CHARLOTTE LATIN SCHOOL

MakerCAM Workflow

This presentation covers setting up your project, importing your design files, and creating the three necessary toolpaths (traces, drills, and outline) to mill a PCB on the Carvera.

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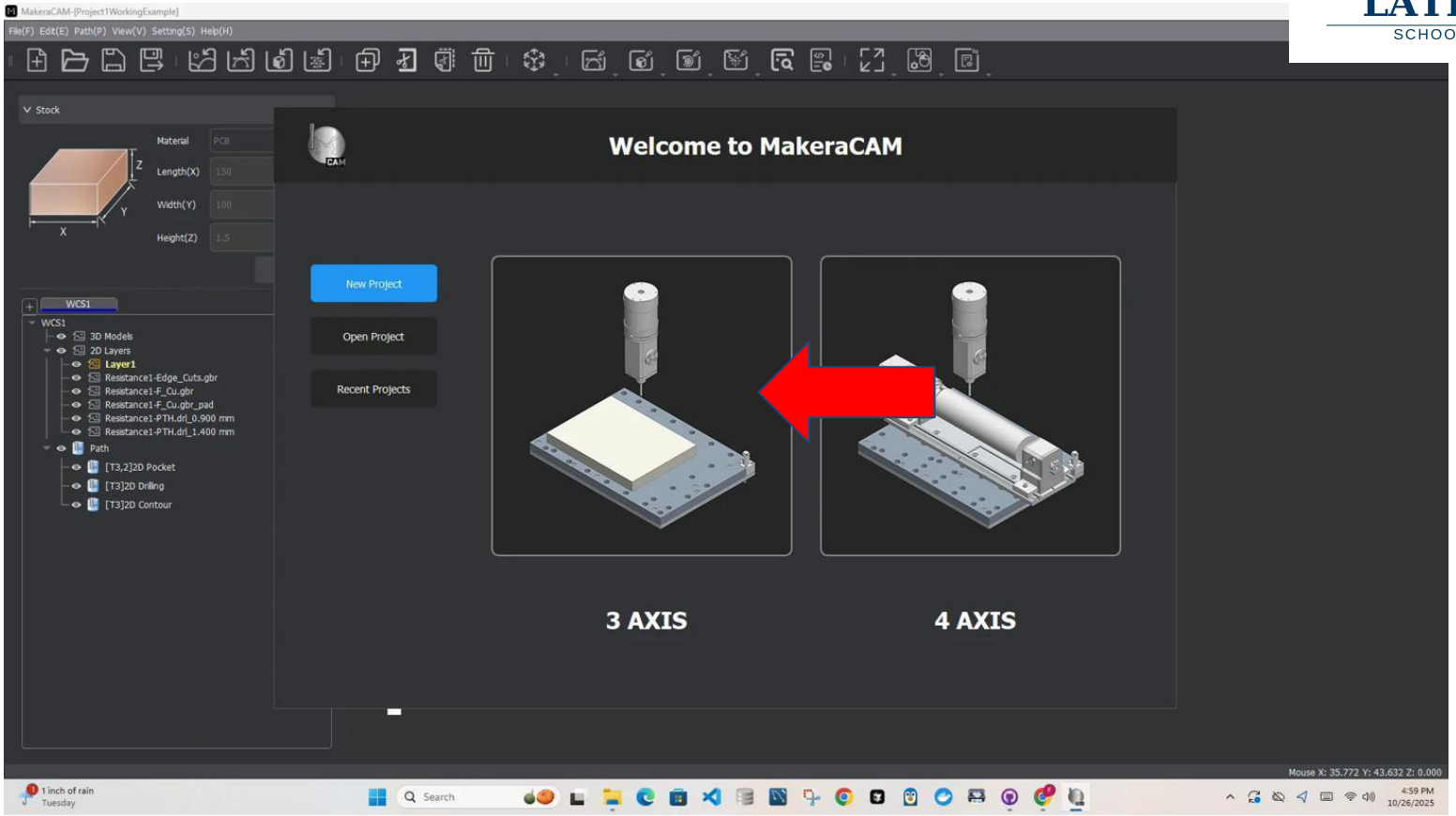
This presentation covers setting up your project, importing your design files, and creating the three necessary toolpaths (traces, drills, and outline) to mill a PCB on the Carvera.

Phase 1: Project & Stock Setup

- Open Makera CAM and select **New Project**.
- On the "Welcome to MakeraCAM" screen, choose a **3 AXIS** project.


MakeraCAM-[Project1WorkingExample]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
Stock
Material
Length(X)
Width(Y)
Height(Z)
WCS1
3D Models
2D Layers
Layer1
Resistance1-Edge_Cuts.gbr
Resistance1-F_Cu.gbr
Resistance1-F_Cu.gbr_pad
Resistance1-PTH.drl_0.900 mm
Resistance1-PTH.drl_1.400 mm
Path
[T3,2]2D Pocket
[T3]2D Drilling
[T3]2D Contour
Welcome to MakeraCAM
New Project
Open Project
Recent Projects
3 AXIS
4 AXIS
Mouse X: 35.772 Y: 43.632 Z: 0.000
1 inch of rain
Tuesday
Search
4:59 PM
10/26/2025

Phase 1: Setting the Stock

- In the **Stock Setup** panel on the left, click **"Edit"**.
- Enter the dimensions of your PCB stock:
  - **Material:** PCB
  - **Length (X):** 127 mm
  - **Width (Y):** 101 mm
  - **Height (Z):** 1.7 mm
- Click **OK** to save.

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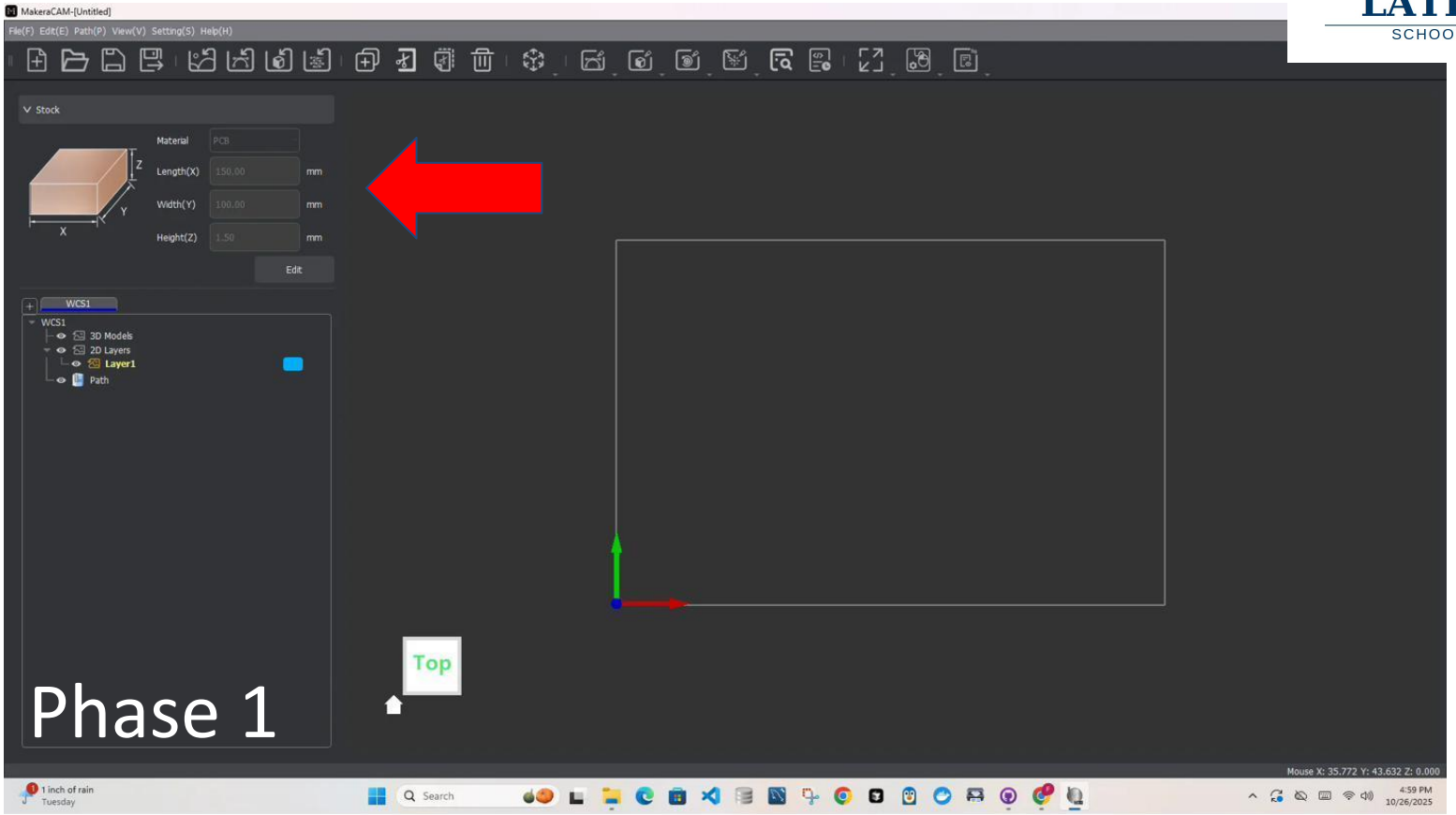
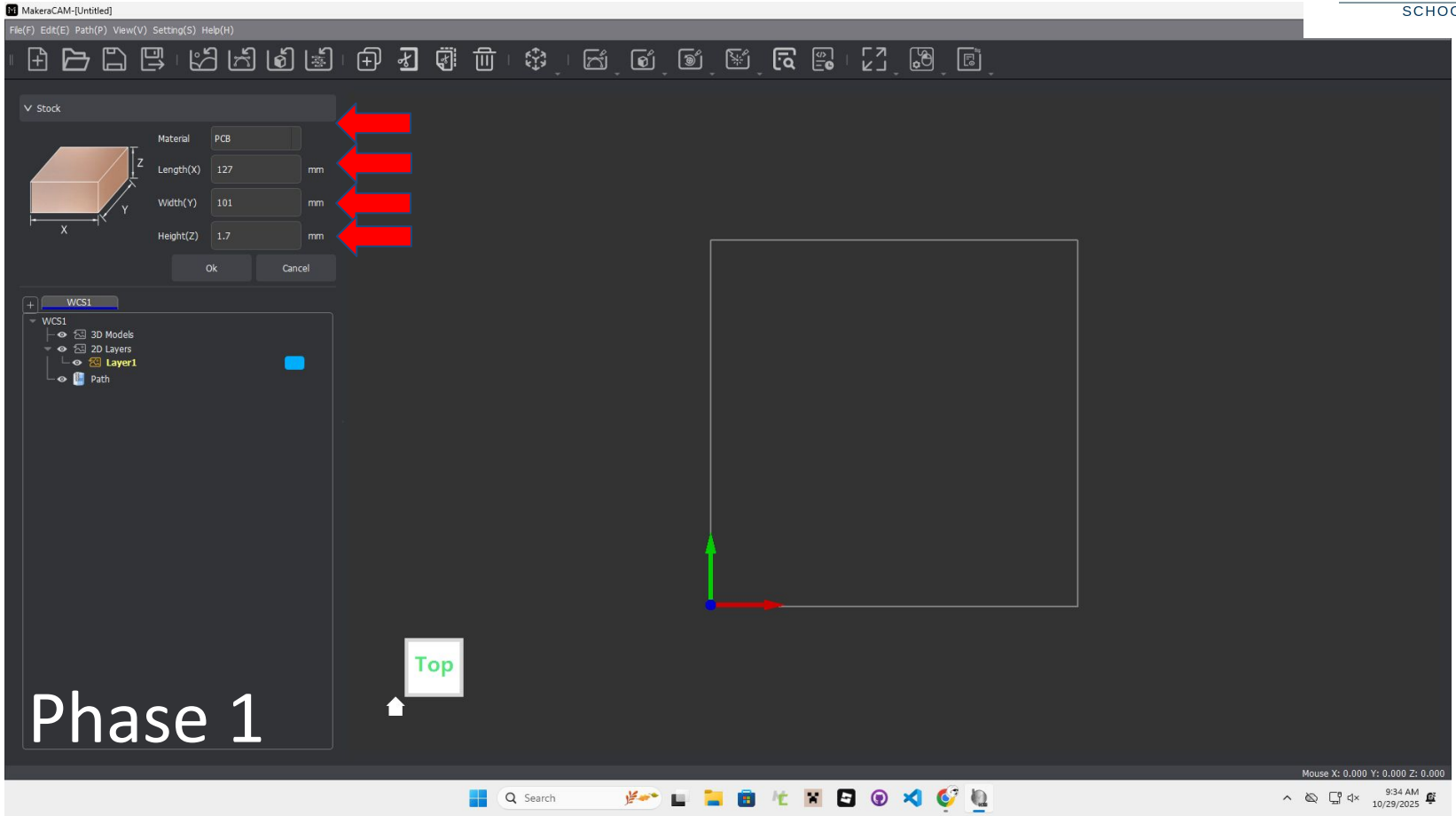
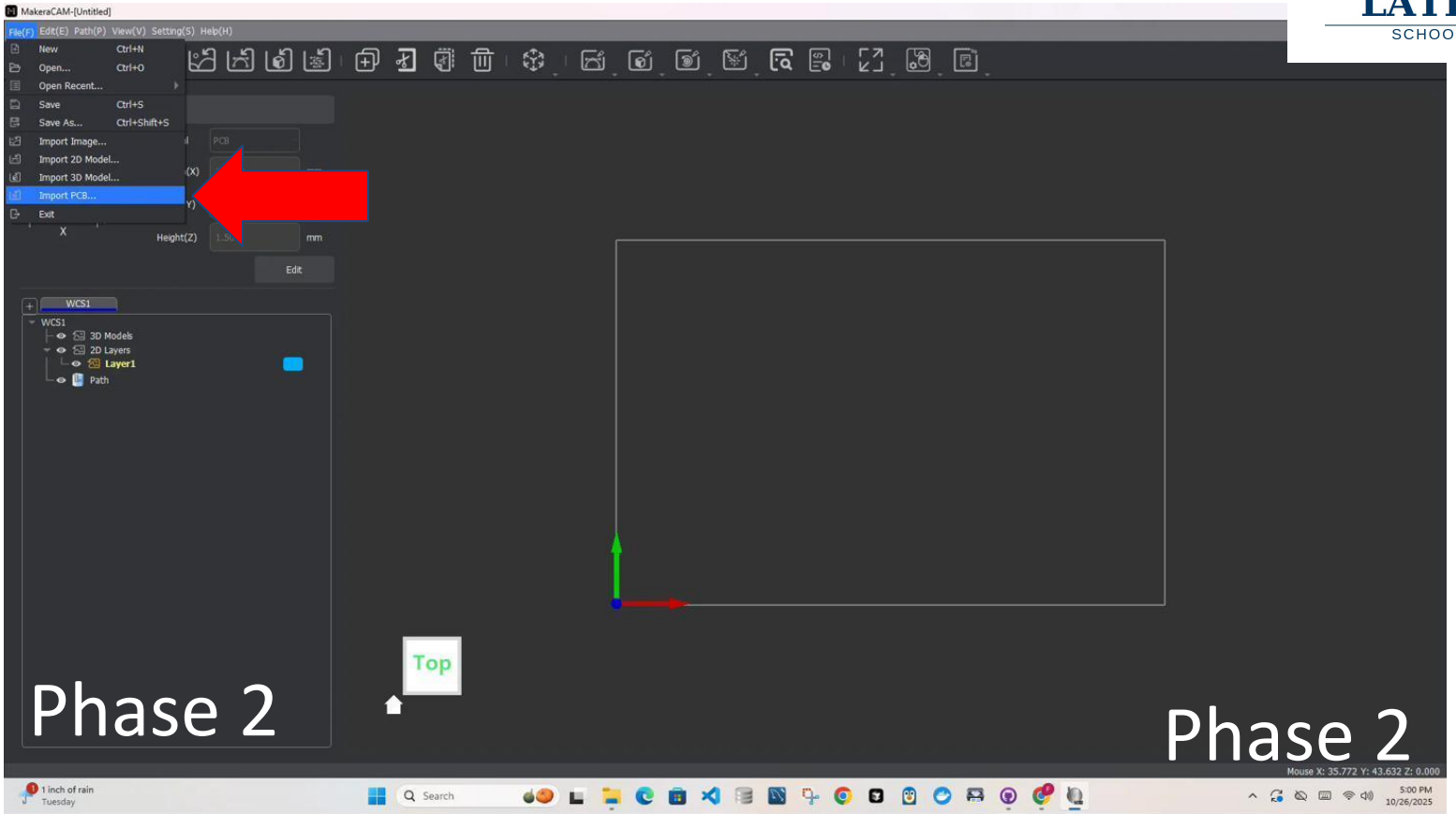


CHARLOTTE LATIN SCHOOL

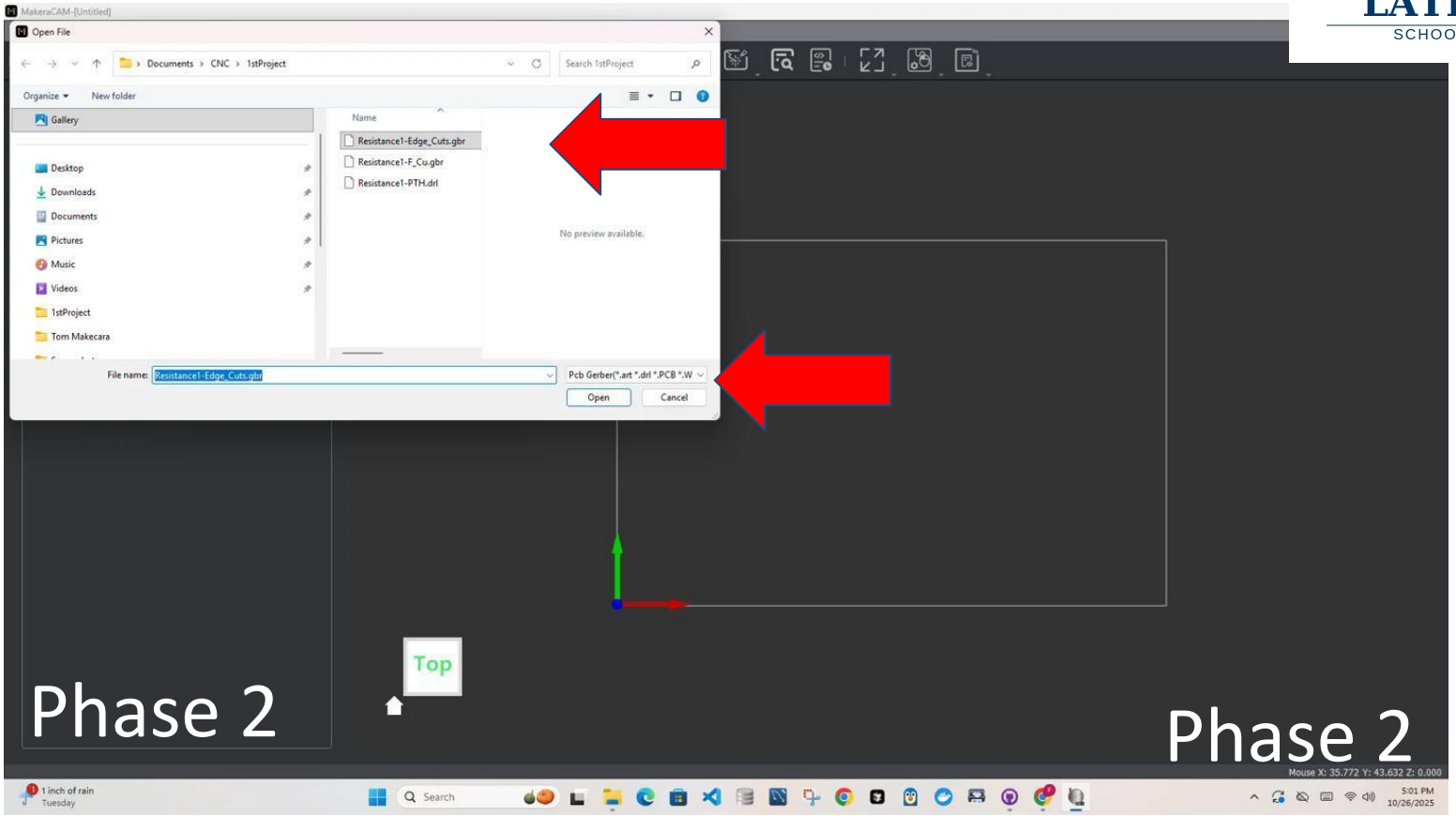


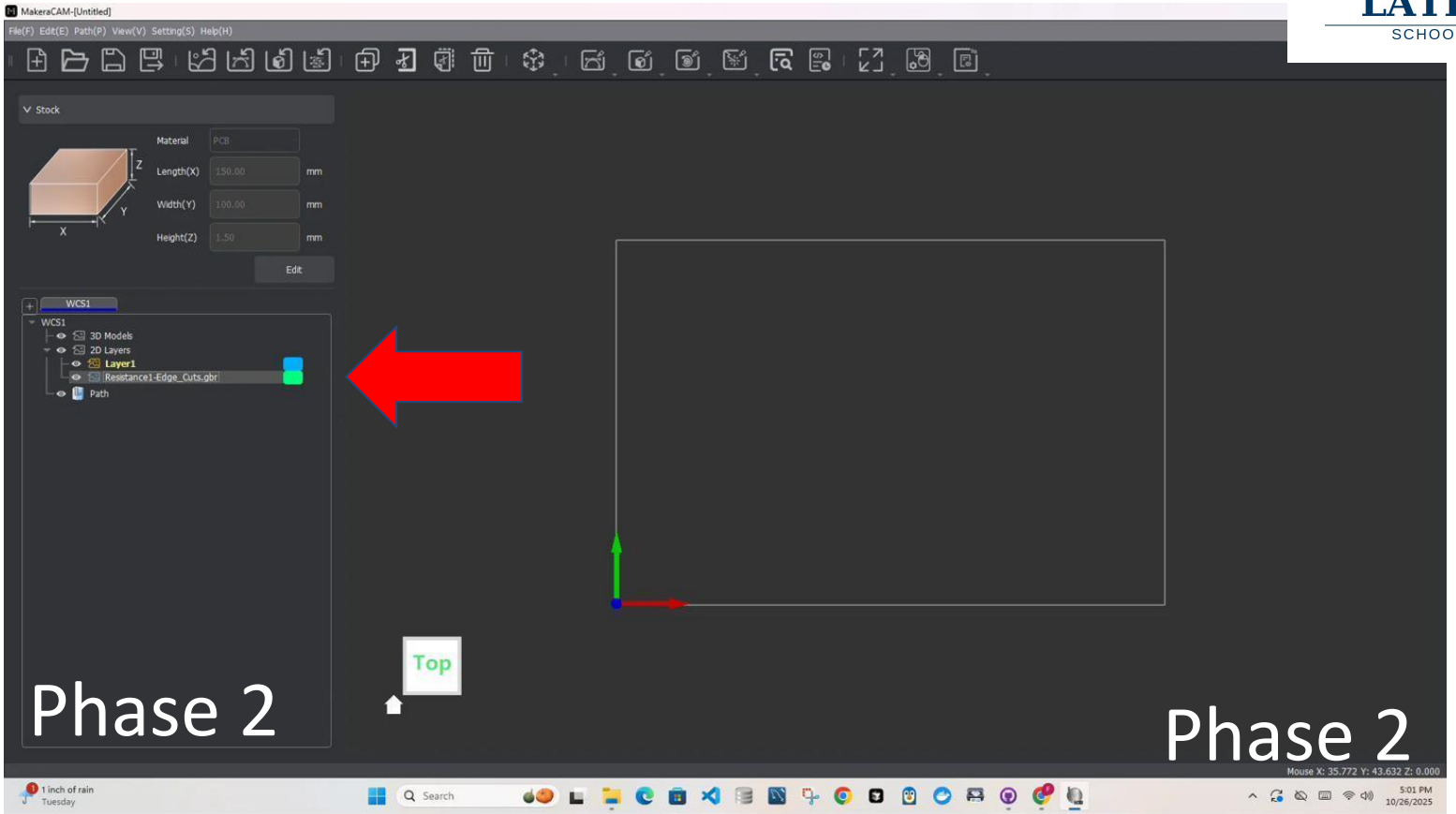
Phase 3: Import Your Design

- Go to the top menu: **File --> Import --> Import PCB (KiCad Gerber & Drill)**.
- Import your three files one by one:
  - **Edge_Cuts** file (outline)
  - **F.Cu** file (traces)
  - **PTH.drl** file (holes)


MakeraCAM-[Untitled]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
New Ctrl+N
Open... Ctrl+O
Open Recent...
Save Ctrl+S
Save As... Ctrl+Shift+S
Import Image...
Import 2D Model...
Import 3D Model...
Import PCB...
Exit
Height(Z)
mm
Edit
WCS1
3D Models
2D Layers
Layer1
Path
Top
Phase 2
Phase 2
Mouse X: 35.772 Y: 43.632 Z: 0.000
1 inch of rain
Tuesday
Search
5:00 PM
10/26/2025

CHARLOTTE LATIN SCHOOL




MakeraCAM-[Untitled]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
Stock
Material
PCB
Length(X)
150.00
mm
Width(Y)
100.00
mm
Height(Z)
1.50
mm
Edit
WCS1
WCS1
3D Models
2D Layers
Layer1
Resistance1-Edge_Cuts.gbr
Path
Top
Phase 2
Phase 2
Mouse X: 35.772 Y: 43.632 Z: 0.000
1 inch of rain
Tuesday
Search
5:01 PM
10/26/2025

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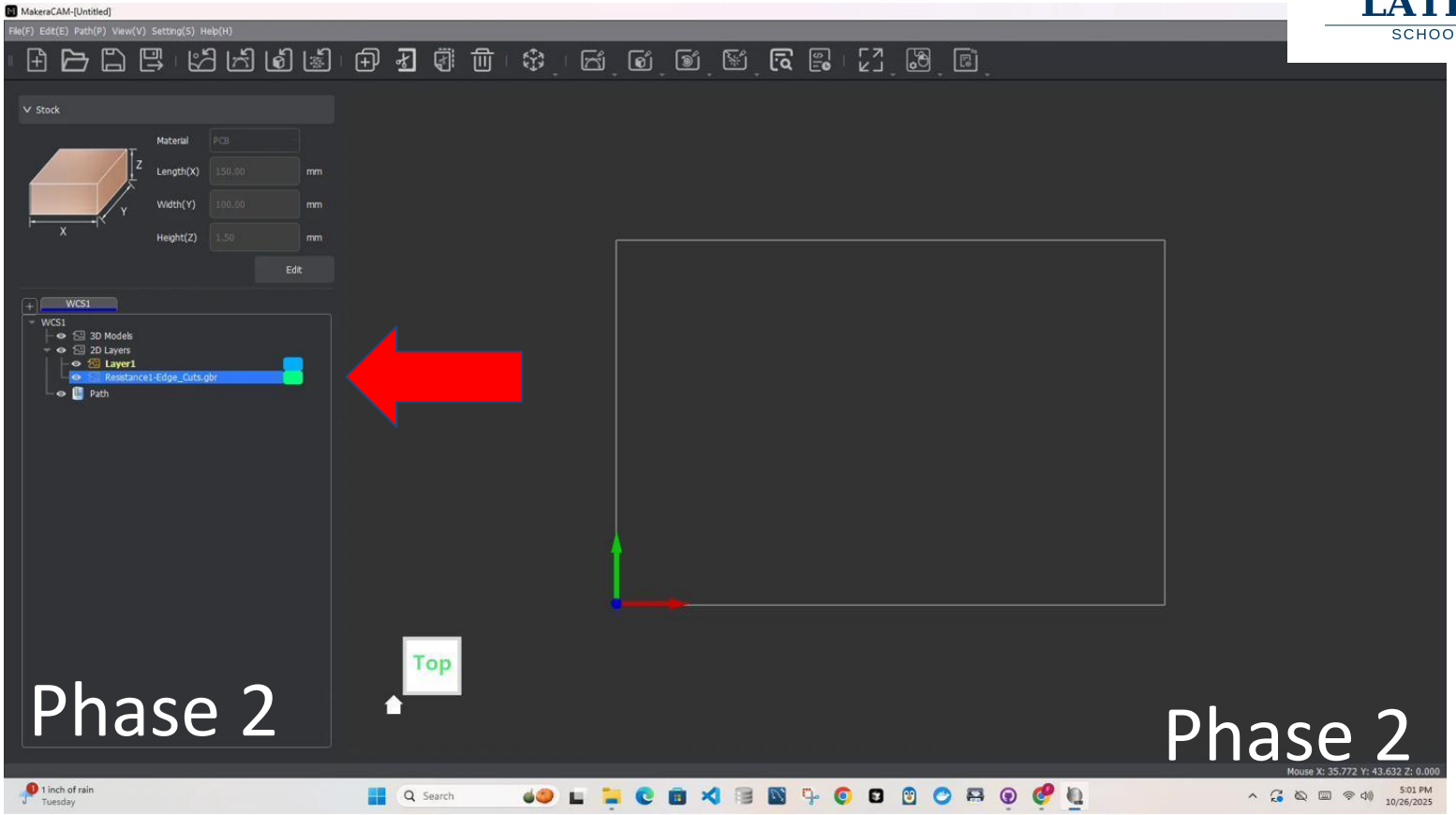

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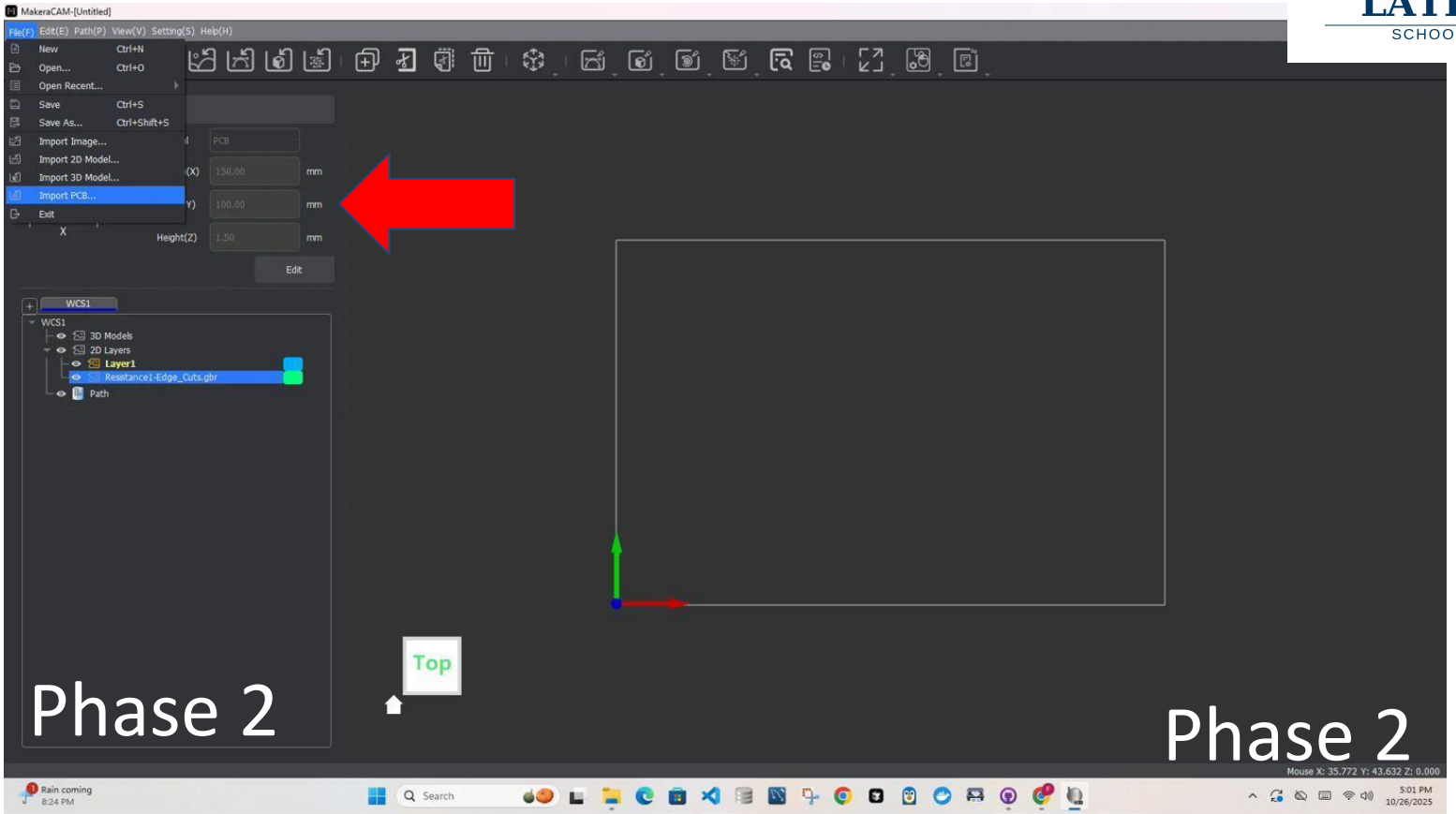

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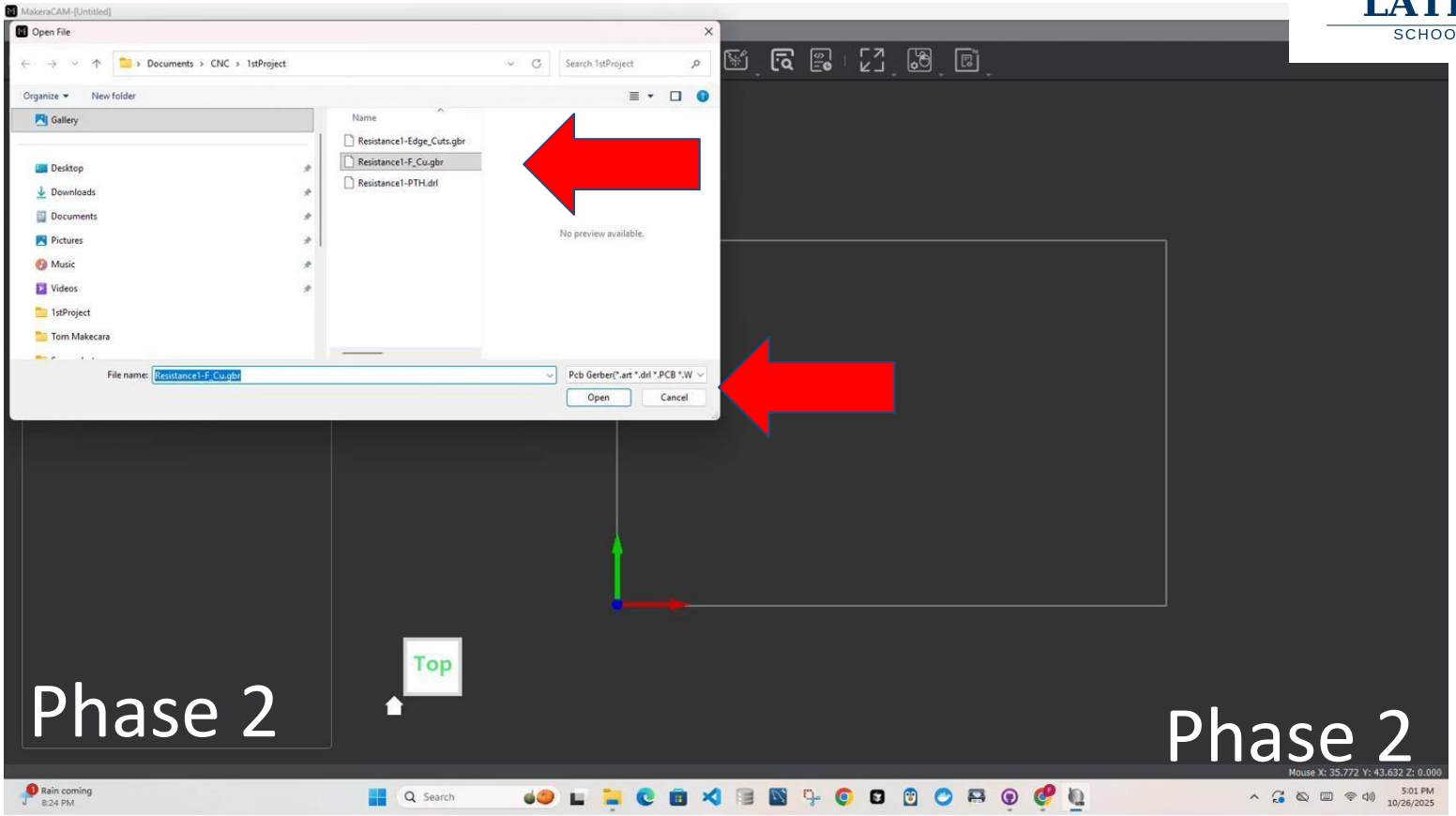

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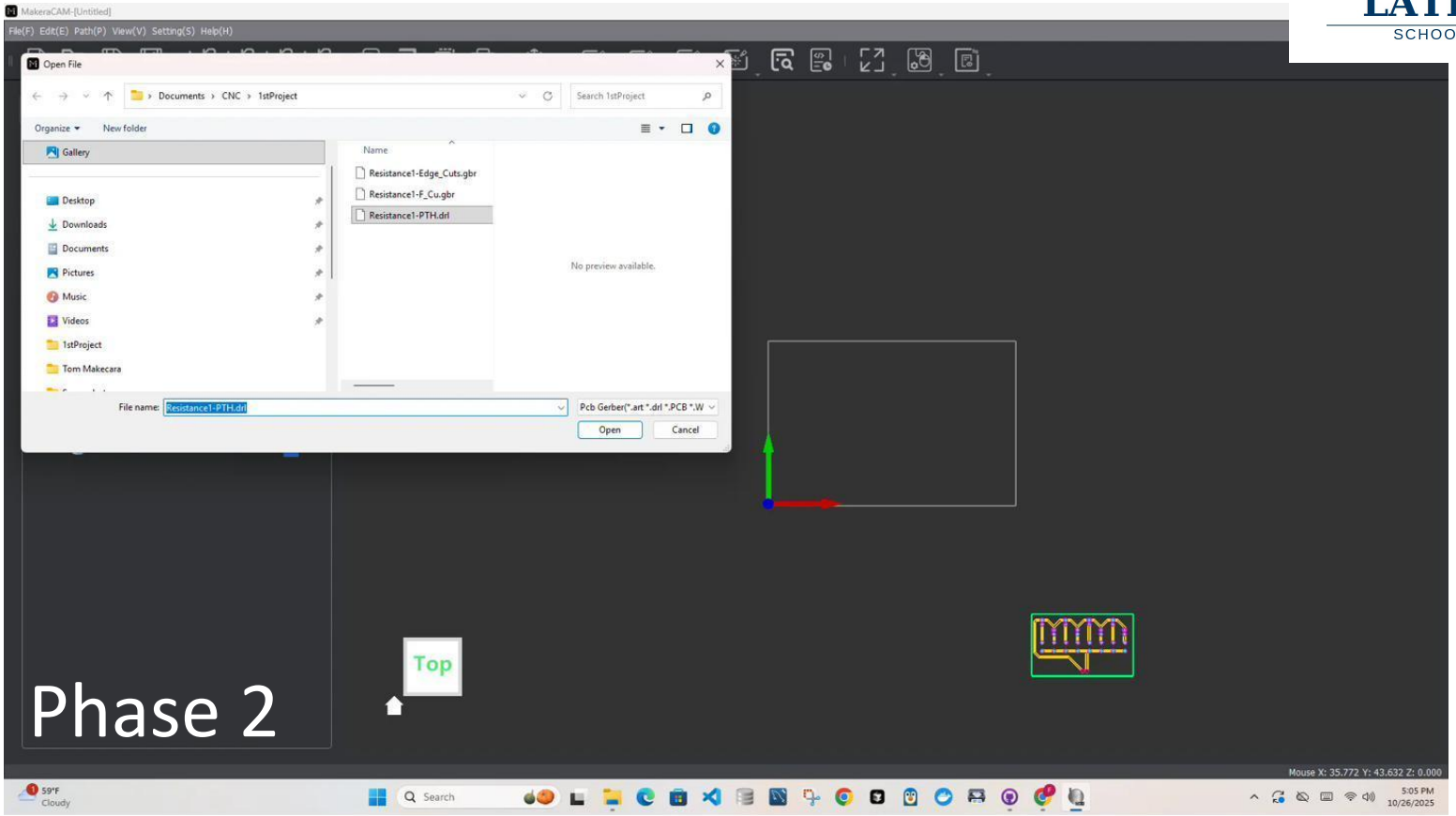

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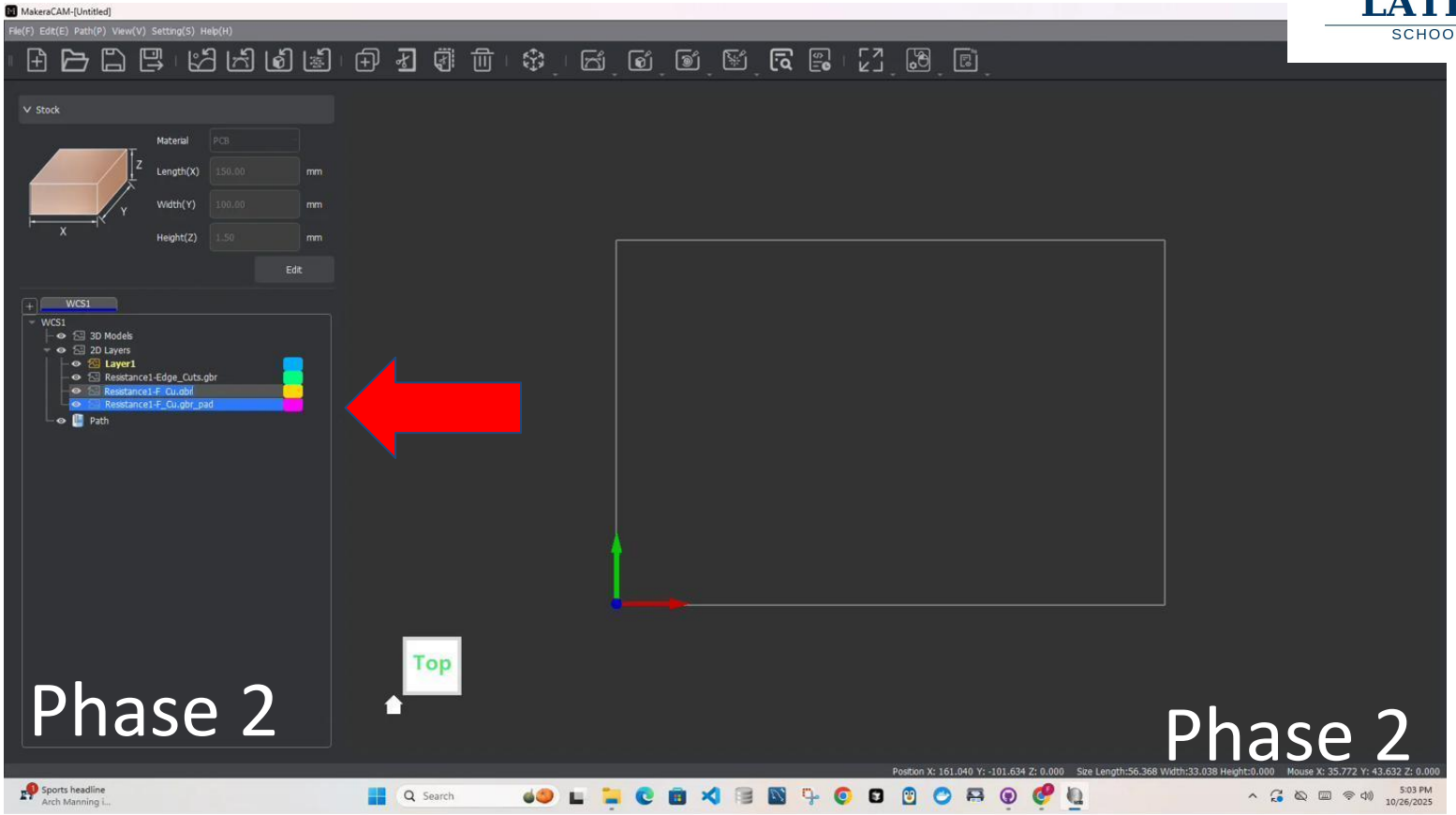
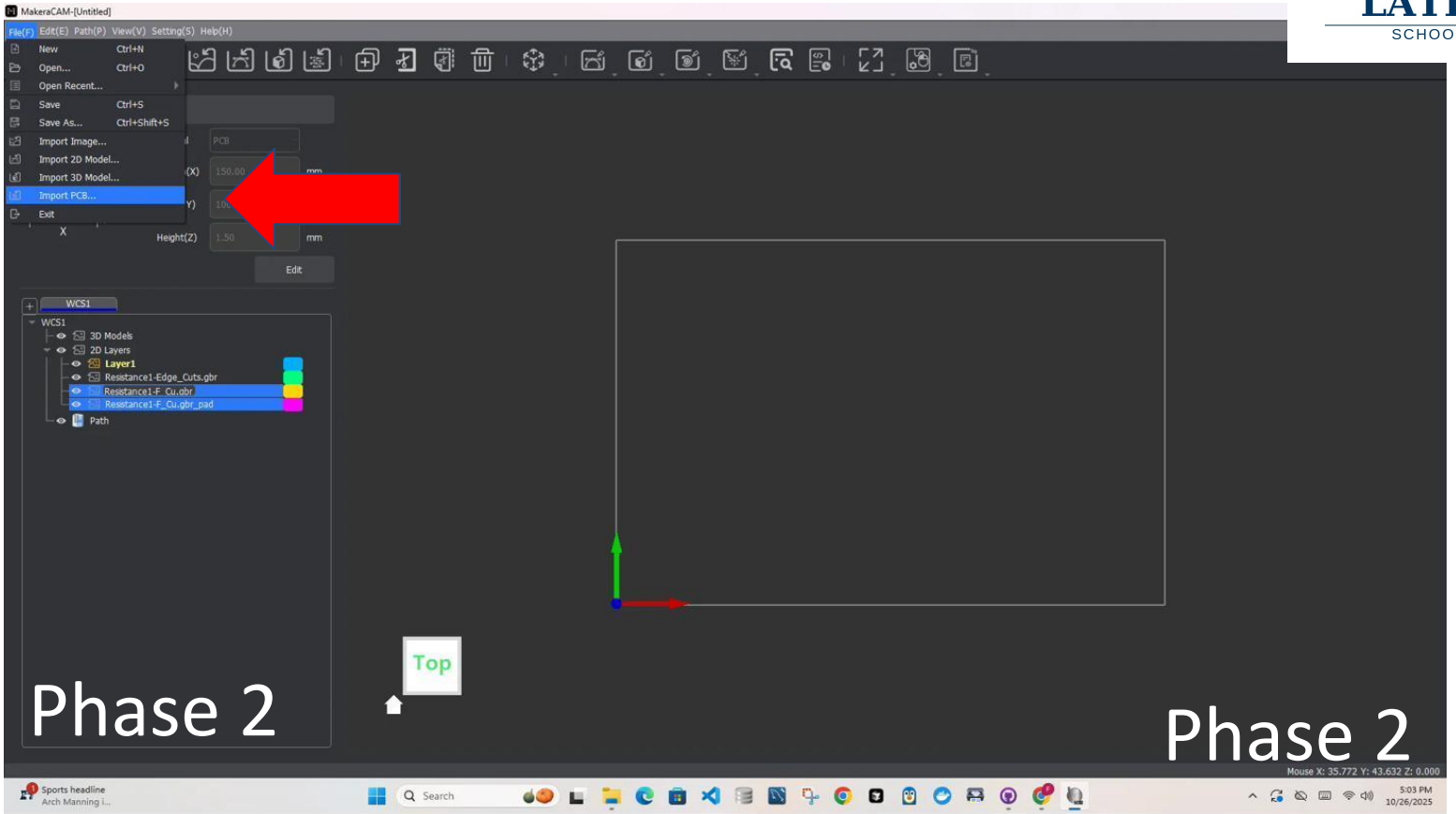
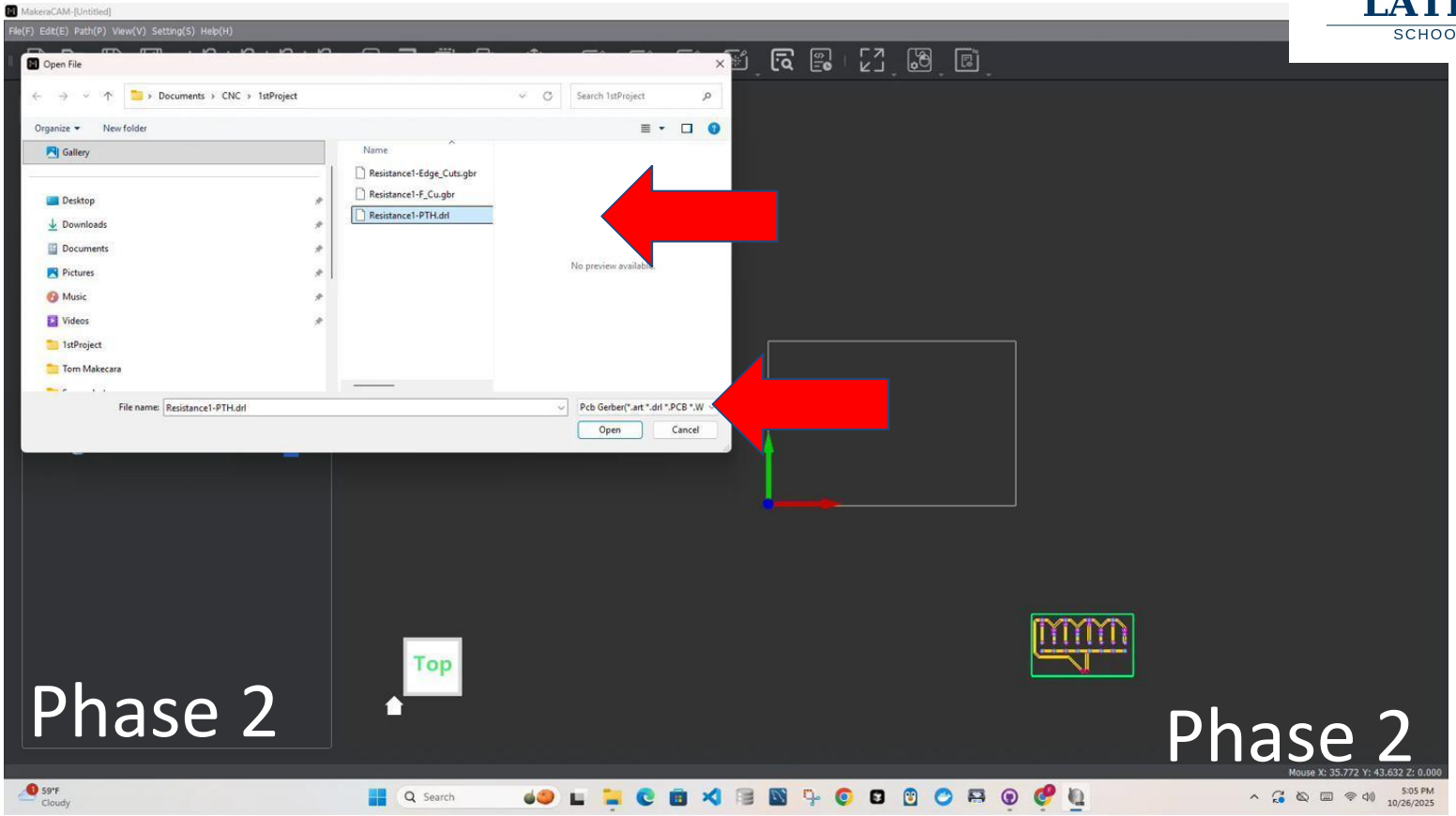
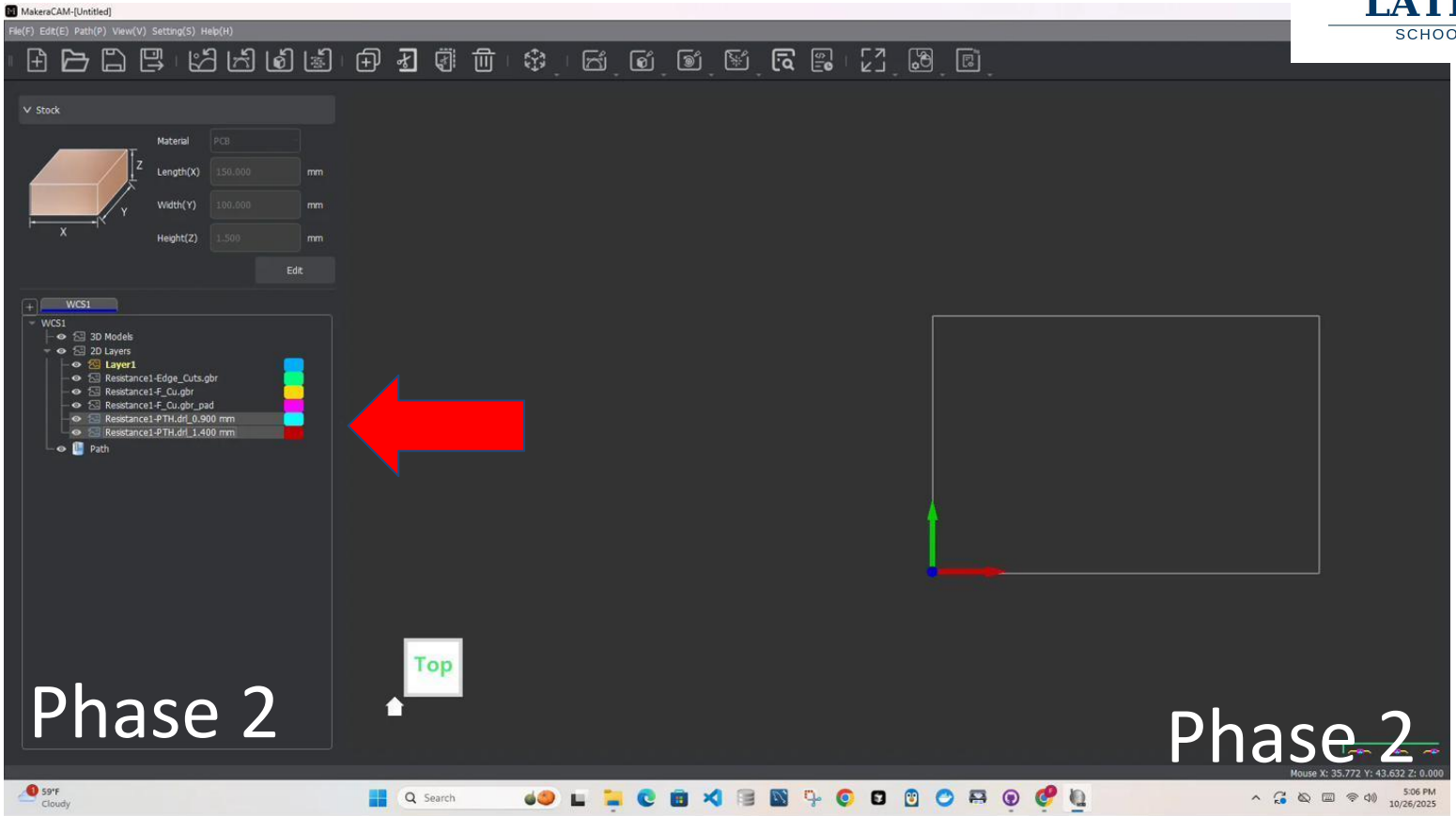



MakeraCAM-[Untitled]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
New Ctrl+N
Open... Ctrl+O
Open Recent...
Save Ctrl+S
Save As... Ctrl+Shift+S
Import Image...
Import 2D Model...
Import 3D Model...
Import PCB...
Exit
Height(Z)
Edit
WCS1
3D Models
2D Layers
Layer1
Resistance1-Edge_Cuts.gbr
Resistance1-F_Cu.gbr
Resistance1-F_Cu.gbr_pad
Path
Top
Phase 2
Phase 2
Search
Mouse X: 35.772 Y: 43.632 Z: 0.000
5:03 PM
10/26/2025

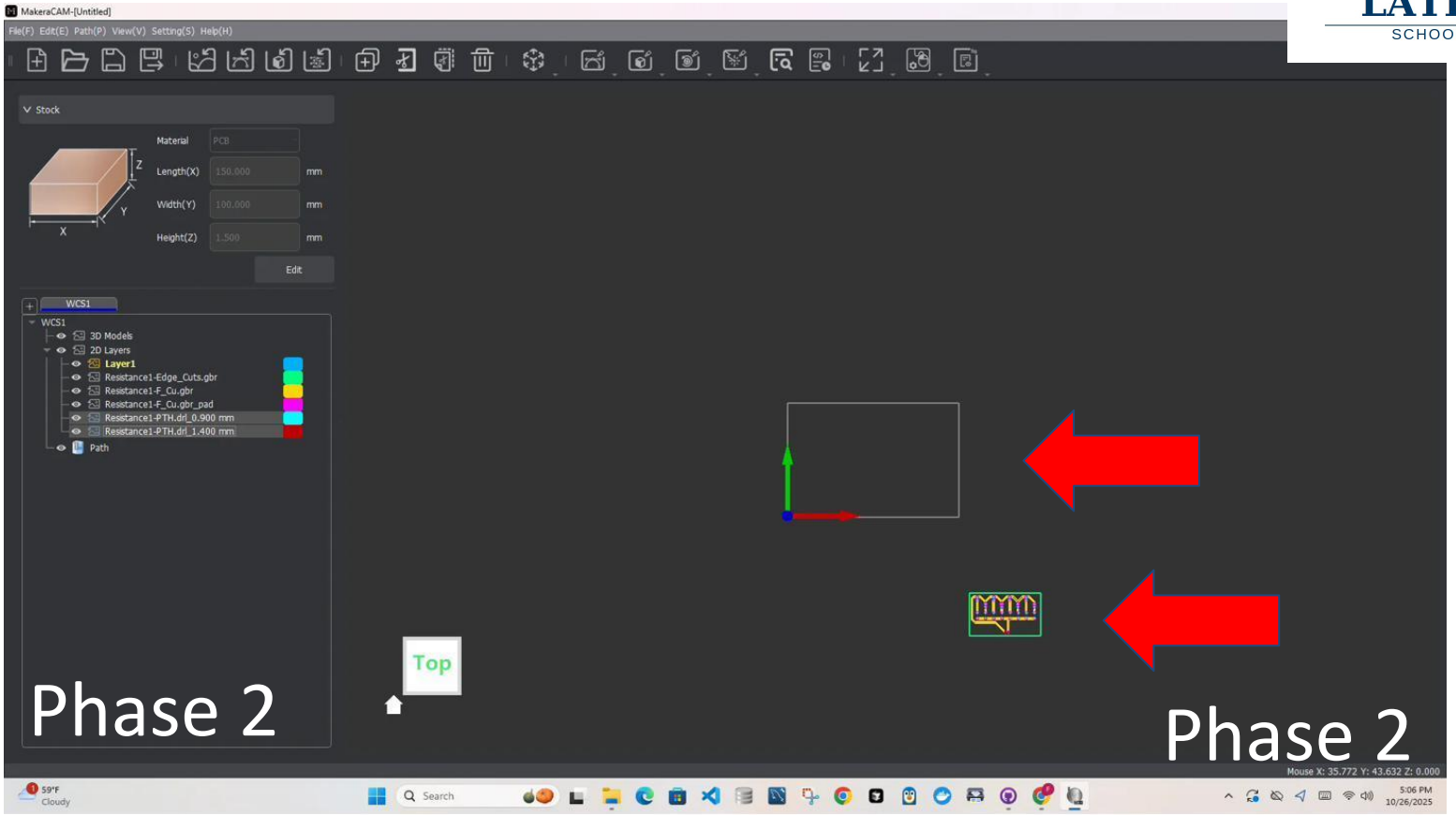
CHARLOTTE LATIN SCHOOL




MakeraCAM-[Untitled]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
Stock
Material
PCB
Length(X)
150.000
mm
Width(Y)
100.000
mm
Height(Z)
1.500
mm
Edit
WCS1
3D Models
2D Layers
Layer1
Resistance1-Edge_Cuts.gbr
Resistance1-F_Cu.gbr
Resistance1-F_Cu.gbr_pad
Resistance1-PTH.drl_0.900 mm
Resistance1-PTH.drl_1.400 mm
Path
Top
Phase 2
Phase 2
Mouse X: 35.772 Y: 43.632 Z: 0.000
59°F
Cloudy
Search
5:06 PM
10/26/2025

Phase 3: Position Your Design

- Your design may be off-screen. Zoom out to find it.
- Drag your mouse to select the entire design (it will become dotted).
- Press the **M key** (or **Transform → Move**).
- In the "Move" panel:
  - Change the **Anchor** to the **lower-left corner**.
  - Set **Location X:** 6.000
  - Set **Location Y:** 6.000
- Click **Close**.


MakeraCAM-[Untitled]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
Stock
Material
PCB
Length(X)
150.000
mm
Width(Y)
100.000
mm
Height(Z)
1.500
mm
Edit
WCS1
3D Models
2D Layers
Layer1
Resistance1-Edge_Cuts.gbr
Resistance1-F_Cu.gbr
Resistance1-F_Cu.gbr_pad
Resistance1-PTH.drl_0.900 mm
Resistance1-PTH.drl_1.400 mm
Path
Top
Phase 2
Phase 2
Mouse X: 35.772 Y: 43.632 Z: 0.000
59°F
Cloudy
Search
5:06 PM
10/26/2025

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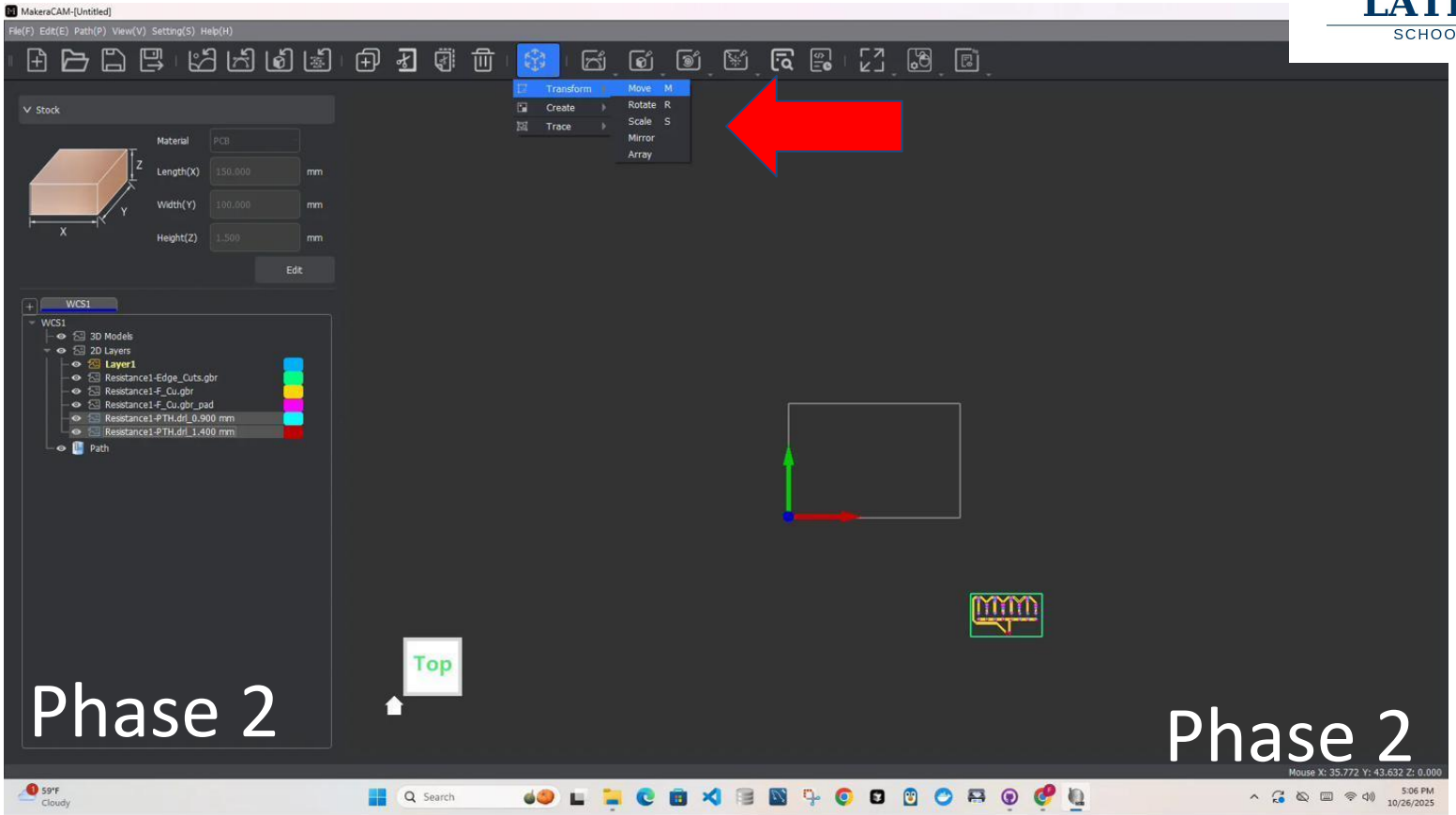

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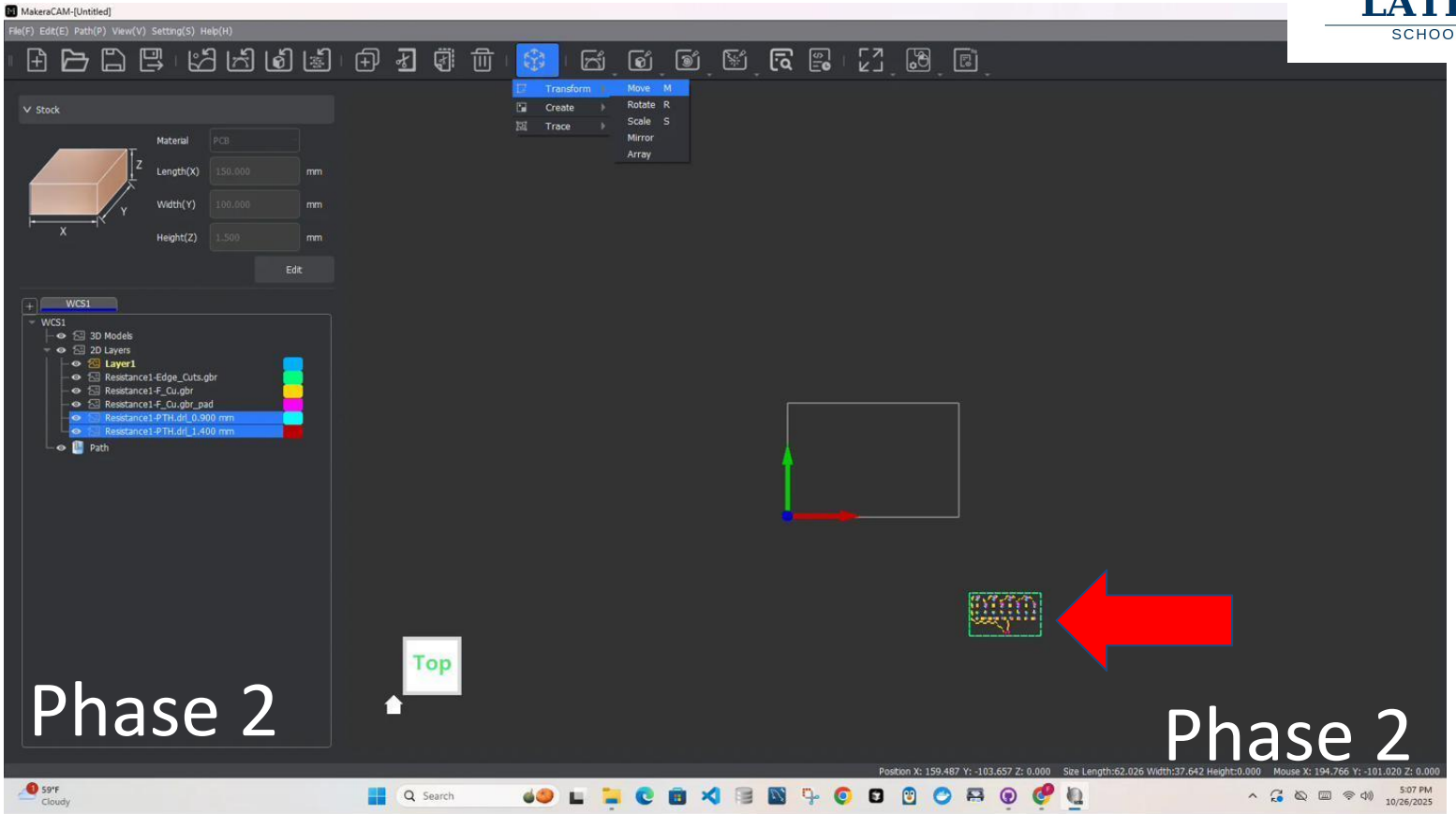

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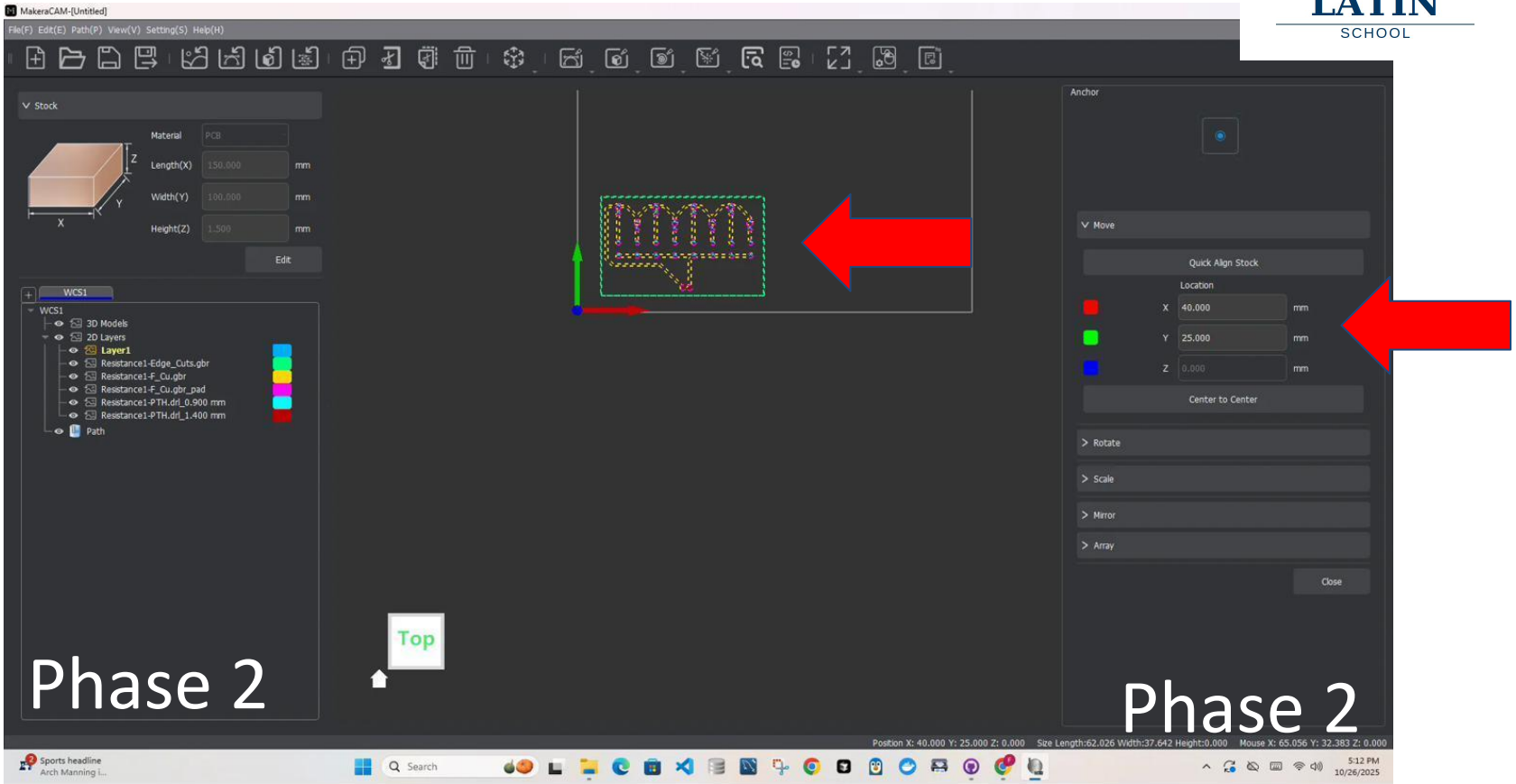

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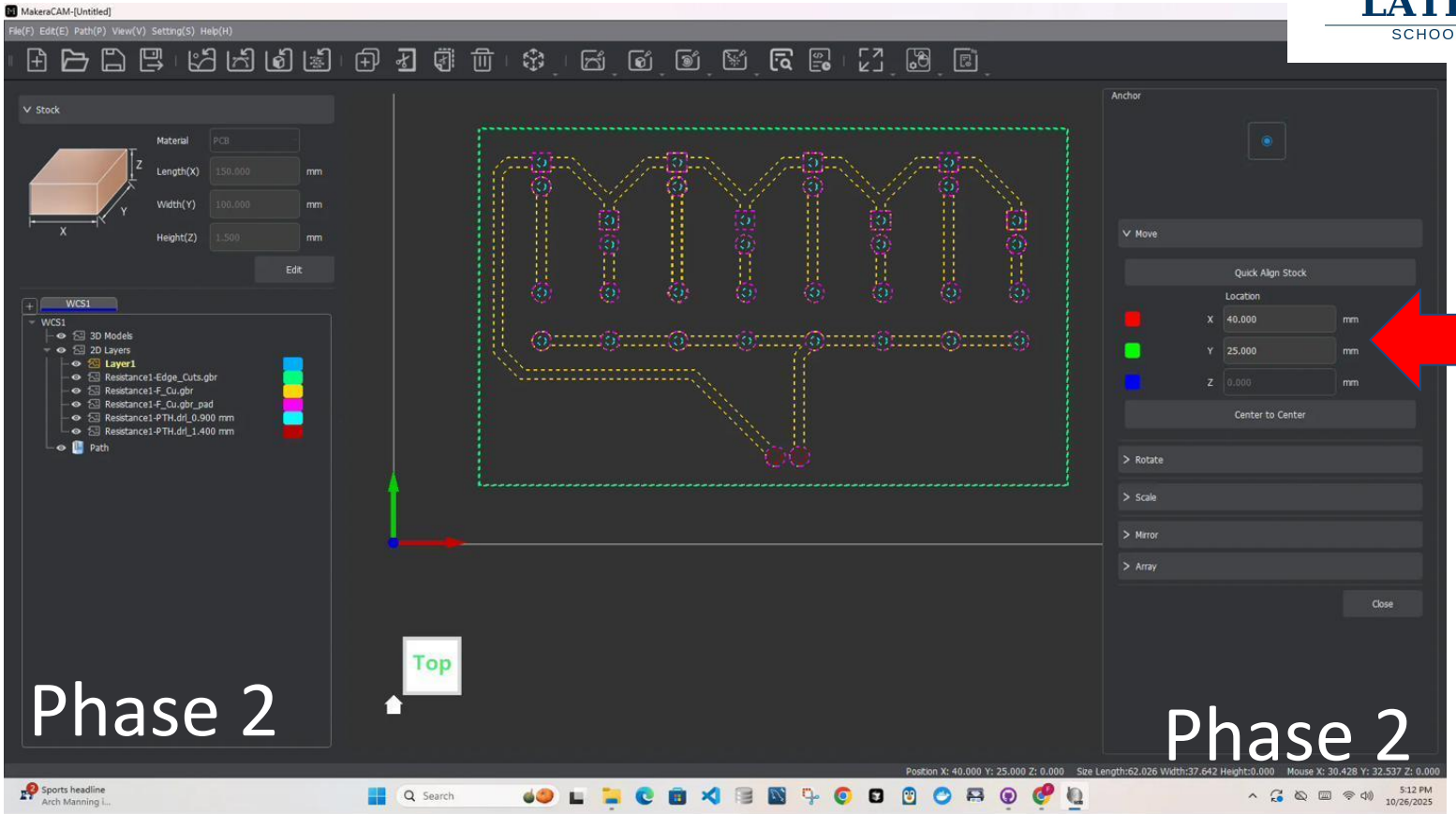

Phase 3: Traces and Toolpaths - Important Tip

A trace is selected when you see a dotted line !

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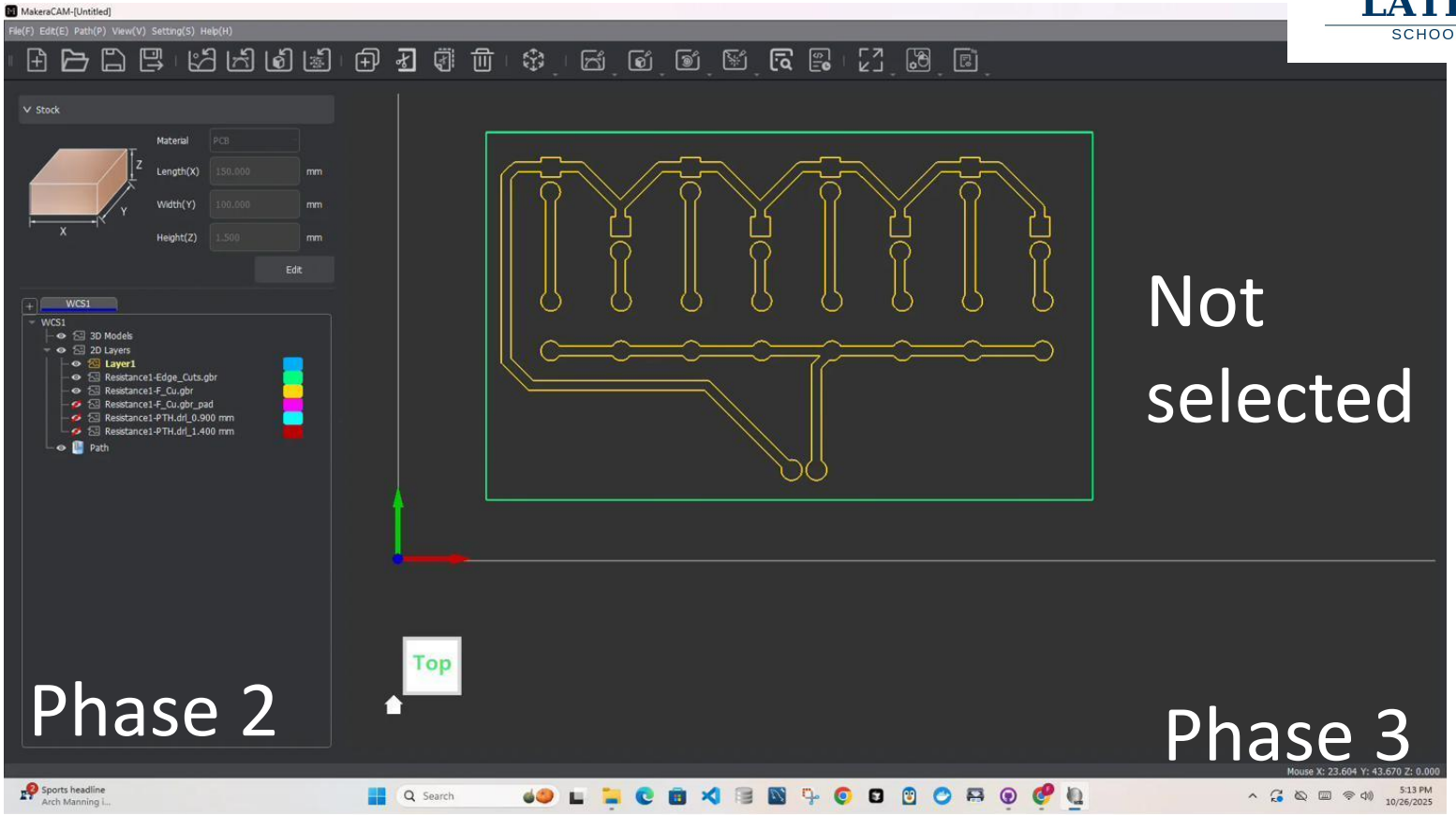

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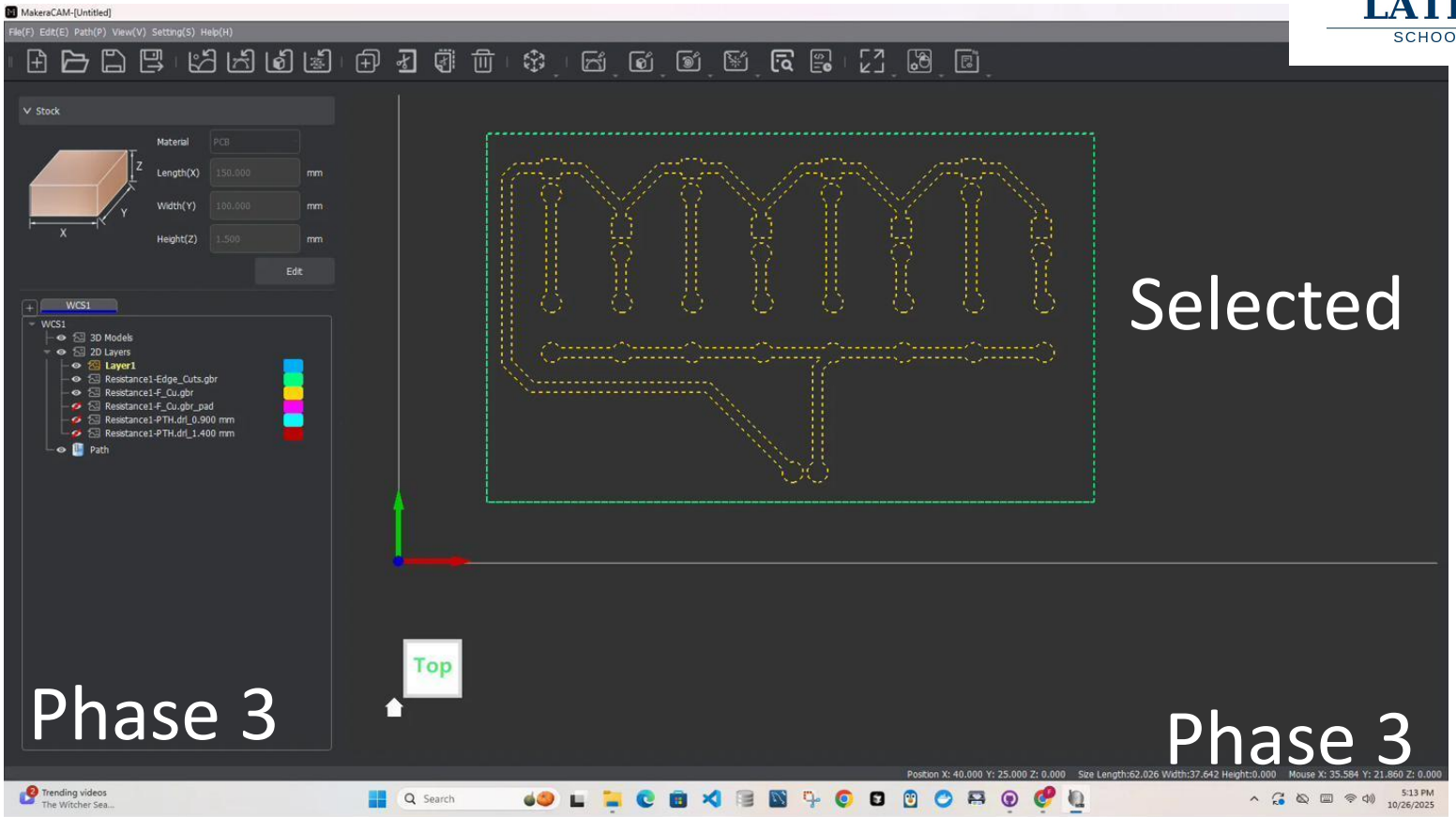
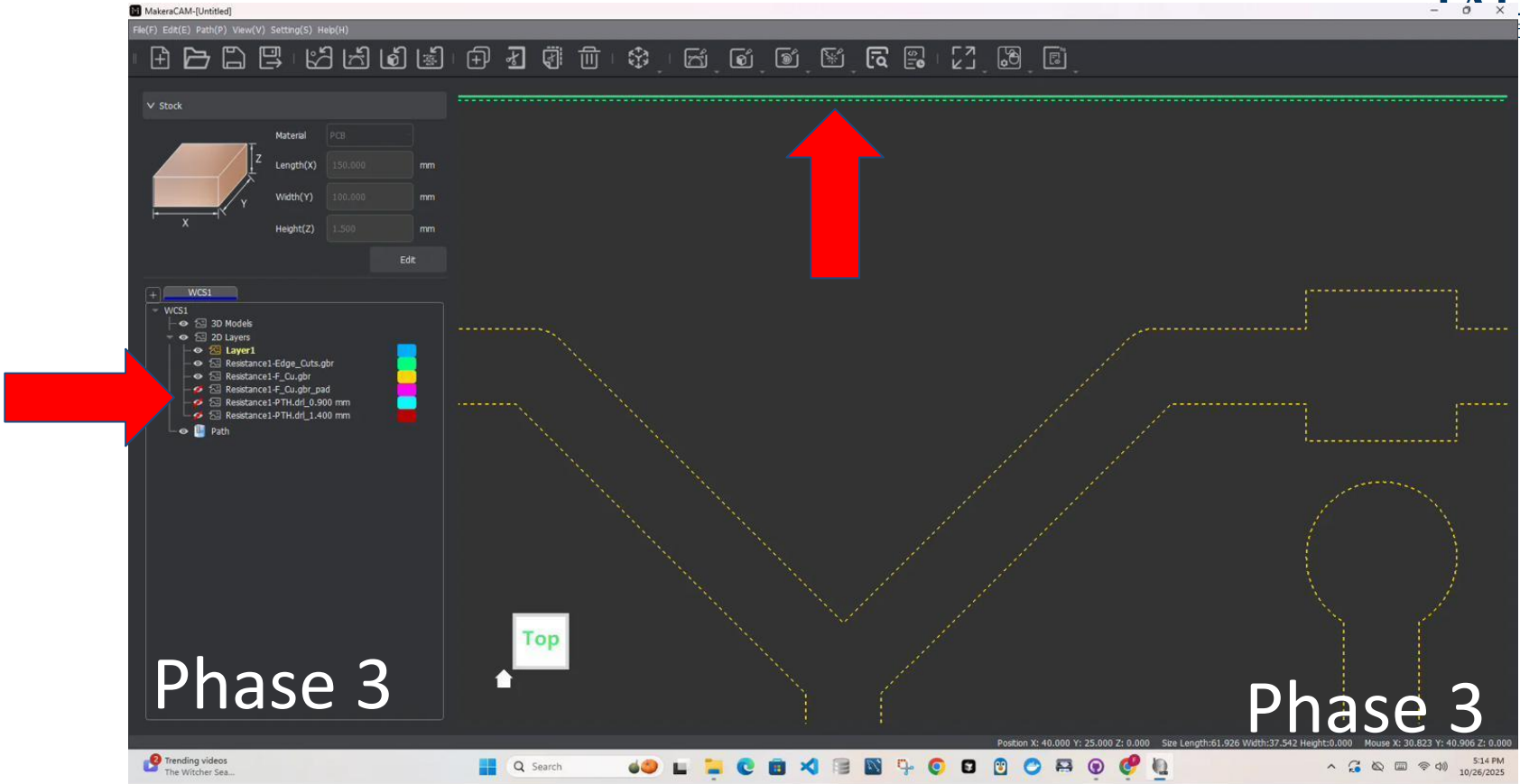


Phase 3: Toolpath 1 (Traces) - Boundary

- This path clears the copper for your traces.
- **Critical Step:** Set the Boundary.
  - Make only the **F.Cu** and **Edge_Cuts** layers visible.
  - Hold **Shift** and click both layers to select them.
  - **Hold Shift** and click the **OUTERMOST line** of the outline to **deselect it** (it will turn solid).
  - Only the traces and the *inner* outline should remain selected (dotted).


MakeraCAM-[Untitled]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
Stock
Material
PCB
Length(X)
150.000
mm
Width(Y)
100.000
mm
Height(Z)
1.500
mm
Edit
WCS1
3D Models
2D Layers
Layer1
Resistance1-Edge_Cuts.gbr
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Resistance1-F_Cu.gbr_pad
Resistance1-PTH.drl_0.900 mm
Resistance1-PTH.drl_1.400 mm
Path
Top
Phase 3
Phase 3
Position X: 40.000 Y: 25.000 Z: 0.000
Size Length:61.926 Width:37.542 Height:0.000
Mouse X: 30.823 Y: 40.906 Z: 0.000
Search
5:14 PM
10/26/2025

Phase 3: Toolpath 1 (Traces) - Settings

- Select the **2D Pocket** tool from the top toolbar.
- **Cutting Depth:**
  - **Start Depth:** 0.000 mm
  - **End Depth:** 0.05 mm
- **Add Tools:**
  - **Tool 1:** Click **Add Tool** --> **0.8mm Corn** --> "Choose".
  - **Tool 2:** Click **Add Tool** --> **0.2mm 30 degree Engraving (Metal)** --> "Choose".
  - (Ensure 0.8mm bit is listed first)
- **Strategy:**
  - Set **Path Strategy** to **Parallel**.
- Click **Calculate**.

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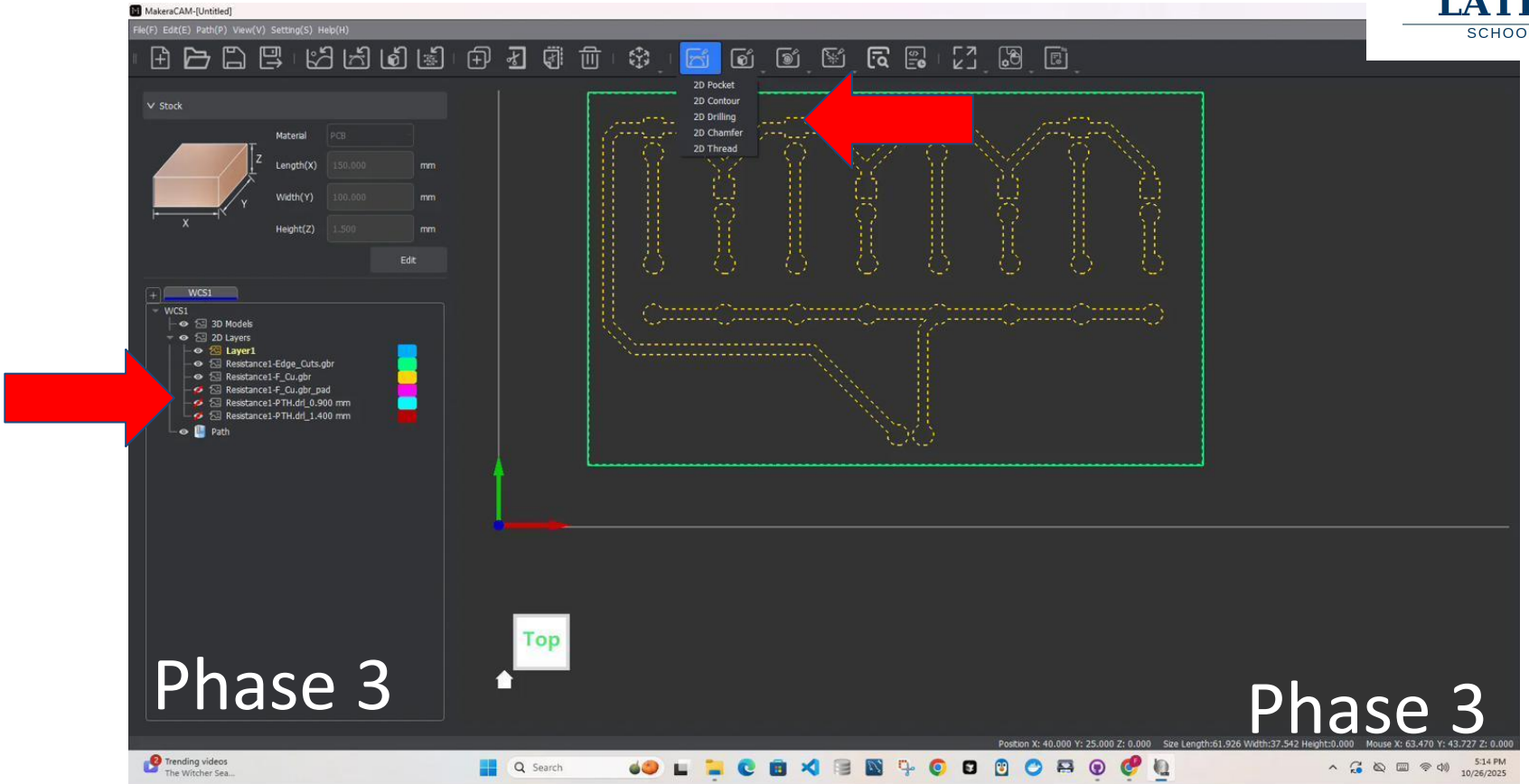

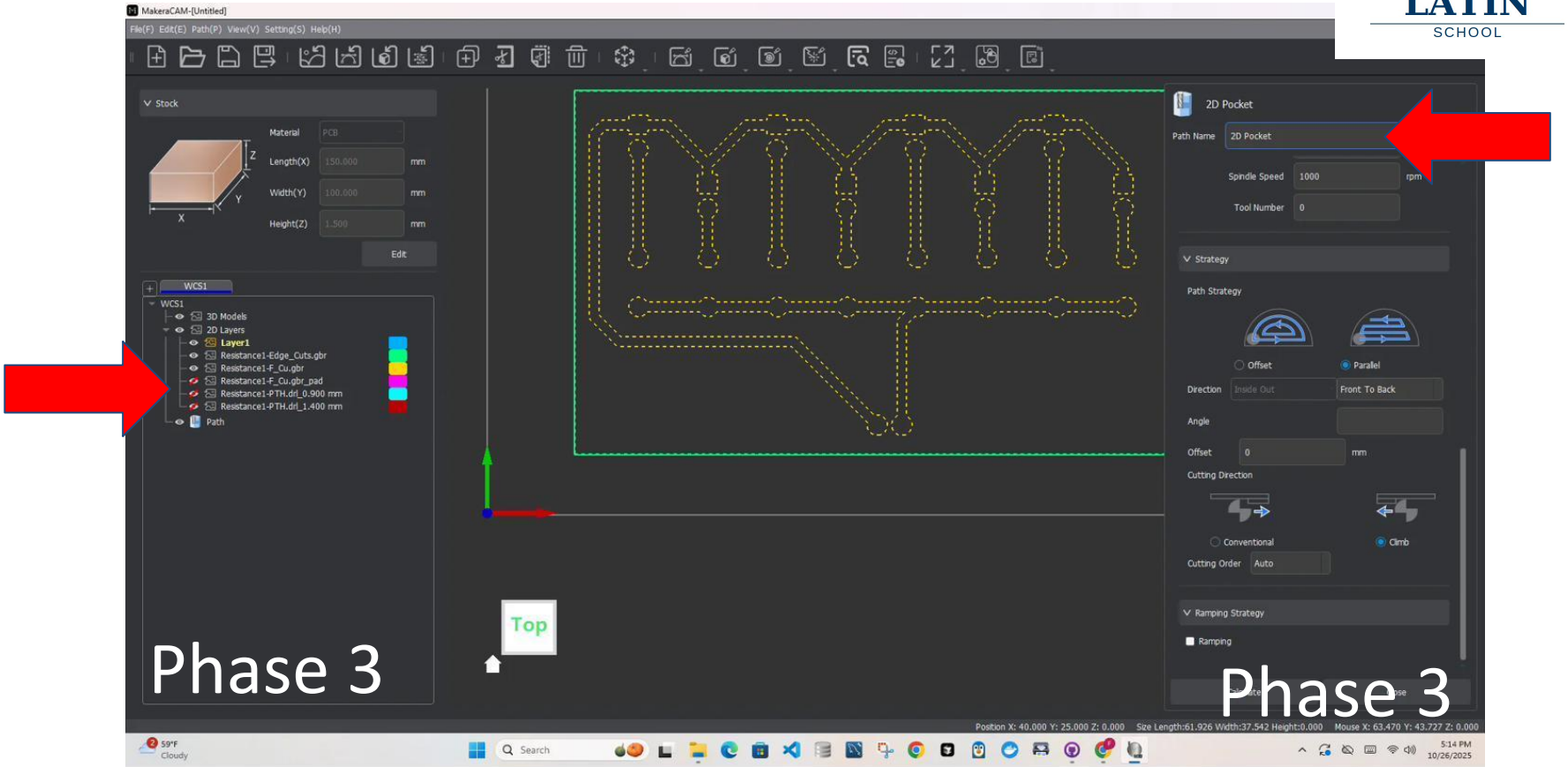
MakeraCAM-[Untitled]
File(F) Edit(E) Path(P) View(V) Setting(S) Help(H)
Stock
Material
Length(X)
Width(Y)
Height(Z)
Edit
WCS1
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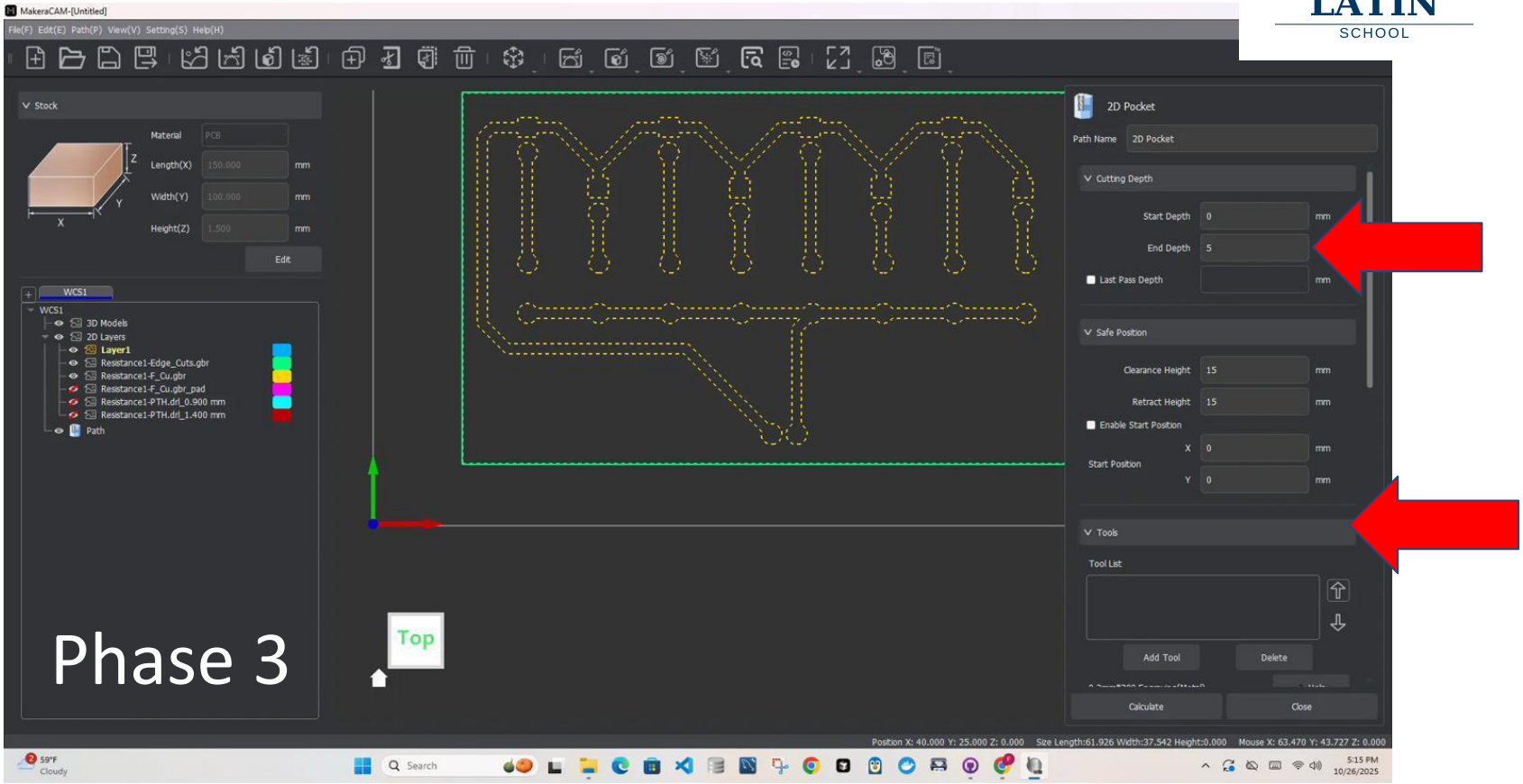
Resistance1-Edge_Cuts.gbr
Resistance1-F_Cu.gbr
Resistance1-F_Cu.gbr_pad
Resistance1-PTH.drl_0.900 mm
Resistance1-PTH.drl_1.400 mm
Path
Top
2D Pocket
Path Name
2D Pocket
Spindle Speed
1000
rpm
Tool Number
Strategy
Path Strategy
Offset
Parallel
Direction
Inside Out
Front To Back
Angle
Offset
Cutting Direction
Conventional
Climb
Cutting Order
Auto
Ramping Strategy
Ramping
Phase 3
Phase 3

CHARLOTTE LATIN SCHOOL



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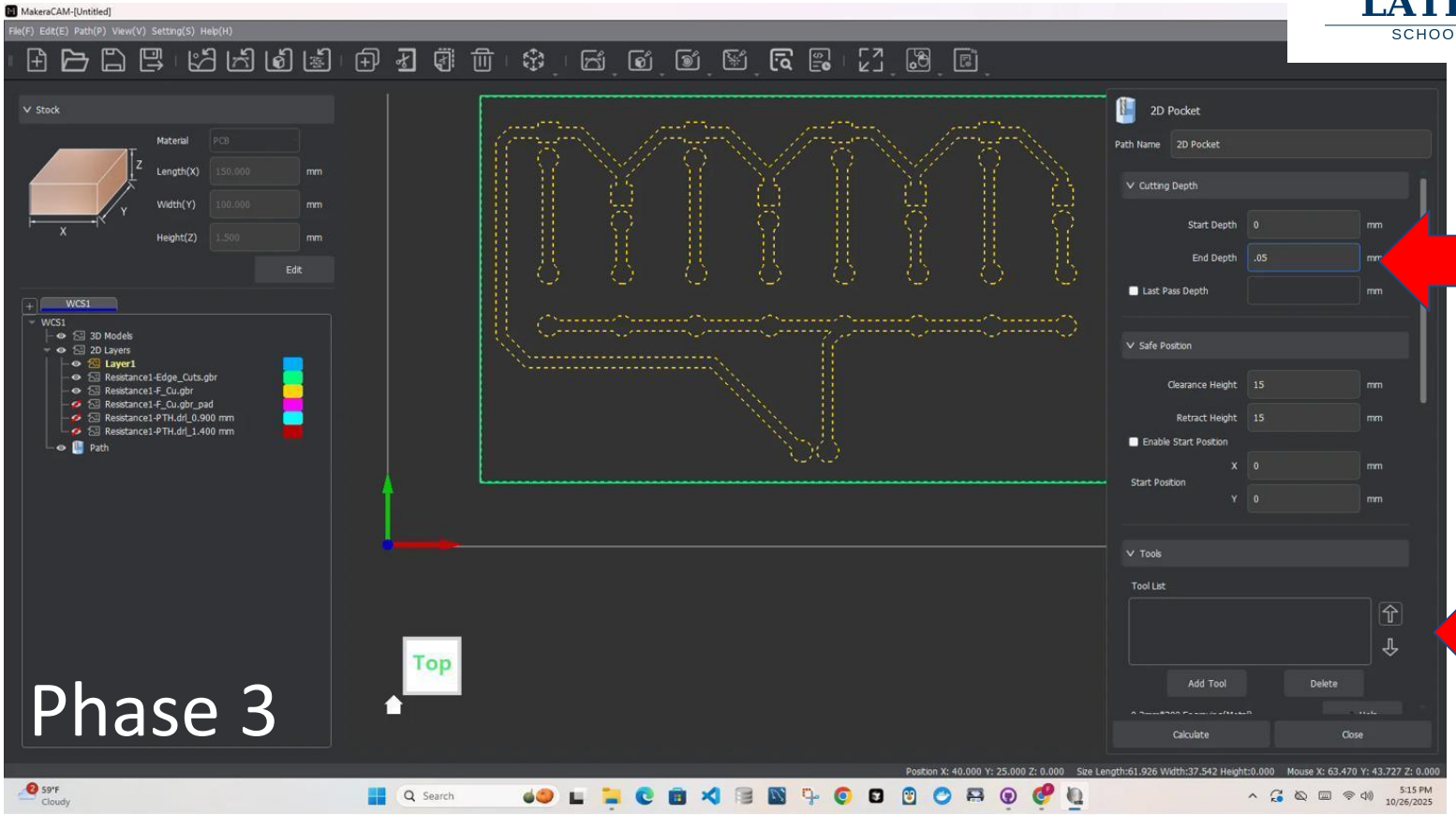
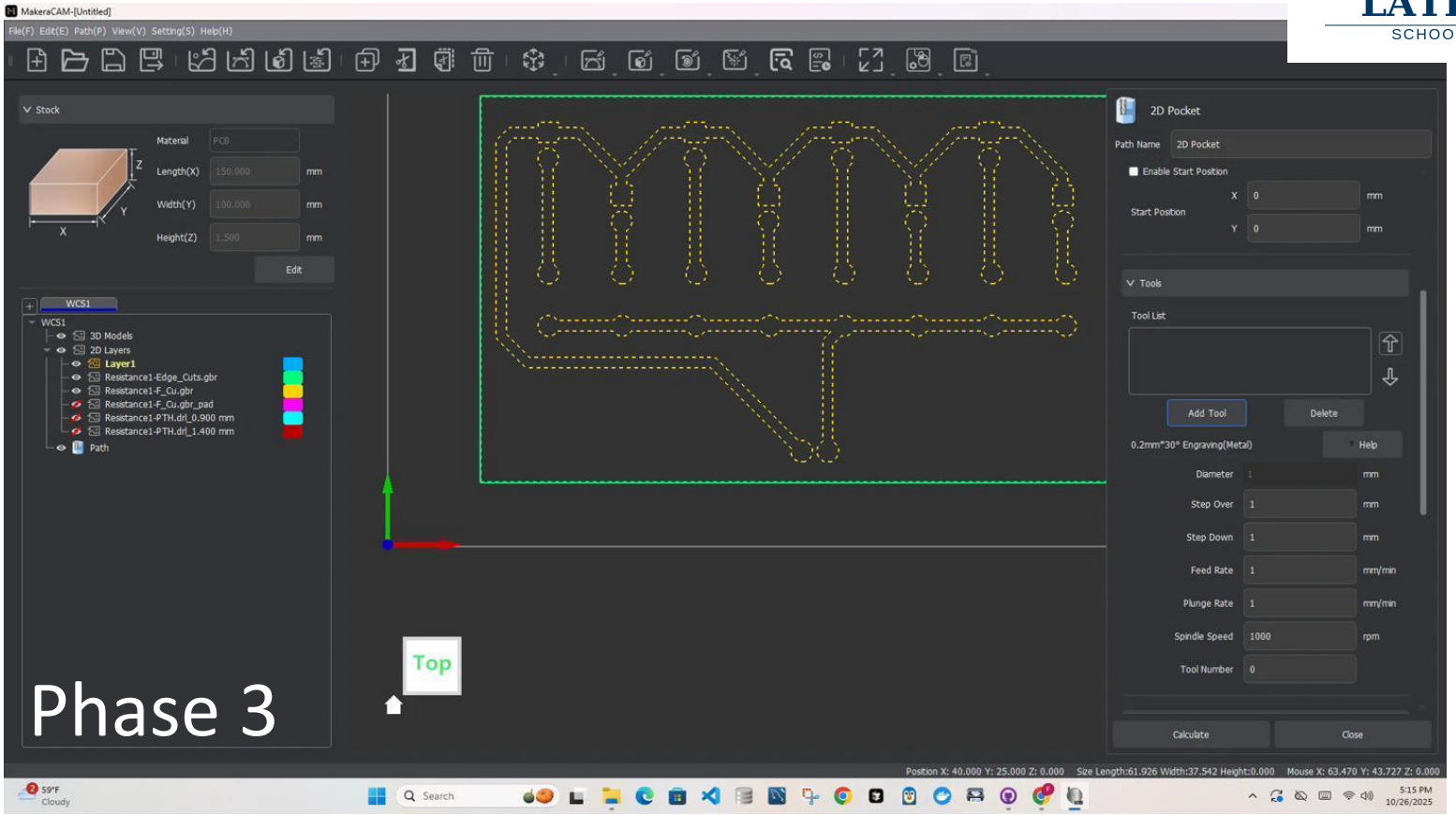


Phase 3

CHARLOTTE LATIN SCHOOL



Phase 3

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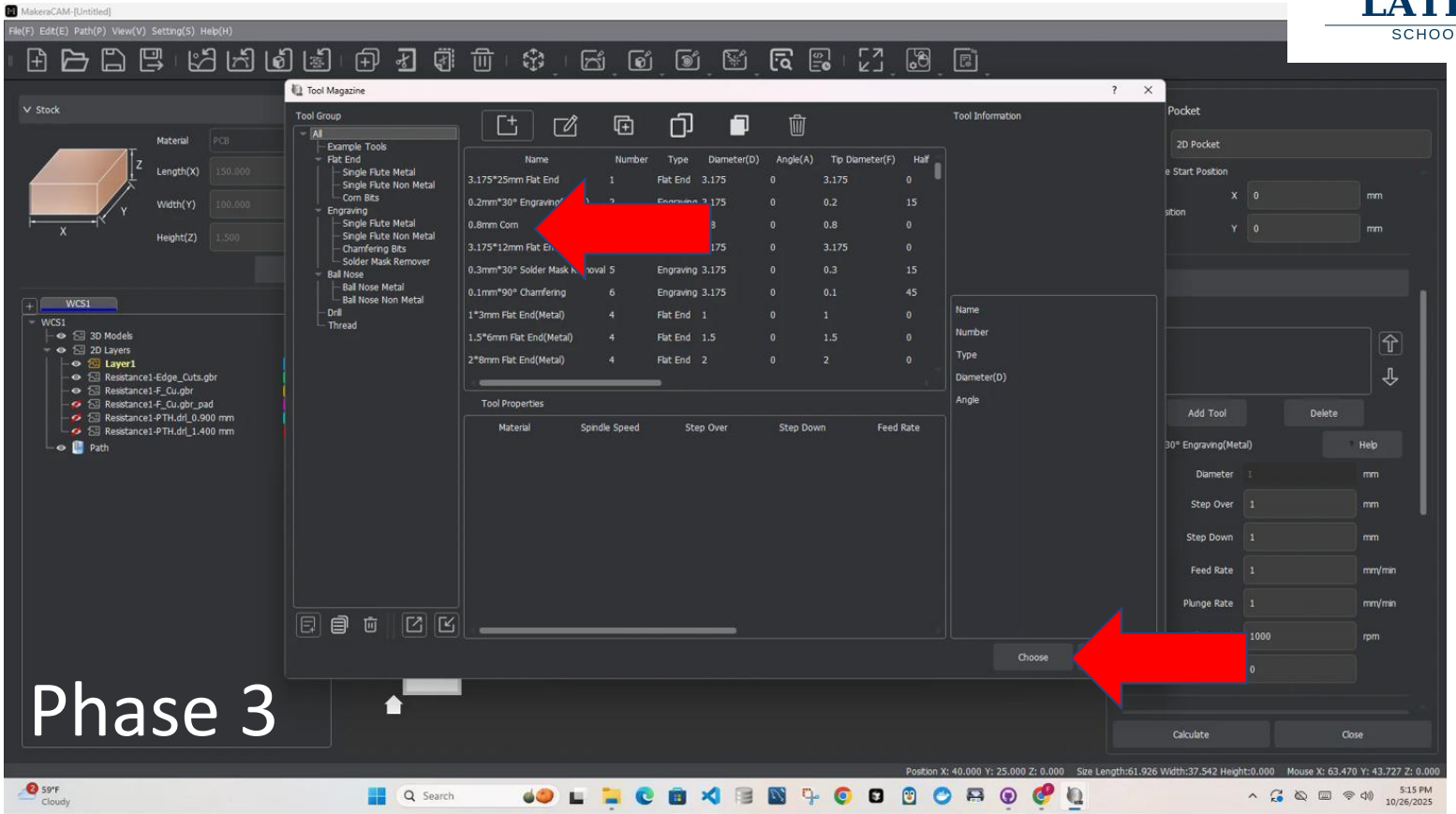

Phase 3

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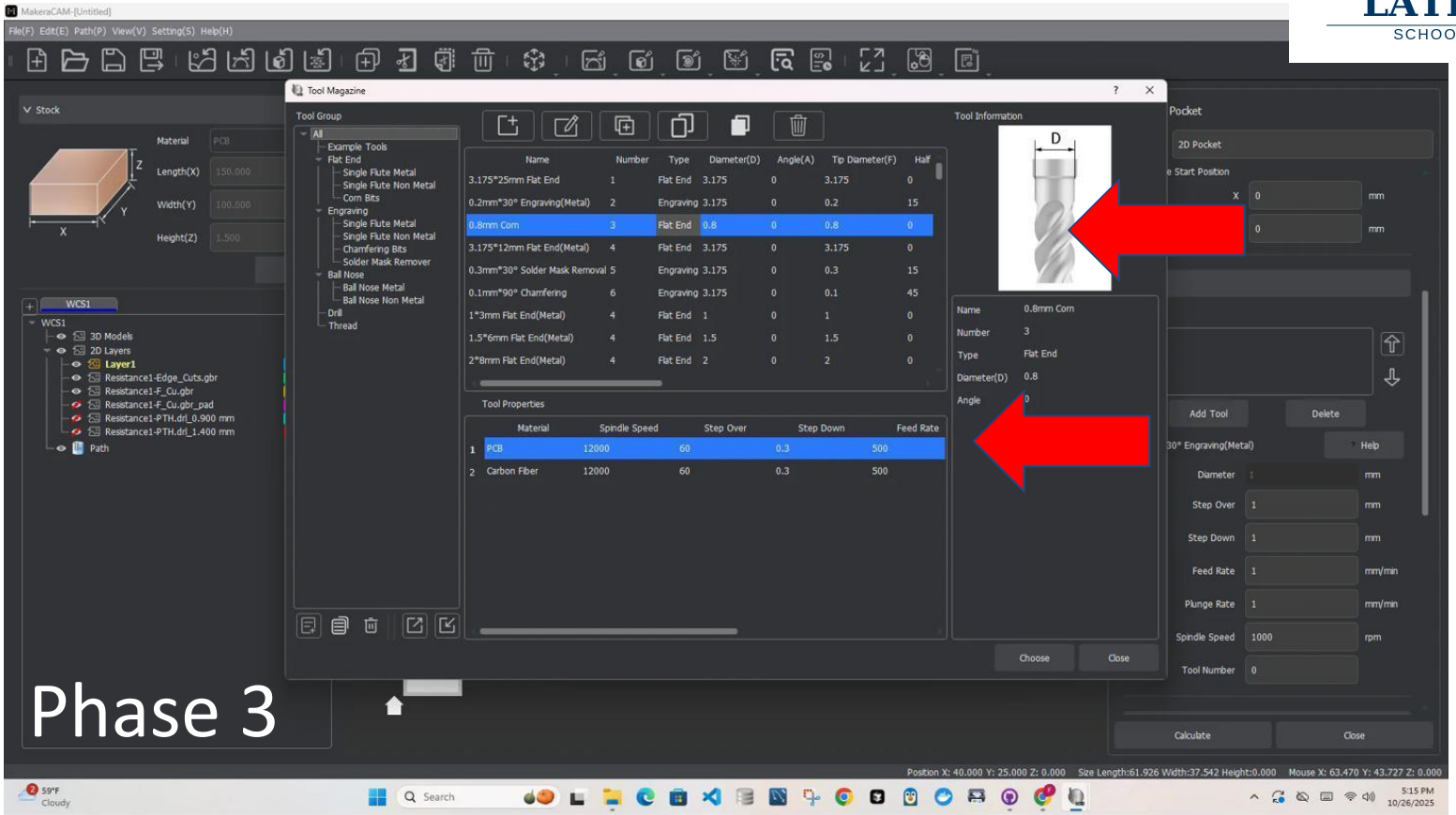

Phase 3

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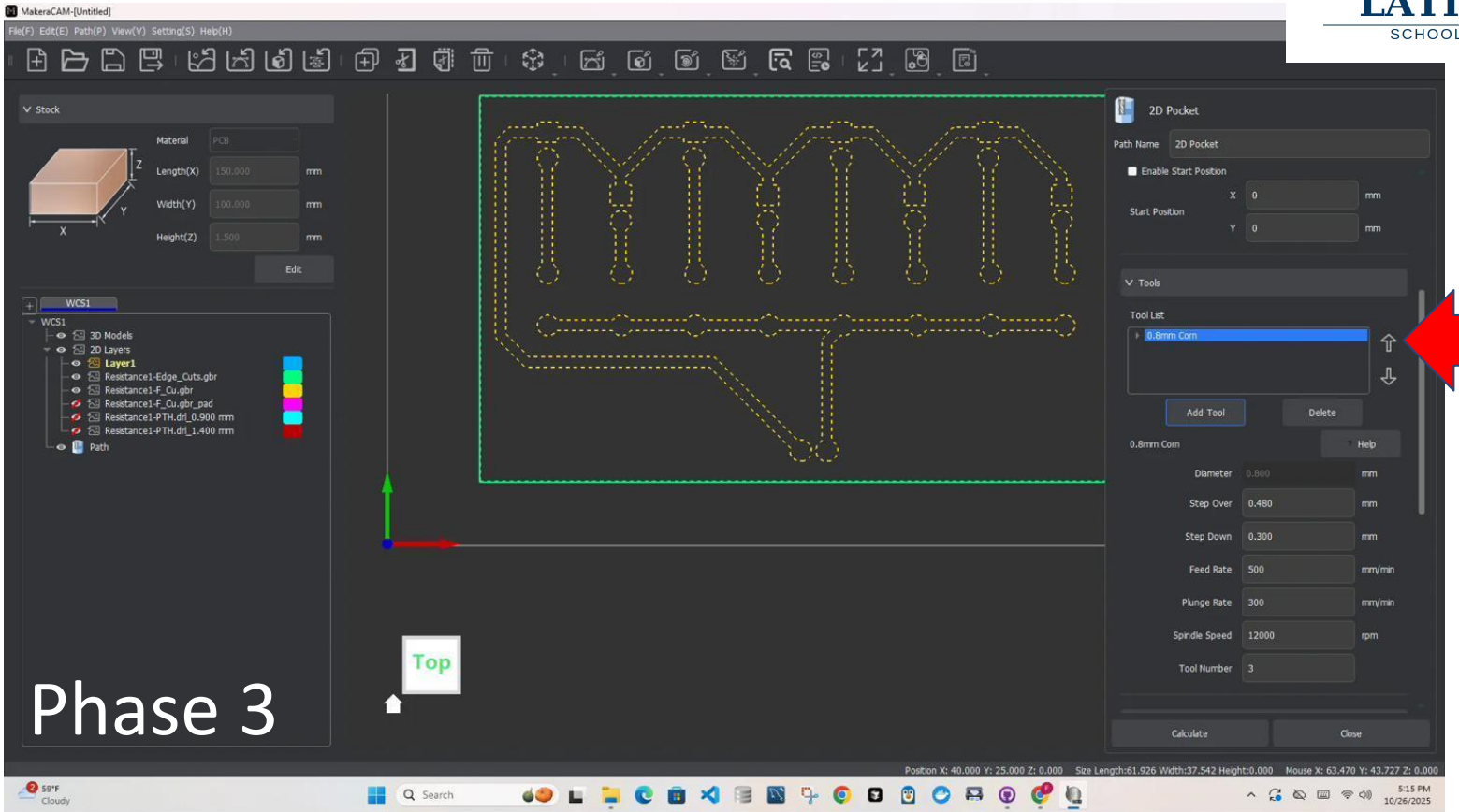

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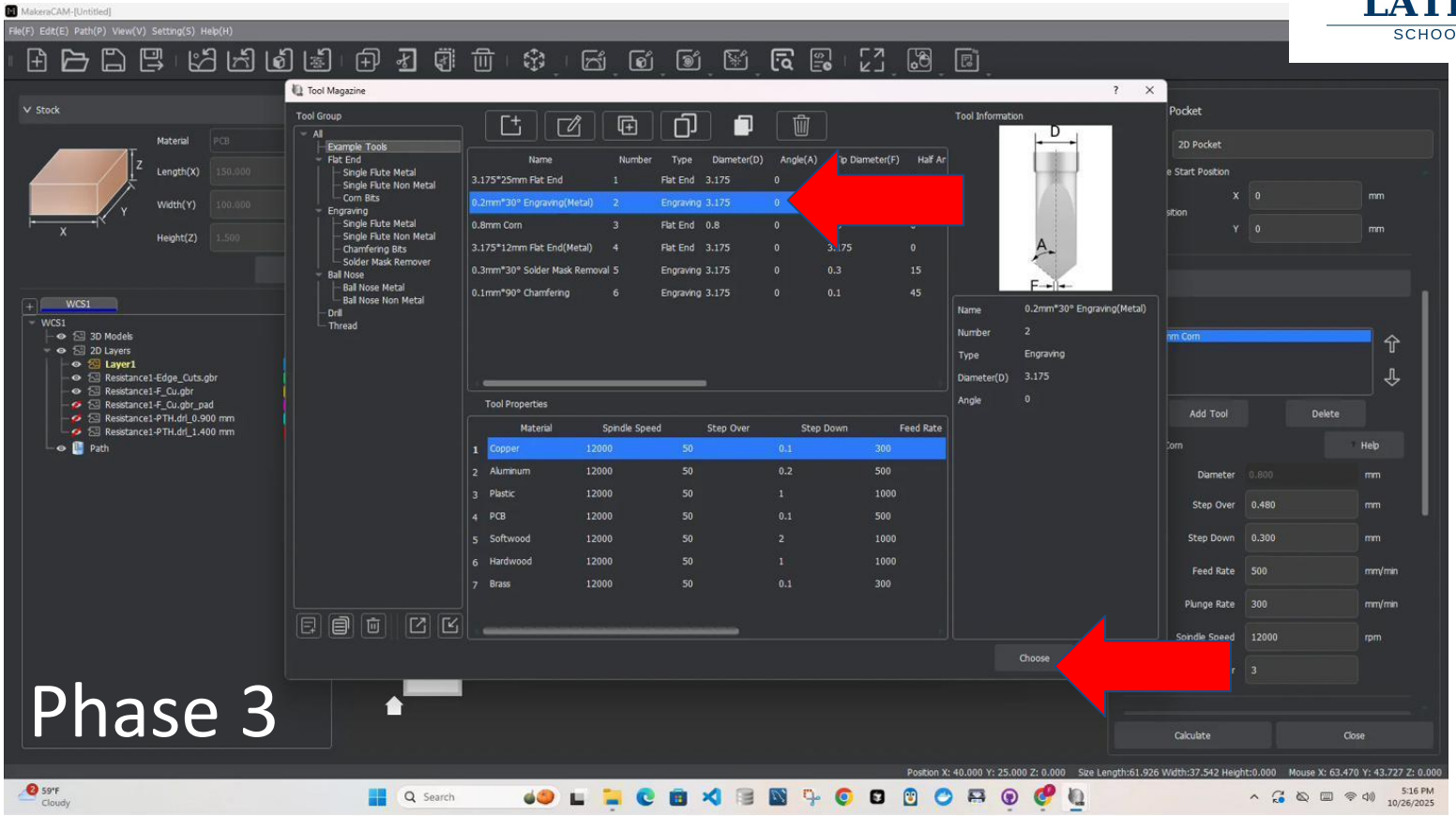

Phase 3

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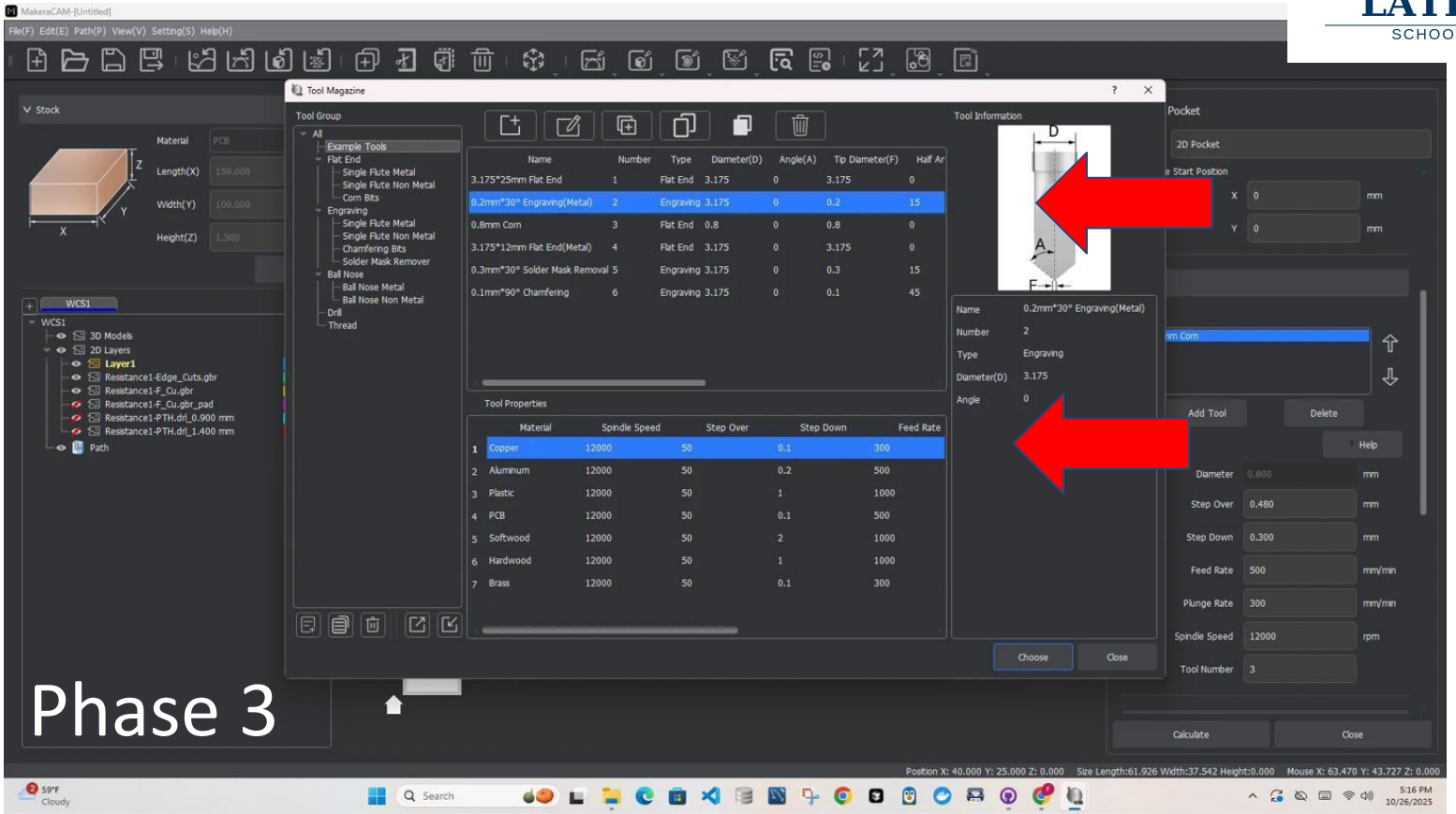

Phase 3

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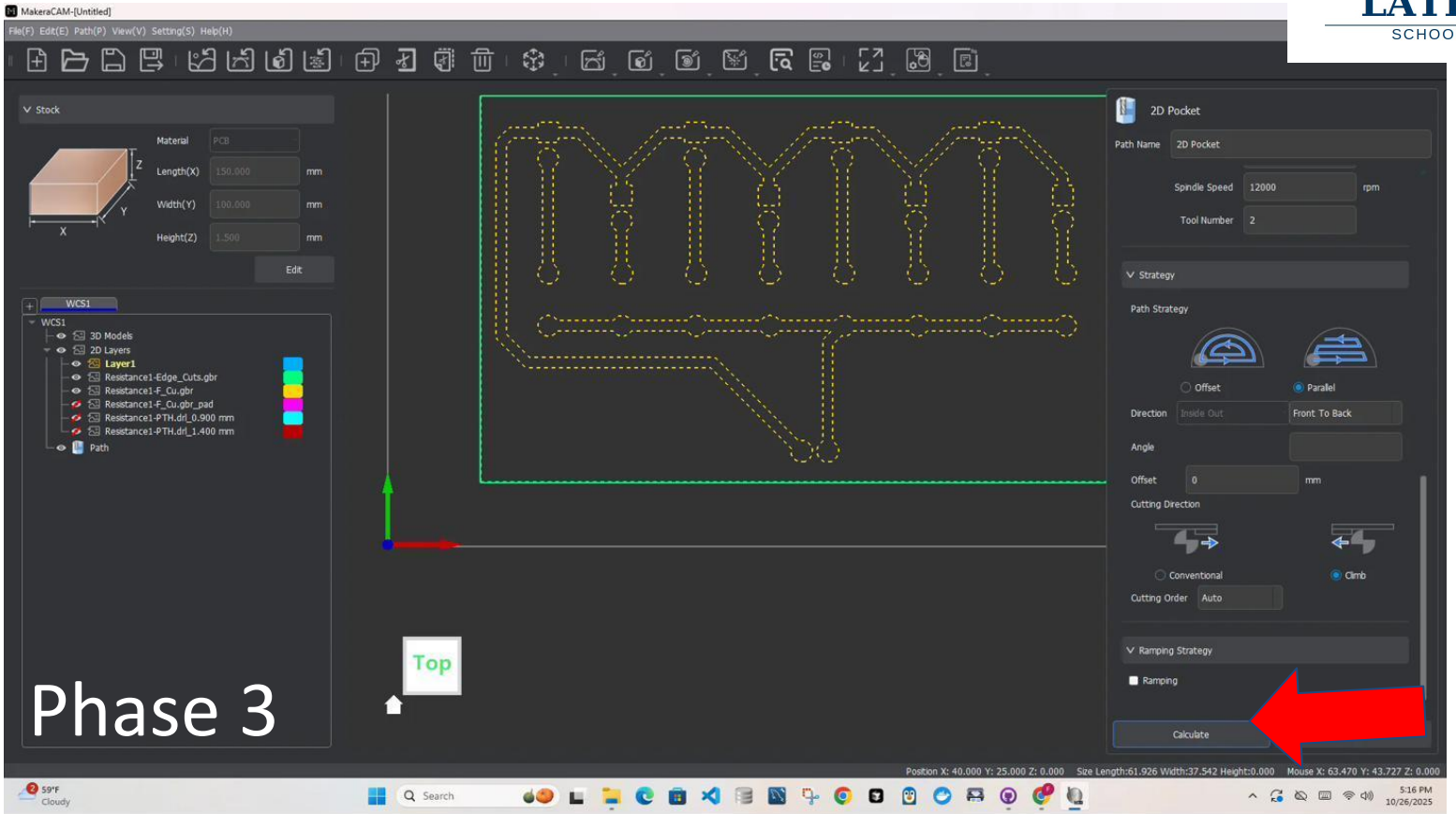
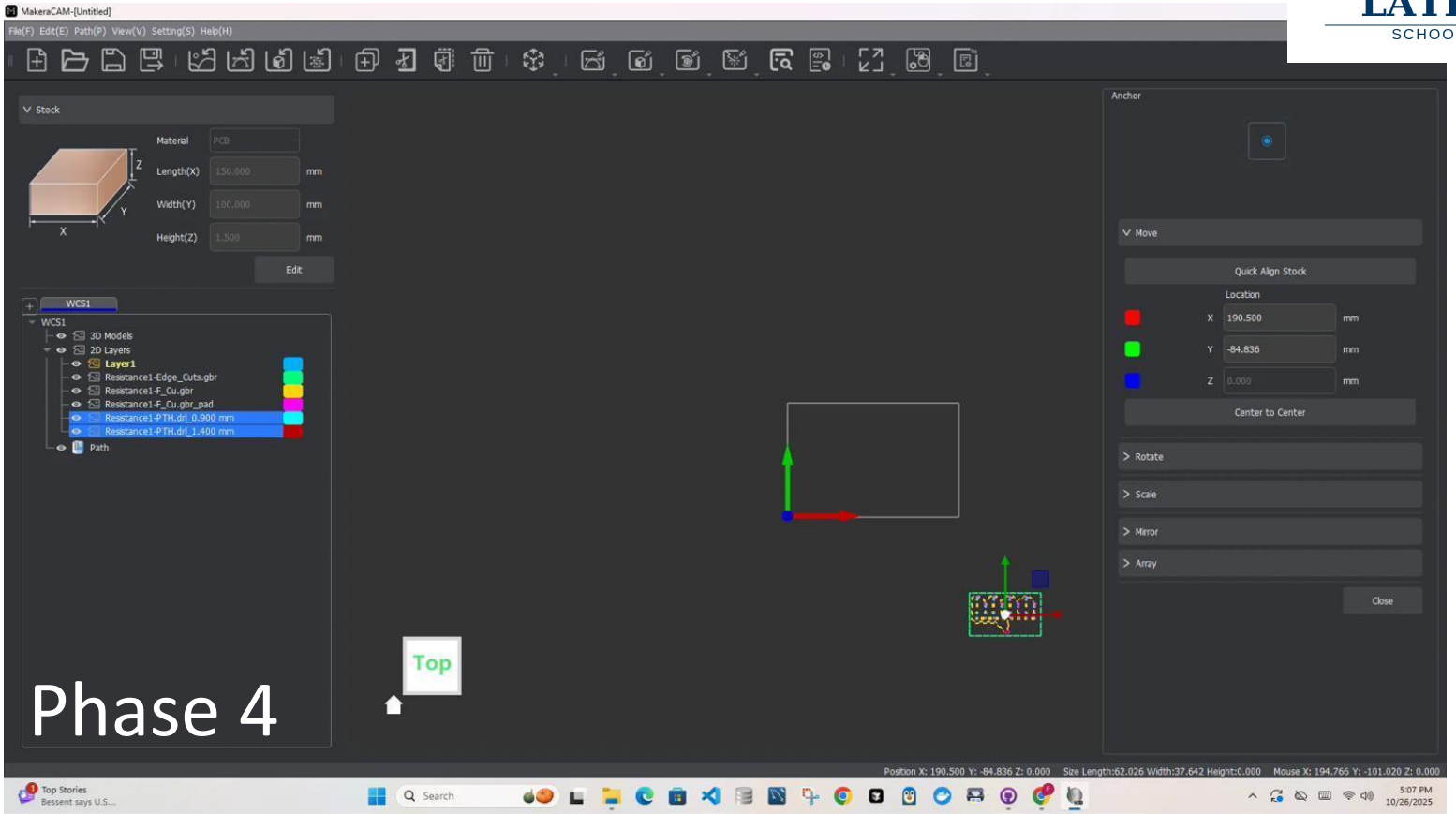


Phase 4: Toolpath 2 (Drill Holes)

- This path drills the component holes.
- **Visibility:** In the "WCS1" panel, hide everything except your **PTH.drl** (drill) layers.
- **Tool:** Select the **2D Drilling** tool from the top toolbar.
- **Selection:** Select all the visible drill holes.
- **Cutting Depth:**
  - **Drill Tip Start Depth:** 0.000 mm
  - **Drill Tip End Depth:** 1.7 mm (full board thickness)
- **Add Tool:**
  - Click **Choose Tool**.
  - Select the **0.8mm Corn** bit and click "Choose".
- Click **Calculate**.

CHARLOTTE LATIN SCHOOL



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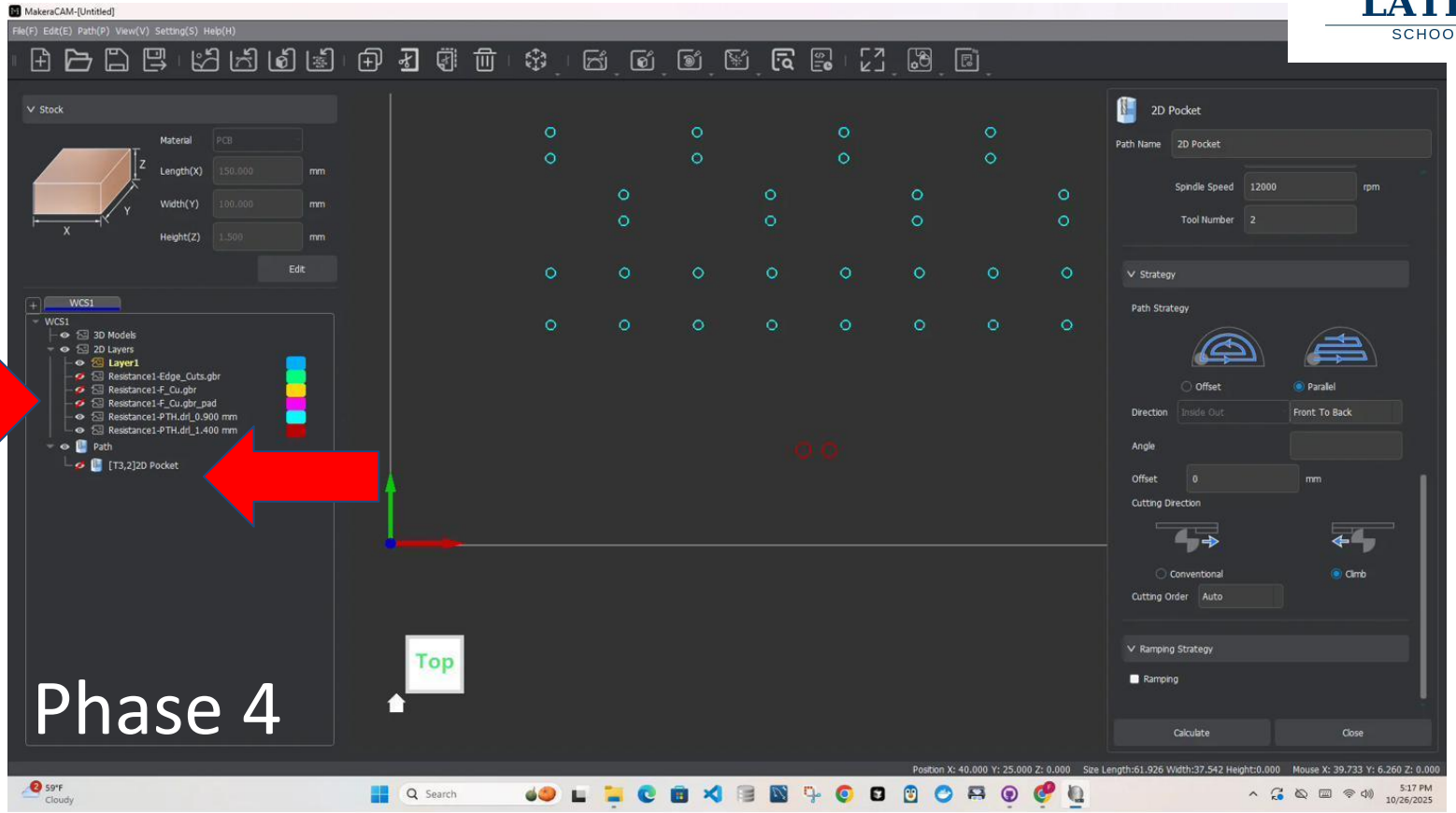
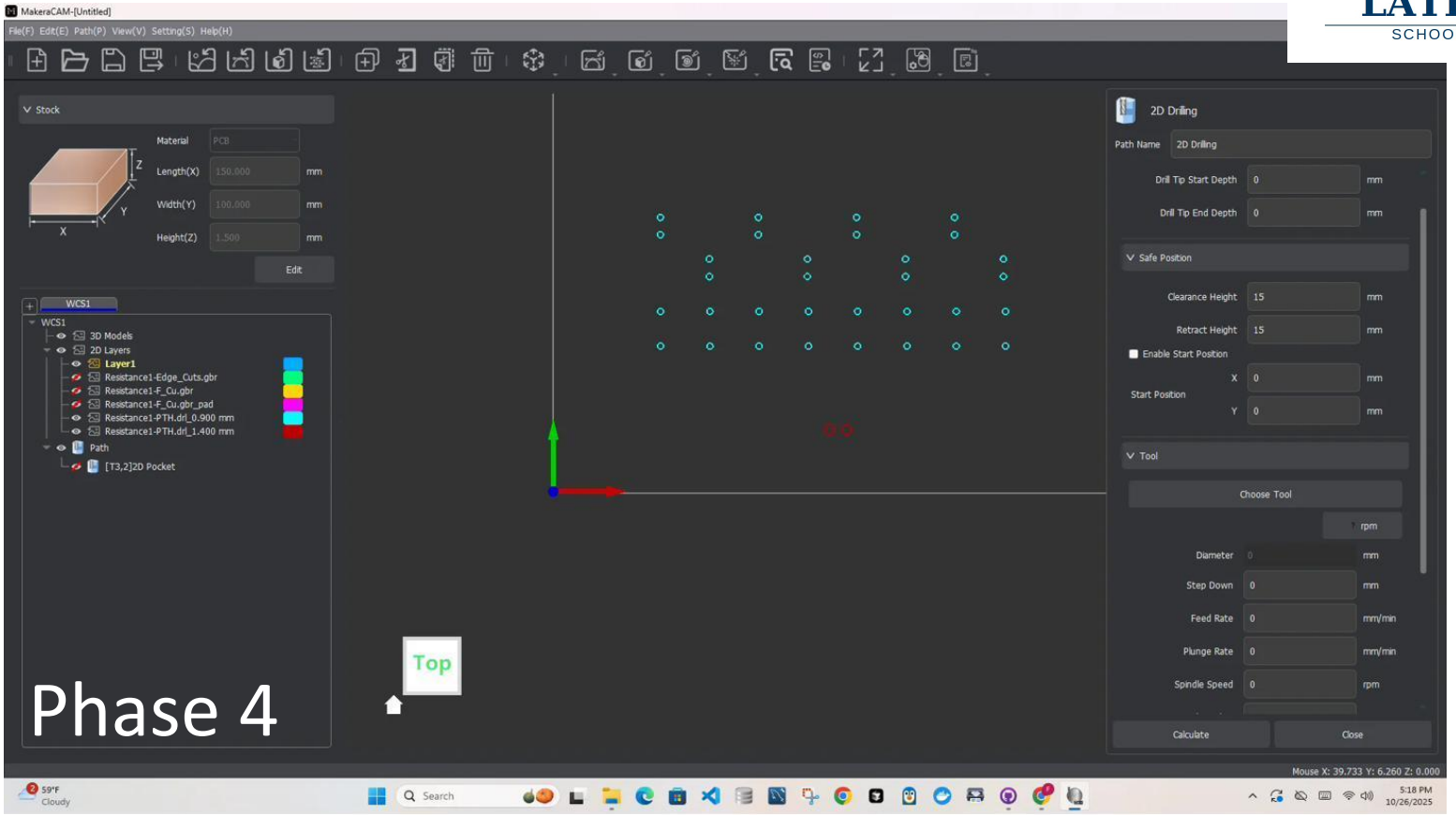
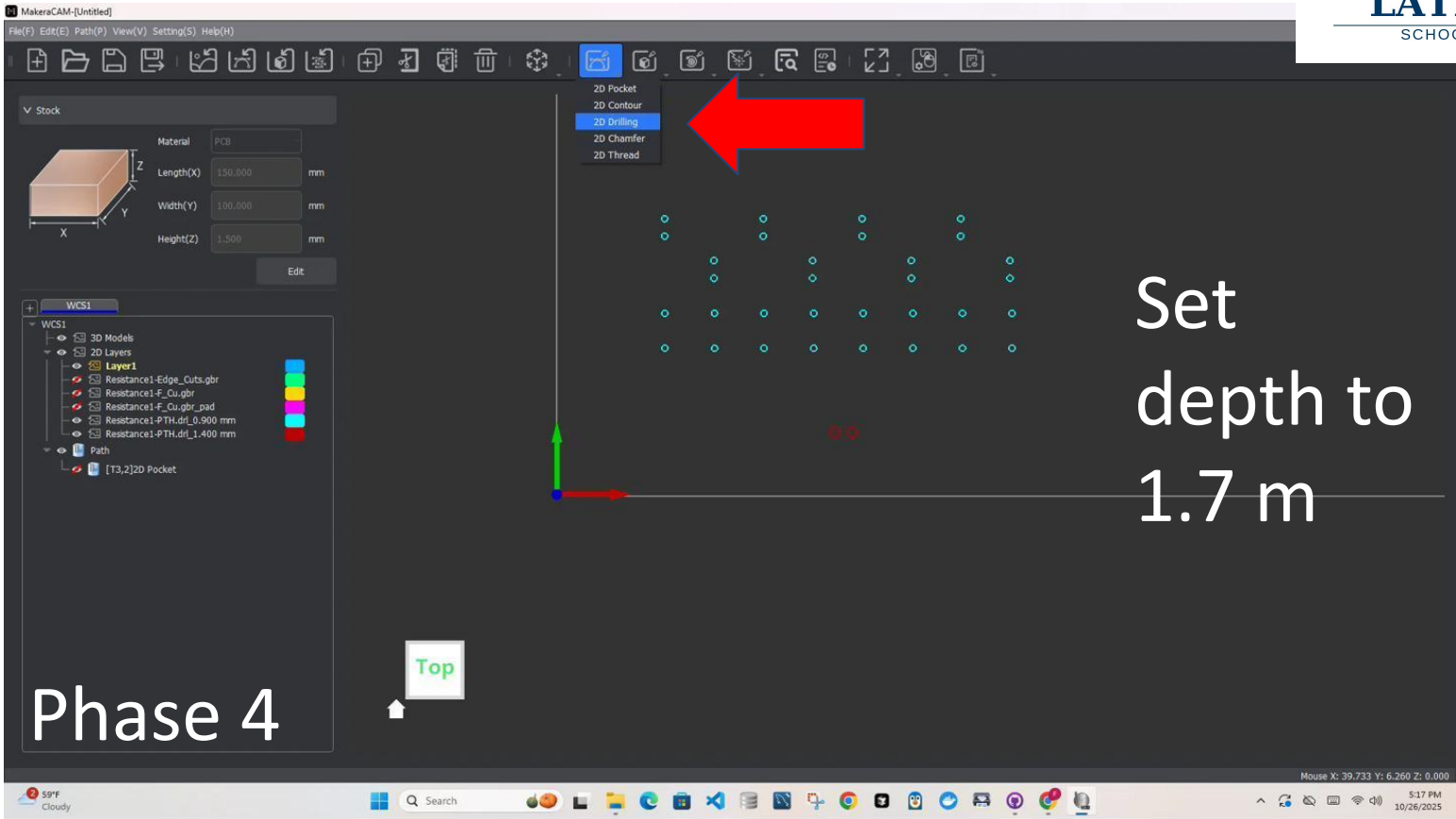


CHARLOTTE LATIN SCHOOL



Phase 4

CHARLOTTE LATIN SCHOOL



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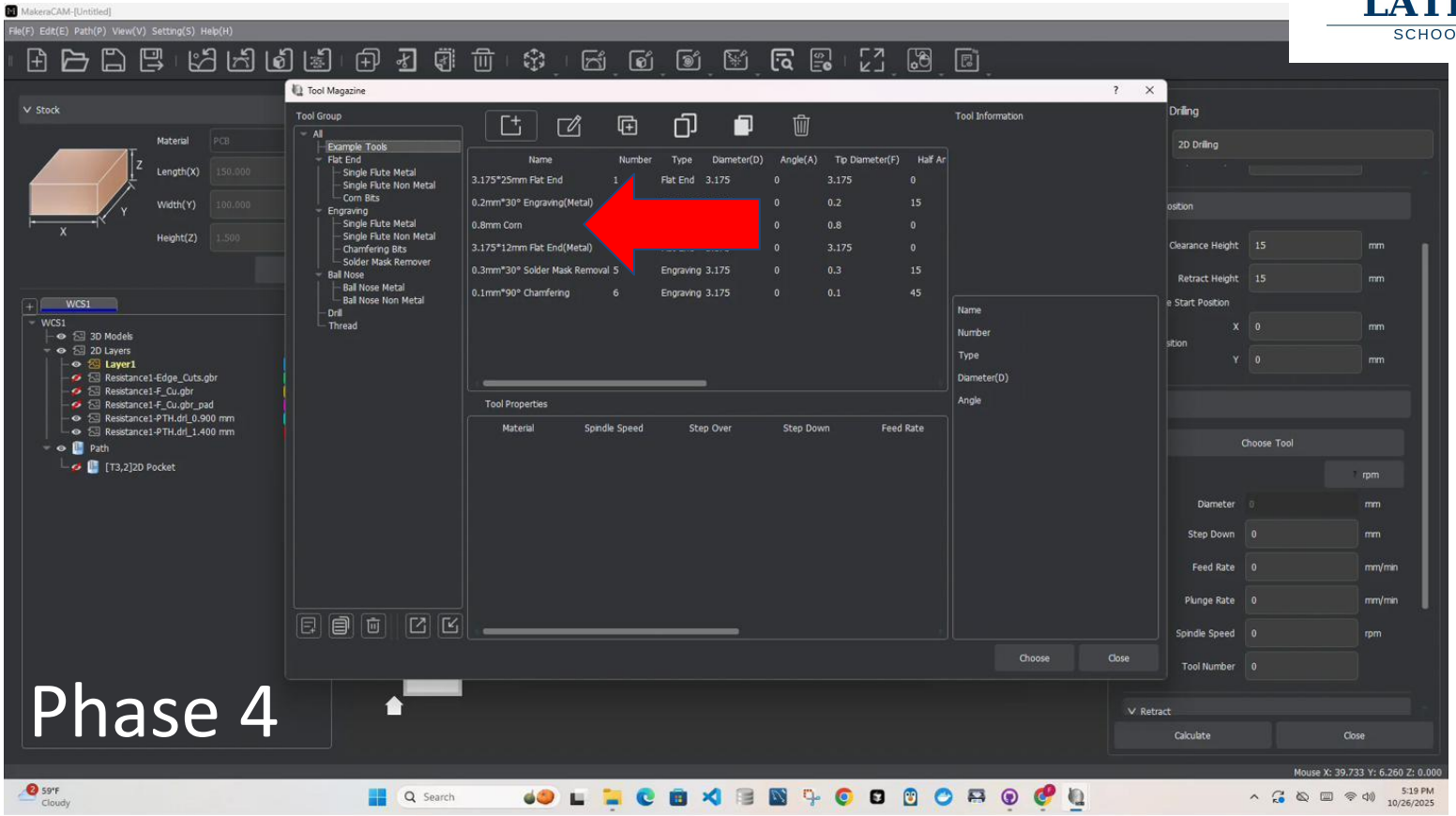

Phase 4

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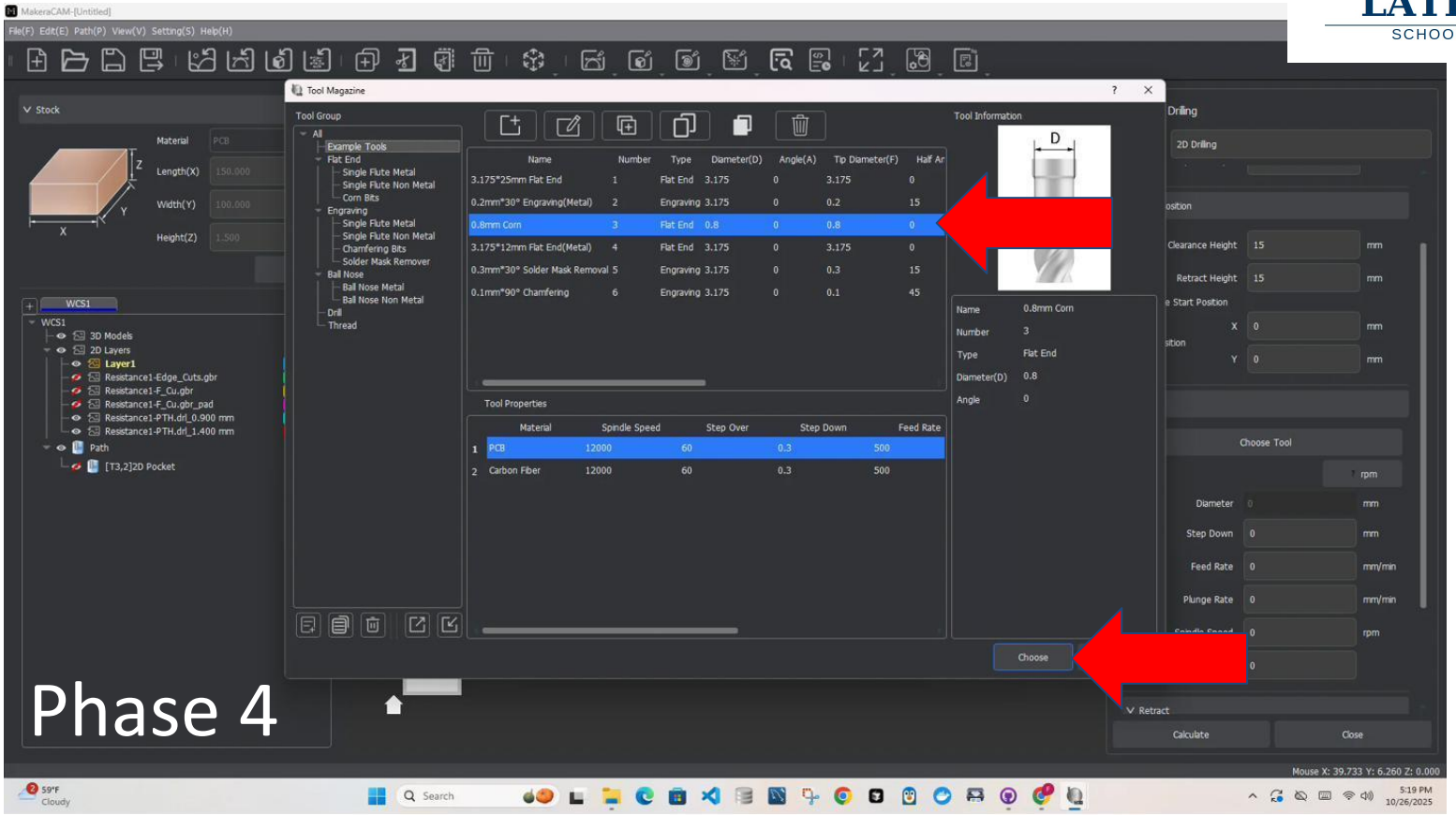
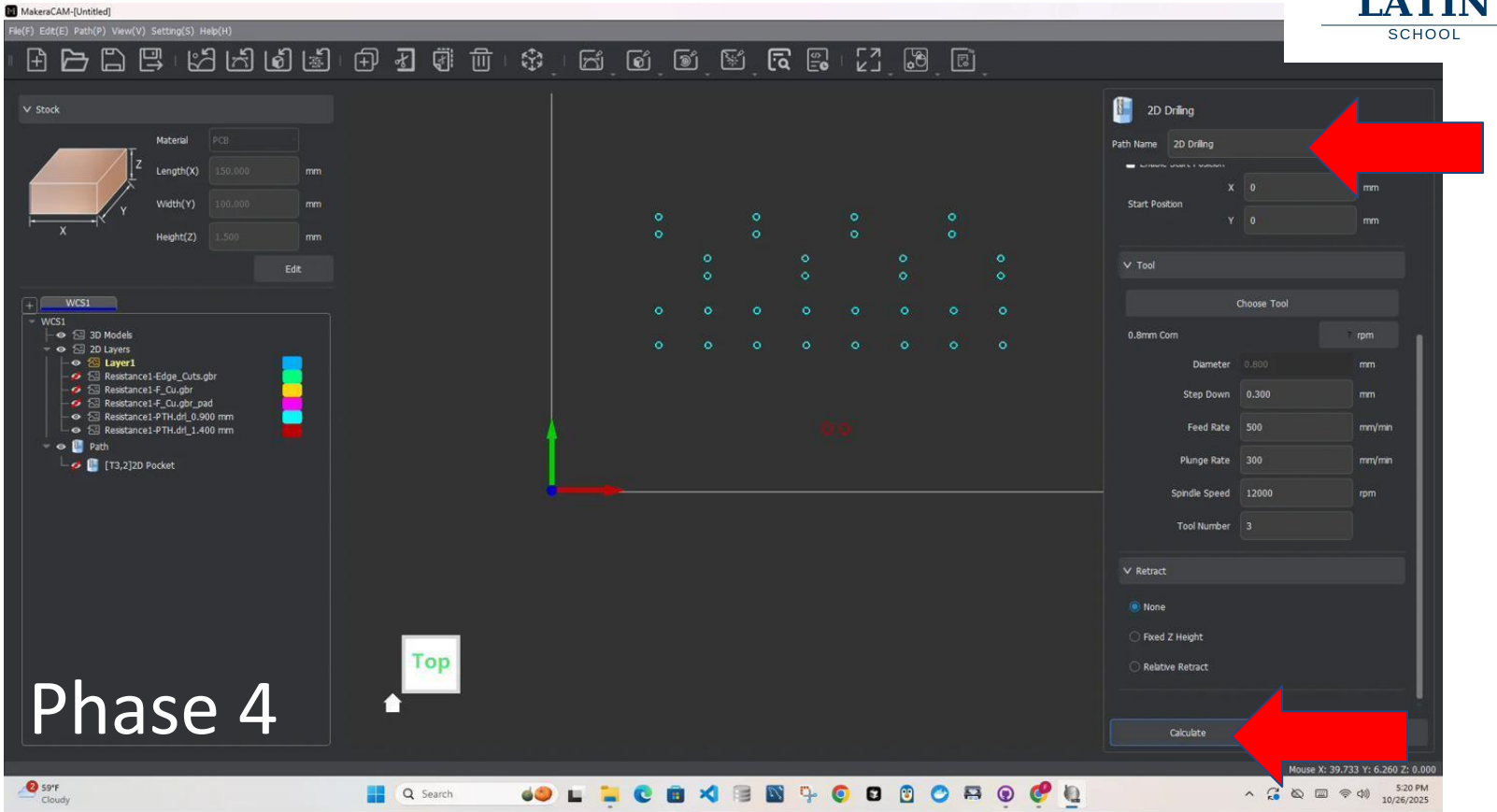


Phase 4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Stock
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PCB
Length(X)
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mm
Width(Y)
100.000
mm
Height(Z)
1.500
mm
Edit
WCS1
3D Models
2D Layers
Layer1
Resistance1-Edge_Cuts.gbr
Resistance1-F_Cu.gbr
Resistance1-F_Cu.gbr_pad
Resistance1-PTH.drl_0.900 mm
Resistance1-PTH.drl_1.400 mm
Path
[T3,2]2D Pocket
Top
2D Drilling
Path Name
2D Drilling
Start Position
X
0
Y
0
Tool
Choose Tool
0.8mm Corn
rpm
Diameter
0.800
Step Down
0.300
Feed Rate
500
mm/min
Plunge Rate
300
mm/min
Spindle Speed
12000
rpm
Tool Number
3
Retract
None
Fixed Z Height
Relative Retract
Calculate
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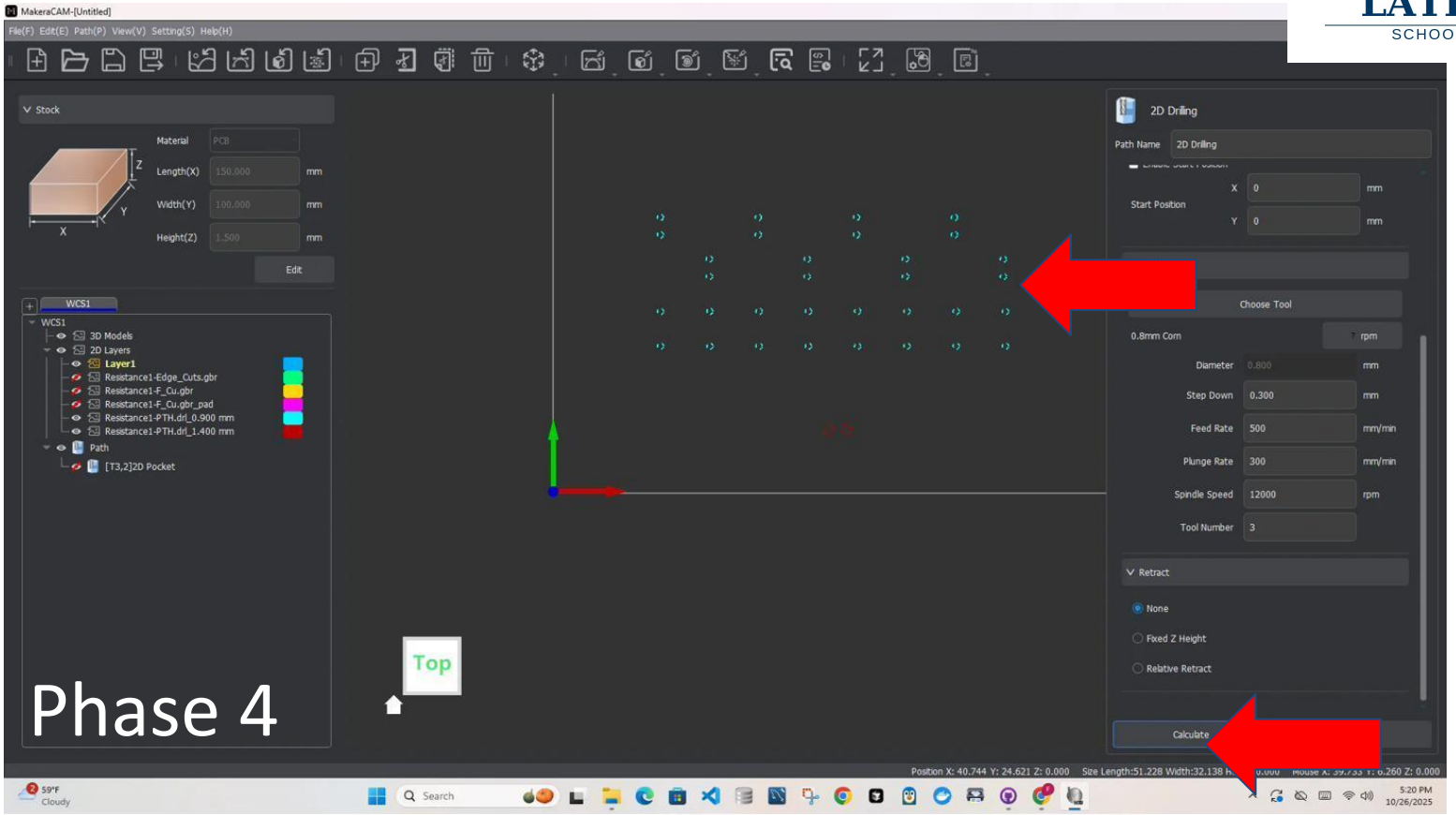
Search
5:20 PM
10/26/2025

Phase 4

CHARLOTTE LATIN SCHOOL



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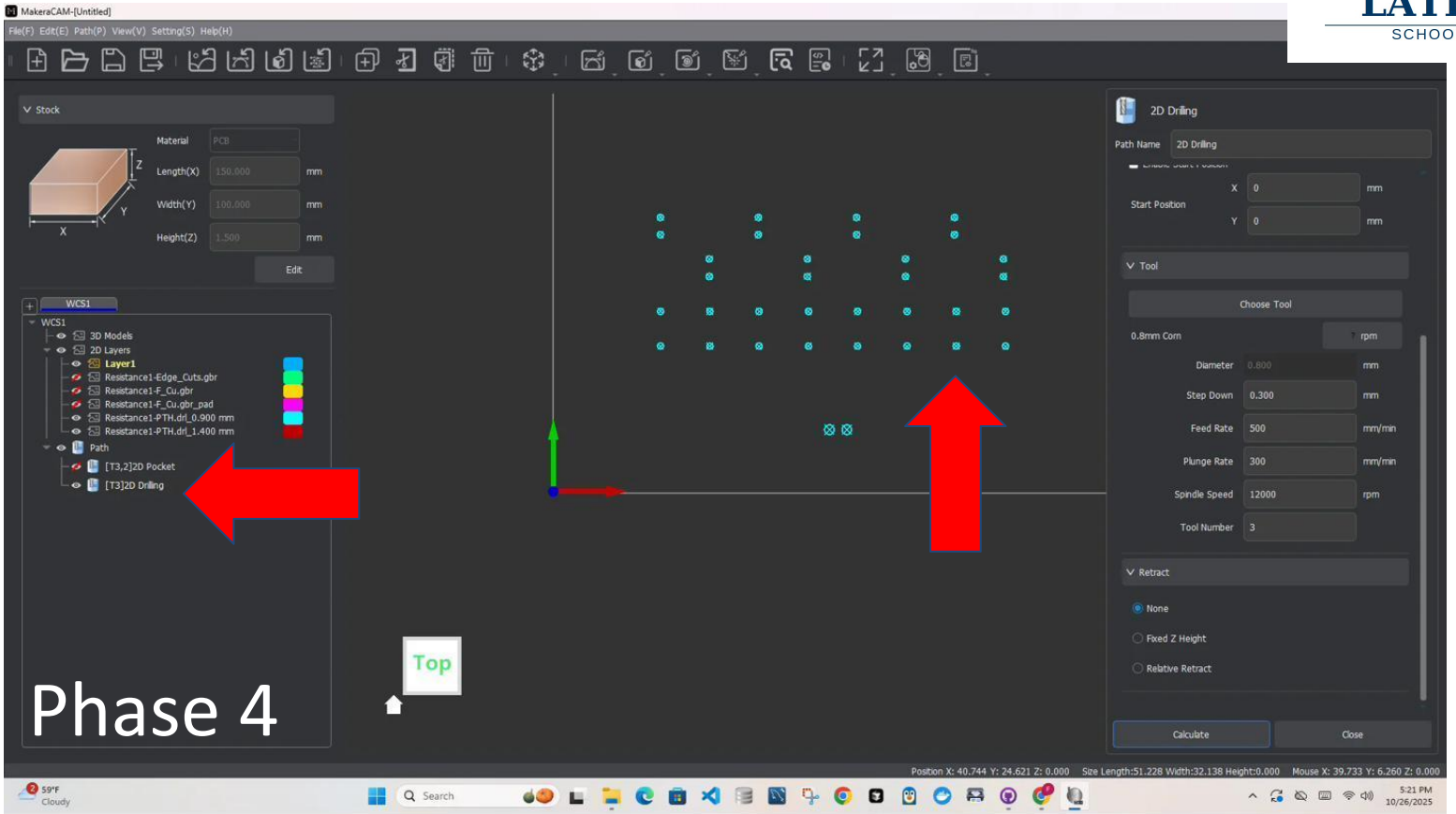
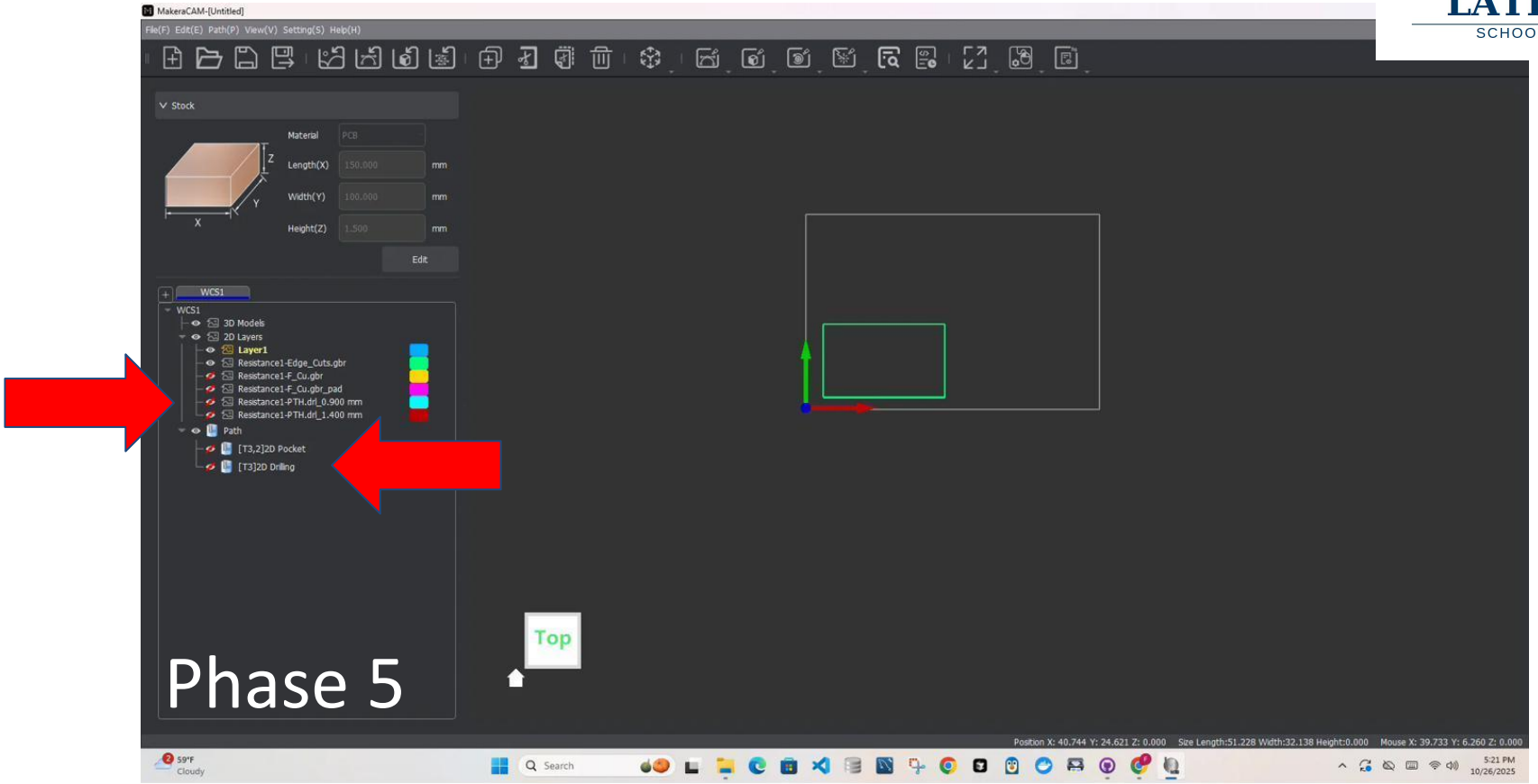


Phase 4

Phase 5: Toolpath 3 (Board Outline)

- This path cuts the board out from the stock.
- **Visibility:** In "WCS1", hide everything except the **Edge.Cuts** layer.
- **Tool:** Select the **2D Contour** tool from the top toolbar.
- **Selection:** Select the outline. Click the **OUTSIDE** line to deselect it (it turns solid). The **INSIDE** line must remain dotted.
- **Cutting Depth:**
  - **Start Depth:** 0.000 mm
  - **End Depth:** 1.7 mm
- **Add Tool:**
  - Click **Choose Tool** → **0.8mm Corn** → "Choose".

CHARLOTTE LATIN SCHOOL



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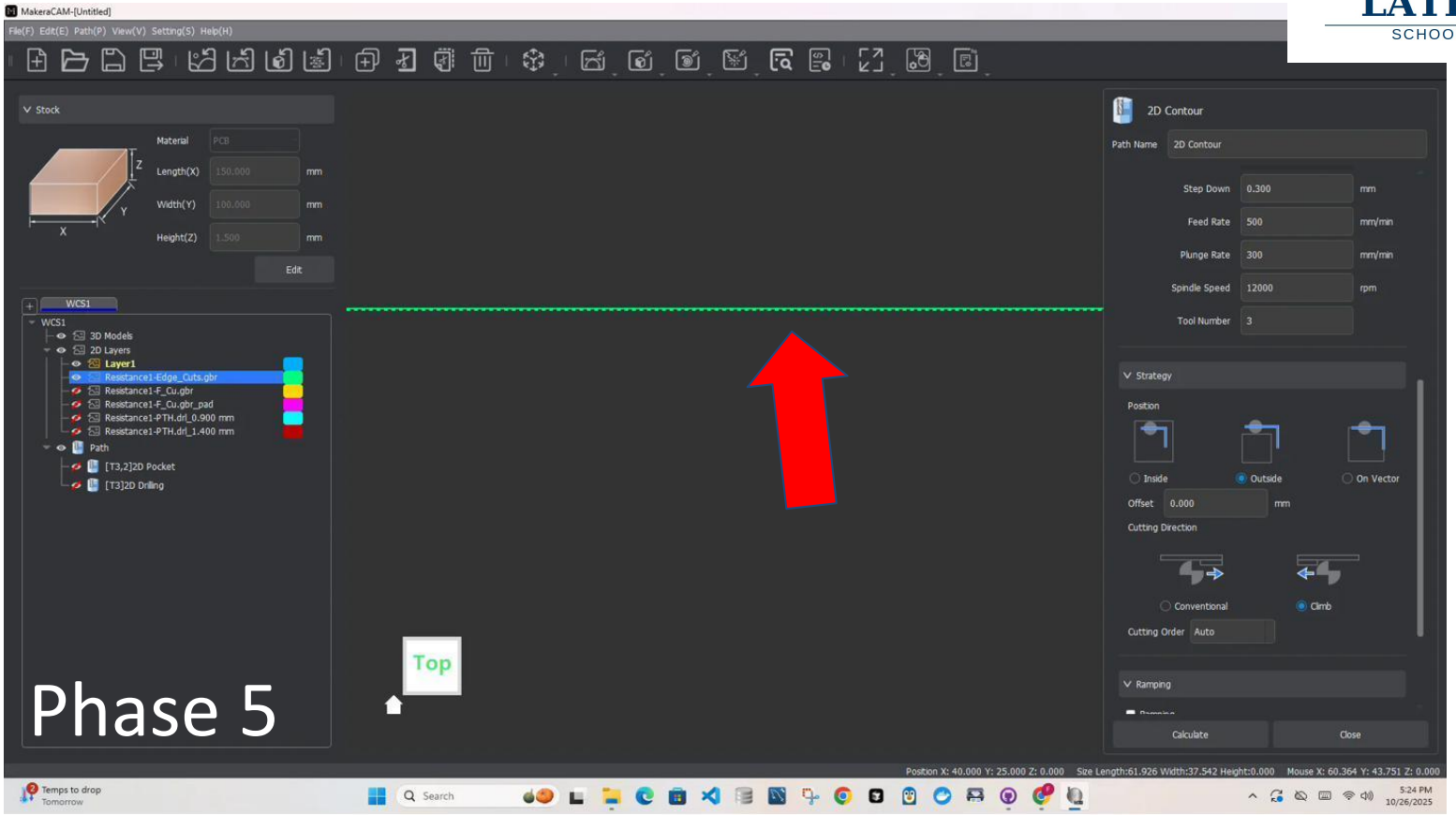

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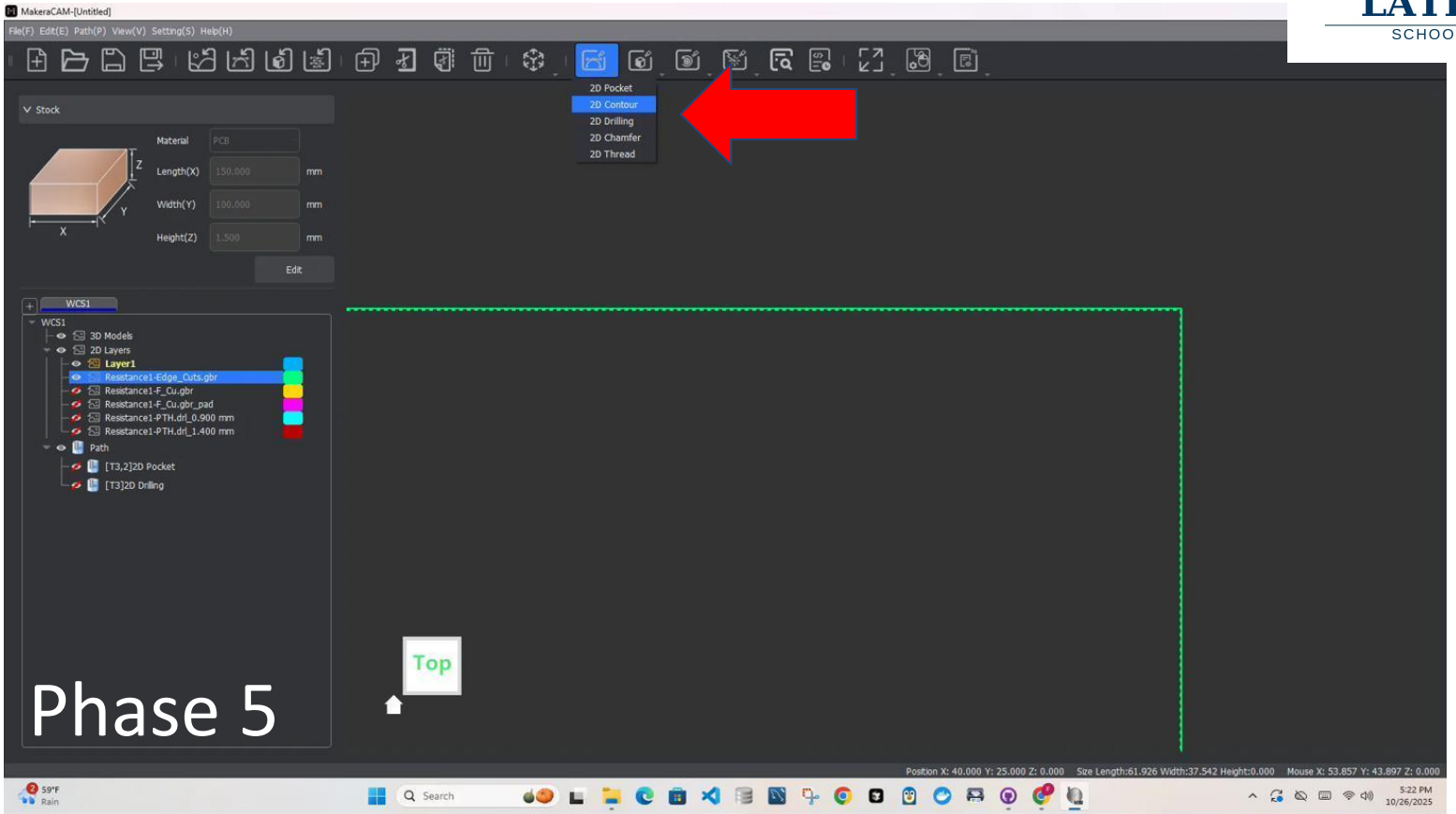

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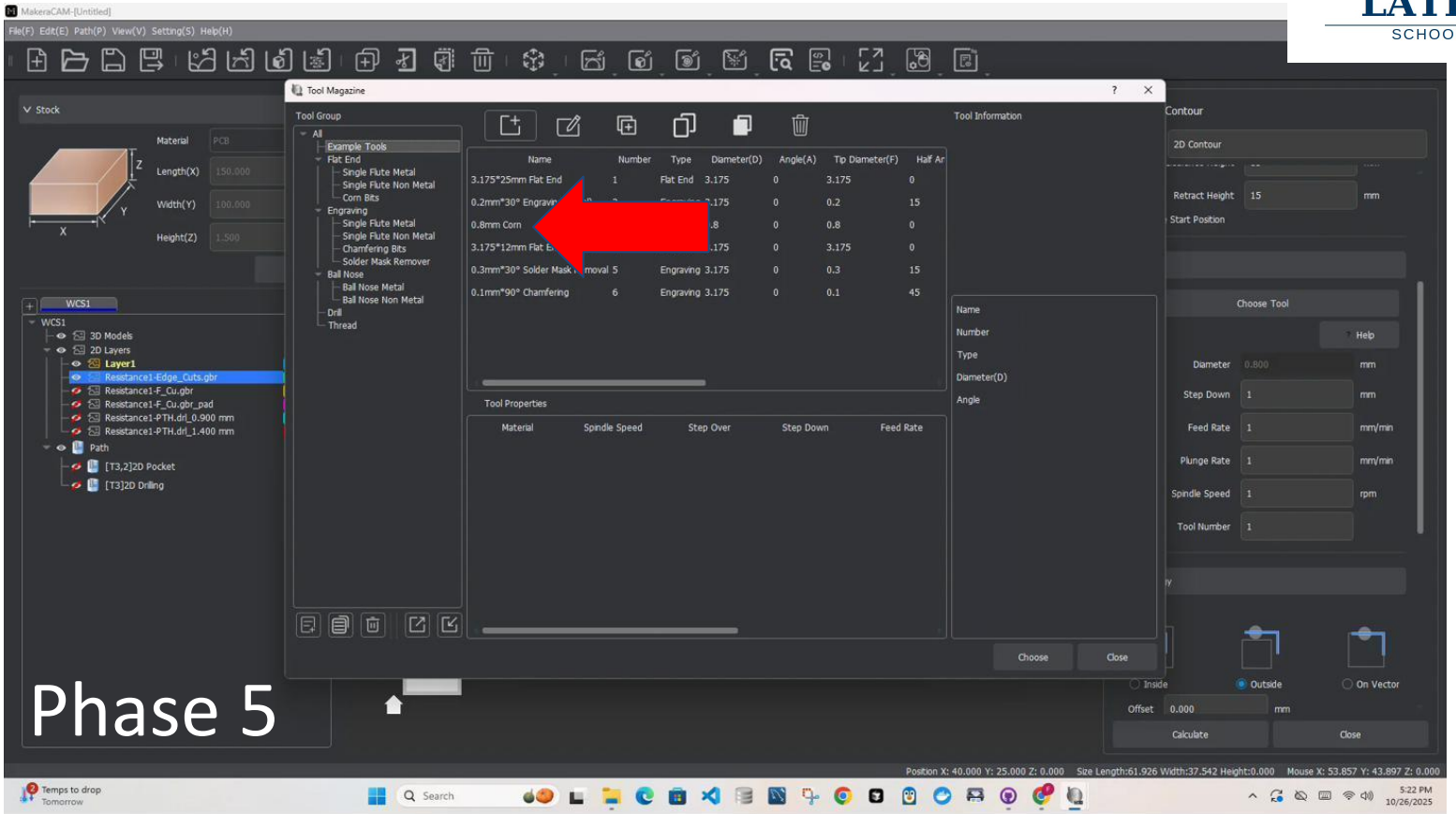

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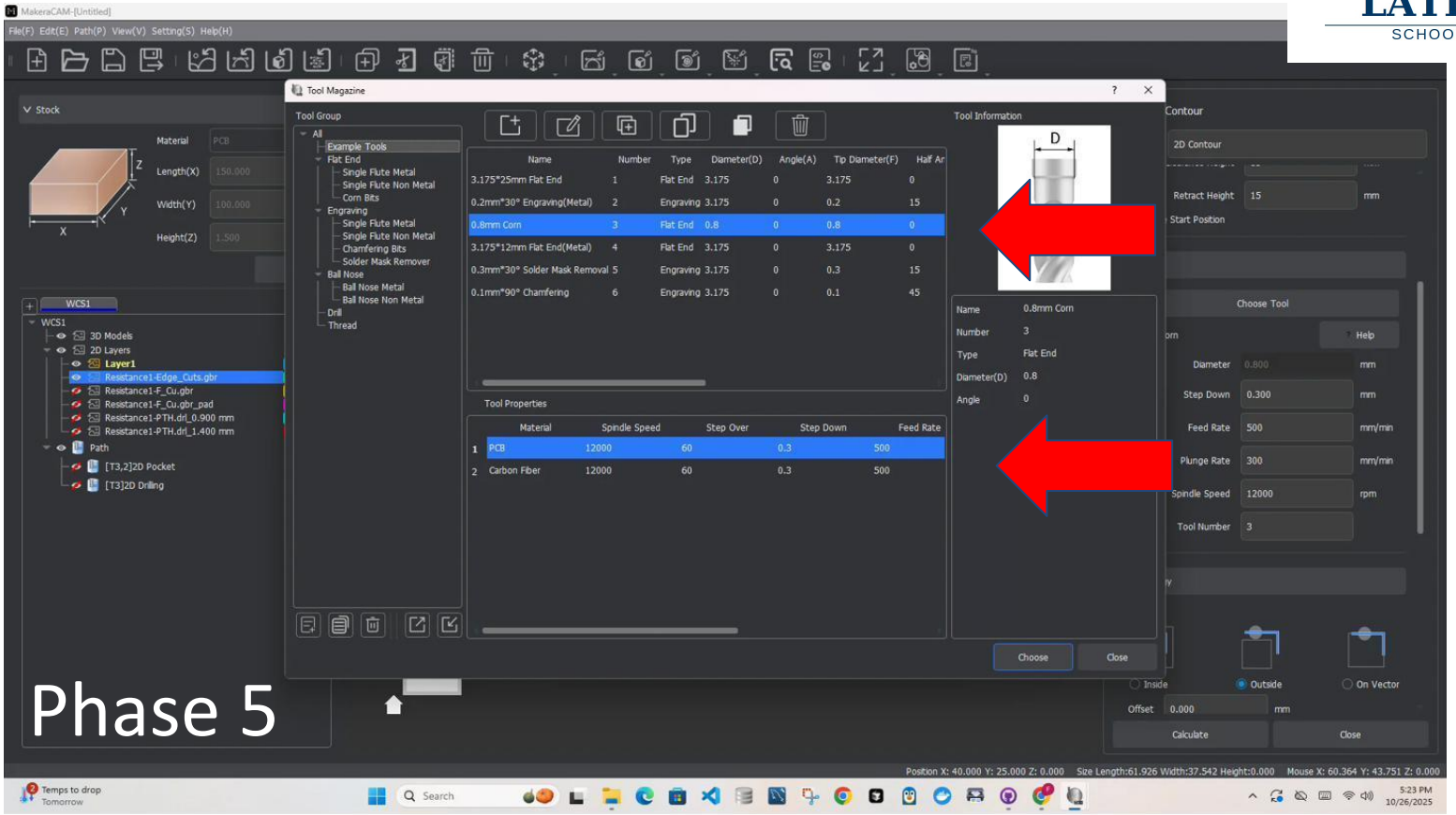
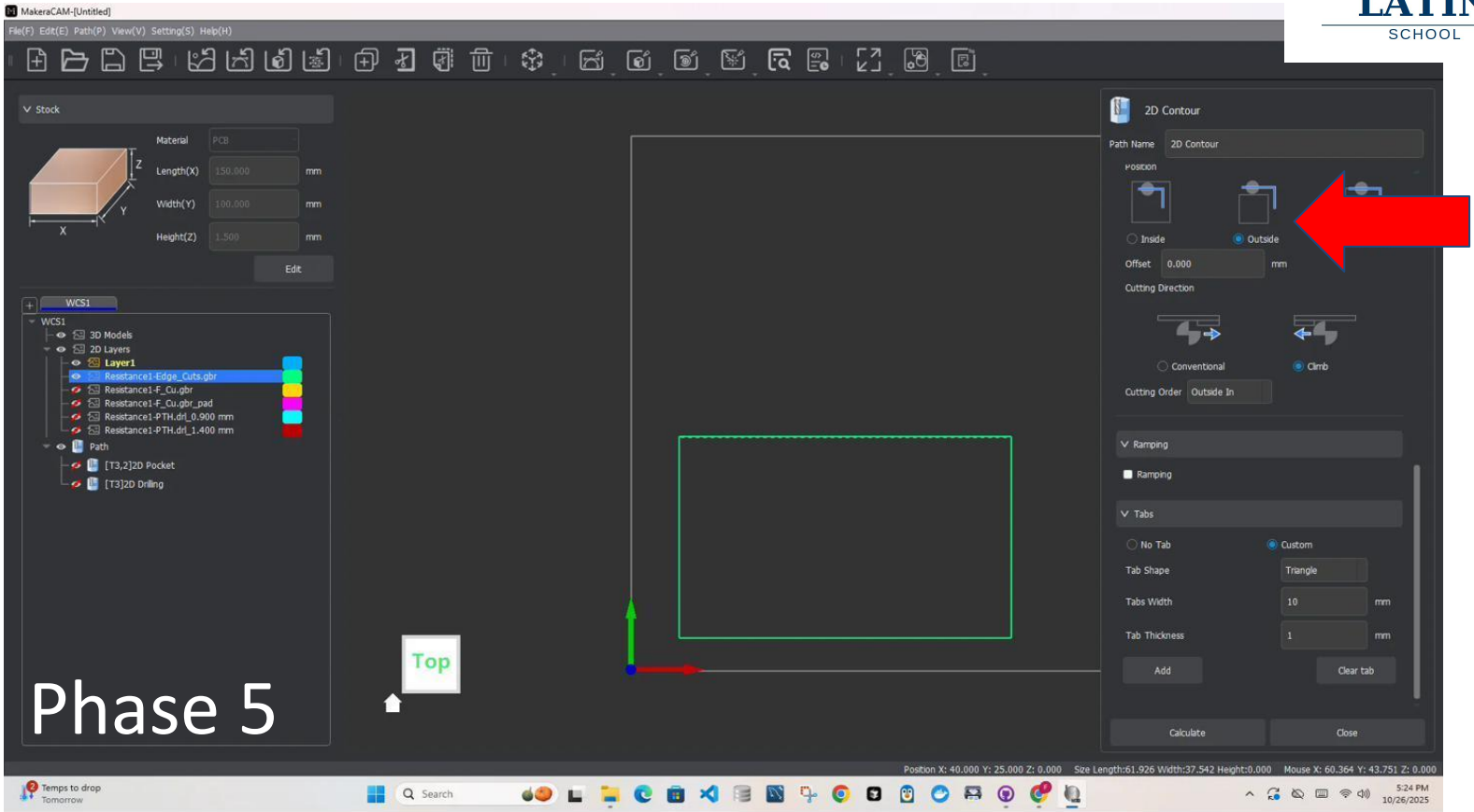


Phase 5

CHARLOTTE LATIN SCHOOL



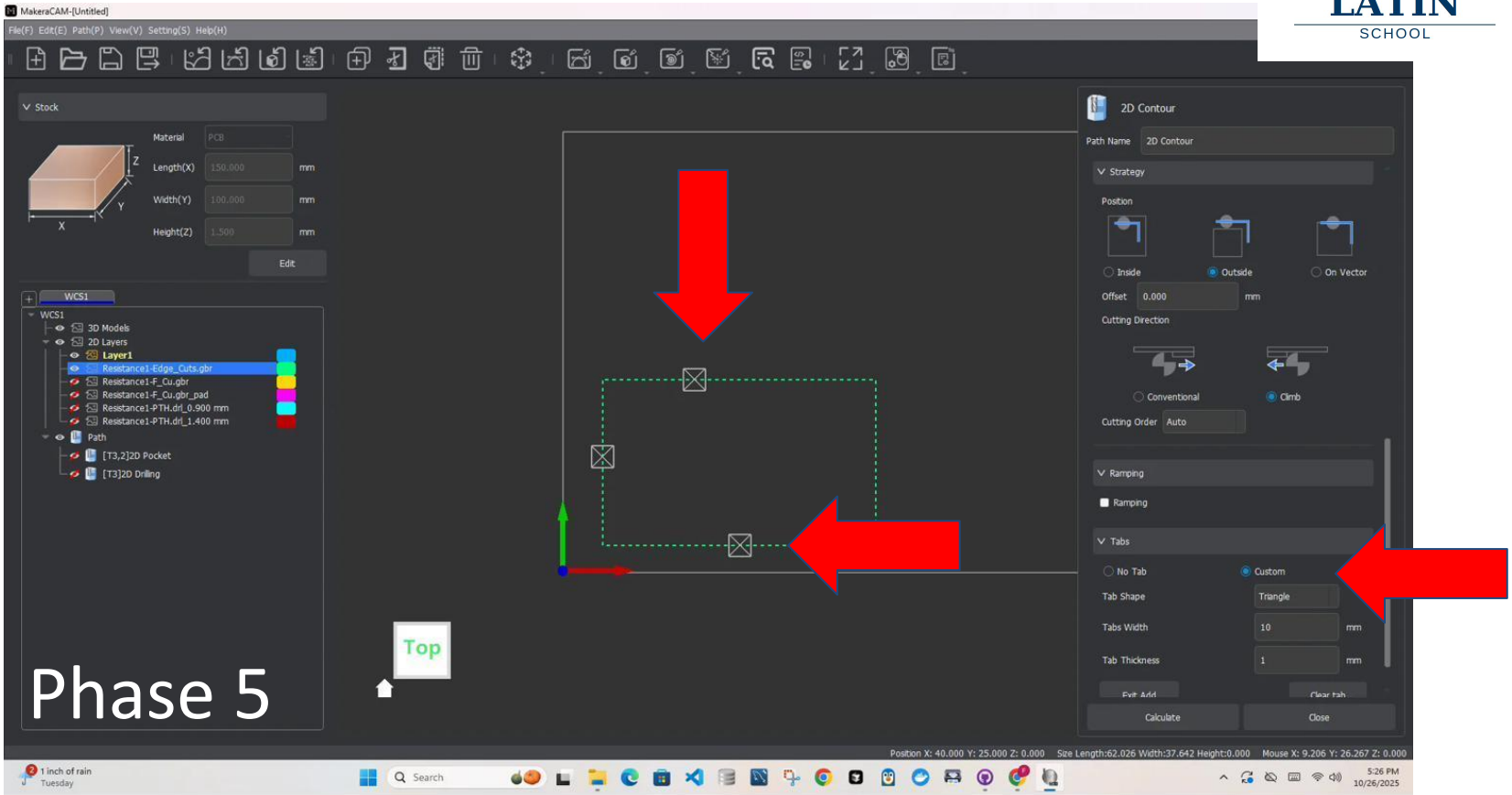
Phase 5

Phase 5: Toolpath 3 - Strategy & Tabs

- **Strategy:** Scroll down and select **Outside**.
- **Tabs:**
  - Scroll down to **Tabs**.
  - Select **Custom** and click **Add**.
  - Click on 3-4 edges of your board outline to add tabs.
- Click **Calculate**.

-

CHARLOTTE LATIN SCHOOL



Phase 5

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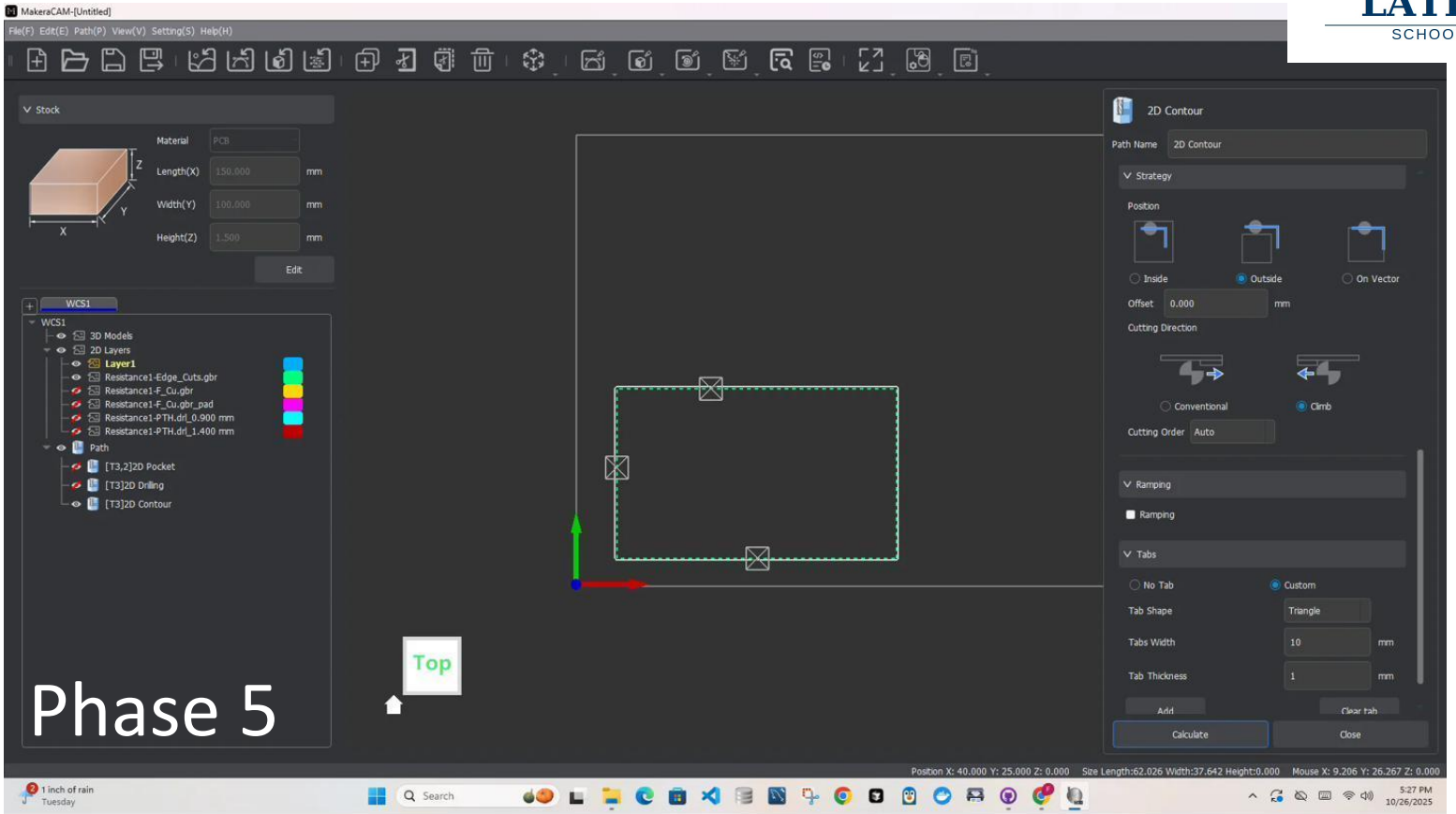
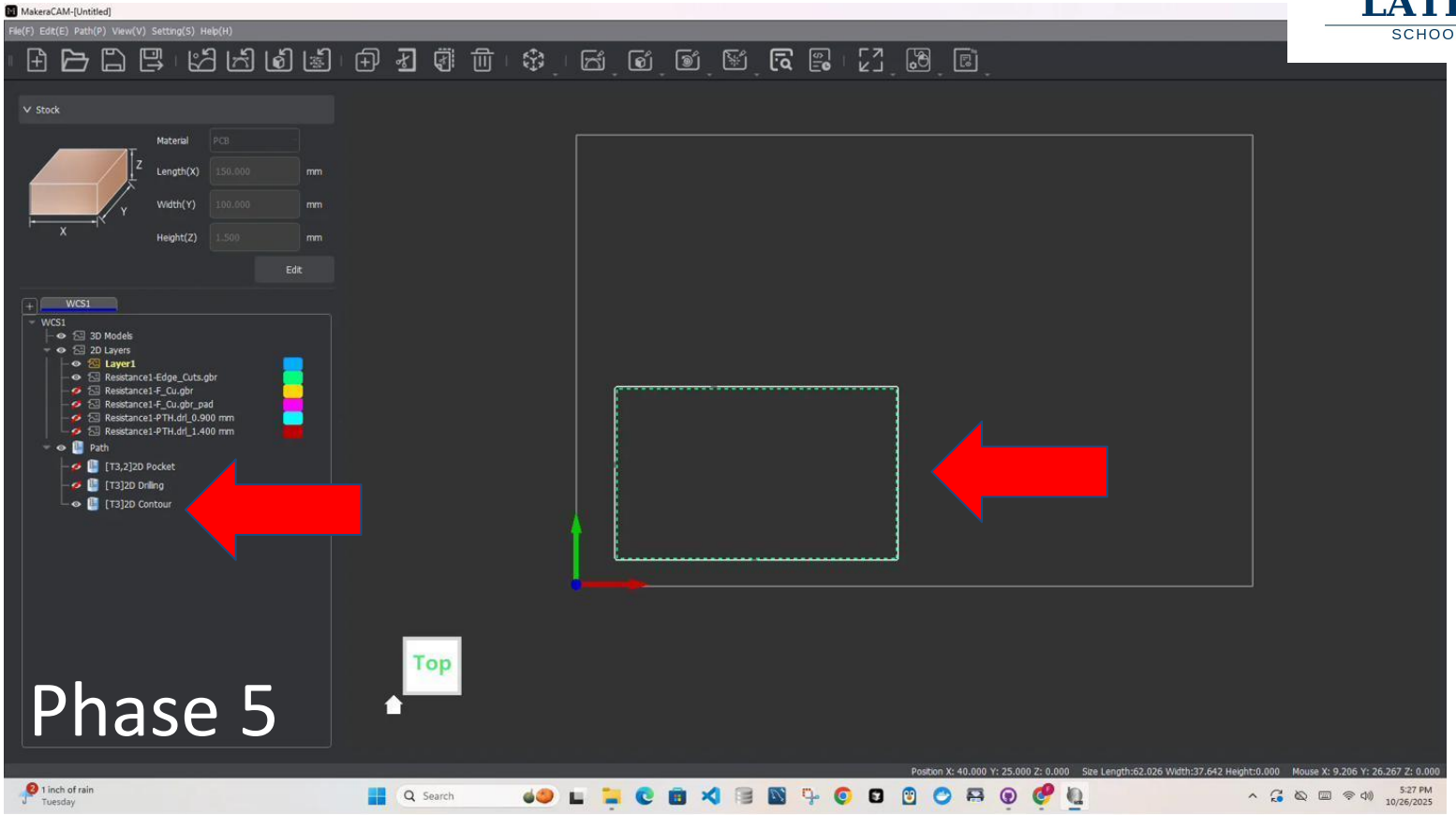


Phase 5

CHARLOTTE LATIN SCHOOL



CHARLOTTE LATIN SCHOOL

MakerCAM Workflow

Phase 6: Simulate and Export

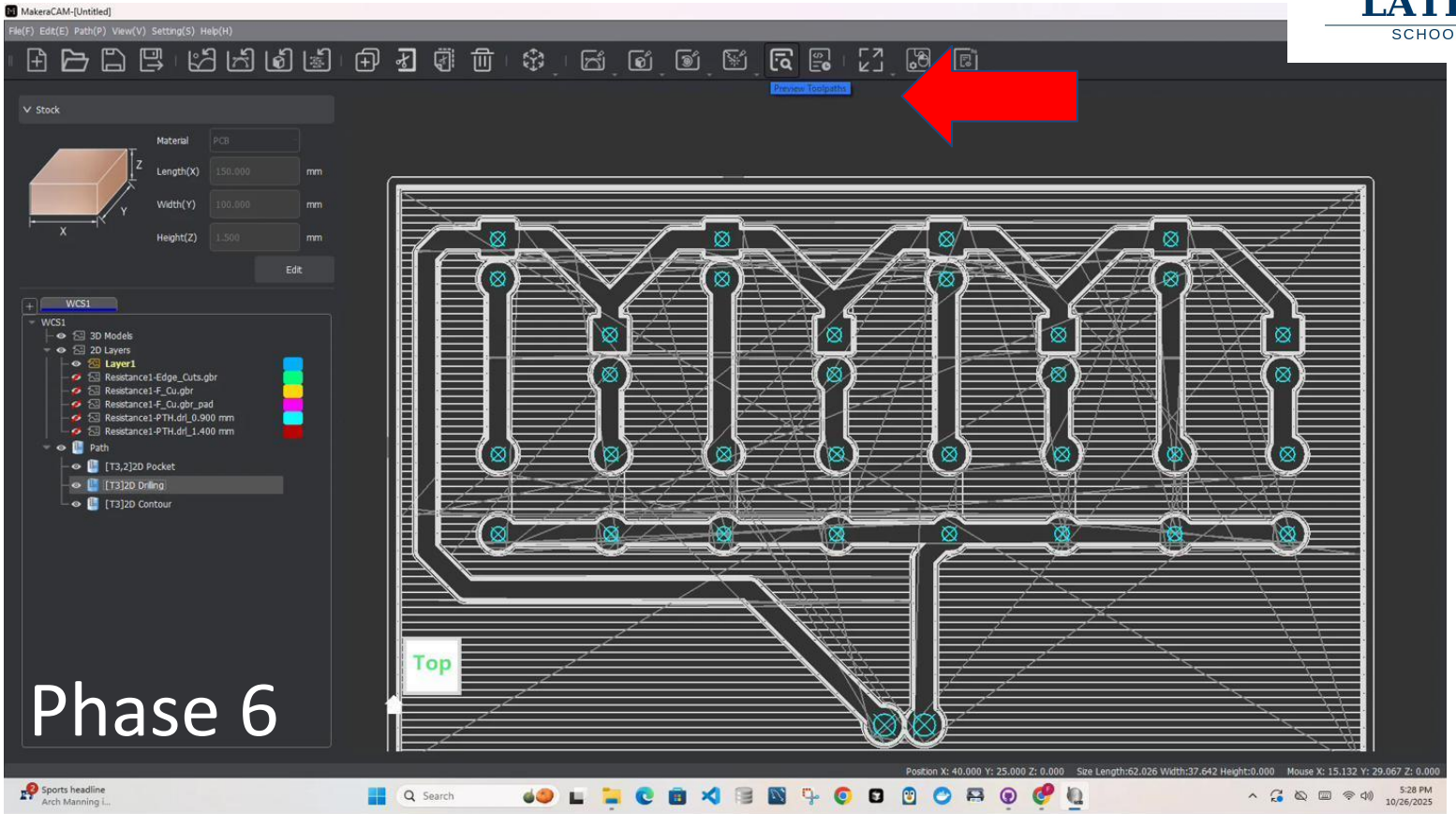
Preview:

- Click the **Preview Toolpaths** icon.
- Check the boxes for all three toolpaths (Pocket, Drilling, Contour).
- Click **Preview** and watch the simulation.

Export:

- Close the preview and click the **Export** icon.
- Select all three toolpaths in the new window.
- Click the **Export** button.
- Save your **.nc** g-code file.

CHARLOTTE LATIN SCHOOL



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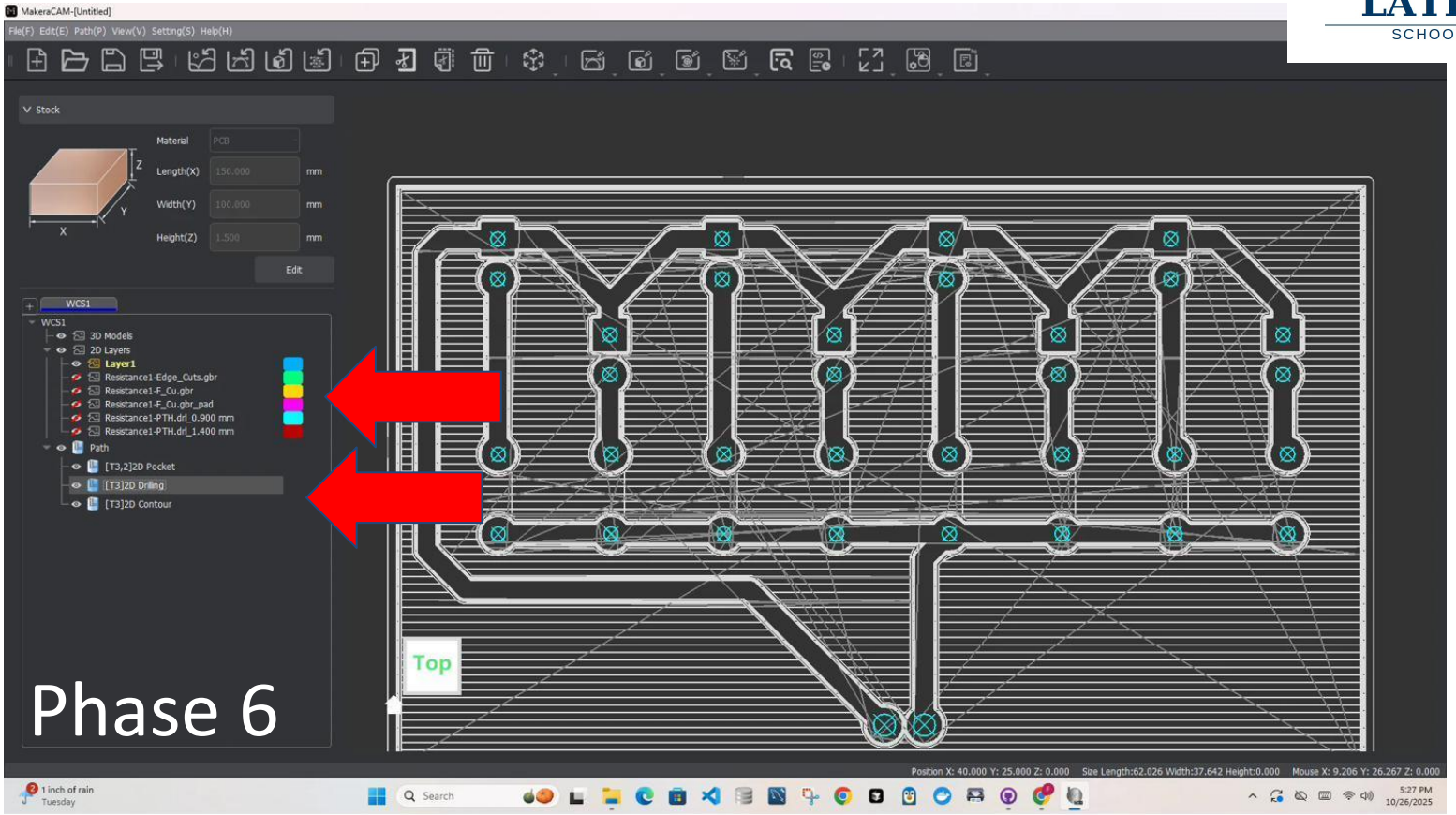

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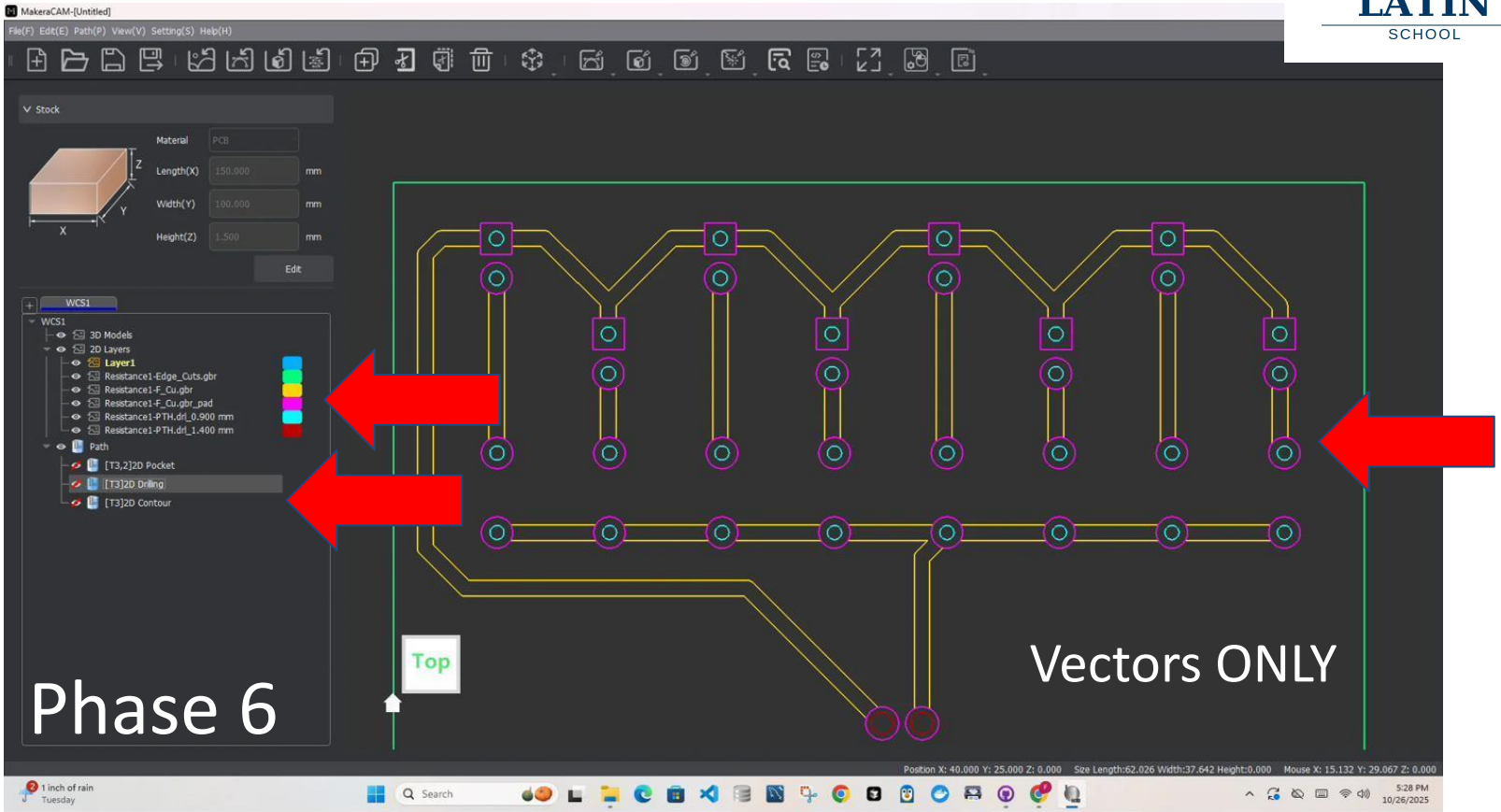

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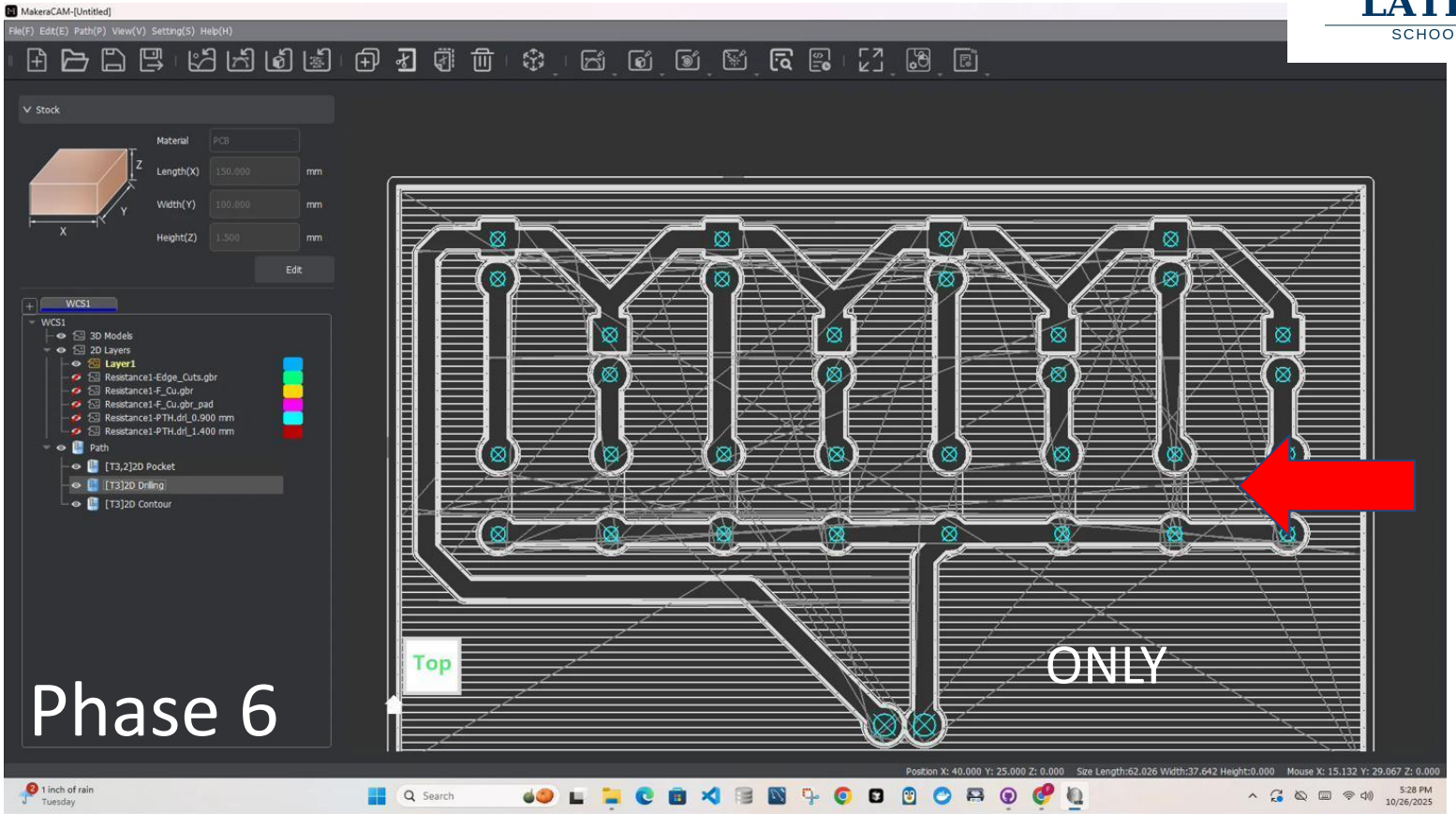

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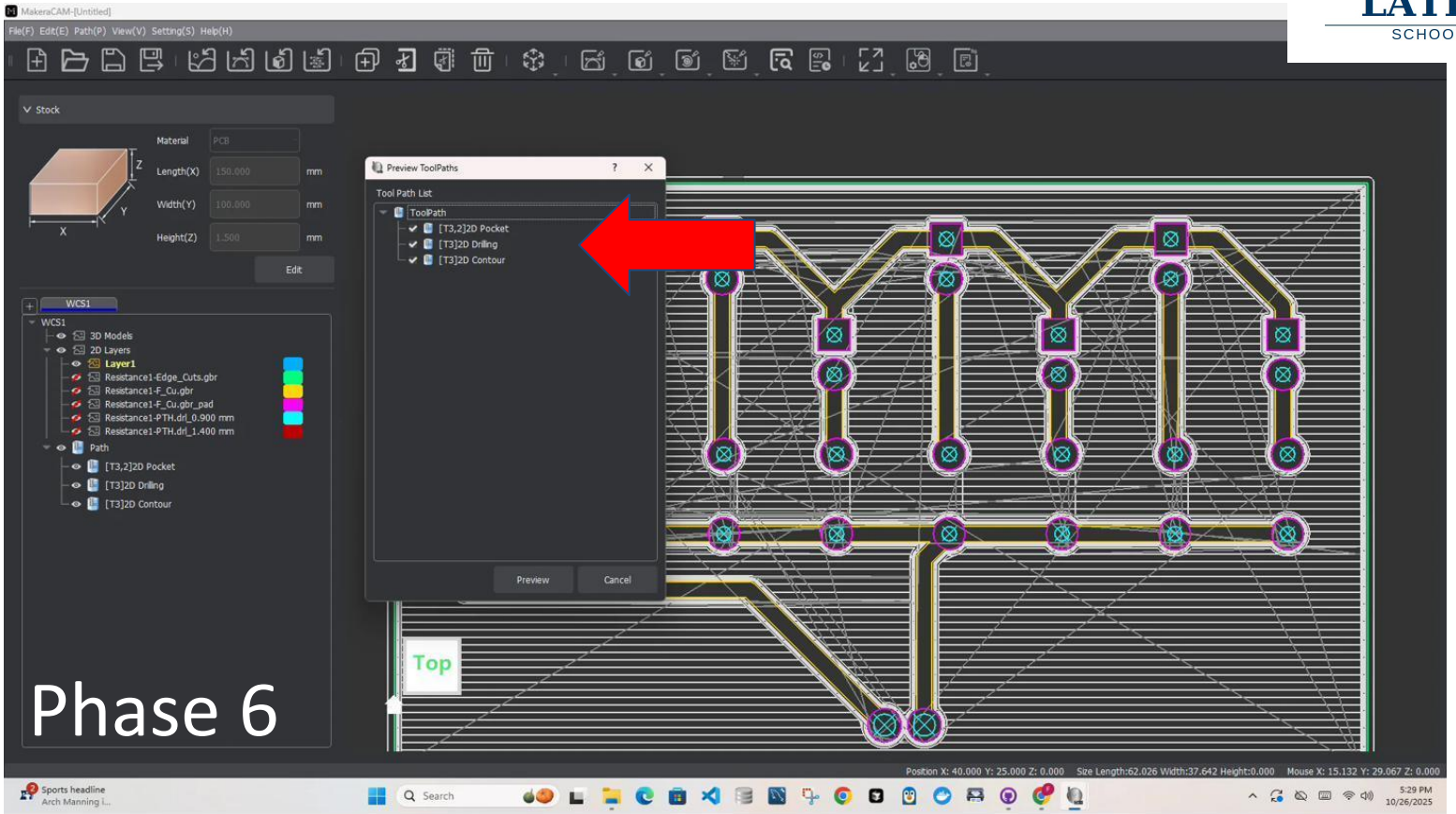

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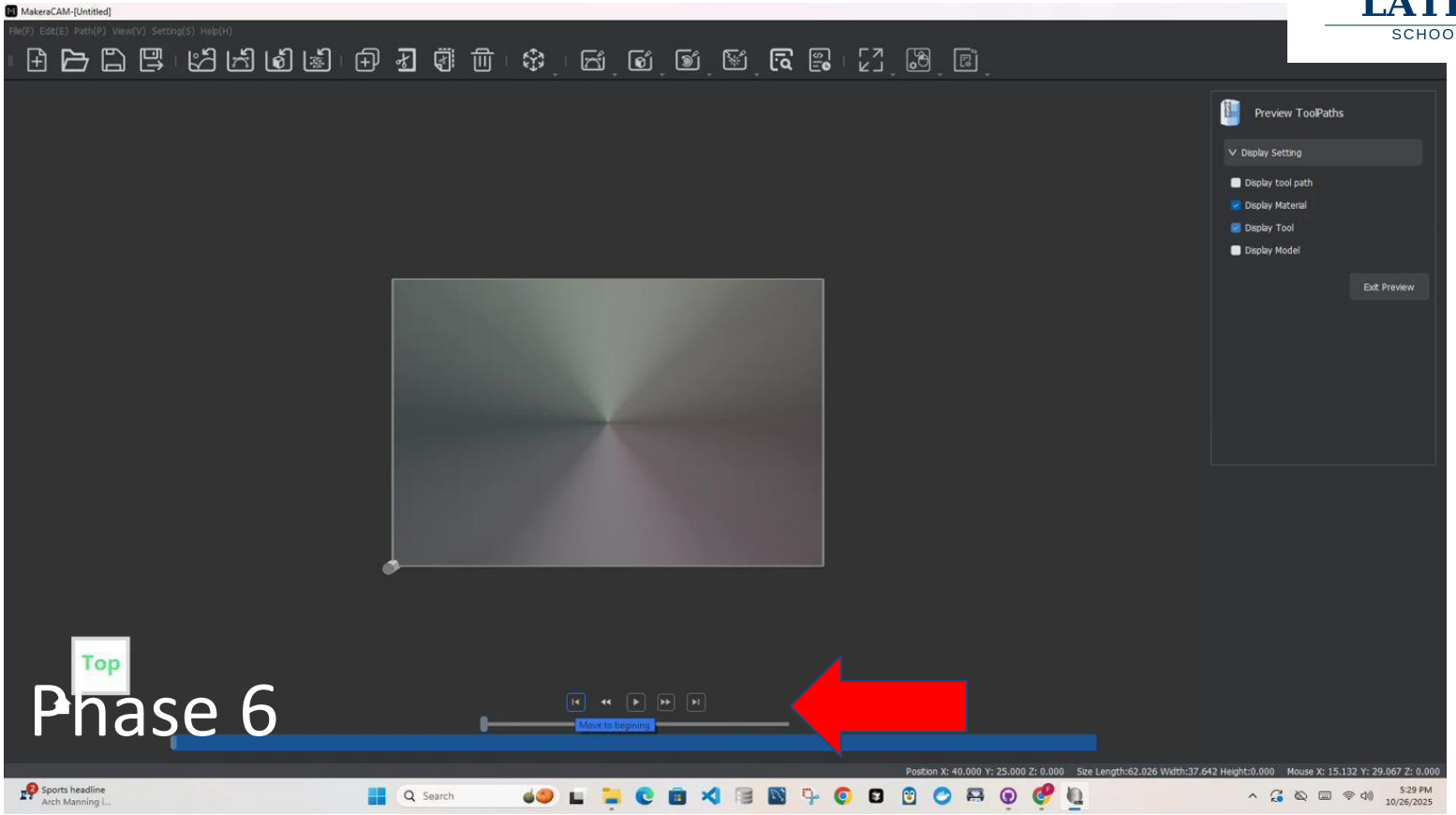
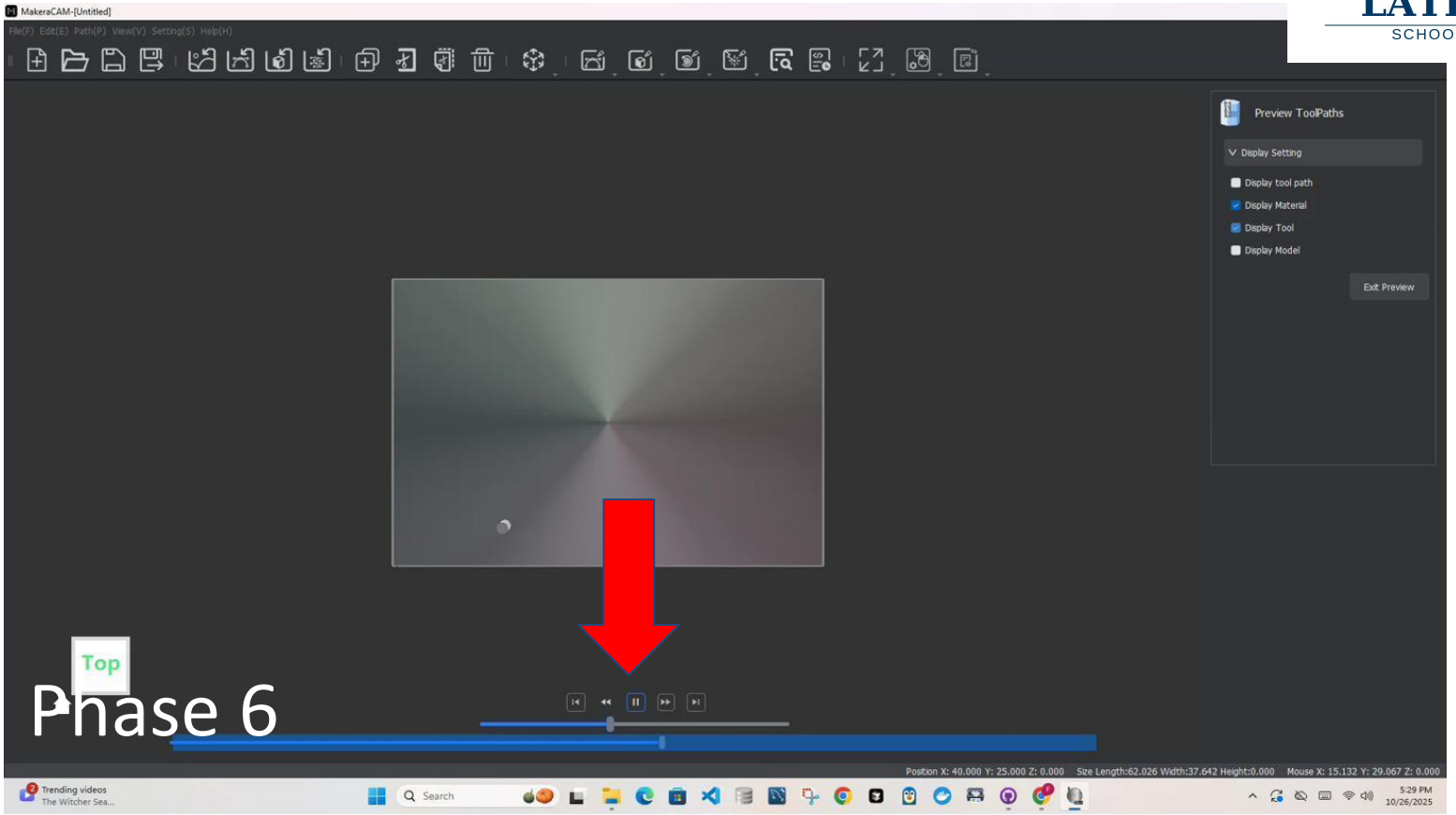


Phase 6

CHARLOTTE LATIN SCHOOL



Phase 6

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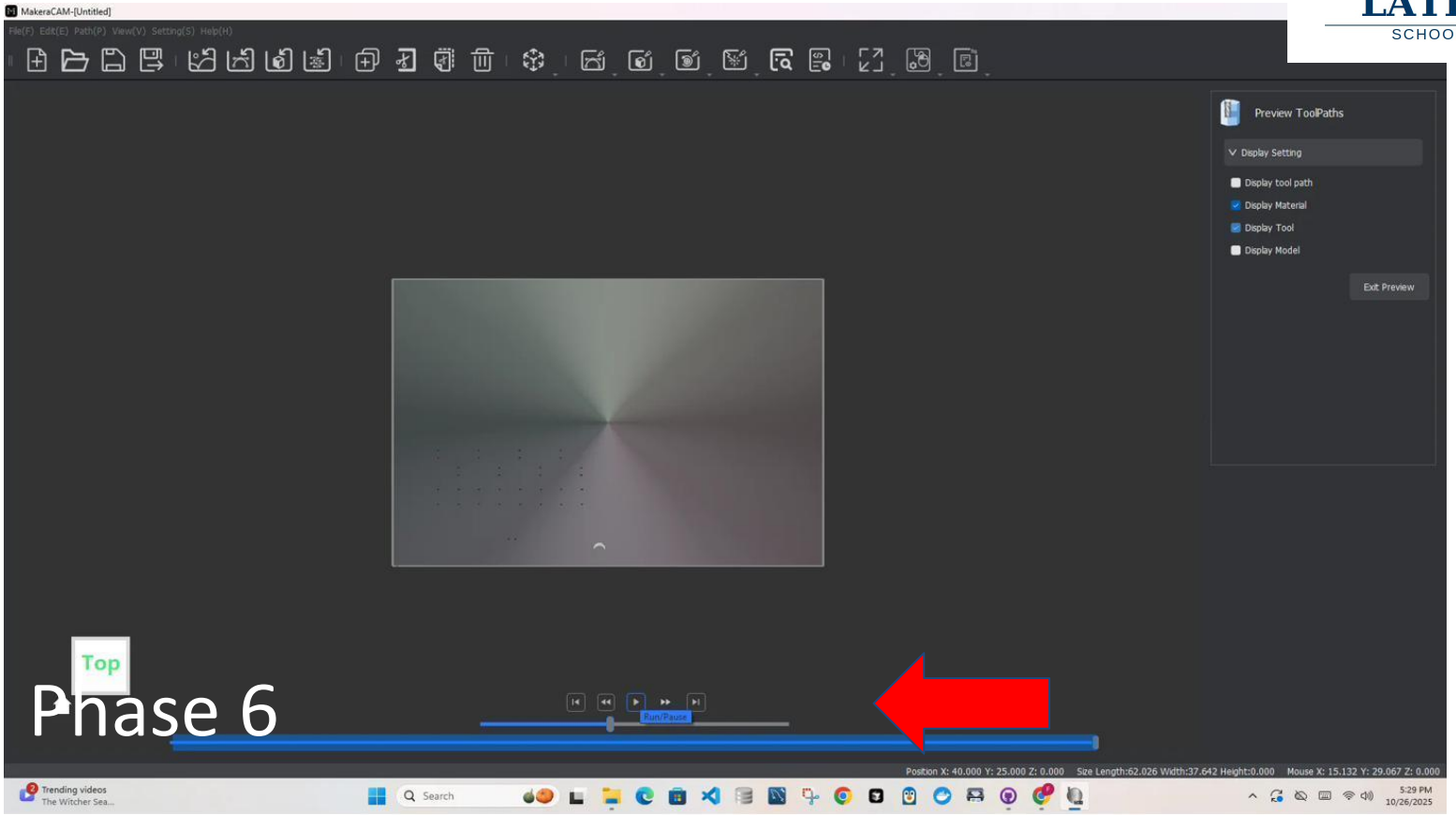
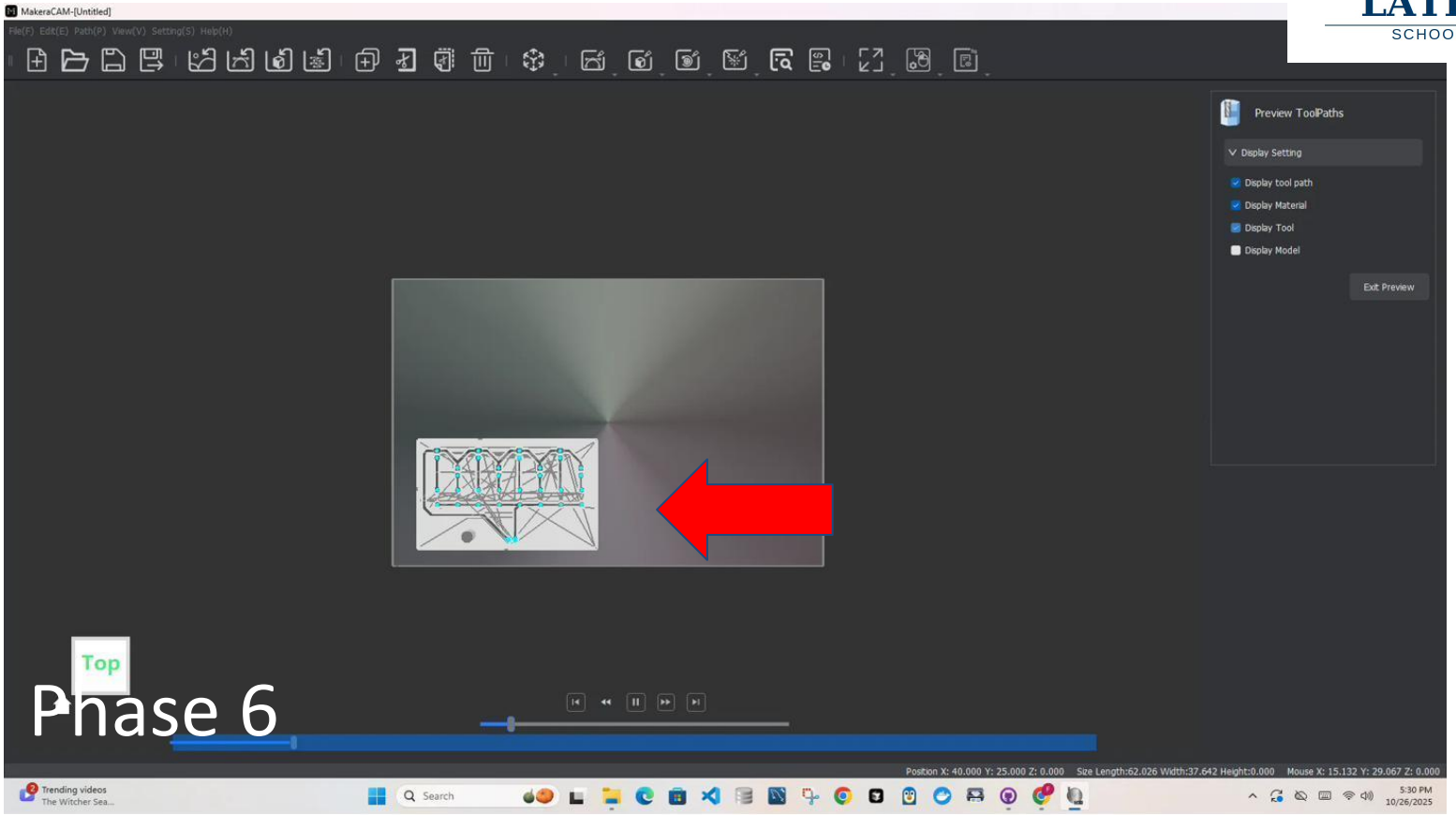


Phase 6

CHARLOTTE LATIN SCHOOL



Phase 6

Phase 6: Simulate and Export

Export:

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- Click the **Export** button.
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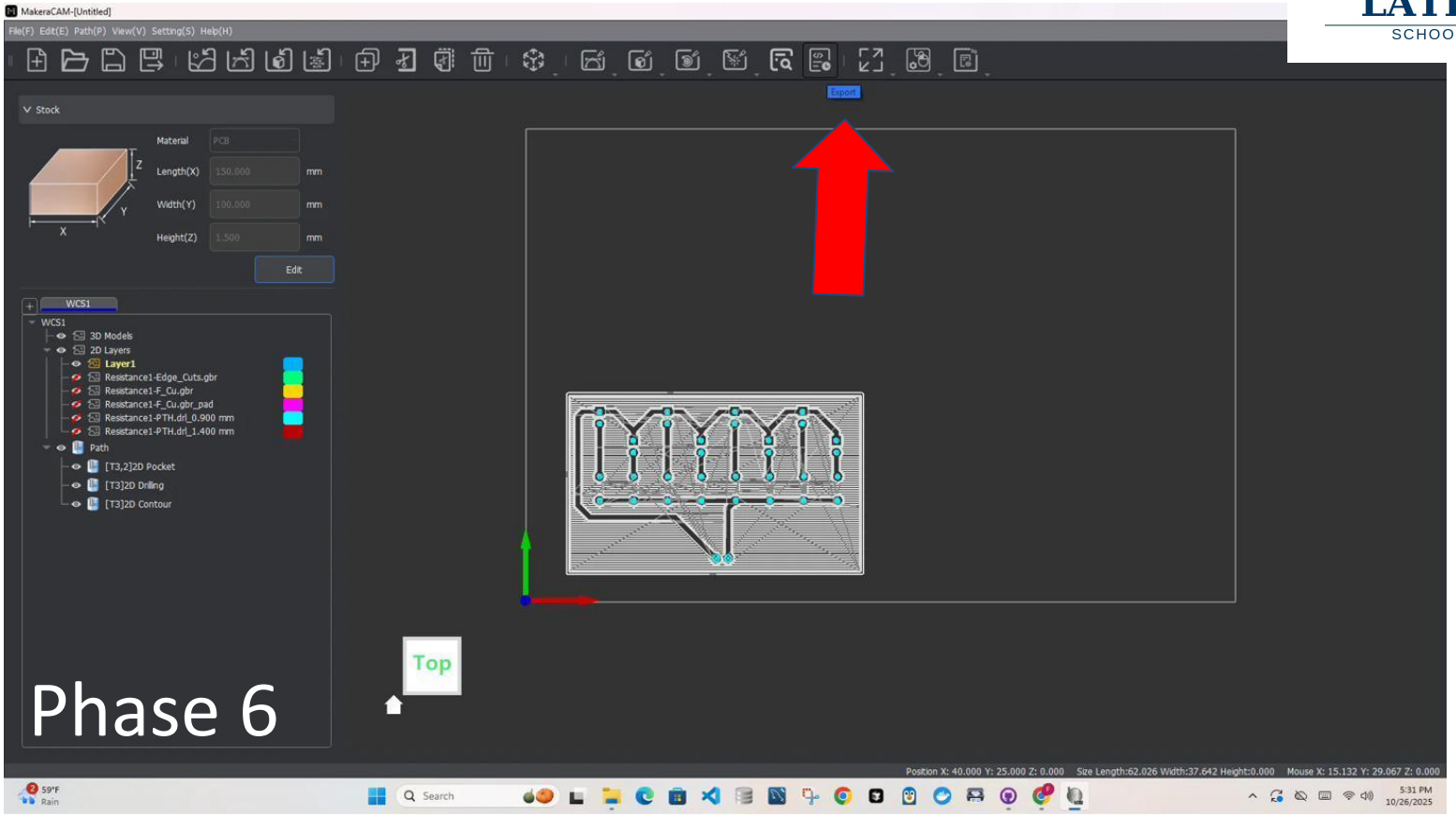

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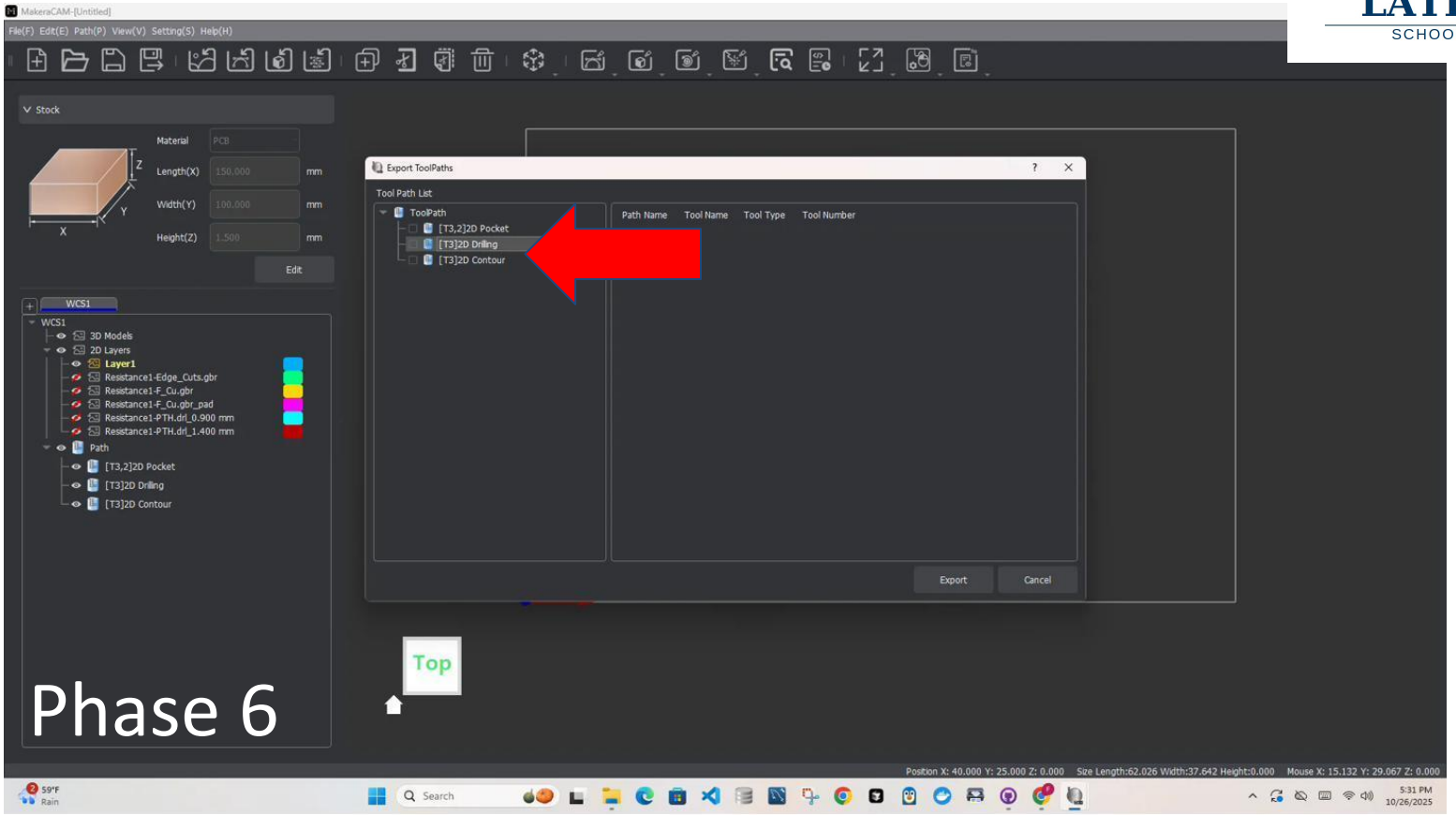

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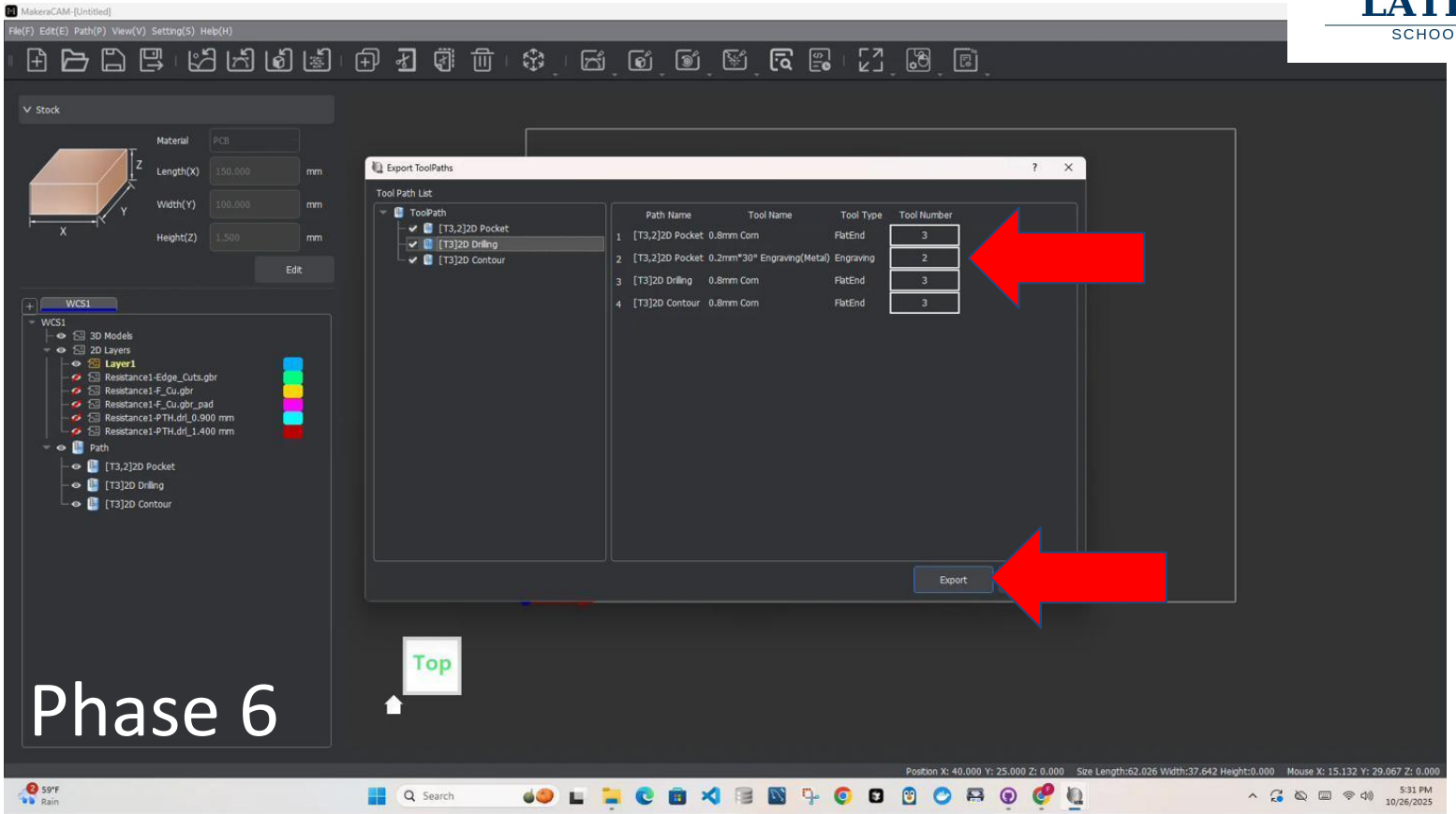

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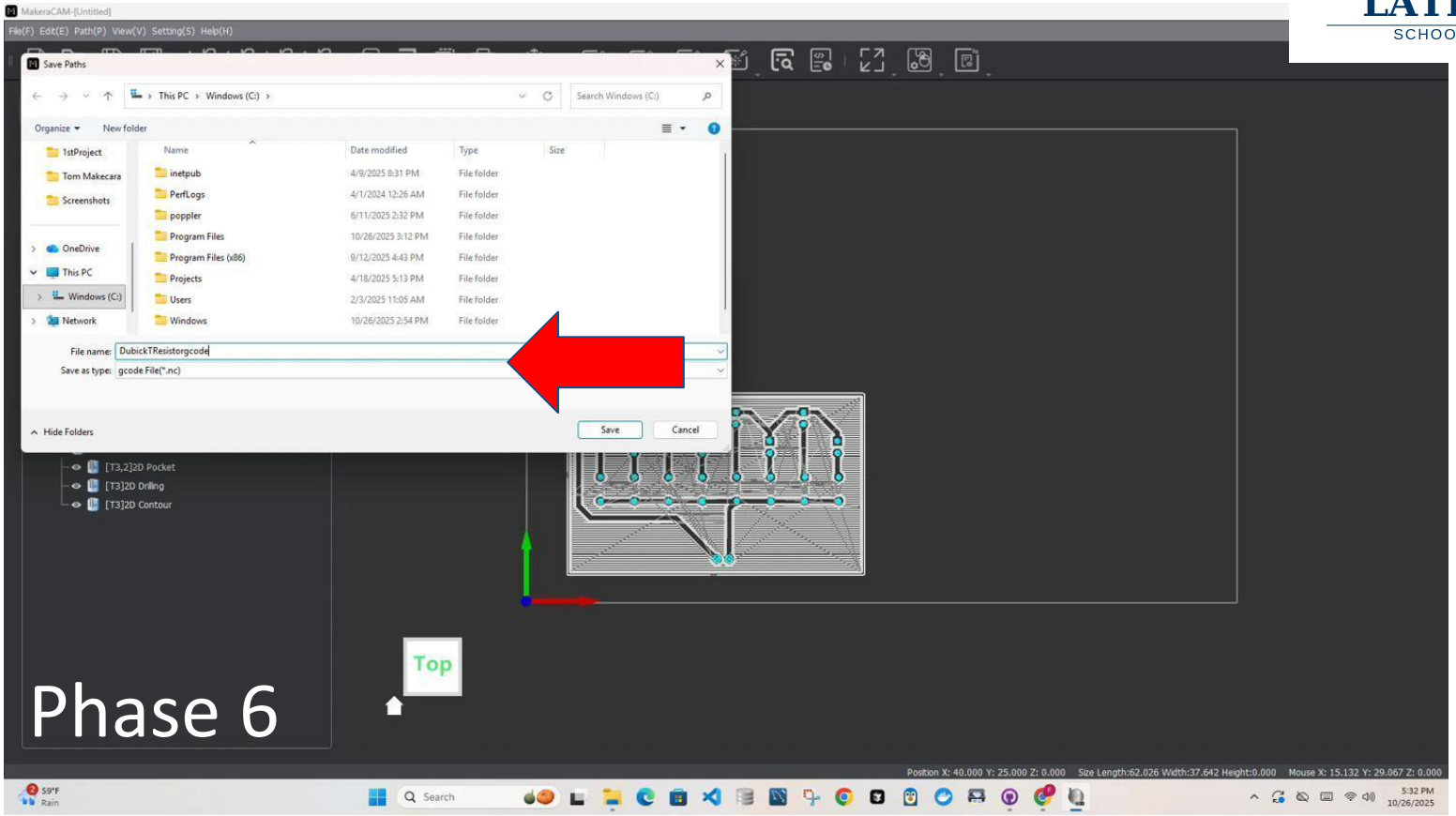

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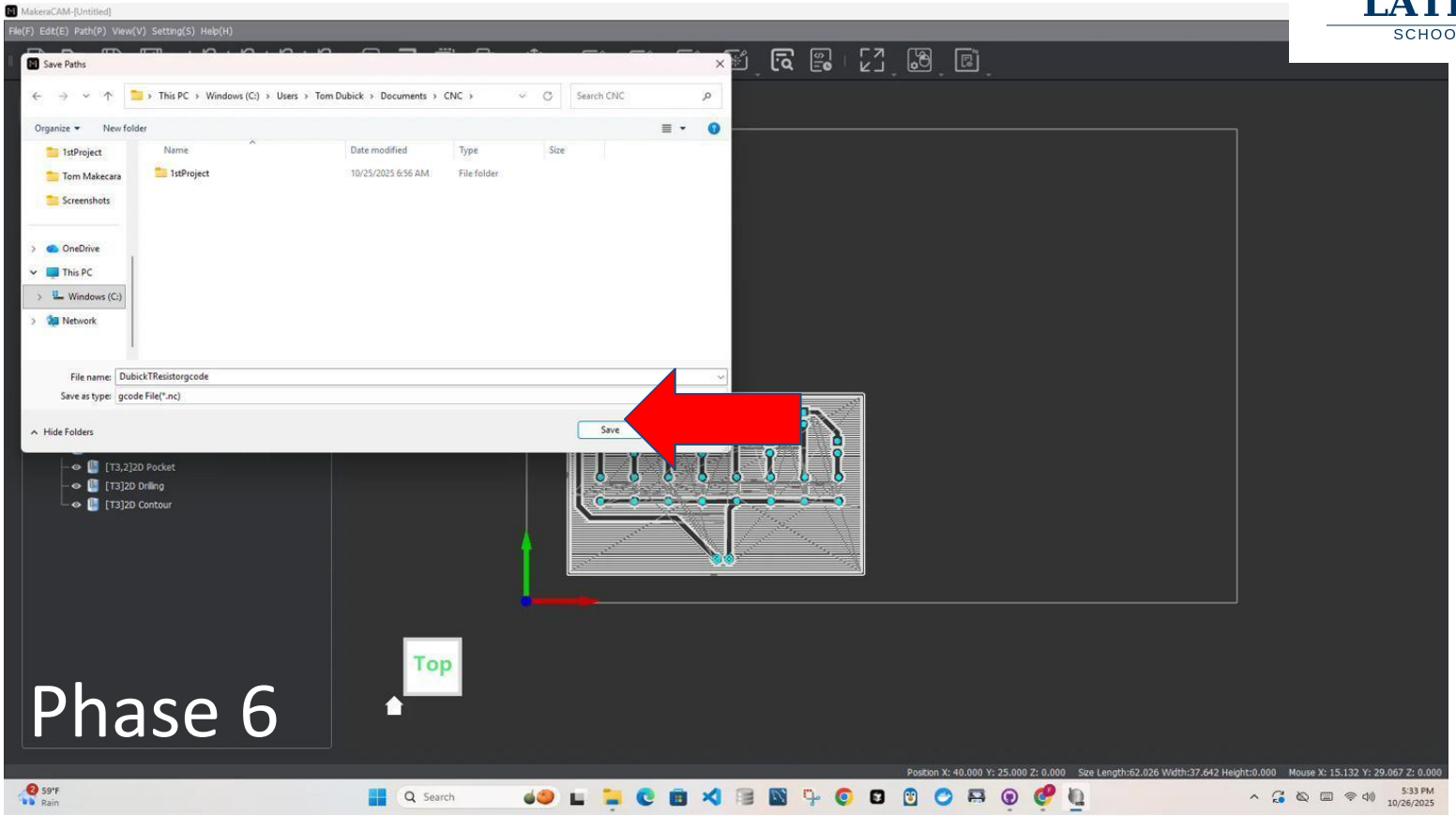

CHARLOTTE LATIN SCHOOL

MakerCAM Workflow