AUTODESK

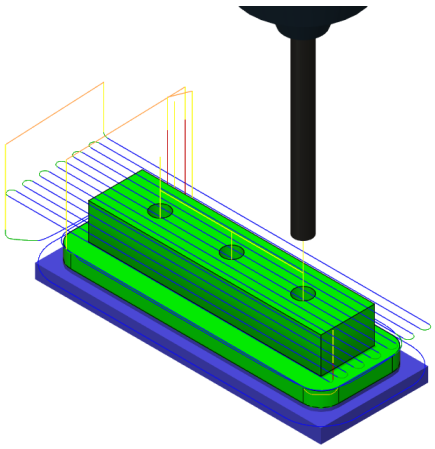
Step-by-step guide

Use toolpath simulation

Determine whether a setup is ready to be machined by analyzing it in a simulation.

Learning objectives:

- Simulate a single toolpath.
- Simulate a CAM setup.



The completed exercise

---

1. Upload and open the supplied *CAM Simulation.f3d* file.

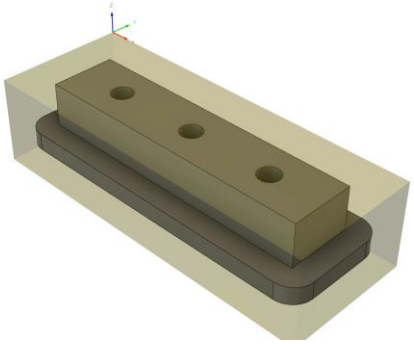


Figure 1. Open the supplied file

2. Activate Setup1 and select each of its operations. Notice that the green in-process stock body illustrates the material removed by each operation.

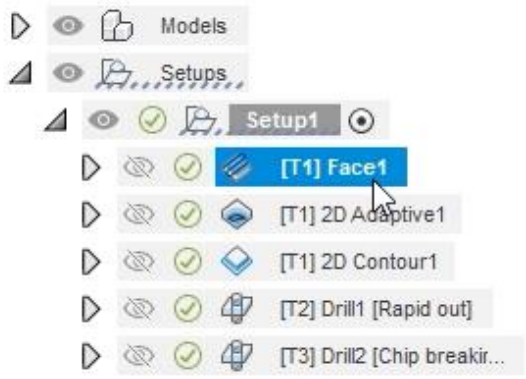


Figure 2. Explore each operation

3. You can toggle each operation's toolpaths by pressing F7. You can also configure the toolpath's visibility by using the options in the Display and Settings bar's Toolpath visibility menu.

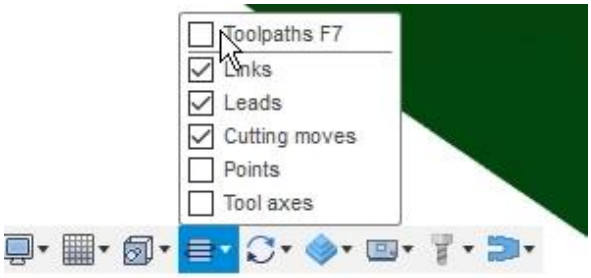


Figure 3. Note the toolpath options

4. Expand the Display and Settings bar's Stock visibility menu and notice that you can toggle the in-process stock. Activate the Transparent stock option.

Figure 4. Activate the Transparent stock option

5. You can now see the modeled geometry inside the in-process stock.

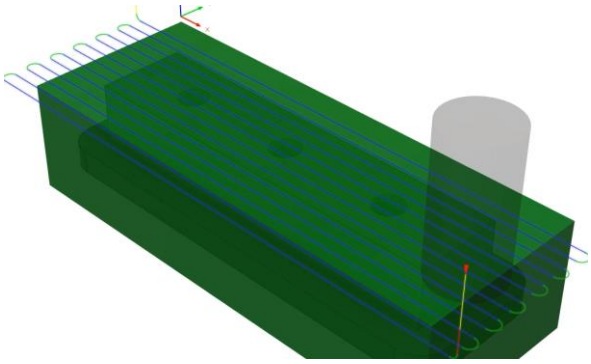


Figure 5. Notice the in-process stock's transparency

6. The Display and Settings bar's Tool visibility menu can be used to configure the tool. For example, you can determine whether the tool's holder and shaft are visible. Activate the Show Tool on Cursor option.

Figure 6. Customize the tool's appearance

7. Notice that the tool follows your cursor. This option can be useful for determining whether the tool has enough flute length to cut a part's geometry. Press Ctrl+T to toggle off the Show Tool on Cursor option.

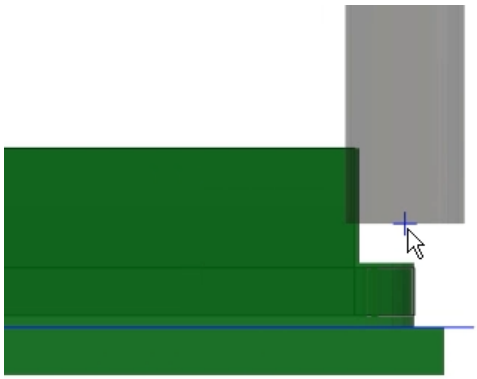


Figure 7. Notice the tool follows the cursor

8. Select Setup1.

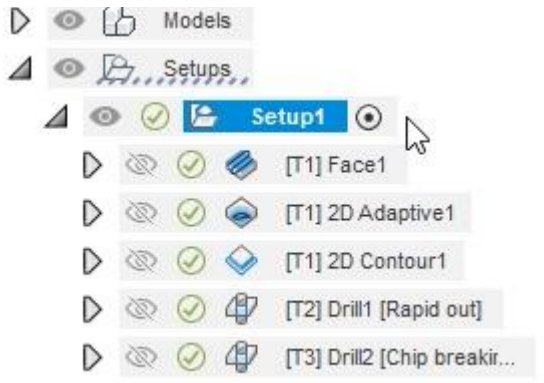


Figure 8. Select Setup1

9. Simulate the selected setup by clicking Actions> Simulate.

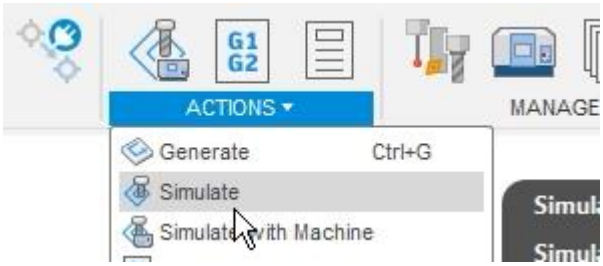


Figure 9. Select the setup

10. Explore the Simulate dialog's options. For example, the Comparison option in the Colorization menu can be used to determine whether there is excess material, gouged material, or whether the machined material is in tolerance.

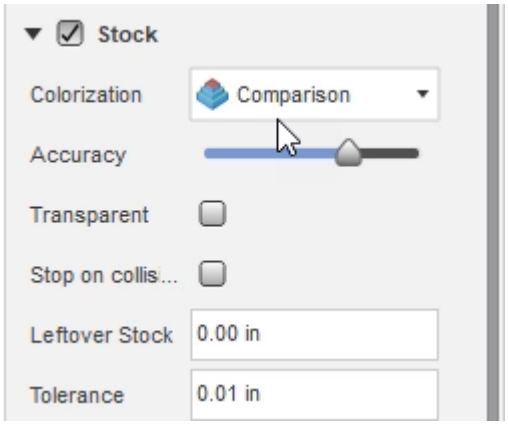


Figure 10. Note the Simulate dialog's options

11. You can scrub through the setup's animation by clicking and dragging the mouse across the Canvas area.

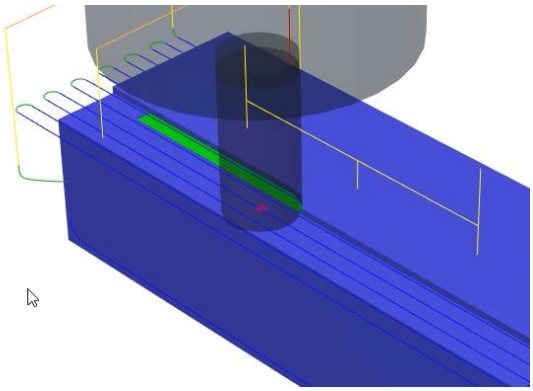


Figure 11. Scrub through the animation

---

12. You can also click the green timeline at the bottom of the screen to navigate through the animation.

Figure 12. Navigate to the animation

---

13. Press play to begin animating the stock removal.

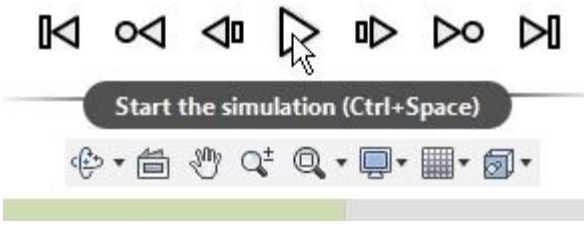


Figure 13. Press play

14. Watch the animation to the end and notice that the model's faces are green and blue. The green faces match the modeled geometry and the blue faces have extra stock material to remove. Red faces would indicate areas where too much material has been removed.

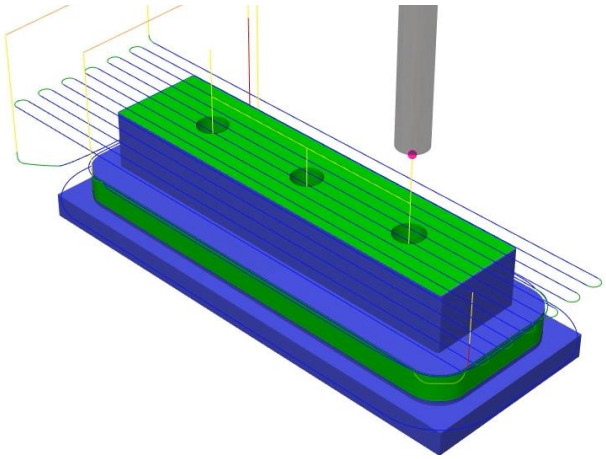


Figure 14. Inspect the model

15. End the simulation by clicking Exit Simulation> Exit Simulation.

Figure 15. Exit the simulation

16. Right-click the 2D Adaptive operation and choose Edit from the menu.

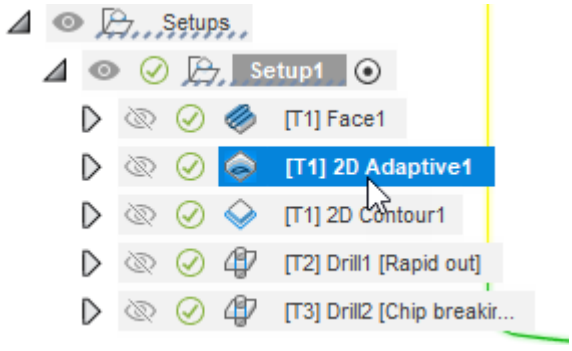


Figure 16. Edit the 2D Adaptive operation

17. Navigate to the Passes tab and notice that the Stock to Leave option is activated. This is the reason you noticed blue faces in Step 14. OK the dialog.

Figure 17. Notice that stock is left behind

---

18. A new operation needs to be created to remove the extra material left behind by the 2D Adaptive operation. Click 2D> 2D Contour.

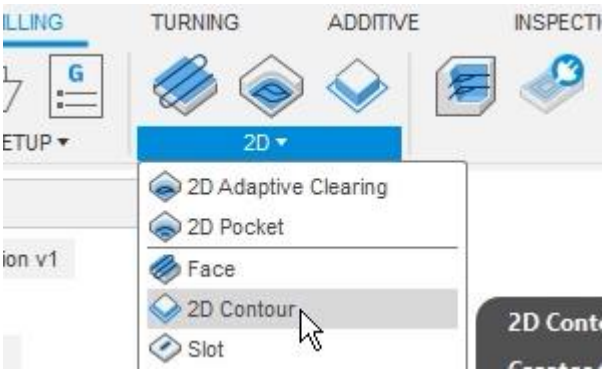


Figure 18. Create a 2D Contour operation

---

19. Inspect the dialog's Select to choose an appropriate tool for the operation.

Figure 19. Select the operation's tool

20. Use the dialog's left column to navigate to the Documents> CAM Simulation tool library, then select Tool 1 from the CAM Simulation tool library.

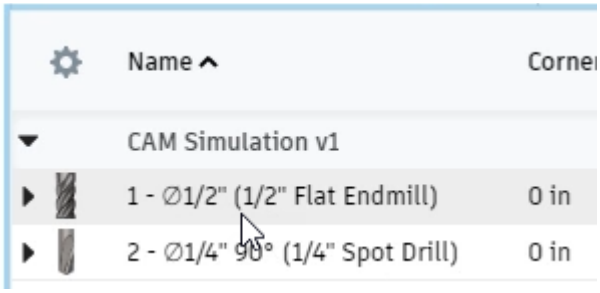


Figure 20. Select the tool

21. Choose the Aluminum - Finishing option from the Cutting data section, then click the Select Tool dialog's Select.

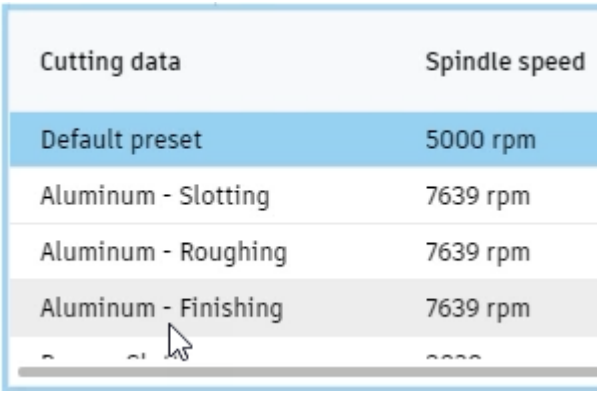


Figure 21. Choose the tool's cutting preset

22. Continue to the Geometry tab and select the edge shown in the image on right. OK the dialog to generate the toolpath preview.

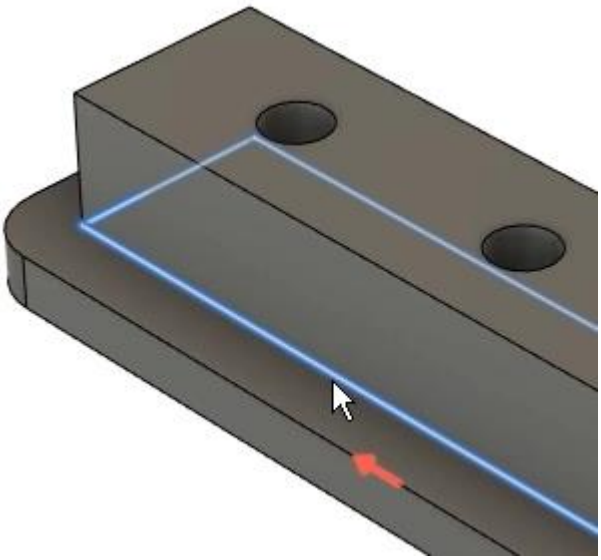


Figure 22. Select the edge

23. Click and drag the new 2D Contour operation before the Drill operations. This will reorder the operations and minimize tool changes. All the operations that use Tool 1 are now grouped together.

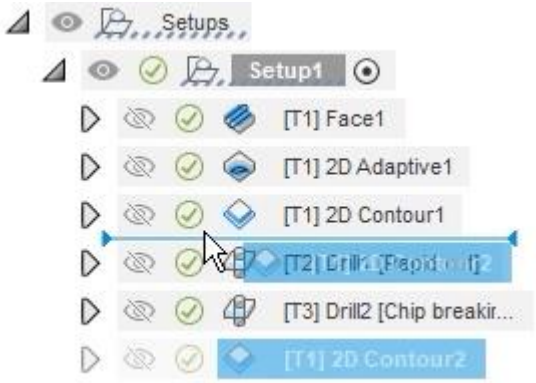


Figure 23. Reorder the setup's operations

24. Select the new 2D Contour operation and click Actions> Simulate.

Figure 24. Simulate the new operation

25. Play the animation and notice that the blue faces are machined away. The machined geometry now matches the modeled geometry. Click the dialog's Exit Simulation after you finish watching the animation.

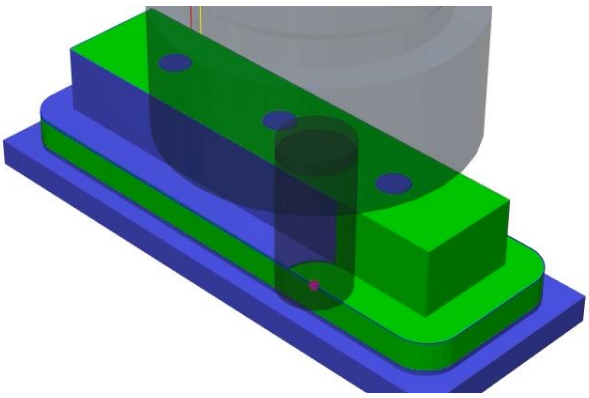


Figure 25. Play the animation

26. In the Browser, select Setup1, right-click it, then choose Edit from the menu. Click the dialog's Select to choose the setup's machine.

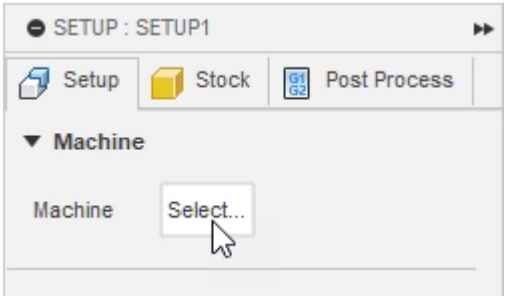


Figure 26. Choose the setup's machine

27. Locate and select the HAAS VF-2 machine, then click the Machine Library dialog's Select.

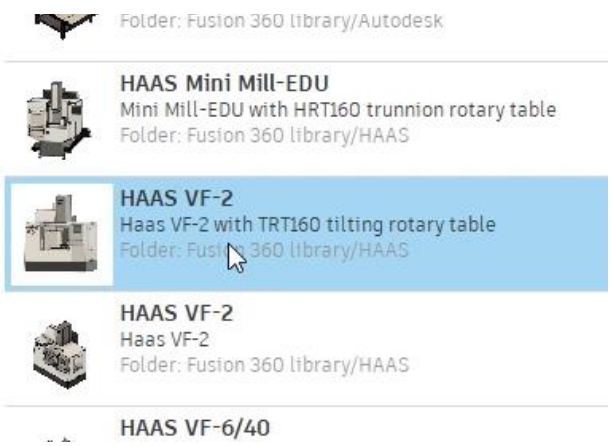


Figure 27. Select the machine

28. A dialog will ask you to download the model if it is not already downloaded. Click Download Model.

Figure 28. Click Download Model

29. Downloading the model will place it inside your current project and allow you to simulate the machine as it cuts the stock. You can access this feature by clicking Actions> Simulate with Machine. This is a useful tool for making sure you don't collide with the stock or fixtures. Save the design.

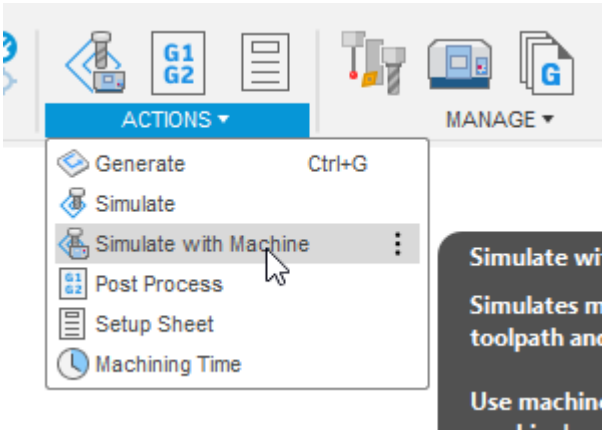


Figure 29. Simulate a setup inside a machine