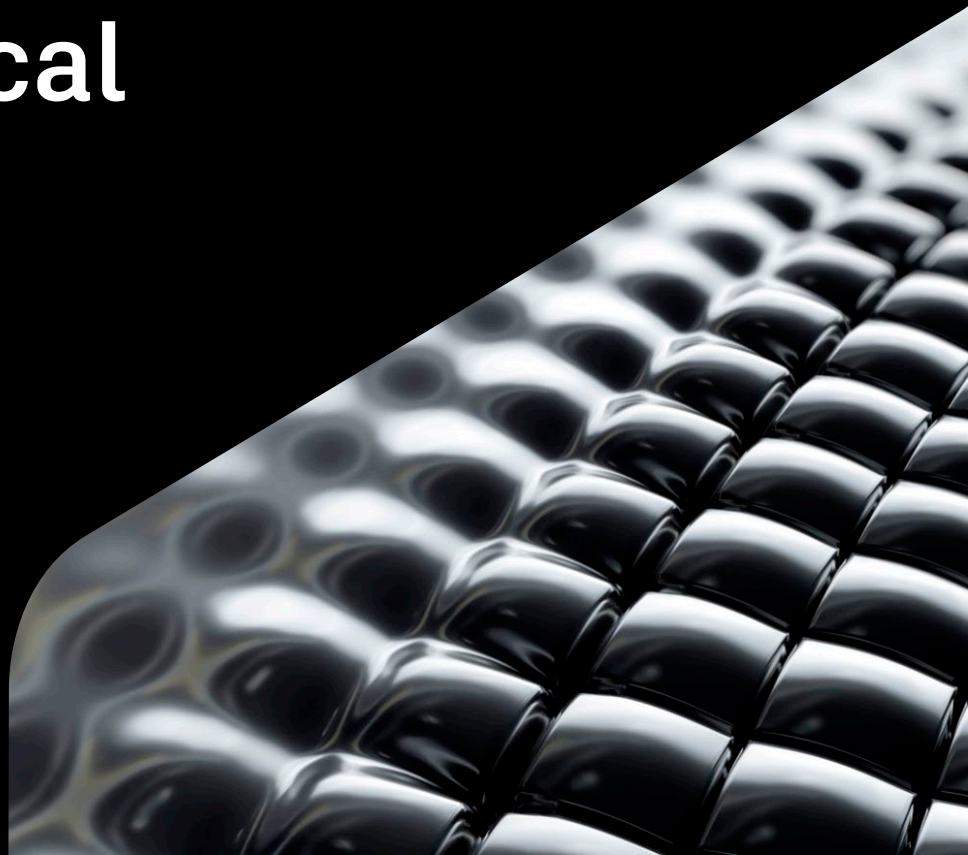
AUTODESK UNIVERSITY

Electro-Mechanical Product Design Re-Imagined

Fusion 360 Electronic Product Design

Edwin Robledo
Technical Marketing Mgr. - Electronics

Kristen Kilroy
Product Marketing Mgr. - Simulation



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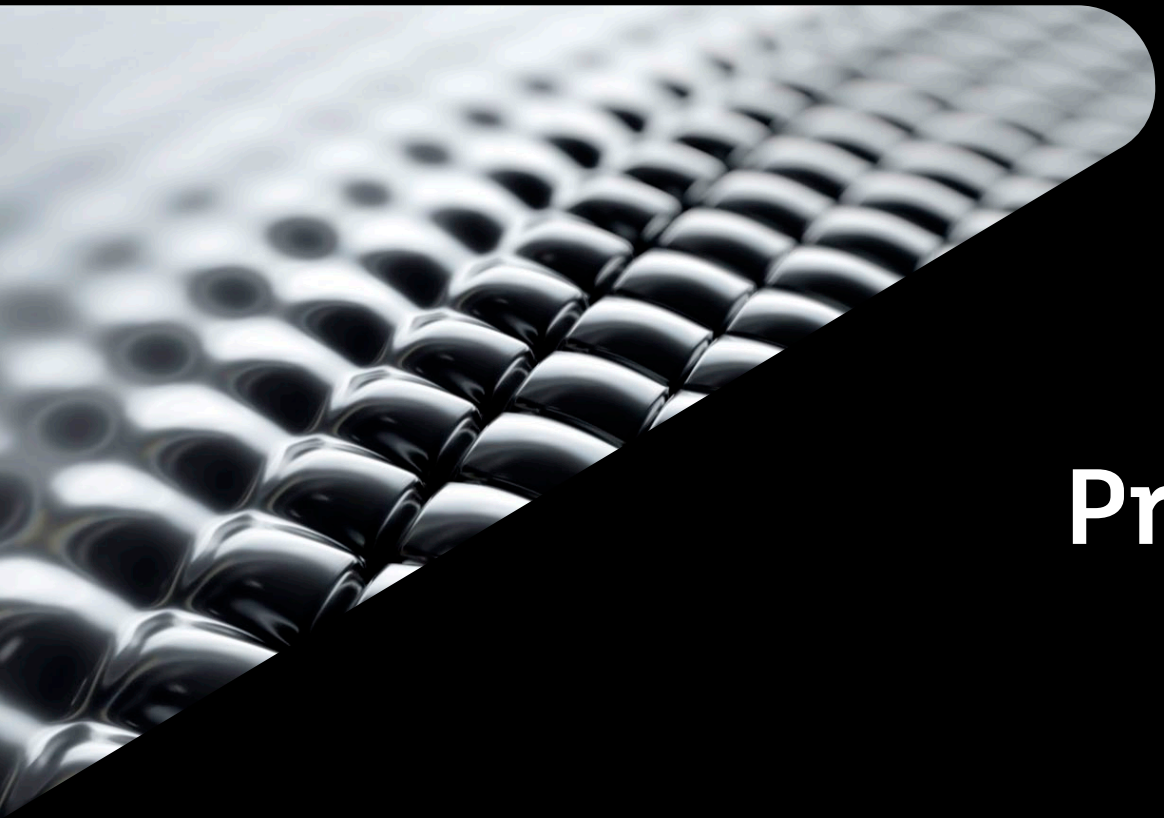


Product Design

Autodesk University Factory Experience

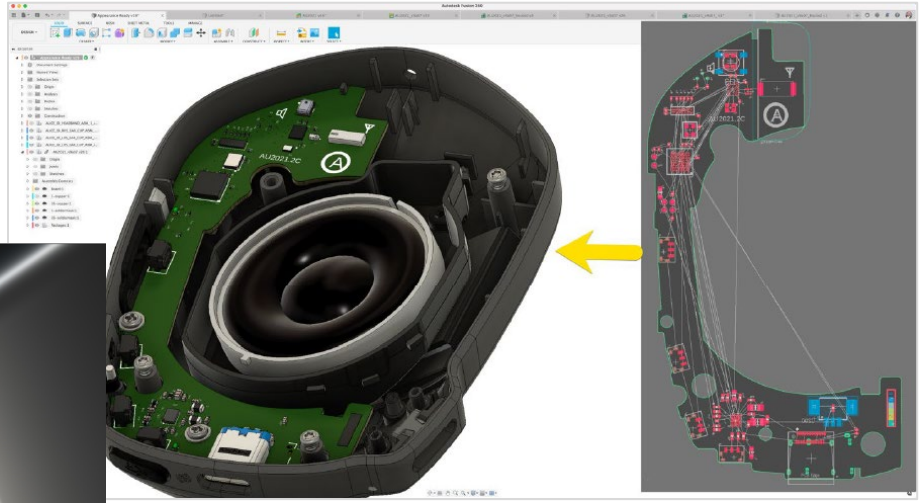
Autodesk University

Factory Experience Exhibit

- AU Attendees' Impact:
  - See Autodesk's products work
  - Experience an accelerated product design and manufacturing sequence
  - Get to take home a neat, functioning part they built
- Autodesk Employee Impact:
  - Use our product for the whole workflow
  - Understand the product development/manufacturing cycle in the eyes of our customers
  - Identify potential roadblocks and solutions

Autodesk University

2021 Virtual Session



AUTODESK UNIVERSITY

Consumer Product Design Re-Imagined – CP500021

Edwin Robledo
Technical Marketing Manager
Autodesk, Inc.

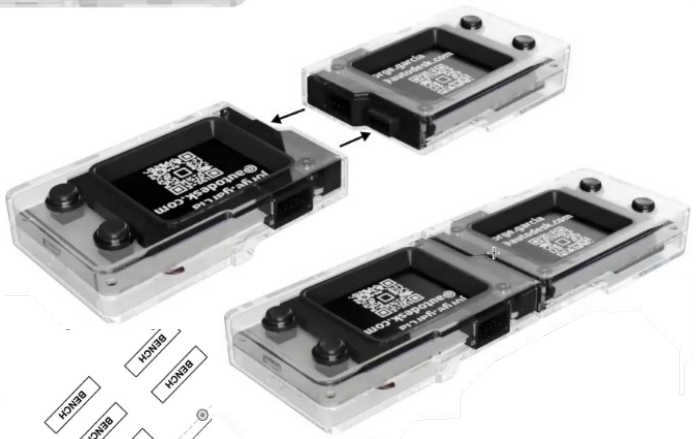
Garin Gardiner
Sr. Product Manager
Autodesk, Inc.

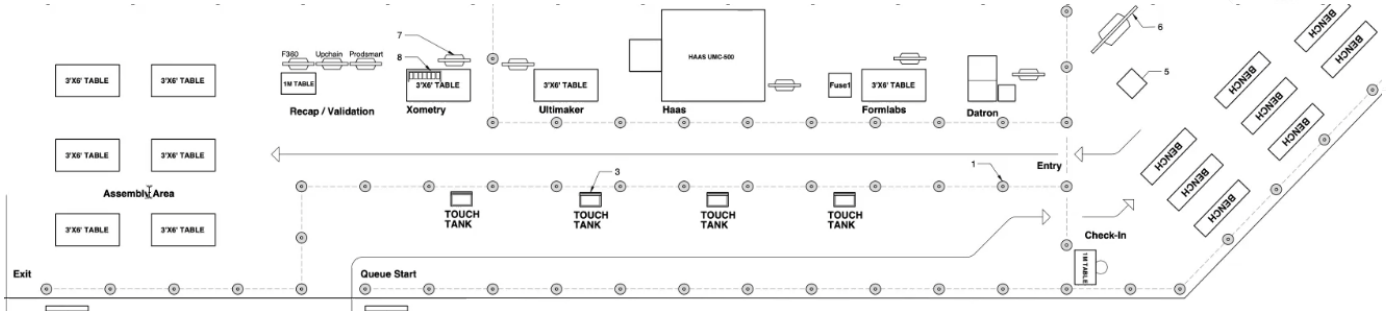
Kristen Kilroy
Product Marketing Manager
Autodesk, Inc.

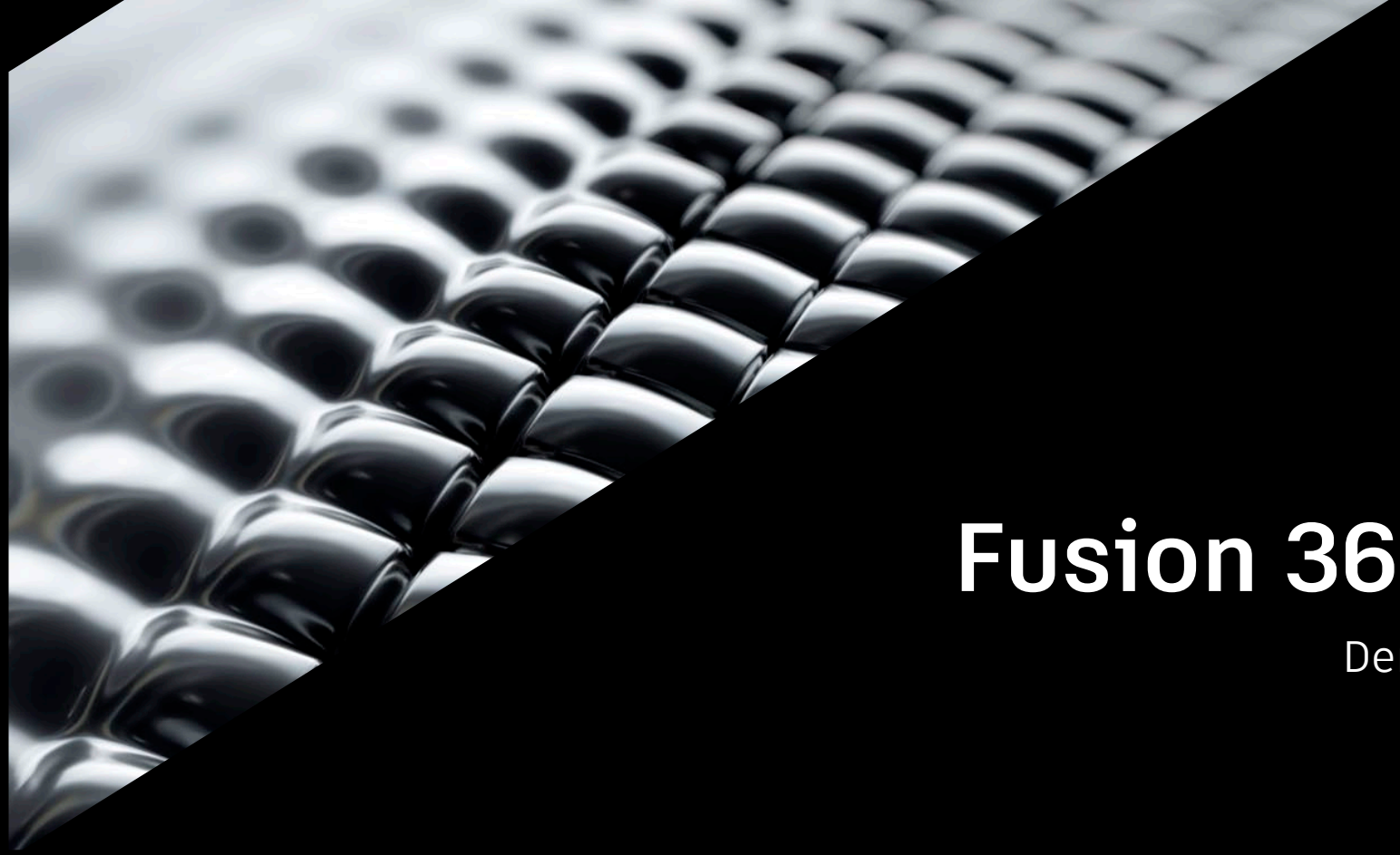
Autodesk University

Factory Experience Exhibit

- 2022 Exhibit:
  - Digital Badge
    - Displays attendee's name
    - Manually connect to another badge to play a game
  - "Agile" Product Development
    - Worked in sprints to finalize the design
    - Able to accommodate quick design changes based on supply shortages or functionality requirements

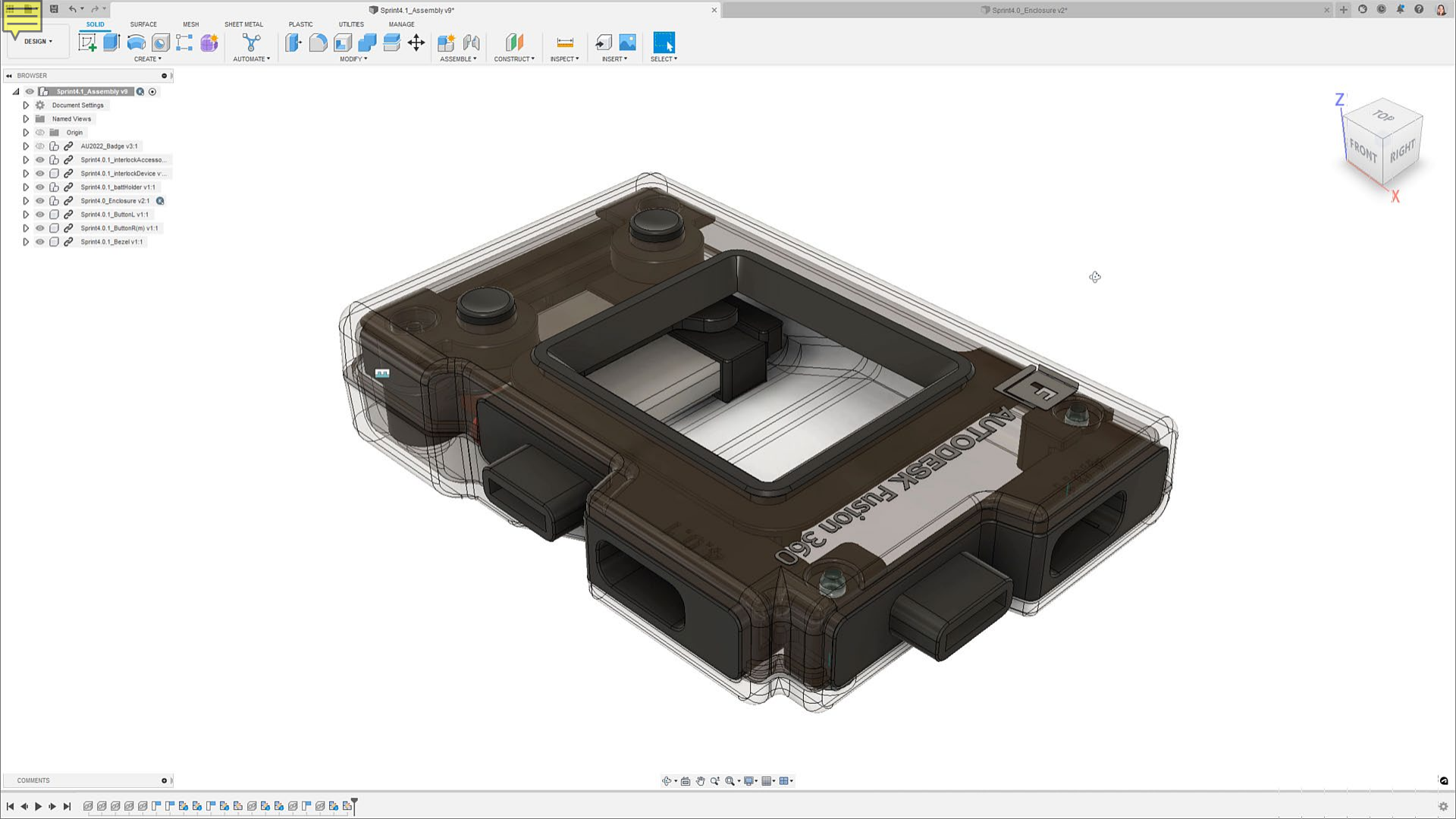


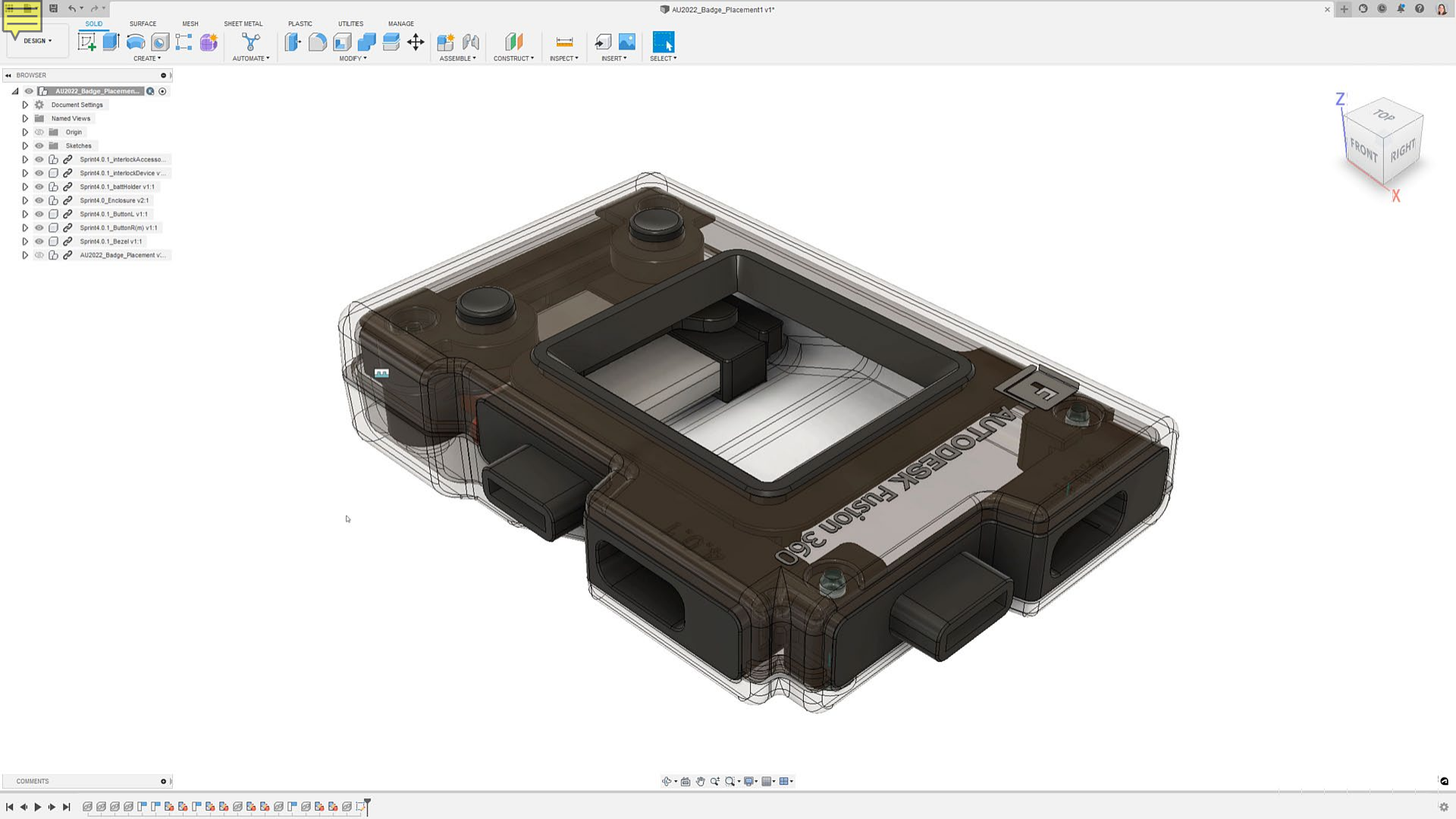




Fusion 360

Demo


Sprint4.1_Assembly v9*
Sprint4.0_Enclosure v2*
SOLID
SURFACE
MESH
SHEET METAL
PLASTIC
UTILITIES
MANAGE
DESIGN
CREATE
AUTOMATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
SELECT
BROWSER
Sprint4.1_Assembly v9
Document Settings
Named Views
Origin
AU2022_Badge v3:1
Sprint4.0.1_interlockAccesso...
Sprint4.0.1_interlockDevice v:...
Sprint4.0.1_battHolder v1:1
Sprint4.0_Enclosure v2:1
Sprint4.0.1_ButtonL v1:1
Sprint4.0.1_ButtonR(m) v1:1
Sprint4.0.1_Bezel v1:1
AUTODESK Fusion 360
TOP
FRONT
RIGHT
Z
X
COMMENTS


AU2022_Badge_Placement1 v1*
DESIGN
SOLID
SURFACE
MESH
SHEET METAL
PLASTIC
UTILITIES
MANAGE
CREATE
AUTOMATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
SELECT
BROWSER
AU2022_Badge_Placemen...
Document Settings
Named Views
Origin
Sketches
Sprint4.0.1_interlockAccesso...
Sprint4.0.1_interlockDevice v:...
Sprint4.0.1_battHolder v1:1
Sprint4.0_Enclosure v2:1
Sprint4.0.1_ButtonL v1:1
Sprint4.0.1_ButtonR(m) v1:1
Sprint4.0.1_Bezel v1:1
AU2022_Badge_Placement v:...
AUTODESK Fusion 360
Z
X
TOP
FRONT
RIGHT
COMMENTS

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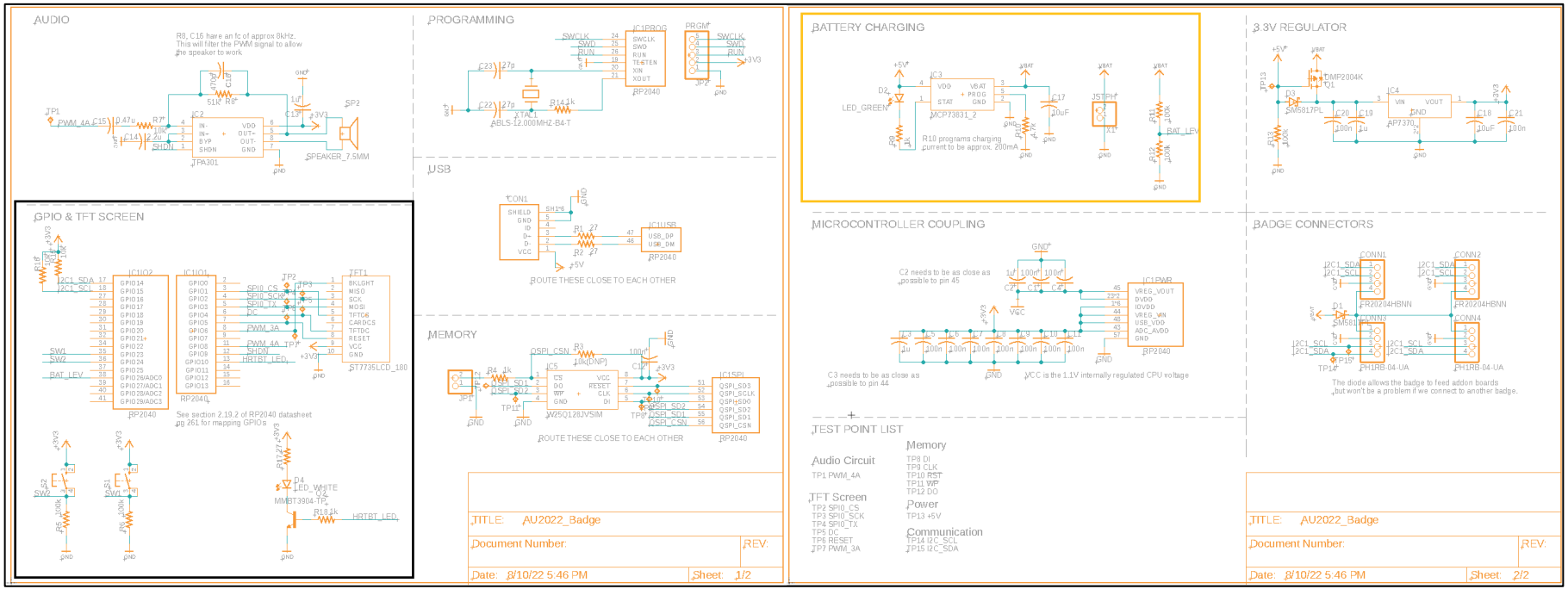
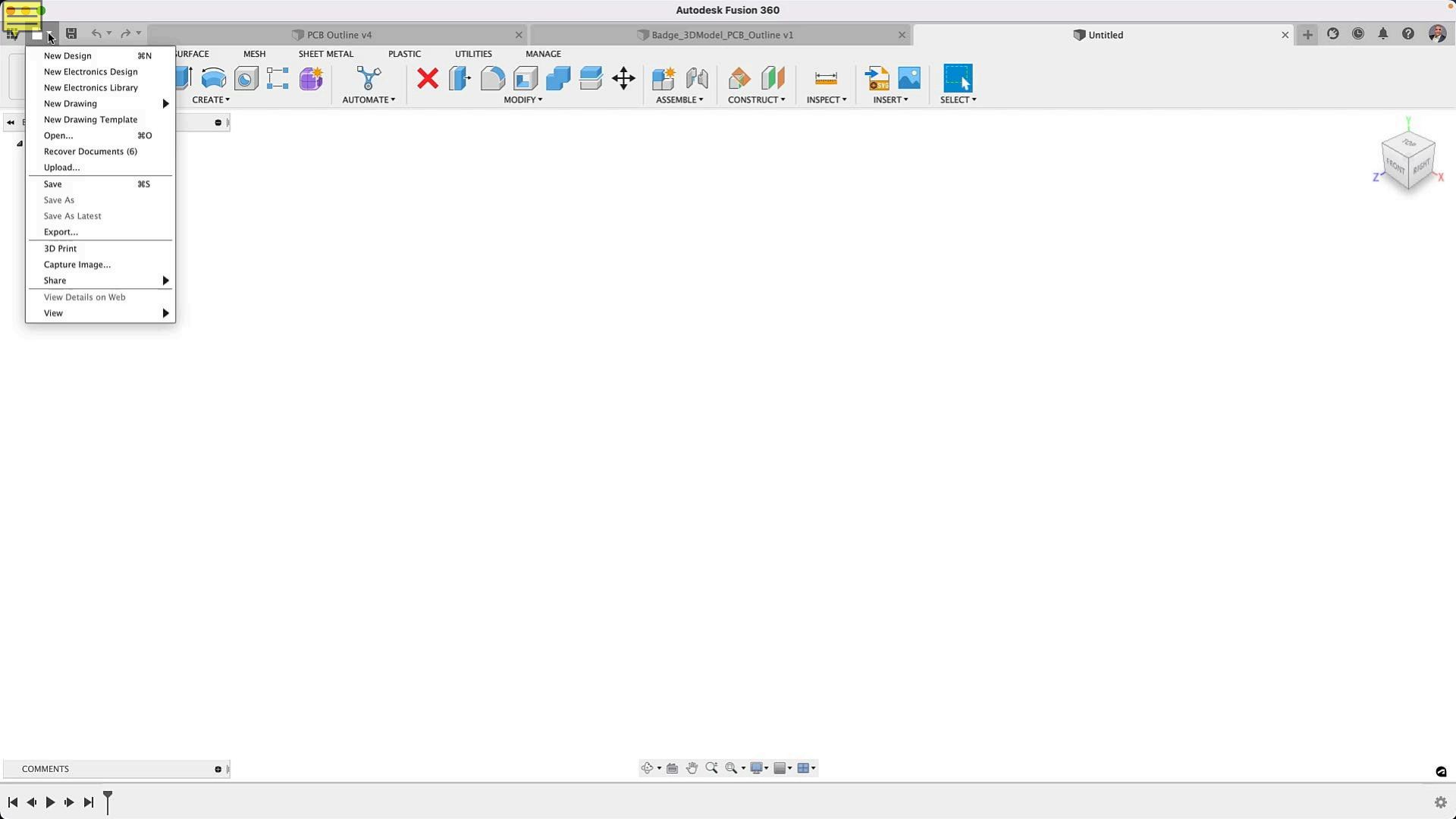
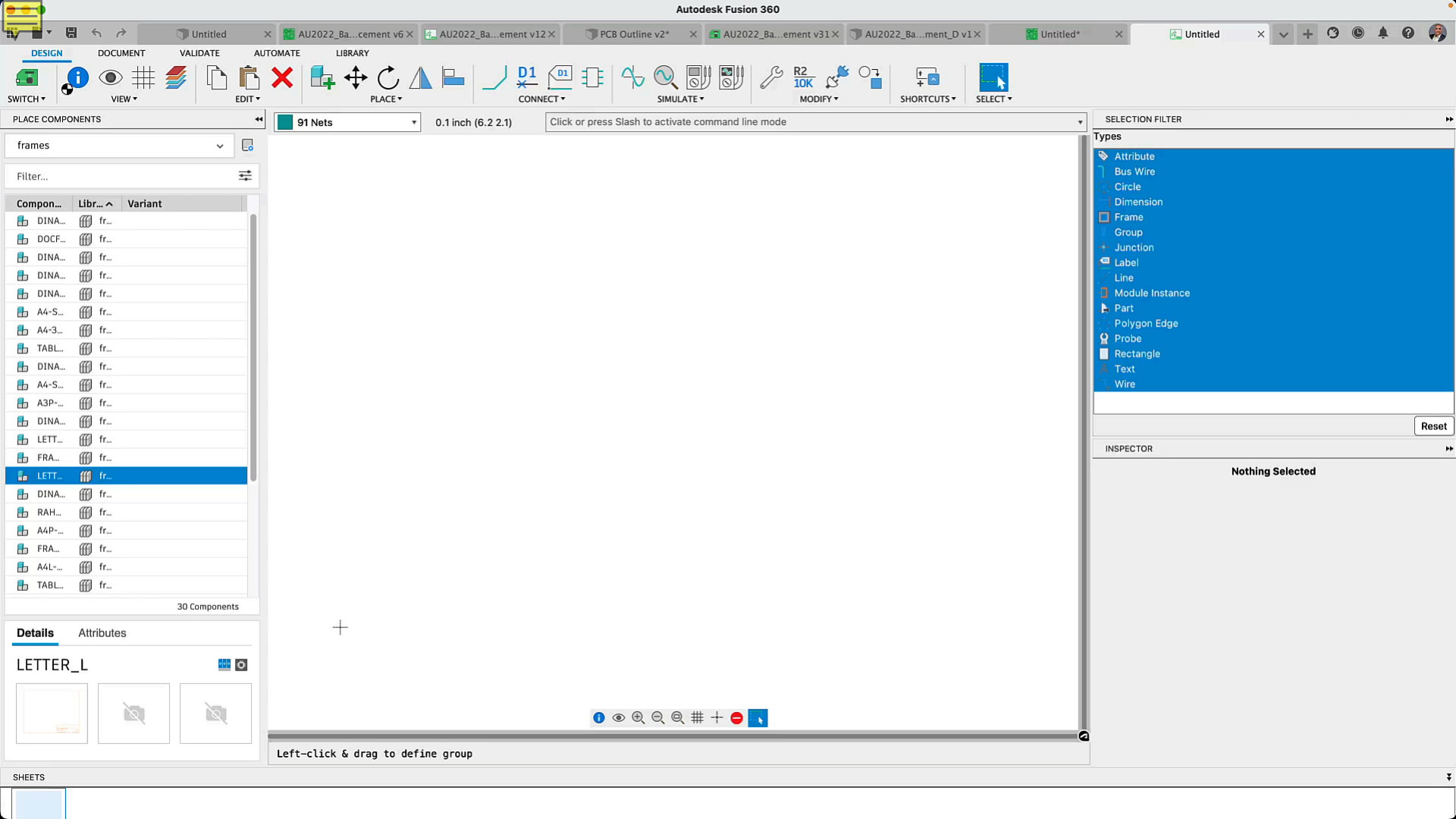
Electronic Schematic Diagram




Autodesk Fusion 360
PCB Outline v4
Badge_3DModel_PCB_Outline v1
Untitled
New Design ⌘N
New Electronics Design
New Electronics Library
New Drawing
New Drawing Template
Open... ⌘O
Recover Documents (6)
Upload...
Save ⌘S
Save As
Save As Latest
Export...
3D Print
Capture Image...
Share
View Details on Web
View
SURFACE
MESH
SHEET METAL
PLASTIC
UTILITIES
MANAGE
CREATE
AUTOMATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
SELECT
COMMENTS


Autodesk Fusion 360
Untitled
AU2022_Ba...cement v6
AU2022_Ba...ement v12
PCB Outline v2*
AU2022_Ba...ement v31
AU2022_Ba...ment_D v1
Untitled*
Untitled
DESIGN
DOCUMENT
VALIDATE
AUTOMATE
LIBRARY
SWITCH
VIEW
EDIT
PLACE
CONNECT
SIMULATE
MODIFY
SHORTCUTS
SELECT
PLACE COMPONENTS
frames
Filter...
Compon...
Libr...
Variant
DINA...
DOCF...
A4-S...
A4-3...
TABL...
A3P-...
LETT...
FRA...
RAH...
A4P-...
A4L-...
30 Components
Details
Attributes
LETTER_L
91 Nets
0.1 inch (6.2 2.1)
Click or press Slash to activate command line mode
Left-click & drag to define group
SELECTION FILTER
Types
Attribute
Bus Wire
Circle
Dimension
Frame
Group
Junction
Label
Line
Module Instance
Part
Polygon Edge
Probe
Rectangle
Text
Wire
Reset
INSPECTOR
Nothing Selected
SHEETS

Autodesk Fusion 360

PCB Outline v4 | Badge_3DModel_PCB_Outline v1 | Untitled | Untitled* | Untitled

DESIGN | DOCUMENT | VALIDATE | AUTOMATE | LIBRARY

SWITCH | VIEW | EDIT | PLACE | CONNECT | SIMULATE | MODIFY | SHORTCUTS | SELECT

DESIGN MANAGER | PLACE COMPONENTS

frames

Filter...

Component	Libra...	Variant
DINA3...	fra...	
DOCFIE...	fra...	
DINA3_L	fra...	
DINA4...	fra...	
DINA5...	fra...	
A4-S35...	fra...	
A4-35SC	fra...	
TABL_P	fra...	
DINA4_L	fra...	
A4-SM...	fra...	
A3P-LOC	fra...	
DINA5_L	fra...	
LETTER...	fra...	
FRAME...	fra...	
LETTER...	fra...	
DINA-...	fra...	
RAHME...	fra...	
A4P-LOC	fra...	
FRAME...	fra...	
A4L-LOC	fra...	

30 Components

Details | Attributes

LETTER_L

91 Nets

Click or press Slash to activate command line mode

SELECTION FILTER

Types

Attribute
Bus Wire
Circle
Dimension
Frame
Group
Junction
Label
Line

Reset

INSPECTOR

Nothing Selected

SHEETS

1

Autodesk Fusion 360

PCB Outline v4* | Untitled | AU2022_Badge_Placement v4* | AU2022_Badge_Placement v12 | AU2022_Badge_Placement* | PCB Outline v2*

DESIGN | DOCUMENT | RULES DRC/ERC | MANUFACTURING | AUTOMATION | SIMULATION | LIBRARY

SWITCH | VIEW | EDIT | LAYERS | BOARD SHAPE | PLACE | ROUTE | QUICK ROUTE | POLYGON | RIPUP | REWORK | MODIFY | SHORTCUTS | SELECT

INSPE... | SELECTION F.. | PLACE COMPON... | DESIGN MAN...

1 Top | 50 mil (5631 2995) | Click or press Slash to activate command line mode

Types

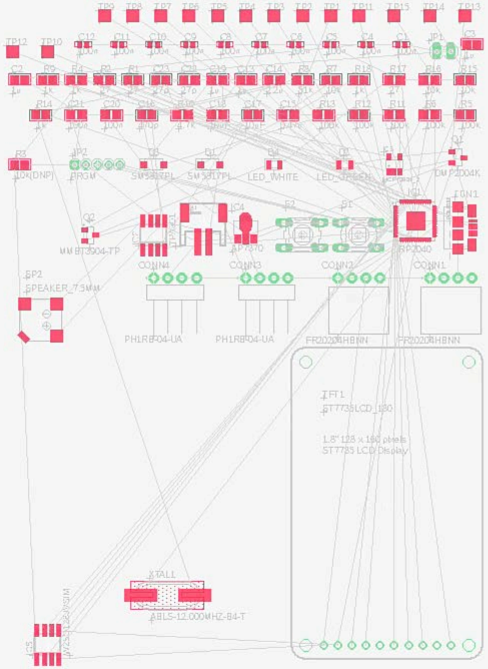
- Airwire
- Attribute
- Circle
- Device
- Dimension
- Frame
- Group
- Hole
- Line
- Polygon Edge
- Rectangle
- Spline
- Text
- Via

Layers

<All>

- 1 Top
- 16 Bottom
- 17 Pads
- 18 Vias
- 19 Unrouted
- 20 Dimension
- 21 tPlace
- 22 bPlace
- 25 tNames
- 26 bNames
- 27 tValues
- 28 bValues
- 39 tKeepout
- 40 bKeepout
- 41 tRestrict
- 42 bRestrict
- 43 vRestrict
- 48 Document
- 49 Reference
- 51 tDocu

Reset



Left-click & drag to define group

Autodesk Fusion 360

PCB Outline v4* | Untitled | AU2022_Badge_Placement v5 | AU2022_Badge_Placement v12 | AU2022_Badge_Placement_ v1 | PCB Outline v2*

Name: PCB Outline v2*
Project: TechMarketing
Recovery File created: 8/15/22 9:48 PM

DESIGN | DOCUMENT | RULES DRC/ERC | MANUFACTURING | AUTOMATION | SIMULATION | LIBRARY

SWITCH | VIEW | EDIT | LAYERS | BOARD SHAPE | PLACE | ROUTE | QUICK ROUTE | POLYGON | RIPUP | REWORK | SELECT

INSPE... | SELECTION F.. | PLACE COMPON... | DESIGN MAN...

21 tPlace | 50 mil (-21 5367) | Click or press Slash to activate command line mode

Types

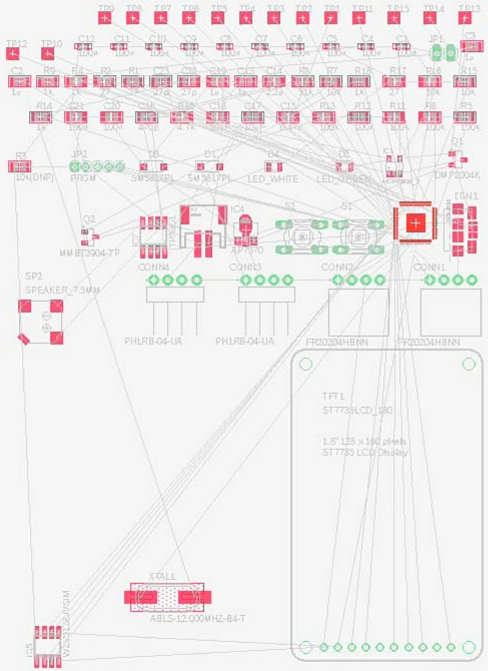
- Airwire
- Attribute
- Circle
- Device
- Dimension
- Frame
- Group
- Hole
- Line
- Polygon Edge
- Rectangle
- Spline
- Text
- Via

Layers

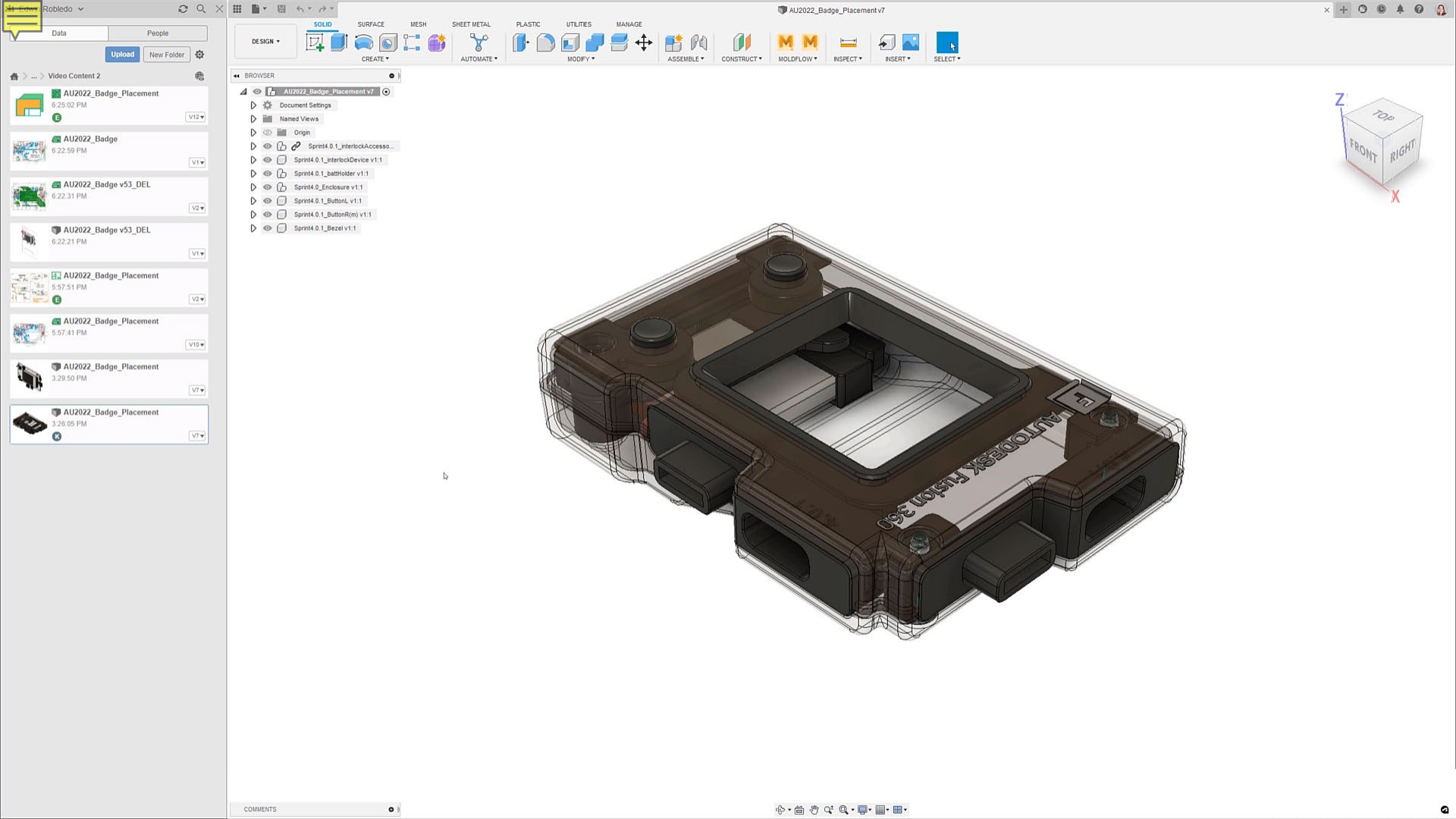
<All>

- 1 Top
- 16 Bottom
- 17 Pads
- 18 Vias
- 19 Unrouted
- 20 Dimension
- 21 tPlace
- 22 bPlace
- 25 tNames
- 26 bNames
- 27 tValues
- 28 bValues
- 39 tKeepout
- 40 bKeepout
- 41 tRestrict
- 42 bRestrict
- 43 vRestrict
- 48 Document
- 49 Reference
- 51 tDocu

Reset



Left-click & drag to define group


Robledo
Data
People
Upload
New Folder
Video Content 2
AU2022_Badge_Placement
6:25:02 PM
AU2022_Badge
6:22:59 PM
AU2022_Badge v53_DEL
6:22:31 PM
AU2022_Badge v53_DEL
6:22:21 PM
AU2022_Badge_Placement
5:57:51 PM
AU2022_Badge_Placement
5:57:41 PM
AU2022_Badge_Placement
3:29:50 PM
AU2022_Badge_Placement
3:26:05 PM
AU2022_Badge_Placement v7
DESIGN
SOLID
SURFACE
MESH
SHEET METAL
PLASTIC
UTILITIES
MANAGE
CREATE
AUTOMATE
MODIFY
ASSEMBLE
CONSTRUCT
MOLDFLOW
INSPECT
INSERT
SELECT
BROWSER
AU2022_Badge_Placement v7
Document Settings
Named Views
Origin
Sprint4.0.1_interlockAccesso...
Sprint4.0.1_interlockDevice v1:1
Sprint4.0.1_battHolder v1:1
Sprint4.0_Enclosure v1:1
Sprint4.0.1_ButtonL v1:1
Sprint4.0.1_ButtonR(m) v1:1
Sprint4.0.1_Bezel v1:1
AUTODESK FUSION 360
Z
TOP
FRONT
RIGHT
X
COMMENTS


AU2022_Badge_Placement v7*
DESIGN
SOLID
SURFACE
MESH
SHEET METAL
PLASTIC
UTILITIES
MANAGE
CREATE
AUTOMATE
MODIFY
ASSEMBLE
CONSTRUCT
MOLDFLOW
INSPECT
INSERT
SELECT
BROWSER
AU2022_Badge_Placemen...
Document Settings
Named Views
Origin
Sprint4.0.1_interlockAccesso...
Sprint4.0.1_interlockDevice v1:1
Sprint4.0.1_battHolder v1:1
Sprint4.0_Enclosure v1:1
Sprint4.0.1_ButtonL v1:1
Sprint4.0.1_ButtonR(m) v1:1
Sprint4.0.1_Bezel v1:1
AU2022_Badge_Placement v...
Z
RIGHT
Y
X
COMMENTS

Autodesk Fusion 360

AU2022_Badge_Placement v5* | AU2022_Badge_Placement v1 | AU2022_Badge_Placement v6* | AU2022_Badge_Placement v6 | AU2022_Badge_Placement v2

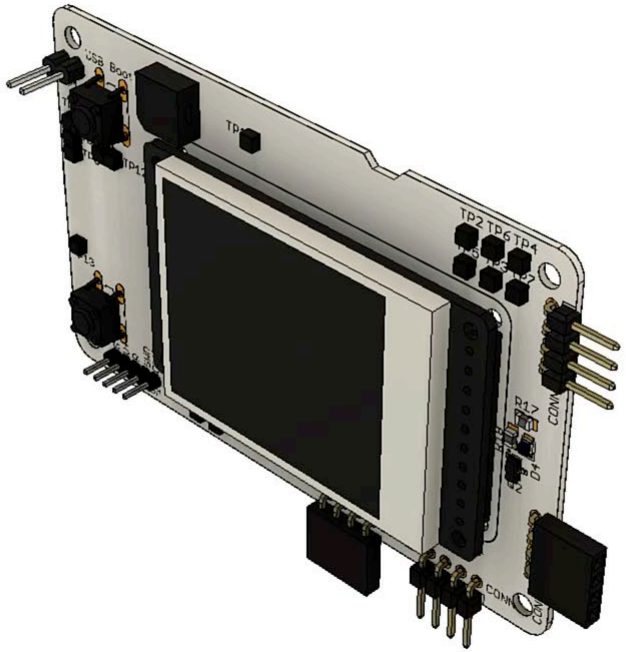
3D PCB

MODIFY | INSPECT | SELECT

The 2D and 3D PCB documents are out of sync.

BROWSER

- AU2022_Badge_Placem...
  - Document Settings
  - Named Views
  - Origin
  - Joints
  - Sketches
  - Board:1
  - 1-copper:1
  - 16-copper:1
  - 1-soldermask:1
  - 16-soldermask:1
  - Packages:1



COMMENTS

Autodesk Fusion 360

AU2022_Badge_Placement v9*

AU2022_Badge_Placement v1*

AU2022_Badge_Placement v9*

DESIGN DOCUMENT RULES DRC/ERC MANUFACTURING AUTOMATION SIMULATION LIBRARY

SWITCH VIEW EDIT LAYERS BOARD SHAPE PLACE ROUTE QUICK ROUTE POLYGON RIPUP REWORK MODIFY SHORTCUTS SELECT

INSPE... SELECTION F... PLACE COMPON... DESIGN MAN...

Browser Filter

Assembly Variant: Default Variant

View: Devices

Device Sets 3 of 3 shown (1 selected)

Search

Device Set

<All Devices>
<Bottom Side Devices>
<Top Side Devices>

Devices 81 of 81 shown (0 selected)

Search

Name	Footprint
XTAL1	XTAL_ABLS_ABR
TP1	TP20SQ
TP2	TP20SQ
TP3	TP20SQ
TP4	TP20SQ
TP5	TP20SQ
TP6	TP20SQ
TP7	TP20SQ
TP8	TP20SQ

Items 0 of 0 shown (0 selected)

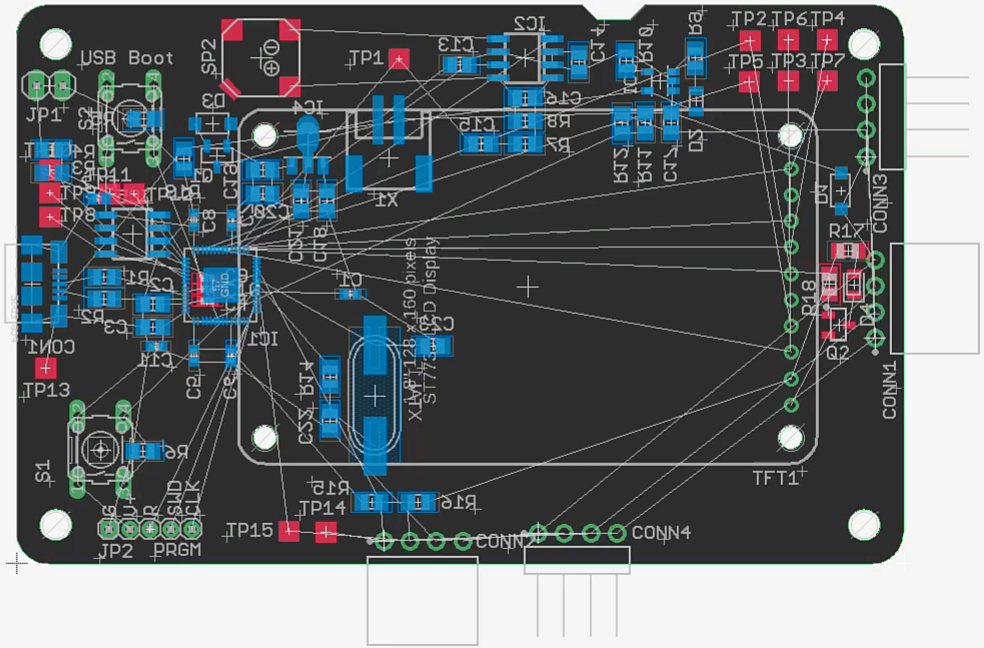
Search

Type	Name	Signal	Layer

16 Bottom

0.06858 mm (111.28565 17.80822)

Click or press Slash to activate command line mode



Left-click & drag to define group

Autodesk Fusion 360

Untitled | AU2022_Badge_ecooling v7* | AU2022_Badge v4* | AU2022_Badge v2 | AU2022_Badge v0* | AU2022_Badge v5* | AU2022_Badge v5*

DESIGN | DOCUMENT | RULES DRC/ERC | MANUFACTURING | AUTOMATION | SIMULATION | LIBRARY

SWITCH | VIEW | EDIT | LAYERS | BOARD SHAPE | PLACE | ROUTE | QUICK ROUTE | POLYGON | RIPUP | REWORK | MODIFY | SHORTCUTS | SELECT

INS... | SELECTIO... | PLACE COMP... | DESIGN M...

Browser | Filter

Assembly Variant: Default Variant

View: Devices

Device Sets 3 of 3 shown (0 selected)

Search

Device Set

<Top Side Devices>
<Bottom Side Devices>
<All Devices>

Devices 0 of 0 shown (0 selected)

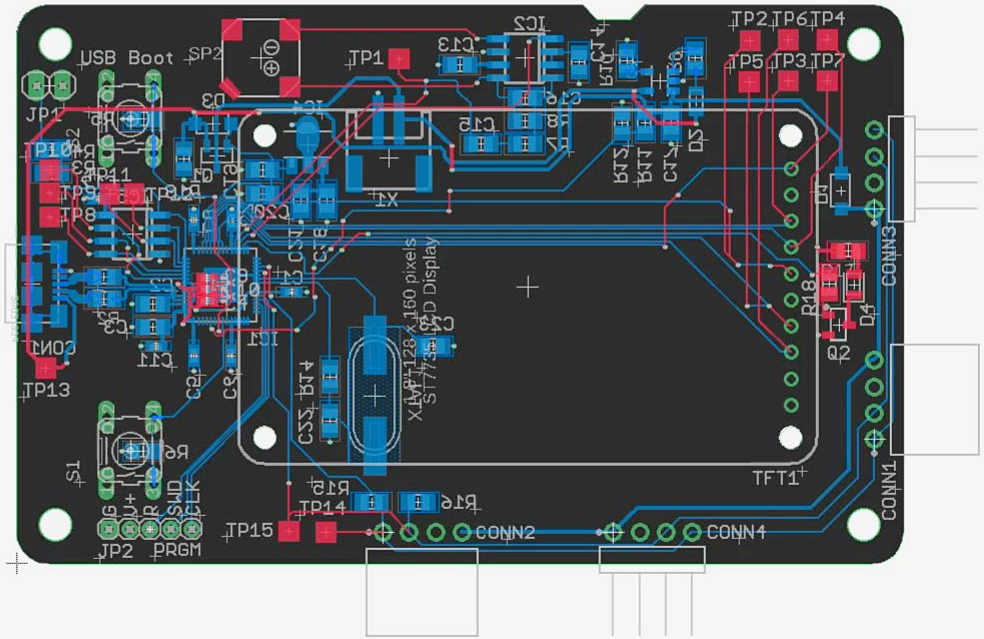
Name | Footprint

Items 0 of 0 shown (0 selected)

Search

Type | Name | Signal

1 Top | 2.7 mil (-634.5 488.7) | Click or press Slash to activate command line mode



Autodesk Fusion 360

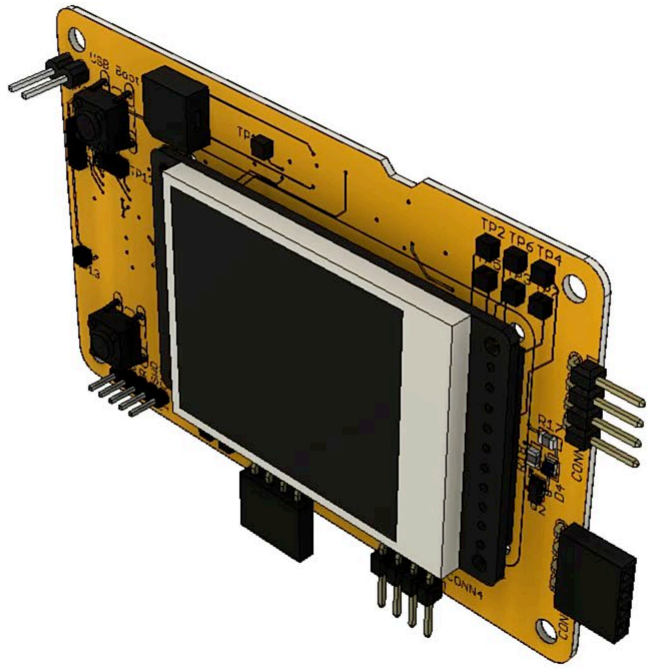
Untitled | AU2022_Badge_ecooling v7* | AU2022_Badge v4* | AU2022_Badge v2 | AU2022_Badge v0* | AU2022_Badge v5* | AU2022_Badge v5*

3D PCB

3D PCB | MODIFY | INSPECT | SELECT

BROWSER

- AU2022_Badge_ecoolin...
  - Document Settings
  - Named Views
  - Origin
  - Joints
  - Sketches
  - Board:1
  - 1-copper:1
  - 16-copper:1
  - 1-soldermask:1
  - 16-soldermask:1
  - Packages:1



COMMENTS

Fit

Autodesk Fusion 360

Untitled | AU2022_Bad...ooling v7* | AU2022_Badge v5 | AU2022_Badge v2 | AU2022_Badge v1 | AU2022_Badge v6 | AU2022_Badge v6 | Untitled*

DESIGN | DOCUMENT | RULES DRC/ERC | MANUFACTURING | AUTOMATION | SIMULATION | LIBRARY

SWITCH | VIEW | EDIT | LAYERS | BOARD SHAPE | PLACE | ROUTE | QUICK ROUTE | POLYGON | RIPUP | REWORK | MODIFY | SHORTCUTS | SELECT

INS... | SELECTIO... | PLACE COMP... | DESIGN M...

Browser | Filter

Assembly Variant: Default Variant

View: Devices

Device Sets 3 of 3 shown (0 selected)

Search

Device Set

<Top Side Devices>
<Bottom Side Devices>
<All Devices>

Devices 0 of 0 shown (0 selected)

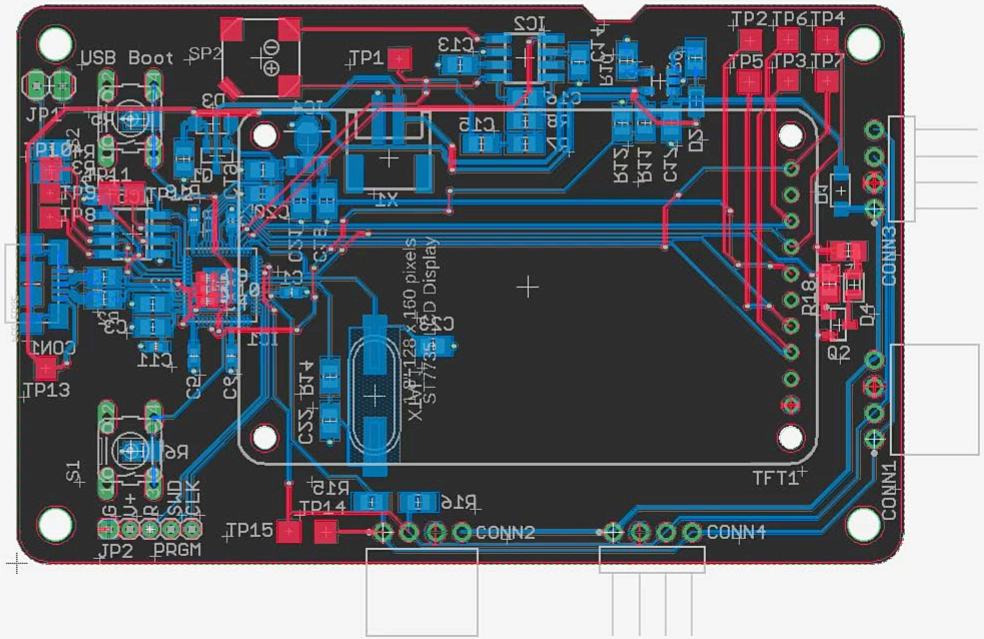
Name | Footprint

Items 0 of 0 shown (0 selected)

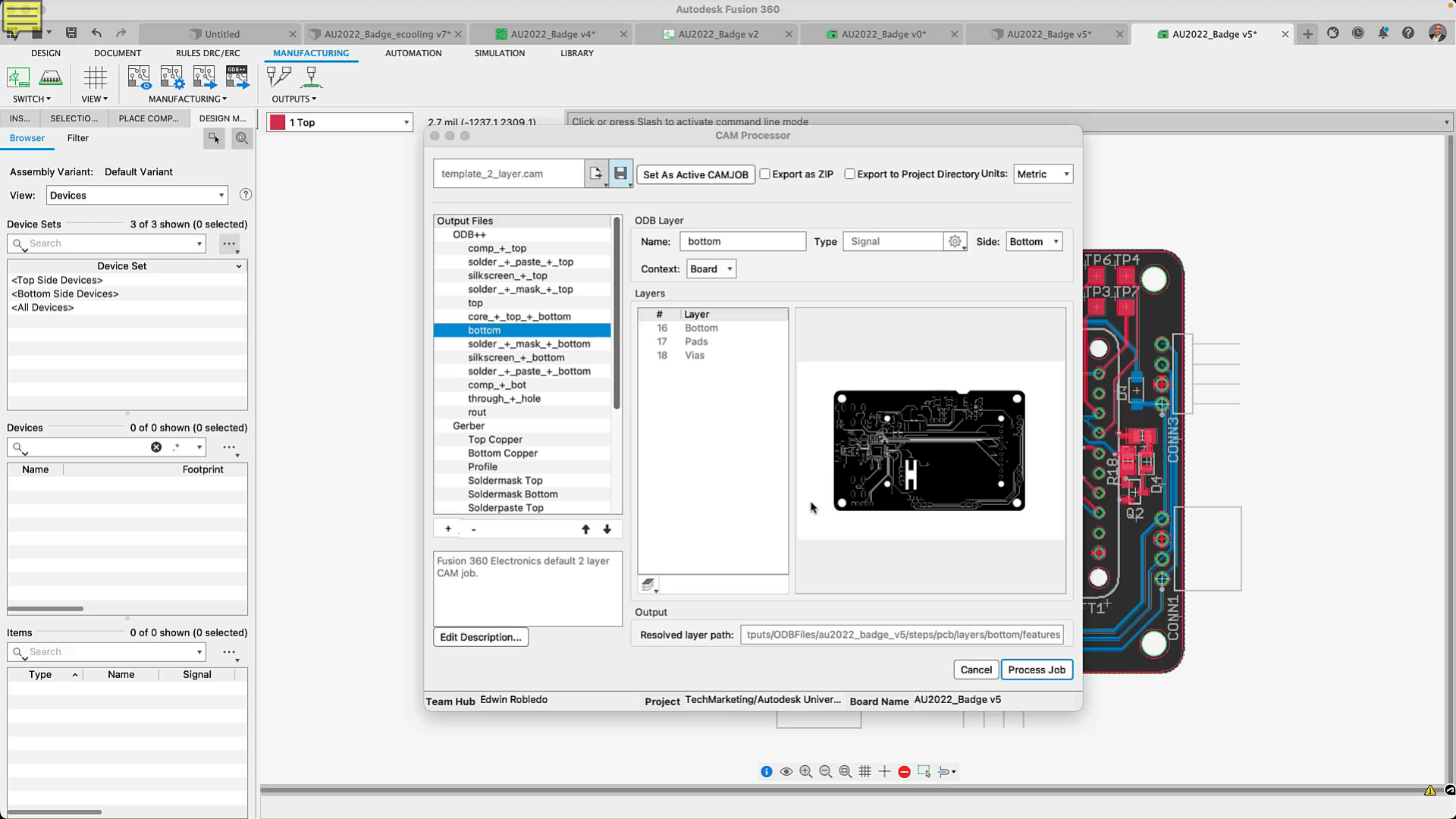
Search

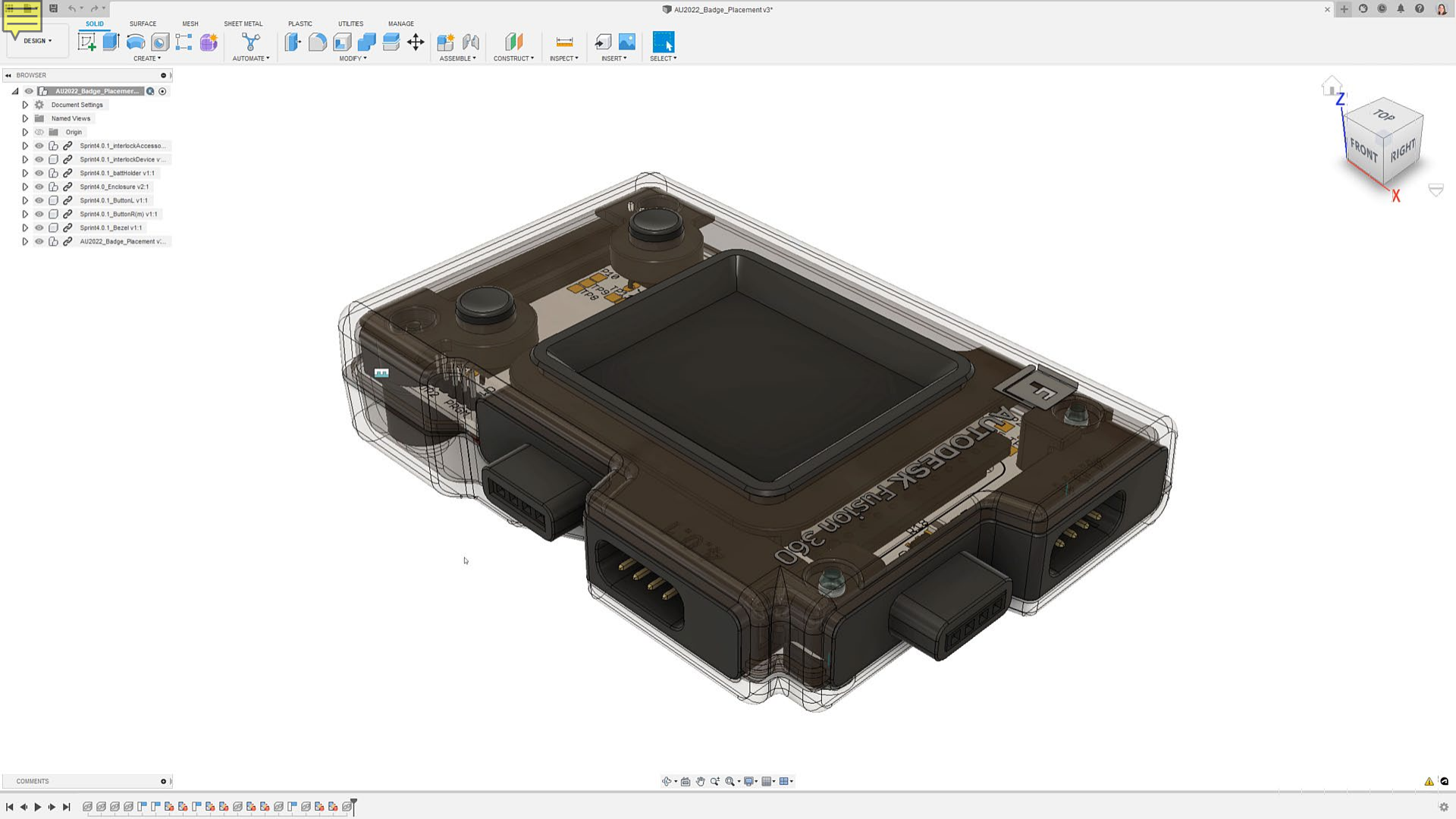
Type | Name | Signal

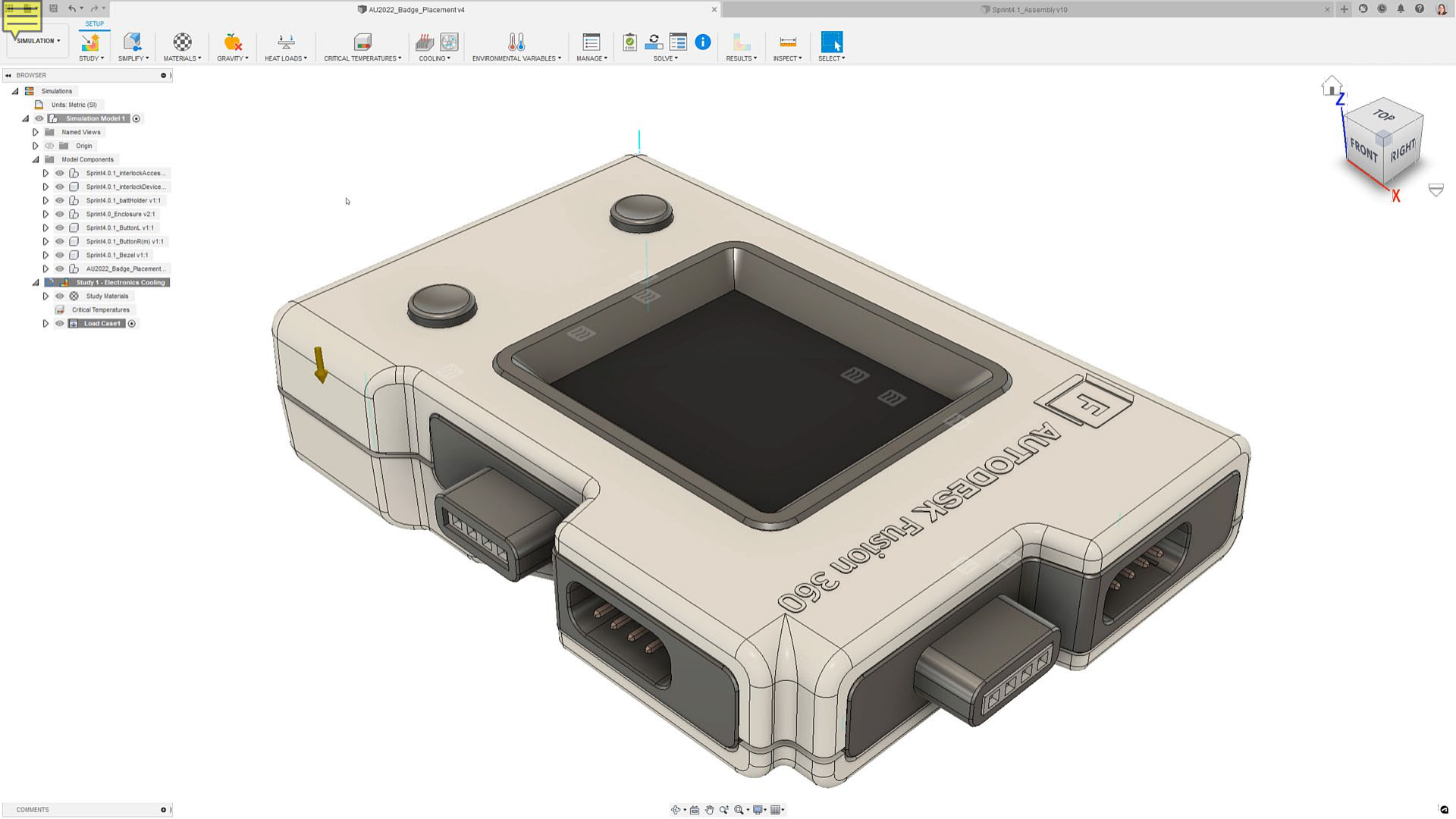
1 Top | 2.7 mil (-666.1 2434.8) | Click or press Slash to activate command line mode

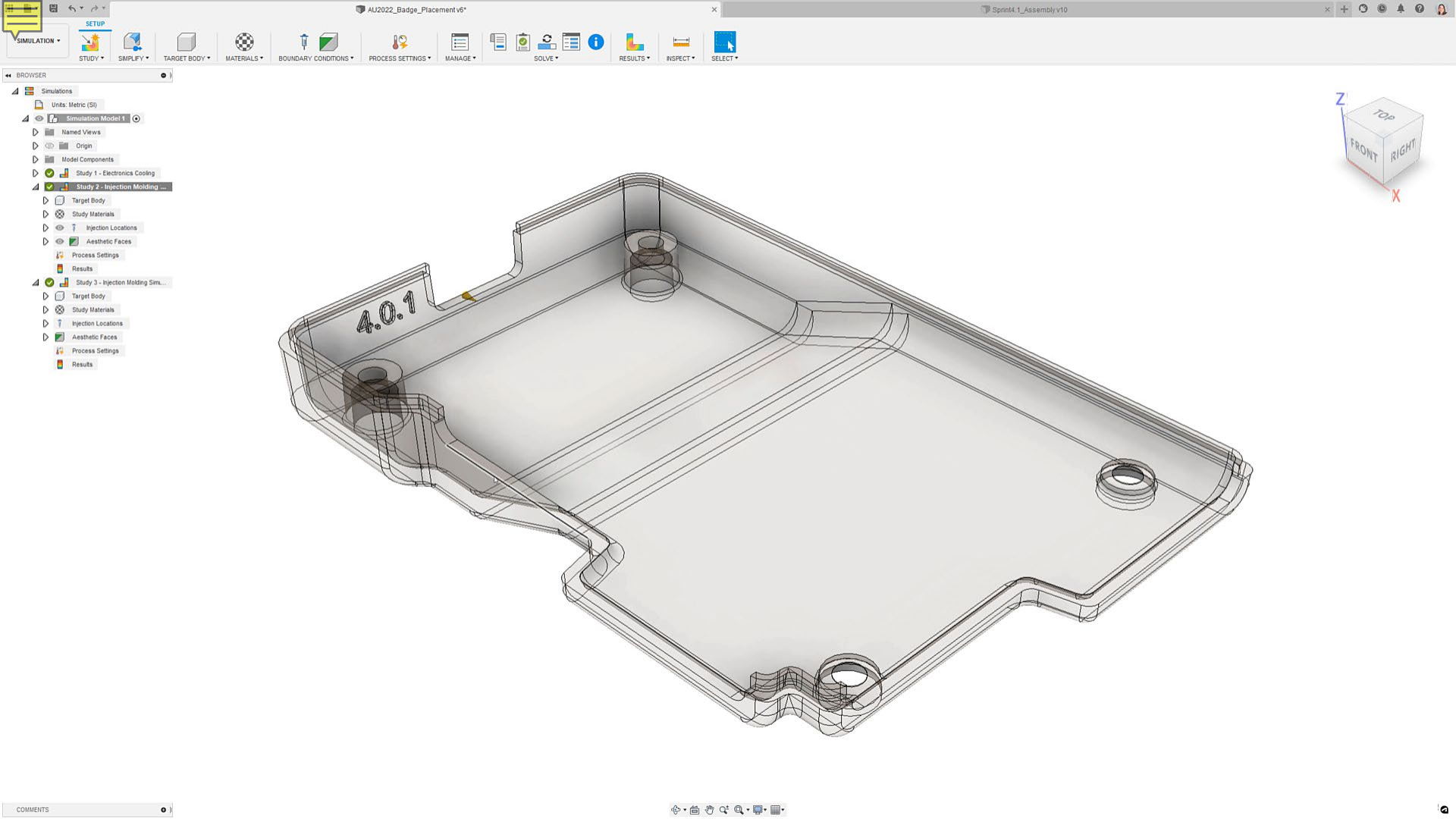


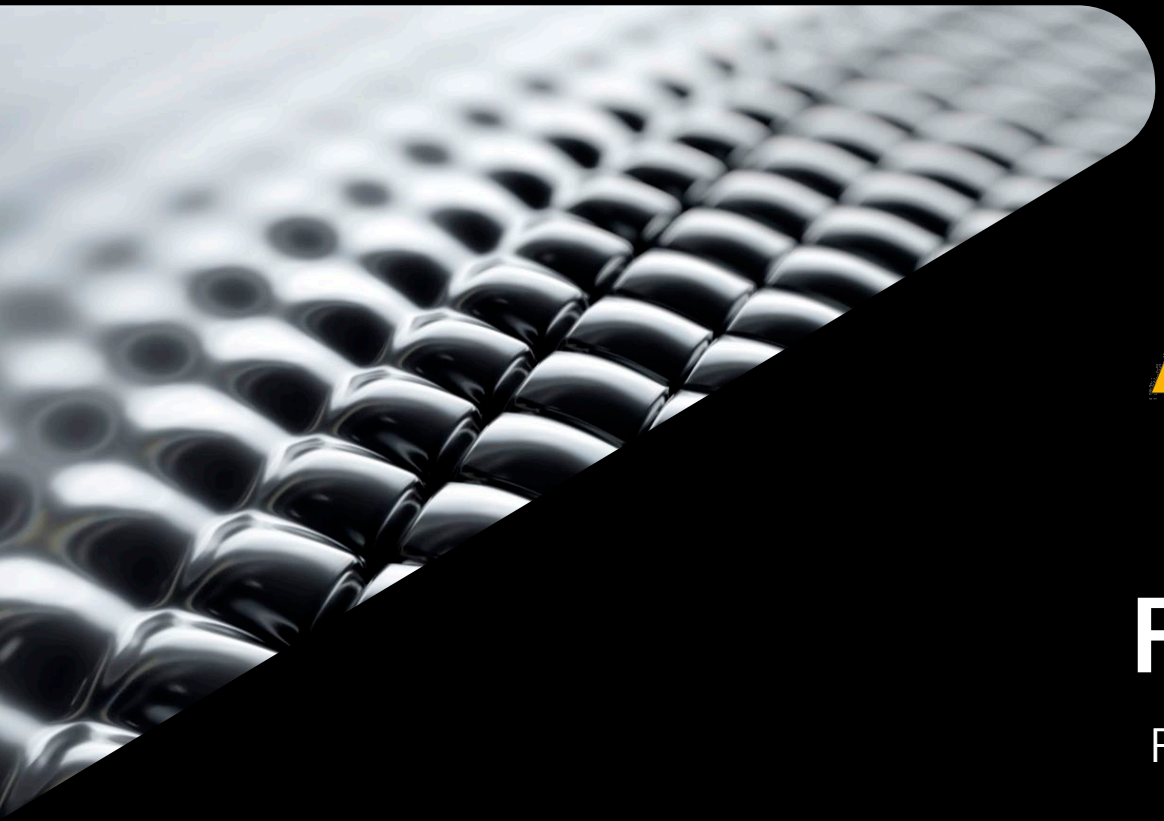
Left-click & drag to define group


Autodesk Fusion 360
Untitled
AU2022_Badge_ecooling v7*
AU2022_Badge v4*
AU2022_Badge v2
AU2022_Badge v0*
AU2022_Badge v5*
AU2022_Badge v5*
DESIGN
DOCUMENT
RULES DRC/ERC
MANUFACTURING
AUTOMATION
SIMULATION
LIBRARY
SWITCH
VIEW
MANUFACTURING
OUTPUTS
INS...
SELECTIO...
PLACE COMP...
DESIGN M...
Browser
Filter
Assembly Variant: Default Variant
View: Devices
Device Sets 3 of 3 shown (0 selected)
Search
Device Set
<Top Side Devices>
<Bottom Side Devices>
<All Devices>
Devices 0 of 0 shown (0 selected)
Name
Footprint
Items 0 of 0 shown (0 selected)
Search
Type
Name
Signal
1 Top
2.7 mil (-1237.1 2309.1)
Click or press Slash to activate command line mode
CAM Processor
template_2_layer.cam
Set As Active CAMJOB
Export as ZIP
Export to Project Directory
Units:
Metric
Output Files
ODB++
comp_+_top
solder_+_paste_+_top
silkscreen_+_top
solder_+_mask_+_top
top
core_+_top_+_bottom
bottom
solder_+_mask_+_bottom
silkscreen_+_bottom
solder_+_paste_+_bottom
comp_+_bot
through_+_hole
rout
Gerber
Top Copper
Bottom Copper
Profile
Soldermask Top
Soldermask Bottom
Solderpaste Top
Fusion 360 Electronics default 2 layer CAM job.
Edit Description...
ODB Layer
Name: bottom
Type Signal
Side: Bottom
Context: Board
Layers
Layer
16 Bottom
17 Pads
18 Vias
Output
Resolved layer path: tputs/ODBFiles/au2022_badge_v5/steps/pcb/layers/bottom/features
Cancel
Process Job
Team Hub Edwin Robledo
Project TechMarketing/Autodesk Univer...
Board Name AU2022_Badge v5


AU2022_Badge_Placement v3*
SOLID
SURFACE
MESH
SHEET METAL
PLASTIC
UTILITIES
MANAGE
DESIGN
CREATE
AUTOMATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
SELECT
BROWSER
AU2022_Badge_Placemer...
Document Settings
Named Views
Origin
Sprint4.0.1_interlockAccesso...
Sprint4.0.1_interlockDevice v:...
Sprint4.0.1_battHolder v1:1
Sprint4.0_Enclosure v2:1
Sprint4.0.1_ButtonL v1:1
Sprint4.0.1_ButtonR(m) v1:1
Sprint4.0.1_Bezel v1:1
AU2022_Badge_Placement v:...
AUTODESK Fusion 360
Top
FRONT
RIGHT
Z
X
COMMENTS


AU2022_Badge_Placement v4
Sprint4.1_Assembly v10
SIMULATION
SETUP
STUDY
SIMPLIFY
MATERIALS
GRAVITY
HEAT LOADS
CRITICAL TEMPERATURES
COOLING
ENVIRONMENTAL VARIABLES
MANAGE
SOLVE
RESULTS
INSPECT
SELECT
BROWSER
Simulations
Units: Metric (SI)
Simulation Model 1
Named Views
Origin
Model Components
Sprint4.0.1_interlockAcces...
Sprint4.0.1_interlockDevice...
Sprint4.0.1_batHolder v1:1
Sprint4.0_Enclosure v2:1
Sprint4.0.1_ButtonL v1:1
Sprint4.0.1_ButtonR(m) v1:1
Sprint4.0.1_Bezel v1:1
AU2022_Badge_Placement...
Study 1 - Electronics Cooling
Study Materials
Critical Temperatures
Load Case1
AUTODESK Fusion 360
TOP
FRONT
RIGHT
Z
X
COMMENTS


AU2022_Badge_Placement v6*
Sprint4.1_Assembly v10
SIMULATION
SETUP
STUDY
SIMPLIFY
TARGET BODY
MATERIALS
BOUNDARY CONDITIONS
PROCESS SETTINGS
MANAGE
SOLVE
RESULTS
INSPECT
SELECT
BROWSER
Simulations
Units: Metric (SI)
Simulation Model 1
Named Views
Origin
Model Components
Study 1 - Electronics Cooling
Study 2 - Injection Molding ...
Target Body
Study Materials
Injection Locations
Aesthetic Faces
Process Settings
Results
Study 3 - Injection Molding Simu...
Target Body
Study Materials
Injection Locations
Aesthetic Faces
Process Settings
Results
4.0.1
Z
TOP
FRONT
RIGHT
X
COMMENTS



Ansys & Fusion 360

Functionality Preview

Autodesk Fusion 360

Untitled | AU2022_Badge_ecooling v7* | AU2022_Badge v4* | AU2022_Badge v2 | AU2022_Badge v0* | AU2022_Badge v5* | AU2022_Badge v5*

DESIGN | DOCUMENT | RULES DRC/ERC | MANUFACTURING | AUTOMATION | SIMULATION | LIBRARY

SWITCH | VIEW | ANSYS | ANALYZE SIGNAL | ELECT

INS... | SELECTIO... | PLACE COMP... | DESIGN M...

Browser | Filter

Assembly Variant: Default Variant

View: Devices

Device Sets 3 of 3 shown (0 selected)

Search

Device Set

<Top Side Devices>
<Bottom Side Devices>
<All Devices>

Devices 0 of 0 shown (0 selected)

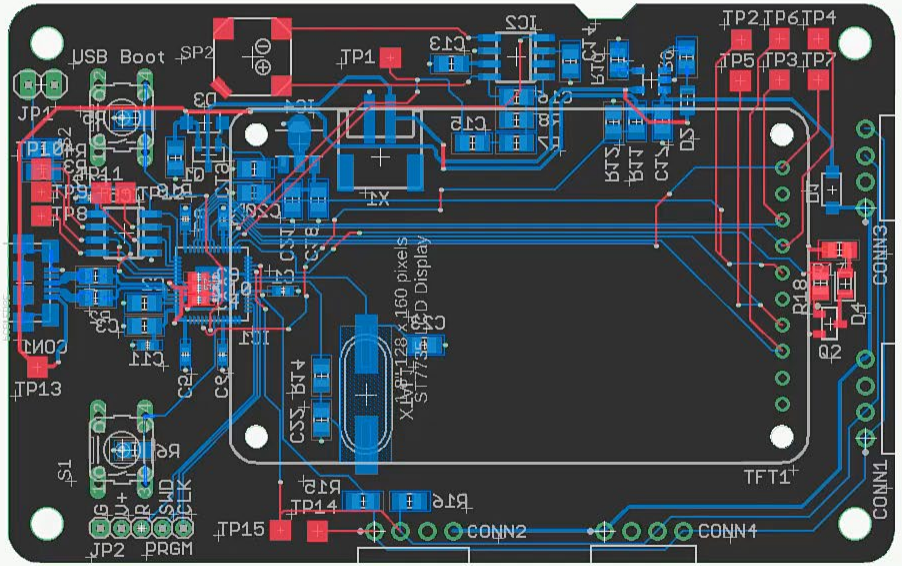
Name | Footprint

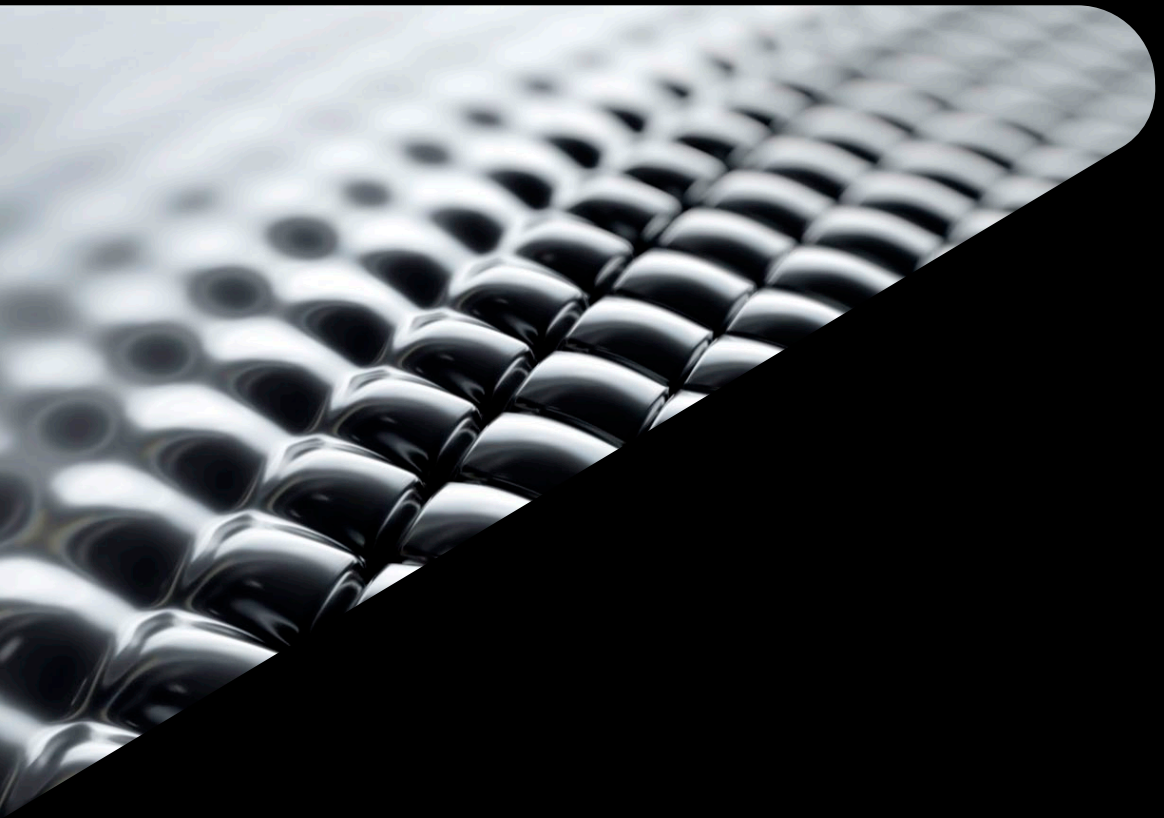
Items 0 of 0 shown (0 selected)

Search

Type | Name | Signal

1 Top | 2.7 mil (-634.5 488.7) | Click or press Slash to activate command line mode



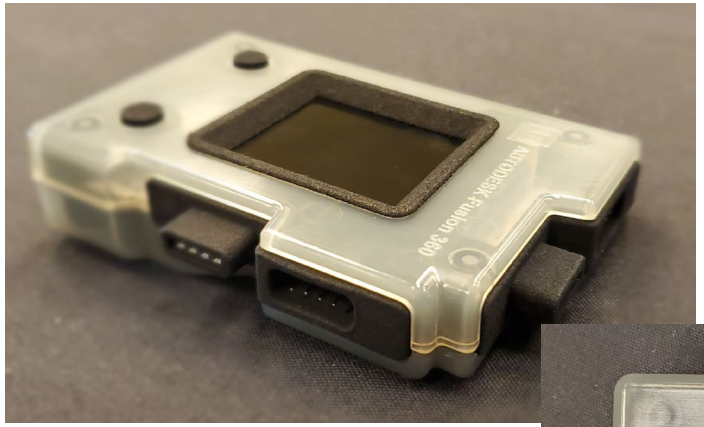


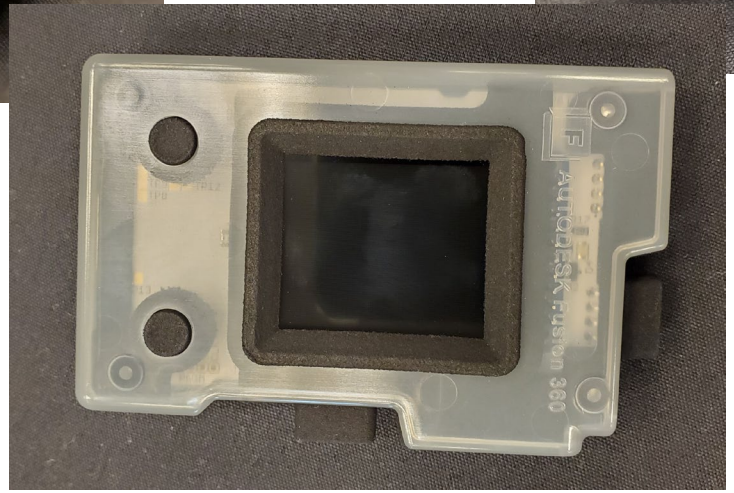
Wrap-Up

Key-Takeaways

Autodesk University Digital Badge

Final Product





Key Takeaways

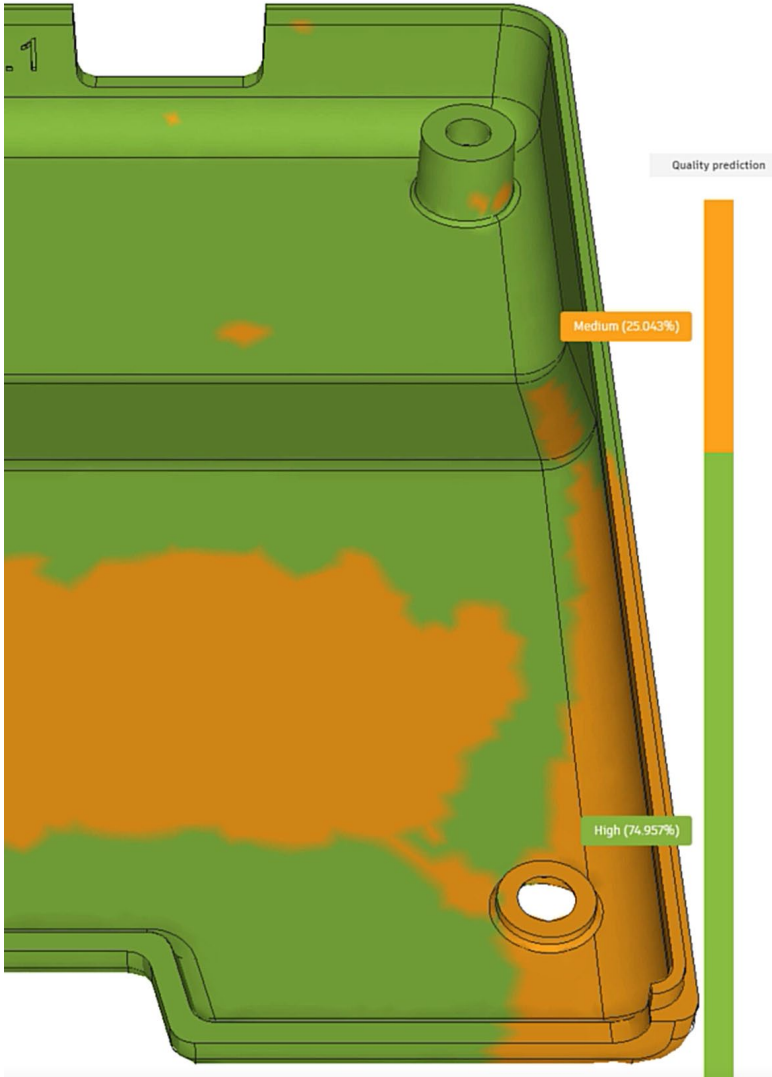
Electronic Design with Fusion 360

- Collaboration for easy passing of component files between mechanical/design engineer and electronic engineer
  - Design unification
  - No file conversions are necessary
- 3D PCB board creation tied to part geometry
- Expansive part library includes partner contributions
- Dynamic manufacturability error checking and automated path creation

Key Takeaways

Product Design with Fusion 360

- Quick to learn CAD tool
- Seamless integration and design updates with key stakeholders
- The simulate as-you-design advantage
  - Design Comparison
    - Iterate designs and compare simulation results side by side
  - Manufacturability
    - Injection molding simulation
  - Performance
    - Event simulation
    - Linear static (no cost)
    - Non-linear static




SCAN ME