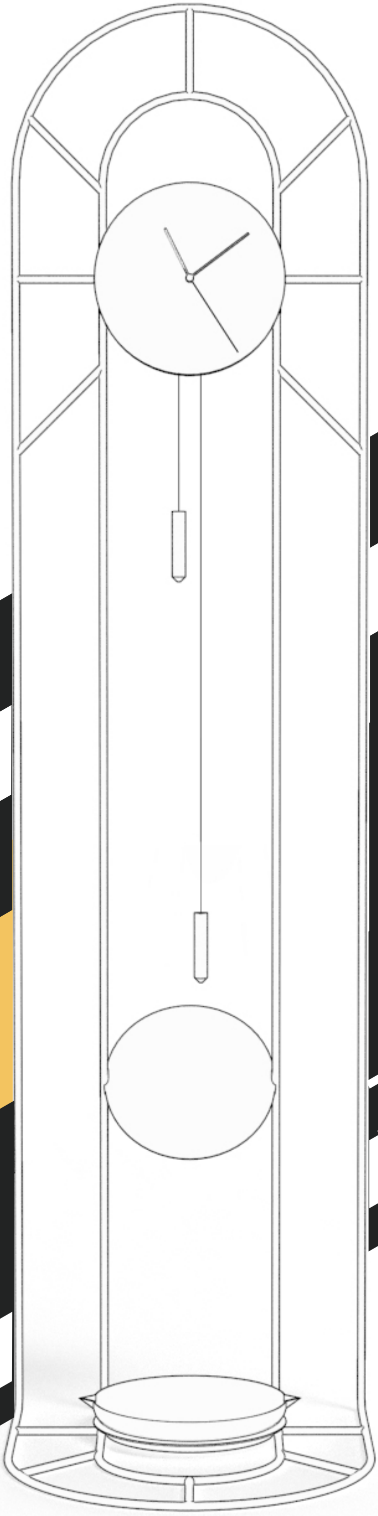

AMATHOS

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BIRMINGHAM CITY
University

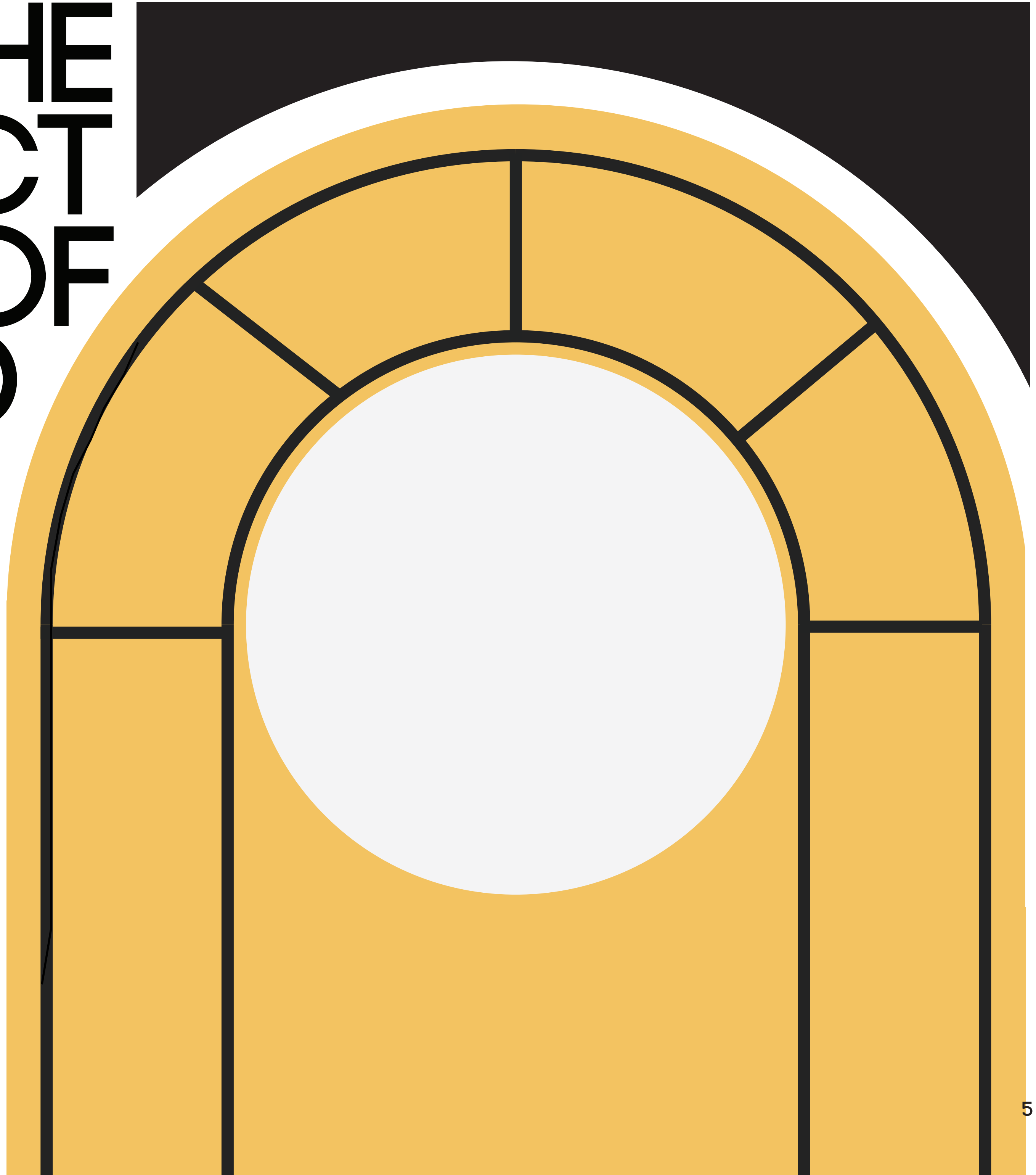
CONTENTS

THE IMPACT OF SOUND

What we consider the traditional five senses are commonly ranked by importance in the following order: sight, hearing, smell, taste and touch. As users have become familiar with products, they no longer register visual elements as much, instead they rely on audio-based stimuli as their primary sensory input to monitor engagement.

This project explores consequential sound. Sounds of a more analogue nature provide a less predictable sonic output and allow for more varied or interesting stimuli. Analogue sound output allows for greater amounts of personality to be present within the sounds produced, as many factors that cannot be accounted for in as great a measure within digital design can be shown.

The satisfaction brought about through the correct implementation of audio qualities is dictated by the peak end rule: a form of cognitive bias that affects memory through focus upon intense moments, or 'peaks', and the end of an experience. Importance is placed upon the sound 'peaks', particularly sounds often attributed to friendliness (typically with deeper, more resonant qualities) as this group is observed to be more impacted by the peak and end of loudness rather than the entire experience.



DESIGN BRIEF

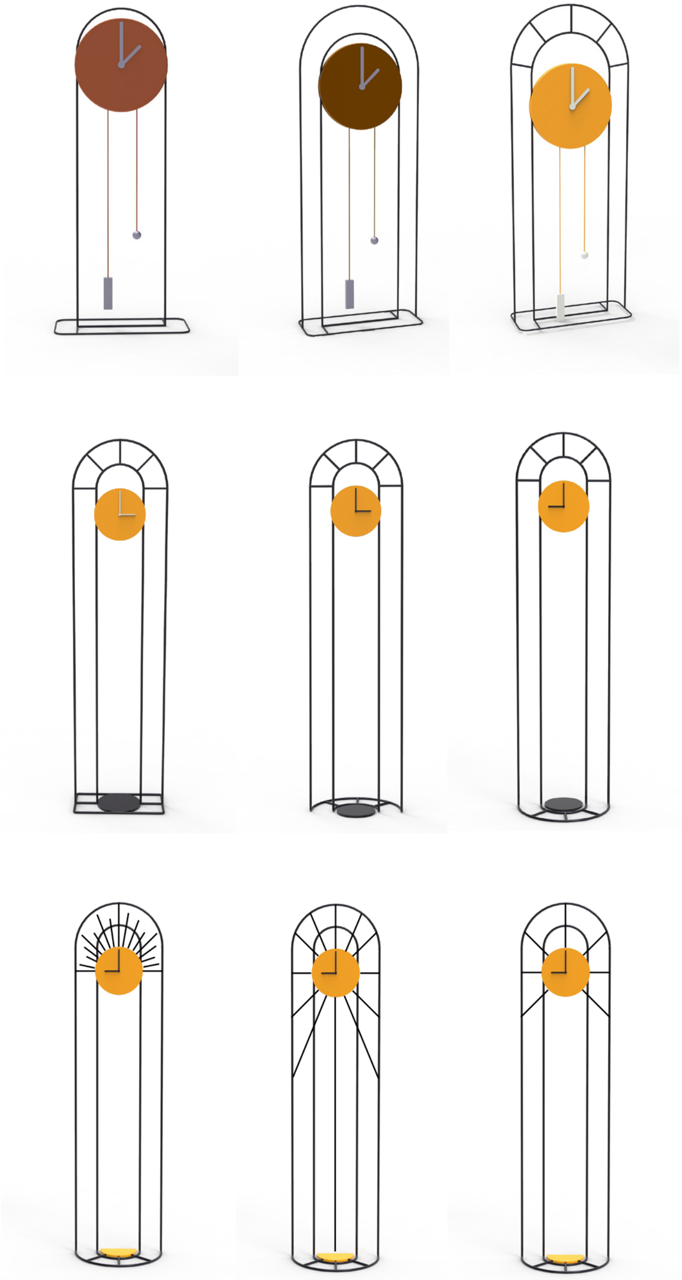
The aim this project is to explore methods of emphasizing consequential analogue sound, achieved through creating a soundscape of limited yet effective sensory output within what could be considered commonplace items.

The introduction of this audio element must explore restructuring the importance of the senses through contextual means, demonstrating the importance of sound within design and user interaction.

The design process began by creating image boards that combined elements of musicality and comon interactions with everyday items and activities: winding a clock, tidying away shoes, visiting a garden and knocking on a door.

The most exciting rhythms seem unexpected and complex, the most beautiful melodies simple and inevitable.

W.H. Auden



DEVELOPMENT

Development was primarily conducted through digital means; this was a constraint imposed by both the pandemic and an injury sustained in 2020.

These constraints imposed a workflow that encouraged gradual evolution of models, as parts could be swapped out and modified at a relatively rapid pace.

Early into developing this design the decision to make the frame double arched was made, this then led to cross beams being implemented - a factor that would become very significant to the design, as original drafts pointed toward implementation of guitar strings drawn across the frame, a concept from an earlier project that stemmed from the same research avenue.

The base element began as a geometric form, however as the design developed a more elongated single direction foot was produced, using the counterweight to echo the form of the face at the top of the frame, with the runoff plate later introduced following this visual language.

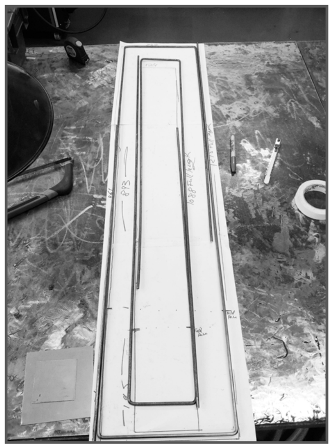
TEST RIGS

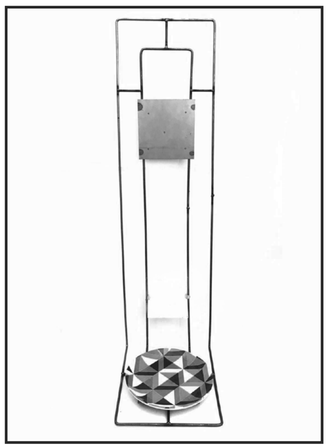
A 1/2 scale test rig was fabricated based upon the form generated, though with certain adjustments to speed up manufacturing process without compromising the accuracy of testing. The aim of the rig was to test appropriate scale, weight distribution and material selection.

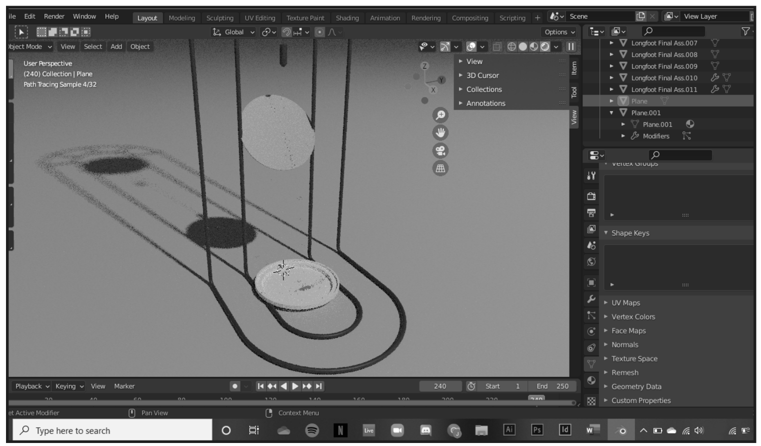
Once the rig had been welded together and bent around to 90 degrees, counterweight testing began, starting with a counterweight of two individual 2mm plates.

This initial weight proved to be too low, and a final set of weights incorporating a further two 3mm plates was added by spot welding these components together, creating a more than effective counterweight for the structure.

Physical testing of the sand dropping process proved very effective, even more so when working with a full scale plate, however in order to assure the lowest spill chance possible a simulated flow test was conducted, with this test displaying little if any spillage.

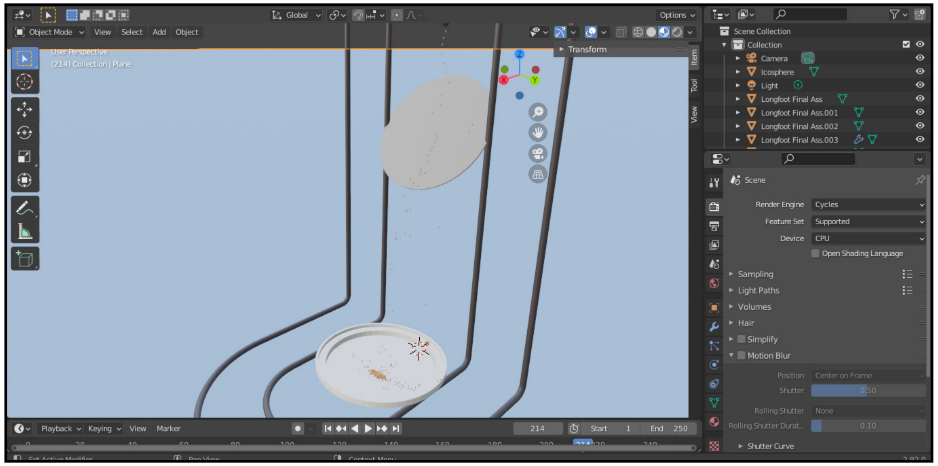


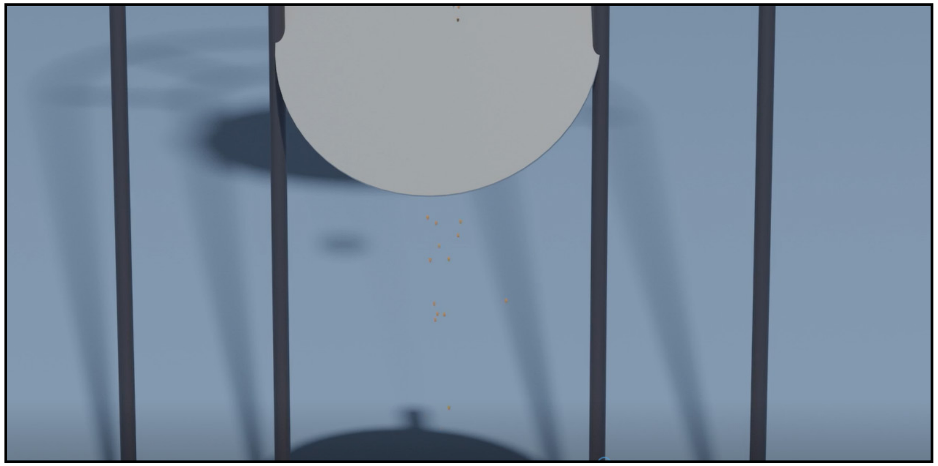


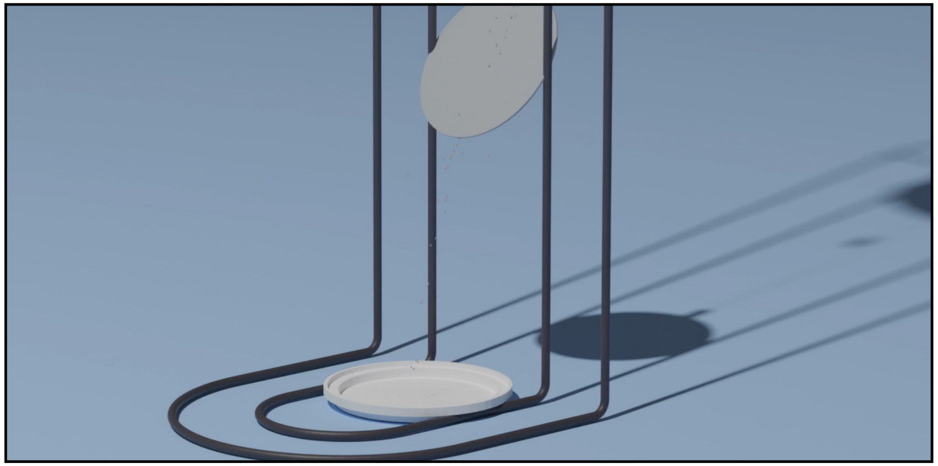


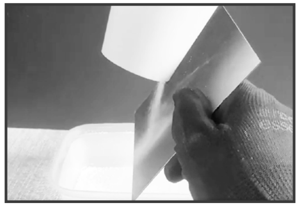
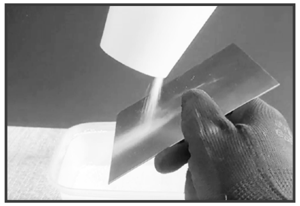
FLOW SIMULATION

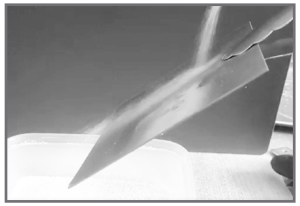
Flow simulation displayed the catchment area of the released sand, showing that the selected plate angle was suitable and displaying the required adjustments needed to the base in order to guarantee all released sand would land within the vessel.











SOUND TESTING

Material exploration began by dropping sand onto varying thicknesses of sheet steel at different angles, with thicker sheet angled at just under 45 degrees proving to create the most effective sound, while also providing a reflective angle that would allow the dropped sand to be caught below.

The 1/2 size test rig was used in more advanced drop tests, with a dish that was shallow yet almost full scale being used to catch the sand. This test displayed that a deeper bowl would be needed, while also displaying that the sound element was strong, resonating the sounds of the reflecting sand throughout the frame.

AMATHOS

Amathos is a grandfather clock with a sand driven weight mechanism that draws inspiration from connections between the movement of volume and the passing of time, exploring this through direct interaction from users and the output of audio stimuli.

The name of the product, meaning sand in Ancient Greek, is given as the workings of the product take inspiration from the water clocks once used in official meetings to allocate speakers time.

The intended audience for this product would be design concious, mid-high income consumers.

Users are able to monitor time passing through the acoustic properties of the product, users must refill the suspended vessels using the dish at the base, a grounding action aimed to provide a visual and material representation of time as it passes and increase the importance of each moment.

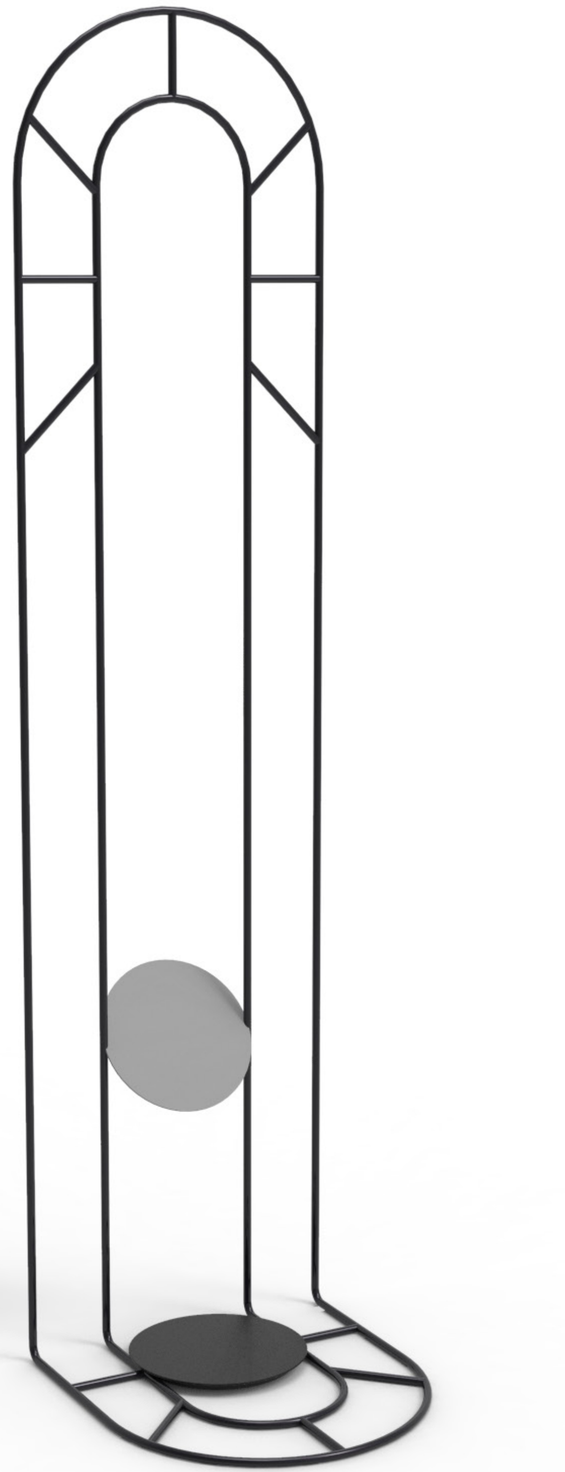
The isolated pendulum system releases sand causing the weights to move, with the rushing sands flowing down the run off plate into the dish below, only to be poured back into the weight system once emptied, allowing a reflective and direct relationship with time through a quantifiiable stimuli.

FINAL FORM

The final form has elongated die cast weights supporting a volume of sand suitable for one hour of time and half an hour of time. During the design process it was questioned as to whether multiple different weights would be created, as this would allow users to design thier own timeframe. However, multiple weights may have discouraged product interaction, and tooling costs would have increased the overall product price point.

The product is intended to be produced in low volume, at batch or small scale production levels, with a projected market value of £750-£1000

SPECIFICATIONS



WHEEL ELEMENT
Housing to be machine lathed, welded in place to front, and back of plate in the assembly.

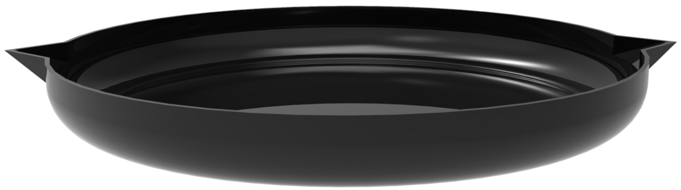
WIRE
1475mm of 2mm wound steel wire to be wound around the wheel element, this will suspend the weights in loops at each end.

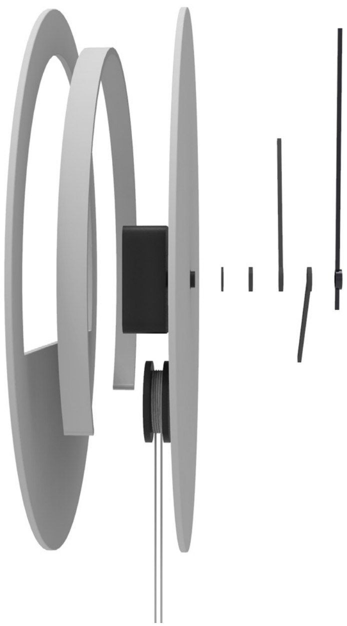
FRAME
12mm tubular steel, beams to be milled appropriately, with CSM ring roller used to bend U shapes, though, if necessary, jig bending will also be appropriate, needing tooling to be made. A simple pipe bender will work adequately for the 90-degree bend at the base, reducing any unnecessary CNC involvement. The frame is then to be welded to the clock face in the appropriate position, and masked ready for powder coating to RAL 9004 matte. *Tooling costs are between £1600-2000, £100-250 per unit.*

RUN OFF PLATE
This is to be water jet cut for low volume, with milling being used to remove material allowing for the angled grooves to be machined into the sides, this will then be welded to the frame and masked ready for powder coating to RAL 7042 matte. *Approx cost (inc. materials and tooling): £6 per unit per 100 units.*

WEIGHT PLATE
This is to be machine lathed, allowing curvature to fit above the steel frame as specified in drawings. This part is then to be finished to RAL 9004 matte. *Approx cost (inc. materials and tooling): £15 per unit per 100 units.*

SPECIFICATIONS





<u>*CLOCK HANDS*</u>
Laser cut 2mm aluminum. Lower cost than casting elements and due to low thickness is well suited to most laser cutters used in fabrication, with a typical limit for aluminum of 1 inch, additionally this process presents a lower carbon footprint though will produce fumes due to the laser being in use. To be finished to RAL 9004 Matte.

<u>*CLOCK MOVEMENT*</u>
A silent sweep quartz movement, this is to be battery powered as the back is easily accessible, though the product may require some small amount of movement to replace batteries the battery should last more than long enough to make this a minor inconvenience.

<u>*SHEET STEEL ELEMENTS*</u>
Front, back and middle plate 3mm steel. The front and back elements are to be water jet cut for low volume production. The middle curved component element is to be sheared using pneumatic shears, then CNC rolled into the required diameter. The face is then to be welded together using a welding jig to ensure accuracy, this will be welded to the frame in the appropriate position and masked ready for powder coating to RAL 9010. *Approx cost (inc. materials and tooling): £15-20 per unit per 100 units.*

<u>*SAND DISH*</u>
Slip-cast component finished with a flat black, low-gloss glaze.

SUSPENDED VESSELS

Slip cast full length and half length variations. Based upon the volumes allowed within the vessels, the larger vessel should allow for one hour and the smaller one half an hour. These have been selected as the product's standard units of time as they are most accessible to consumers, as the weight system has no bearing on the functionality of the clock mechanism they will not need to be constantly refilled. Both weights will remain hollow, one with an open apeture at it's base allowing the closed vessel to act as a constant weight. Component is to be finished with an appropriate flat white matte glaze.

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