

Written Evidence

Sustained Investigation

Identify the inquiry that guided your sustained investigation.

Response:

How can I combine manufacturing and art? I have a long history of combining STEM and the humanities; during this project I wanted to incorporate both to create a beautiful end product. By changing manufacturing steps, I could reach my artistic vision. At the beginning, the question was, "How can I design a chess set that is uniform, visually balanced, and pleasant to play with?" Further on, the question became, "What can I change in my code to best fabricate my design?" Throughout, I aimed to combine the sciences (psych, manu...) with the fundamentals of art (esp. form, texture, and color).

Describe ways your sustained investigation developed through practice, experimentation, and revision.

Response:

I had to fix the code whenever the machine erred. The kings' hats broke (7); the lathe tools shook when cutting the rook's head (8); the pawns slid and created an offset (9). Most often, the solution: cut slower/shallower. The knight (12-13) had the most evolution: a) First try had a large offset. b) I tried to smooth the transition with deeper cuts--which I used in the end, but first I had to c) fix the offset. d) I tried adding detail by sharpening the muzzle, and e) switched to a round tool (img 11) to reduce sharp angles. Finally, f) fixed a tool problem.

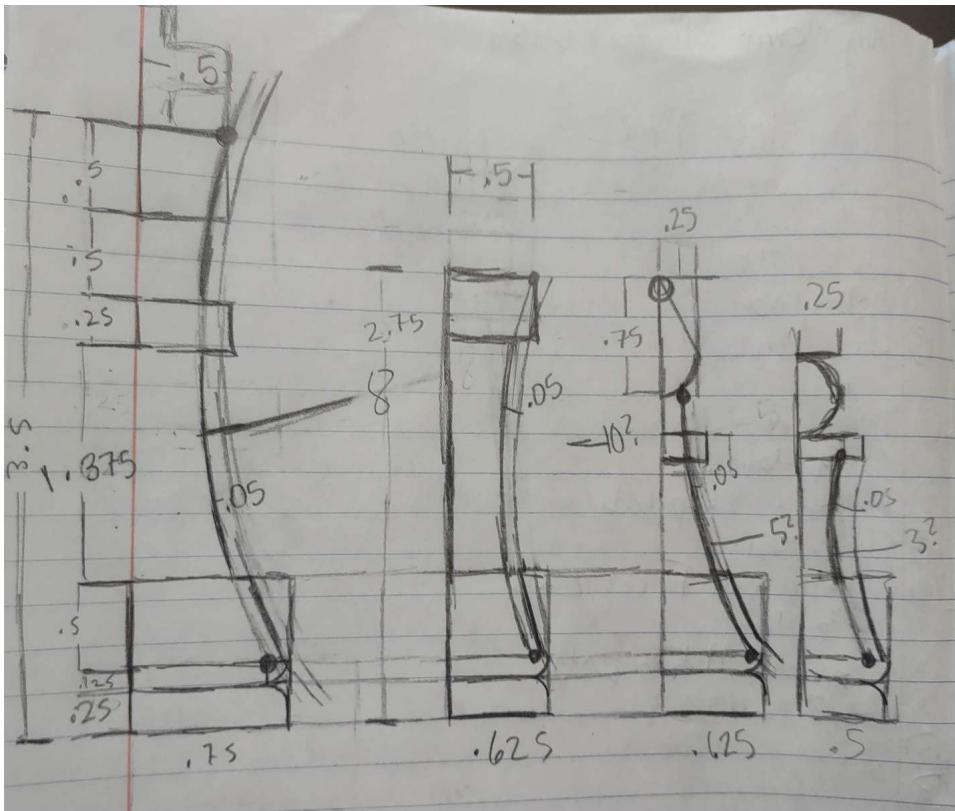


Image 1

Sustained Investigation

Height: NA

Width: NA

Depth: NA

Materials: Paper and pencil

Process(es):

Initial design. Unified all with the same base, the Knight/Bishop/Rook with the same height.



Image 2

Sustained Investigation

Height: NA

Width: NA

Depth: NA

Materials: Haas ST10

Process(es):

Learning how the lathe works. Over time I learned its sounds, rhythms, etc, helping me catch errors

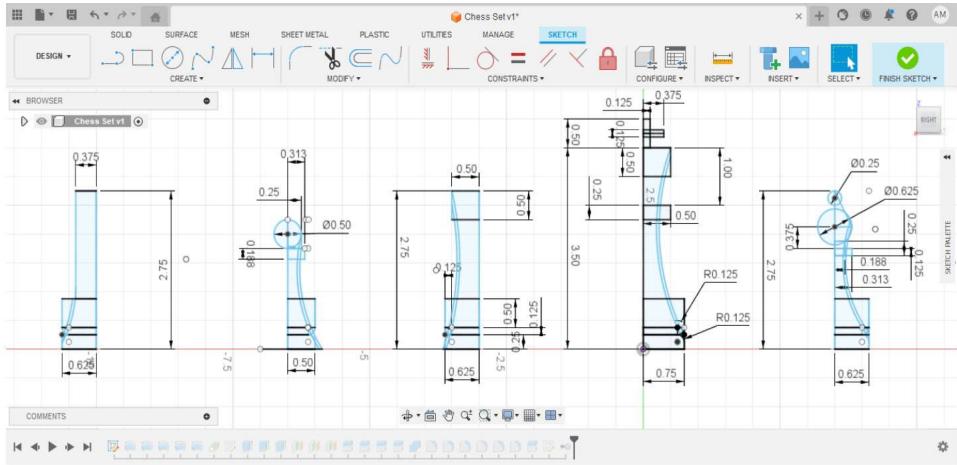


Image 3

Sustained Investigation

Height: NA

Width: NA

Depth: NA

Materials: Fusion360

Process(es):

Final designs (sans knight). Used circles to get the side-curves. Adjusted Bishop and Rook thickness

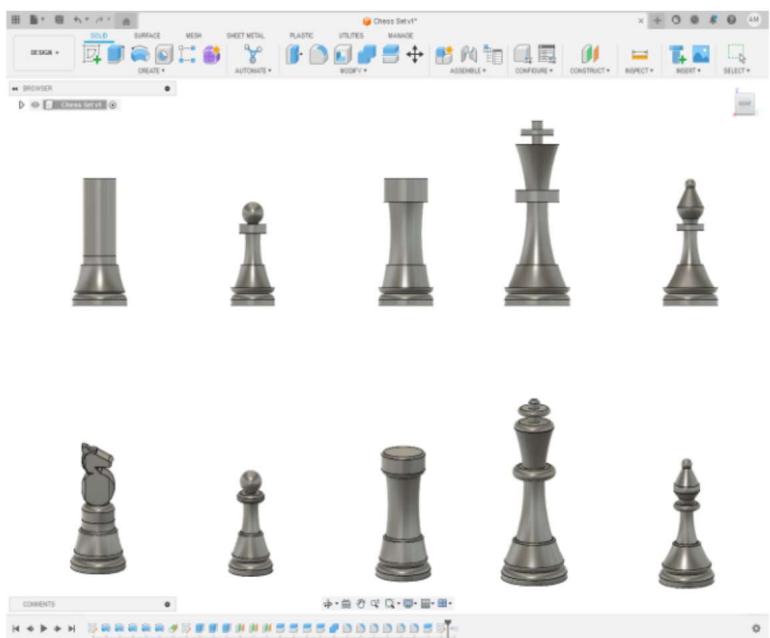


Image 4

Sustained Investigation

Height: NA

Width: NA

Depth: NA

Materials: Fusion360

Process(es):

Smoothing the sharp edges to protect chess players' fingers; sculpting the knight.

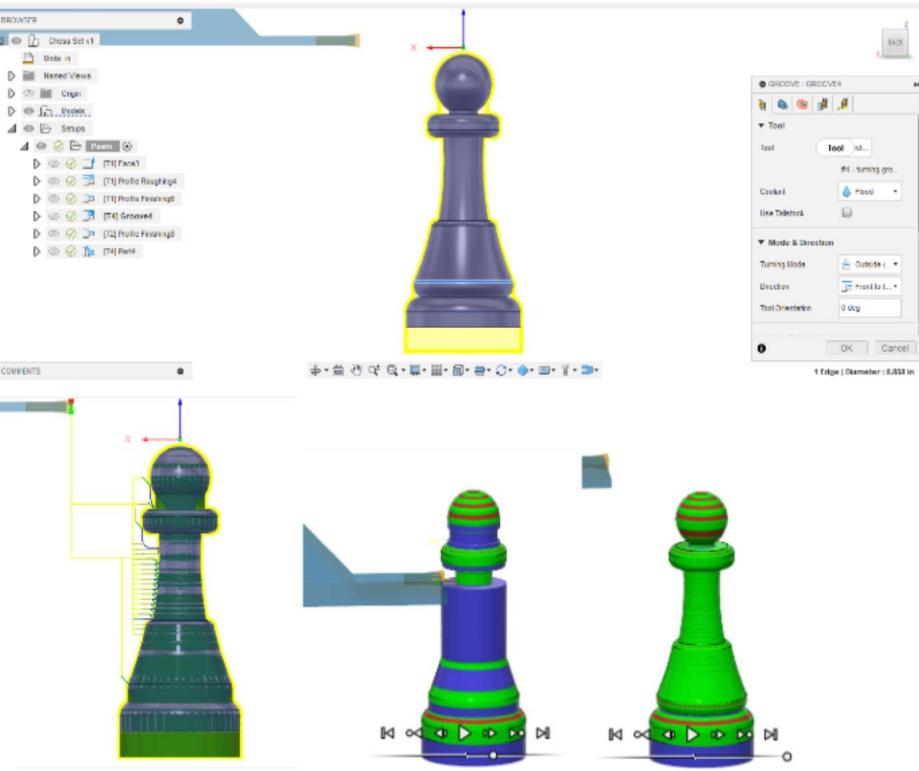


Image 5

Sustained Investigation

Height: NA

Width: NA

Depth: NA

Materials: Fusion360

Process(es):

Coding each part. Most revisions were changing cutting speeds or tools.

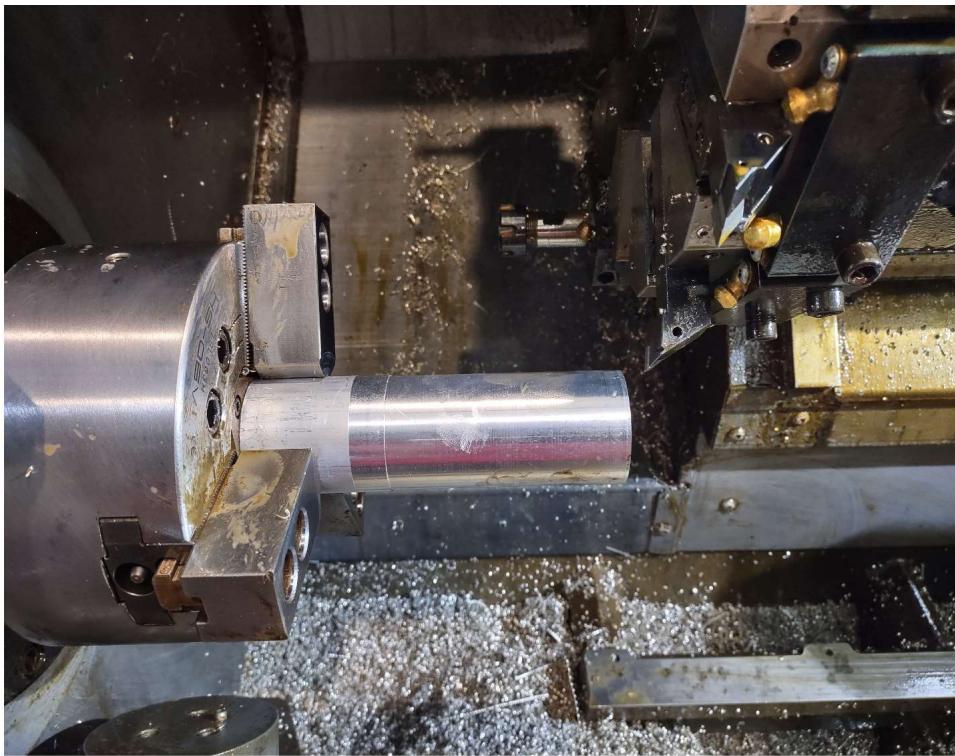


Image 6

Sustained Investigation

Height: NA

Width: NA

Depth: NA

Materials: NA

Process(es):

Re-calibrating tool setup after discovering issues.



Image 7

Sustained Investigation

Height: 3.5

Width: 1.5

Depth: 1.5

Materials: Aluminum

Process(es): Adjust code to prevent chipping



Image 8

Sustained Investigation

Height: 2.25

Width: 1

Depth: 1

Materials: Aluminum

Process(es):

Adjust code and position of "stock"
(unfinished material) to increase
consistency.



Image 9

Sustained Investigation

Height: 2.75

Width: 1.25

Depth: 1.25

Materials: Aluminum

Process(es):

Adjust code and position of stock to prevent the rough texture of "chatter" (tool shakes as it cuts)



Image 10

Sustained Investigation

Height: 2.75

Width: 1.25

Depth: 1.25

Materials: Aluminum

Process(es):

Selecting pieces with the most uniformity
(especially in bases and tops) [uniform on
right]

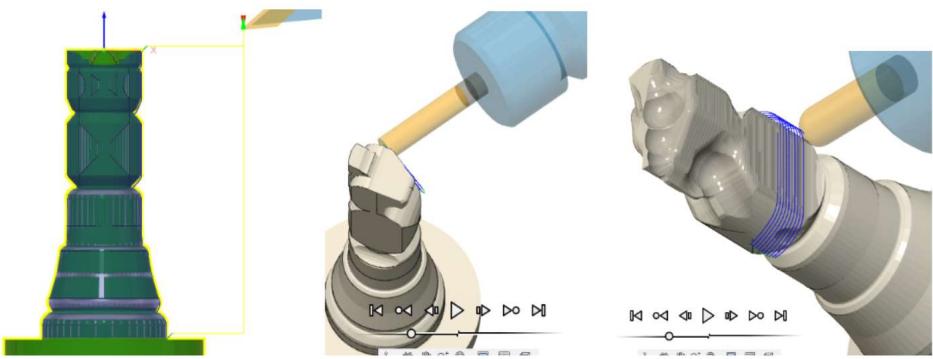


Image 11

Sustained Investigation

Height: NA

Width: NA

Depth: NA

Materials: Fusion360

Process(es):

"Live tooling" to get the profile. Switched to a rounded drill to allow curved edges.

Image 12

Sustained Investigation

Height: 2.75

Width: 1.25

Depth: 1.25

Materials: Aluminum

Process(es):

Adjust machine offsets until the halves meet,
then add details.





Image 13

Sustained Investigation

Height: 2.75

Width: 1.25

Depth: 1.25

Materials: Aluminum

Process(es):

Adjust machine offsets until the halves meet,
then add details.



Image 14

Sustained Investigation

Height: 4.13

Width: 19

Depth: 19

Materials:

Aluminum, acrylic paint, felt, wood chess board

Process(es):

Painted one half black, added felt feet



Image 15

Sustained Investigation

Height: NA

Width: NA

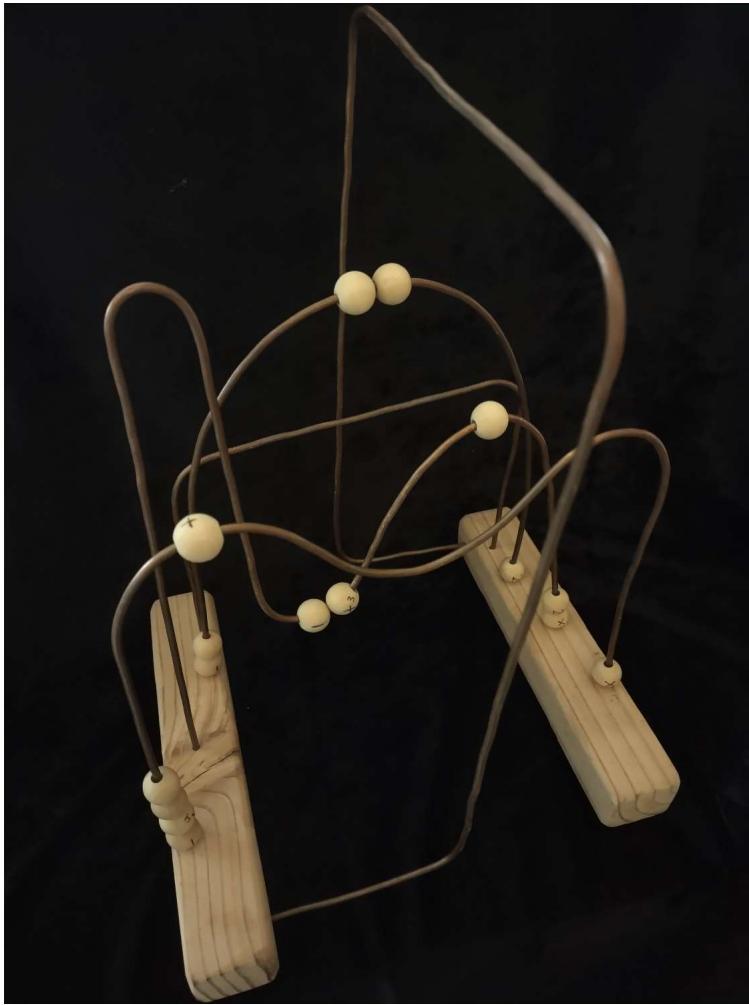
Depth: NA

Materials:

Aluminum, acrylic paint, felt, wood chess board

Process(es):

Painted one half black, added felt feet



Work 1.1

Selected Works

Height: 12.7

Width: 10

Depth: 8.5

Idea(s):

Contrast calculus' difficulty with the ease of a toddler's toy. Allow viewers to manipulate.

Materials:

Thick gauge copper wire, wooden beads, wooden planks

Process(es):

Each layer is a related function on an x-y plane. Wood-burnt equations onto beads.

Citation(s):

Used Desmos.com to find a graph whose derivations were clean visually and mathematically



Work 1.2

Selected Works

Height: 12.7

Width: 10

Depth: 8.5

Idea(s):

Contrast calculus' difficulty with the ease of a toddler's toy. Allow viewers to manipulate.

Materials:

Thick gauge copper wire, wooden beads, wooden planks

Process(es):

Each layer is a related function on an x-y plane. Wood-burnt equations onto beads.

Citation(s):

Used Desmos.com to find a graph whose derivations were clean visually and mathematically



Work 2.1

Selected Works

Height: 3.75

Width: 8.5

Depth: 1.5

Idea(s):

Compare/contrast various school staff members. All human yet unique.

Materials: Solid aluminum

Process(es):

CNC Lathing and Live Tooling. Each piece has 1/4 removed (and light detailing) to reveal the name.

Work 2.2

Selected Works

Height: 3.75

Width: 8.5

Depth: 1.5

Idea(s):

Compare/contrast various school staff members. All human yet unique.

Materials: Solid aluminum

Process(es):

CNC Lathing and Live Tooling. Each piece has 1/4 removed (and light detailing) to reveal the name.





Work 3.1

Selected Works

Height: 10

Width: 6.5

Depth: 10

Idea(s):

Reflect on childhood with a visually soft doll chair

Materials: Pine fence wood

Process(es):

Wood CNC; softening edges w/ Dremel;
mushrooms represent family/growth;
negative space

Citation(s):

Mushroom design adapted from ClipArt Best



Work 3.2

Selected Works

Height: 10

Width: 6.5

Depth: 10

Idea(s):

Reflect on childhood with a visually soft doll chair

Materials: Pine fence wood

Process(es):

Wood CNC; softening edges w Dremel;
mushrooms represent family/growth;
negative space

Citation(s):

Mushroom design adapted from ClipArt Best



Work 4.1

Selected Works

Height: 10.7

Width: 9

Depth: 6

Idea(s):

Represent grief, visual irony of a drowning cork, incorporate Hamlet

Materials:

Soap, water, glass bottles, corks, wire, acrylic paint, metal ring, paper, pen

Process(es):

Symbolic amounts of water, ring = Ophelia's innocence, align bottles as drowning hand grasping light



Work 4.2

Selected Works

Height: 10.7

Width: 9

Depth: 6

Idea(s):

Represent grief, visual irony of a drowning cork, incorporate Hamlet

Materials:

Soap, water, glass bottles, corks, wire, acrylic paint, metal ring, paper, pen

Process(es):

Symbolic amounts of water, ring = Ophelia's innocence, align bottles as drowning hand grasping light



Work 5.1

Selected Works

Height: 4.13

Width: 19

Depth: 19

Idea(s):

Combine manufacturing and art; use my late father's handmade chessboard: chess is intergenerational

Materials:

Solid aluminum, acrylic paint, felt, wood chess-board

Process(es):

CNC Lathing and Live Tooling. Design: Align skirt heights; smooth texture; paint, apply felt feet



Work 5.2

Selected Works

Height: 4.13

Width: 19

Depth: 19

Idea(s):

Combine manufacturing and art; use my late father's handmade chessboard: chess is intergenerational

Materials:

Solid aluminum, acrylic paint, felt, wood chess-board

Process(es):

CNC Lathing and Live Tooling. Design: Align skirt heights; smooth texture; paint, apply felt feet