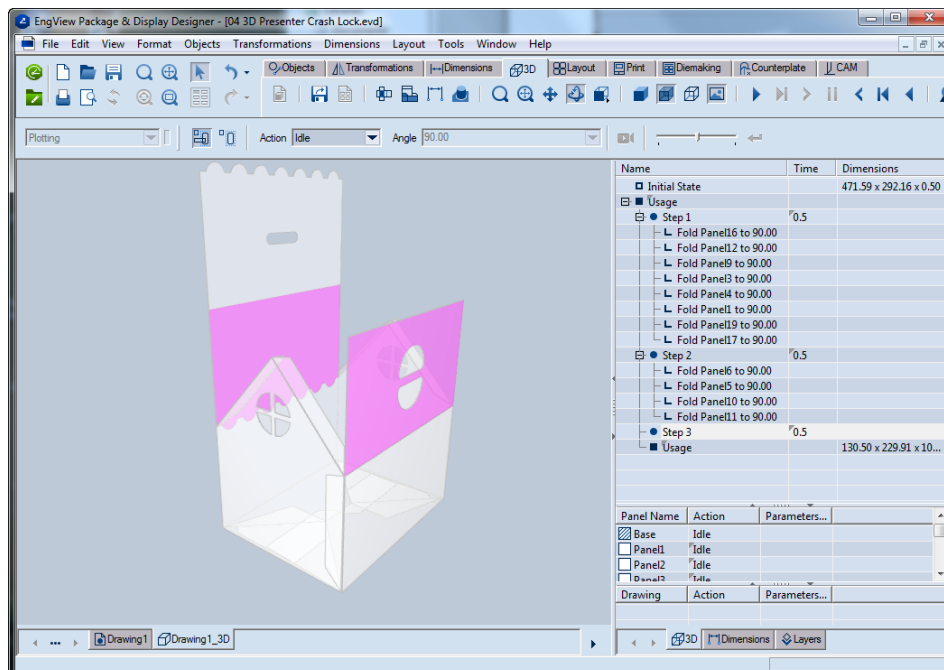


After we set the folding, the actions have gone to Step 2.



We proceed by creating a new step, which will hold the folding of other panels.

##### 5. Create a new step below Step 2.





## Using a Parameter in the Folding Sequence

Now, the panels we're about to fold are folded at an angle different from 90 degrees.

This angle is directly dependent on the roof's width and height. Because parameters were used when the structure was being made, the angle can be easily calculated.

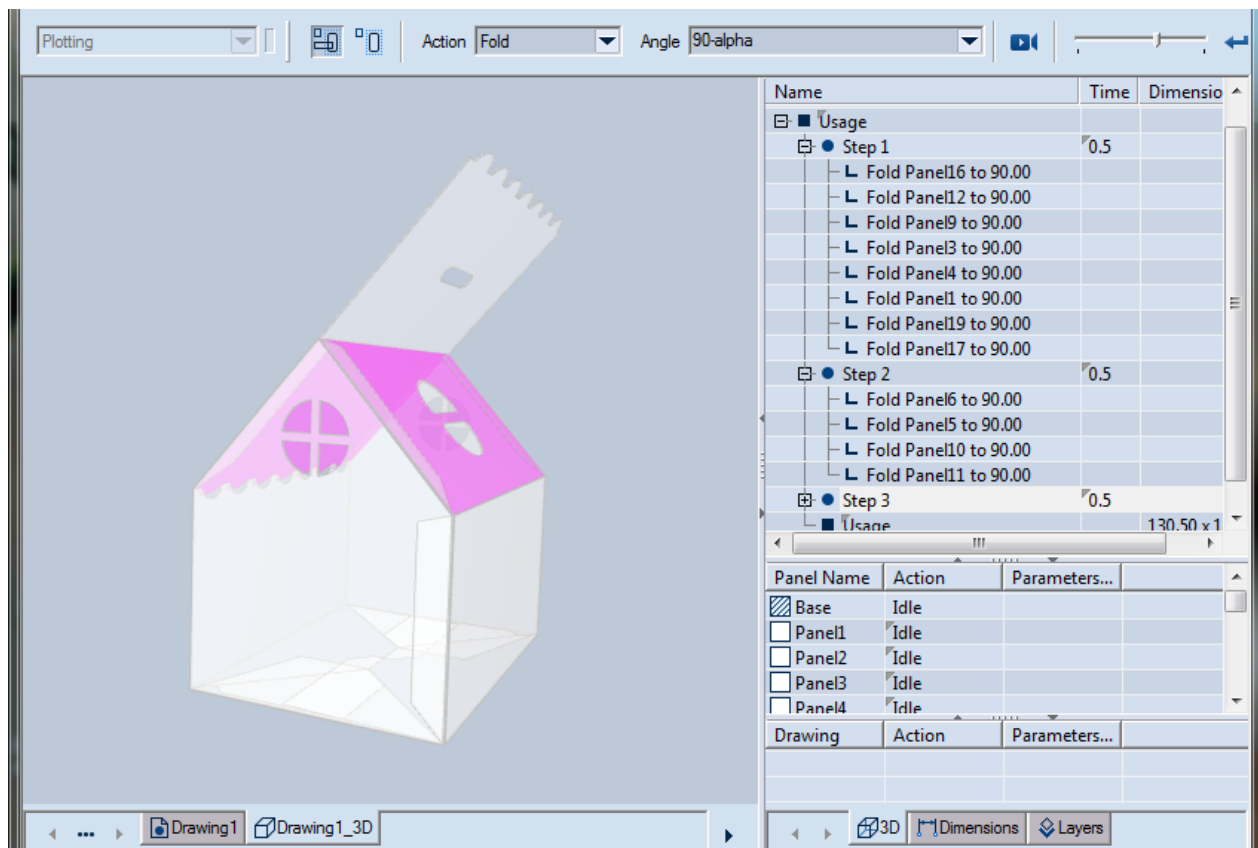
6. Go to the structure's 2D drawing, and then, in the tabular area, click the **Parameters** tab.

The structure's width is linked to the parameter B; the height of the roof, to the parameter TFH. It is these two parameters that are used in calculating the parameter alpha.

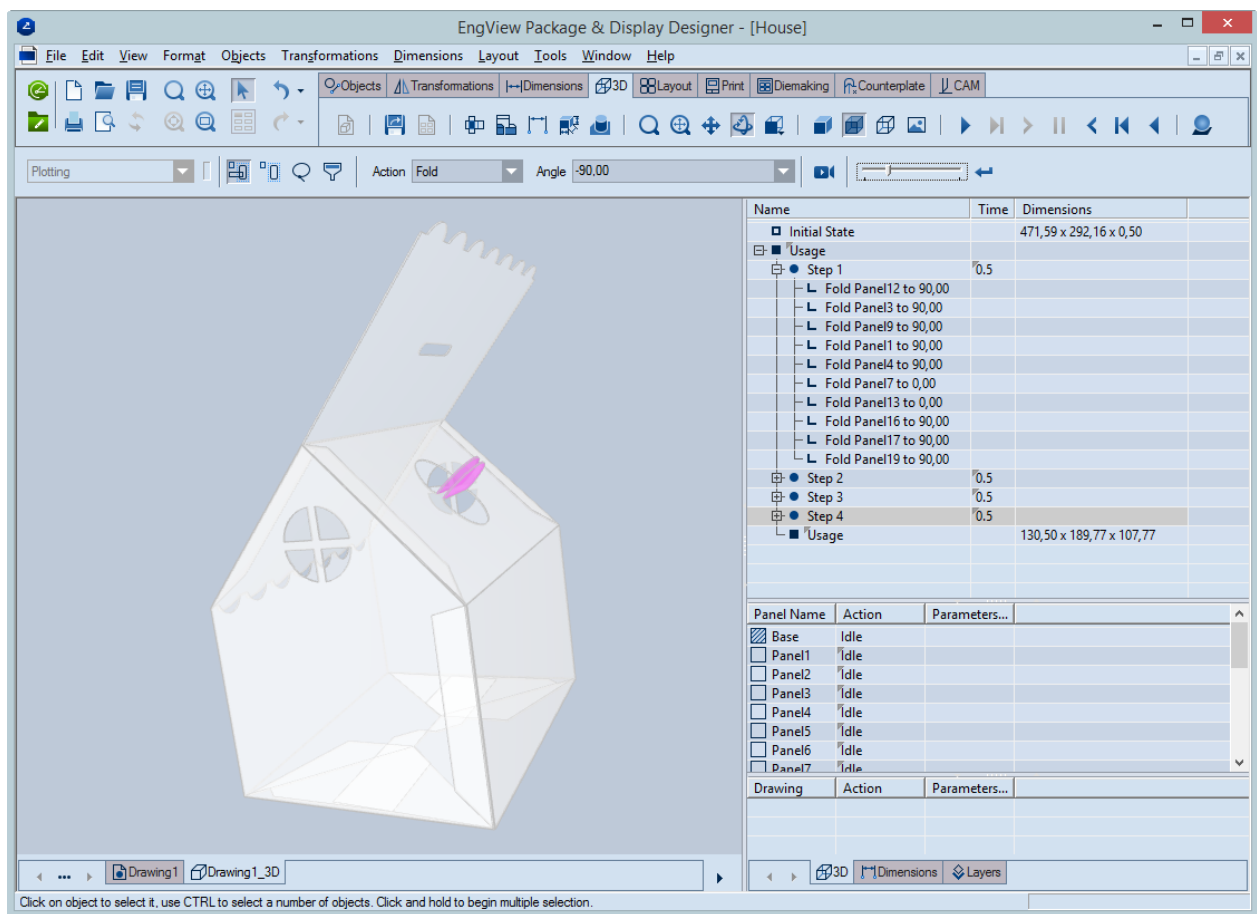
The parameter alpha will recalculate each time any of the values of B or TFH changes. That is why if we use the parameter alpha in the structure's folding sequence, the panels selected in the above picture will always fold correctly.

7. Go back to the 3D drawing.

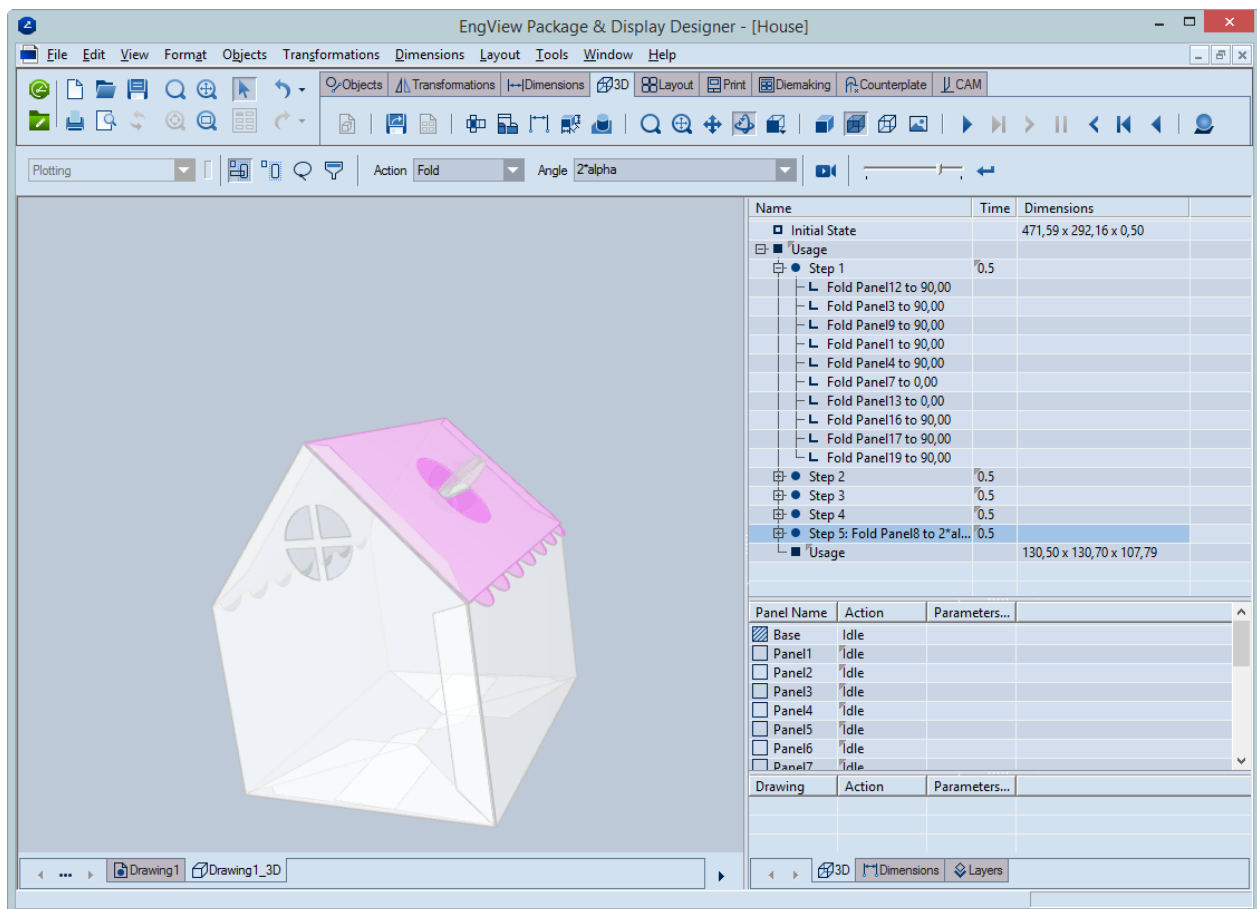
8. Ensure that the two panels are selected, in the tabular area click Step 3, and in the contextual edit bar, in Angle type 90-alpha (pictured).



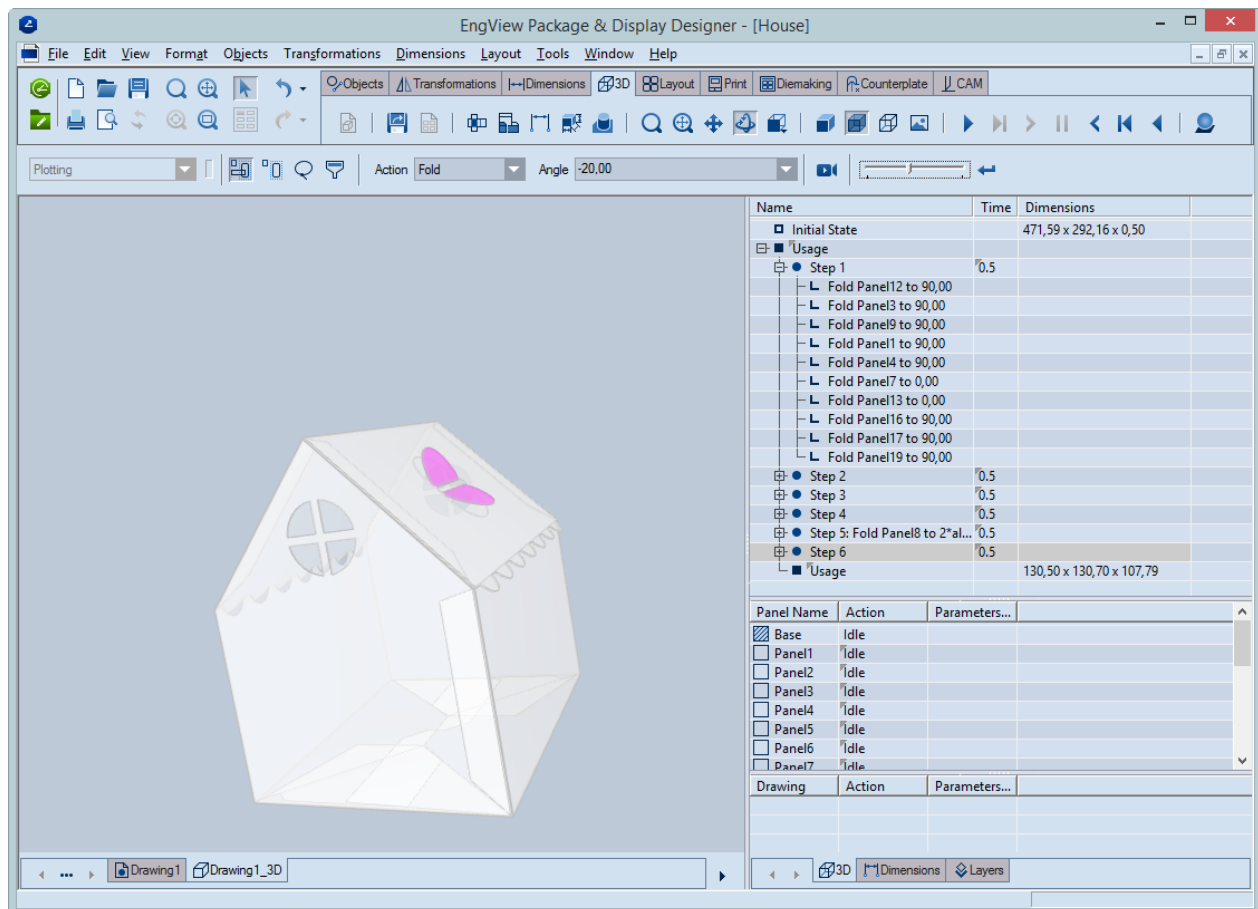
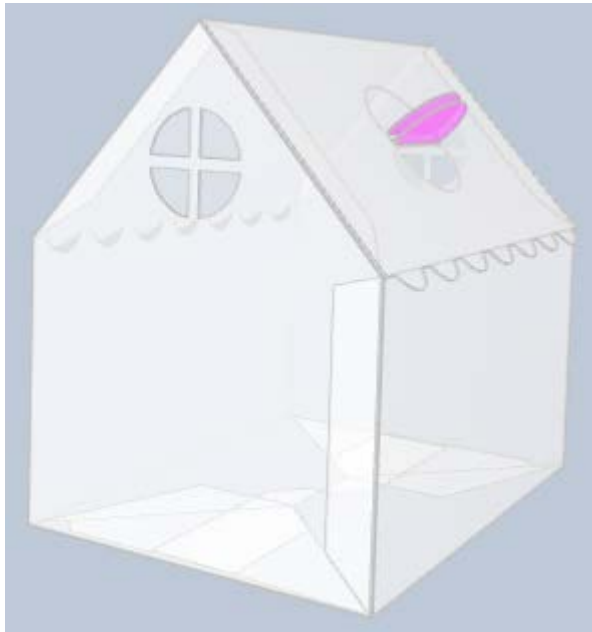
9. Create a new step below Step 3; then fold the panels (pictured) at minus 90 degrees.



10. Create a new step below Step 4, and then fold the panel (pictured) at an angle  $2 \cdot \alpha$  (pictured).



11. Create a new step below Step 5.
12. Select the tongues that we folded at minus 90 degrees (pictured), and then, in Step 6, set for them a new folding – at minus 20 degrees.




To recap:

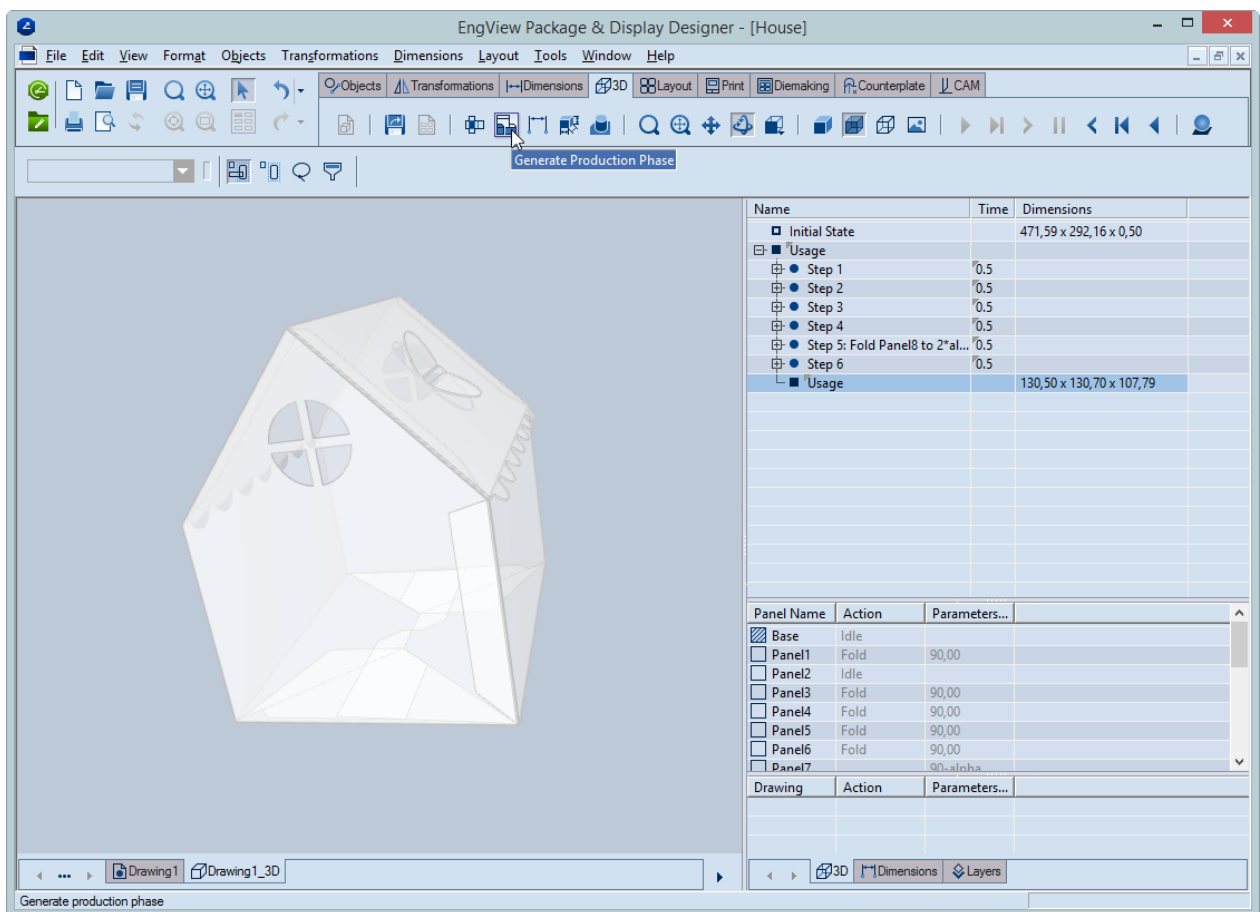
- Using parameters makes the 3D model respond correctly to changes in the 2D drawing. The only thing we need to do is manually click **Refresh**. In our case we used the parameter alpha, which controls the folding of panels in the top.
- The same panel can have actions in different steps. In our case these were the tiny panels of the locking system.

## Creating a Production Phase in the 3D Model

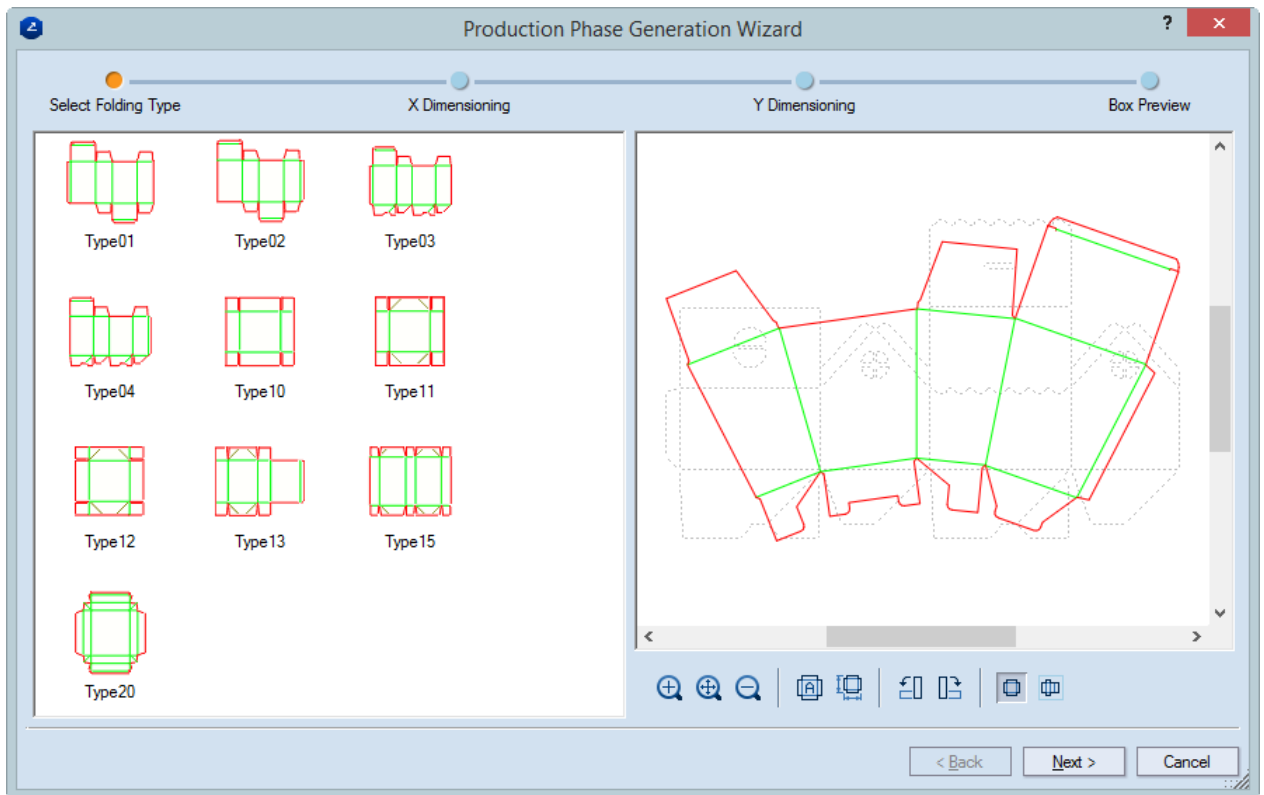
In production phase you define the folding sequence of a box on a gluing machine.

A production phase is generated by means of a wizard, which offers templates for how a box should fold.

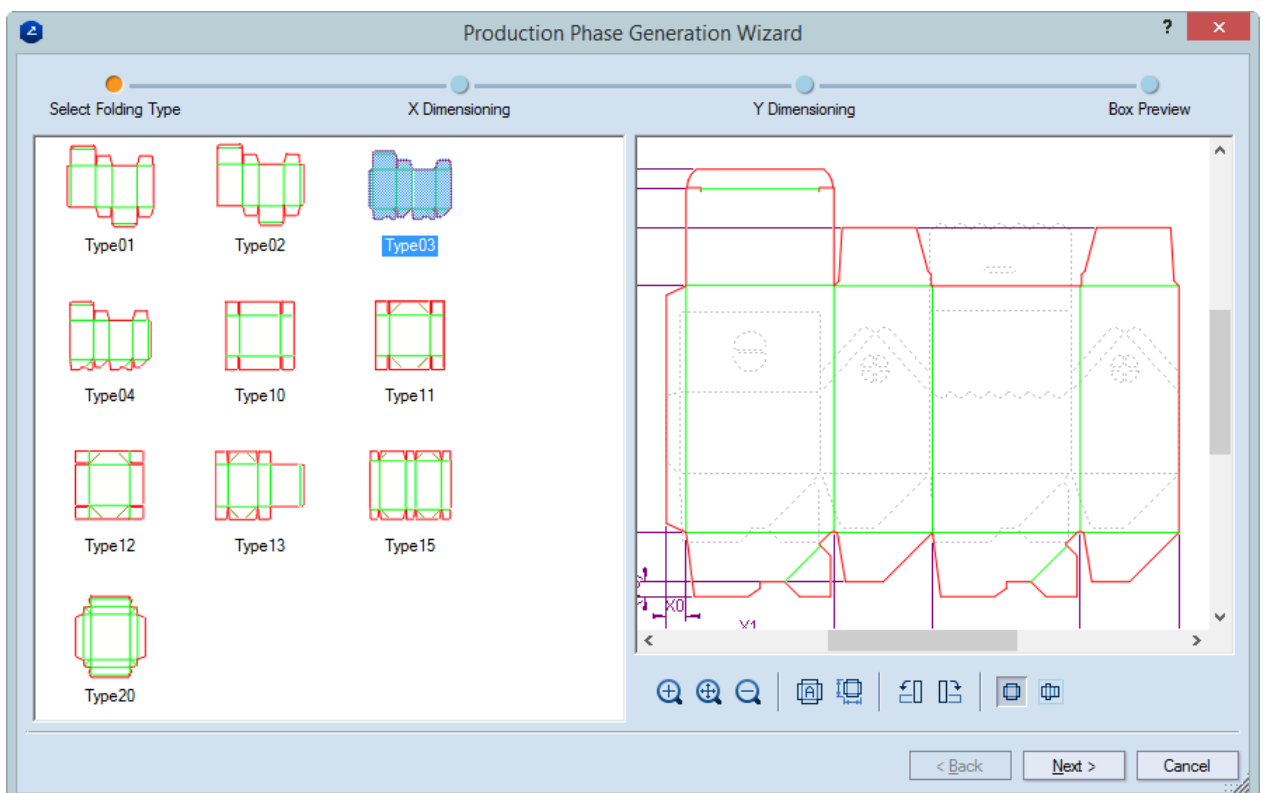
1. To create the production phase, click **Generate Production Phase** .



2. The **Production Phase Generation Wizard** opens. Its left-hand pane presents the standard folding box types. In the right-hand pane we will see a preview of the selected folding box type. As background you see the design.




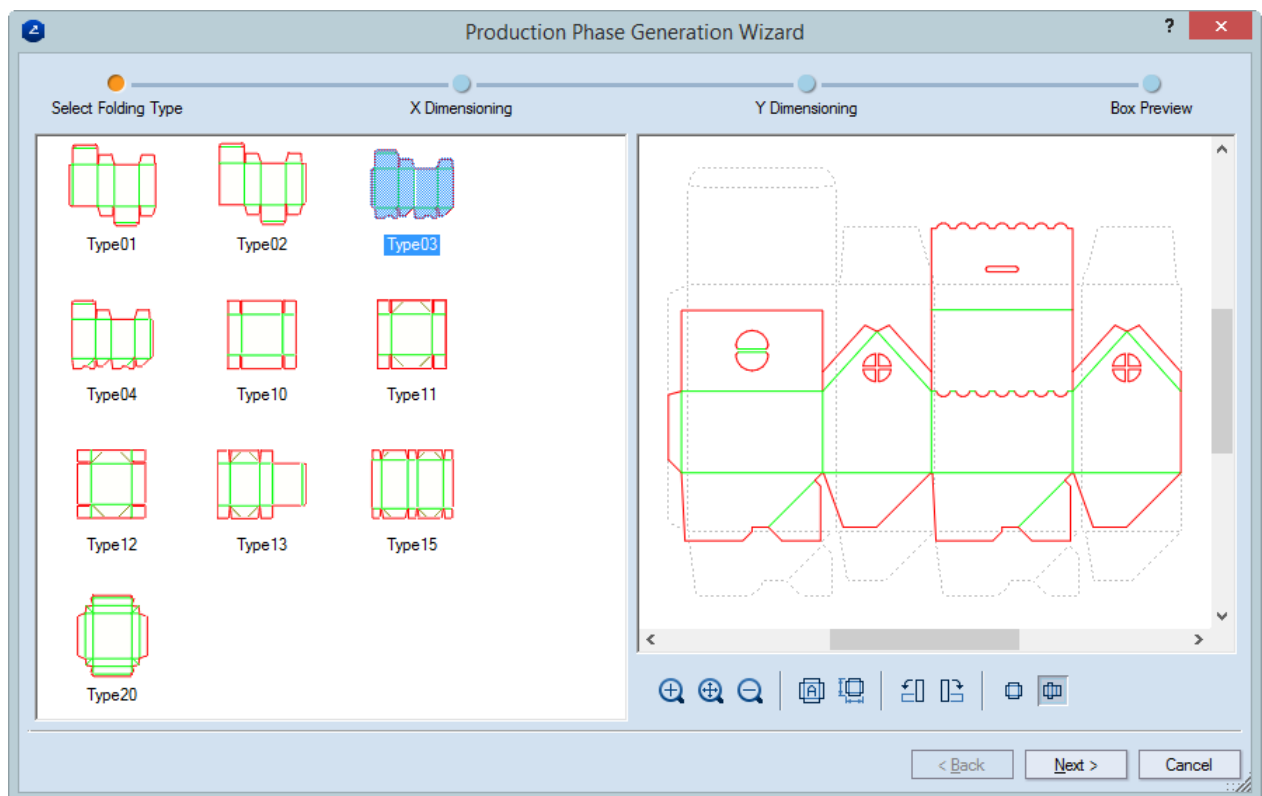
2. We can use the **Automatically choose the correct type** button  to define the type of the structure.



NOTE: The box type definition can be done also manually – by clicking the respective type in the left pane.

Pay attention to:

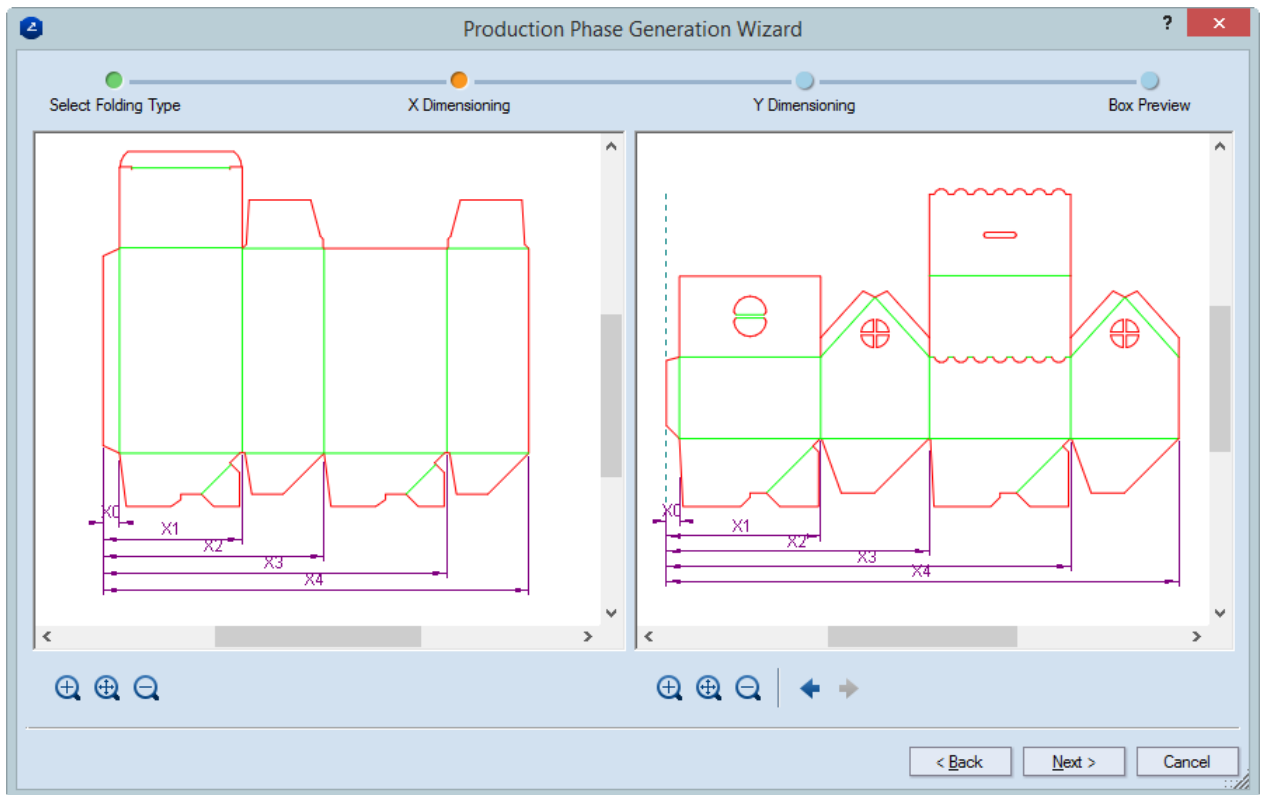
- The top and bottom flaps.
  - The position of the glue flaps: these should match those of the design.
  - The number of the crease lines.
3. To switch between the preview of the selected folding box type and your design, click **Show Design** . You will see the design in color. As background, the selected folding box type appears as a grey contour.



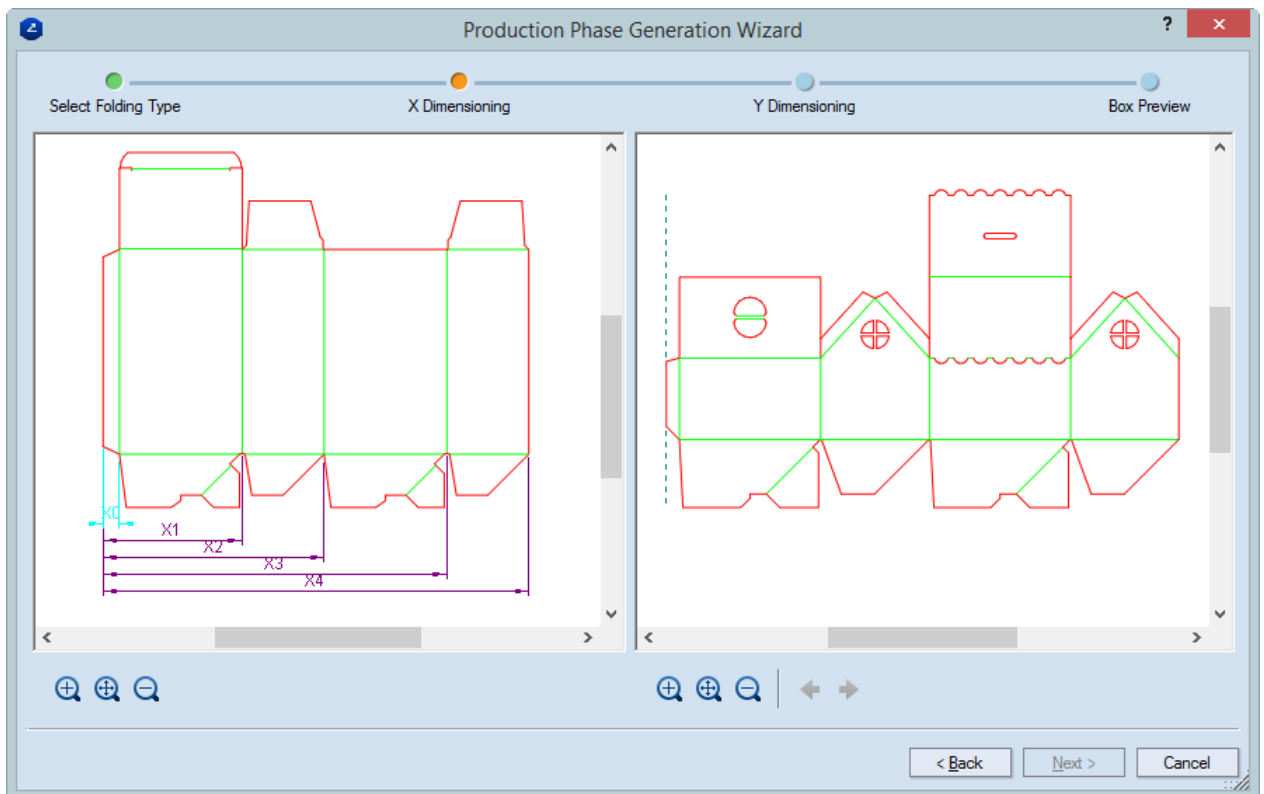
4. Click **Next**.

The **Production Phase Generation Wizard** opens at the *X Dimensioning* step.

Note that because during the definition of the box type, we used the automatic recognition, on this step the program has automatically detected the folding spots.



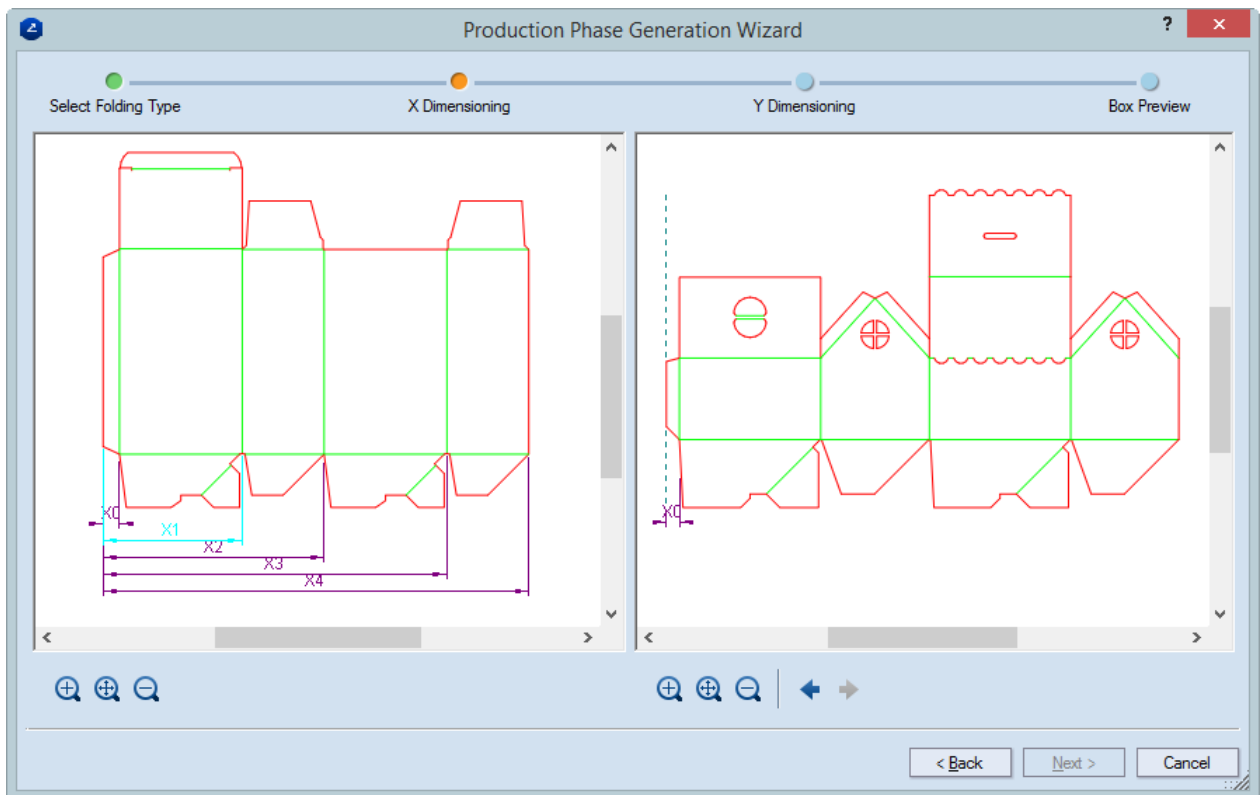
NOTE: If we will choose the type manually, we need to define the folding spots here.



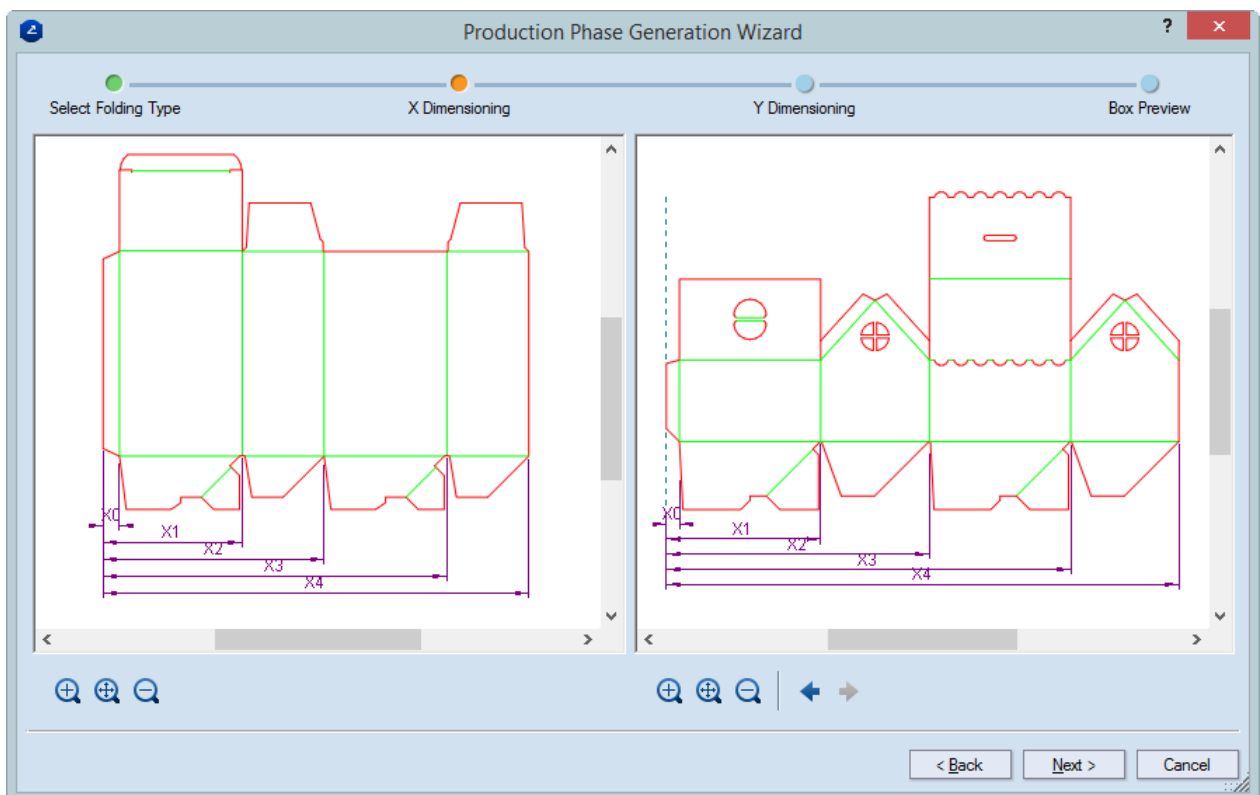
The dimension to be specified is highlighted in the left-hand pane.



5. To define how the glue flap will be created, click the crease line of the glue flap.

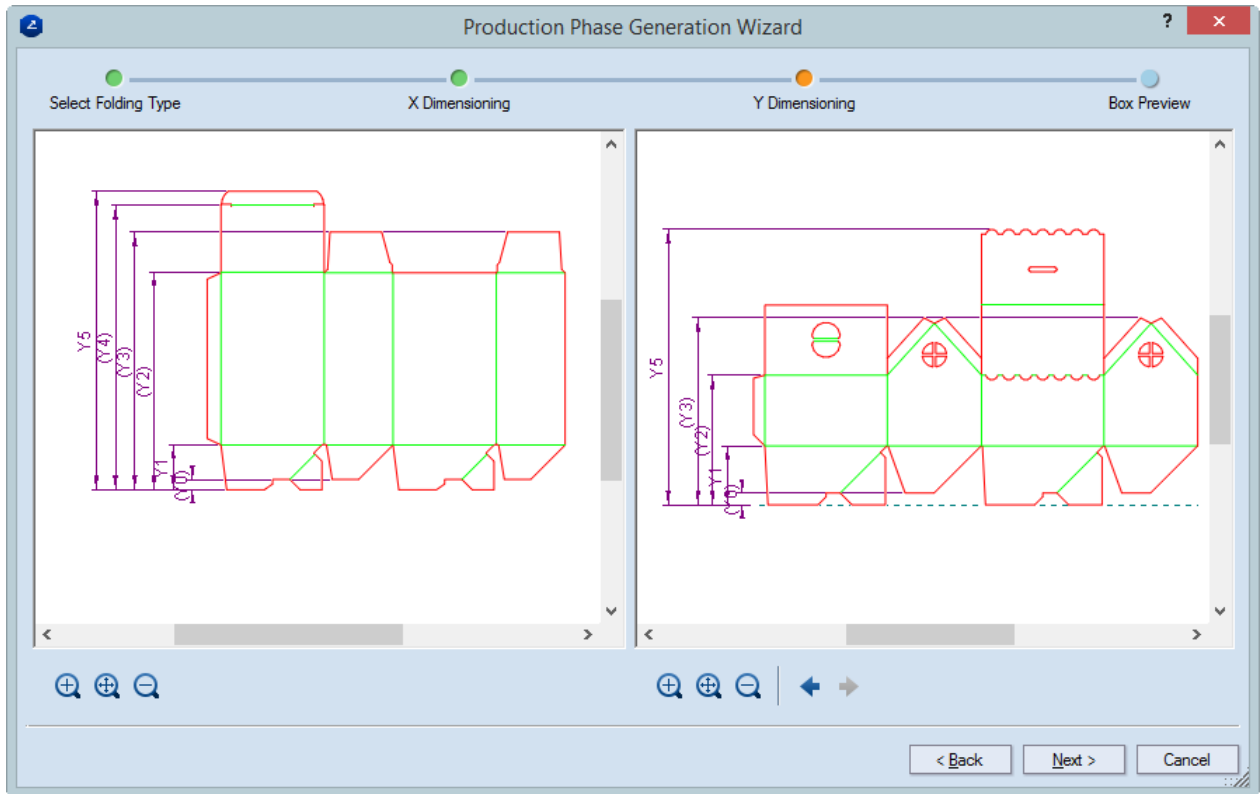


6. Define the rest of the X dimensions by clicking each vertical crease line.



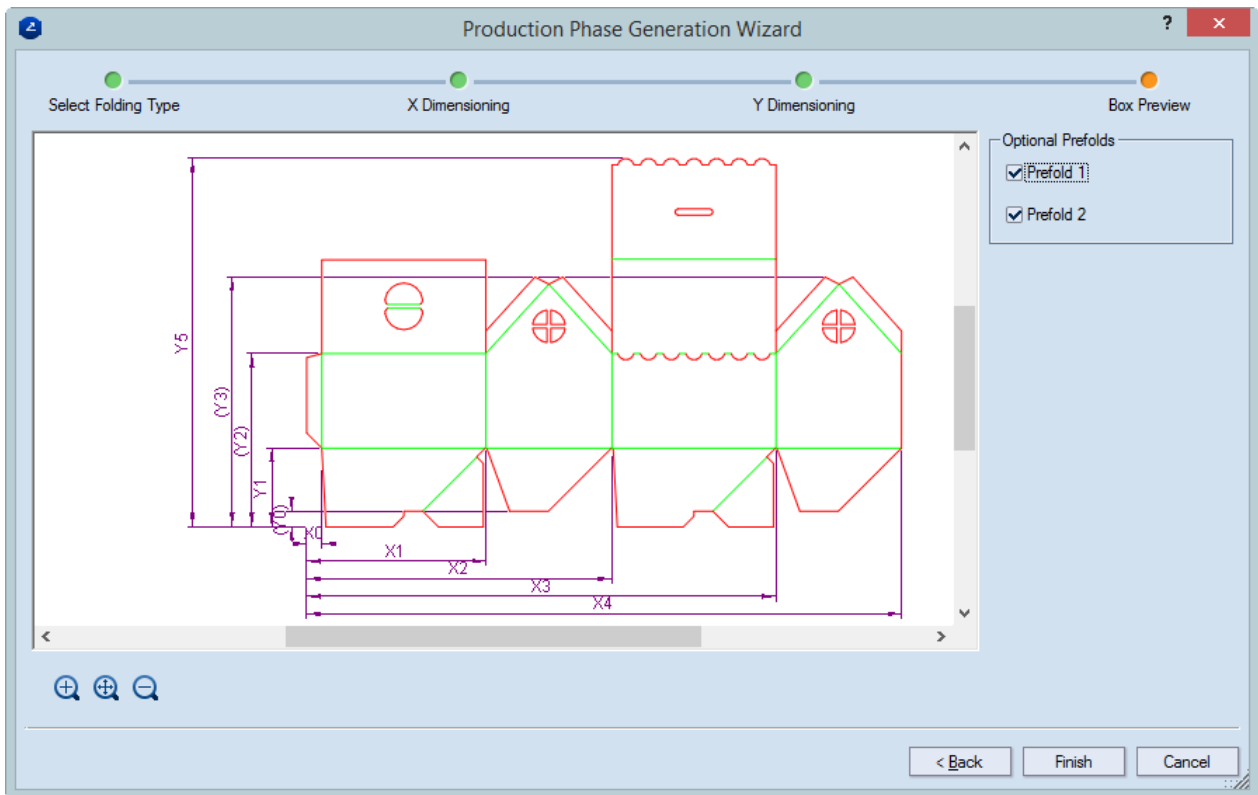
7. Click **Next**.

The *Y Dimensioning* step appears, in which the program has recognized the spots needed for animating the production process.



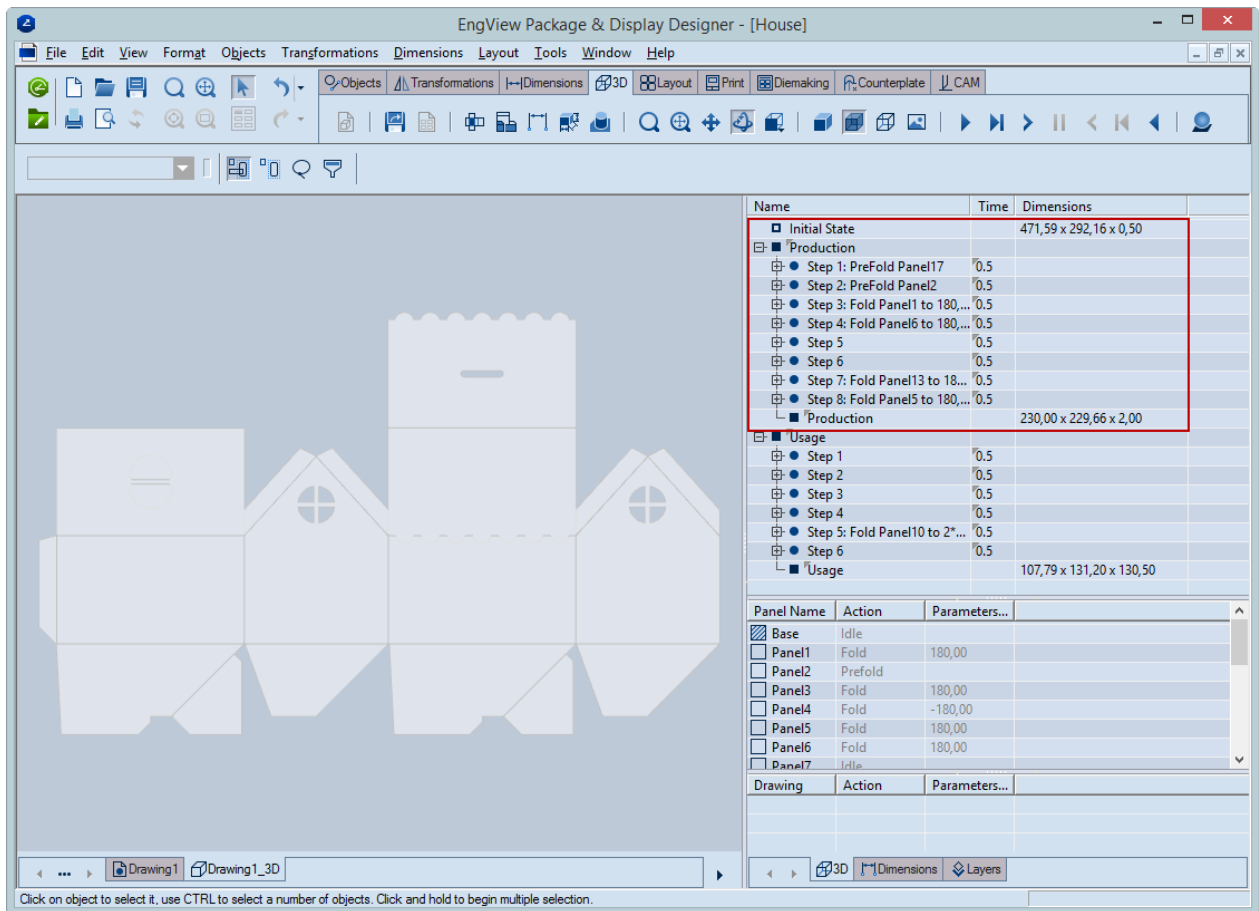
NOTE: If we have manually selected the type also in this step, we must also manually indicate the necessary spots. The dimensions in brackets are optional (Y0, Y2, and Y3). To skip them, we can click **Skip** ➡.

8. Press **Next**, which takes us to the *Box Preview* step. Here you can define whether or not you need a prefold. By using prefold a flap is mechanically folded and unfolded again so that better crease lines are formed. This is necessary for the box to open more easily when it is being filled (reset forces).



3. Click **Finish**.

This generates the production phase in the folding sequence. A new phase, *Production*, is added in the tabular area between the phases *Initial State* and *Usage*. In the graphical area the design is displayed in its production phase.



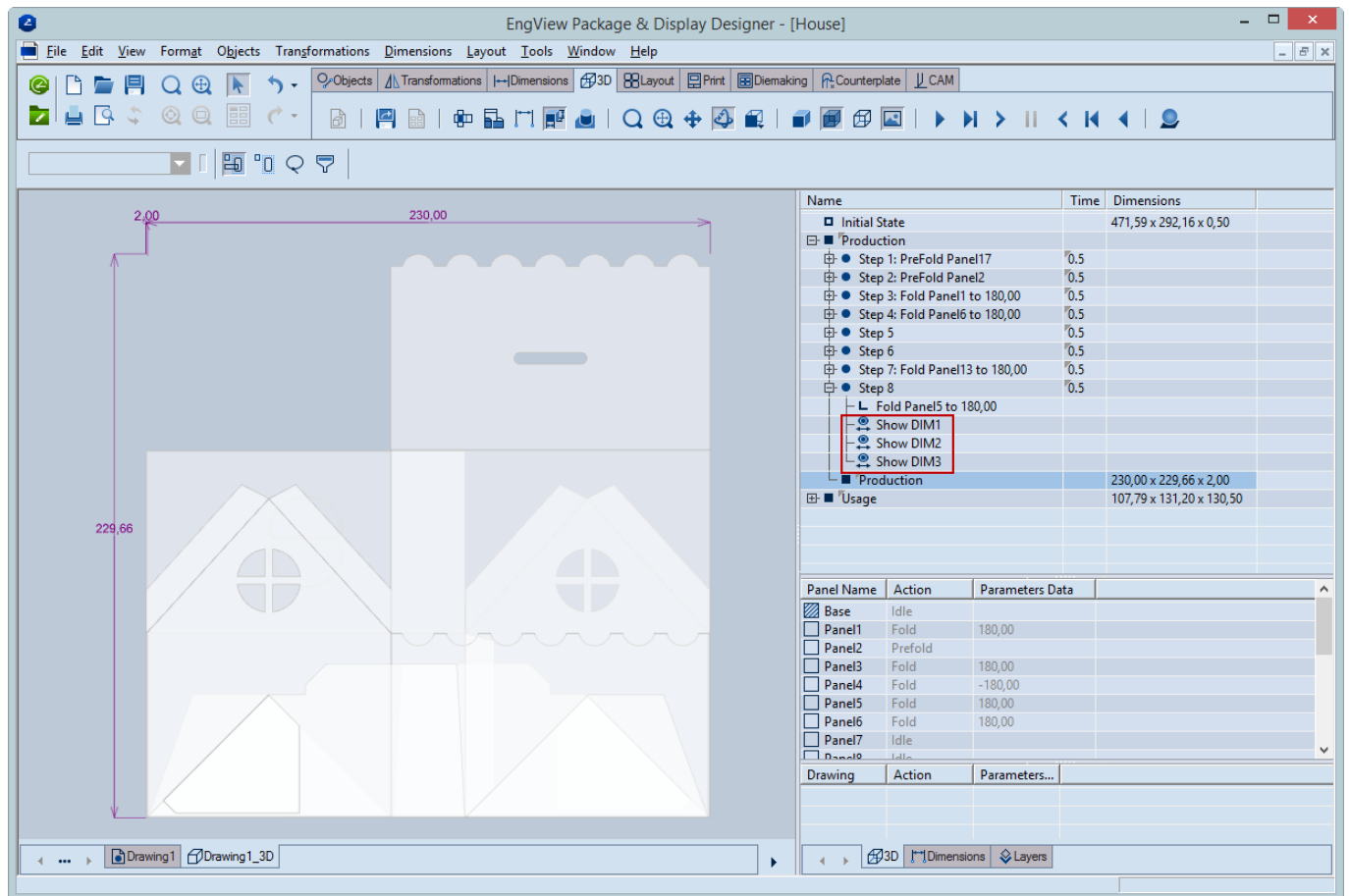
## Adding 3D Dimensions


We will use overall dimensions for each phase of the folding sequence.

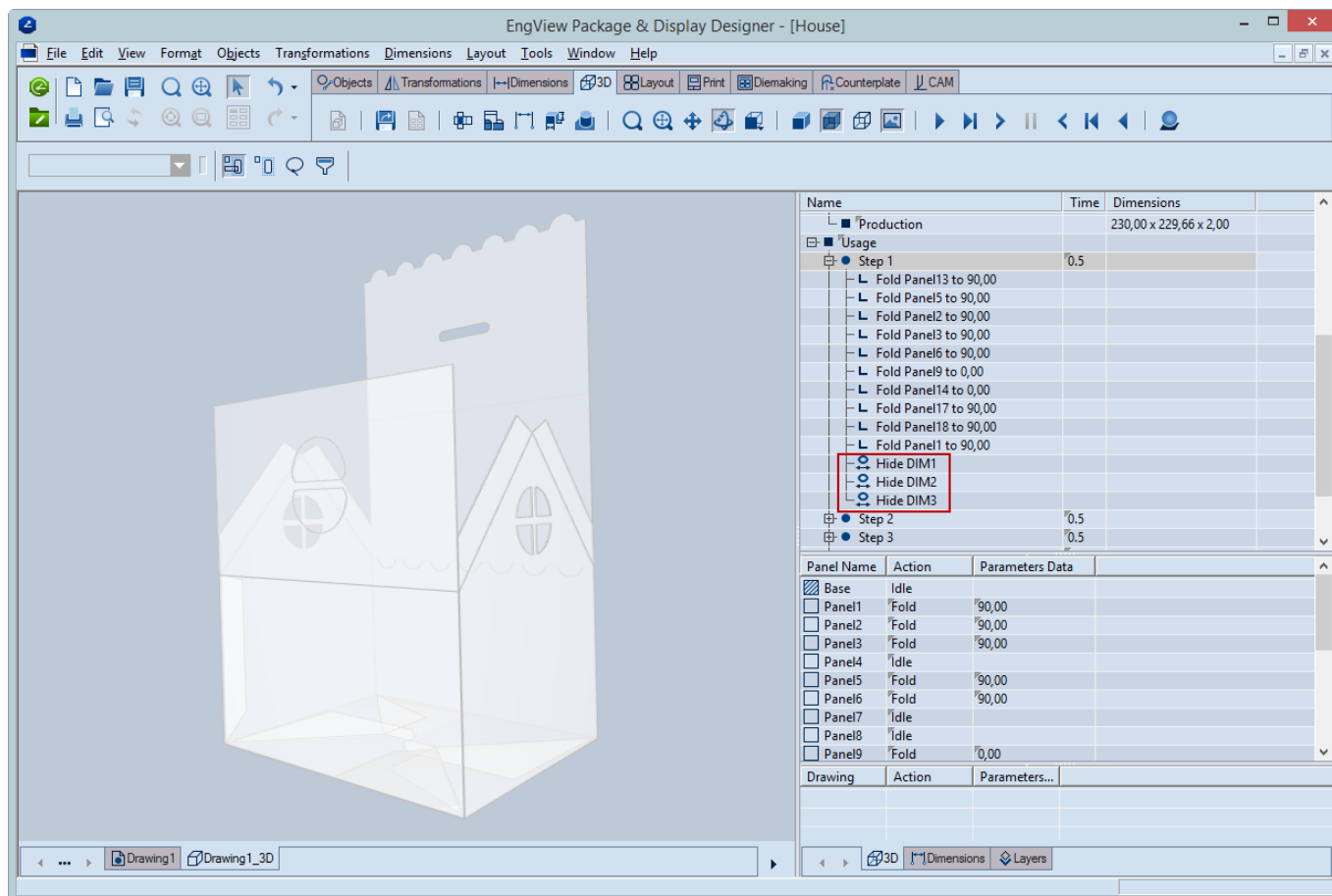
1. Click the end of the **Production** phase.

2. On the 3D toolbar, click **3D Overall Dimension** .

The actions for the overall dimensions appear in the last step the **Production** phase.



If we do not want to see the dimension lines during the animation of the **Usage** phase, in Step 1 of the phase click **3D Overall Dimensions** . This turns off the appearance of dimensions and creates HIDE actions for the three dimensions.

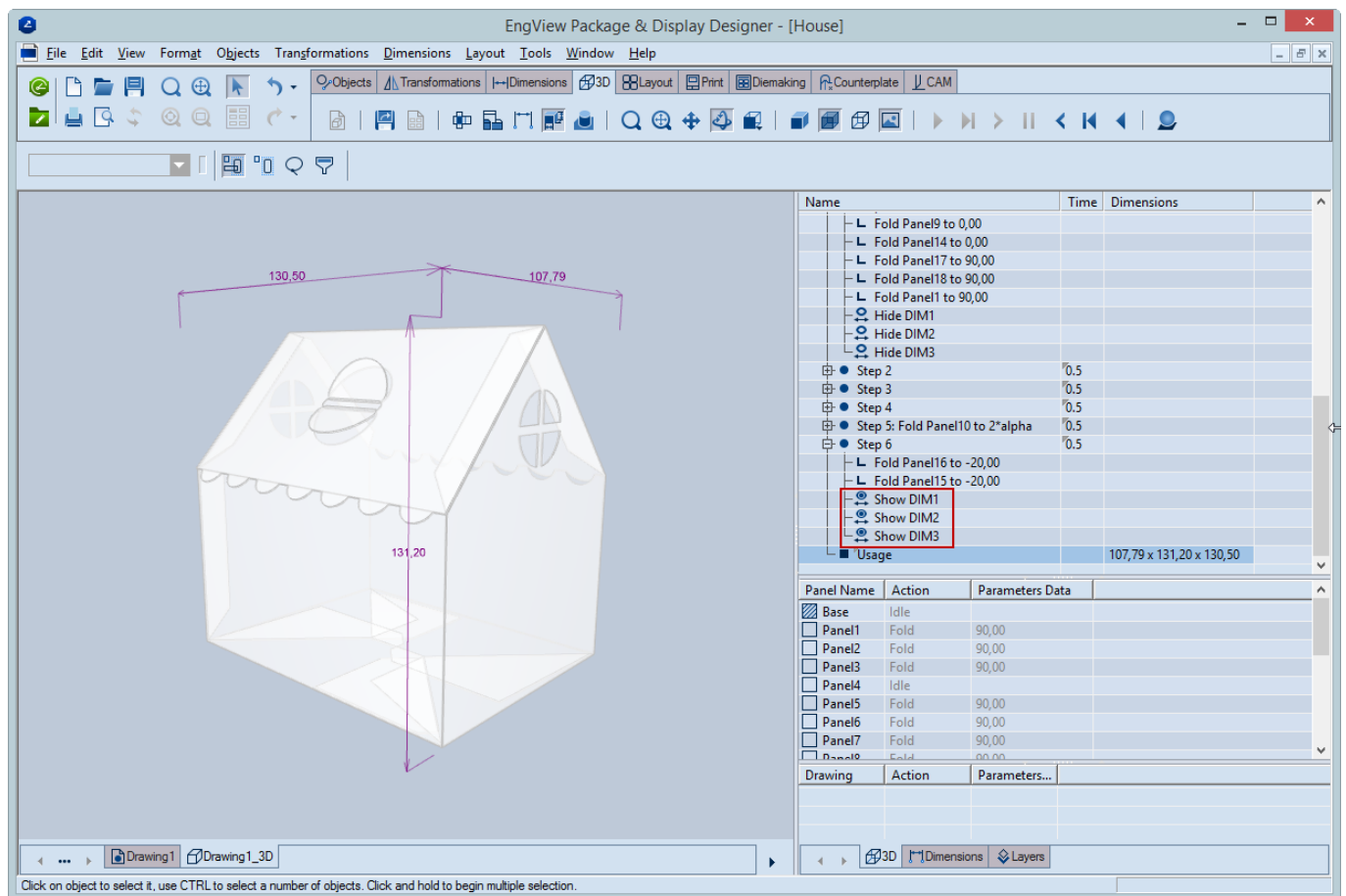


Now we'll show the dimensions again – when the box is in its end state.

3. Click the end of the **Usage** phase.


4. Click **3D Overall Dimensions** .

We see that three actions for showing the overall dimensions have appeared in the last step (Step 6) of the **Usage** phase.



## Adding the Graphic Design

We will conclude the project by adding a graphic design that will make our structure complete.

1. Go to the structure's 2D drawing.
2. On the **Objects** toolbar, click **Quick Image** .
3. In the **Insert Image** dialog box, browse to c:\EngViewWork6\EngView Samples, and then select the file House.jpg.
4. Click **Finish**.

The file is applied onto the 2D design. It fits perfectly because it was created especially for it.

5. To see how the image fits in 3D, go to the 3D drawing.



6. Save the file.