MODELLING & MATERIALS PROJECT 1 - STUFF: OBJECTS AS DATA

Exploring 3D Modelling, Materials & Printing to Represent Household Objects -
Process Documentation & Development

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DESIGN STATEMENT

Through exploring 3D modelling, 3D printing, and a variety of different materials, this project aims to examine the significance of different materials on individuals' perception of an object. Along with how form, scale and texture can be interacted with and implemented to represent everyday objects in alternative digital and physical applications.

By referencing a collection of five household objects, each item is investigated and represented with a digitally published 3D modelled version, followed by one physical 3D printed version for the object best suited for physical printing.

RESEARCH - WEEK 2



ELEMENTS OF 3D DESIGN:

- Line
- Colour
- Light
- Shapes/Planes
- Texture
- Volume/Mass

PRINCIPLES OF DESIGN:

- Repetition
- Scale
- Balance
- Proportion
- Contrast

APPLYING ELEMENTS OF DESIGN:

- Elements of 3D Design = building blocks of how we understand, describe & develop 3D concepts & ideas
- 3D Design exists as both physical objects & digital depictions

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RESEARCH - WEEK 3



3D DESIGN - MATERIAL WORKSHOP 1:

- **3D Design:** Creative responses to physical objects or environments
  - Includes design & development of physical & digital artifacts
  - Makes use of arrangement, composition, intent & cohesion so that it can move seamlessly between physical & digital spaces

MATERIALS & THEIR VALUES- MATERIAL WORKSHOP 1:

Materials:

- Raw & Refined Materials
- Physical & Digital Objects (ex. Sculpting, 3D Modelling, etc.)

Material Values:

- Cultural
- Economical
- Social

MATERIAL SIGNIFICANCE - MATERIAL WORKSHOP 1:

- Different factors (including materials' usual purpose & applications, understood value) influence the language of materials
  - i.e. the cultural ideas associated with a certain material

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RESEARCH - WEEK 3



MATERIAL CLASSIFICATIONS - MATERIAL WORKSHOP 1:

- WOOD
  - Material Associations/Perceptions:
    - Organic
    - Warm/Cozy
    - Strong
    - Comforting
    - Durable

- METAL
  - Material Associations/Perceptions:
    - Inorganic
    - Conductive
    - Strong
    - Shiny
    - Cold/Sterile

- PLASTIC
  - Material Associations/Perceptions:
    - Synthetic/Semi-Synthetic
    - Pliable
    - Lightweight
    - More Inexpensive Look/Feel

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RESEARCH - WEEK 3



MATERIAL CLASSIFICATIONS - MATERIAL WORKSHOP 1:

- TEXTILE
  - Material Associations/Perceptions:
    - Natural/Synthetic
    - Comfortable
    - Soft
    - Warm

- GLASS
  - Material Associations/Perceptions:
    - Inorganic
    - Solid
    - Transparent/Translucent
    - Brittle/Delicate

- CERAMIC
  - Material Associations/Perceptions:
    - Expensive
    - Durable
    - Crystalline, Glassy or Crystalline & Glassy
    - Hard

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RESEARCH - WEEK 3

3D DESIGN TAKEAWAYS - MATERIAL WORKSHOP 1:

- 3D Design, Material Language & Developing Spatial Awareness is integral to Interaction Design

- 3D Design includes how digital design is used in real-world material studies & physical applications

- Material design is crucial in design toolkit
  - WHY?
    - Materials convey meaning & perceived value of an object

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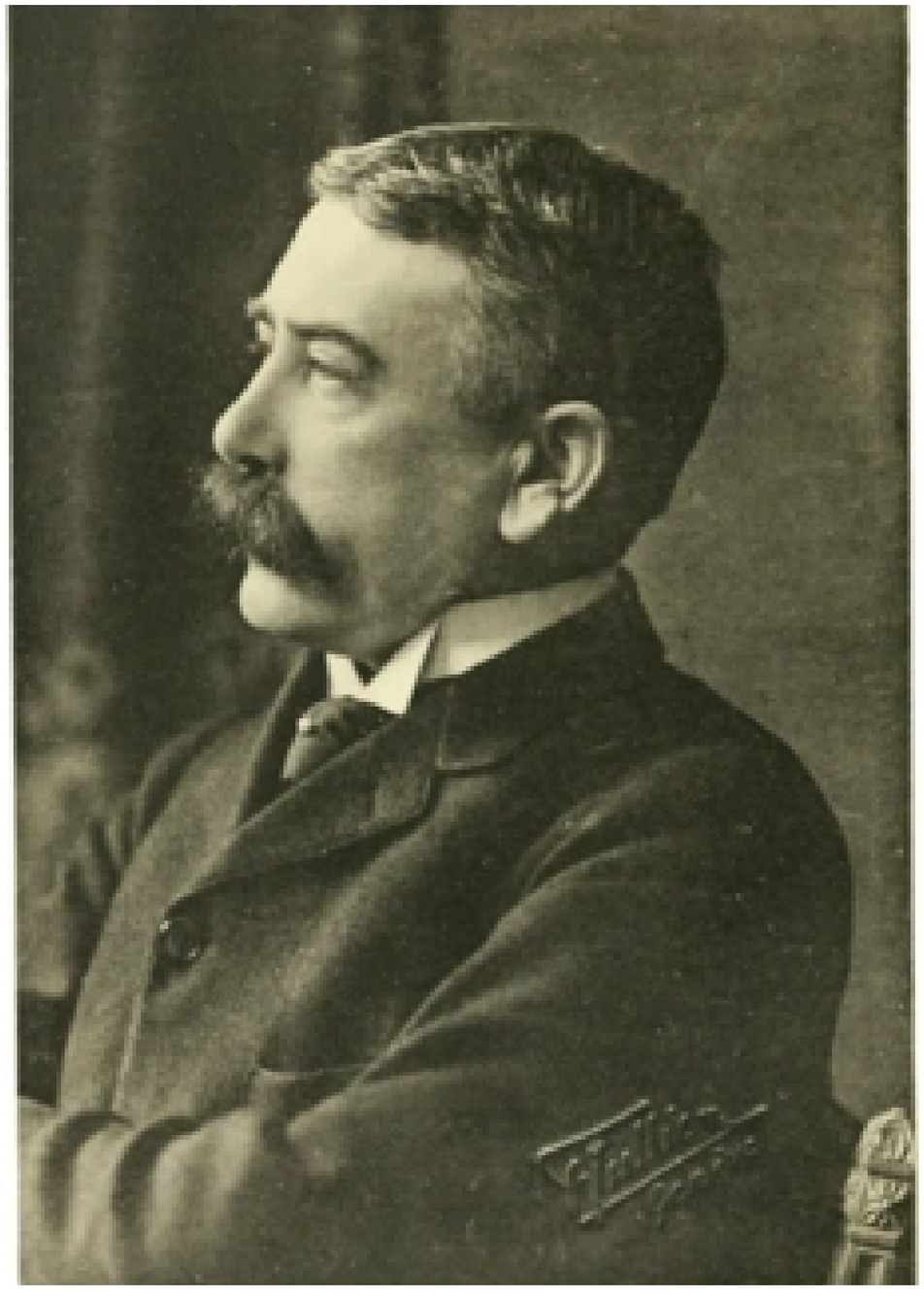
RESEARCH - WEEK 4



SEMIOTICS:

- **Semiotics:** The study of signs & symbols
  - Semiotics can be used to explain how symbolism can connect ideas of things to things themselves
    - Semiotics is a language of codes & cultural effect of codes
    - They are a method of understanding how human cultures replace visual things/ideas with representations to communicate more efficiently

  - Implementing semiotics into design = recognizing, analyzing & implementing associations

- **THE FATHERS OF SEMIOTICS:**
  - Ferdinand de Saussure (Swiss Linguist, Semiotician):
    - Signs:
      - Signifiers: the form the sign takes
      - Signified: the concept it shows

    - Syntagms & Paradigms:
      - Syntagms: single element that when altered can change overall meaning
      - Paradigms: elements that can be altered & still keep the same meaning

    - **Saussure's Proposal:** A sign is constructed of 2 parts - the signifier & the signified.

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RESEARCH - WEEK 4

SEMIOTICS - De Saussure's Semiotic Classification :

Communication Device:

- Words
- Language
- Sentences
- Gestures
- Symbols
- Images
- Maps
- Diagrams
- Math
- Statistics

Correspondence:

- Exemplify
- Pictures
- Match
- Echo
- Embody
- Represent
- Describe
- Chart
- Model
- Measure

The World:

- Facts/Values
- Reality
- Thoughts
- Beliefs/Emotions
- Meanings
- Things
- Places
- Viewpoint
- Relationships
- Quanitities

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RESEARCH - WEEK 4



SEMIOTICS:

- **SIGNS & IMPLIED MEANINGS:**
  - Charles Sanders Pierce (Philosopher):
    - Denotation & Connotation:
      - Denotation: specific/direct meaning
        - Ex. Heart
      - Connotation: an associated idea/feeling
        - Ex. Love

    - Sign Classifications:
      - **Symbolic:** conventional sign, culturally specific between signifier & signified
        - Ex. Public bathroom sex symbols
      - **Iconic:** signs where signifier resembles the signified
        - Ex. High-heeled shoe to represent a woman
      - **Indexical:** signs where the signifier is caused by the signified
        - Ex. Smoke signals fire

    - **Sanders Pierce's Proposal:** Signs could be classified into symbolic, iconic & indexical based on their associations.

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RESEARCH - WEEK 4

COMMUNICATION THEORY:

- Codes:
  - Micro-expressions
  - Body language
  - Hand gestures

- Methods of Communication Theory:
  - Linear
  - Interactional
  - Transactional

DISCOURSE ANALYSIS- Examining, Deconstructing & Describing Meaning in Images:

- Denotative:
  - Literal
  - Objective
  - Deductive
  - Explicit

- Connotative:
  - Figurative
  - Subjective
  - Inductive
  - Implicit

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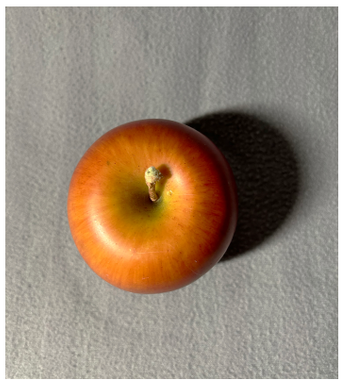
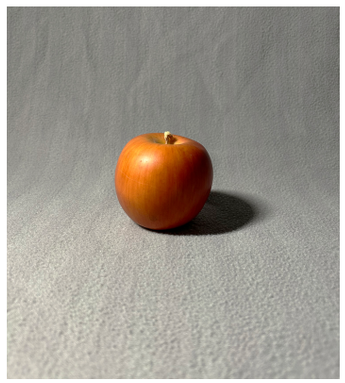
FORMSTORMING - WEEK 1

COLLECTING & ESTABLISHING REFERENCE IMAGES FOR FUTURE 3D MODELLING:

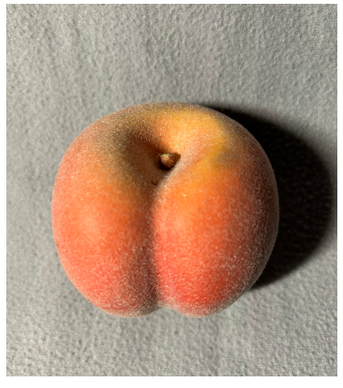








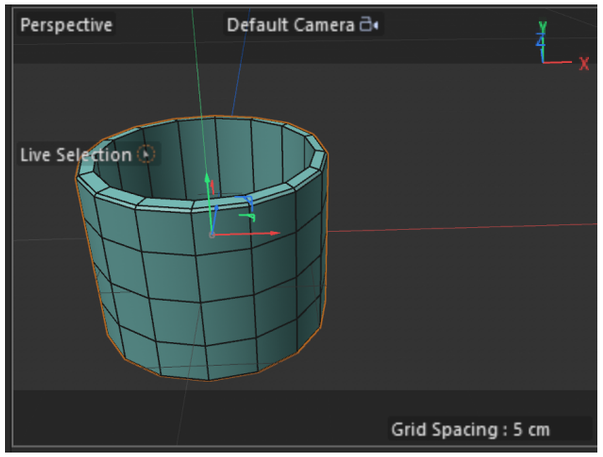


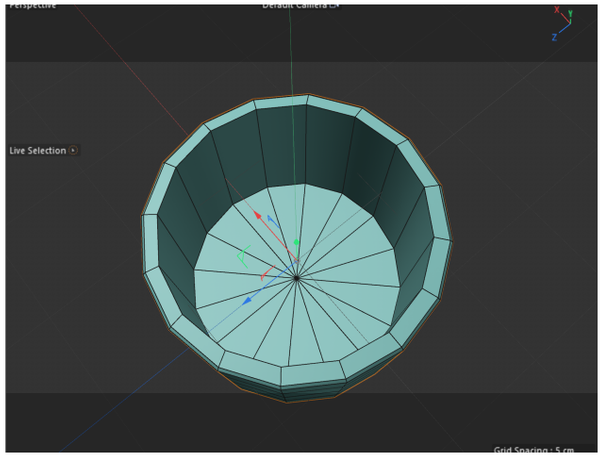


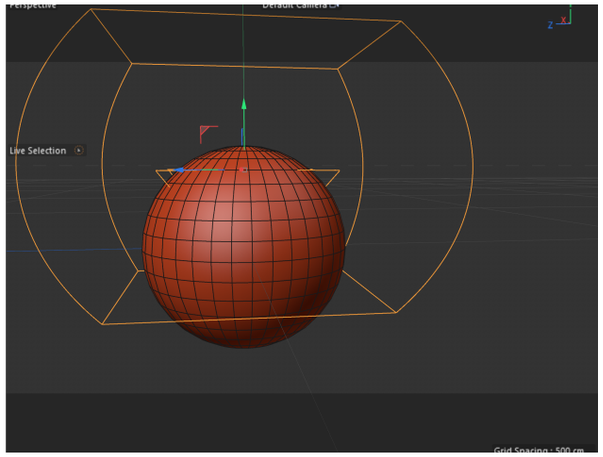

By selecting a variety of household objects, that had an array of different forms, proportions, scales and textures, I intended to gather a collection of reference objects that I thought could create interesting 3D models and prints. By taking reference photos of each of the eight objects, I established a foundation for each of the final 3D model designs to be built upon.

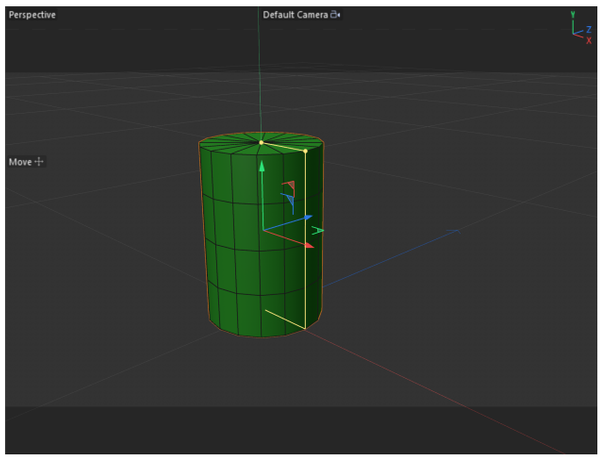
FORMSTORMING - WEEK 1

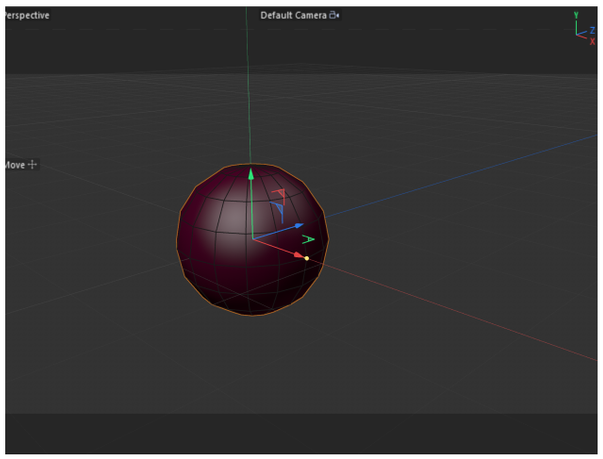
EXPLORING & EXPERIMENTING WITH CINEMA 4D TO REPRESENT SOME OF THE COLLECTED OBJECTS:

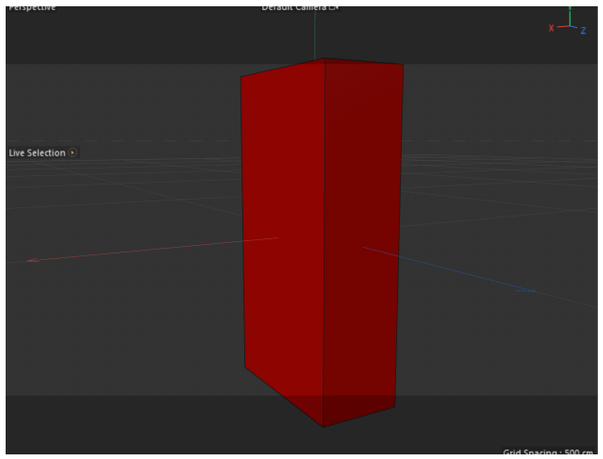












Making a point to begin exploring the Cinema 4D interface from the very beginning, I wanted to learn more about how it could be used to 3D model different objects. By initiating the rapid problem-solving required to overcome the steep learning curve of learning how to use Cinema 4D, I aimed to try to work through the initial frustrations and challenges sooner. By creating rough, primitive representations of some of the reference objects, I was able to build a basic understanding of the program's software and tools, that I could then apply when modelling my final objects.

FORMSTORMING - WEEK 2

FURTHER EXPERIMENTING WITH CINEMA 4D & ITS TOOLS TO EXPLORE DIFFERENT MODELLING TECHNIQUES:



Becoming more familiar with Cinema 4D, I began using the primitive shapes and experimenting with tools such as extrusion, bevelling and the scale tool. I began exploring how textures could be applied to the faces of an object and gradually became better acquainted with the Cinema 4D interface. Through creating these initial models, I was able to create strong bases to expand upon in the following weeks.

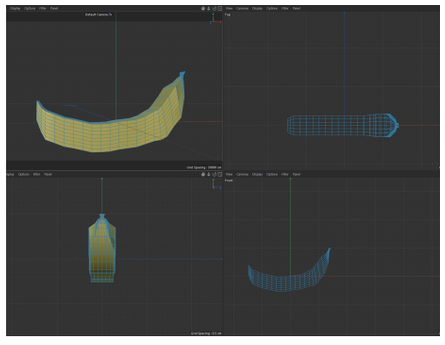
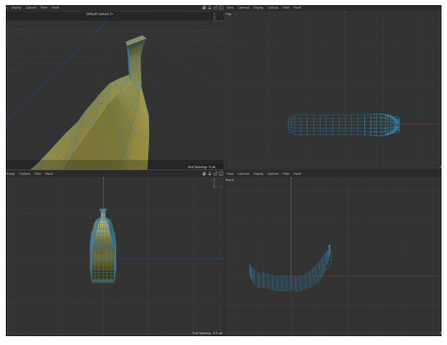
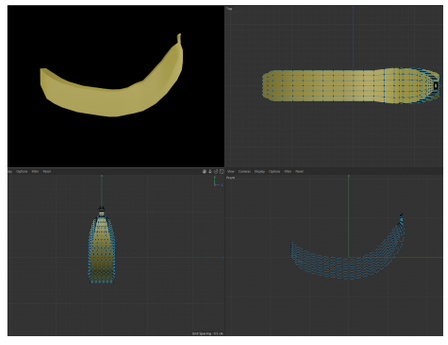
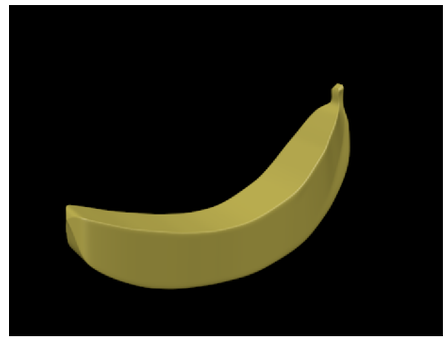
FORMSTORMING - WEEK 3

CREATING & REFINING THE FINAL 5 MODELLED OBJECTS (3 SIMPLE OBJECTS):

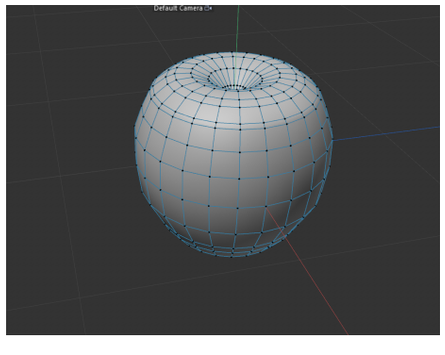
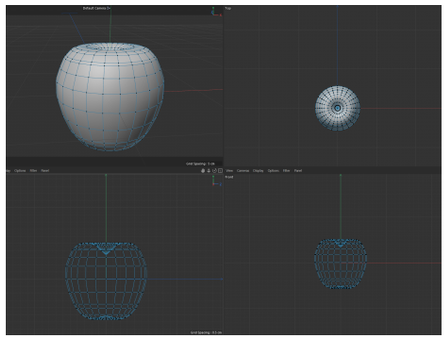
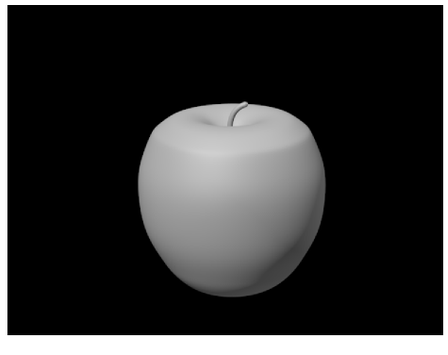
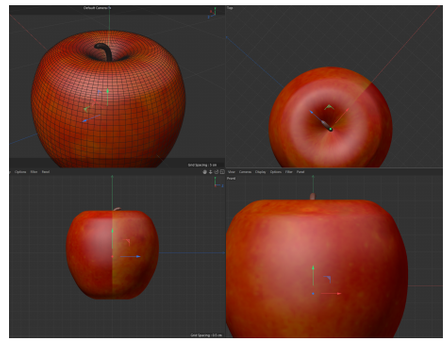





Further refining the model that I had created in the previous week, I adjusted the bevelled the edges of the rectangular prism base to better reflect the reference object. Then, I adjusted the edges between each of the objects' faces so that the final cracker box was cohesive and completely uniform.

Creating a rough base with primitive shapes, I built a very geometric version of the banana with a rectangular prism. Through gradually adjusting the outer and inner curvatures of the banana and its stem (using extrusion, along with the move and scale tools), I worked to design a visually proportionate and balanced 3D model of the reference object.

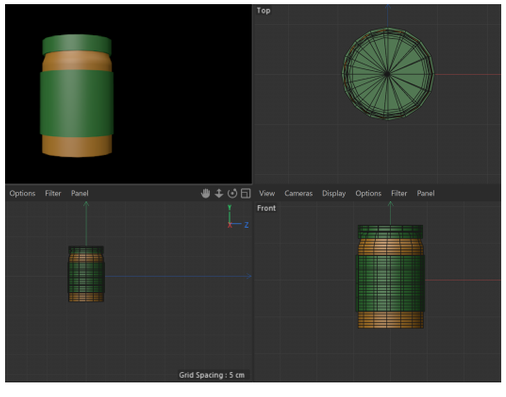





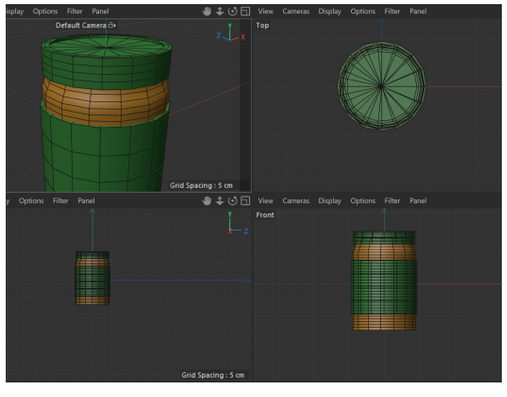
By using a sphere as the foundation, I used a combination of the move, scale and extrude tools to create the body of the apple. Then, I used the line tool, the circle object, the sweep object and the tapering tool to create the apple stem.

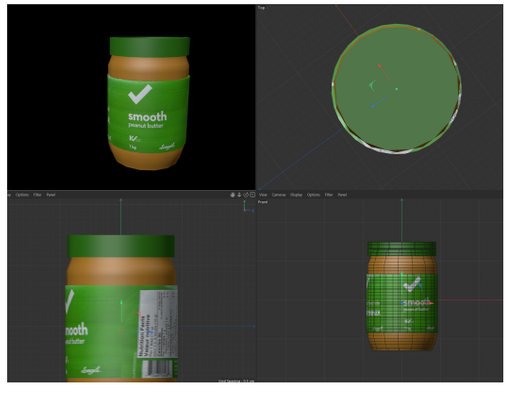
To finalize the apple, I applied representative textures to both the apple and the stem.

FORMSTORMING - WEEK 3

CREATING & REFINING THE FINAL 5 MODELLED OBJECTS (2 COMPLEX OBJECTS):

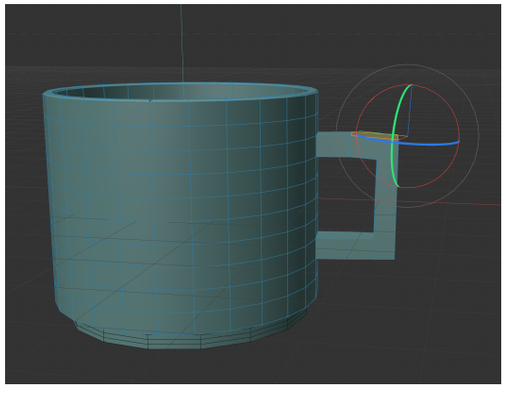


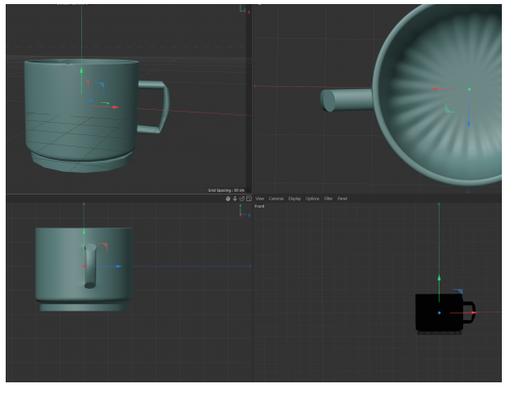


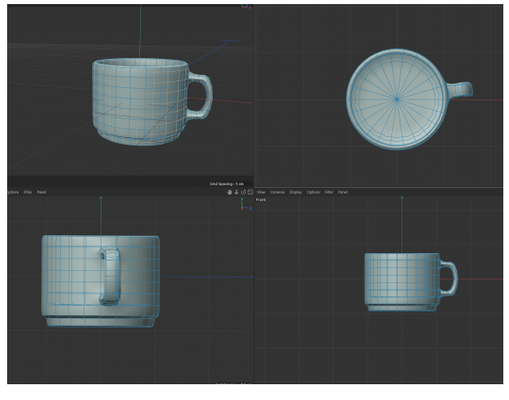




Starting with primitive shapes, I began layering different components of the peanut butter jar. Then, I began to add more detail to the lid and label - by extruding the top of the lid and the bottom of the jar to create inset elements. From there, I tapered the top and bottom of the jar to replicate the slightly rounded shape of the reference object. To complete the jar, I added textures to the label and body of the jar to create a stronger sense of realism in the final design.









Elaborating on the base that I had created in the second week, I began refining the primitive shapes I had created. By rounding the mug's handle and adjusting the curvature of the inner, outer and bottom lip of the mug, I worked to create a softer and more realistic digital representation of the reference object.

FORMSTORMING - WEEK 4

DIGITALLY PUBLISHING THE FINAL 5 MODELLED OBJECTS (3 SIMPLE OBJECTS):

Simple Object #1 - Cracker Box:



Transferring the 3D modelled version of this cracker box to digitally publishing was rather straightforward. The minimal amount of additional components and collection of flat planes on this model made it easy to have a cohesive and consistent representation of the cracker box in a digitally published perspective.

Simple Object #2 - Banana:



The process of taking the 3D modelled version of this banana to digitally publishing was relatively simple. The textures and planes remained consistent with the original 3D modelled version. After initially publishing it with a flat-colour texture, I decided that I wanted to make the final published version more realistic- so I added a banana texture to the entire object. Then I re-published it once more to create this final version pictured above.

Simple Object #3 - Apple:



Digital Publishing- V1

Observations:

- Harsh edge along the top ring of the apple
- Stem appears too flat and not substantial enough beside the richness of the apple body's colour and more realistic texture

Digital Publishing- V2

Changes Made:

- Refined top edge of apple to get rid of harsh line
- Applied texture to apple stem to improve cohesion of realism throughout the apple
- Adjusted lighting to display the apple's form better

FORMSTORMING - WEEK 4

DIGITALLY PUBLISHING THE FINAL 5 MODELLED OBJECTS (2 COMPLEX OBJECTS):

Complex Object #1 - Peanut Butter Jar:





Digital Publishing- V1

Observations:

- Inconsistency in colouring of jar lid, body and label between modelled version and digitally published version.
- Appearance of the label is far too thick in digitally published version - should be thinner to represent thin, flexible nature of paper label on reference object.





Digital Publishing- V2

Changes Made:

- Refined width of the label's thickness to create more seamless appearance along the perimeter of the jar
- Adjusted the saturation of the lid and label colours to better reflect the reference object
- Added peanut butter texture to the jar body to improve the realism of the final design

Complex Object #2 - Mug:









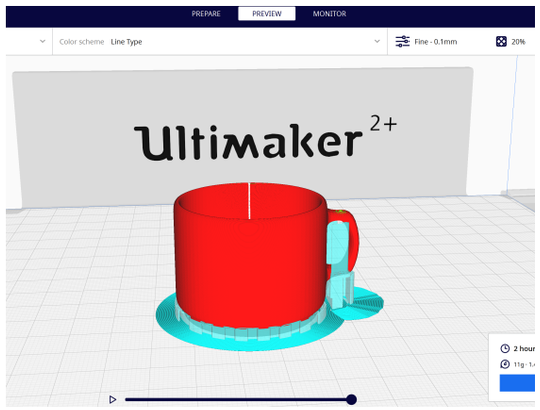
The transition from 3D modelling this mug to digitally publishing it were fairly straightforward. I felt that the smoothness and rounded nature of the mug's edges and forms were transferred well between the modelled version and the digitally published version. Although I did have to adjust the colouring slightly so that it appeared more saturated and opaque in the digitally published version, the overall shape, texture and proportions reflected the reference object well in the final design.

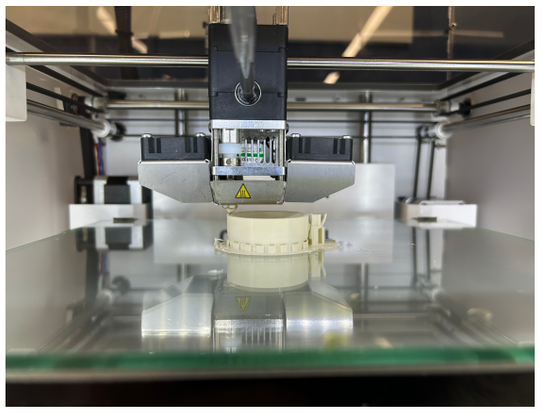
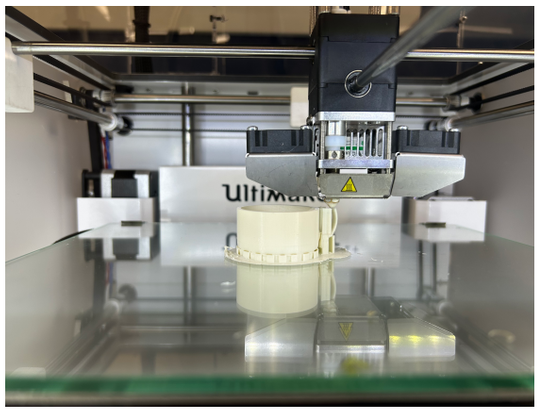
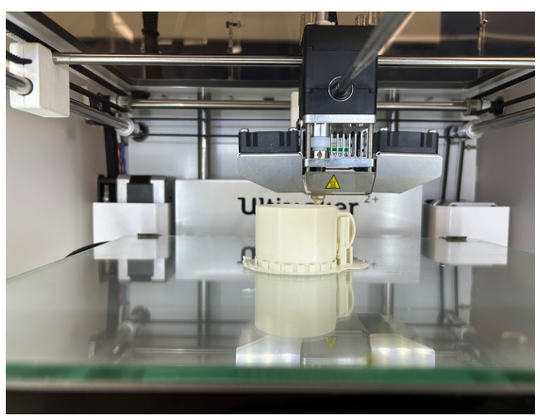
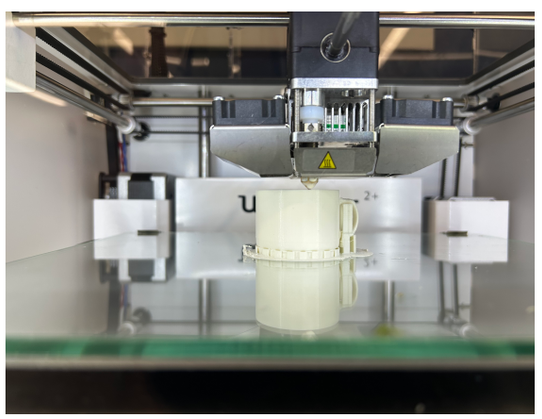
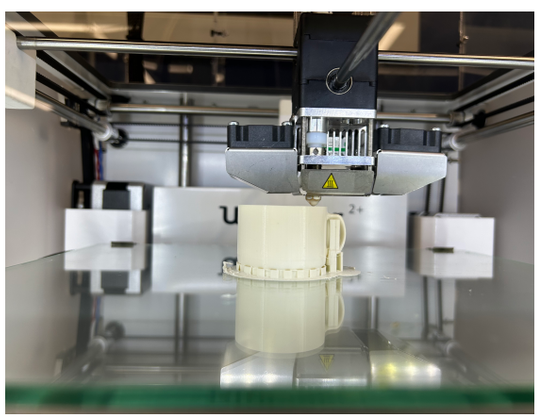
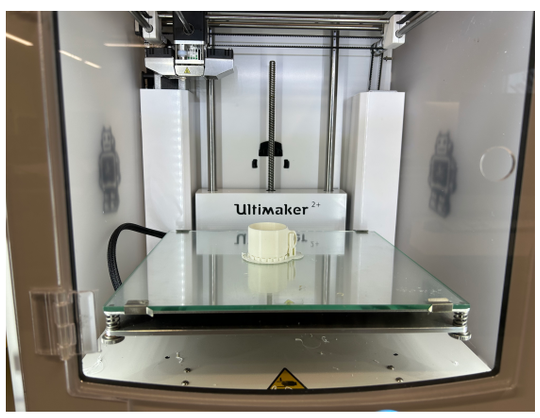
FORMSTORMING - WEEK 4

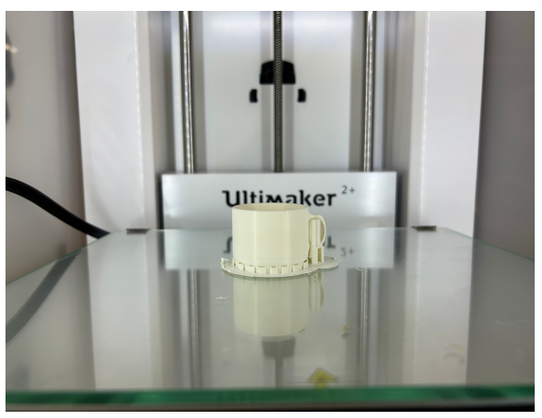
3D PRINTING THE FINAL 3D MODEL DESIGN - MUG:

After contemplating and analyzing the base structures (i.e. texture-less versions) of all of the final 3D models, I felt that the mug would create the most visually-compelling 3D print. Its variety of intricate details within the inner portion of the mug, the handle and the bottom lip of the mug, along with its combination of hollow and solid rounded forms informed a higher potential for an easily identifiable and realistic representation of the reference object. As a result of this, I opted to move forward with printing the mug as the final physical print.

Using Cura, I added supports to the final 3D model and 3D printed the mug. Once it was done printing and had fully cooled, I carefully removed all of the supports and filed the edges to create a smooth and polished final product.







FINAL 3D MODEL DESIGN - CRACKER BOX (SIMPLE OBJECT #1)



Cracker Box - Simple Object #1:

Digital Publishing - Web View:

https://sharp-amelia-mandm-gmv-project1-cracker-box.sharpam.repl.co/

FINAL 3D MODEL DESIGN - BANANA (SIMPLE OBJECT #2)



Banana - Simple Object #2:

Digital Publishing - Web View:

https://sharp-amelia-mandm-gmv-project1-banana.sharpam.repl.co/

FINAL 3D MODEL DESIGN - APPLE (SIMPLE OBJECT #3)



Apple - Simple Object #3:

Digital Publishing - Web View:

https://sharp-amelia-mandm-gmv-project1-apple.sharpam.repl.co/

FINAL 3D MODEL DESIGN - PEANUT BUTTER JAR (COMPLEX OBJECT #1)



Peanut Butter Jar - Complex Object #1 :

Digital Publishing - Web View:

https://sharp-amelia-mandm-gmv-project1-pb-jar.sharpam.repl.co/

FINAL 3D MODEL DESIGN - MUG (COMPLEX OBJECT #2)



Mug - Complex Object #2:

Digital Publishing - Web View:
https://sharp-amelia-mandm-gmv-project1-mug.sharpam.repl.co/

FINAL 3D PRINT DESIGN - MUG (COMPLEX OBJECT #2)



REFLECTION

In completing this project, I had the opportunity to gain a deeper understanding of materials, the perceived values and effects that materials can have when applied to objects, and how 3D modelling and printing can be used to represent everyday items.

By exploring and experimenting with different modelling techniques, a variety of 3D modelling textures and 3D printing, I was able to become more knowledgeable about the impact that materials can have when capturing an object's likeness. In addition to how influential an object's overall scale and form can be when working to represent an object in a realistic way.

Through using a combination of new tools to 3D model and print the final objects, I was able to become more familiar with the interfaces of Cinema 4D, Cura, Google Model Viewer, and the Ultimaker 3D printers. I was able to recognize inconsistencies between the 3D models and the digitally published versions, and how to resolve them. In doing so, I learned to quickly adapt and problem-solve to overcome the challenge of working with many new programs at once. Although working through the learning curves that this project introduced was challenging at times, it was rewarding to document the progress made each week.

If it were possible to continue the exploration and experimentation conducted during this project, I would investigate additional complex objects with more internal and external components.

I would look into how primitive shapes can be manipulated to create more high-poly versions of 3D models, and how modelling can be used and/or applied outside of 3D printing.

WORKS CITED

IMAGES:

Samad, “Banana Peel Texture.” Adobe Stock, https://stock.adobe.com/ca/search?k=banana+texture&search_type=usertyped&asset_id=331420604.

Inesska25082, “Texture of the Apple Peel.” Adobe Stock, https://stock.adobe.com/ca/search?k=apple+texture&search_type=usertyped&asset_id=92467623.

GCapture, “Black Walnut Wood Texture From Two Boards Oil Finished.” Adobe Stock, https://stock.adobe.com/ca/search?filters%5Bcontent_type%3Aphoto%5D=1&filters%5Bcontent_type%3Aillustration%5D=1&filters%5Bcontent_type%3Azip_vector%5D=1&filters%5Bcontent_type%3Avideo%5D=1&filters%5Bcontent_type%3Atemplate%5D=1&filters%5Bcontent_type%3A3d%5D=1&filters%5Bfetch_excluded_assets%5D=1&filters%5Binclude_stock_enterprise%5D=1&filters%5Bcontent_type%3Aimage%5D=1&k=wood+texture&order=relevance&safe_search=1&limit=100&search_page=1&search_type=usertyped&acp=&aco=wood+texture&get_facets=0&asset_id=284485295.

Begun1983, “Brown Peanut Paste Made From Whole Nuts. The Texture of Peanut Paste Top View. Peanut Butter Background.” https://stock.adobe.com/ca/search filters%5Bcontent_type%3Aphoto%5D=1&filters%5Bcontent_type%3Aillustration%5D=1&filters%5Bcontent_type%3Azip_vector%5D=1&filters%5Bcontent_type%3Avideo%5D=1&filters%5Bcontent_type%3Atemplate%5D=1&filters%5Bcontent_type%3A3d%5D=1&filters%5Bfetch_excluded_assets%5D=1&filters%5Binclude_stock_enterprise%5D=1&filters%5Bcontent_type%3Aimage%5D=1&order=relevance&safe_search=1&limit=100&search_page=1&search_type=usertyped&acp=&aco=peanut+butter+texture&k=peanut+butter+texture&get_facets=0&asset_id=494869022.

WEEKLY LECTURE RESOURCES:

Hudak, Steve. “Interaction Design: Modelling & Materials Week 2.” Modelling & Materials, Sheridan College. Lecture Slides.

Hudak, Steve. “Interaction Design: Modelling & Materials Week 3.” Modelling & Materials, Sheridan College. Lecture Slides.

Hudak, Steve. “Interaction Design: Modelling & Materials Week 4” Modelling & Materials, Sheridan College. Lecture Slides.