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## **Mastercam® X<sup>4</sup> Training Tutorials – Professional Courseware Router**

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## 16. MACHINING THE NESTED PARTS

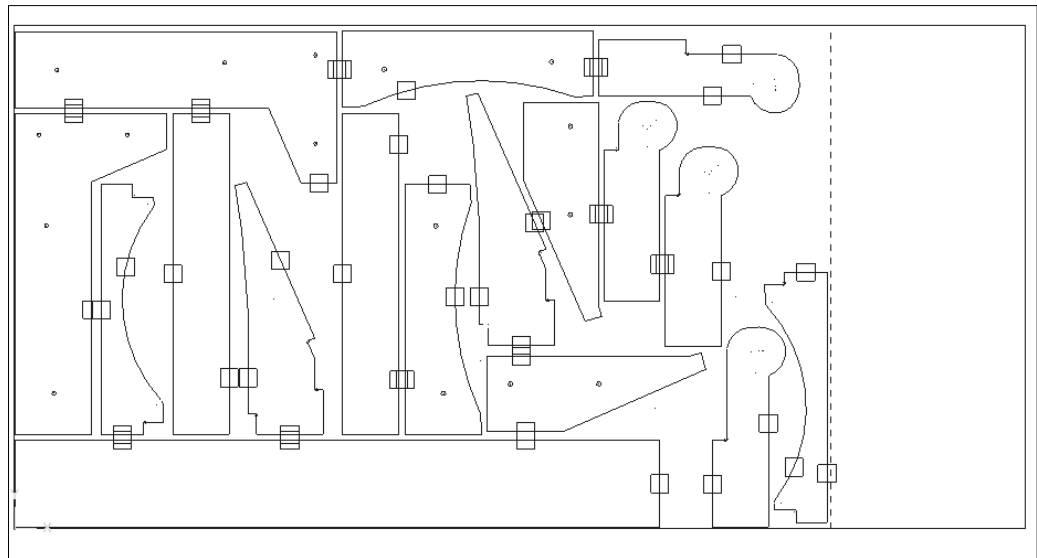
**Resources** – Download the file from [www.emastercam.com/files/x4\\_pc-router.html](http://www.emastercam.com/files/x4_pc-router.html)

### File

➤  Open

➤ Select **Frame Nested.mcx**

➤ Delete the text “Sheet #1 Results and the original parts and keep only the sheet with the nested parts as shown.



### Screen

➤ Combine Views

➤ This ensures that all arcs are moved from the parallel views to the single view. This option is useful when you translate files from other applications and want to reduce the number of different views. For example, if you have arcs on the bottom view and top view, Mastercam moves all arcs to top view.

## Properties

### Tool Settings

- Set the **Program # 600**
- Enable **Assign tool numbers sequentially** and all the **Advanced** options.
- Enable **Feed Calculation From Tool**

### Establishing the stock size

- Set the stock size using **All Entities** button. Enter the thickness of the stock Z=16

## 16.1. DRILLING THE 10MM DIAMETER THROUGH HOLES

### ➤ Toolpath



➤ Use Mask on Arc

➤ In the **Toolpath Parameters** using **Select library tool** and the filter options select the 10mm Drill

➤ Set the **Spindle speed** and the **Feed rate** (no coolant)

➤ Type in the comment area "Drilling the 10mm diameter holes".

### Simple drilling

➤ **Clearance** = 50 (Abs)

➤ Enable **Use clearance only at the start and end of operation**

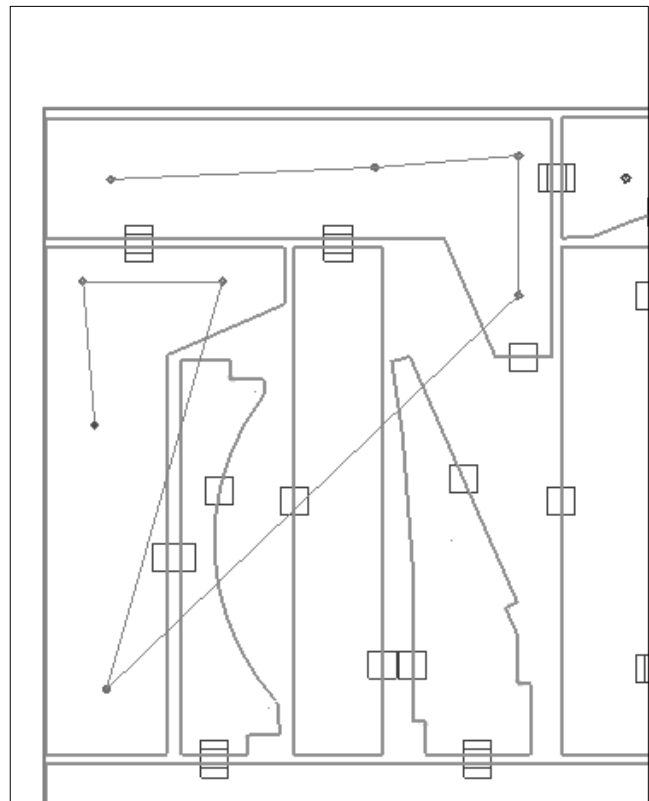
➤ **Retract** = 5.0(Abs)

➤ **Top of stock** = 0 (Abs)

➤ **Depth** = -17.0

➤ Set the **Cycle** to **Drill/Counterbore**

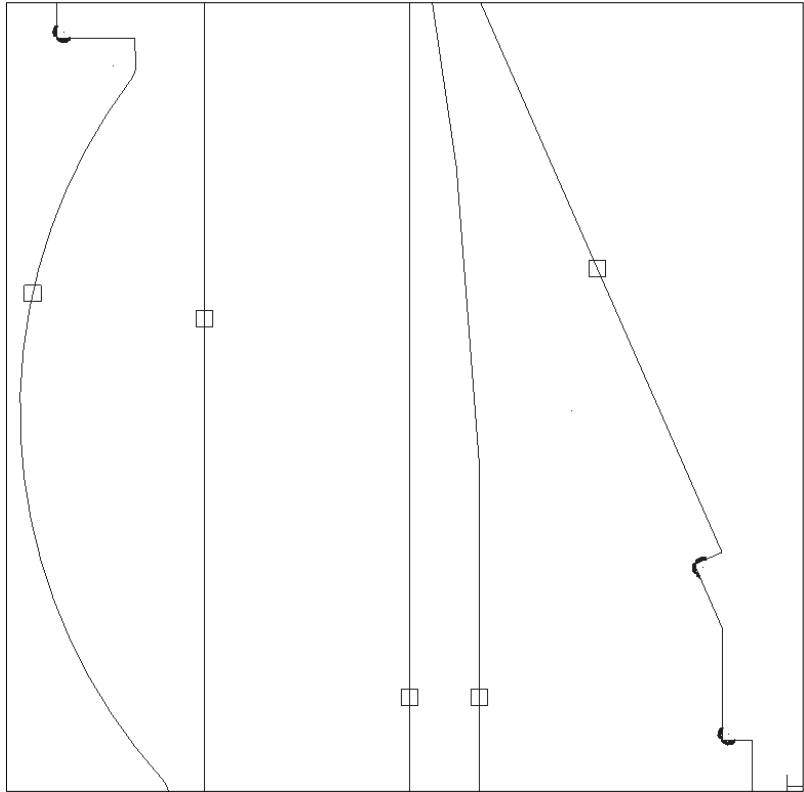
➤ **Backplot** and **Verify** the toolpath



## Router X<sup>4</sup>


- Note the green color #10 arc that where created to ensure a better fitting of the parts when they will be assembled.

- We are going to drill them with a 12mm drill



### 16.2. DRILLING THE 12MM DIAMETER THROUGH HOLES

#### ➤ Toolpath

-  Drill

- Use Entity and mask on color 9 and color 10
- In the **Toolpath Parameters** using **Select library tool** and the filter options select the 12mm Drill
- Set the **Spindle speed** and the **Feed rate** (no coolant)
- Type in the comment area "Drilling the 12mm diameter holes".

#### Simple drilling

- **Clearance** = 50 (Abs)
- Enable **Use clearance only at the start and end of operation**
- **Retract** = 5.0(Abs)
- **Top of stock** = 0 (Abs)
- **Depth** = -17.0
- Set the **Cycle** to **Drill/Counterbore**
- **Backplot** and **Verify** the toolpath

### 16.3. CONTOUR THE OUTSIDE PROFILES

#### ➤ Toolpaths

##### ➤ Contour

- Use window selection, mask on color magenta #13 and enable CW for Closed chains to ensure climb cut.

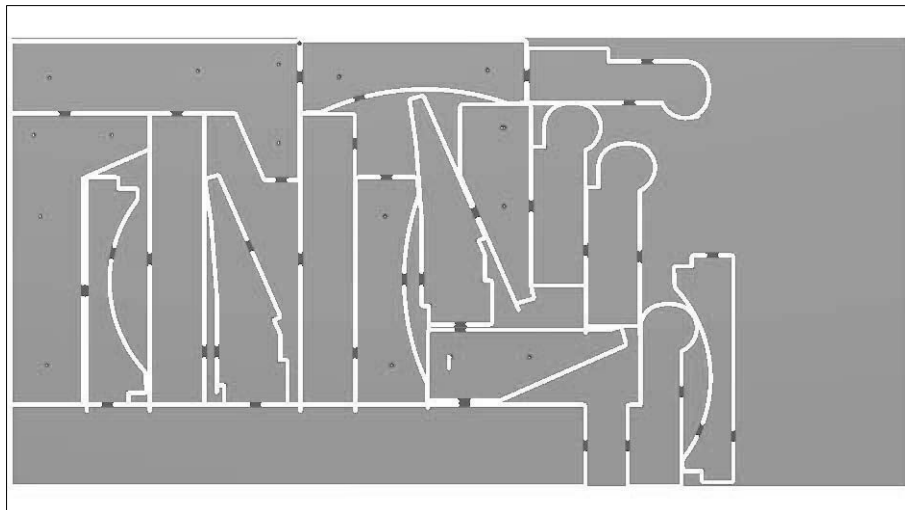
#### Toolpath parameters

- In the **Toolpath Parameters** click on **Select library tool** and using **Filter** select the 12mm Router Bit

#### Contour Parameters

#### Set-up Heights

- Clearance = 50 (Abs)
- Retract = 25 (Abs)
- Feed plane = 2 (Incr)
- Top of stock = 0 (Abs)
- Depth = -17 (Abs)
- Set the cutter compensation in Computer to the Left.
- Enable Lead In/out and set the Entry line to Tangent and 200%
- No Arc entry and no exit Line and Arc
- Enable Filter and keep the defaults
- Enable Tabs and set them to;
- Partial, Width= 30 and Tab thickness = 3.0
- Enable Manual and Use square point for tab position
- In the Settings, enable Midpoint and Ramp moves with Ramp angle = 45 deg
- Backplot the toolpath
- Verify the toolpaths




## 16.4. USE CONTOUR TOOLPATH TO MACHINE THE CUT OFF

### ➤ Toolpaths

#### ➤ Contour

- Use Single selection and select the line in the upward direction

### Toolpath parameters

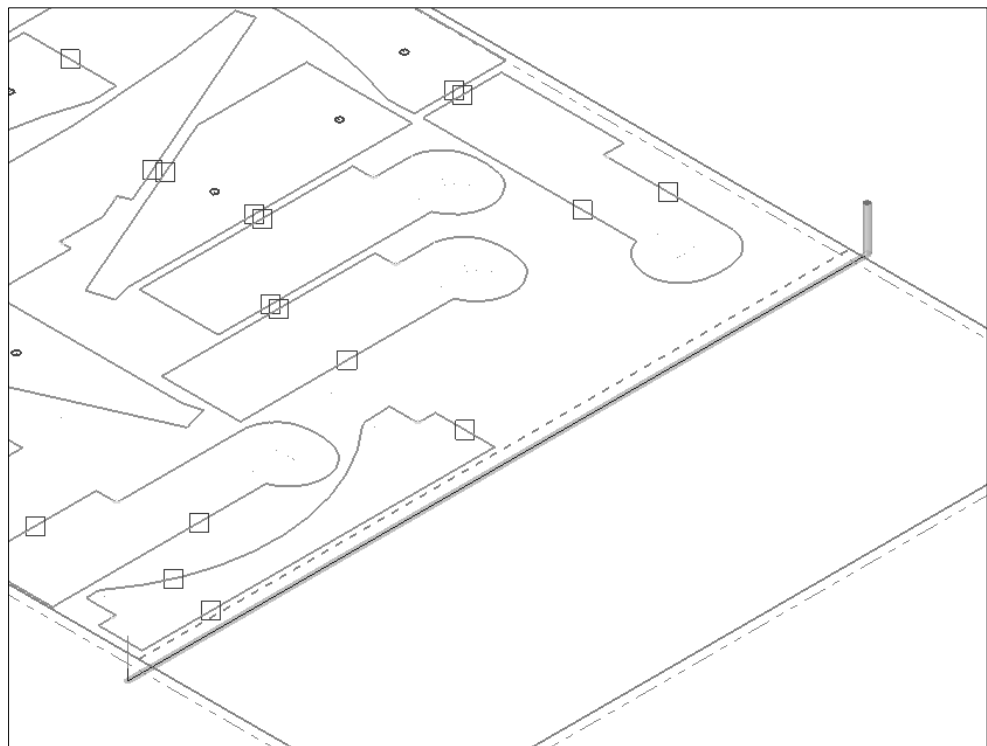
-  Use the 12mm Router Bit

### Contour Parameters

### Set-up Heights

- Clearance = 50 (Abs)
- Retract = 25 (Abs)
- Feed plane = 2 (Incr)
- Top of stock = 0 (Abs)
- Depth = -17 (Abs)
- Set the cutter compensation in **Computer** to the **Right**.
- Enable **Lead In/out** and set the **Entry/exit** line to Tangent and 200%
- No Arc entry and exit
- Backplot the toolpath.

- **Post process** the file.



## 17. TOOLPATH NESTING

**Resources** – Download the file from [www.emastercam.com/files/x4\\_pc-router.html](http://www.emastercam.com/files/x4_pc-router.html)

### File

➤  Open


➤ Select **Nesting geom.mcx**

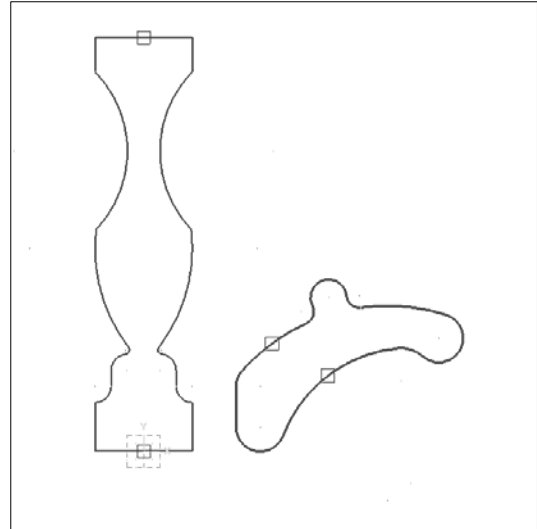
### 17.1. CONTOUR THE RIGHT PART

#### Toolpaths

➤  Contour

➤ Select the first chain in the **CW** direction.

**Tips:** Use **Reverse** button to change the direction if needed. 



#### Toolpath parameters

- Select the 1/4 Straight Bit
- Set the **Spindle speed** and the **Feed rate**
- Insert a comment: "Contour the left part".

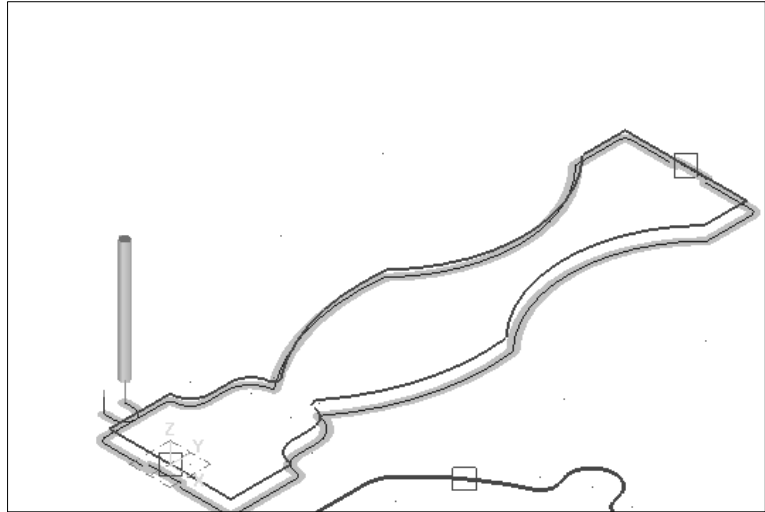
#### Contour parameters

- **Clearance** = 2.0 (Abs)
- **Retract** = 0.25 (Abs)
- **Feed plane** = 0.1 (Incr)
- **Top of stock** = 0 (Abs)
- **Depth** = -0.250 (Abs)
- Set the cutter compensation in Control to the Left
- Make sure that the Lead in/out is enable; enable Entry/exit at midpoint in closed contours
- Enable Tabs and set the parameters to; Partial; Width = 0.5; Tab thickness = 0.1
- Enable Manual and Use square point for tab position
- Select Settings and enable Point Geometry Tab Positioning at Midpoint



## Router X<sup>4</sup>

- Backplot the first contour toolpath.



- Note the tabs.

### 17.2. CONTOUR THE LEFT PART.

#### ➤ Toolpaths

-  Contour

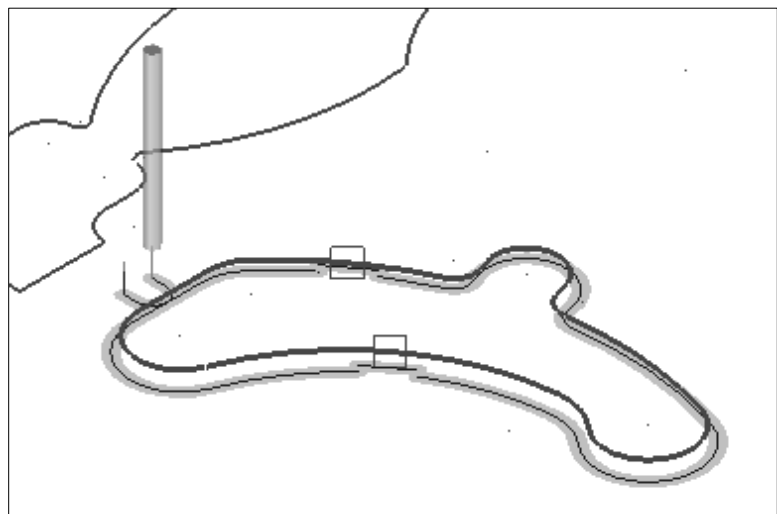
- Select the first chain in the **CW** direction.
- Select the 1/4 Straight Bit
- Set the **Spindle speed** and the **Feed rate**
- Insert a comment: "Contour the right part".

Set the contour parameters same as the first part

- **Depth = -0.250 (Abs)**
- Set the cutter compensation in **Control** to the **Left**
- Make sure that the **Lead in/out** is enable; enable **Entry/exit at midpoint in closed contours**

- **Disable Tabs**

- **Backplot** the second contour toolpath.




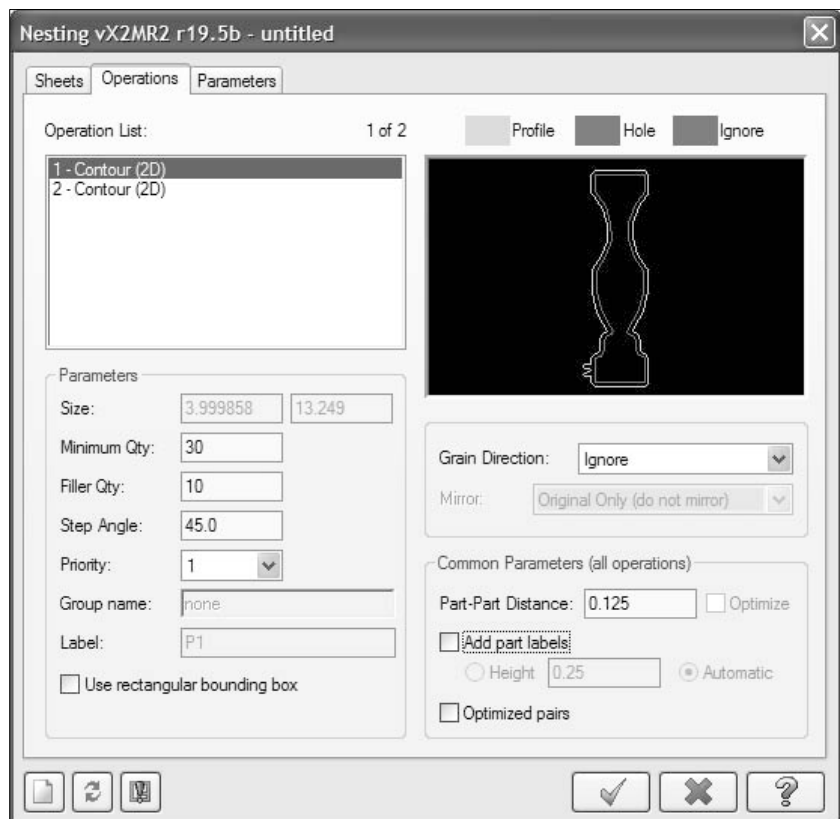
### 17.3. NESTING THE TOOLPATHS.

#### ➤ Toolpaths

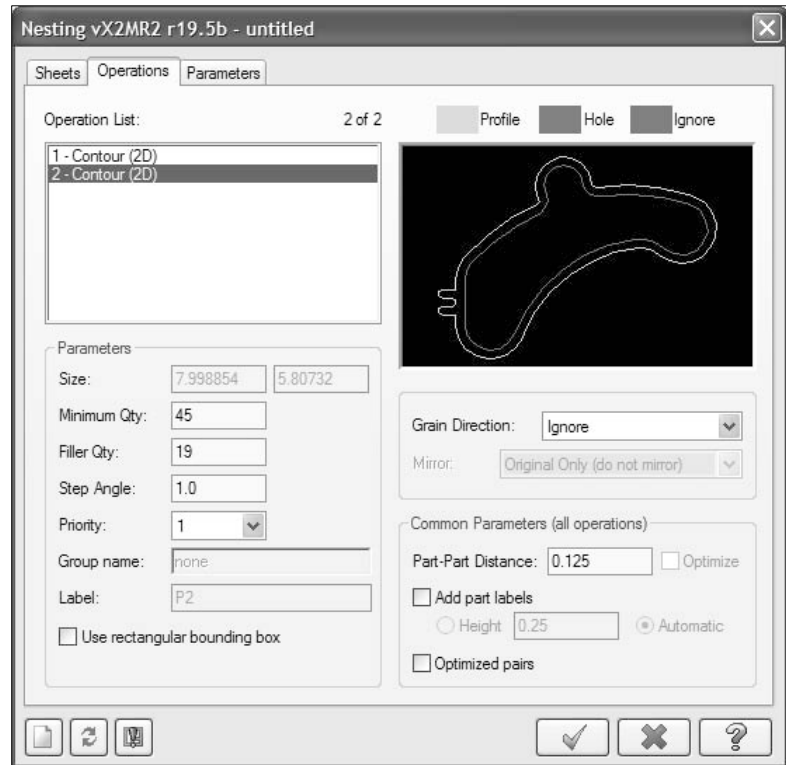
##### ➤ Nesting

#### Sheets tab

- Leave the **Size** 96 by 48
- **Quantity** = 1
- **Origin** X0,Y0
- **Grain Direction** set to **Horizontal**
- **Sheet Margin** = 0.125
- Select the Config button .
- Enable **Load default sheet** and **Display Results dialog**
- Enable True Shape and Nest to Tool diameter
- **Accuracy** set to **Fine**
- Enable **Include rapid move** to **All ops**
- Disable Nest smaller part in the holes of larger parts
- **Operation tab**
- **Right-mouse click** and select **Add operations**
- Select both contours
- Click on 1-Contour and set the parameters as shown



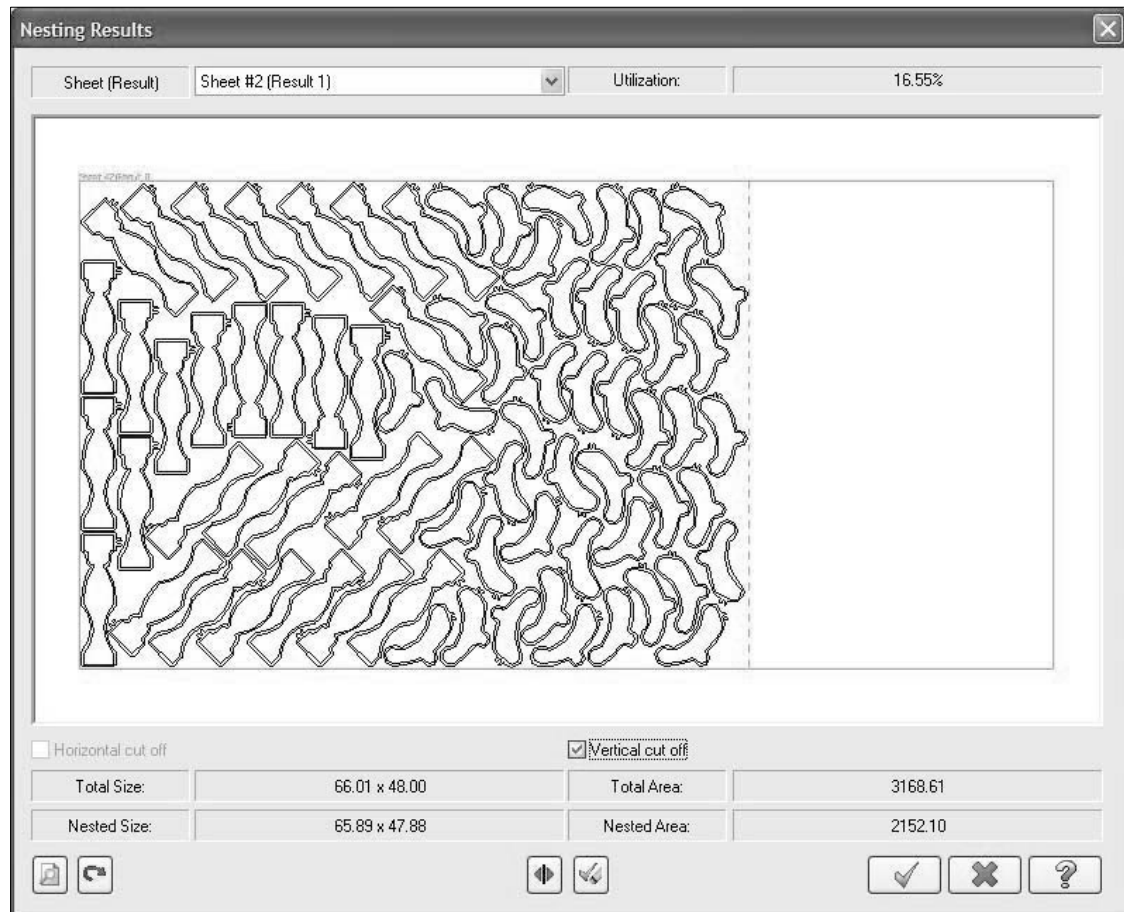
- ➔ Click on **2-Contour** and set the parameters as shown



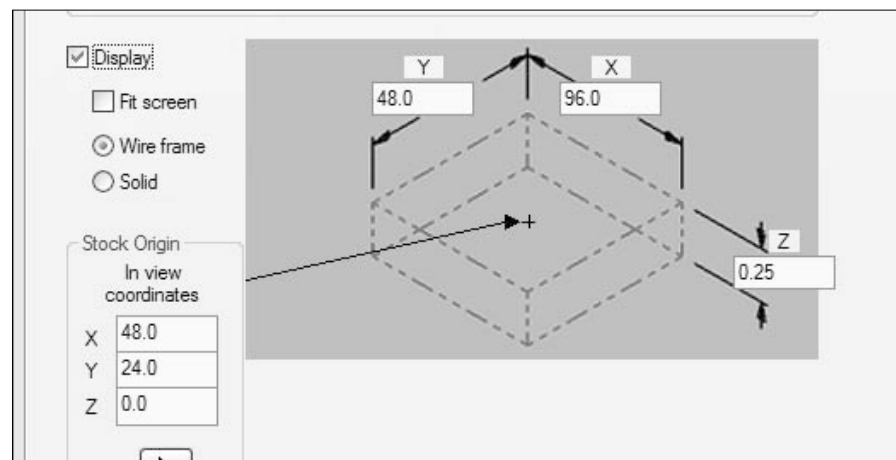
### Parameters tab

- ➔ Enable **Maximum vacuum** and **Minimum tool change**
- ➔ Set **Stop condition** to **None**
- ➔ Enable **One work origin per sheet**

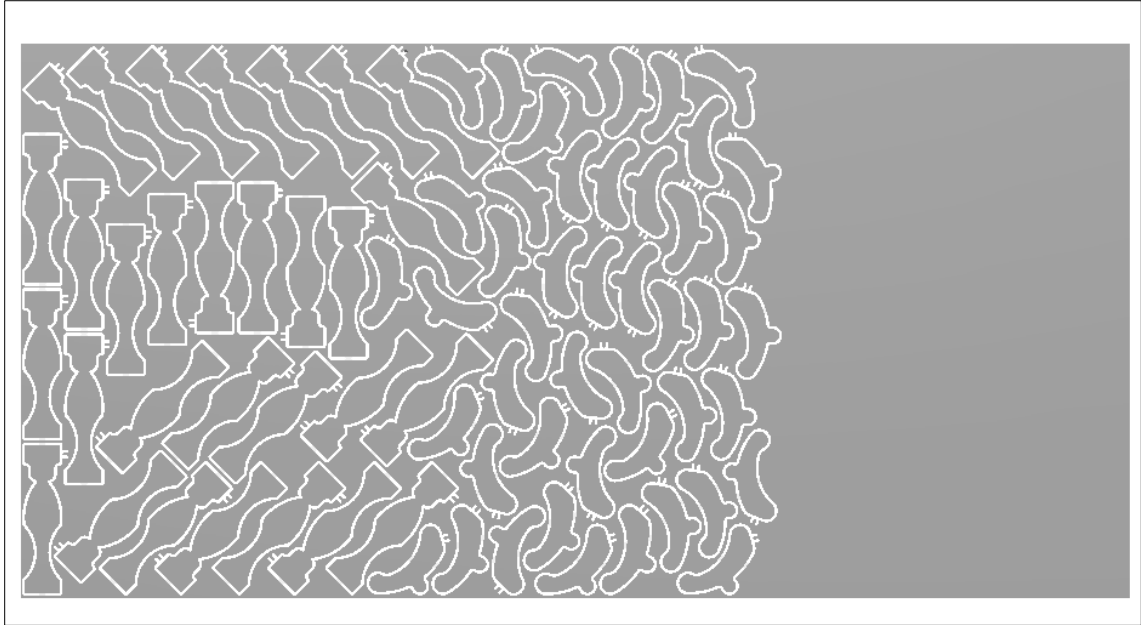
- The **Nesting results** should look as shown **Vertical cut off**.



- Set the Stock as shown




- Verify the Nesting toolpath



## DRAWING # 11.MCX

### 18. REVIEW- POCKET (ISLAND FACING) TO MACHINE THE PANELS

- File
  -  Open
  - Select **Drawing 11.mcx**
  - Using **Xform Translate** command to **move** the panels (The inside chains) along Z-.0125

