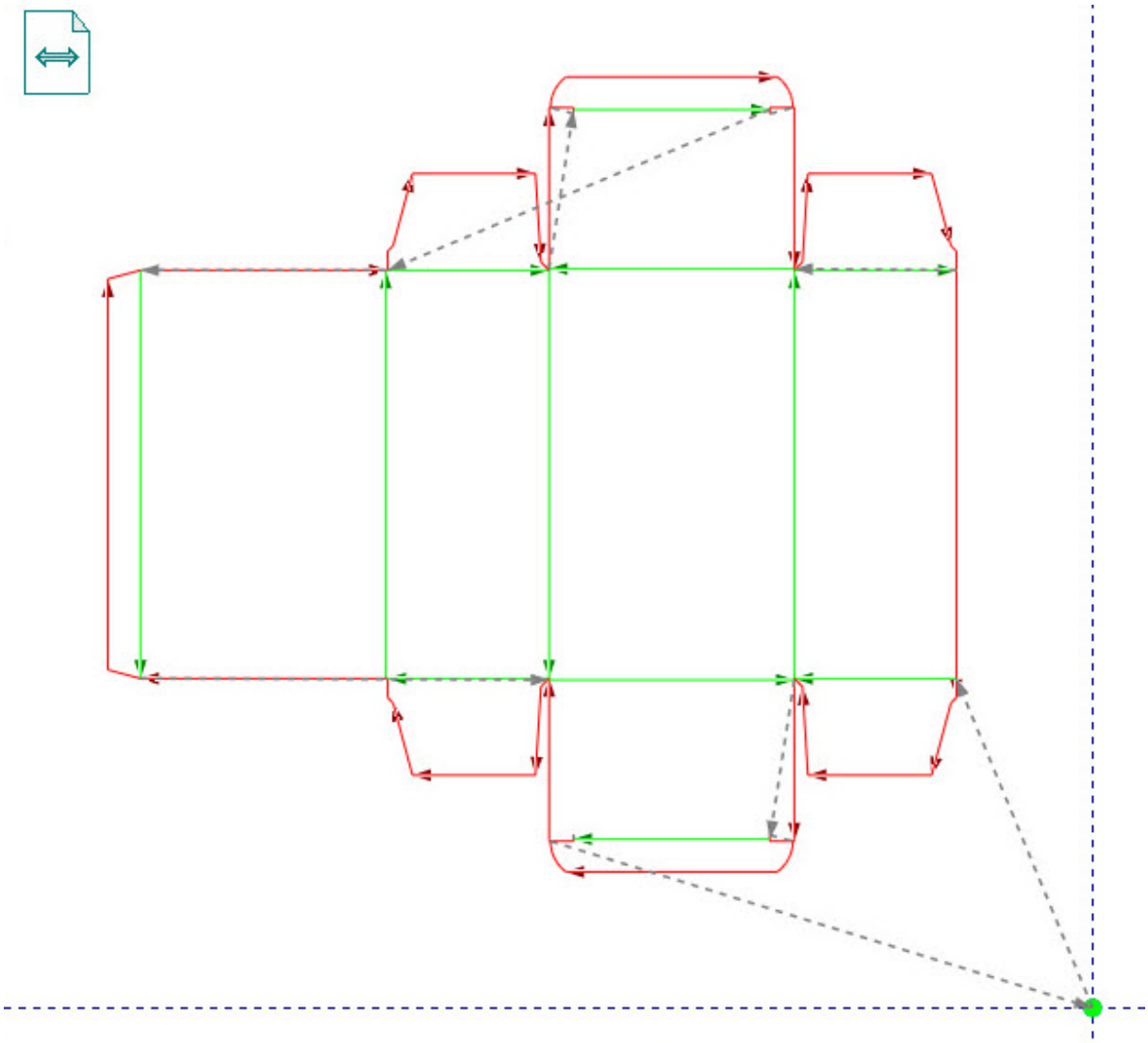
CAM – Cutting Packaging Box; Using Sample Counter

Task

In this exercise we will make a sample packaging that will be cut on a plotter. To do this we will generate a tool path. In the sample, to make the creases more explicit and the folding easier, we will use an underlay tool (sample counter).

Tool path



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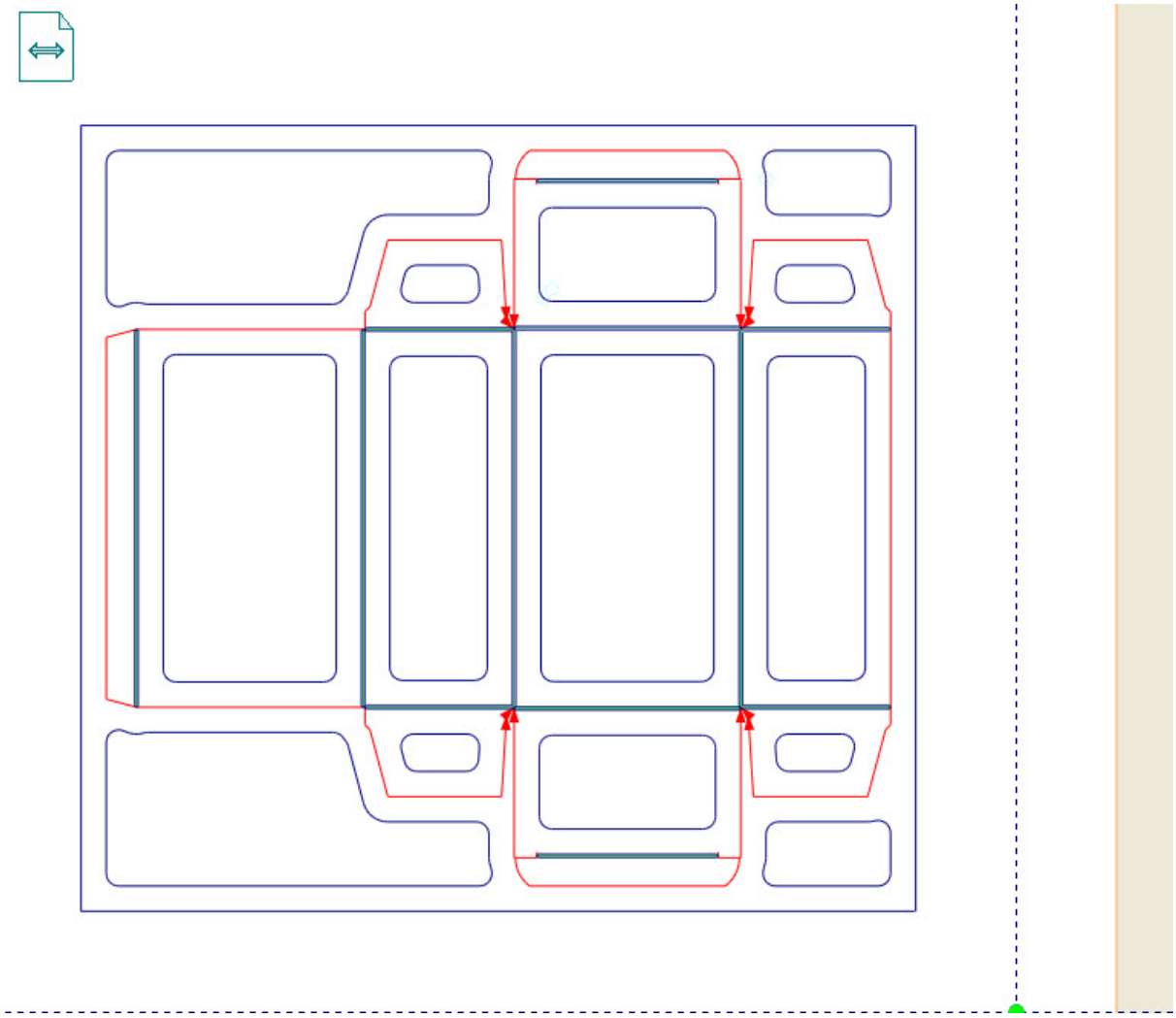
Sample counter



Exercise description

CAM

1. From the Library of Resizable Designs, open EVF11021.evr, and go to the 1up drawing.

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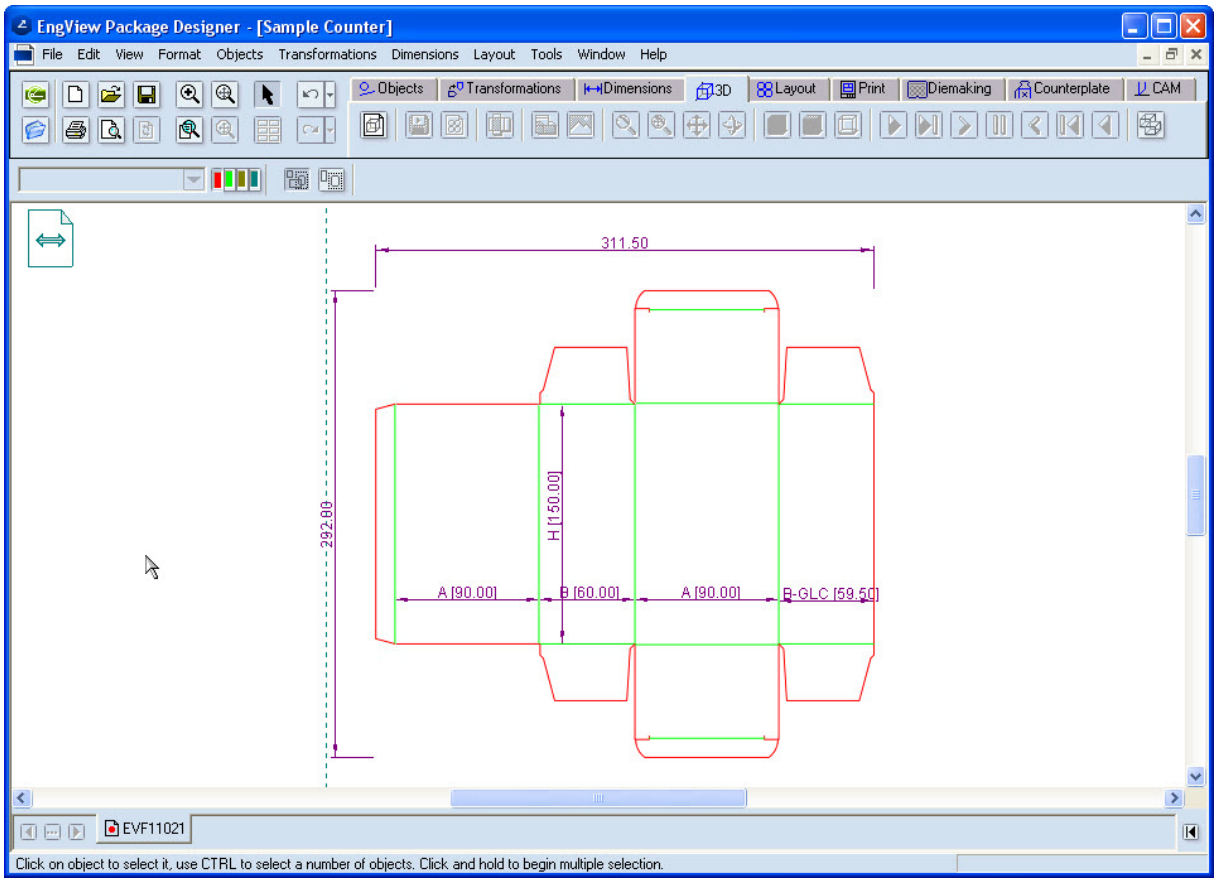
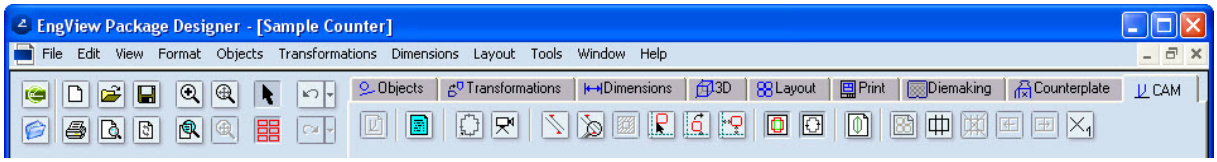
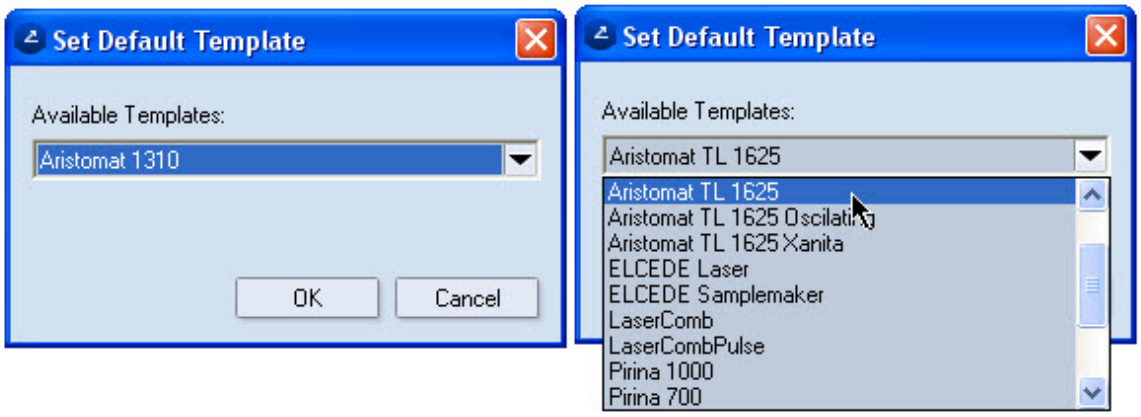


2. On the CAM tab, click **New CAM Drawing**  .

The CAM-related buttons become available.



NOTE: When you generate a CAM drawing for the first time after the program has been installed, a dialog appears in which we select a template for the plotter from the drop-down menu.



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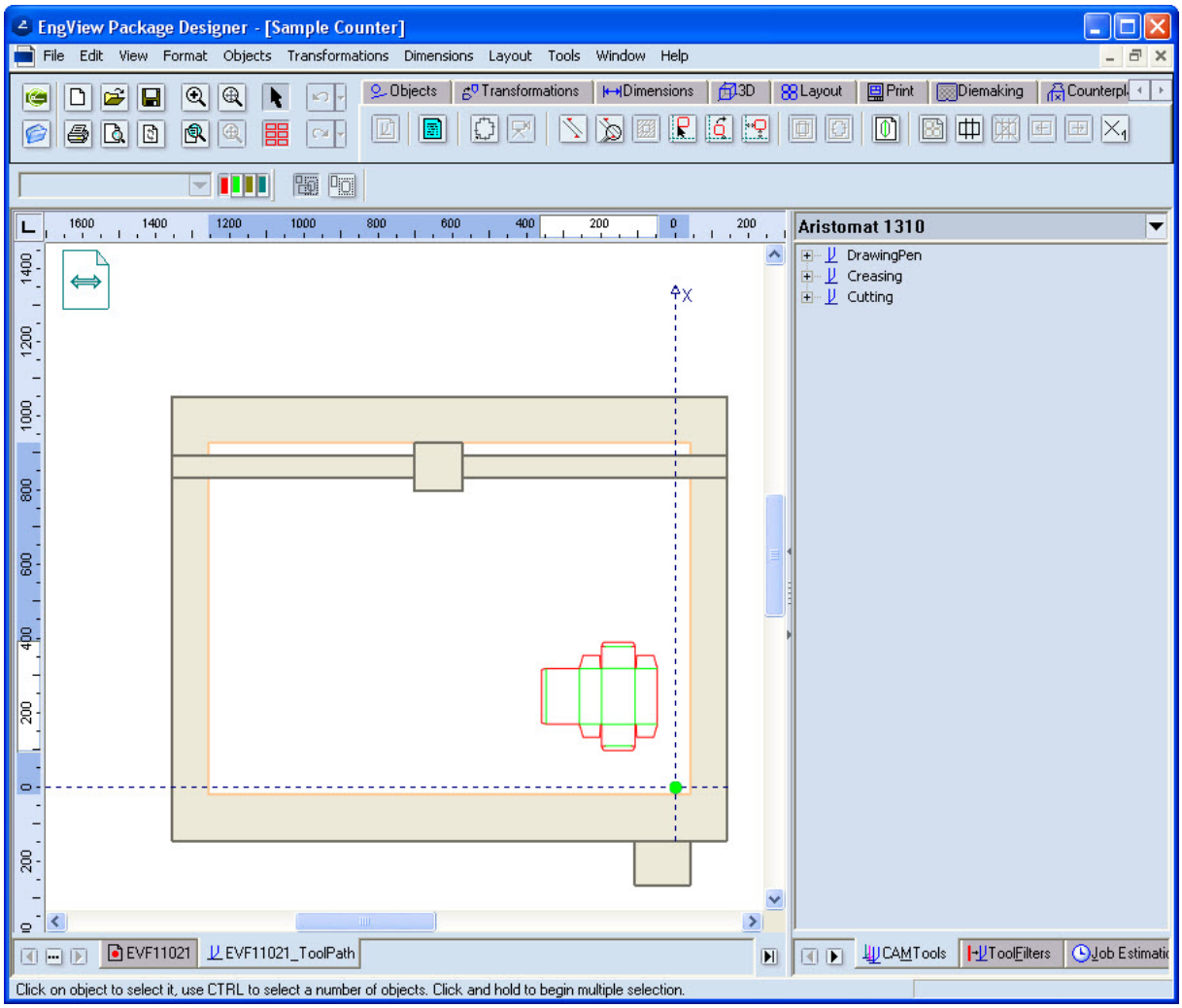
Package Designer offers plotter templates with their respective properties. After selecting a plotter template, the program displays the tools in the template and their respective properties.

3. When we have used the CAM functionality before, the template that was used last is loaded. We can choose a CAM template – for example, Aristomat1310 – from the drop-down list. The program will also display, in the graphical area, what the selected machine will look like.



About CAM tools

The **CAM Tools** tab displays the tools that are available for processing the material. The tools are predefined for the selected CAM template. Each tool appears with its predefined properties – for example width, the style (this is the color in which the tool path of the tool will be visualized during animation), options for processing inner contours, the velocity at which the tool moves across the drawing and acceleration.

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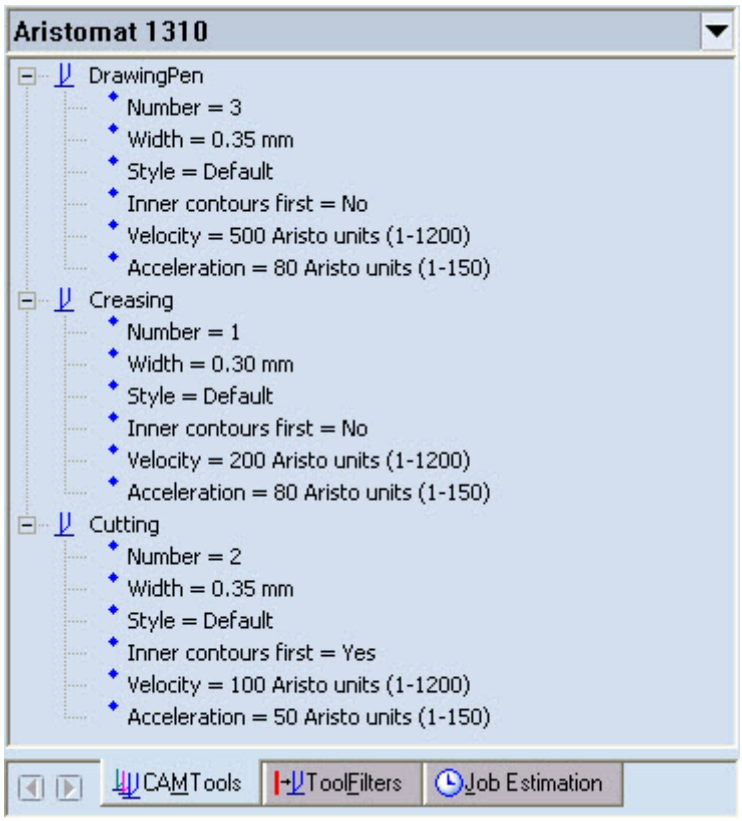
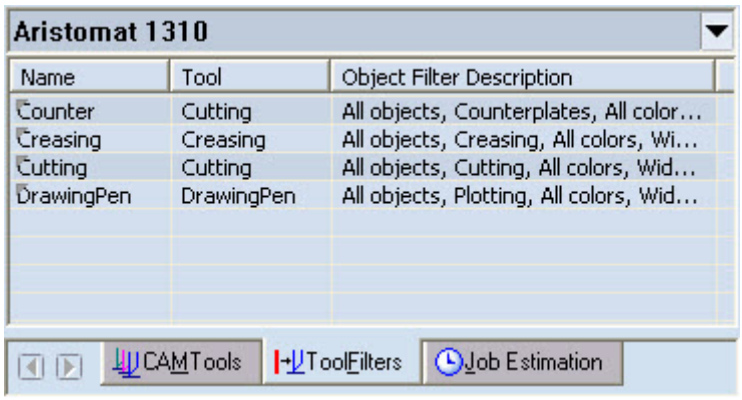


CAM tools

About tool filters

Tool filters are the rules according to which the objects in the drawing are associated with the respective plotter tools that will process them. The tool filters are specific for the CAM template to which they belong.



*The available tool filters are visible in the **Tool Filters** tab in the tabular area.*

In a tool filter (pictured) the tool associations are based on the general object attributes — among others, type (line, arc, and so on), style, color, pattern.

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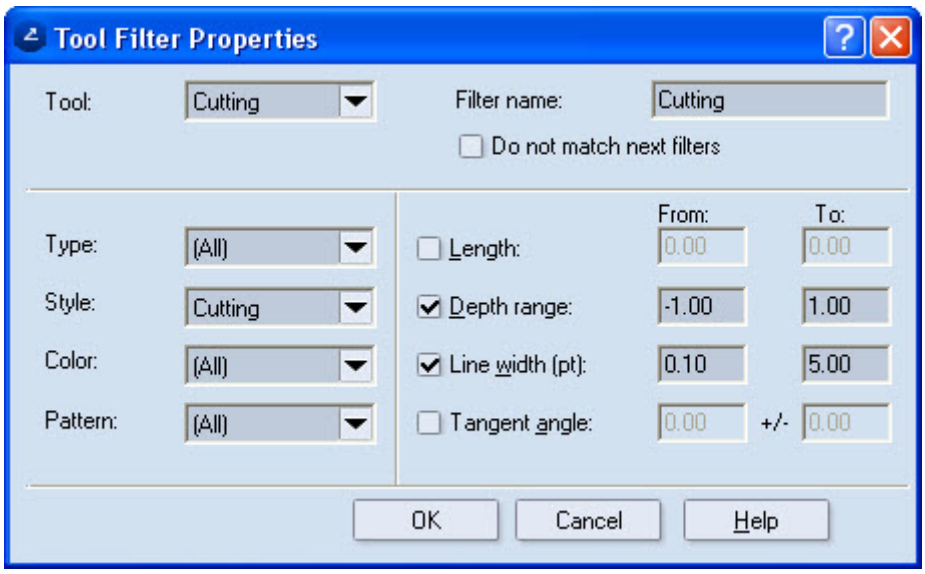
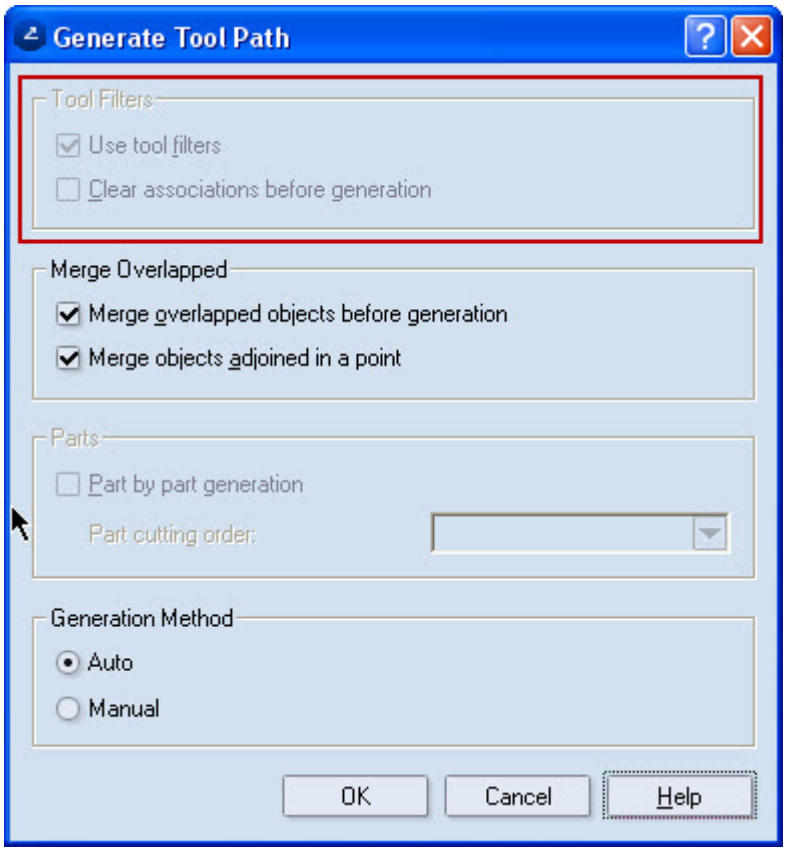


4. To define the cutting and creasing paths, click **Generate Tool Path**  .

The **Generate Tool Path** dialog box appears.

When no association with a tool exists for an object – this is the case when generation of a tool path is done for the first time – tool filters are always applied. This creates the associations necessary for processing the objects.



When a tool path is being generated for the first time, the Tool Filters *area is unavailable for editing because the use of filters is mandatory.*

Using tool filters

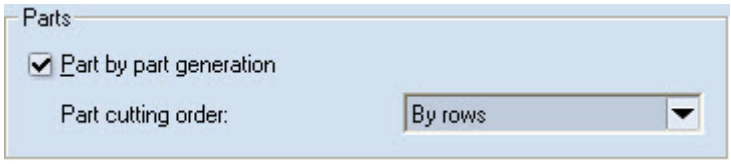
You can edit the settings in *Tool filters* section when tools have been associated with particular objects. We can have two situations:

- If we need to again create associations by using tool filters without saving the previous ones, select both the **Use tool filters** and **Clear associations before generation** check boxes.
- To keep the current associations and create new ones by applying the tool filters to objects, select the **Use tool filters** check box and clear the **Clear associations before generation** check box. In this way the object will not lose their earlier association. NOTE: Objects may be associated to more than one tool. This is the case when the object meets a condition in a tool filter that associates it with an instrument other than the first one. Consider the following example: An object in the Cutting style is associated (manually) with the Drawing Pen. When the tool path is being generated automatically and tool filters are used, the object will acquire a second association – to the cutting tool. The reason is that the Cutting tool filter associates all objects in the Cutting style to the cutting tool.

Merging objects

In the section *Merge Overlapped*, we define how objects will be merged. Enable both options in the *Merge Overlapped* section of the **Tool Path Generation Options** dialog box. This will detect and merge overlapping objects that share the same properties to prevent the plotter from processing these areas multiple times.

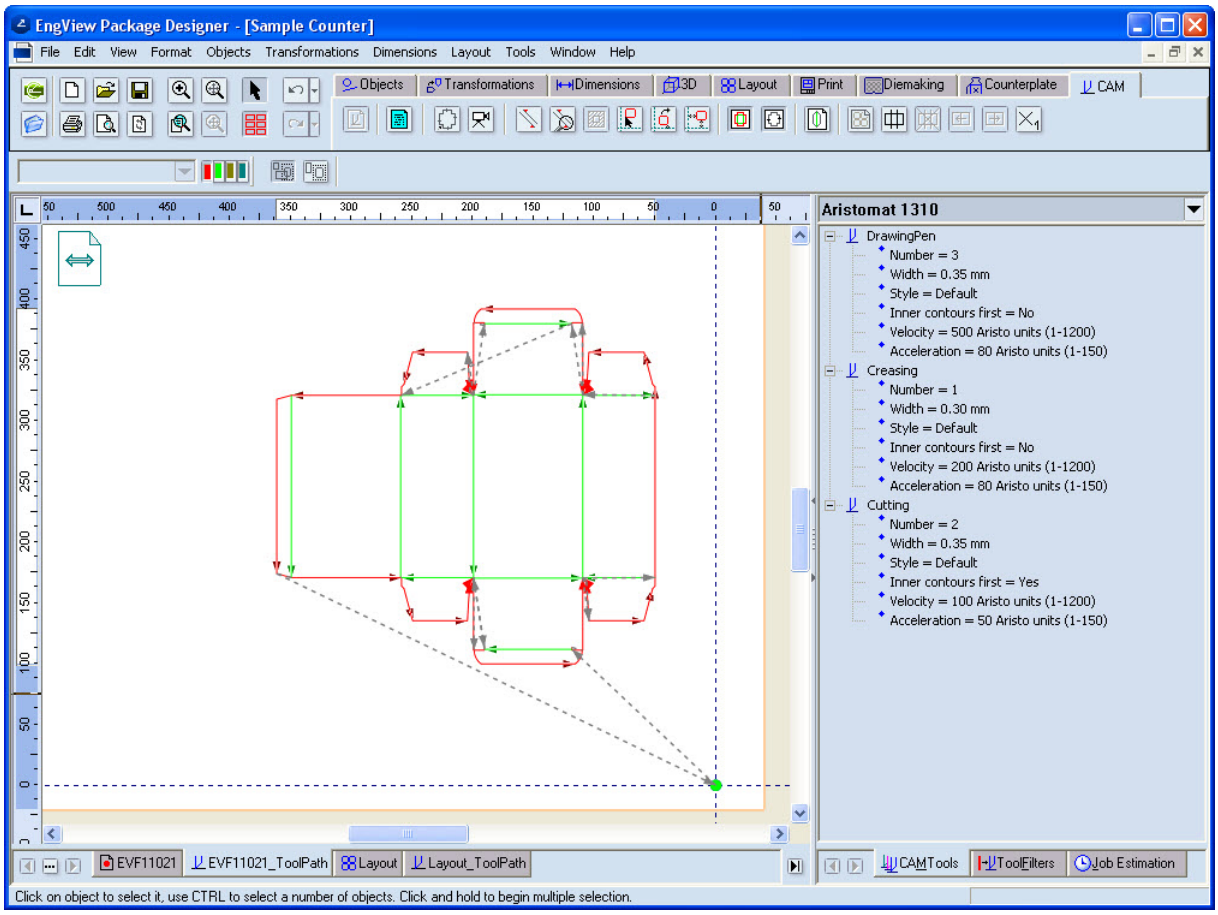
Parts (tool path generation for layout drawings)



The *Parts* section becomes available when we need to generate a tool path for a layout drawing that features individual 1ups. The program processes each 1up separately. The processing sequence can be selected in the drop-down list: by either columns or rows.

5. Click **OK.**

The tool path is generated. The arrows in the drawing indicate the paths of the individual tools during the generation of the sample. During the generation of tool path, the program always generates an optimized path.



Generating NC code

An NC code is a set of instructions that the cutting machine uses to execute the generated tool path.

1. Click **Generate NC** .

The **Generate NC** dialog box opens.

The list displays the instruments set in the CAM template.

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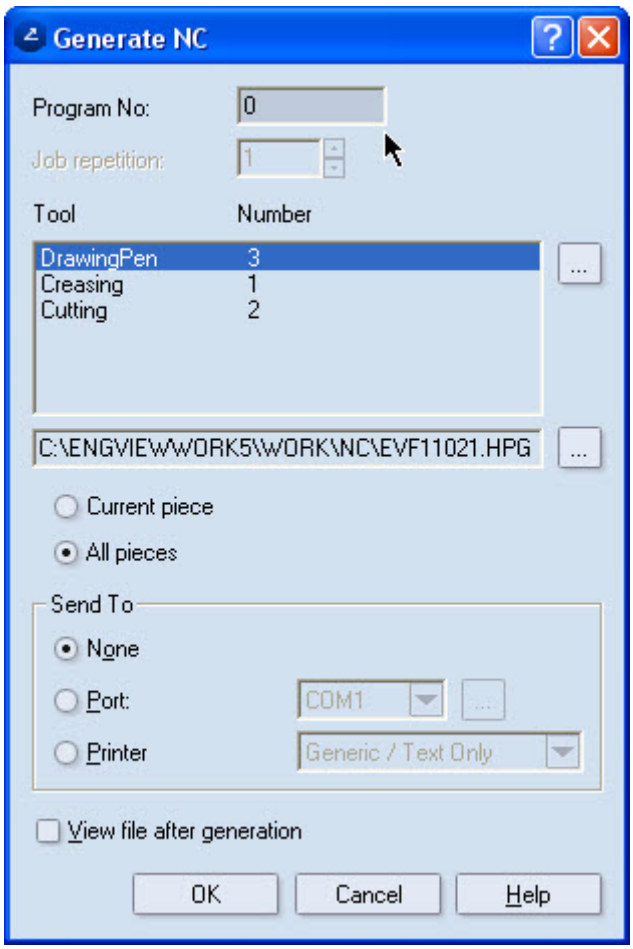

The NC can be put out in three ways:

- **None** The NC commands are stored in a file, which is then loaded in the machine.
- **Port** The NC commands are sent directly to the machine.
- **Printer** The NC commands are sent to a virtual network printer (Generic/Text Only), to which the plotter has access.

2. Click **OK**.

Animating the tool path

1. To animate how the design will be processed, click the **Animate tool path** button.

The **CAM Animation Control** dialog box appears.

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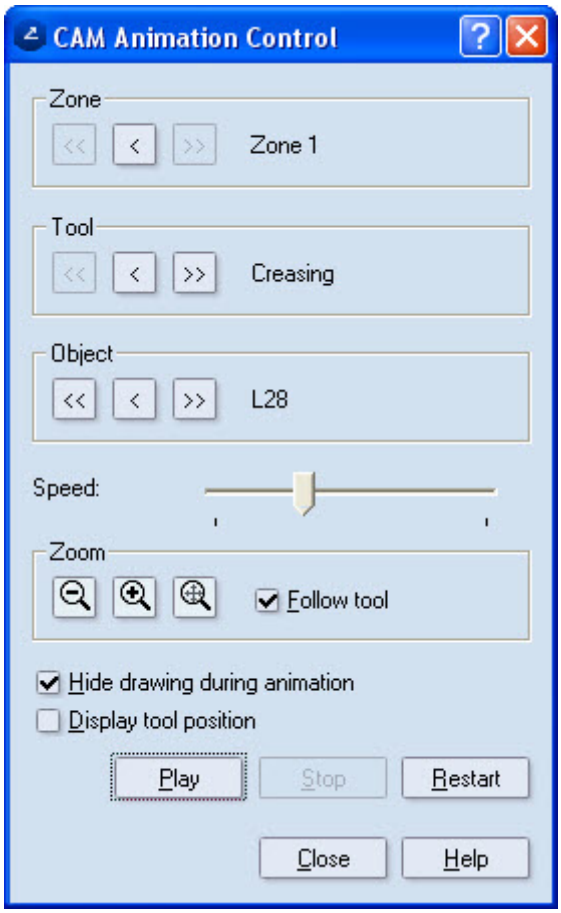

The **CAM Animation Control** dialog box has the **Pause**, **Stop** and **Restart** buttons. These let you follow the movement of tools.

The sections *Zone*, *Tool* and *Object*, provide information about what is currently being animated.

2. Use the slider to control the animating speed.

3. Select the **Display tool position** check box to see the tool at the current processing position.

4. To only see the drawing tools and not the folding box design, select the **Hide drawing during animation** check box.

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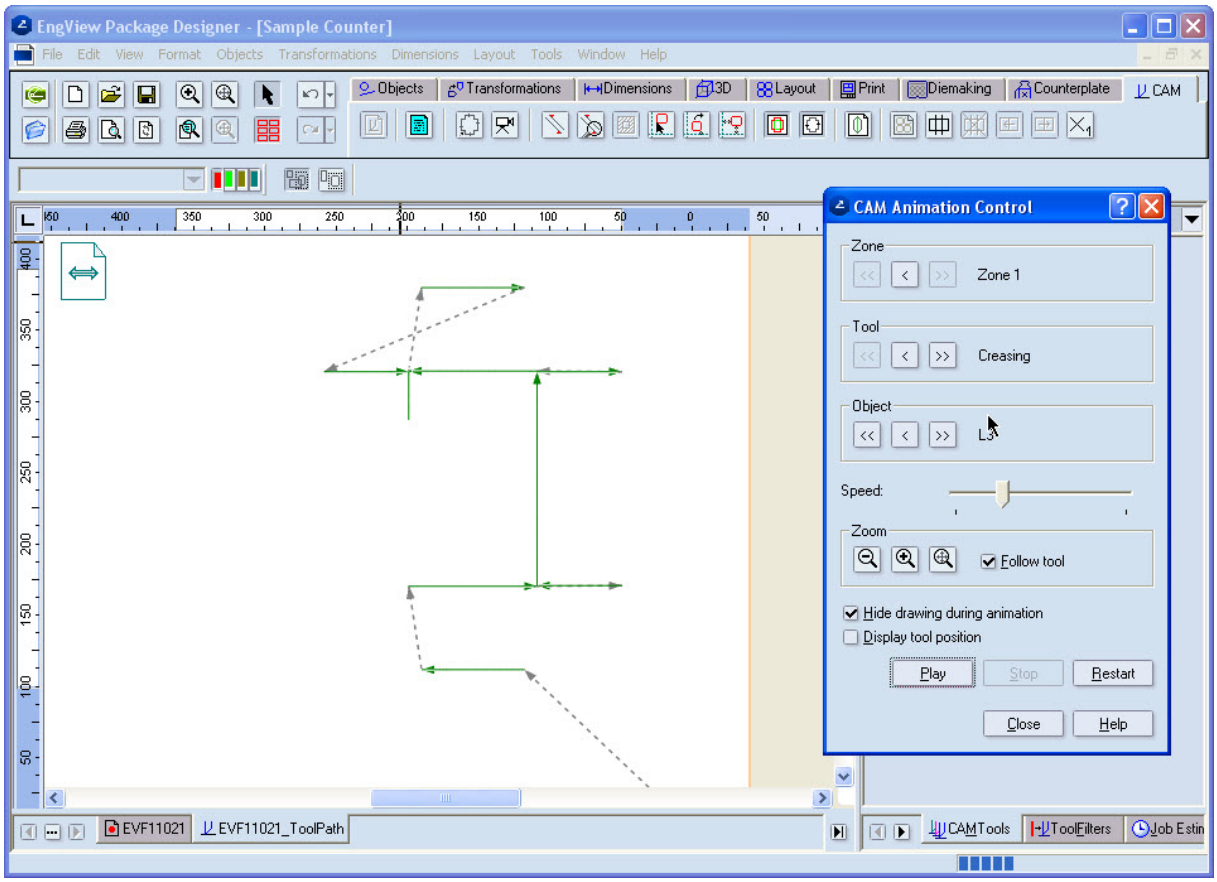


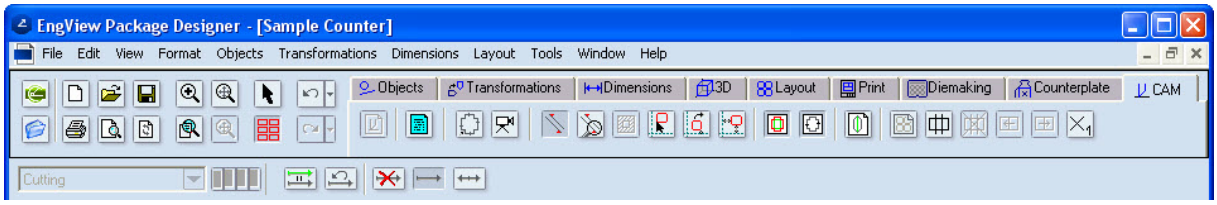
5. Click **Close** to exit the animation.

Changing the cutting direction

You can manually change the cutting direction to prevent damaging the material.

1. Click **Set Cutting Directions**  tool to define — or edit — the cutting direction manually.

Additional modes are available for manual editing of the cutting directions.



 **Set direction from tool path** Use this mode to keep some of the directions when you created the tool path before you made manual direction changes.

 **Reverse direction** Use this mode to reverse the current direction of an object on which you will click.

 **Delete direction** Use this mode to delete the direction of the object on which you will click.

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 **Positive direction** Depending on which half of the object you click, sets the cutting in the same direction. For example, if you click the right half of an object, the cutting direction will be to the right; if you click the left half, the cutting direction will be to the left.

 **Split from center** Applying this mode on an object splits the tool path in the object's middle.

HOW TO CLICK

- If we click near the middle, the two cutting directions will point towards the middle.

- If we click any end of the object, the two cutting directions will start in the middle and will point toward the two ends of the object.

NOTE: We can set cutting directions to more than one object at a time. To do this, select the objects, and then use the respective direction-setting mode. For example, we may select all objects in the Cutting style, or all curves. You can use the Select Object functionality, available on the context menu.

When we have selected the objects that we need, and then click **Set Cutting Directions**  , the following cutting direction modes become available:

 **Positive direction** When you apply this mode, the cutting direction will change from left to right or from top to bottom.

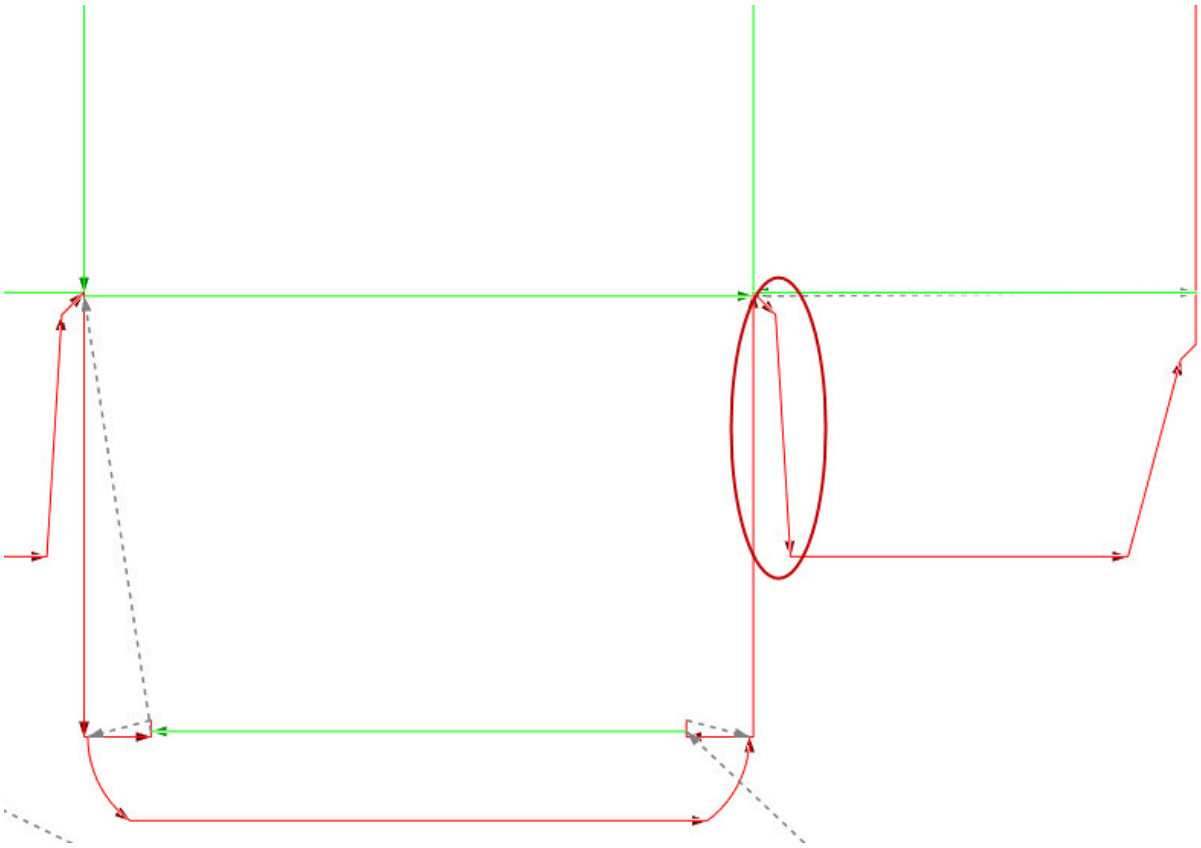
 **Negative direction** When you apply this mode, the cutting direction will change from right to left right or from bottom to top.

 **Split toward center** When you apply this mode, two cutting directions are set, which point toward the center of the object.

 **Split from center** When you apply this mode, two cutting directions are set, which point toward the two ends of the object.

2. There are situations in which sharp angles need to be processed in a special way to prevent material damage. In our case such a critical area is the area where the dust flaps attach to the tuck-in flaps. The processing of sharp angles can be set also automatically – see Situation 2 later in this section.

We will change the tool direction on the dust flap towards the tuck-in flap. Here the cutting direction needs to move toward the objects' meeting point. This serves to prevent material damage. That is why we need to change the cutting directions of the two dust flaps objects.



We can change the cutting directions either manually or automatically. Before changing the cutting directions, consider the following situations:

- **Manually**

1. To make manual changes to the path, click **Set cutting direction**  , and then, in the contextual edit bar that appears, click **Positive direction**  . Then click the object whose tool path direction you want to change (see the highlighted object in the picture).

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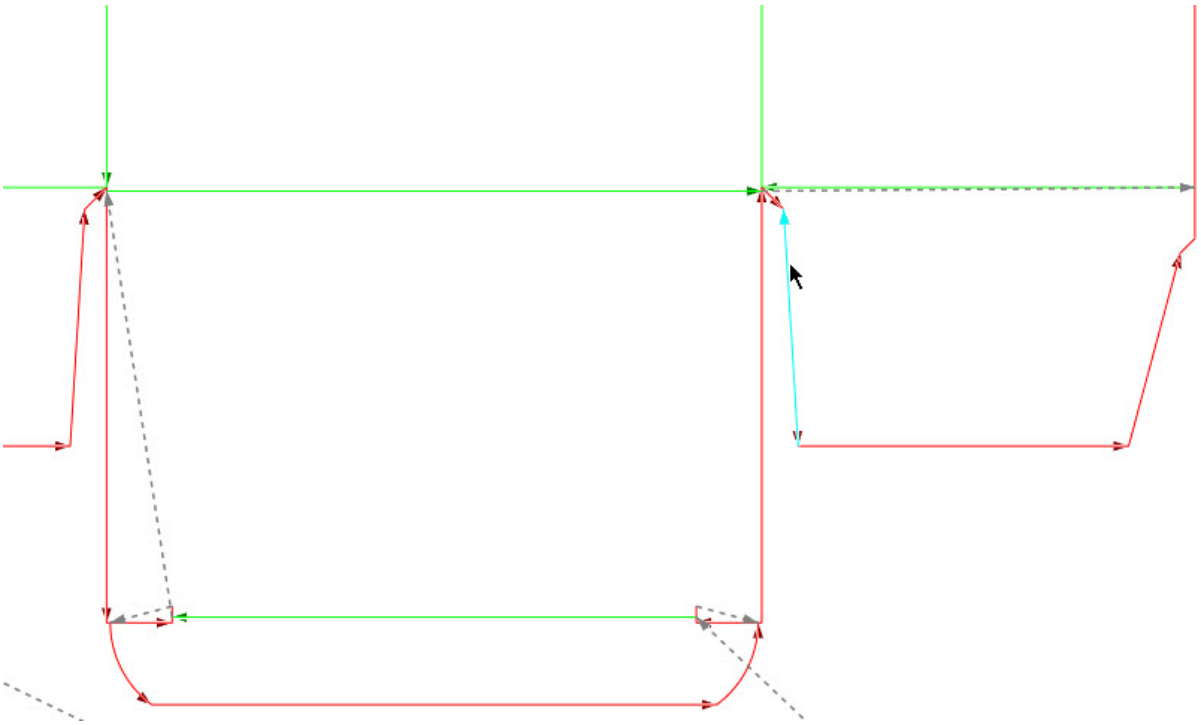
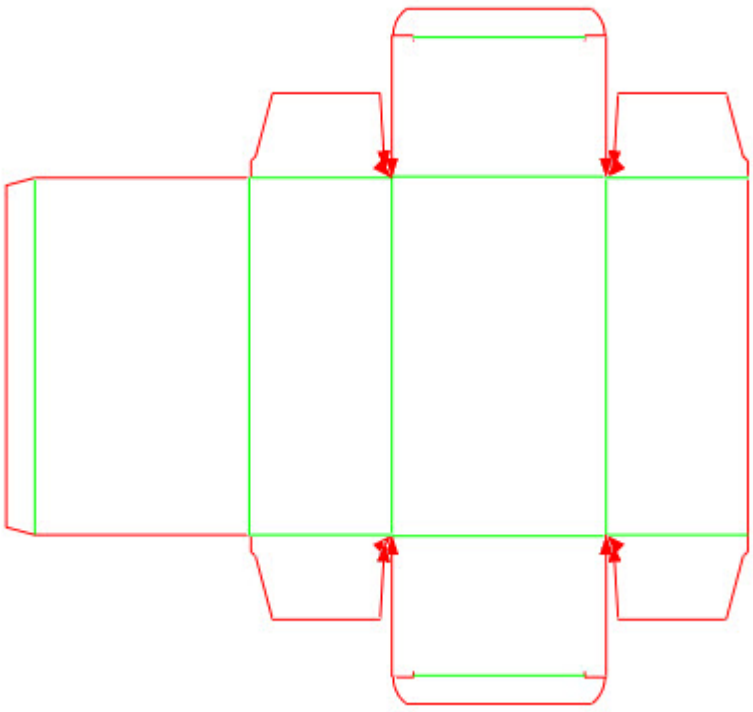


2. Repeat the procedure for the rest of the objects.

NOTE: After we have started editing the tool path, the tool path we have just generated disappears. After we have finished with the editing, we need to generate a new tool path.



We have edited the old tool path, which has ceased to exist.

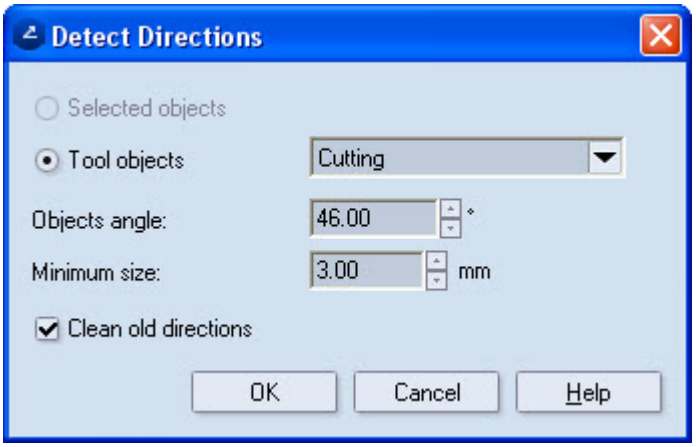
NOTE: While applying path direction, you can use the **Repeat changes** functionality  . This will apply an action to all the positions in the tool path where there are identical path patterns. This is especially useful when we are editing a tool path for a layout drawing that contains identical designs.

- **Automatically**

Automatic setting cutting direction for processing of sharp angles.

1. On the CAM toolbar, click **Detect Directions**  .

The **Detect Directions** dialog box appears, in which the rules are set for the sharp angle processing.



Objects angle Sets the maximal angle at which two objects may meet. If the angle value is less that the set value, a special tool path will be generated for them (the cutting directions will move toward the edge they form).

Minimum size Sets the minimal length of the objects for which the tool path processing rule will be applied.

Instruments for design positioning

The following tools on the CAM toolbar control the positioning of the design on the machine.

 = Position alignment

Positions the drawing manually by dragging the mouse or by setting Dx and Dy offset values.

 = Orientation alignment

Rotates the drawing manually by dragging the mouse or by setting a Rot Value angle. The rotation angle is set between the following two axes: the one defined by the point of clicking and the origin of the plotter's coordinate system and the one defined by the point where we want to relocate the point and the origin of the coordinate system.

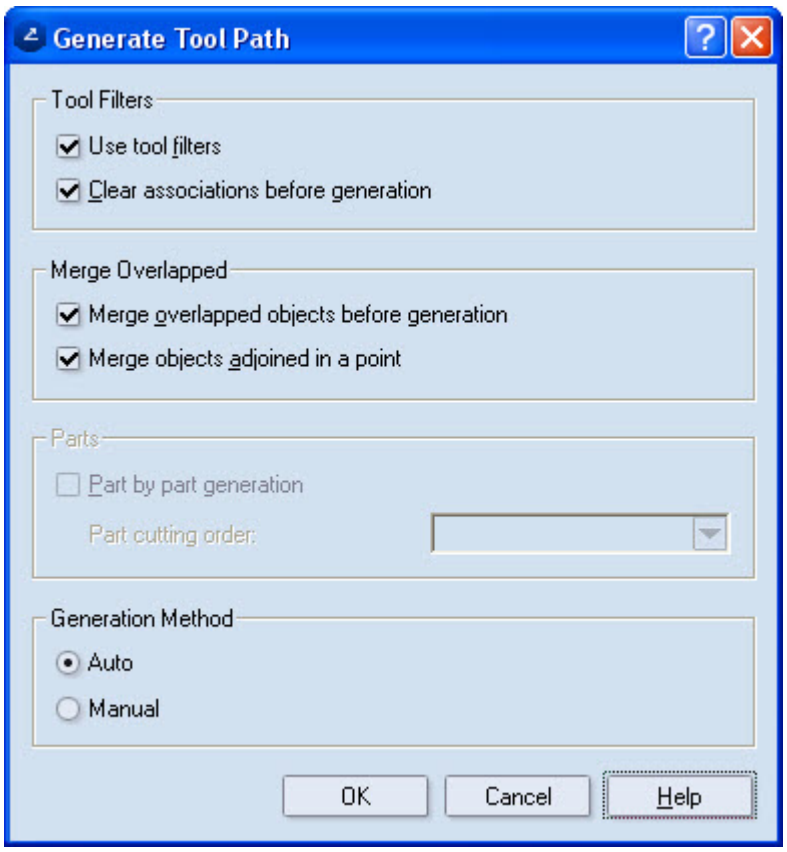
 = Design alignment

Opens the dialog where you can align (move and/or rotate) the drawing via coordinates.

 = Sheet

For improved representation of reality, you can use a sheet whose dimensions are identical with those of the actual one.

3. To generate a tool path that will take into account the changes, on the CAM toolbar, click **Generate Tool Path**  .



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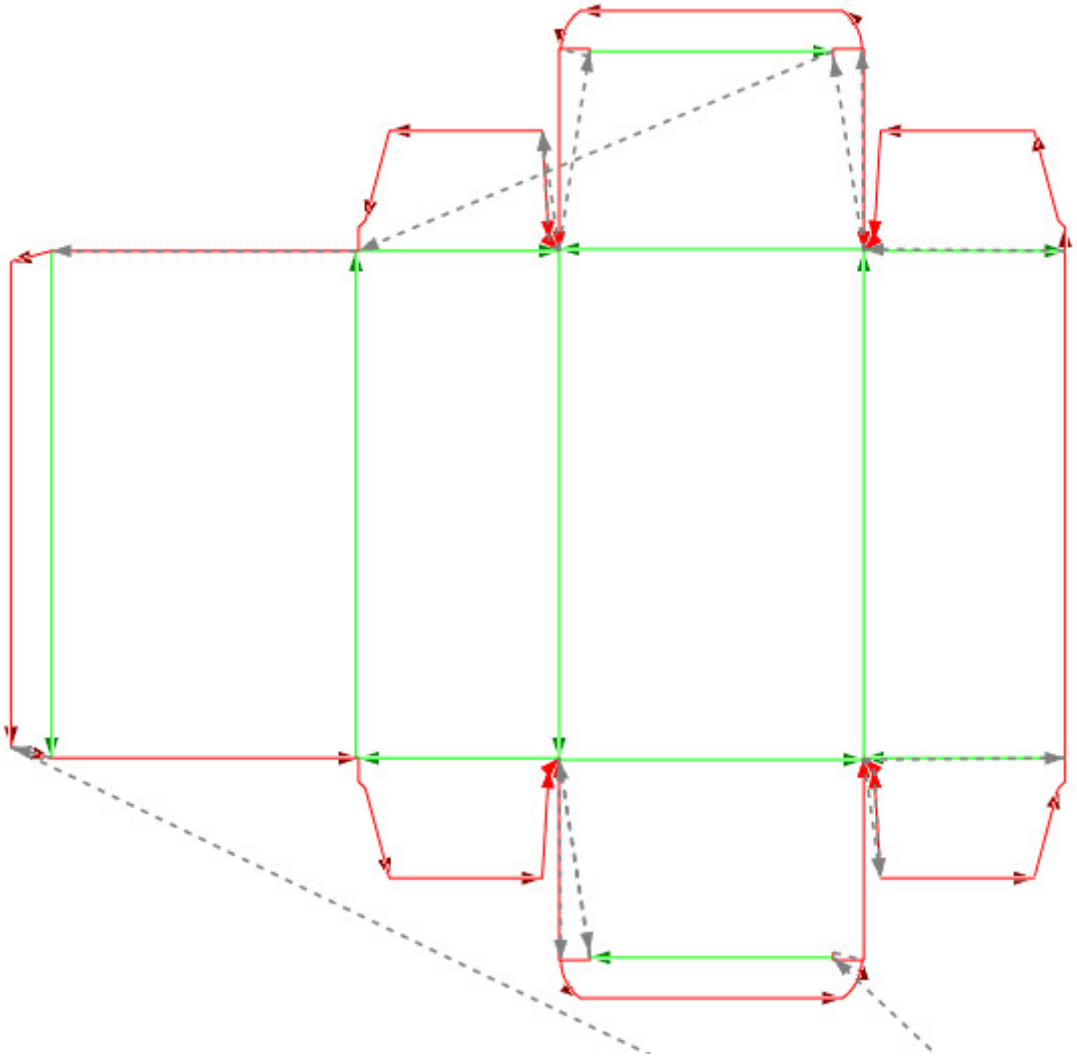


 = Show drawing

Shows the structural design.

 = Show tool path

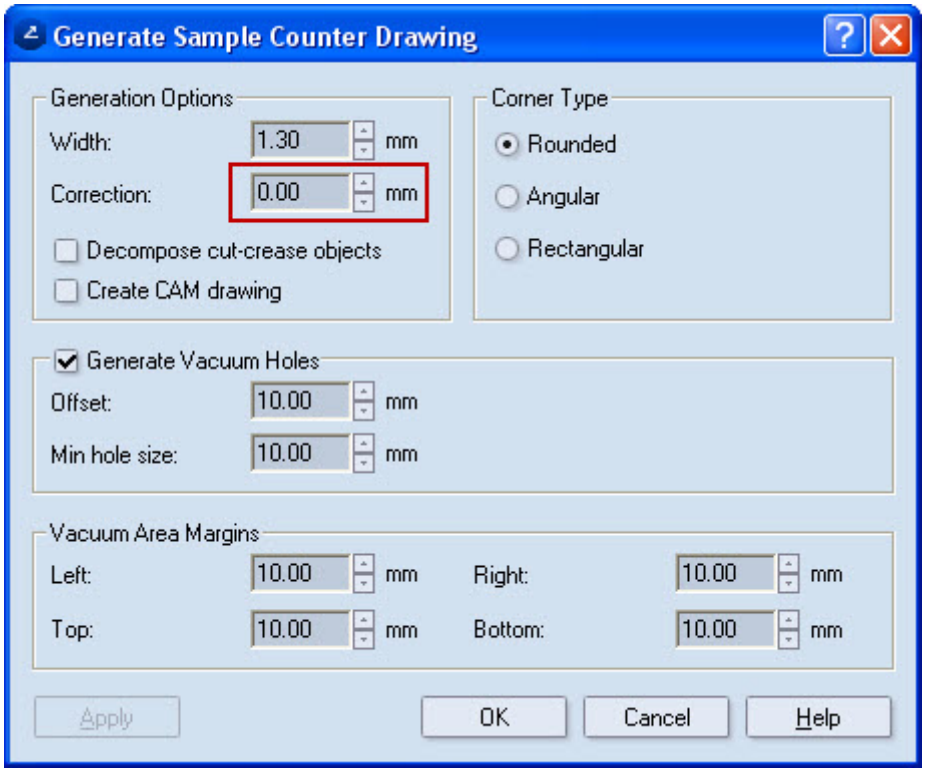
Shows the tool path.

Generating sample counter

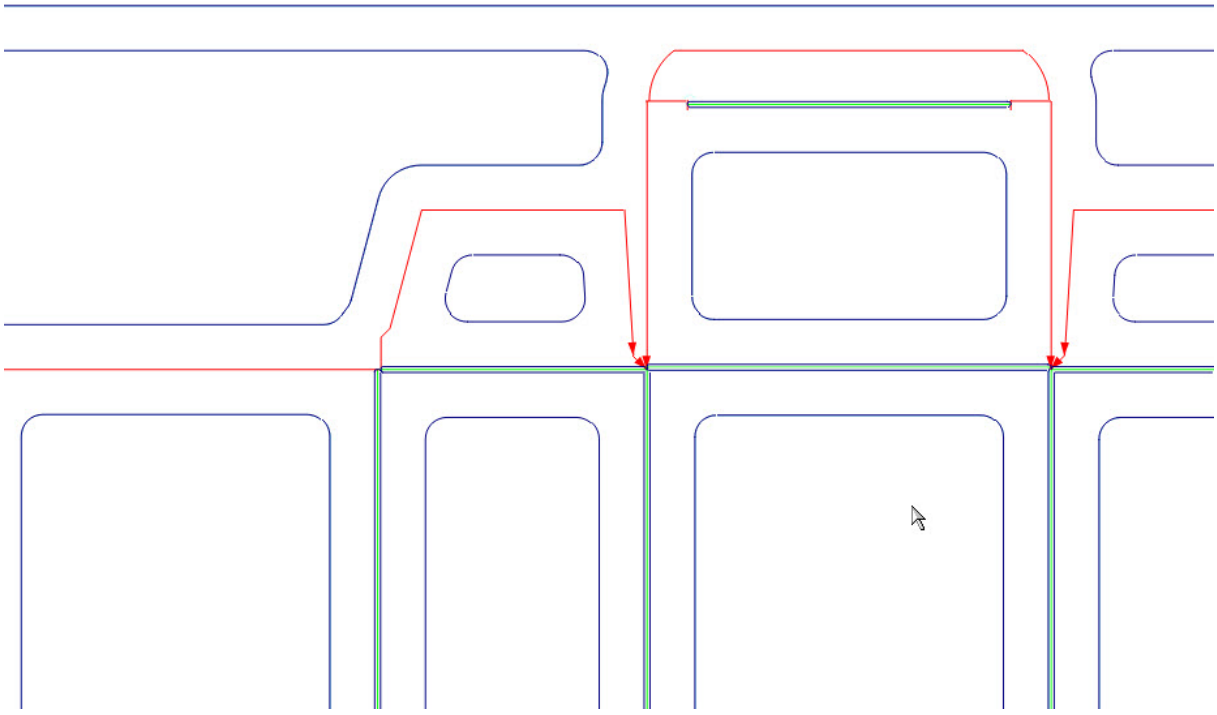
We will create a sample counter to make the creases in the sample more pronounced and to make the folding of the sample easier. A sample counter is a plate with cut channels indicating the creasing objects. The sample counter is placed onto the machine and remains on the plotter. The material from which the sample will be cut is placed onto the sample counter. Additionally, the sample counter is fitted with vacuum holes that allow the holding of the material on the sample counter. After the material is aligned onto the sample counter, the cutting begins.

1. On the CAM toolbar, click **New Sample Counter Drawing**  .

The **Sample Counter Generation Options** dialog box appears.



NOTE: In the *Generation Options* area we set the width of the channel (the distance between two lateral lines of the channel). In **Correction**, we set the offset between the end of the folding line and the end of the channel line.



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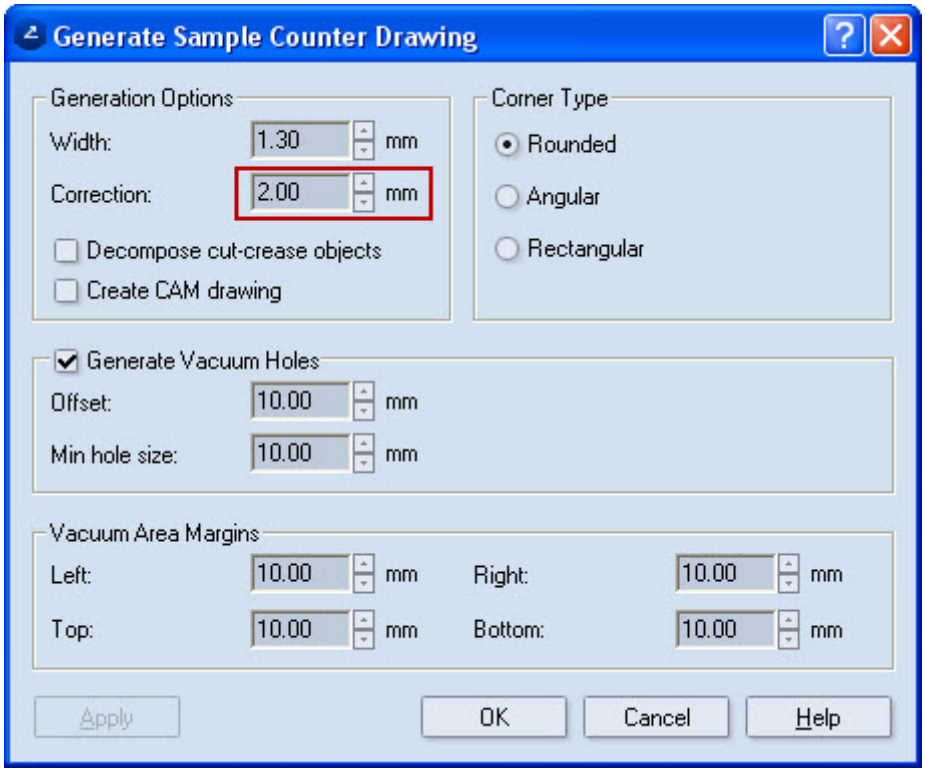
Without correction. The end of the folding lines coincides with that of the channel line.



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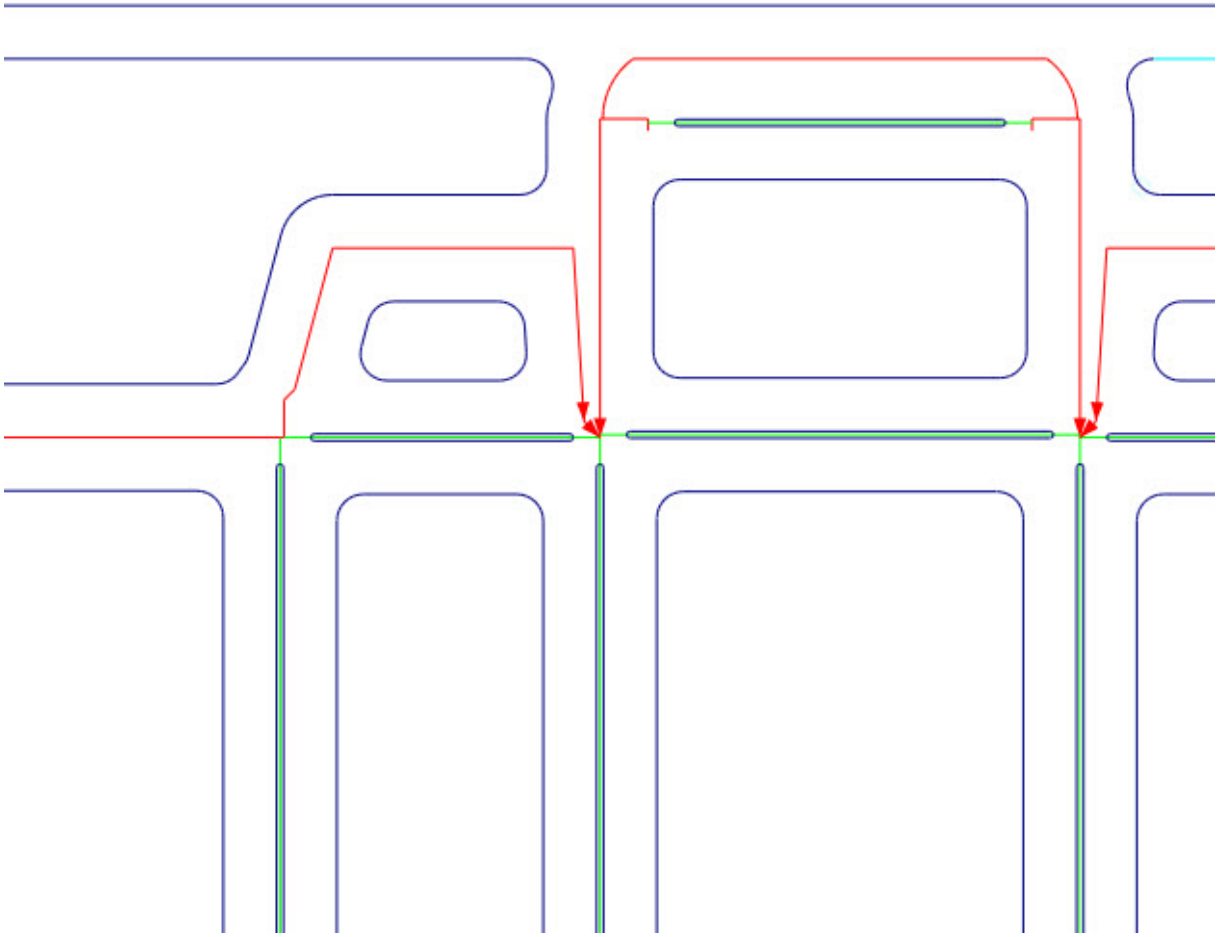

*With correction. The end of the folding lines is stops at a distance from that of the channel line, entered in **Correction**.*

2. If you have cut-crease objects and want to have them transformed into individual cutting and noncutting sections in the sample counter, select the **Decompose cut/crease objects** check box. This results in little holes for the creasing sections (pictured). If the cut-crease objects are not decomposed, a single channel for the entire object would be cut as if the entire line were in the Creasing style.

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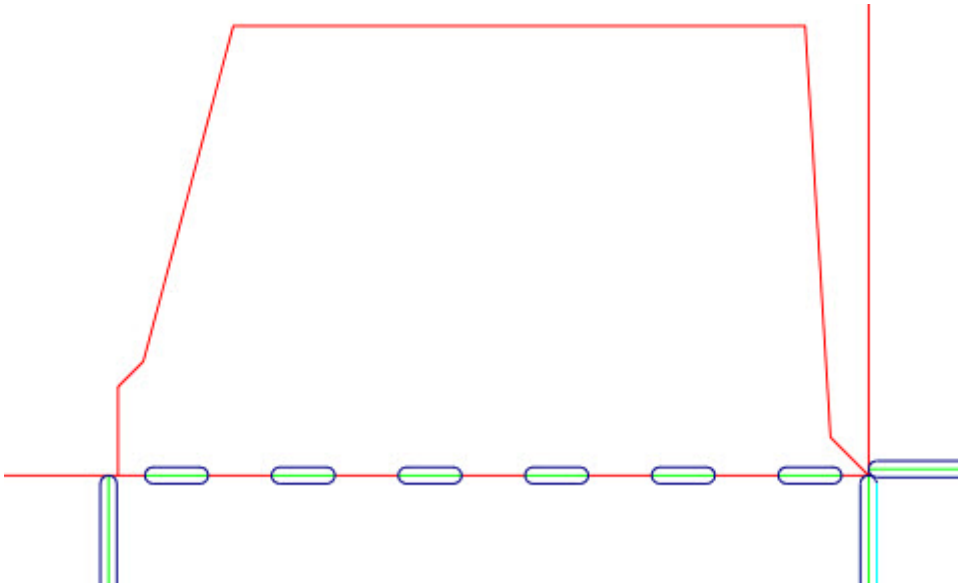


An object, originally in the Cut-Crease style, after processing. Notice the noncutting sections, which are separated from those that are to be cut.

To increase the air-sucking effect on the sample counter, vacuum holes must be generated.

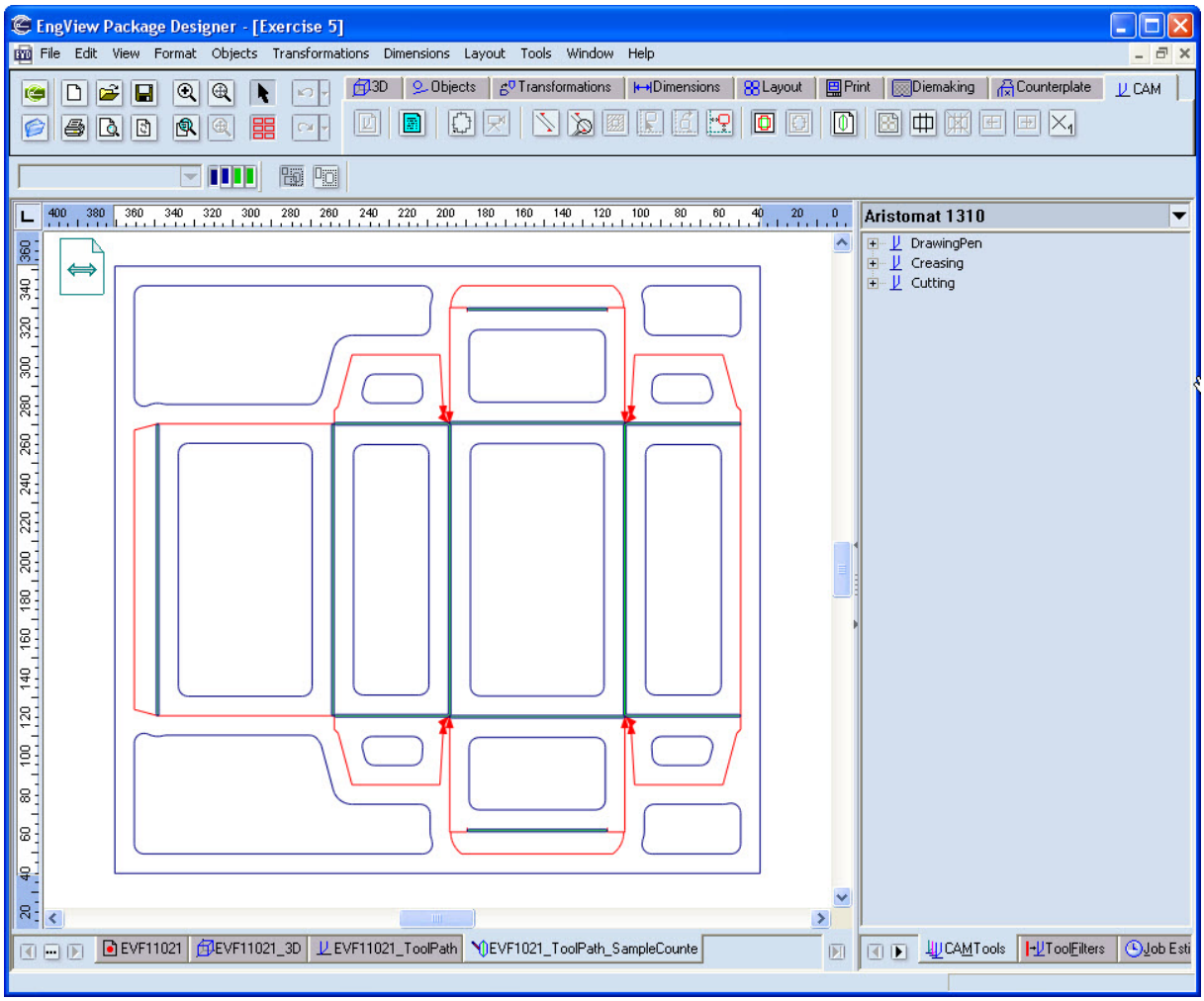
3. In *Generate Vacuum Holes* area, in **Offset** you specify the distance of the vacuum holes to the next object – a fold/crease or vacuum line. Type the minimum size of the vacuum hole in the **Min** box.

4. Consider the following situations:

- If we want to create manual editing of the sample counter job, which will be created in accordance with the rules we have set, we need to leave the Create CAM drawing check box empty. This creates a sample counter drawing in which we can make the necessary corrections. When we are ready we continue by creating a new CAM drawing.
- If we want to create a CAM drawing directly for the sample counter drawing, we select the **Create CAM drawing** check box. The result is that we have no stand-alone counterplate drawing but a CAM drawing (it is indicated by the EVF110 icon).

  NOTE: No manual editing is possible in this CAM drawing. If we need to make corrections, we click **Generate Sample Counter Drawing** . Notice that in the dialog box that appears, the **Create CAM drawing** check box is missing because all editing now takes place in the CAM drawing we have just created. In the dialog box, make the changes that you want, and then click **Apply** to see the result before clicking **OK**. This re-creates the CAM drawing.

5. To confirm the settings, click **OK**.



NOTE: The sample counter tool path drawing appears, displaying the result. The sample counter is positioned in the same place as the design in the main tool path. This is why after we have generated the sample counter drawing, we are advised not to change the box's position in the main CAM tool path. However, if, due to technological reasons this must be done, we refresh the sample counter drawing (if we have created one) and then the CAM drawing. Note that refreshing the sample counter drawing removes all manual changes we have made.

Splitting designs

If you must work with materials that are larger than the machine's work area, you can split them into parts, which you process separately. This is useful for both manual feed and a machine with a roller. The entire procedure includes the use of splitters and align markers.

1. Open the design EVC51002.

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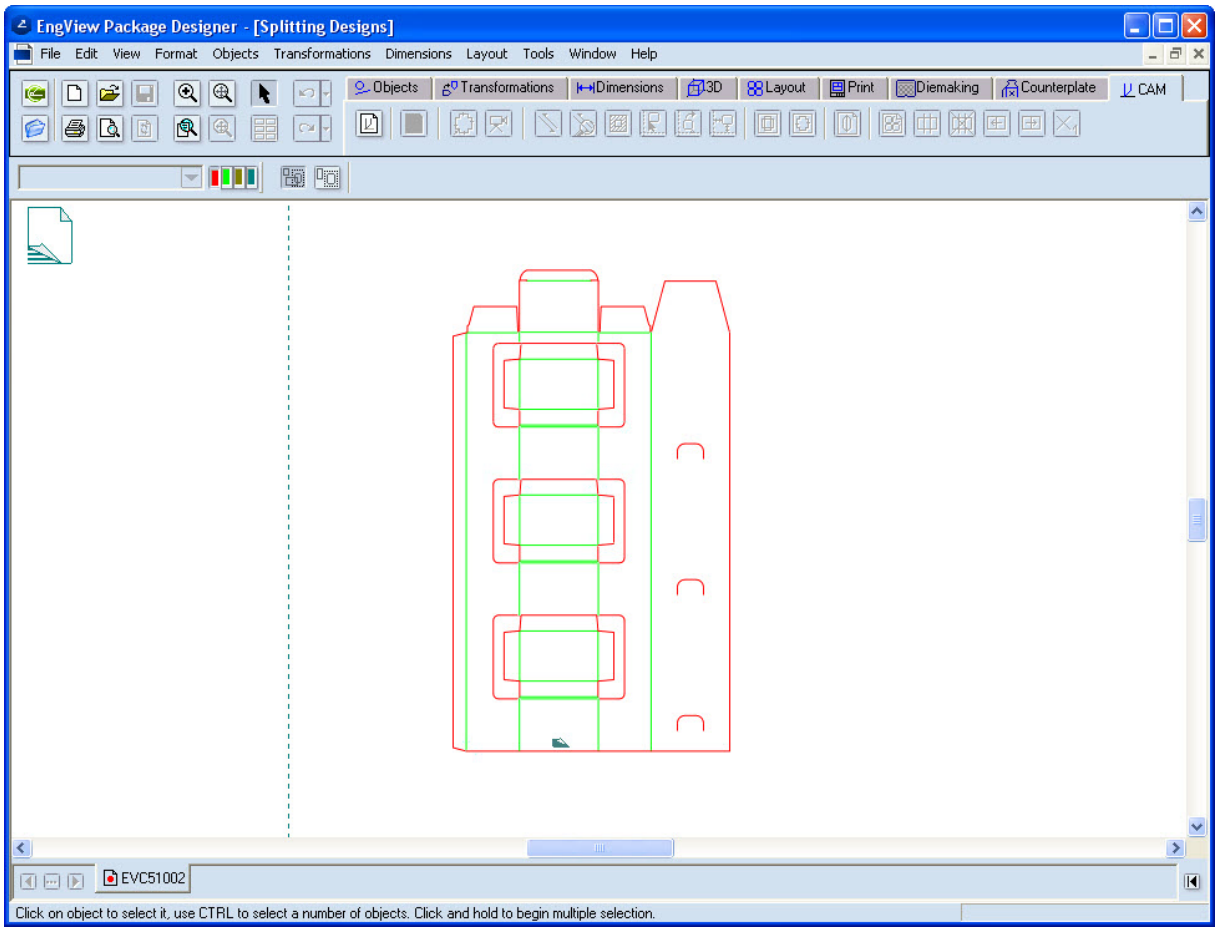

2. Create a CAM drawing: On the CAM toolbar, click **New CAM Drawing**  . Then load the Zund 800 CAM template.

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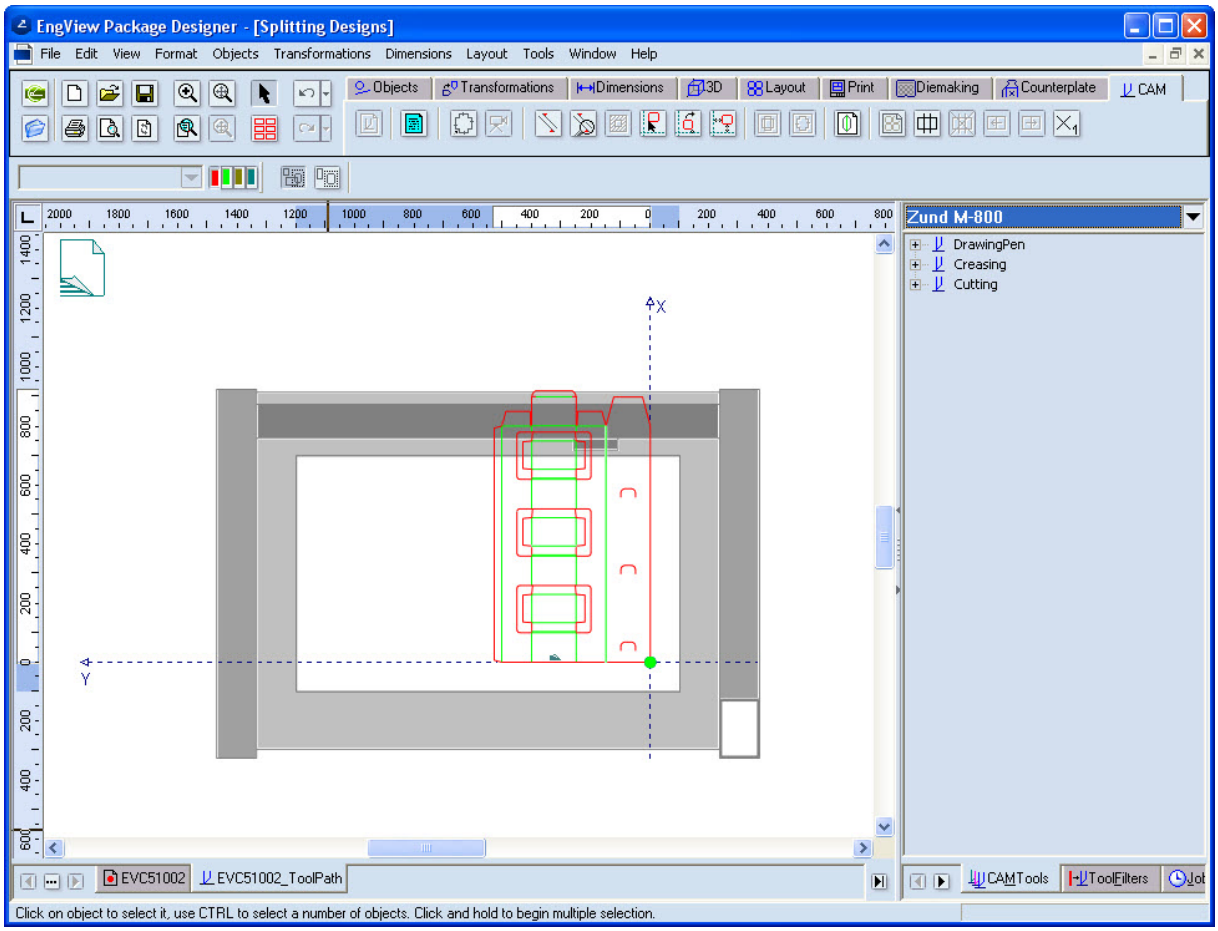

The design proves too large for the machine's work area. That's why we need to split it and process each of its part separately.

3. On the CAM toolbar, click **Insert Splitters**  .

The Insert Splitters dialog box appears.

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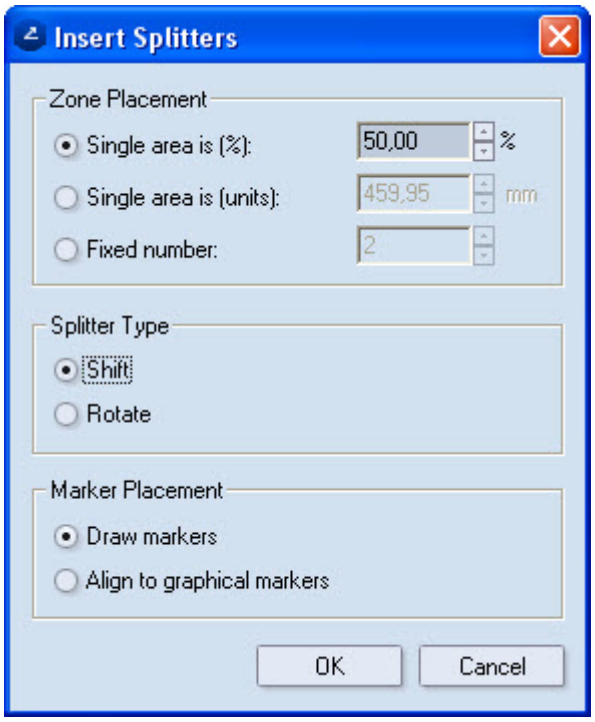
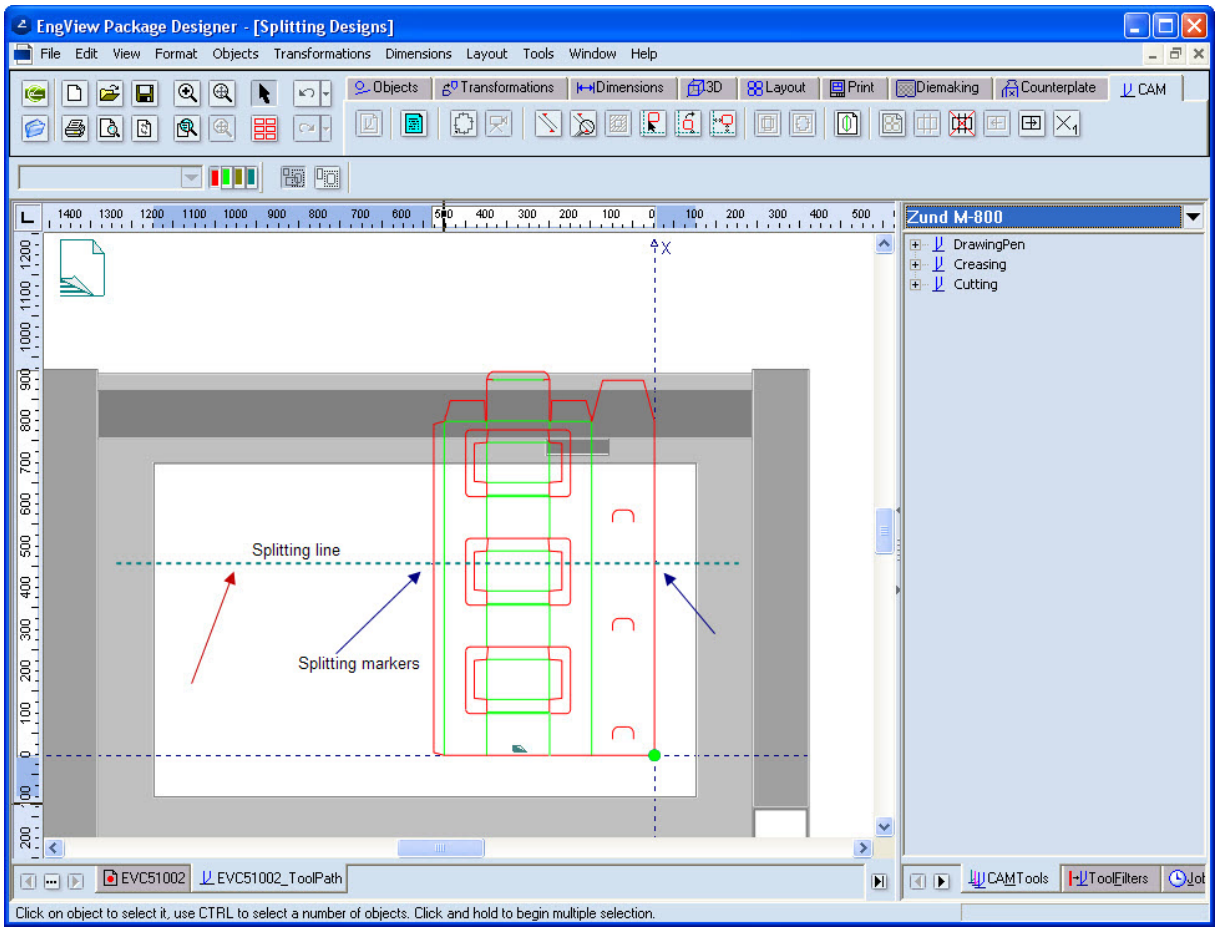


In this case it is sufficient to split the design into two parts. After we click **OK**, a splitting line appears that divides the drawing in two. It shows which objects fall in which part.



If we will cut the design manually, we shall need aligning markers.

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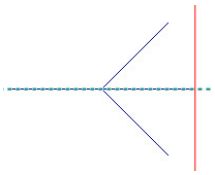
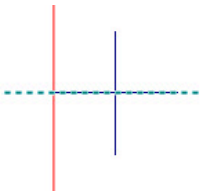


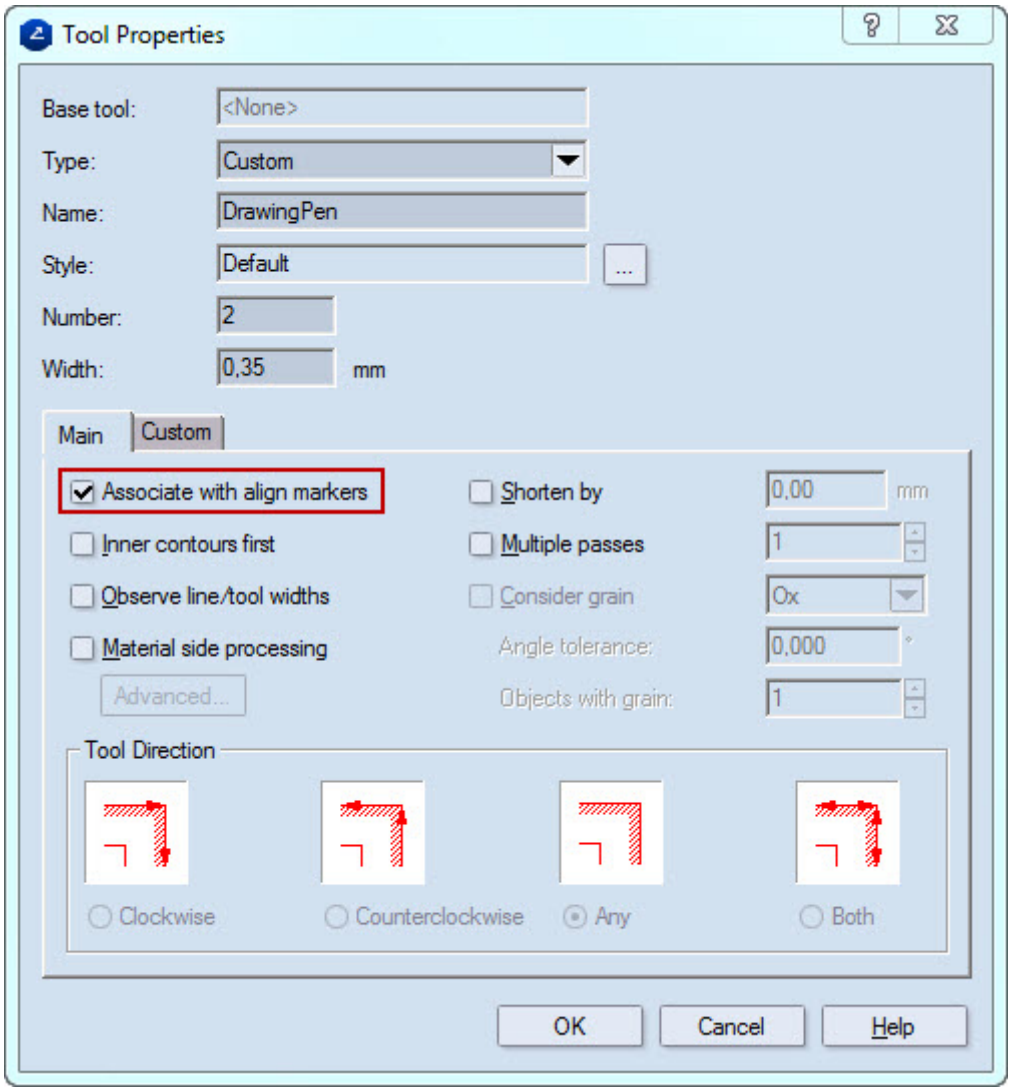
Left-hand marker



Right-hand marker

The program positions the aligning (splitting) markers over the splitting line left by the processing tool.

The align markers will be processed by the tool that has been associated with them. To associate a tool to process the align markers, double-click the tool in the **CAM Tools** tab, and then select the **Associate with align markers** check box (pictured).



TIP: To change the splitting of the design, click **Remove Splitters**  . Then relocate the design and apply a new splitting.

4. To switch between the two section, click **Next Zone**  .

5. Generate tool path: click **Generate Tool Path**  .

The tool path takes the splitting into account and the two sections of the split design are processed one by one.

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