OnShape 5-12

Hamilton School District

About Us

Megan Sykes - Silver Spring Intermediate School (5th and 6th grade)

Shannon Flaherty - Templeton Middle School (7th and 8th grade)

Joe Premo - Hamilton High School, Woodworking (9th thru 12th grade)

Chad McLaughlin - Hamilton High School, Welding (9th thru 12th grade)

AET APPLIED ENGINEERING & TECHNOLOGY
HAMILTON SCHOOL DISTRICT

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Silver Spring Intermediate

(5th & 6th grade)

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Why use OnShape?

1.) **ITS FREE! -** OnShape is a cloud-based CAD platform that students, educators and schools can access for free.
2.) **EASY TO LEARN!** - OnShape performs similar to other CAD platforms such as Fusion 360, SolidWorks and Inventor.
3.) **THE CLOUD!** - Cloud-based enables students to access their files ANYWHERE from a Chromebook, laptop, desktop, tablet and even their phone.
4.) **COLLABORATIVE!** - Collaboration is huge in streamlining the design process, files can be shared, modified and changed seamlessly while using the platform. Changes are tracked and revisions are real time on each device.

How on shape works here

Signing up Teacher Student

General overview

Exporting dxf, stl, etc.

Use it anywhere - examples of outside of school work.

Silver Spring Intermediate School

5th Grade

Quarter Class

Onshape Goal - I can follow my plan to create a 3D model.

6th Grade

Quarter Class

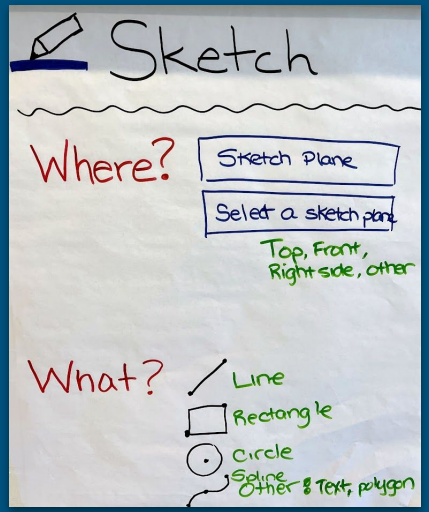
Onshape Goal - I can follow my plan to create a 3D model with specific size and location dimensions.

On Shape Examples

5th Grade

6th Grade

3D Modeling Resources



3D Modeling with Onshape Terms

Sketch

Create a new sketch *on the selected plane*

Sketching Tools

Line, rectangle, circle, arc, pentagon, spline, text, and *more*!

Plane

Top, Front, or right sides of an object

Dimension

Usually requires multiple "clicks"
Dimension from one line to another line.

Extrude

Defaults to 1" - must change

Thickness of the chromebook ID tag is **.1"**
Add or remove **.05"** at a time

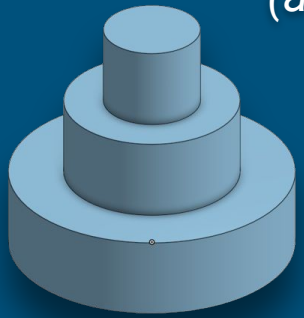
New

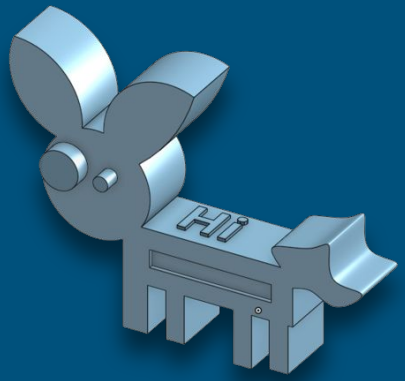
Add material

Remove Material

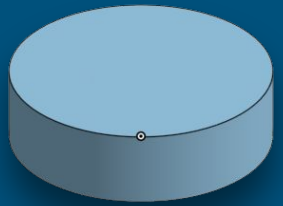
Onshape Introduction

Cake - Know where you are sketching, extrude *(add)*.





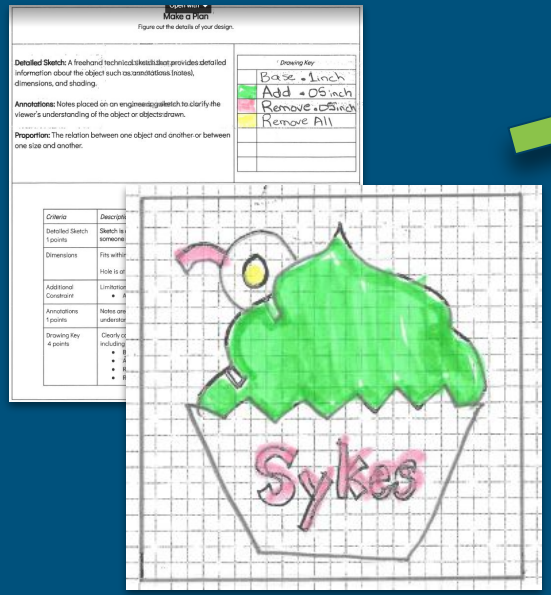
Hockey Puck - Sketch, plane, sketching tools, extrude (new).

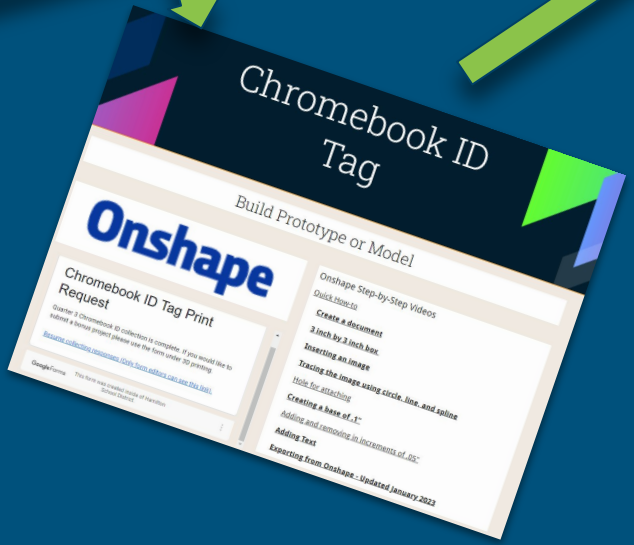


Animal - Extrude *(add & remove)*, text.

Chromebook ID Tag

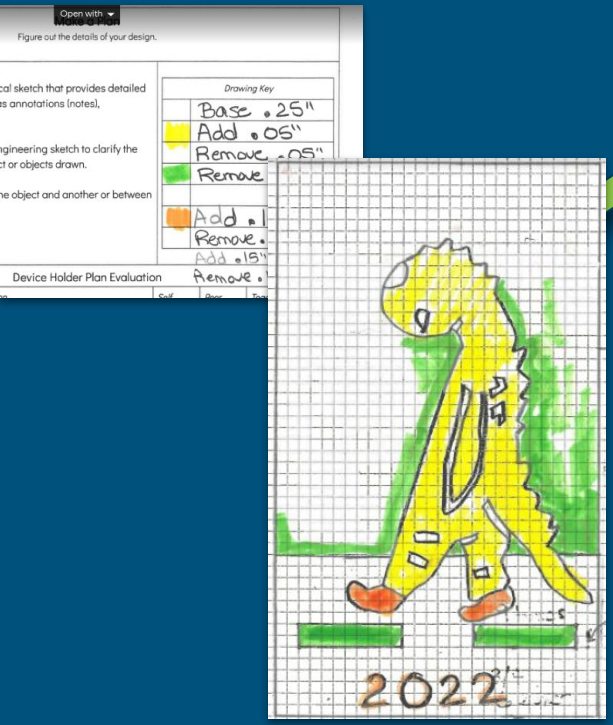
5th Grade

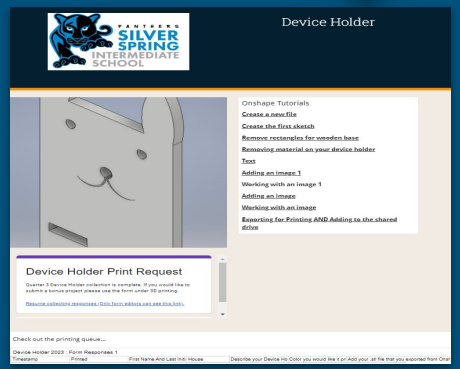


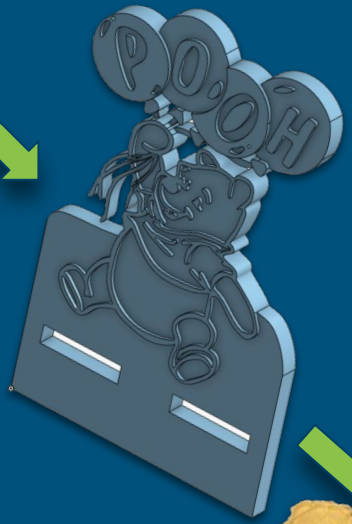


Device Holder

6th Grade



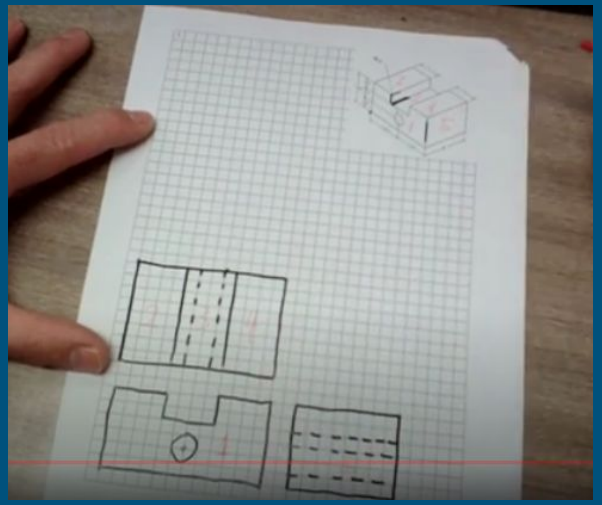


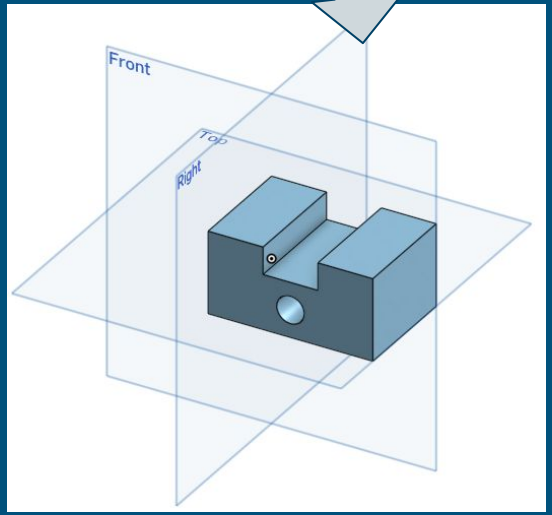


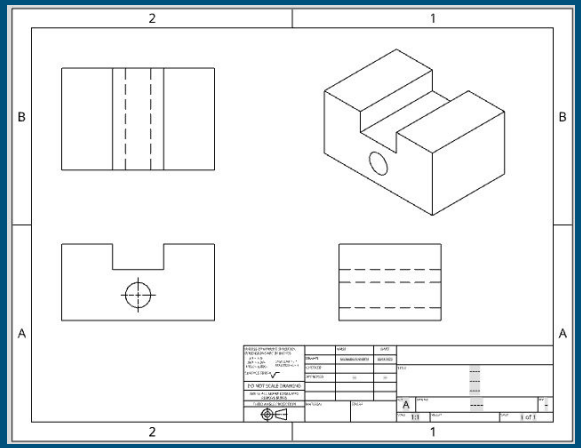
Templeton Middle School

- 7th Grade participates in a ¼ long course as part of the elective rotation
  - Onshape Goal: Develop Onshape proficiency enough to be able to draw plans specific for classroom use
- 8th Grade students can enroll in a year long elective. Approximately ⅓ of 8th grade students enroll in this class.
  - Onshape Goal: Develop Onshape proficiency to be an independent designer. Independent and unique design for 3D printing and manufacturing (woods and plastics) is expected.

7th Grade Onshape / Orthographic Drawing





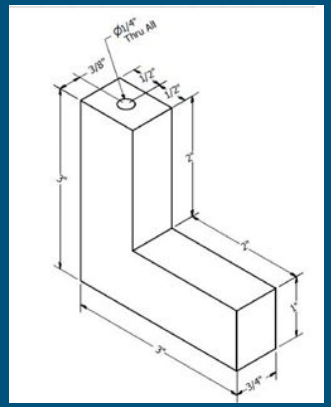


Orthographic Drawing

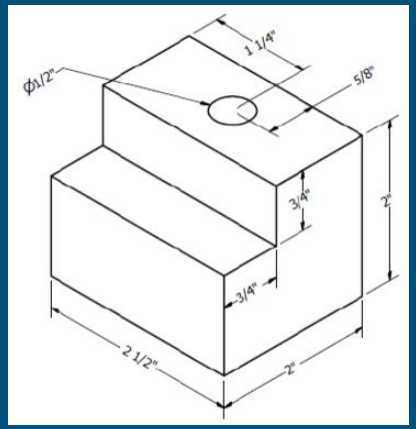
Drawing Sheet

Onshape Model

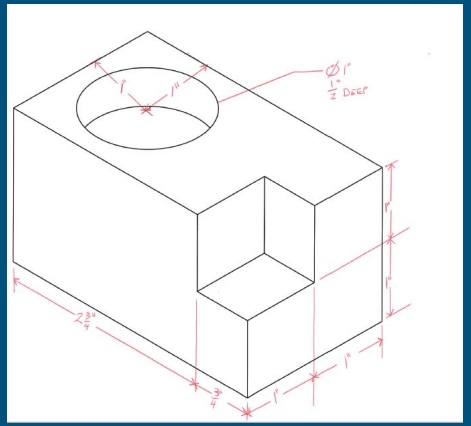
Continued 7th Grade Onshape Progression



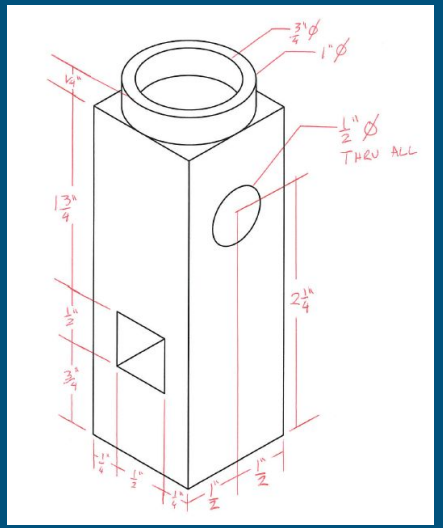
[Drawing Video]
[Drawing Sheet]
[Onshape Direction Sheet]



[Drawing Sheet]
[Onshape Direction Sheet]



[Onshape Direction Sheet]



[Onshape Direction Sheet]

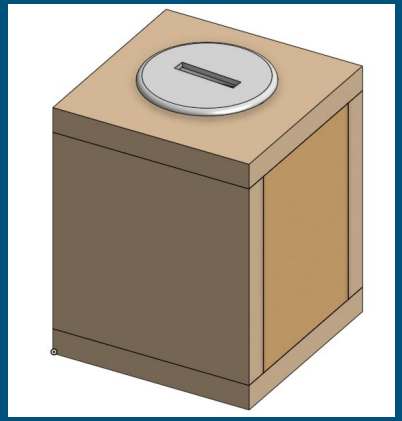
Onshape in 7th Grade 3D Printing and Woods Processes

Points of Emphasis

1. Reading a drawing
2. Accurate Modeling
3. Development of Plans
4. Dimensioning and Tolerance

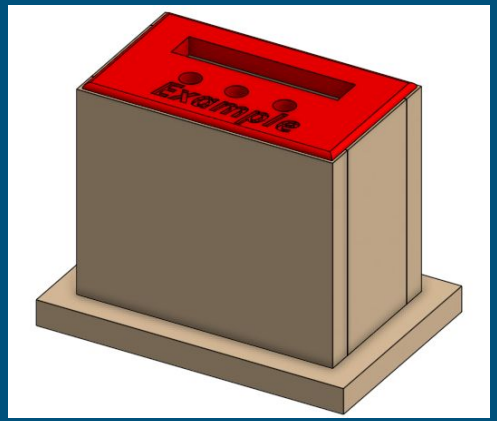
Woods Process Overview Video

Onshape Plans and Processes



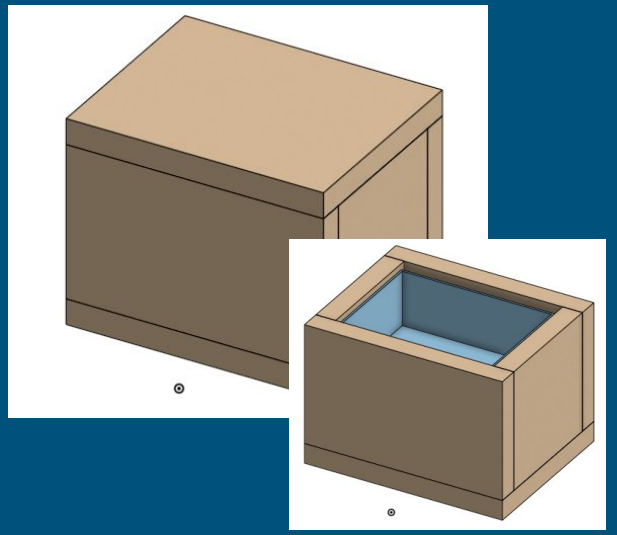
[Project Plans]

[Onshape Process]



[Project Plans]

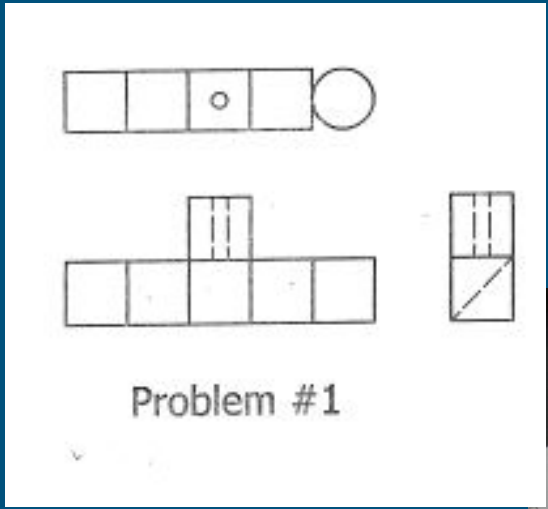
[Onshape Process]



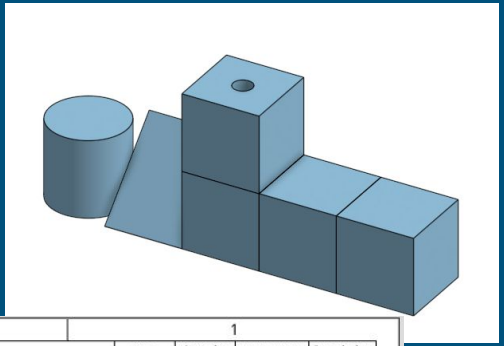
[Project Plans]

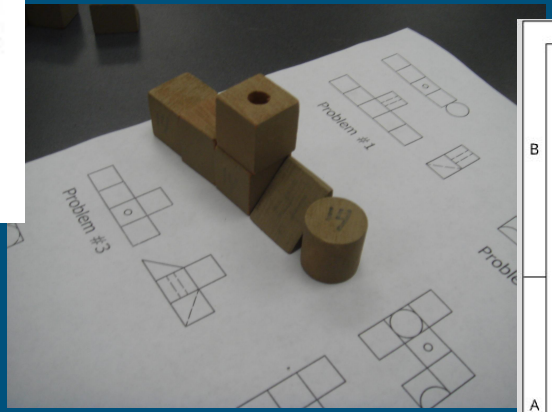
[Onshape Process]

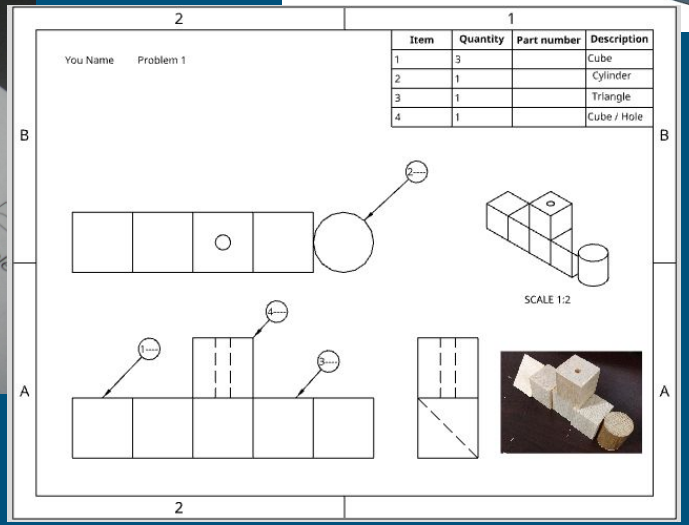
8th Grade Onshape Activities
Orthographic Block Assembly



[Assemble on Onshape]
[Print with Bill of Materials]
[Block Kit Contents]

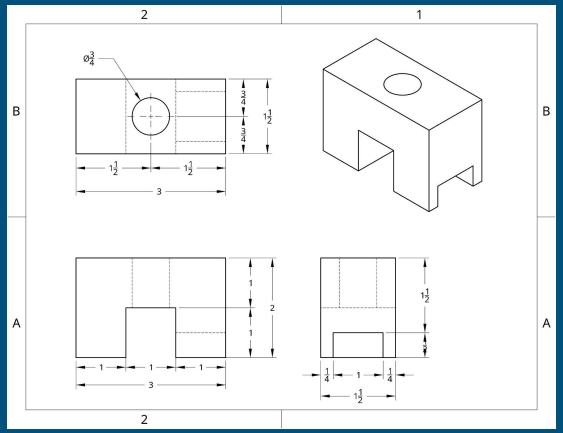




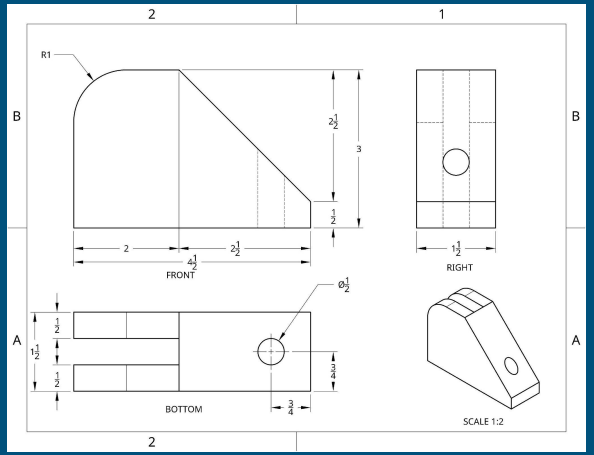


[Orthographic Block Orthographic Sheet PDF]

8th Grade Onshape Activities
Onshape Progression



[Direction Sheet]



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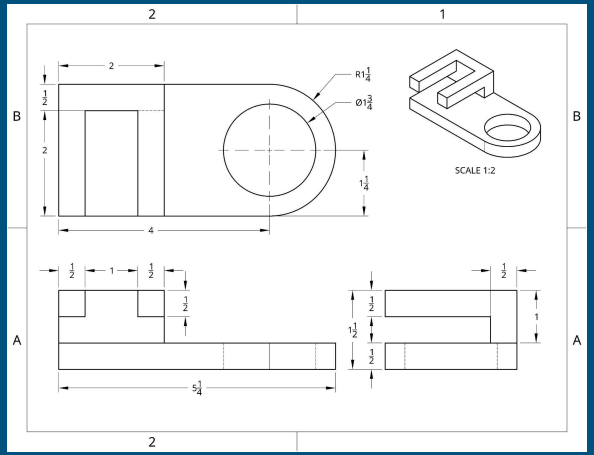


[Direction Sheet]

8th Grade Onshape Activities
Coarse Measurement

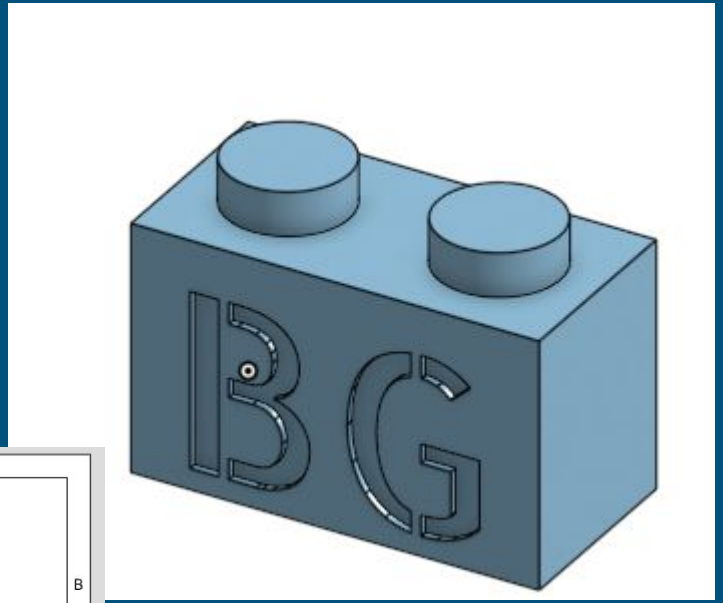
Link to Student Examples

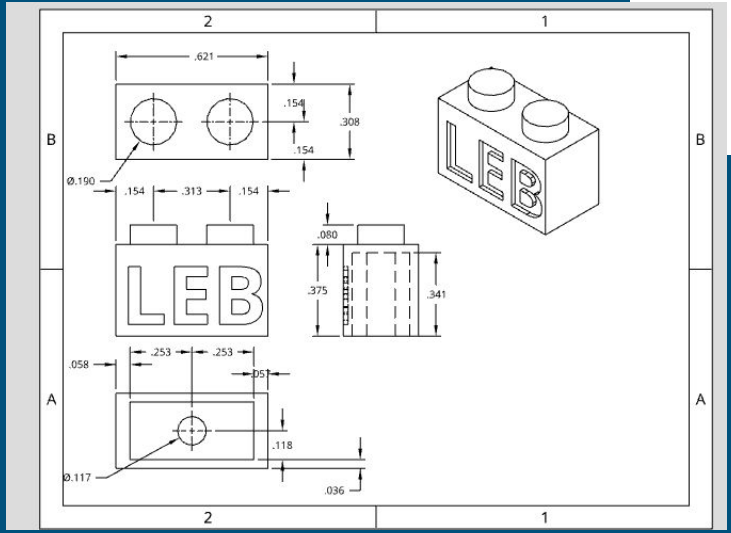
8th Grade Onshape Activities
Precision Measurement

Video 1: Draw the brick

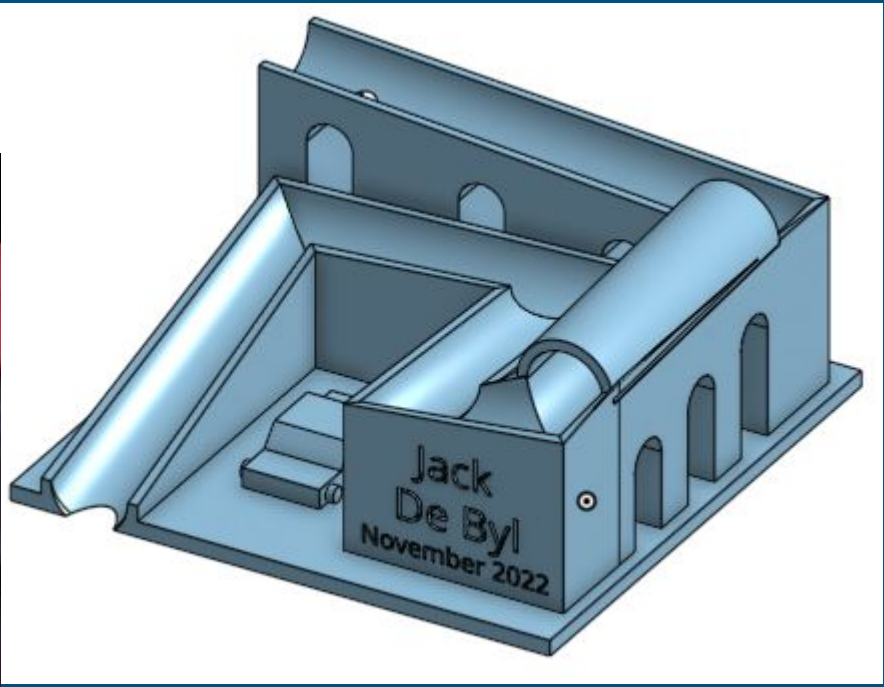
Video 2: Turn it in to 3D print

Video 3: Make an engineering drawing





8th Grade Onshape Activities
Marble Slide



Helpful Videos

Hamilton High School

Courses that use OnShape as primary computer aided drafting software:

- Woods Design and Manufacturing I
  - Wood Joints Project
  - Footstool Project
  - End Table Project
- Woods Design and Manufacturing II
  - Night Stand Cabinet
- Woods Design and Manufacturing III
  - Independent Project Designs
- Welding and Fabrication I
  - Grill Project
- Welding and Fabrication II
  - Independent Project Designs

Woods Design and Manufacturing I

- Entry level woodworking course
- Explore the process of creating wood products
- Exposed to the design, development and manufacturing processes
- Create a quality footstool and end table
- Use the CNC laser and small CNC router to create and personalize small wood products.

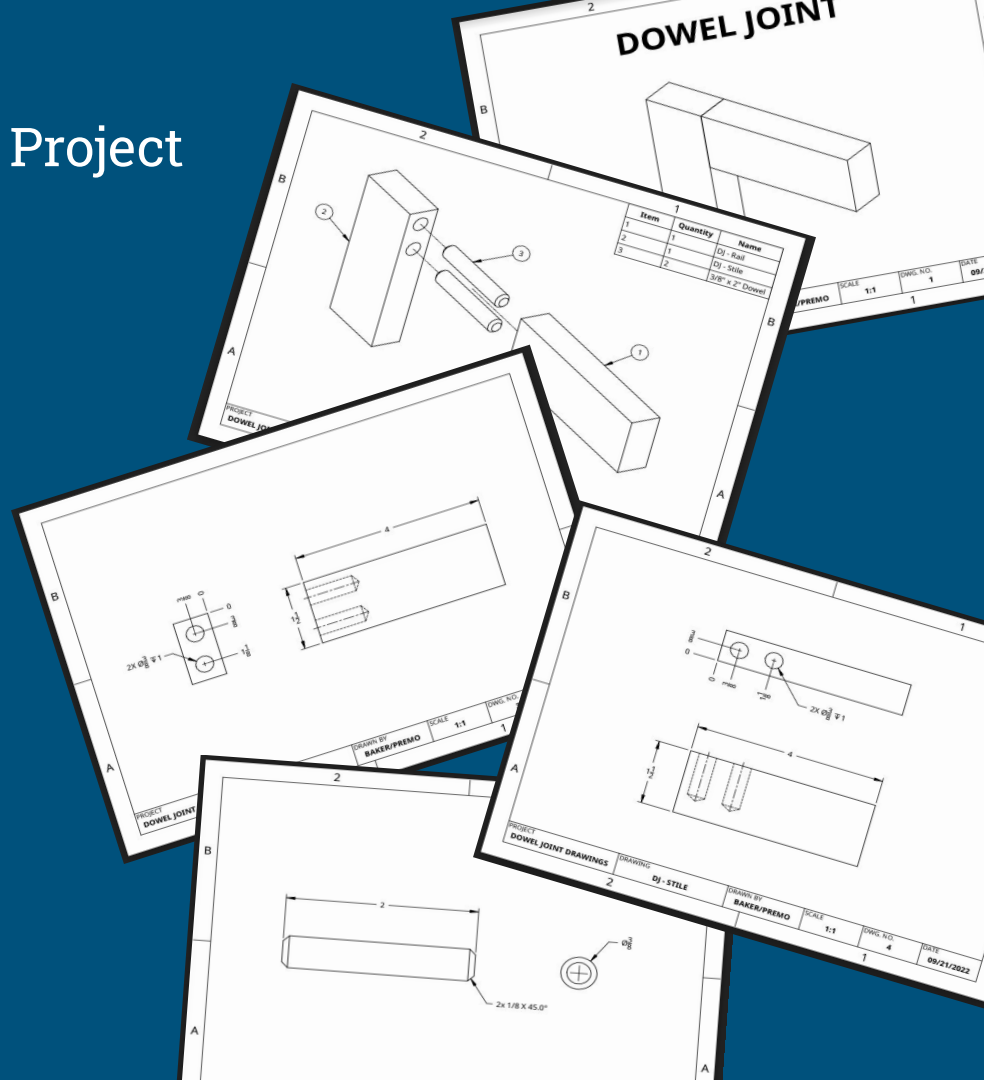
Semester Overview:

- Understanding Materials (Week 1)
- Measurement and Layout (Week 2)
- Machine Safety Block (Week 3 - 4)
- ***Onshape Footstool (Week 4 - 5)***
- Footstool Manufacturing (Week 6-10)
- ***OnShape End Table (Week 11)***
- End Table Manufacturing (Weeks 12-17)
- Lab Cleanup/Exam (Week 18)

Learning OnShape - Wood Joints Project

Woods Design and Manufacturing I

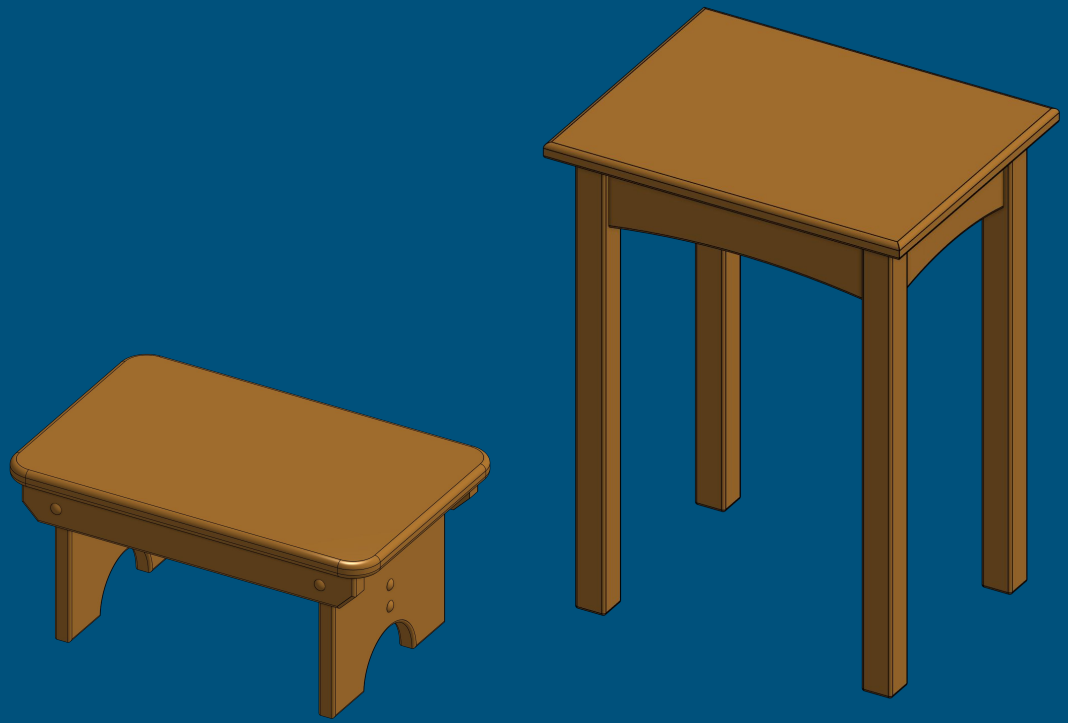
- Used to teach OnShape in a fun and useful way.
- Kids choose 3 of the following:
  - Miter Joint (Basic)
  - Lap Joint (Basic)
  - Rabbet Joint (Basic)
  - Dado Joint (Basic)
  - Dowel Joint (Intermediate)
  - Mortise and Tennon Joint (Intermediate)
  - Biscuit Joint (Advanced)
  - Domino Joint (Advanced)
- Create Model, Assembly and Drawing



Footstool and End Table Project

Woods Design and Manufacturing I

- Bottom-up Design (Part by Part)
- Students do the following:
  - Create each part
  - Create the assembly
  - Create an exploded view
  - Create and edit bill of materials
  - Create a drawing packet



Woods Design and Manufacturing II

- Intermediate level woodworking course
- In-depth experience in cabinetmaking
- Exposed to the design, development and manufacturing processes
- Construct a quality night stand cabinet
- Students independently program and operate the large industrial CNC router to build a cabinet

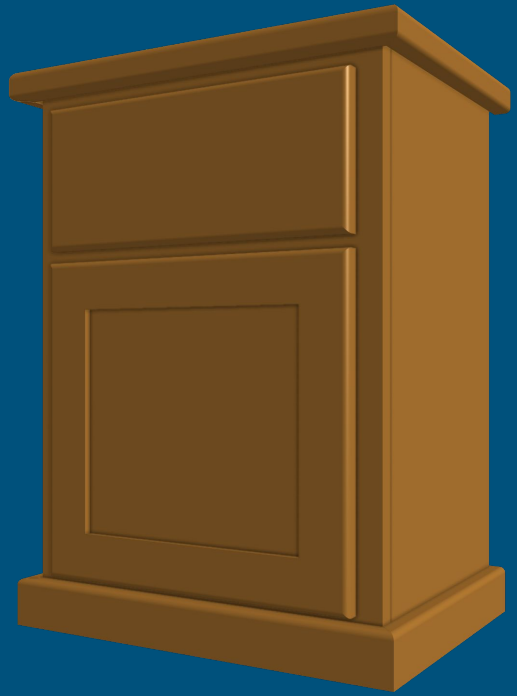
Semester Overview:

- Machine Safety (Week 1)
- ***OnShape - Cabinet (Week 2-3)***
- Cabinet Face Frame (Week 4)
- Cabinet Case (Week 5-6)
- Laminate Top Assembly (Week 7)
- Drawer Box (Week 8)
- Door and Drawer Face (Week 9-10)
- Hinges and Drawer Slides (Week 11)
- Full Assembly (Week 12)
- Finishing Processes (Week 13-14)
- CNC Router Projects (Week 15-18)

Night Stand Cabinet Project

Woods Design and Manufacturing II

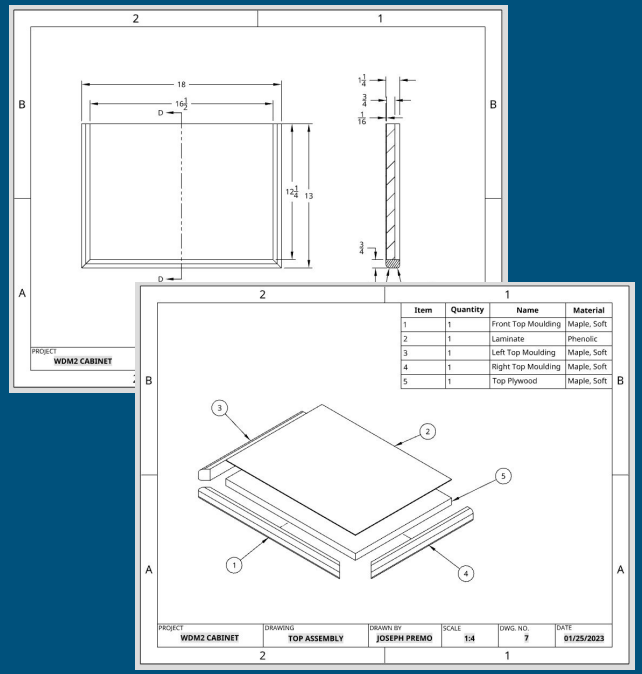
- Top-down Design (All Parts Drawn in an Assembly)
- Students do the following:
  - Create the assemblies
  - Create an exploded views
  - Create and edit bill of materials
  - Create a drawing packet
- “Smart Parts” - Parametric Modeling
  - 5-Piece Doors
  - 5-Piece Drawer Faces
  - Rabbeted Drawer Box
  - Dovetail Drawer Box

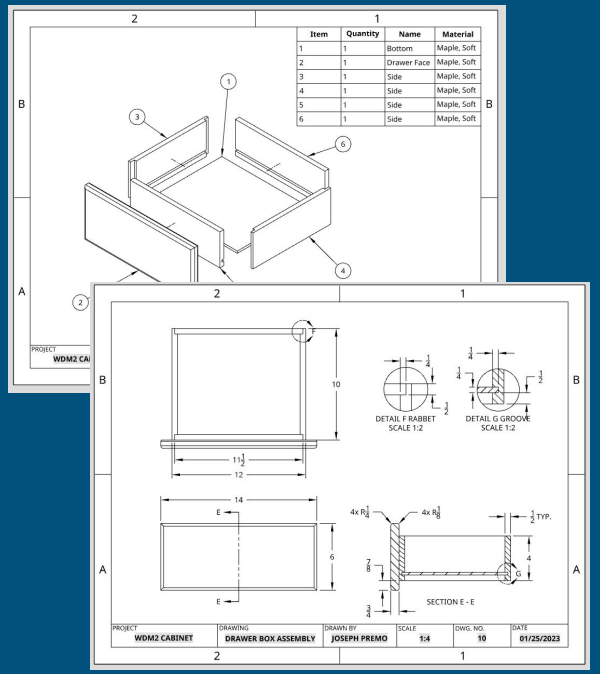


Woods Design and Manufacturing II

Technical Drawings-

- Standard Dimensions
- Ordinate Dimensions
- Section Views
- Detail Views
- Exploded Views
- Bill of Materials
- Callouts
- Dimensioning Assemblies vs Each Part





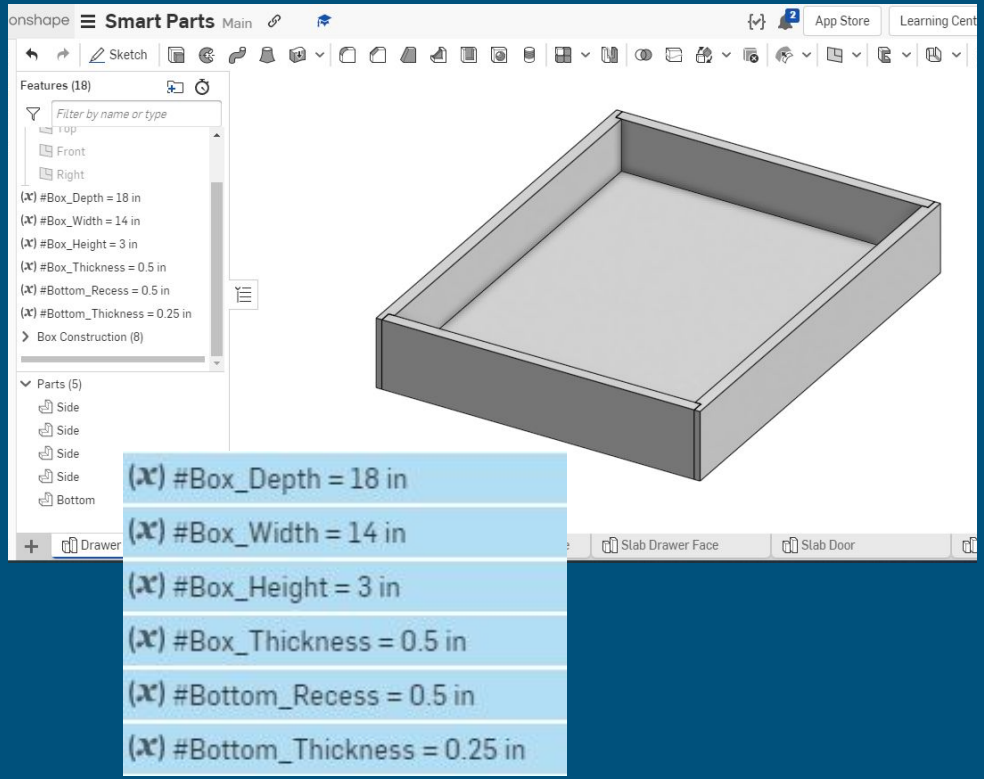
“Smart Parts” - Parametric Modeling

Woods Design and Manufacturing II & III

“Smart Parts” - Parametric Models

- Saves time, streamlines design process
- Change parameters based on needs
- Side mount slides vs undermounts
- Inset vs overlay
- Complexity, shop time, less mistakes

[CLICK HERE FOR MORE INFO]



Woods Design and Manufacturing III

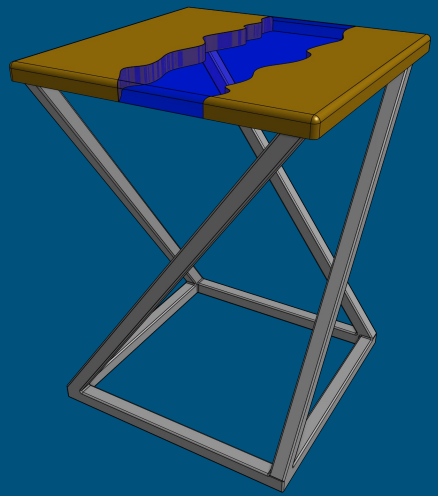
- Advanced level woodworking course
- Apply the engineering design process
- Manufacture wood products using traditional and CNC equipment
- Product of high quality and thoughtful planning is the goal of this course
- Students create a portfolio which will include the project bill of materials, sample plan of procedure, part drawings, assembly drawings, three term reflection papers and detailed pictures of the final products.

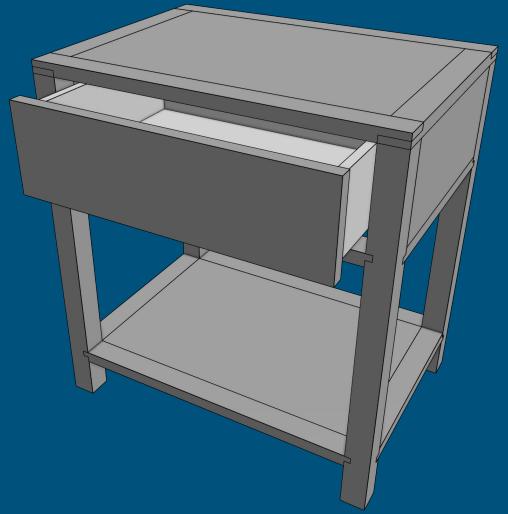
Semester Overview -

- Formulating Ideas (Week 1)
- ***OnShape (Weeks 2-4)***
- Machine Safety (Weeks 2-4)
- Production Process Documents (Week 5)
- Product Manufacturing (Weeks 6-14)
- Finishing Processes (Weeks 14-16)
- ***Final OnShape Documentation (Week 17)***
- Project Portfolio (Week 18)
- WCA Certification (Ongoing)

End Tables - Student Examples

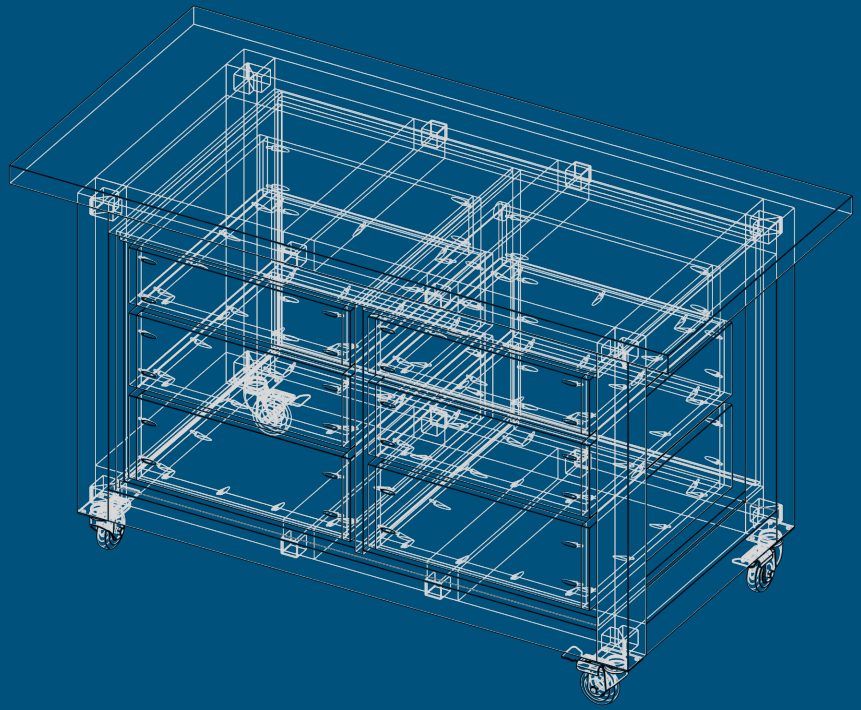
Woods Design and Manufacturing III

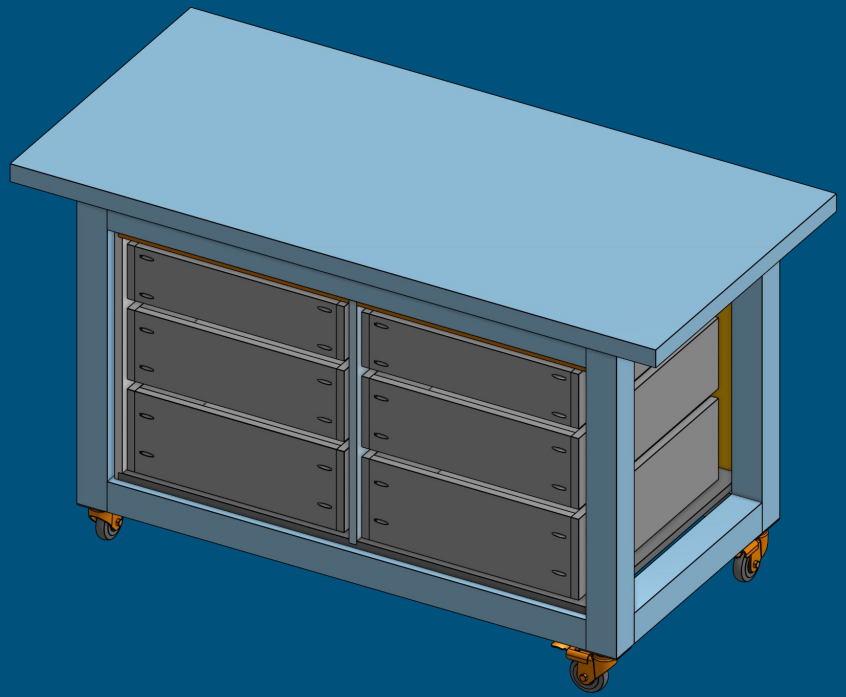




Workbench w/ Storage - Student Example

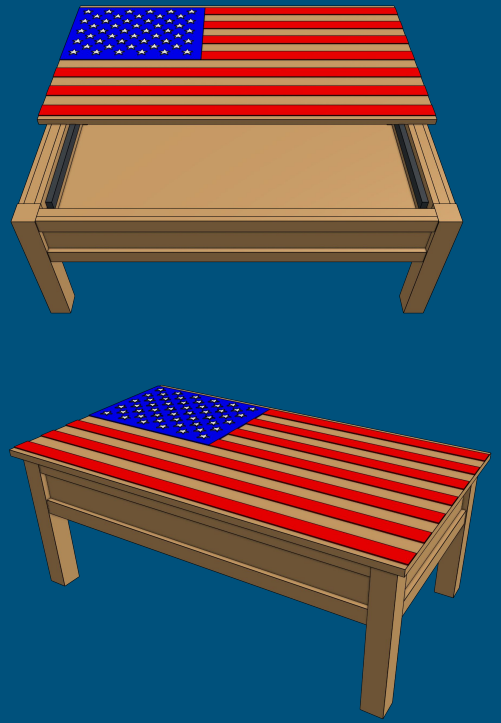
Woods Design and Manufacturing III





Coffee Table w/ Storage - Student Example

Woods Design and Manufacturing III

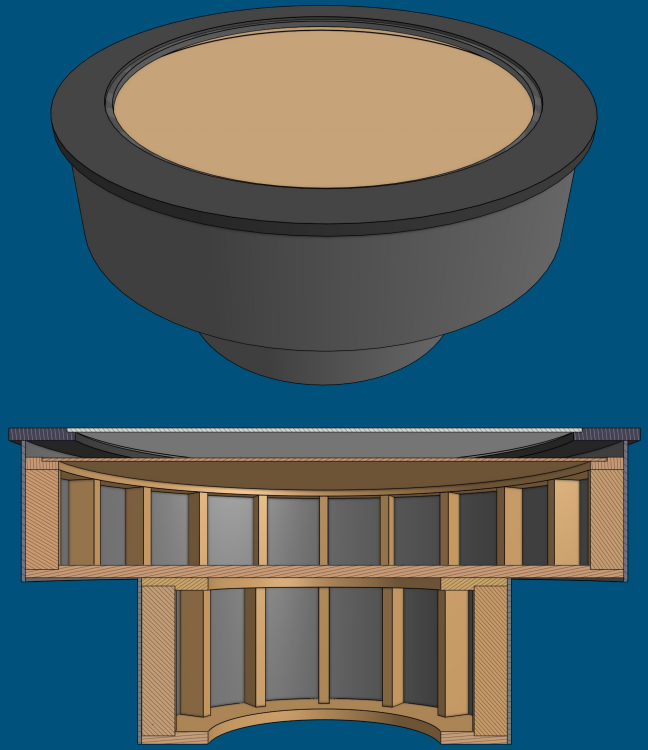


Console Table - Student Example

Woods Design and Manufacturing III

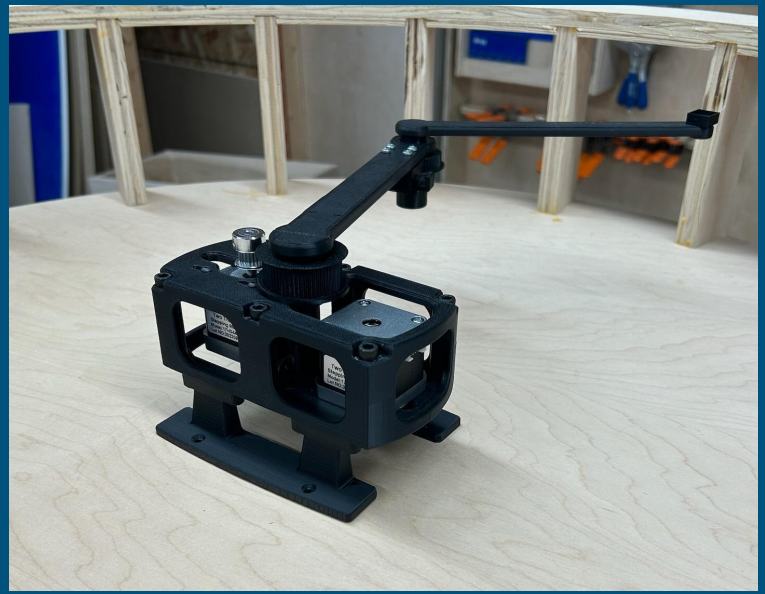
Kinetic Art Coffee Table - Student Example

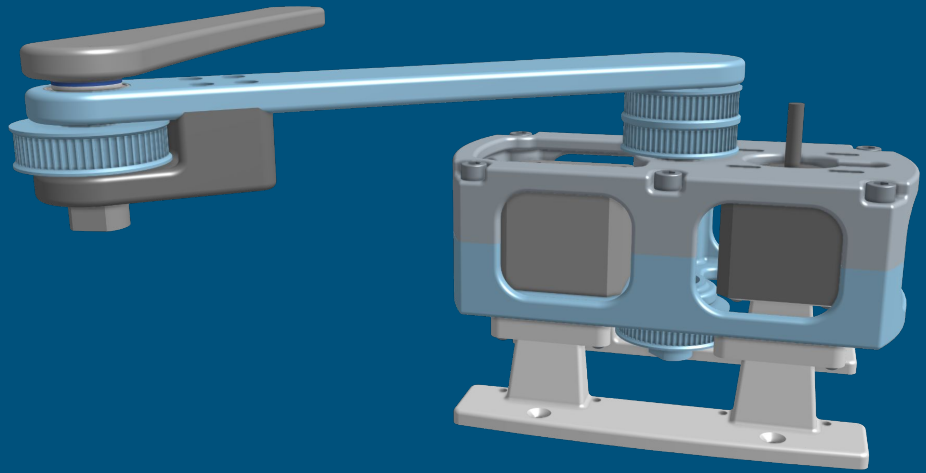
Woods Design and Manufacturing III



Kinetic Art Coffee Table - Student Example

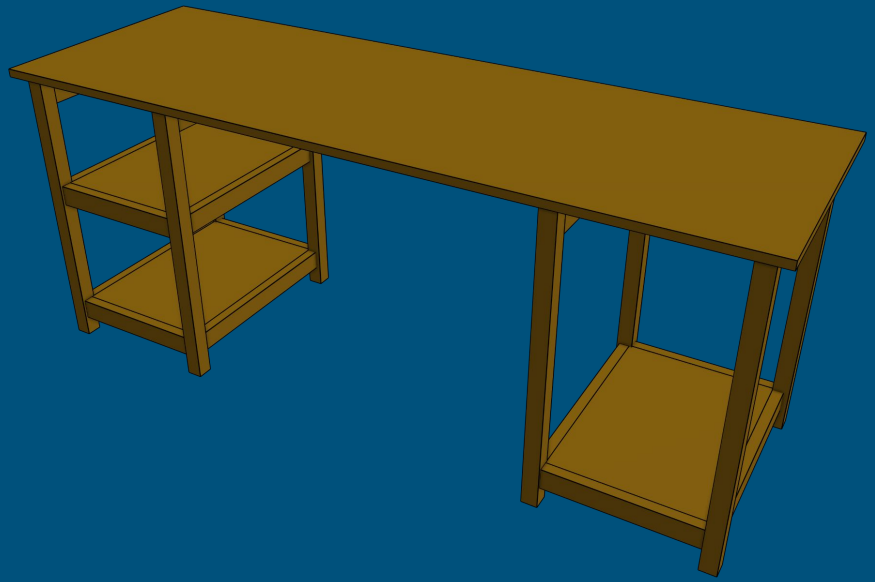
Woods Design and Manufacturing III





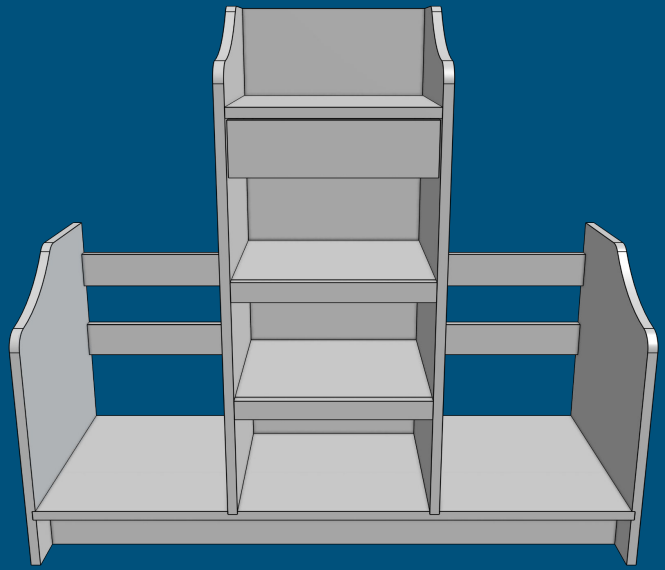
Computer Desk - Student Example

Woods Design and Manufacturing III



Other Projects - Student Examples

Woods Design and Manufacturing III



Welding and Fabrication I

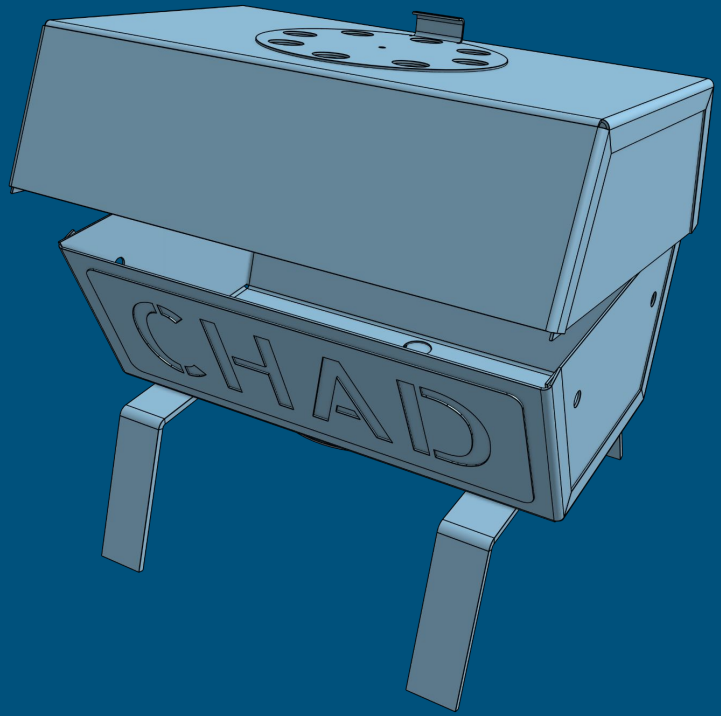
- Introduction to Metals and Fabrication
- Measurement
  - Fraction
  - Decimal
- Weld Procedure Specifications
  - Weld Terminology
  - Welding Electricity
  - Joints and Positions
- Processes
  - SMAW
  - GMAW
- Engineering Design Process
  - Introductory level

Semester Overview -

- Safety in Metals
- Fabrication Measurement
- Blueprint Reading/Technical Drawings
- Cutting
- Joining

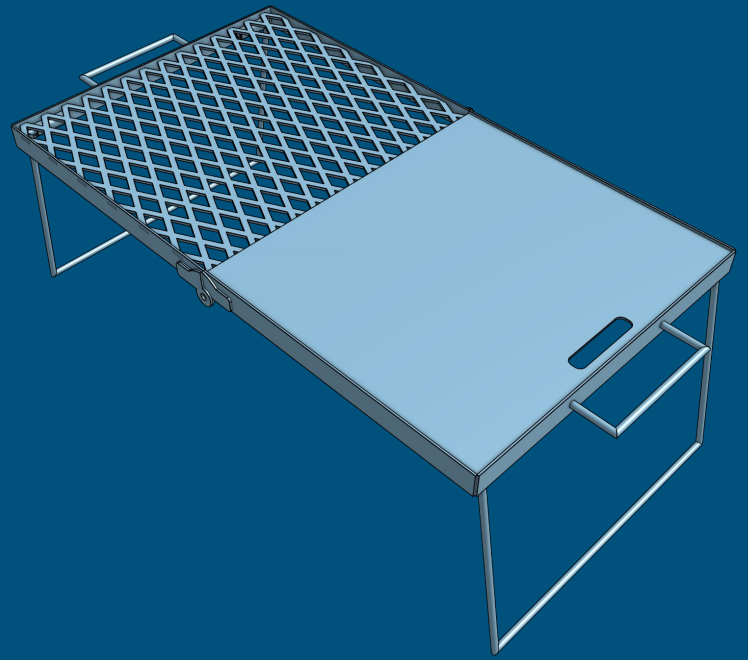
Grill Project

Welding and Fabrication I



Fire Pit Griddle / Grill Project

Welding and Fabrication I



Welding and Fabrication II

- Student Directed Design Process
- Advanced Blueprinting Reading
- D1.1 Mock Certification
- Weld Procedure Specifications
- Processes
  - GMAW
  - GTAW
- Engineering Design Process
  - Student Directed
  - Procedure
  - Technical Drawings
  - Tutorials

Semester Overview -

- Welding and Fabrication Safety
- Engineering Design Process
- Blueprint Reading/WPS
- Independent Design
- GTAW
  - Carbon Steel
  - Stainless Steel
  - Aluminum

Advanced Project Examples

Welding and Fabrication II