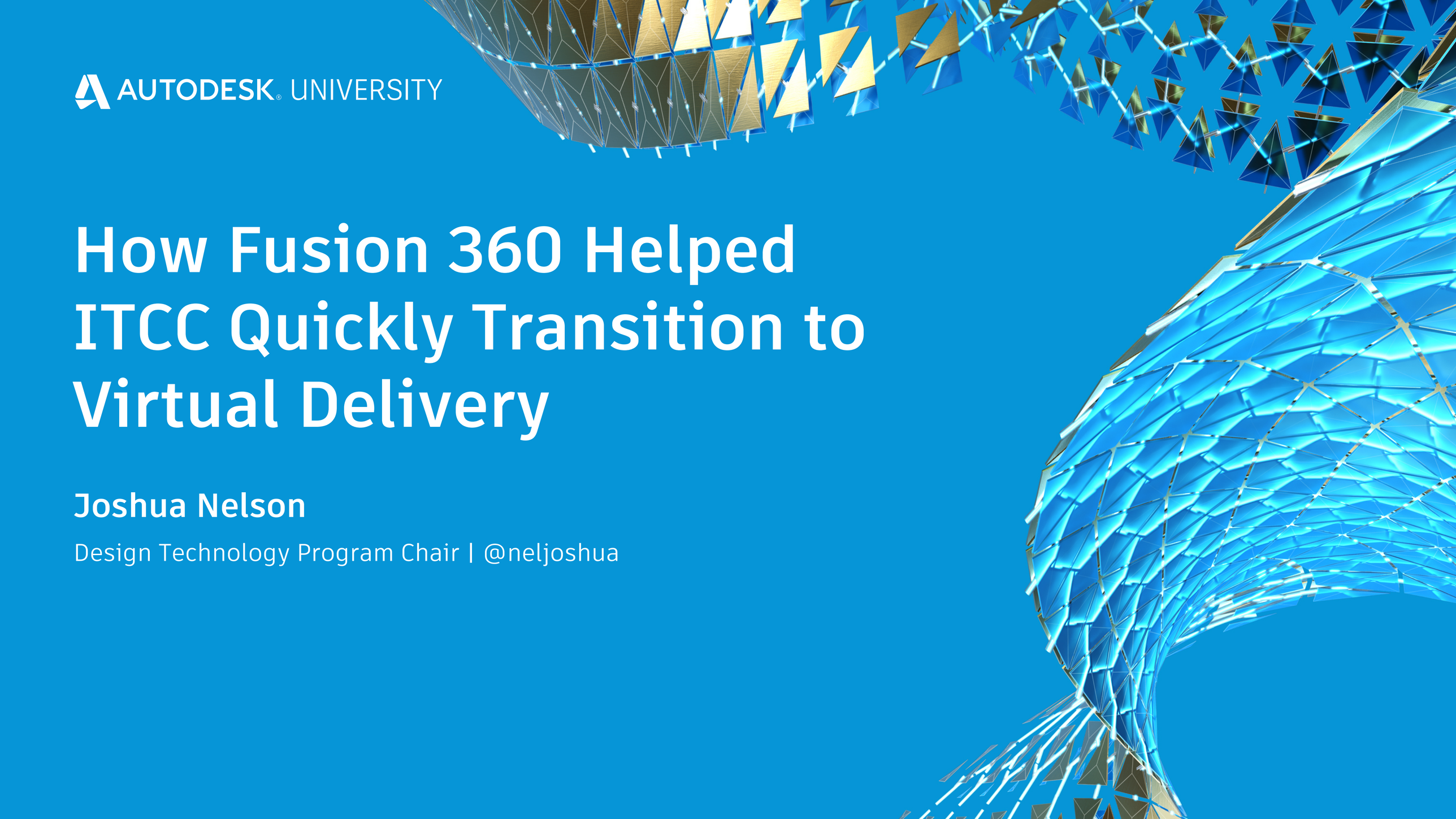
AUTODESK. UNIVERSITY

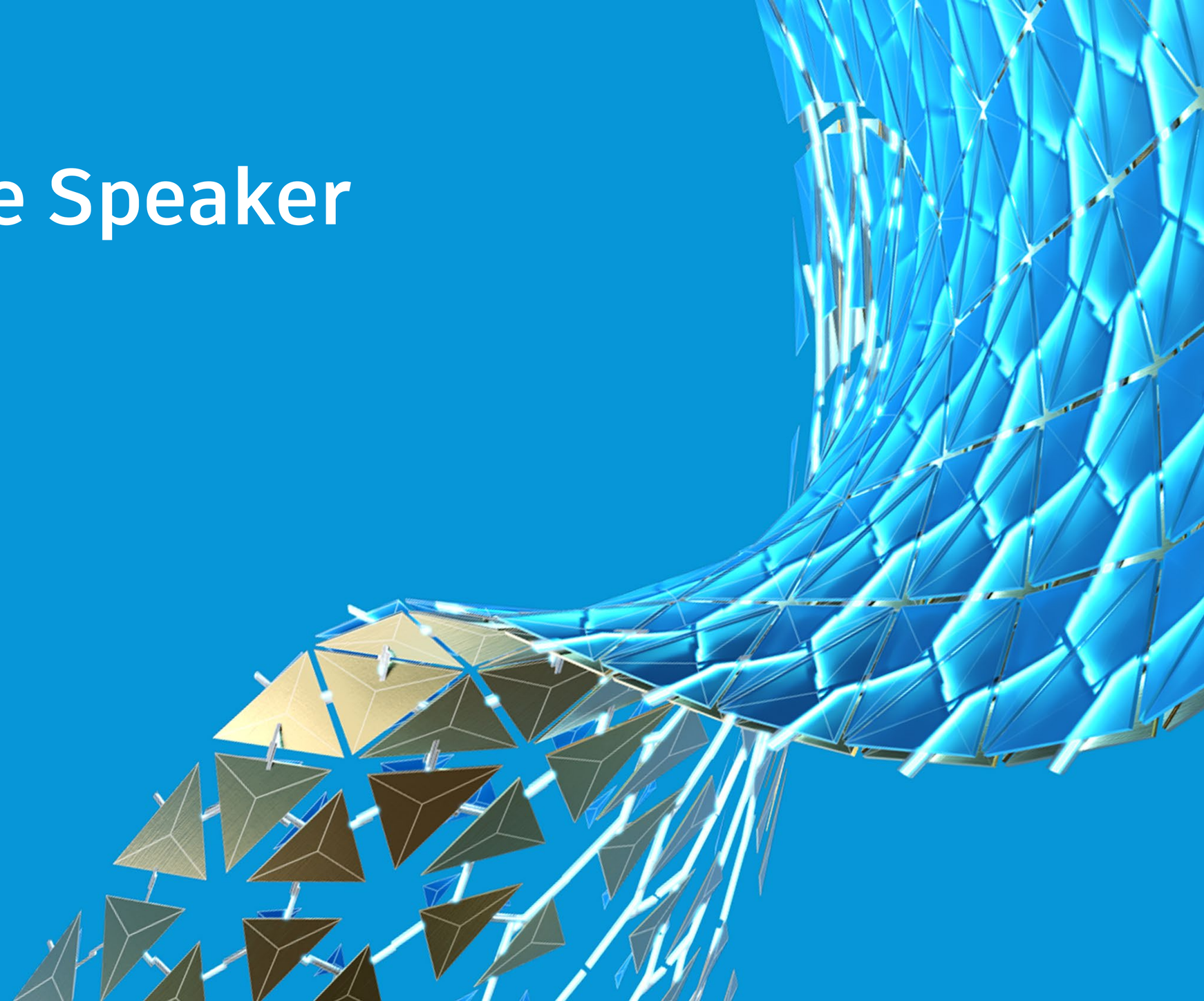
How Fusion 360 Helped ITCC Quickly Transition to Virtual Delivery

Joshua Nelson

Design Technology Program Chair | @neljoshua



Prelude: The Speaker

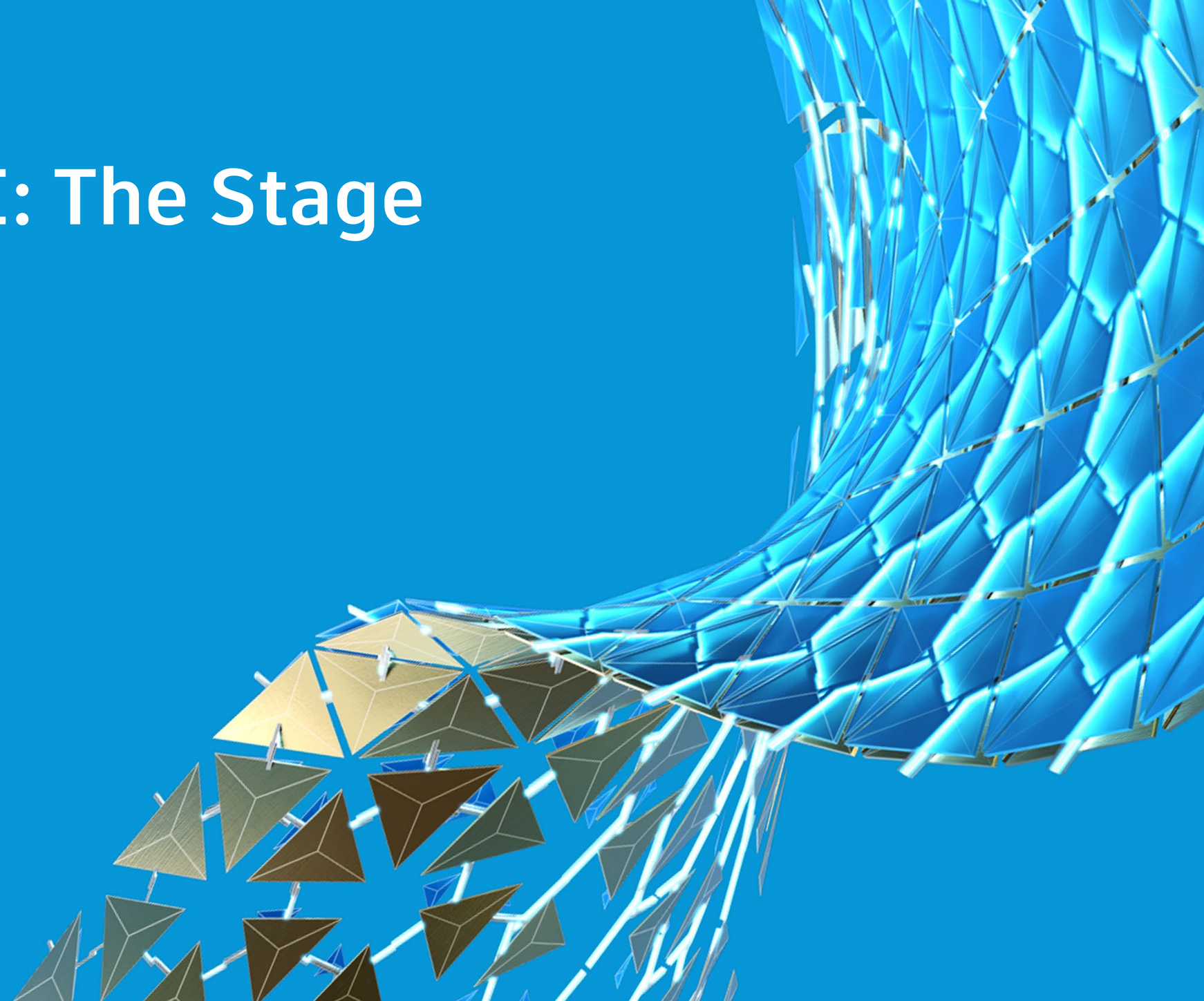


About the Speaker

Josh Nelson

- Program Chair for Design Technology at Ivy Tech Community College in Lafayette, IN
- Industry and academic experience
- My wife, Nicole, and I have five beautiful and creative children
- We enjoy biking, being creative, and music

Movement I: The Stage



DISCOVER THE BENEFITS OF COMMUNITY COLLEGE

Ivy Tech Community College

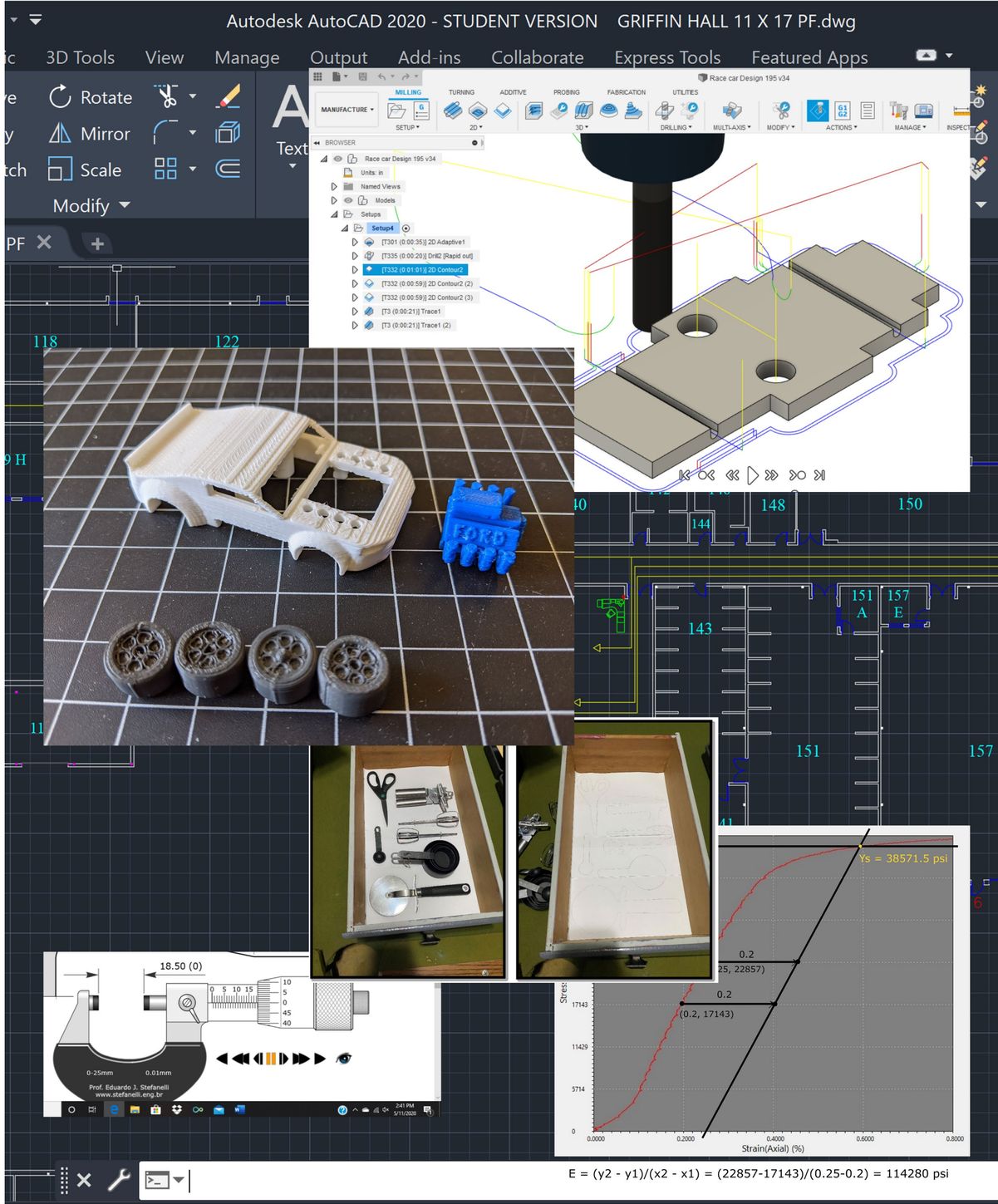
Ivy Tech Community College is Indiana's Community College. We have a history of vocational and technical programs and have also added a number of transfer programs. With nineteen campuses and numerous instructional sites around the state, there are many options.

One of the largest campuses is located in Lafayette, IN. This campus boasts excellent facilities, world-class faculty, and close relationships with Purdue University.

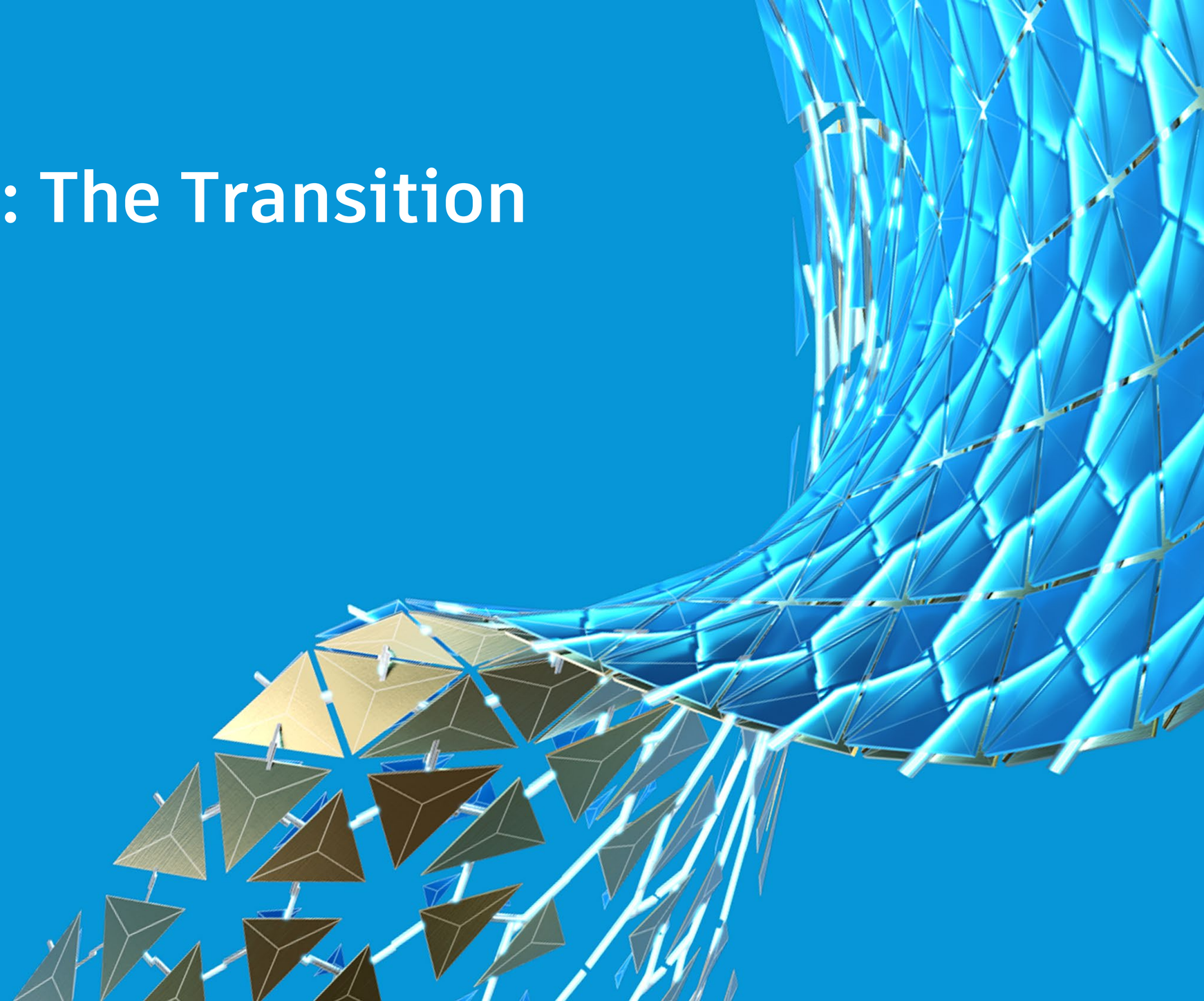
DESN 195 – Manufacturing Principles & Design

This course walks through production processes & concerns in an industry setting. Learning Objectives for DESN 195 are:

- Describe & compare basic manufacturing practices
- Develop drawings for a manufacturing facility layout
- Design & program introductory CNC processes
- Identify & describe material properties, testing, & applications
- Contrast & compare various manufacturing production techniques and systems
- Utilize metrology tools & practices in order to effectively evaluate & measure an object
- Identify the critical aspects of manufacturing workplace safety



Movement II: The Transition



Timeline

Transition Timeline

F2F CLASS

EIGHT WEEKS

Introduce Fusion 360, begin assemblies, determine manufacturing methods, 3D print appropriate parts, select & purchase stock parts

SPRING BREAK

FOUR DAYS

Wait for something to be certain...

EXTENSION

ONE WEEK

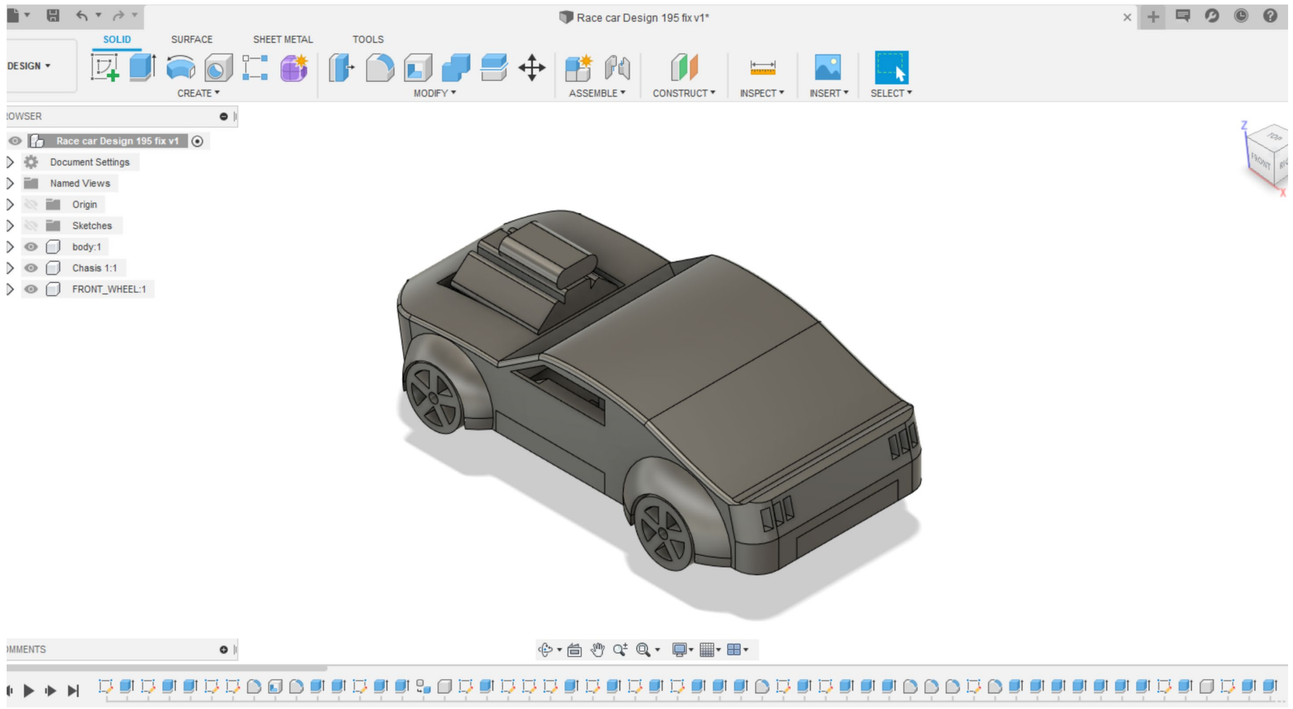
Redevelop course schedule, create new assignments for online/virtual delivery, locate resources, gather information regarding equipment and facilities

VIRTUAL CLASS

EIGHT WEEKS

Create g-code for machined parts, utilize virtual tools, create production plans, create facility layouts

Key Components for Success

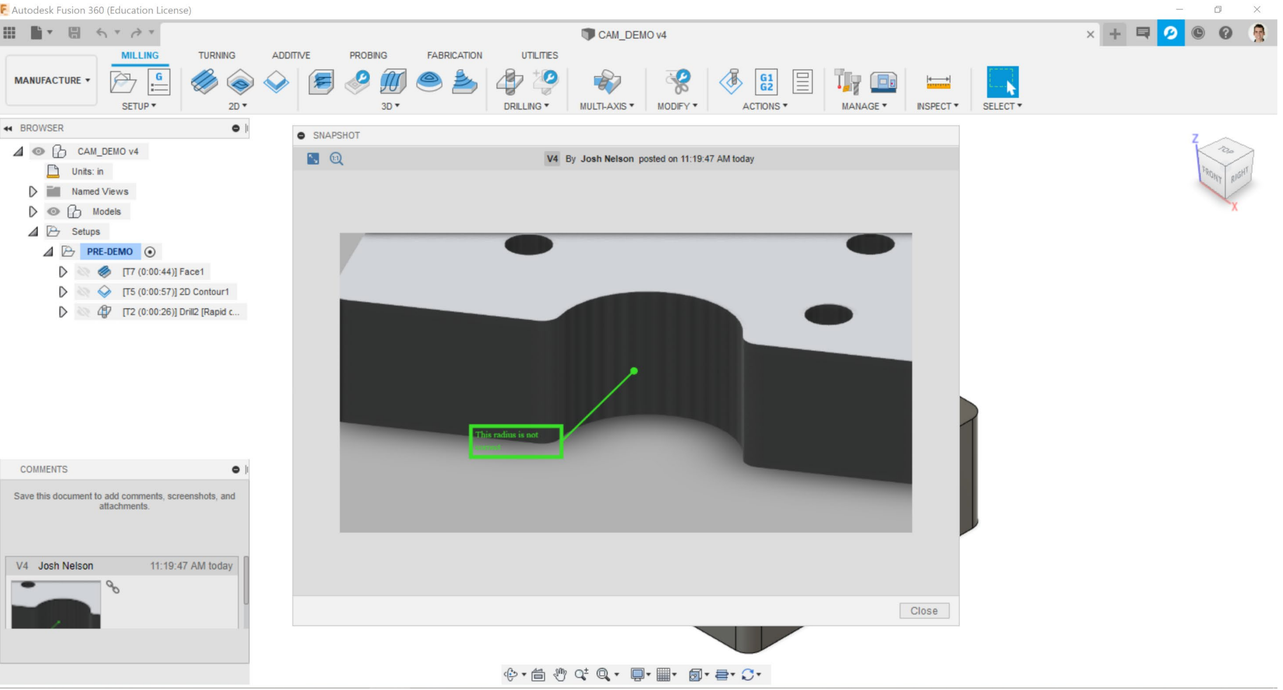


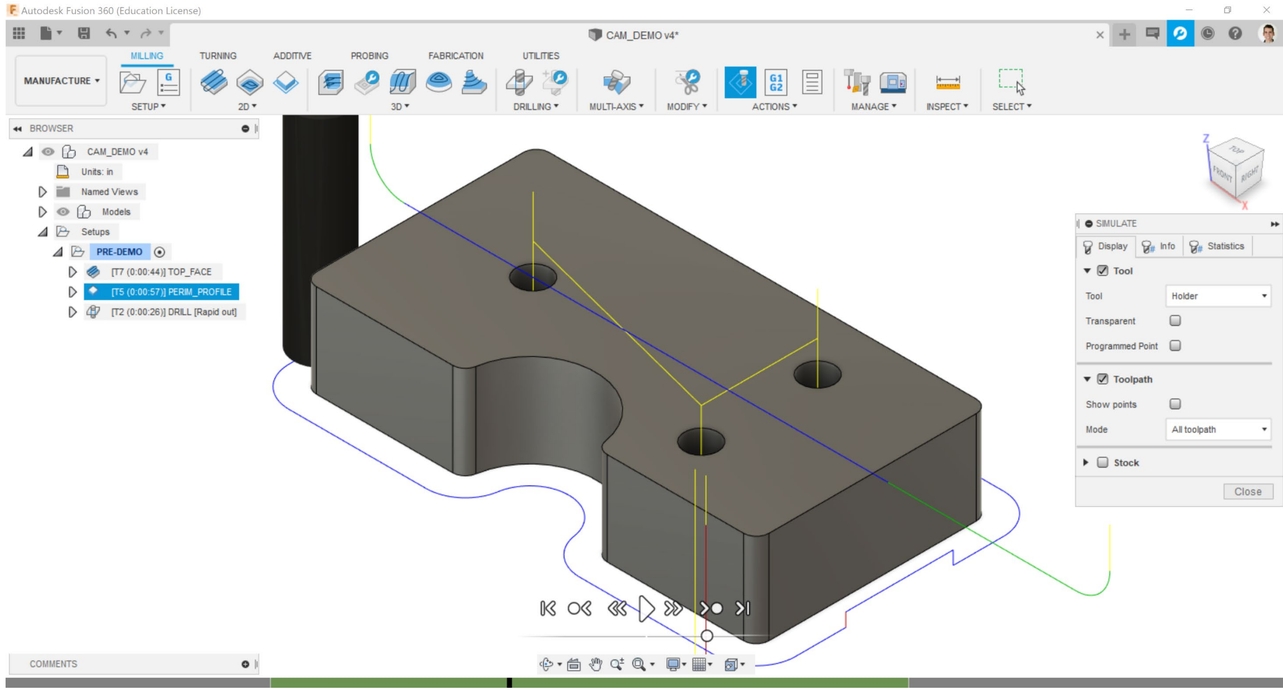
Accessible Cloud Data

Because work was saved in the cloud, students were able to access their projects from home. I did not need to worry about whether a student saved their work locally or if I had a current copy when we left for break.

Awesome Autodesk Staff

Autodesk staff (in particular Fab Clayton) were available for help during this transition. This included demos on features within the software and sharing resources. The transition to virtual was not something I could have done half as well on my own.





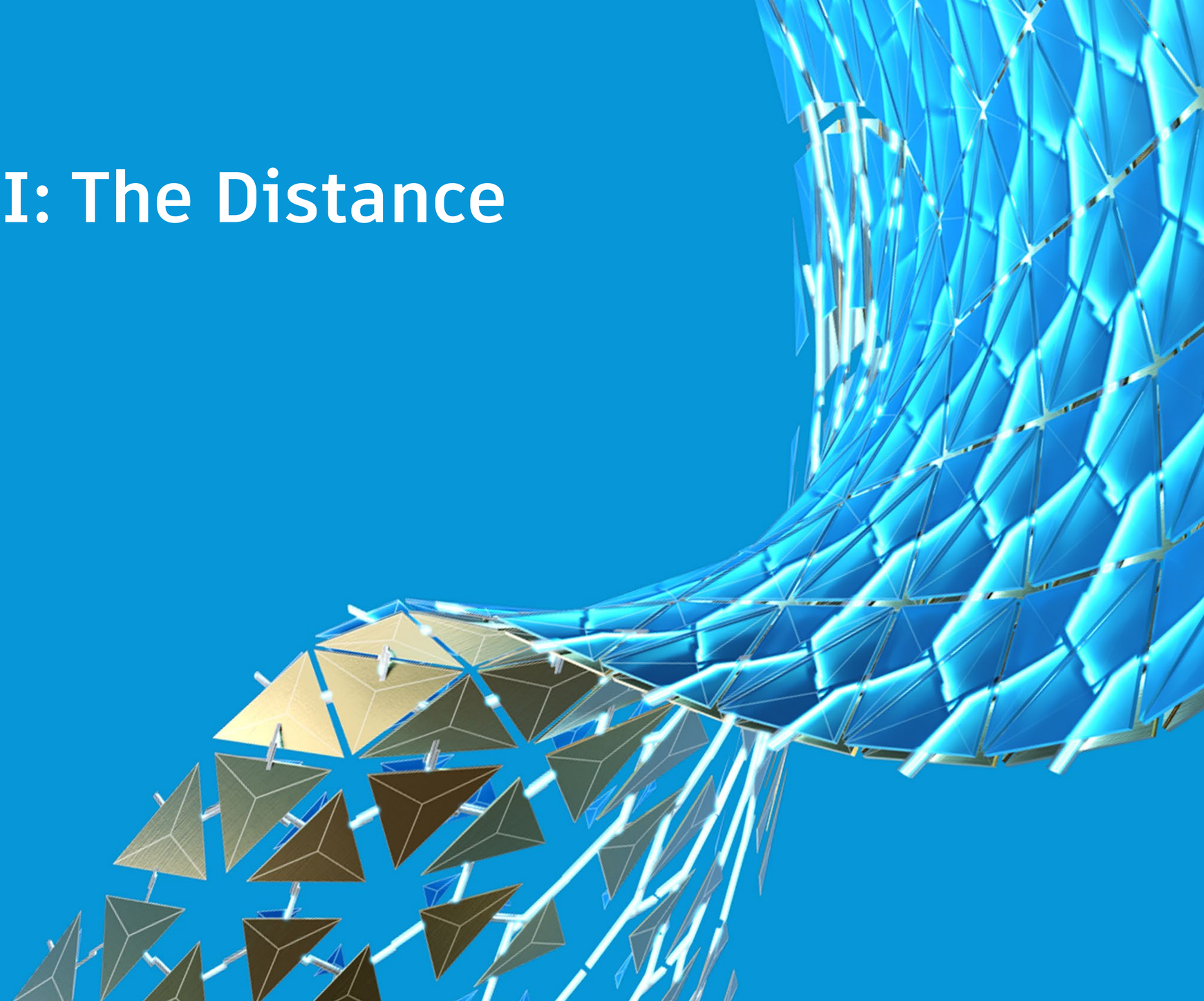
Useful Feedback Tools

Fusion 360 allows comments to be created online. These comments can be linked to particular places within the model. When someone reviews the comments, they can go directly to that spot within the model. This makes feedback more robust.

Powerful Simulation

Fusion 360's ability to simulate CNC operations allowed for the continuation of this course despite the fact that students could not be physically present with the machine tools.

Movement III: The Distance



AU Learning Objectives

- Give examples of ways to share data while working virtually
- Describe best practices when giving feedback using tools in Fusion 360
- Create a CNC setup in Fusion 360
- Create toolpaths in Fusion 360

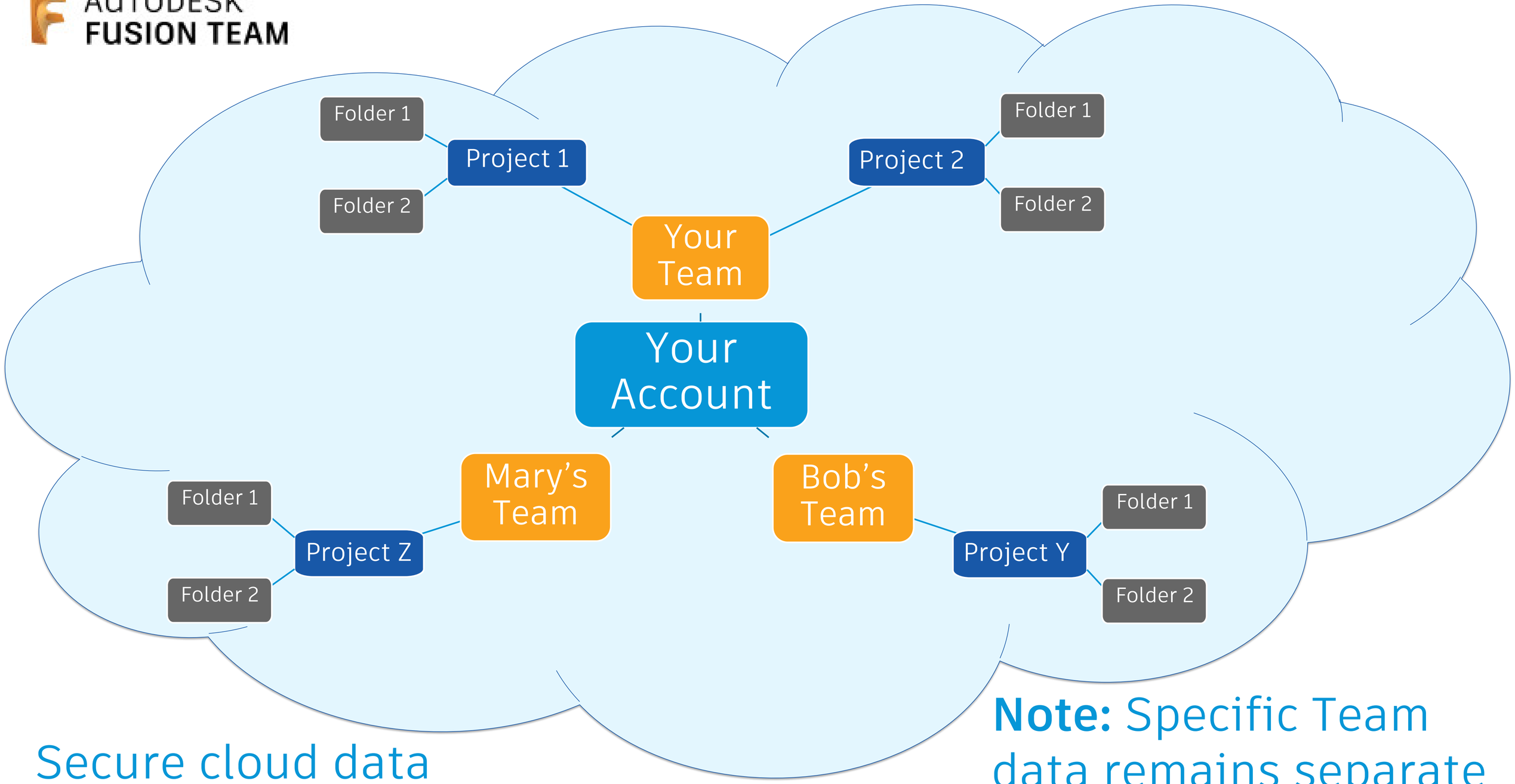
Examples of Data Sharing

Data Sharing

One of the ways to share data is via public link. This is most useful when your primary goal is to allow another user to see your file. For example, maybe you want to show students an example but prevent them from downloading and copying it.

Here I will demonstrate creating a public link.

AUTODESK®
FUSION TEAM



Secure cloud data

Note: Specific Team data remains separate

Autodesk Fusion 360 (Education License)

CAM_DEMO v13

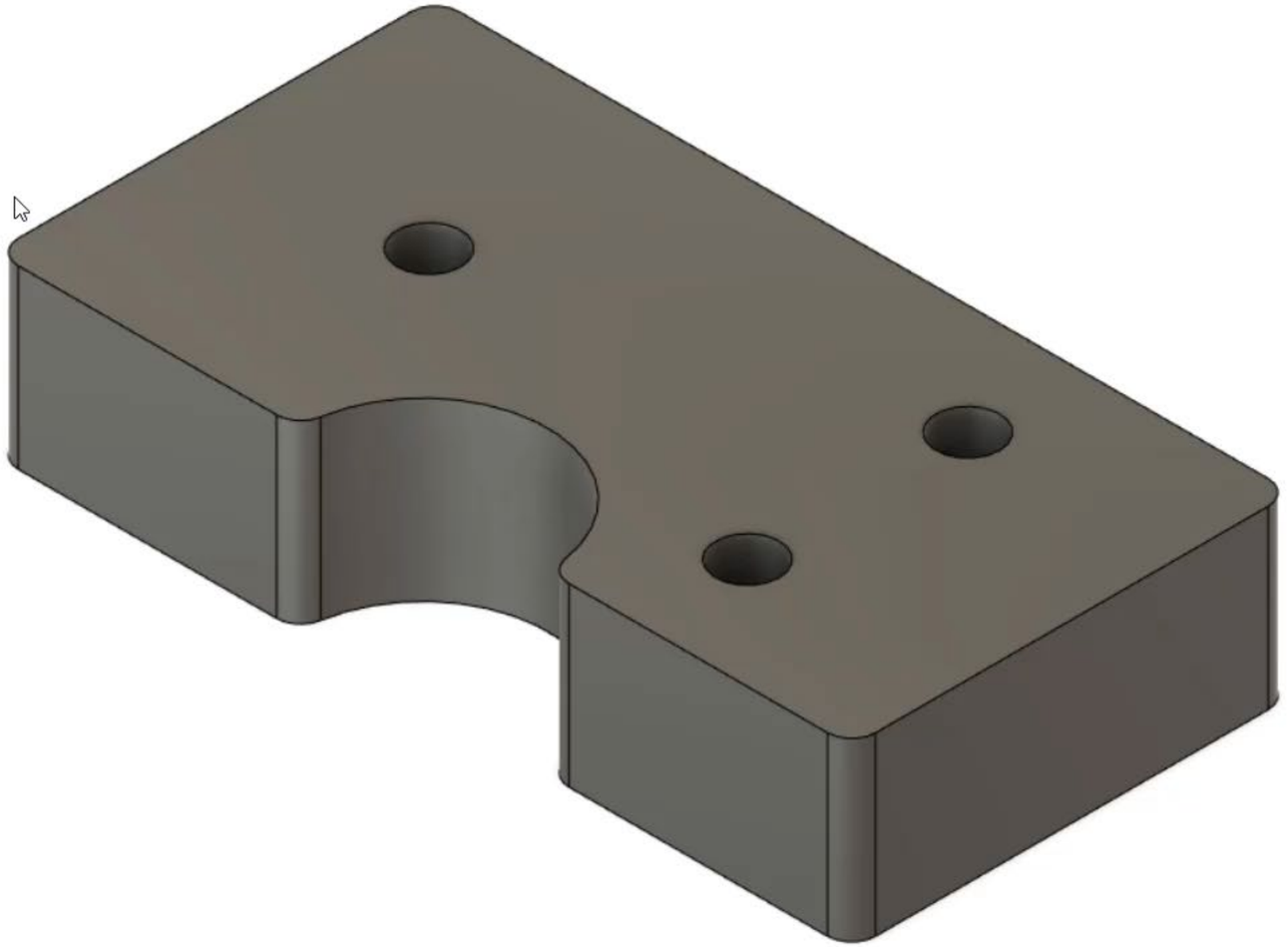
SOLID SURFACE SHEET METAL TOOLS

DESIGN

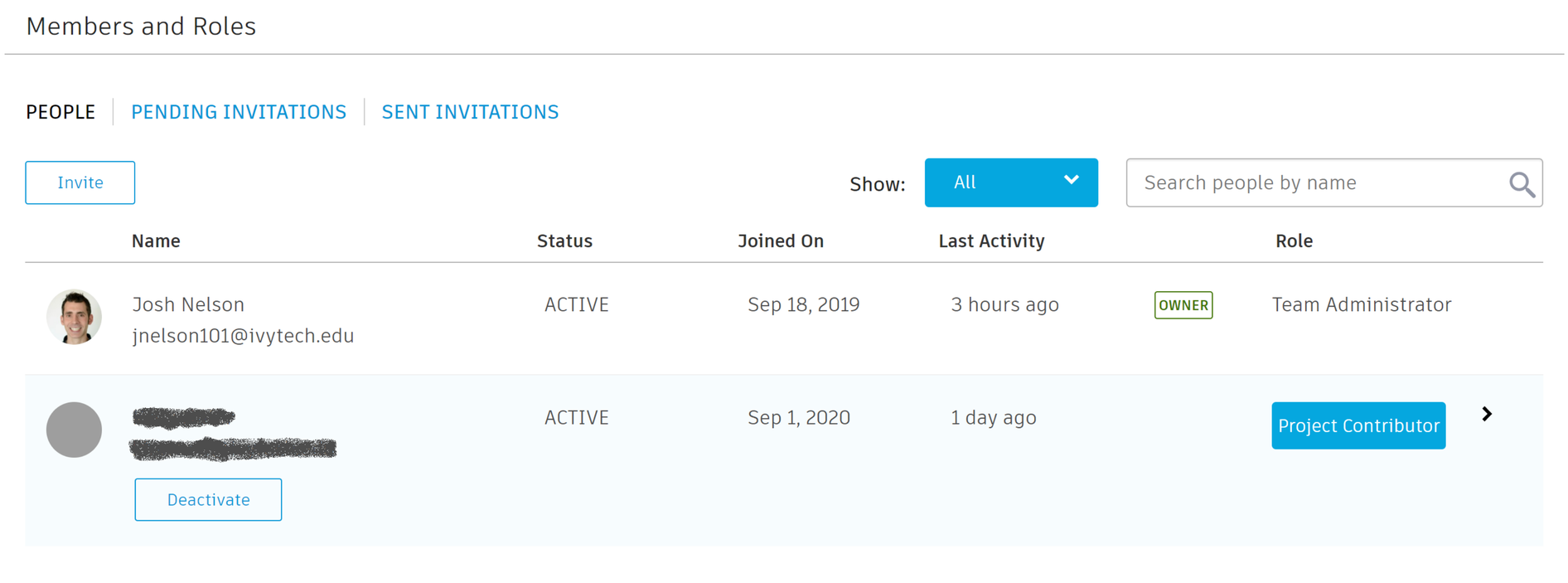
CREATE MODIFY ASSEMBLE CONSTRUCT INSPECT INSERT SELECT

BROWSER

- CAM_DEMO v13
  - Document Settings
  - Named Views
  - Origin
  - BDOY:1



COMMENTS



Data Sharing

You can also ask students to share their work with you via Fusion 360 Team Hub. There are two general ways to do this:

1) Invite students to your Team

2) Have students invite you to their Teams

Note that Fusion 360 Teams currently have Team-level and Project-level security. Folder-level security is coming soon!

Admin - Josh-Ivy_Tech - FUSION

ivytech87.autodesk360.com/g/admin/manage/roles/people

Josh-Ivy_Tech

Team Settings | Members And Roles | Projects

Members and Roles

PEOPLE | PENDING INVITATIONS | SENT INVITATIONS

Invite

Show: Active

Search people by name

	Name	Status	Joined On	Last Activity		Role
	Fab Clayton fab.clayton@autodesk.com	ACTIVE	Sep 14, 2020	Sep 17, 2020		Project Contributor
	Josh Nelson jnelson101@ivytech.edu	ACTIVE	Sep 18, 2019	1 minute ago	OWNER	Team Administrator

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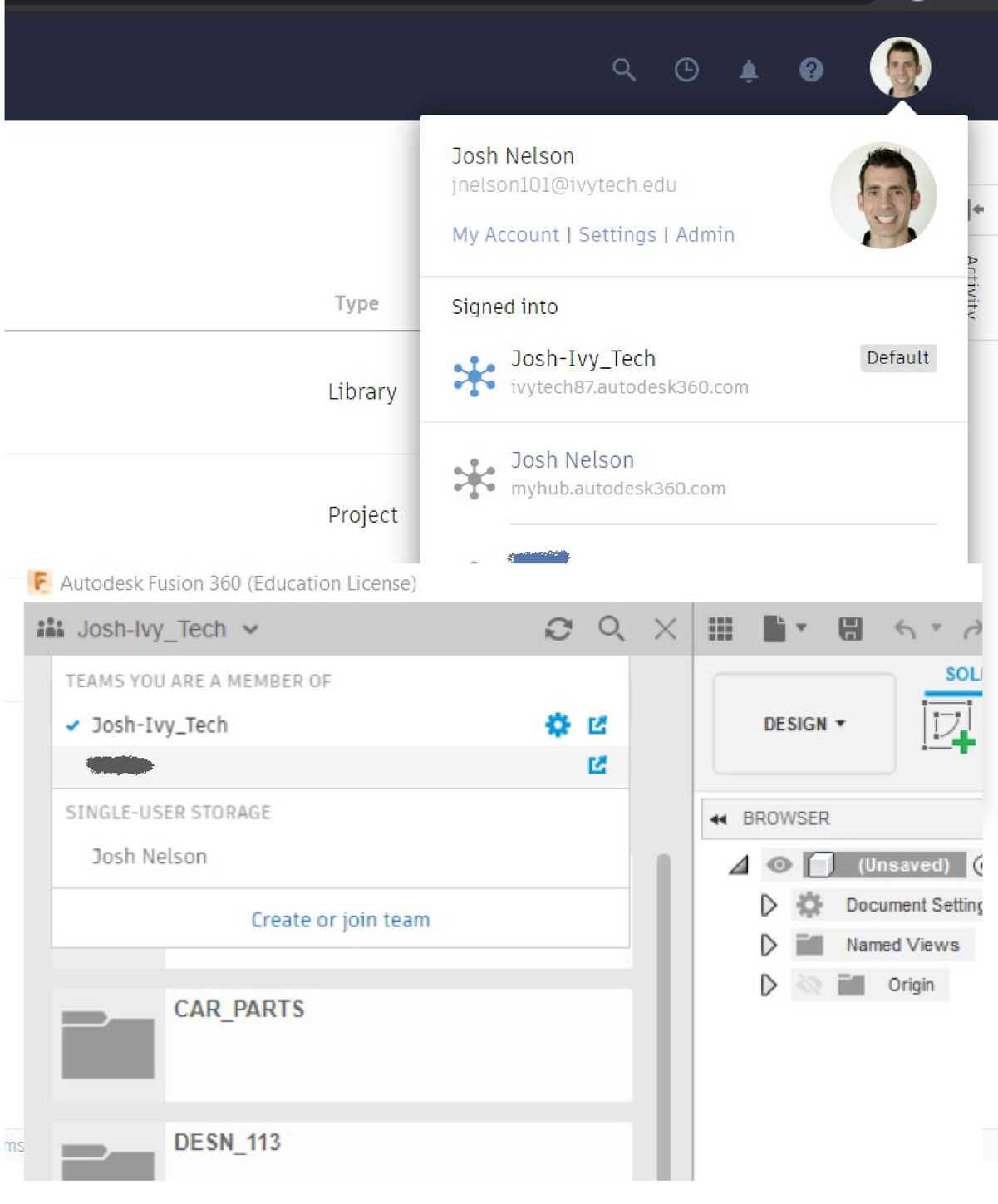
Switching Between Teams

- **This can be done from the browser or from within Fusion 360**



Roles in Fusion Team Hub

TEAM ADMINISTRATOR

Can manage: Hub settings, users, Projects and Project member roles, and subscriptions.

TEAM MEMBER

Can do everything Contributors can do plus the following: view and access Open Projects; view all Closed Projects and request to join them; create Projects on the Hub; invite users to Projects; be assigned an Administrator role; work in Projects based on their Project role.

PROJECT CONTRIBUTOR

Can work with content based on their project role and invite users to a project. They cannot: view, access, or join Open Projects; assign Hub roles; create Projects; view Projects they are not part of; assign Project roles.

Josh-Ivy_Tech - FUSION TEAM

ivytech87.autodesk360.com/g/all_projects/active

Josh-Ivy_Tech

ALL | OWNED BY ME | SHARED WITH ME | ARCHIVED

Create Project

Activity

Name	Created By	Created On	Type
Assets	Josh Nelson	Sep 26, 2019	Library
JMGN_MAIN	Josh Nelson	Jul 9, 2019	Project

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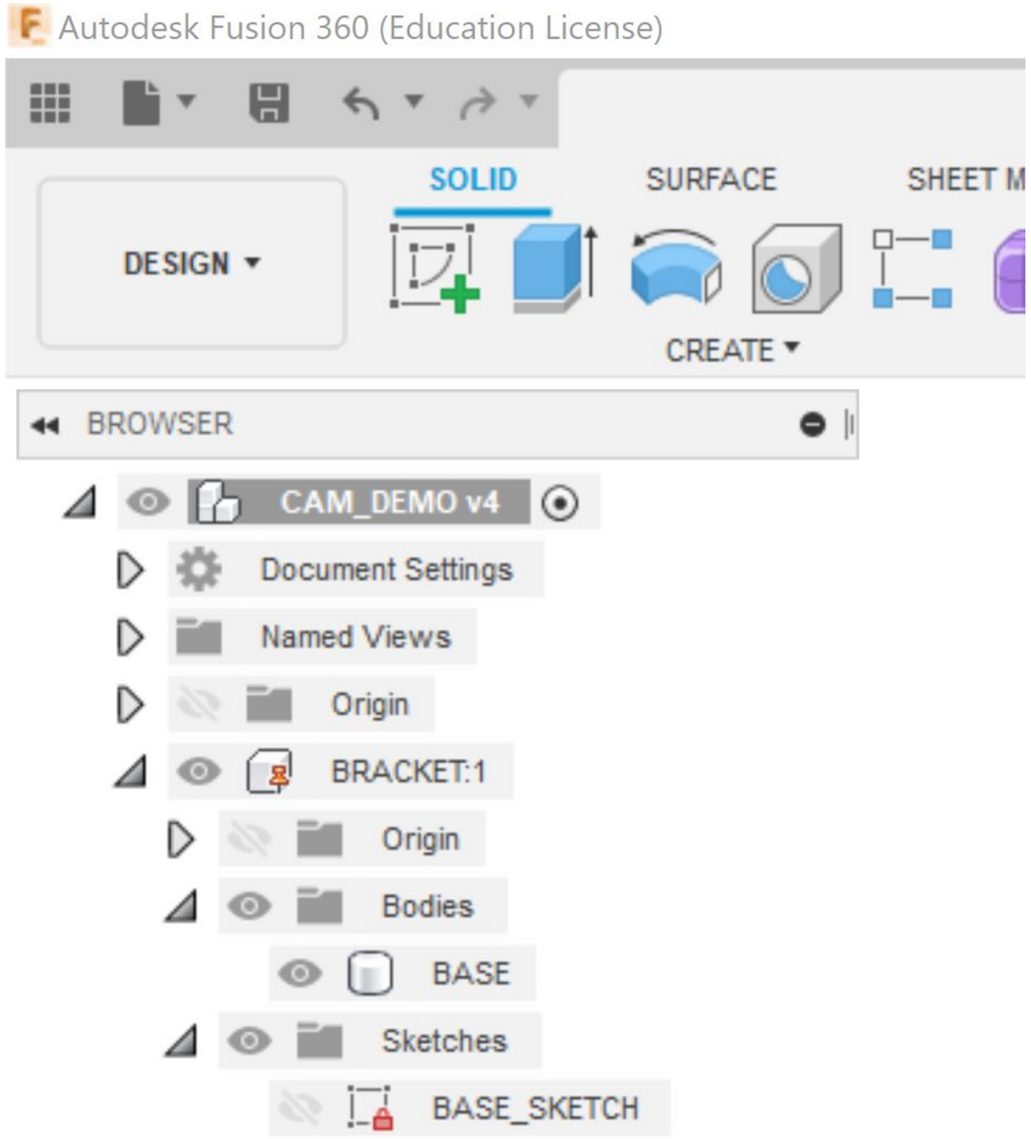
Feedback Best Practices

Feedback Best Practices

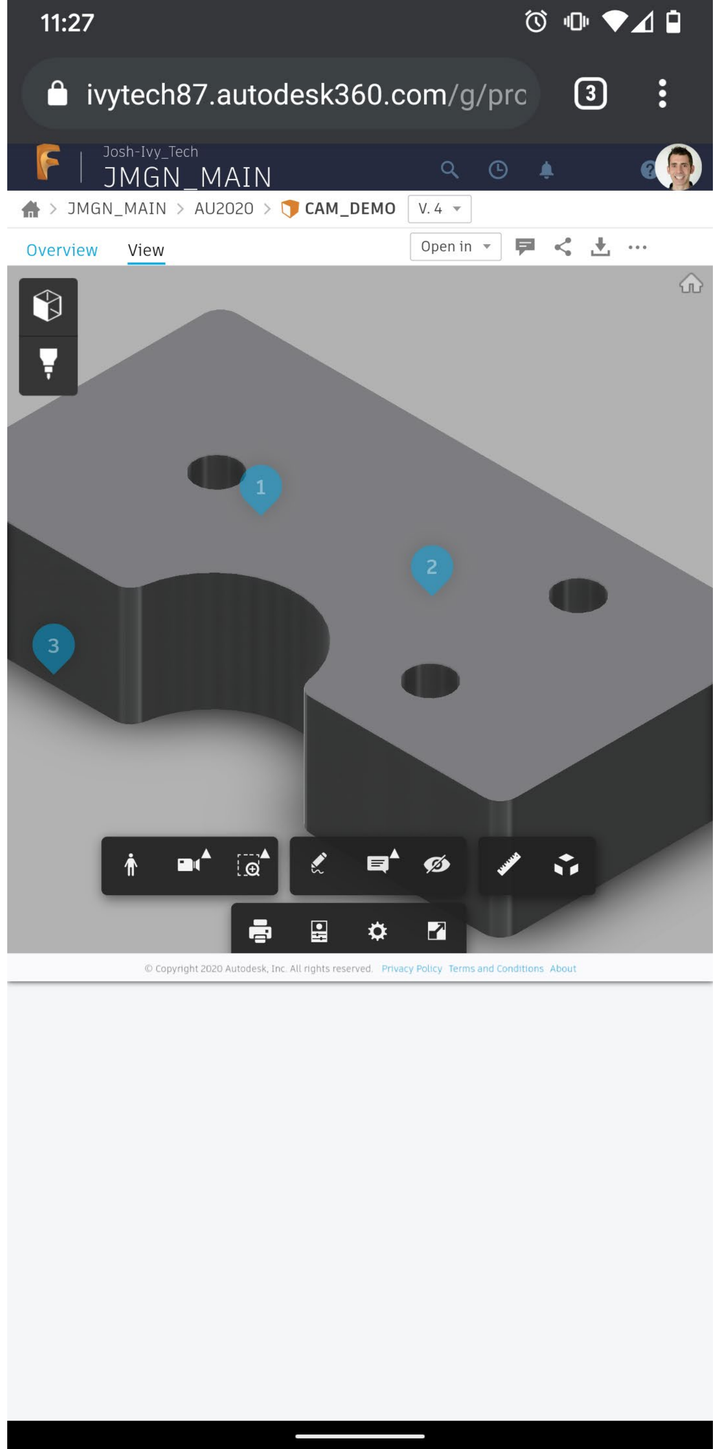
Feedback starts with setting expectations. Let your students know how to document their work.

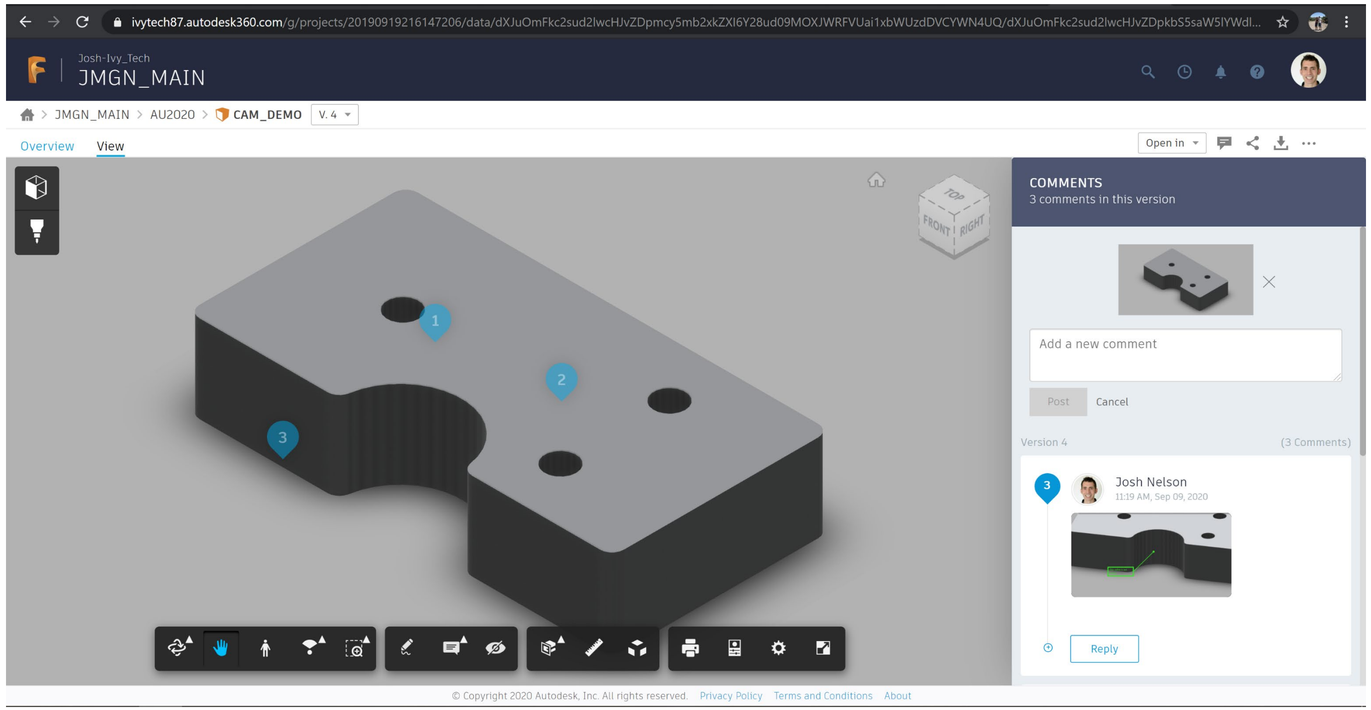
Encourage users to name components, sketches, and features. Naming makes it easier to locate & identify features in the browser and timeline. This is useful when editing and commenting.



Feedback Best Practices

- Before assigning something and providing feedback, consider speed vs. depth. Different kinds of feedback are appropriate at different points in the project. Sometimes it is better to give rapid, brief comments. Other times deep, thoughtful comments are more helpful.
- Email, screenshots, and text messages can provide feedback, but there is no record of this in the design. Project members may not all be aware of the feedback or may not be clear on the intent.
- In class I stress communication as one of the most important aspects of CAD design. Let us strive to communicate well with our students!





Feedback Best Practices

Use Fusion 360 Team Hub to provide comments and tie them to specific features in the model. This can be done from any device through a web browser. Consider adding both positive and negative feedback.

Here I will create a comment through the browser interface.

FUSION TEAM

ivytech87.autodesk360.com/g/projects/20190919216147206/data/dXJuOmFkc2sud2lwcHJvZDpmcy5mb2xkZXI6Y28ud09MOXJWRFVUai1xbWUzdDVCYWN4UQ

Josh-Ivy_Tech

JMGN_MAIN

JMGN_MAIN > AU2020

Content | Project Members (1) | Wiki Pages

Upload | New Folder

Project Details

Name	Owner	Type	Size	Last Updated
Trash				
CAM_DEMO In use by Josh Nelson — V13	Josh Nelson	Fusion 360 Design		12 minutes ago
Fixture_Ex — V3	Josh Nelson	Fusion 360 Design		Sep 17, 2020

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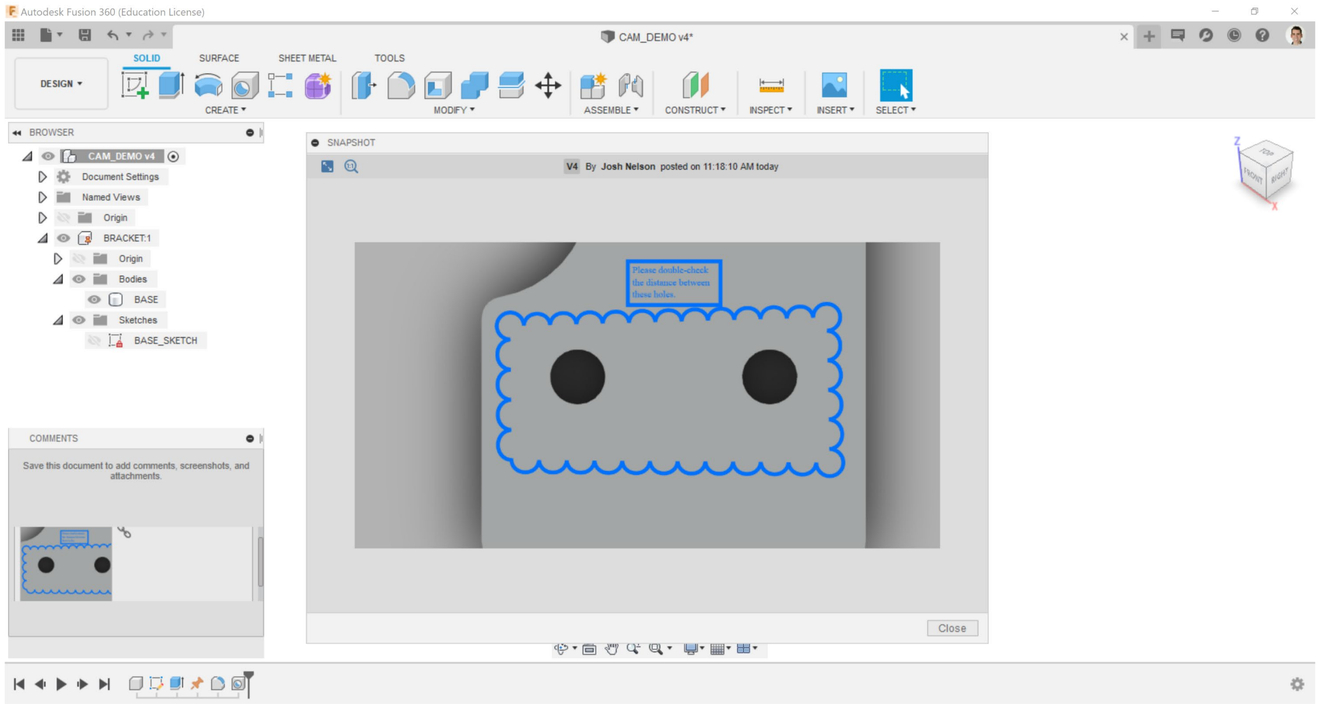

Feedback Best Practices

Comments created in this way show up in the Comment window in Fusion 360 (CTRL + ALT + A). When you click on a comment, the model pans, orbits, and zooms to the view the comment creator saw when creating the comment. When used properly this clearly documents the intent of the comment.

Autodesk Fusion 360 (Education License)

CAM_DEMO v13*

DESIGN

SOLID | SURFACE | SHEET METAL | TOOLS

CREATE | MODIFY | ASSEMBLE | CONSTRUCT | INSPECT | INSERT | SELECT

BROWSER

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  - Document Settings
  - Named Views
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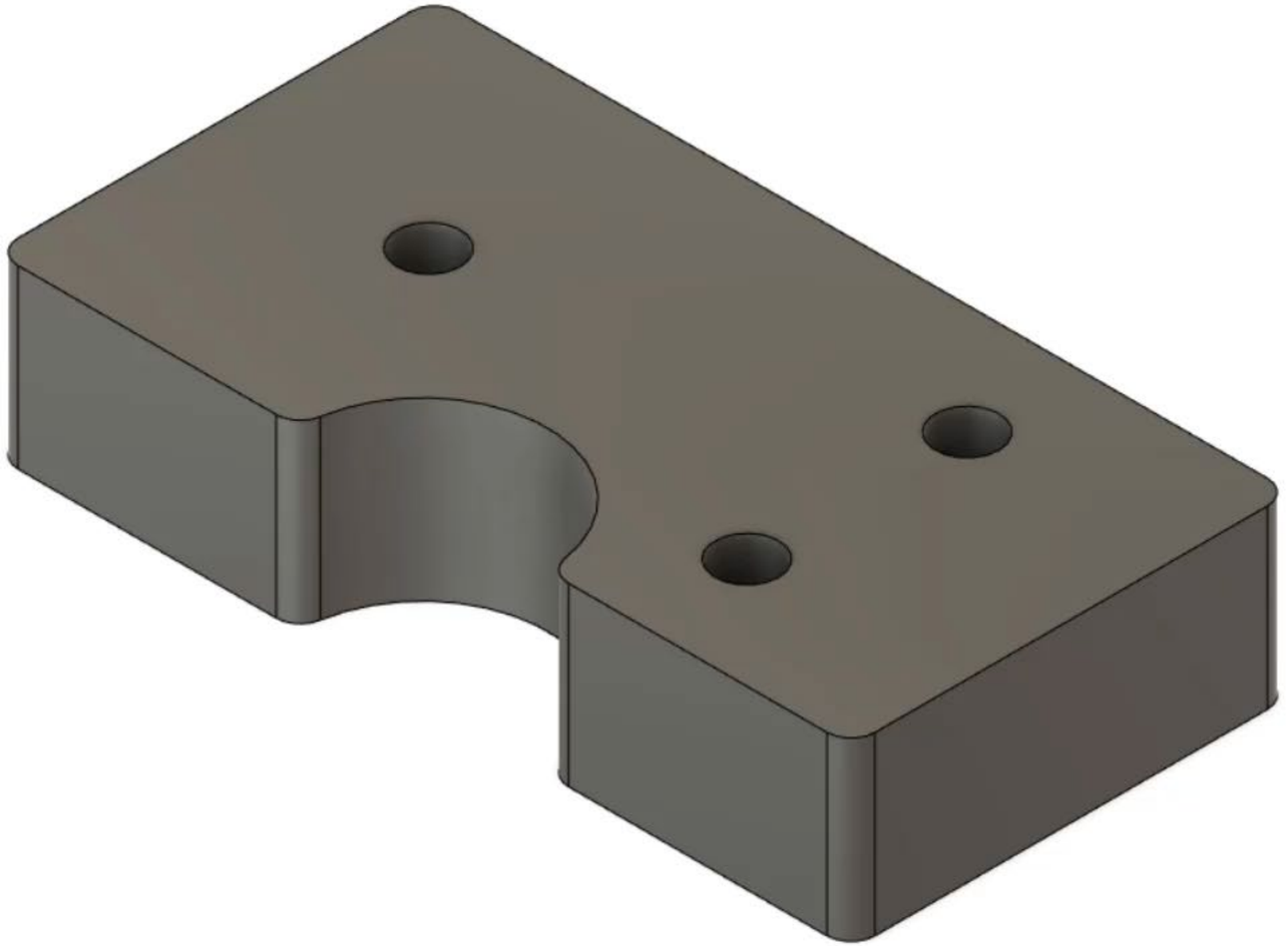
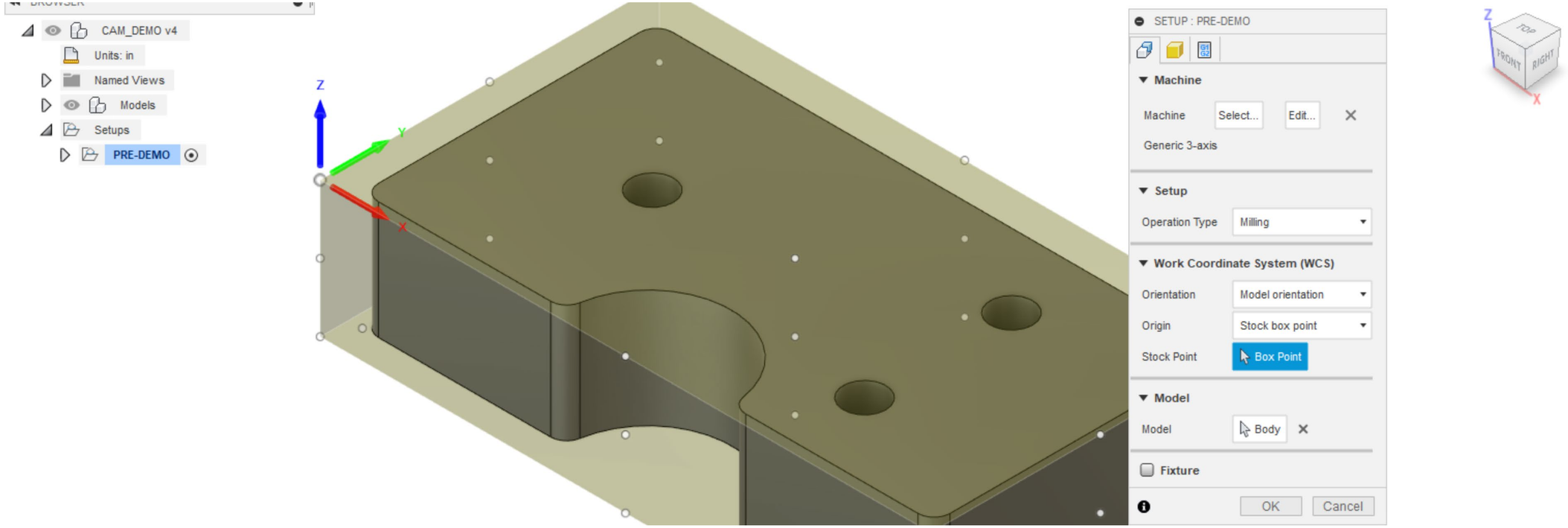


Create CNC Setup



Creating a CNC Setup in Fusion 360

Fusion 360 can create a CNC setup natively. Watch as I demonstrate creating the setup.

Autodesk Fusion 360 (Education License)

CAM_DEMO v13*

SOLID SURFACE SHEET METAL TOOLS

DESIGN

CREATE MODIFY ASSEMBLE CONSTRUCT INSPECT INSERT SELECT

BROWSER

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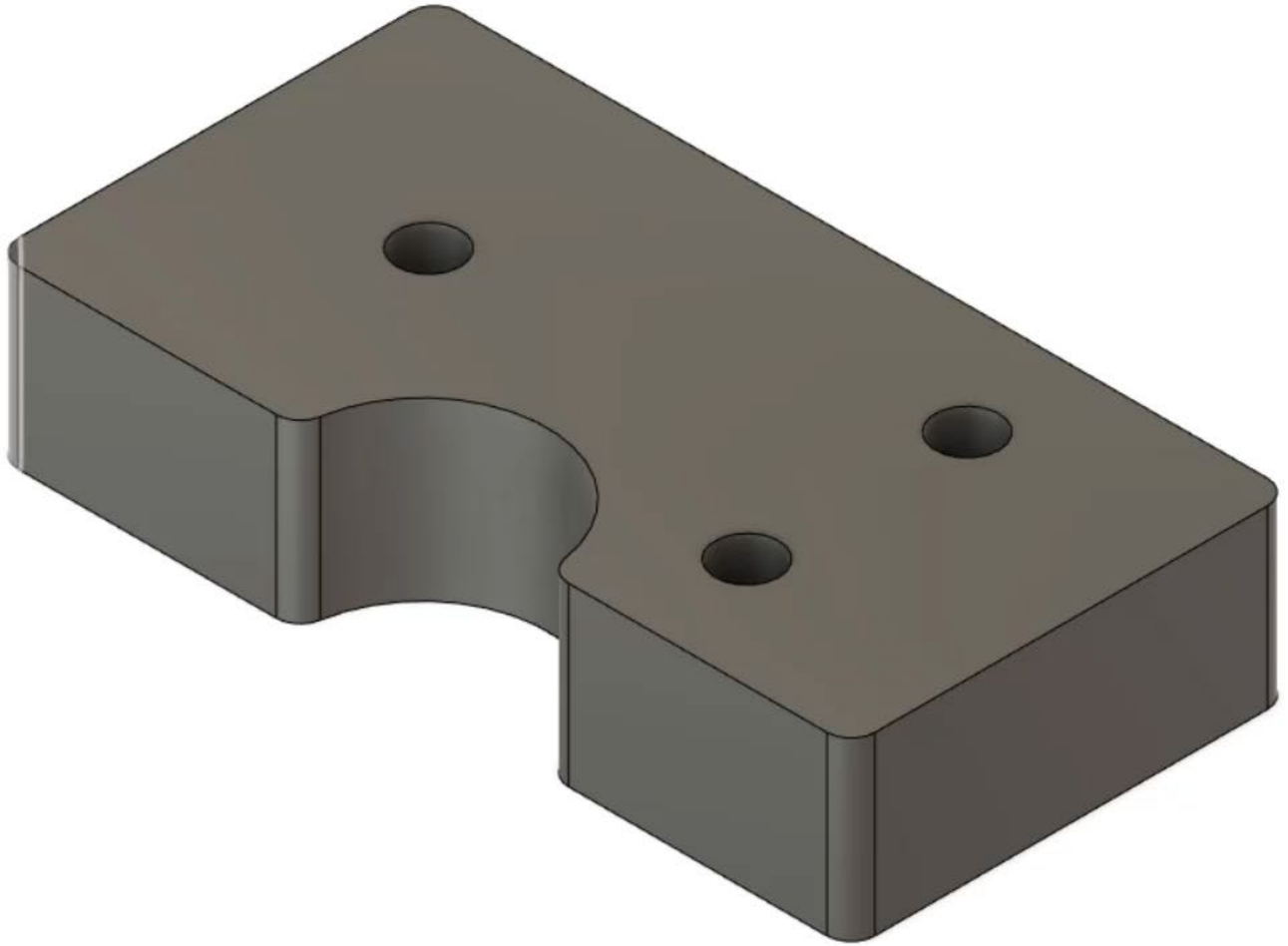
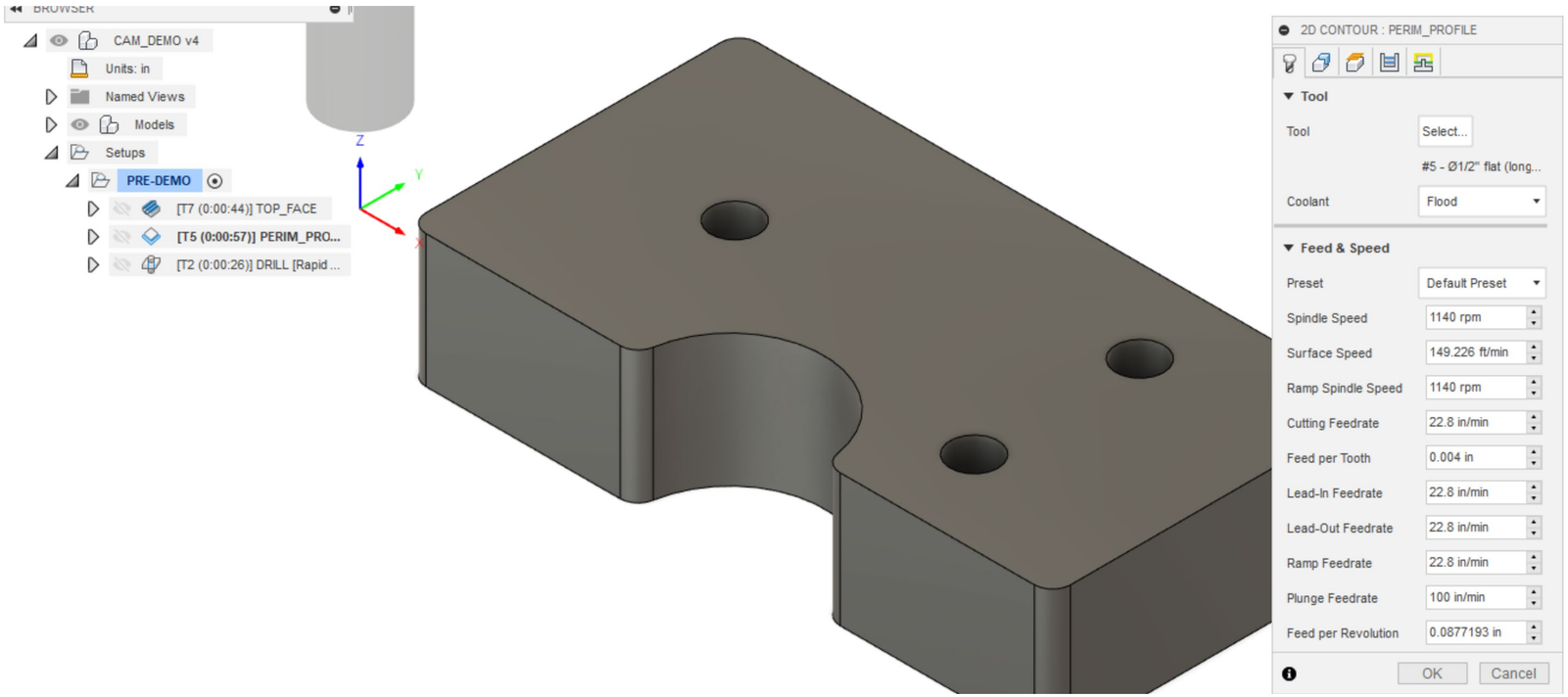
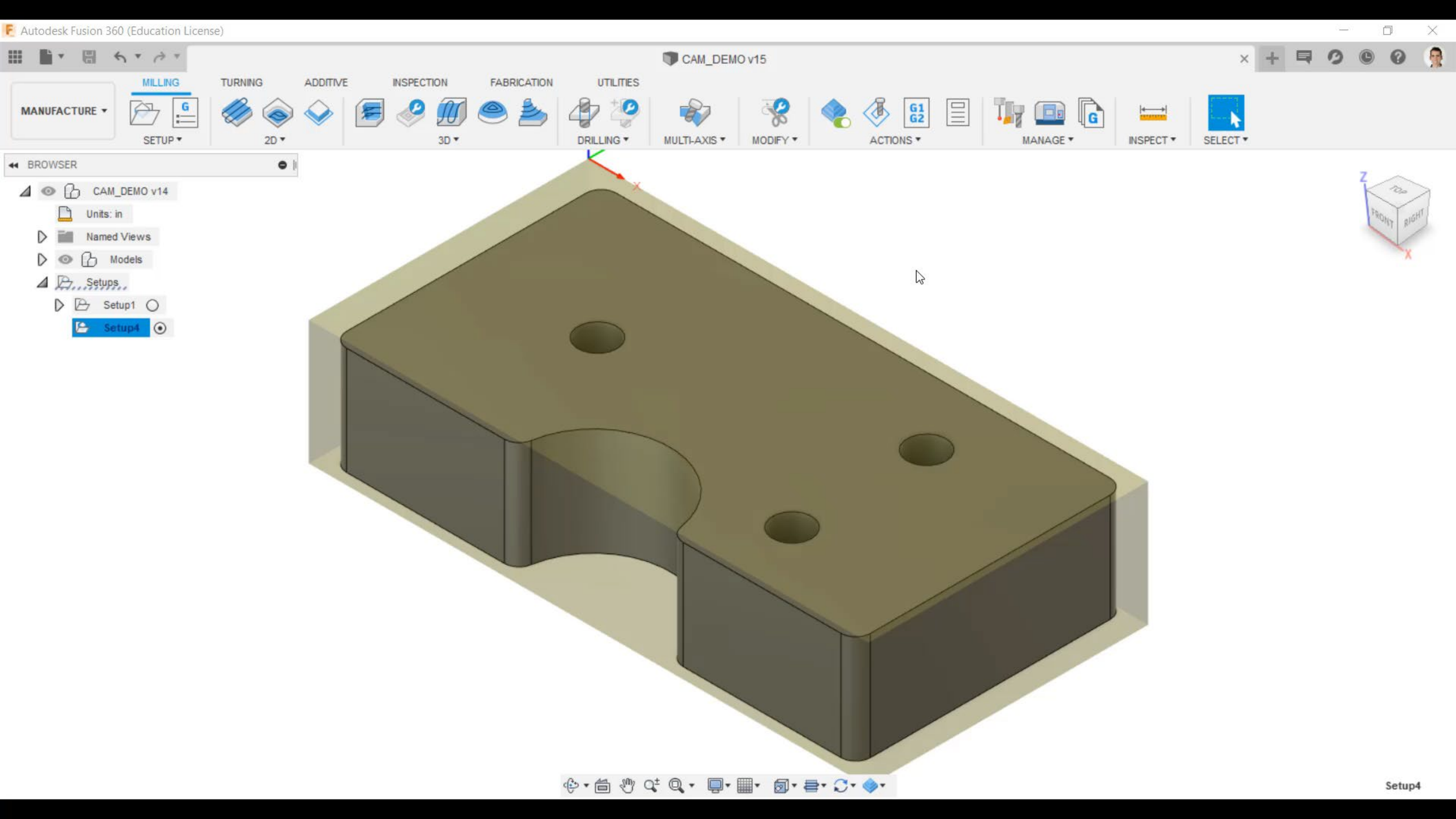


Create Toolpaths



Creating Toolpaths in Fusion 360

Once setup is complete, toolpaths can be created. Fusion 360 has a number of tools available that increase the speed and accuracy of this process. Let's take a look at a few: facing, milling, and drilling.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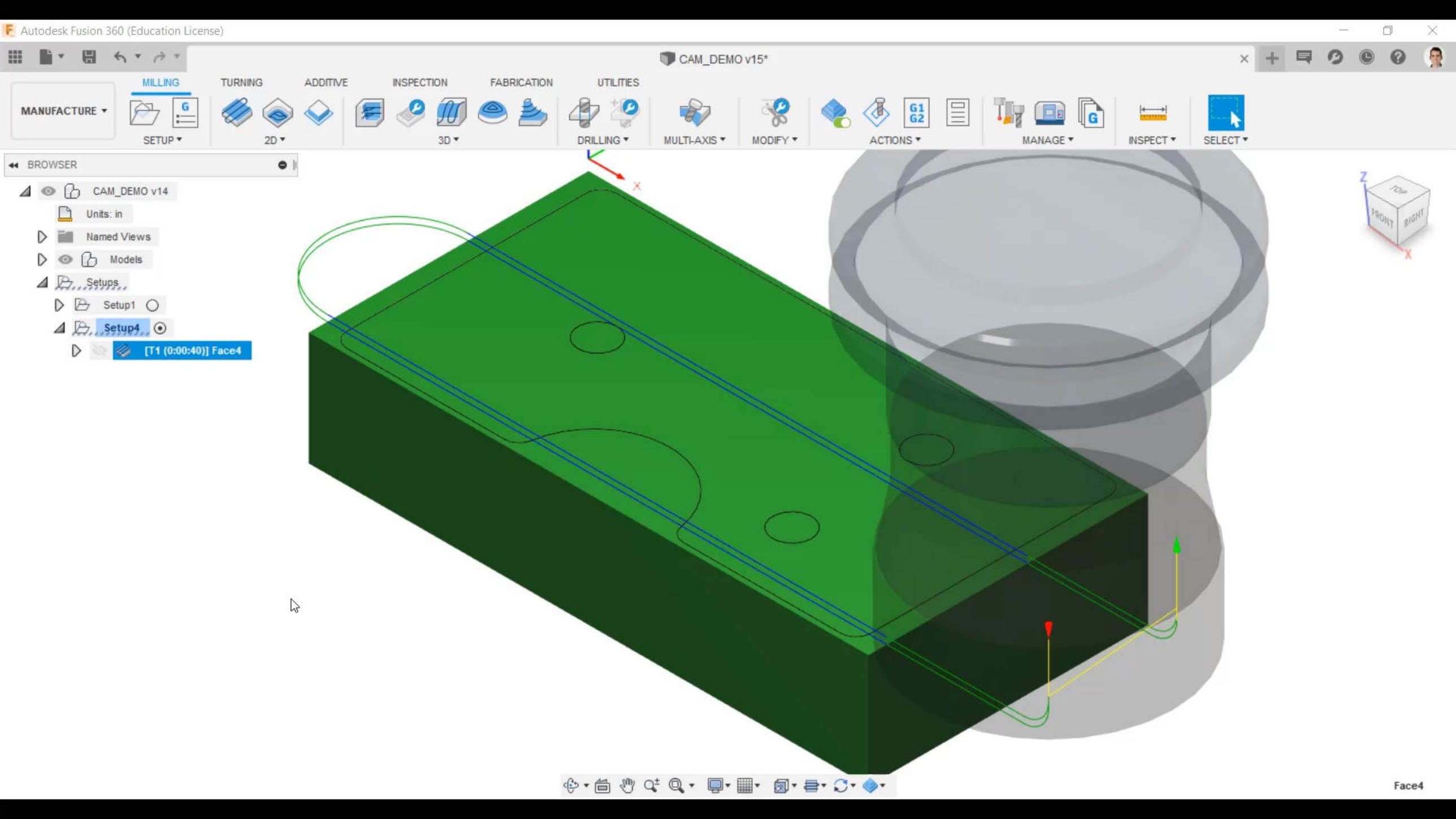
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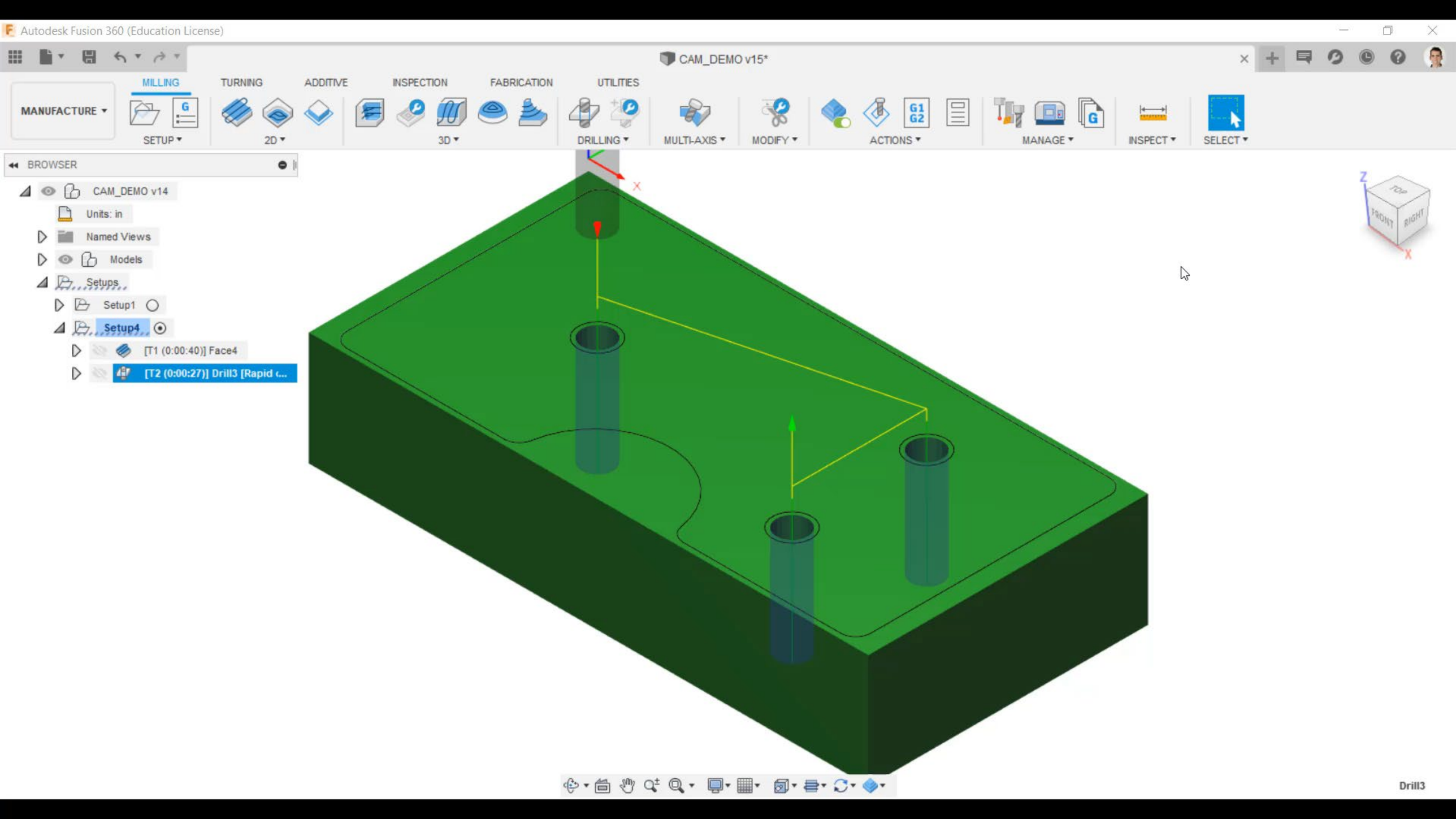
Face4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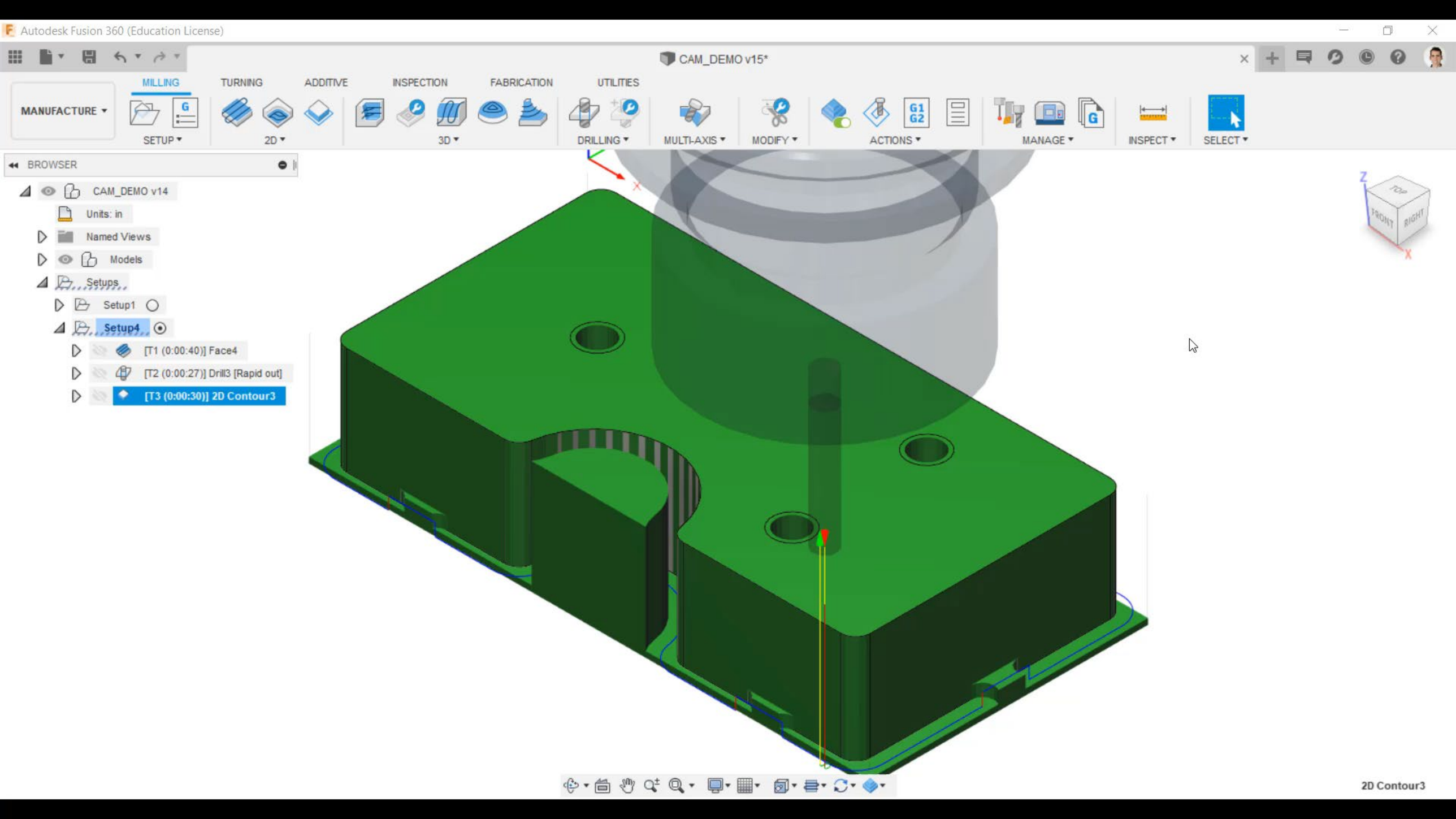
[T2 (0:00:27)] Drill3 [Rapid (...
Drill3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[T3 (0:00:30)] 2D Contour3
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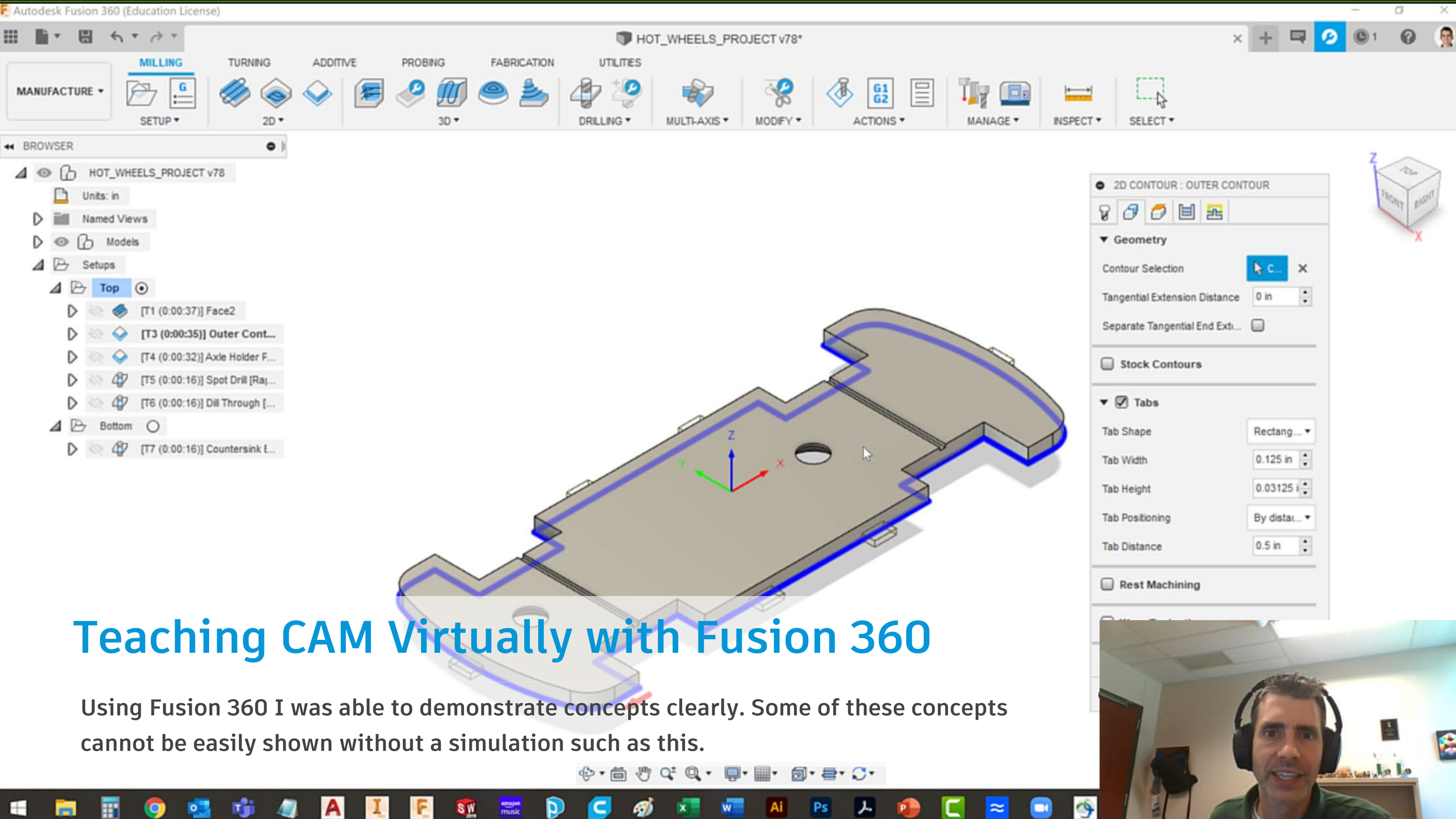
FRONT
RIGHT
2D Contour3

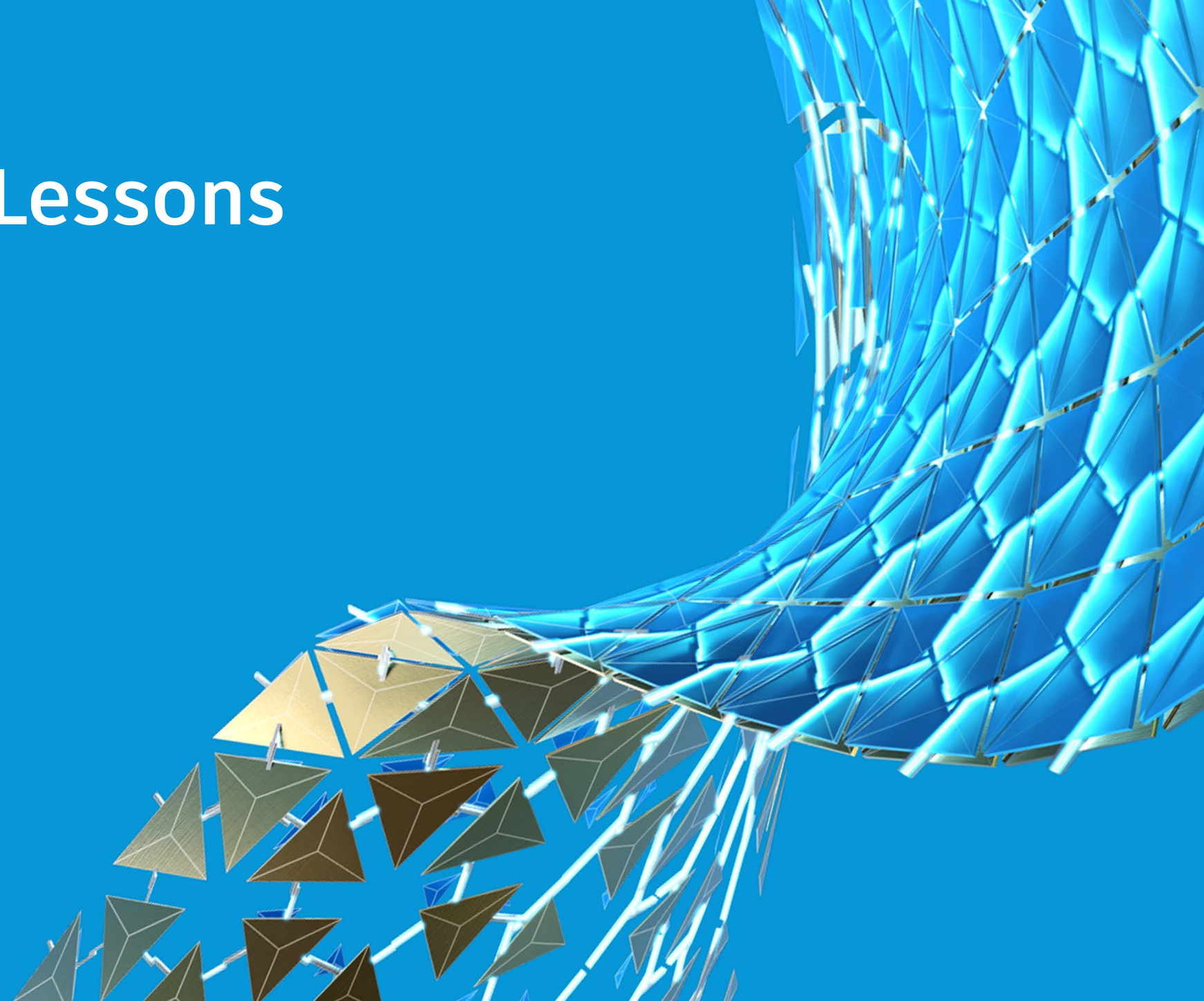
Teaching Virtually



Teaching CAM Virtually with Fusion 360

Using Fusion 360 I was able to demonstrate concepts clearly. Some of these concepts cannot be easily shown without a simulation such as this.

Finale: The Lessons



Lessons Learned

ASK FOR HELP

There are many resources available. Solicit the help of other people, including faculty, Autodesk employees, industry representatives, and students.

SIMULATION IS NOT JUST FOR VIRTUAL

Fusion 360 allows for a great deal of learning, especially for entry-level users. One can easily go slowly and see exactly what is happening without having to worry about taking too much time on the machine or wrecking tools.

UPDATE YOURSELF

Sometimes it is easier to think that you do not have time to try a new technology. Schedule regular time to try new things; perhaps you will find something useful.

THINK OUTSIDE THE SCREEN

Have students organize a “junk drawer” at home to practice implementing Kaizen. Talk with students about proper posture and ergonomics at their homes.

Links

- Fusion 360 Forum
  - Excellent support from other users and Autodesk employees
  - Responsive community
- KETIV Technologies
  - Consultant, solution provider, and Autodesk reseller
  - Great training videos
- Autodesk Knowledge Network
  - Great for quick, accurate information
- Autodesk Design Academy
  - Specifically, the course entitled “Introduction to CAD, CAM, and Practical CNC Machining”
  - Entire course or individual lessons can be used

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