



IMPRIMŌTYPE

A NEW EXPERIENCE OF ANALOGUE PHOTOGRAPHY
THROUGH TACTILITY, TANGIBILITY AND SACRIFICE

江敏慧

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Dedicated to My Family

啊妈, 杨就齐

啊爹, 江勘帆

Minanne

Antony

Amy

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Imprimō: /im.pri.mo/ *verb*

Latin: from in- + premō (“to press”).

-to print, impress or imprint

Imprimōtype: /im.pri.mo.tʰlp/ *noun*

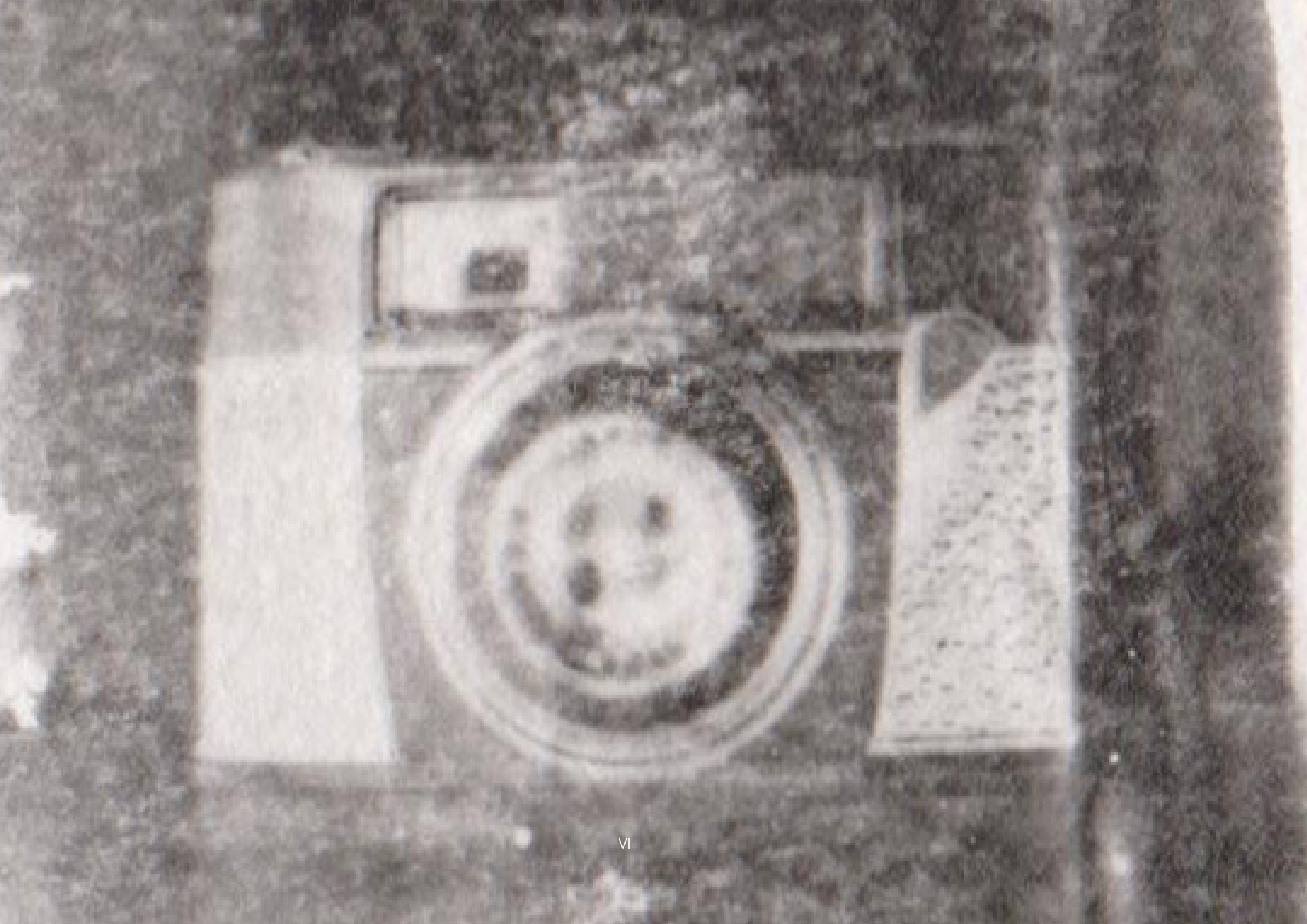
A camera that provides an alternate experience of photography through physical tangibility; rich in tactility, anticipation, reward and emotional connection.

Imprimōgraph: /im.pri.mo.gra:f/ *noun*

The distinctive pentagonal image created by an Imprimōtype camera

// ABSTRACT

This thesis began as a **critical** response to digital photography. It takes an in depth look at the **transition of photography** from **analogue to digital**, and the impact of this transition on the culture of photography. This design-led research features a series of experiments that cross and merge the boundaries between digital and analogue **photographic processes** to offer an **alternate experience** of photography by **tangibly** re-evaluating the **relationship** between the camera and the photograph. Finally, this thesis leads to the creation of the 'Imprimōtype,' (Literally 'print type') a **sacrificial camera** that provides an alternate experience of photography rich in physical tangibility, **tactility, anticipation, reward** and **emotional connection** to the resulting photograph that comes only with **temporal investment** and **connection** in the photographic process.



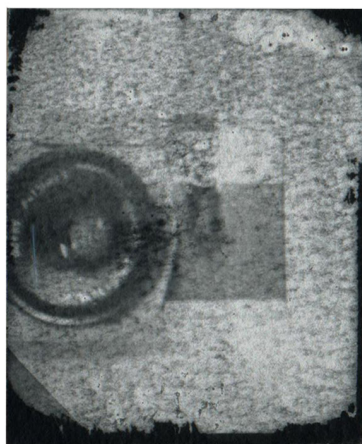
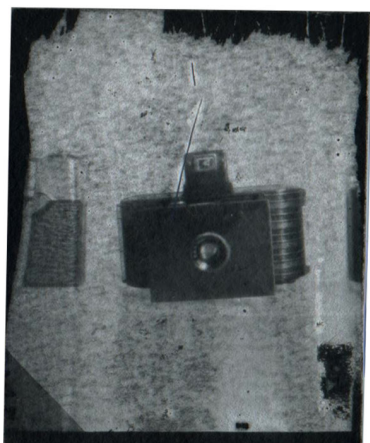
CONTENTS

// ACKNOWLEDGEMENTS.....	III
// ABSTRACT.....	V
CHAPTER ONE // INTRODUCTION.....	02
+ 1.1: Introduction	
+ 1.2: Research Interest	
CHAPTER TWO // A BRIEF HISTORY.....	10
+ 2.1: Evolution of the Camera	
+ 2.2: Analogue to Digital	
CHAPTER THREE // BACKGROUND RESEARCH AND EXPERIMENTATION.....	28
+ 3.1: The Anatomy of a Camera	
+ 3.2: Familiarity vs. Ease of Use	
CHAPTER FOUR // THE PAST AND PRESENT OF IMAGE.....	42
+ 4.1: The Past and Present of Image	
+ 4.2: A Redefinition of Image	
+ 4.3: Parametric Bitmap Sampling	
+ 4.4: A Physical Image	
+ 4.5: Growing Images	
+ 4.6: Discussion and Summary	

CHAPTER FIVE // A RETURN TO PRIMITIVE PHOTOGRAPHIC PROCESSES.....	82
+ 5.1: A Return to Primitive Processes	
+ 5.2: The Darkroom	
+ 5.3: Early Emulsion Experimentation	
+ 5.4: Experimentation of Liquid Emulsion on 3D Form	
+ 5.5: Reintroducing the Camera Variable	
+ 5.6: Emulsion Aperture Experiments	
+ 5.7: The Pin-Egg	
+ 5.8: Discussion and Reiteration of Design Direction	
CHAPTER SIX // REITERATED DESIGN CRITERIA.....	132
+ 6.1: Reiterated Design Criteria	
+ 6.2: Introduction to The Imprimotype	
+ 6.3: Audience and Context	
CHAPTER SEVEN // DESIGN ITERATIONS AND REFINEMENT.....	142
+ 7.1: Design Iterations and Refinement	
+ 7.2: Final Design	
+ 7.3: Instructional Graphics	
+ 7.4: Sacrificing the Imprimotype	
+ 7.5: Imprimographs	

CHAPTER EIGHT // FINAL DISCUSSION AND	
CONCLUSION.....	172
+ 8.1: Discussion and Conclusion	
+ 8.2: Future Development	
 // BIBLIOGRAPHY.....	183
 // LIST OF FIGURES.....	185
 // APPENDIX.....	188
+ A.1: Full Capture Pinhole Investigation	
+ A.2: Other Early Experiments Conducted	
+ A.3: Light and Shadow	
+ A.4: Conceptual Form	
+ A.5: Basic Darkroom Setup	
+ A.6: Modified Diana+	
+ A.7: Full Aperture Investigation	
+ A.8: Folded Chemical Processing Stand Net	
+ A.9: Full Camera Form Investigation	





CHAPTER ONE | INTRODUCTION



fig. 1.1 'Little Sarah,' Aged 5 years, January 18 1997 (from the family album, published with permission.)

1.1 // INTRODUCTION

I was born in 1991, and I grew up in a period of transition between the analogue and the digital.

As a child I watched movies on VHS and enjoyed nothing more than pulling out the ribbon in a cassette just to wind it all back up. My father had a typewriter, and I loved pressing all the keys and making the type bars jam up. My mother had a film camera, (a 35mm consumer model from an unfortunate era of design) which only came out on very special occasions. Most of the photos taken had poor composition, bad lighting or a finger obstructing the flash, but there were so few photographs that each one was cherished. I could even refer to each by a simple description of subject, and Mum would know the photo.

Upon entering my teenage years, I traded playing marbles and cards in the playground for computer games such as Pinball and Solitaire. I watched DVDs, listened to CDs and typed my homework on a computer. At 14 I was given a 5.5 mega-pixel digital camera, which was incredible resolution and clarity for the time. Photography became my favourite pastime. It truly gave me insight into a way of seeing that I had never experienced before, and it provided a way for me to show others how I saw the world around me in a sense that “I was there, and this is what life was at the moment that I saw it” (Cartier-Bresson, 1999: p. 53)

I learned about composition and scale, which I only knew of then as ‘framing.’ Sometimes I would turn the camera on, just to see how a scene looked through the lens. I found it so interesting that a scene could be manipulated to portray different ideals, just by the framing of the photograph “every time we look at a photograph, we are aware, however slightly, of the photographer selecting that sight from an infinity of other possible sights (...) The photographer’s way of seeing is reflected in his choice of subject” (Berger, 1972; p. 10). During my teen years, I often found that though I could use photograph to portray to others my way of seeing, the resulting photograph also taught me to understand and process how I saw the world.

At 16, I was among the last year groups at my school to be taught film photography and the darkroom processes required to bring those photos to light. I had troubles learning to trust a film camera, understanding exposure, light and time without the real-time reassurance of an LCD display. I found analogue photography so difficult to learn, feeling frustrated about getting maybe just 1 or 2 usable negatives on a 24 exposure roll but I enjoyed the anticipation of reviewing the negatives and the amazing feeling I would get every so often when the negative roll was filled with photos beautiful enough for assessment. My favourite part of the whole process, the most incredible and rewarding part was the satisfaction of watching an image ‘appear’ on the page, seeing the crisp lines of focus and the bokeh greys.

Just two years later the school made the switch to solely teaching digital photography, but I have never forgotten the wonder and anticipation of the darkroom photography experience.

“Of all the **means of expression, photography** is the only one that **fixes forever** the precise and **transitory instant**”

- Henri Cartier-Bresson (*The Minds Eye*, 1999; p27)

”

1.2 // RESEARCH INTEREST

My research interest came about as a critical response to the experiential nature of digital photography. Having grown up at the tail end of the consumer analogue photography era, I strongly feel that the move to digital (though offering affordability and accessibility) has come with many changes and what I categorize as 'losses'; particularly in the realm of ritual and experience.

Photography was once reserved for special moments, but today it is an activity that allows us to document every passing moment. However, it is astonishing that despite now having a way to 'preserve' every experience, our connection with experiences has in some ways been weakened. It is now a common sight to observe individuals becoming so caught up in taking photographs during an event (be it a sports match, party, or a display of fireworks) that they risk missing out on experiencing the event itself. This change has come about due to digital technology allowing photography to become ubiquitously integrated into everyday life (Rubinstein, D. & Sluis, K. 2008; Cruz, E. G. & Meyer, E. T. 2012).

Cruz and Meyer, who focus their research on new media and technology, comment on the 'four movements' of photography (photography as socio-technical pendulum, amateur mass-produced cameras, portable professional cameras and digital photography) from first conception to becoming digitally ubiquitous in their 2012 article 'Creation and Control in the Photographic Process' (Meyer & Cruz; 2012: 20). Similarly, Rubinstein and Sluis discuss in their 2008 article '*A Life More Photographic*' how "photo-sharing and social networking sites now provide a platform for photographers to deliver their images to locations where millions can view them simultaneously." (Rubinstein & Sluis, 2008; p.10) Rubinstein and Sluis also discuss in depth technological changes and the way photography is integrated, used and viewed in our everyday life today. Interestingly, they highlight that early digital photography was originally "considered a compromise: not as good as a darkroom print, but an acceptable surrogate" (Rubinstein & Sluis, 2008; p.12) before the technology facilitated higher quality photographs and digital editing software such as Photoshop became prevalent.

The advent of digital photography has caused a change in the culture of photography, where hundreds of photos can be taken within a matter of seconds at virtually zero cost. Also, the technical precision of digital photography eliminates the need for spending time carefully considering composition, lighting, and exposure when taking a photograph. This has led to the culture of 'fast photography,' where billions of images are taken and stored but immediately disregarded. I wanted to create a critical response to the new era of 'fast photography' and provide an alternate experience to those accustomed to 'fast photography.' I decided to provide this experience through design in the form of a camera. Key criteria for this alternate experience include tactility, tangibility, scarcity and longevity.

It is not my intention for this camera to be a replacement for any type of camera currently on the market. I am not setting out to create a camera to be mass marketable or become a 'go to' type of Lomographic or alternative camera (such as a Holga or Diana.) My goal will be to provide the user with an experience of analogue photography without the need to develop a deep understanding of analogue photography processes such as chemical mixing or learning to operate in dark or safelight conditions. I can do this by simplifying the image processing process through well-communicated design. Ultimately, I wish to deliver the user an experience of analogue photography to spark curiosity, emotional connection and tactile tangibility.

This camera will be targeted at people with an interest in experiencing analogue photography, or an interest in alternative and experimental photography. The user may wish to only experience this camera once, or they may wish to experience it a multitude of times, but it is not my intent to replace other forms of photography.

At this stage in my investigation, tactility and investment of time were identified as important criteria to create a successful photographic experience as described above. In the following chapters I begin to experiment with image and how image can be used to provide an alternate experience of photography.

CHAPTER TWO | A BRIEF HISTORY OF PHOTOGRAPHY

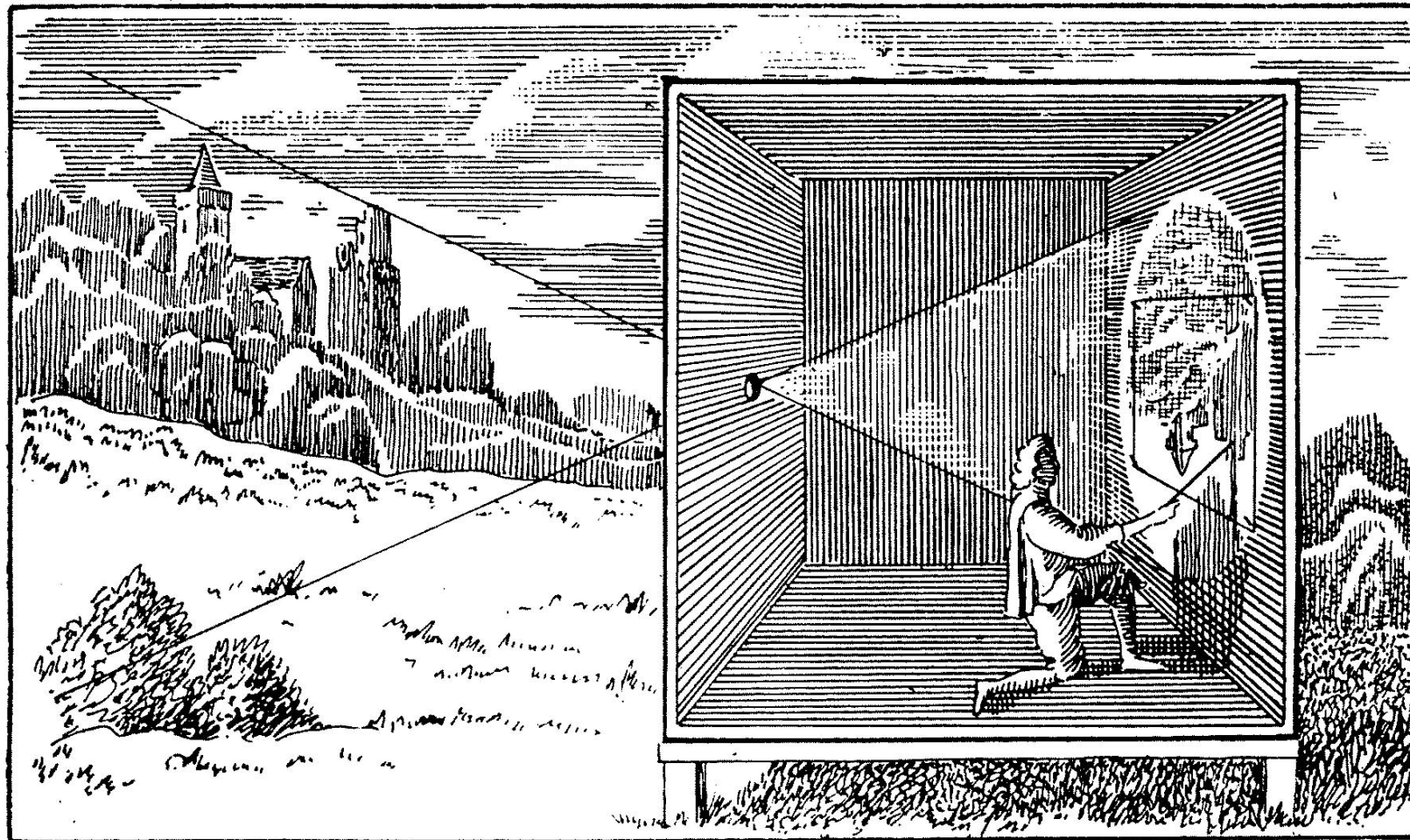


fig.2.1 CAMERA OBSCURA ROOM (<http://pixsylated.com/blog/stepping-inside-havana-camera-obscura/>)

The camera obscura preceded photography, and was often used as a painting tool for artists.

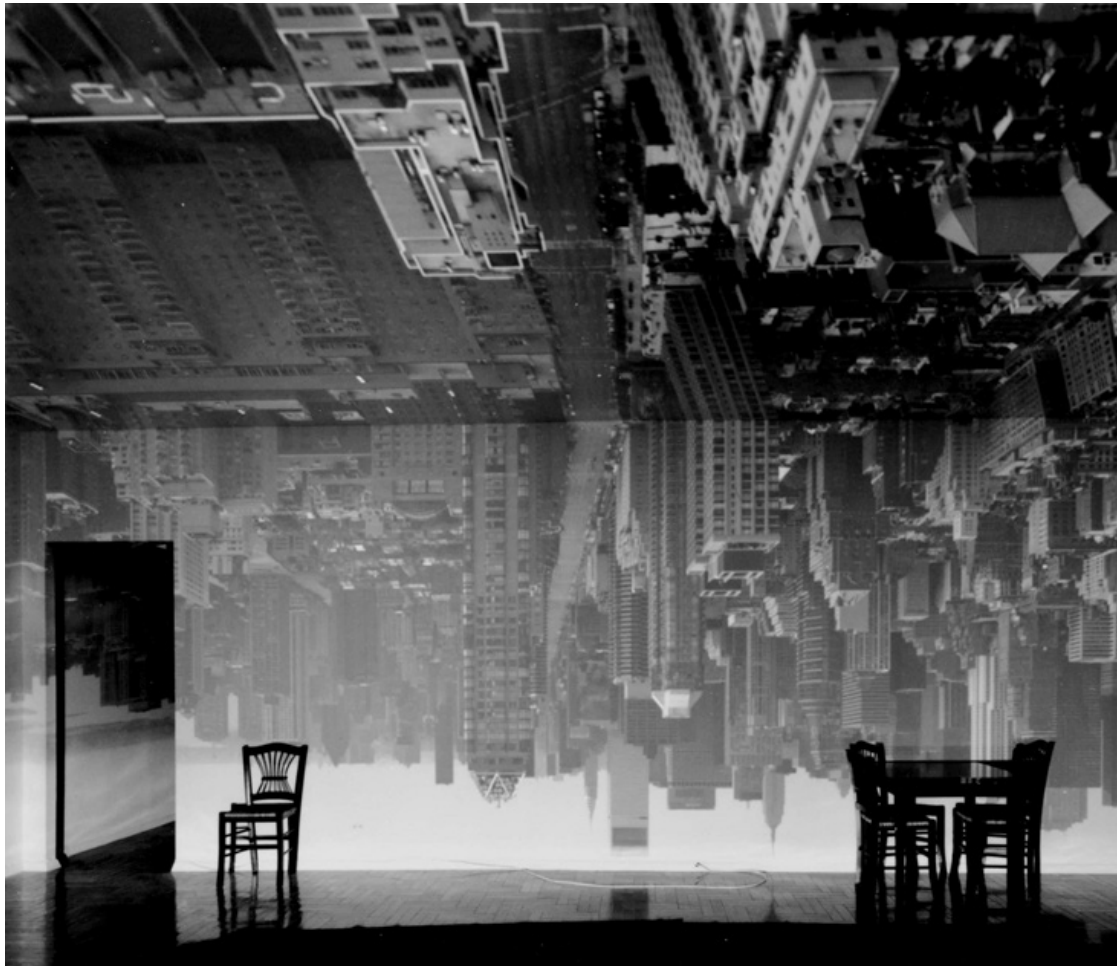


fig.2.2, fig.2.3 FROM THE COLLECTION 'CAMERA OBSCURA' BY ABELARDO MORELL (<http://www.abelardomorell.net/posts/camera-obscura/>)
A blacked out room with an aperture opening allows us to step inside and experience the camera obscura.

“ The **camera** is an **instrument** that **teaches** people
how to **see without a camera**. ”

-Dorothea Lange (*A Photographer's Life*, 1978; p.vii)

2.1// EVOLUTION OF THE CAMERA

The purpose and culture behind the practice of photography has changed dramatically since Louis Jacques-Mandé Daguerre developed one of the first practical photographic processes (the Daguerreotype process) using silver-plated copper plates in the mid-to-late 1830's.¹ He described his experimentation as a “spontaneous representation of the images of nature received in the camera obscura, not with their colours, but with very fine gradual tones.” (Daguerre, 1956: p. 11) Traditionally photography was a scarce and expensive ritual, mostly reserved for the portraiture of loved ones. Photography was so costly that often a single post-mortem photograph was all that a family would have to remember a loved one by. However, there has since been a series of technological shifts in photography that have allowed for photography to become exponentially more accessible and allowed both enthusiasts and the extended public access to cameras. These technological changes have caused a fundamental cultural shift in our relationship with the practice of photography, ultimately changing the role of photography in modern society.

¹ Though the actual date of photography's invention is widely debated, the first “practical process to creating a permanent image was introduced to a group of Parisians on January 7, 1839. This process was devised a few years earlier by Daguerre (1787-1851) based on earlier experiments from his late partner Joseph Nicépore Niépce (1765–1833)” (Gustavson, 2011) Nicépore Niépce is widely known to have captured the first permanent photograph in the mid 1820s but the process was impractical as it required several hours to days of exposure, producing results that were crude at best. “The chemical preparations which he (Niépce) used did not darken rapidly enough under action of light, for he required ten to twelve hours to produce the image and during the long time of exposure the shadows of the objects represented changed from one side to the other, so the resulting pictures were flat and monotonous in tones” (Arago, n.d; p16)

Though there have been many technological advances in photography from its conception to the present day, I have chosen to focus on the following two specific key technological shifts that best contextualize my research interest. The first of these shifts occurred in 1888 when Kodak introduced a line of simple-to-use consumer grade cameras, which for the first time allowed photography enthusiasts access to an affordable camera.² In her article on the changing nature of photography, Susan Murray states:

By the turn of the century, Kodak was creating a market for its \$1 Brownie camera and consequently redefining what amateur photography was supposed to look like and mean; (...) the company defined amateur photography as a practice that could easily be integrated into everyday leisure activities and could be used to express artistic impulses, yet more than anything else was centered on capturing those special moments of everyday life. (Murray, 2008: p. 152)

This is noted as a major event in photographic history as photography became affordable and accessible for the first time: “Amateur photography became not simply an immensely popular leisure / consumer activity but also an organized social and artistic practice that was valued for its spontaneity, authenticity, naturalness and emotionalism” (Murray, 2008: p. 151). As a result of this, a culture of amateur and semi-professional photography emerged showcasing photos of a whimsical aesthetic and carefree nature.

² In 1948, photography became more accessible with the introduction of the Polaroid Land ‘Instant’ Camera. The one-step system (created by Edwin Land) used the “principle of diffusion transfer to reproduce the image recorded by the camera’s lens directly onto a photosensitive surface - which now functioned as both film and photo” (Linderman, 2010). Photos were now materialised as soon as they were taken, offering an alternative to the lengthy (but arguably higher quality) process of having to send film away to a factory for processing, and waiting for it to come back.

The second major shift in technology, and therefore the culture surrounding photography has ties to the invention of the digital camera. The world's first digital camera was the 'Sasson Digital Camera' developed in 1975 by the Eastman Kodak Company;³ It was the size of a toaster and weighed approximately 4kgs. The Sasson provided images at a quality of 0.01 mega-pixels, which it recorded onto a cassette tape to be displayed on a television screen (Gustavson, 2011: 442,). Despite the earliest digital camera technology being pioneered in 1975, the market for digital cameras did not take off until the early 2000's, when technology advanced and the digital cameras started to come down in price (Murray, 2008: 152).

For my research and design approach, the advent of digital photography only represents part of the second major shift. Digital photography paired with the Internet, social media and networking sites, including but not limited to Facebook, Flickr, Twitter, Instagram, MySpace and Snapchat have altered the way in which photography is used and viewed today. Although photos posted on social media websites will in theory be online forever, sites such as Facebook and Flickr "move(s) old pictures out of the way to make room for the new, which creates a sense of temporariness for the photos – as if each one has a limited time in the spotlight" (Murray, 2008: 155). One of the more recent interactive social media platforms 'Snapchat' encourages users to send photos that permanently disappear after 2-10 seconds, further emphasising the temporal shift in the social consumption of photography.

This tension between permanence and temporal ephemerality is interesting to note. Digital photographs have a theoretically infinite life span on hard drives and the Internet (unless of course the hard drive fails, data corrupts, servers are removed or file types/software become completely obsolete.) However, digital photography to some extent promotes a feeling of temporariness .

³ Ironically, the invention of the digital camera contributed to the collapse of the Kodak Empire. Although Kodak were the creators of the first digital camera, they did not have the visionary insight to pursue to possibilities of digital photography for fear that it would slow the sales of Kodak Film. Ultimately, this reluctance to embrace technology left Kodak lagging in the digital photography market.



fig.2.3, fig.2.4, fig.2.5, fig.2.6, fig.2.7, fig.2.8 "ARRAY OF POLAROIDS" BY MINANNE KONG (PUBLISHED WITH PERMISSION FROM AUTHOR)

2.2 // ANALOGUE TO DIGITAL: CHANGES, GAINS AND LOSSES

The arrival of digital photography bought about many new possibilities for photography as a medium. Digital technology has allowed photography to become more affordable and therefore more accessible than ever before. Cameras are now so small they are built into computers, cellphones and watches. These devices have the processing power to capture and store hundreds of photographs per minute. Digital camera chips are now so inexpensive that even a cheap or low quality camera is capable of taking and storing quality, high-resolution images. Digital photography provides an excellent platform for learning photography with very little financial investment as the user is able to review photos in real time and thus has the luxury of shooting multitudes of photos very quickly in hopes of capturing the perfect composition.

Another benefit of digital photography is the ability to manipulate or accentuate photographs using digital software. Digital photography and the use of programs such as Photoshop have also allowed for post production, manipulation and editing of photos in quick, easy, sometimes automated ways that analogue photography never facilitated. Today, even the most amateur of photographers can take a technically high-quality photograph using a combination digital photography, automated hardware (high definition, automatic exposure/flash/aperture/focus and shutter speed) and digital software correction filters. This has bought about a generation of 'Prosumers-' in this context, consumers who are amateur photographers with access to top-of-the-range sensors and lenses with automatic camera functions that allow access to create very high quality photographs. Quality photographs today can be taken not only from digital cameras, but also from devices where photography is not considered a core task, such as smartphones and music players.

This ability to capture hundreds of photos per minute means that scarcity and investment (both financial and temporal investment) no longer need to play a role in the selection of a photo's subject and composition. As Murray highlights, photography "has become less about the special or rarefied moments of domestic living and more about the immediate rather fleeting display and collection of one's discovery and the framing of the small and mundane" (Murray, 2008: 147). Being able to take so many photographs has led to an excessive amount of photos becoming part of a digital landfill, saved onto hard drives never to be looked at again.

The readiness and availability of digital photography has created a sense that a digital photograph is not as precious (both emotionally and financially) as the traditional roll-film photograph. "The ability to store digital data on memory cards, as well as to see images immediately after taking them provides a sense of disposability and immediacy to the photographic image that was never there before now" (Murray, 2008: 156). This phenomenon has been coined 'Fast photography' and it demands changes to the ritual of traditional analogue photography that cause a loss of richness and tactility (among other losses) to the photographic experience.

Like many similar movements to revive the 'slow' including 'slow food' and 'slow film' (Rothermel, 2009; Weismantel, 2008) there is a resistance to 'Fast Photography.' Many photographers and photography enthusiasts are longing for a return to traditional photographic rituals of taking time, developing a relationship with the camera as an extension of self, and carefully selecting and framing a moment. This resistance is known as 'Slow photography.'

Tim Wu, A 'Slow Photography' enthusiast believes:

The real victim of fast photography is not the quality of the photos themselves. The victim is us. We lose something else: the experiential side, the joy of photography as an activity. And trying to fight this loss, to treat photography as an experience, not a means to an end, is the very definition of slow photography. Defined more carefully, slow photography is the effort to flip the usual relationship between process and results. Usually, you use a camera because you want the results (the photos). In slow photography, the basic idea is that photos themselves—the results—are secondary. The goal is the experience of studying some object carefully and exercising creative choice. That's it. (Wu, 2011)

Wu highlights the value in the experiential process of photography. He introduces the idea that Slow Photography requires emphasis on the process of taking a photograph as opposed to the photograph that results from this process. Wu draws attention to the fact that Slow Photography requires a photographer to develop a much deeper connection to the camera, the moment and the subject than required with 'fast photography'. By enriching the experience and extending the temporal process of photography, the resulting photograph offers the photographer a much deeper emotional connection than an image snapped at random. (Wu, 2011)

The 'slow' movements are largely about a sense of pleasure and care, care for composing a photograph, "care for making of the food, care for making of the film, but foremost care for the one for whom it is meant, who will in turn be ready for the receipt of the gift." (Rothermel, 2009; p275) In contrast to the 'fast' movements which focuses on accessibility and convenience.

The Slow Photography Movement is just one example of a longing for the analogue. As analogue photography becomes a rarity, nostalgia for the analogue photography experience has become apparent. The Lomography Society is a platform for photography enthusiasts to express experiences or emotion using artistic and experimental analogue photography. Lomographers use vintage cameras, pinholes or plastic toy cameras to serendipitously achieve a dreamy vintage aesthetic, welcoming inconsistencies such as light leaks and vignetting. A further example of nostalgia for analogue photography can be observed within the smart-device application 'Instagram.' Instagram is a social networking platform for photography, allowing users to share their photographs and candid self-portraits ("selfies") and editing them with pre-set filters to apply an analogue photography aesthetic.



LOMOGRAPHS: Expressive colours and multiple exposures to create dreamy lomographic prints. Retrieved from Lomography website.

Photos taken by Lomography society members, shared on Lomography.

fig.2.12: <http://www.lomography.com/photos/cameras/3314900-lomography-diana-f-plus/popular/11931157>

fig.2.13: <http://www.lomography.com/photos/countries/192-singapore/popular>

fig.2.14: <http://www.lomography.com/photos/cameras/3314900-lomography-diana-f-plus/popular/11852196>

“ Lomography is

“characterised by ever-changing **variables** such as the **mysterious vignettes** that frame the shot, **light leaks**, lo-fi **grain**, beautiful blurs, the magical **balance** of contrast and saturation. Lomography embraces the element of **surprise** that only analoguefilm photography can bring and whole-heartedly **celebrates** the outcome.”

”

–Lomography Website (Lomography Society, n.d.)



fig.2.15, fig.2.16, fig.2.17 "TRANSITORY" By Sam Carew (Published with permission from Author)

However, the rise of digital photography has also sparked a loss in the physicality and tactility of photographs as most photos are now kept on hard drives or in online albums. Having a physically printed photograph is becoming increasingly uncommon, as there are just too many photos to print. This is a significant loss as there is now a lack of tactile connection between a viewer and a photograph, and this in turn impacts emotional connection. As Vavik and Kourennayia from the Oslo School of Architecture and Design report, “The emotional response from a tactile experience is stronger than the visual (...) because visual perception is connected to the tactile perception.” (Vavik & Kourennayia, 2006: 2) Therefore, experiencing a photograph on a computer can provide a weaker experience than experiencing a physical copy of a photo.

Digital photography has facilitated a significant gain in the accessibility and affordability of photography, allowing for new possibilities through digital software including digital manipulation and correction of photographs. However, there has been a loss of experience, tactility, physicality, anticipation, reward and emotional connection to photos that comes with the investment of time in the photographic process. The nature of photography and the way photography is experienced has changed in a way that has caused a disconnect between the relationship of the user to the camera and the resulting image. My design challenge was to find a way to bring back a sense of the analogue photography process by reintroducing the tactility, temporal investment and nostalgia of analogue photography without dismissing the technological advances that have made photography accessible.

In the following chapters, I have detailed my investigations of methods to provide an alternate experience of photography that is rich in tactility, investment, anticipation and reward. These investigations, though diverse in nature, share the common theme of aiming to cross and intertwine the boundaries between digital and analogue processes in relation to creating an alternate photographic experience.

In Chapter Three, I investigate existing camera designs and the viability of changing the form of a camera to produce an alternate experience. Chapter Four shows a shift in focus from the camera and form to the photograph and definition of 'image.' I look into ways that photographs were taken in the past and present and investigated methods that merged digital and analogue to produce an alternative type of tactile 'photograph.' Chapter Five investigates the viability of a return to utilizing primitive photographic processes while Chapter Six offers a discussion on how a primitive process would be used to create a tactile and alternate experience to digital photography without requiring the user to have knowledge of darkroom processes. This chapter also outlines the design theory behind my resulting design. Chapter Seven introduces the Imprimotype, and provides a commentary of my design process and challenges. Finally, Chapter Eight draws conclusions on my journey to provide an alternate experience of photography and discusses potential future developments of the Imprimotype.

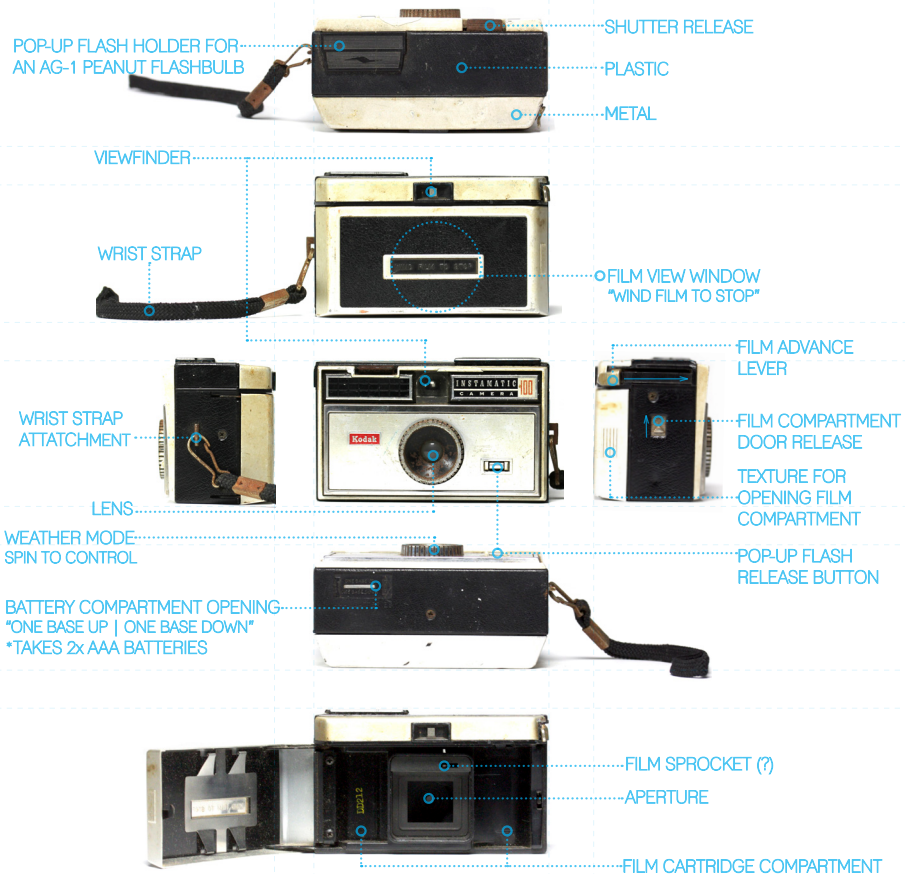
CHAPTER THREE | BACKGROUND RESEARCH AND EXPERIMENTATION

3.1 // THE ANATOMY OF A CAMERA

Tactility is of core importance to the alternate experience that I wanted to provide as tactile interaction provides a tangible connection between the user and the photographic process. I began my thesis with an investigation into existing cameras and their form, because the camera is the first (and in some cases only) point of tactile interaction between a user and the photographic process. I looked at over 30 cameras manufactured between 1935 and 2012 focusing on details such as where components were placed and how the cameras had worn as an indication of human interaction. What I found intriguing was how similar the forms of most cameras were even though many early cameras took different formats of film. More interestingly, I observed that there was little change in the core form of camera design despite a transition from film to digital.⁴

This may have been a product of the law of design and remediation, where products tend to follow what came before due to frameworks set up by earlier technologies in order to position the new product in a manner of categorized meaning for a user to quickly understand and adapt to the new evolution of a product. (Norman, 1990)

⁴The full investigation can be found in Appendix 9 (A.9.)



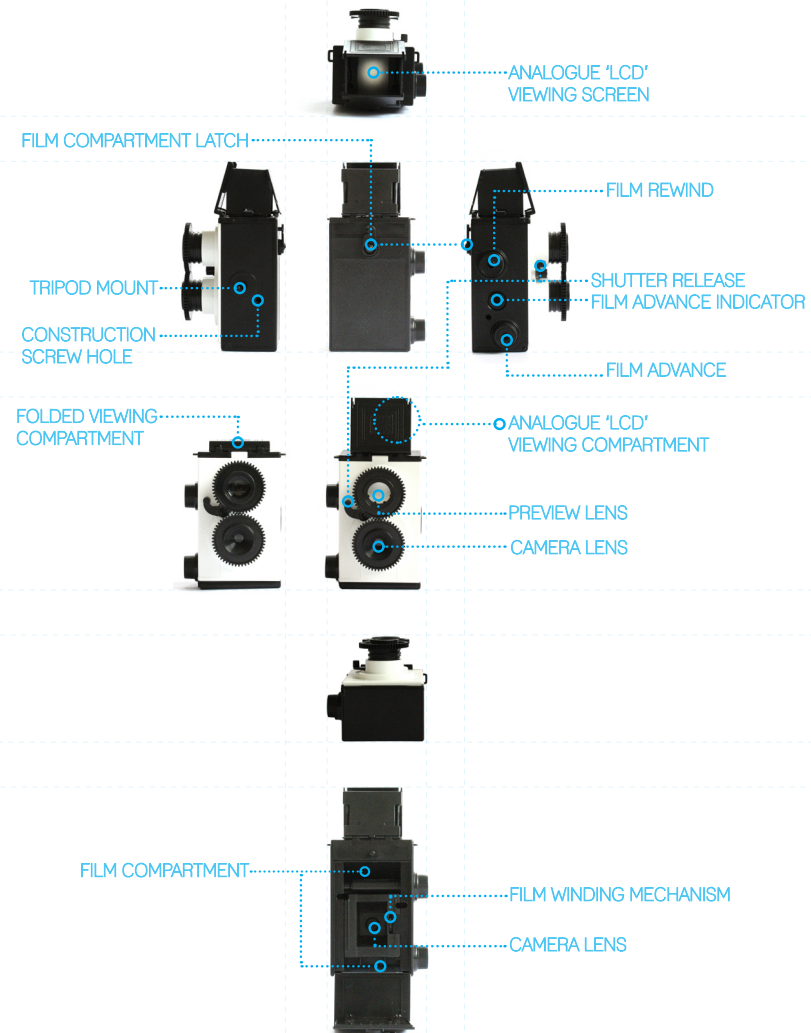


fig.3.3, fig.3.4: Author's Own Images



This investigation sparked my curiosity as to whether I could design a camera that did not confirm to the form of previous cameras, yet still be easy to understand and use. From looking at existing cameras, I noticed that even a slight change in the configuration of the main components of the camera (shutter release, lens, film chamber and display) had the power to alter the experience of taking a photograph. The Twin Lens Reflex (TLR) camera was a type of camera common between the 1870s and 1960s. TLR cameras feature two lenses: one that projected the image onto a viewing screen (viewfinder) and one for taking the photograph. The viewing screen of the TLR camera is called a 'waist level viewfinder,' as you hold the camera at waist level and look down on it to view the scene. Using a waist level viewfinder offers a different experience of photography by offering a different perspective of the photograph subject. I wanted to ascertain whether I could redesign the camera in a way that would provide an alternate experience of photography without sacrificing function or usability. This led to a design led investigation called 'Capture' detailed in the following subchapter.

Please refer to Appendix 9 (A.9) to view the full camera anatomy investigation featuring 42 different cameras from 1935 - 2012.

3.2 // FAMILIARITY VS EASE OF USE

Capture is a design driven research project that challenged T. W. Allan Whitfield's theory that familiarity is integral to understanding an object (and understanding an object leads to ease of use). Whitfield, a professor at Swinburne University of Technology in Melbourne, theorizes that to understand a 'new' object we need to "position it in terms of categorical meaningfulness" (Whitfield, 2005, p.10) so that the brain can identify and make sense of that object.

The aim of 'Capture' was to understand whether an object can take on an unfamiliar form, yet still be 'familiar' and easy to use through considered use of visual language. The object I chose to redesign was the pinhole camera- the most basic of image capturing devices.

Throughout the development of 'Capture,' I paid particular attention to the way in which the camera communicates to a user through visual cues and affordances defined by D. A Norman as "the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used." (Norman, 1990, p.9) In particular, I paid close attention to communicating where to hold the camera and making the 'lens' visually allude to opening. I provided no instruction on how to use the camera and presented it simply as a 'designed object' without disclosing its function as a camera until the late stages of the user testing in order to observe an unbiased opinion of how the user thought that the object functioned.

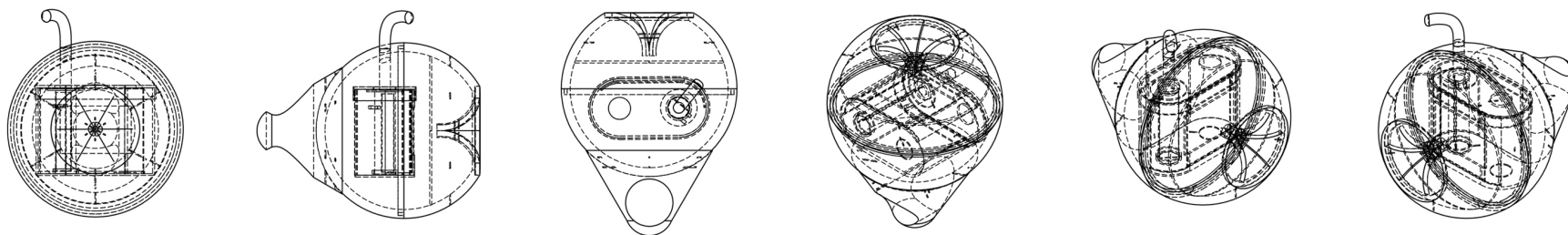
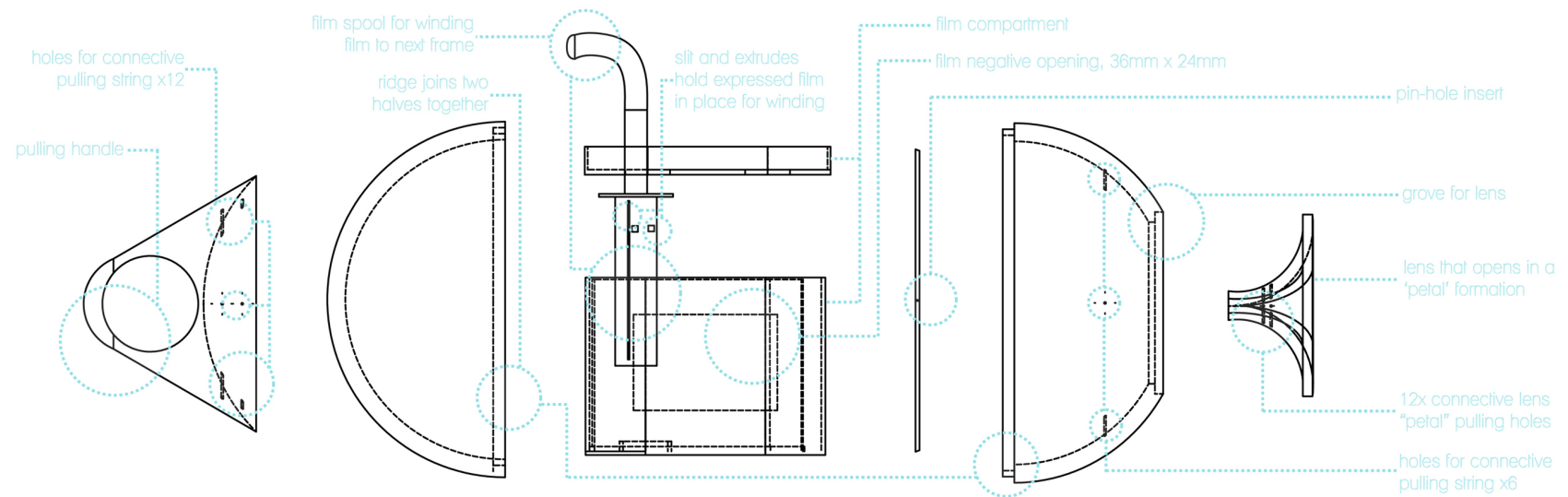
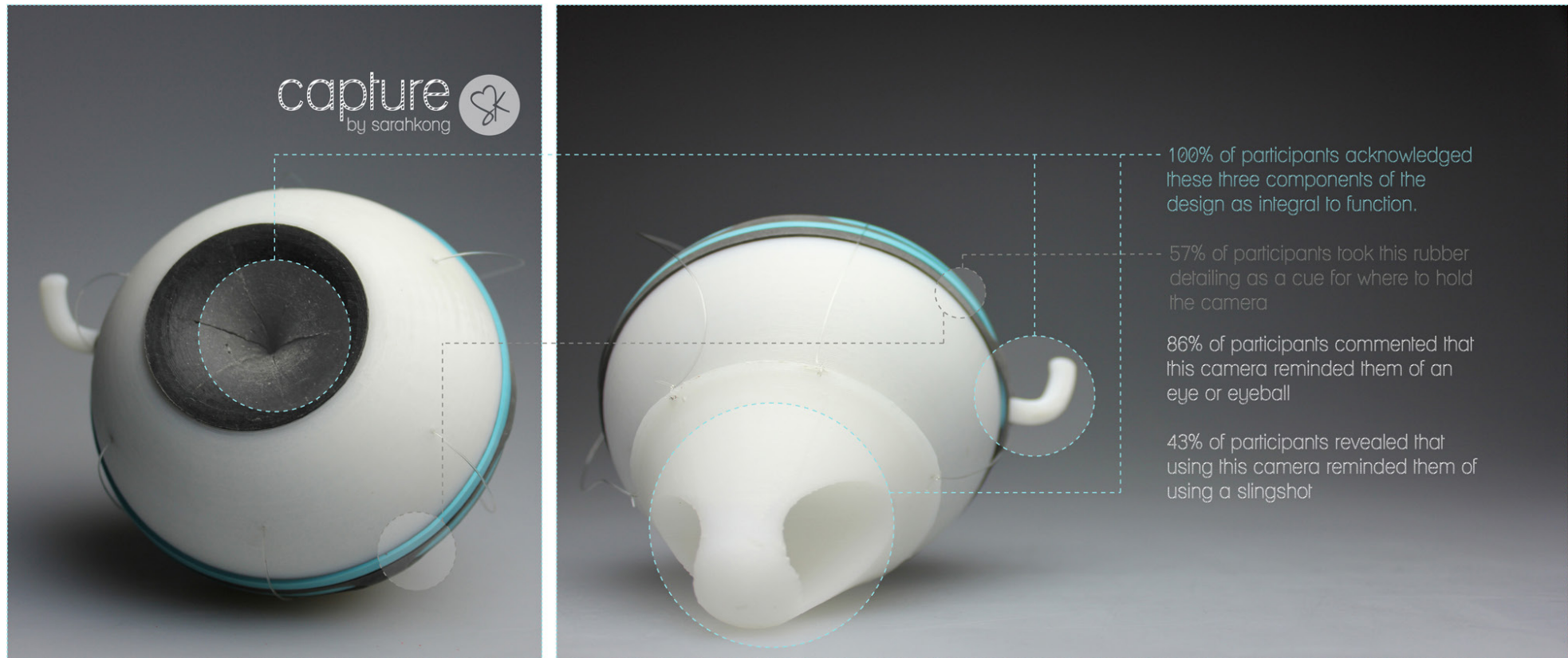


fig.3.7: Author's Own Images



FAMILIARITY VS EASE OF USE // FINDINGS

From this investigation I found that an object can be unfamiliar yet easy to use. The results of this investigation pointed to the unusual looking camera as being self explanatory and easy to use despite its unfamiliar spherical form. I believe this camera was easy to use due to its easy to identify, simplified, prominent functional components (All participants identified the 3 key components of the camera (the Shutter release, Aperture, Film Winder as being integral to function without knowledge of the objects function or being explicitly asked.) I found that a user's unrelated past experiences and tactile knowledge was drawn upon as a reference of familiarity when handling and using the Capture pinhole. Therefore, past visual and tactile knowledge gave users an understanding of how to proceed in interacting with 'unfamiliar' objects.

Please refer to Appendix 1 (A.1) to view the full familiarity vs ease of use investigation.

CASE STUDY // LYTRO CAMERA FORM



Left: The original camera by Lytro, Middle/Right: The second generation camera by Lytro.

fig.3.9: Original Lytro Camera <http://i0.wp.com/www.gcubedofficial.com/wp-content/uploads/2014/04/lytro-camera-group-stacked.jpg>

fig.3.10: Lytro Illum Camera <http://www.wired.com/wp-content/uploads/2014/04/Lytro-Illum-81.jpg>

fig.3.11: Lytro Illum Camera <http://petapixel.com/2014/04/22/lytro-unveils-illum-light-field-camera-features-1-inch-sensor-costs-1600/>

CHAPTER FOUR | THE PAST AND PRESENT OF IMAGE

“ Every form which is **traced by light** is the **impress** of one **moment**,
or one hour, or one age in the great passage of **time**. ”

-Lady Elizabeth Eastlake (*Photography*, 1857; p.65)

4.1 // THE PAST AND PRESENT OF IMAGE

The investigation of camera and form in the previous chapter resulted in an understanding that I could alter the experience of photography through the design of a camera. At this stage, I had to take a step back and decide what type of photograph a camera redesigned around offering an alternate experience would take. Because the form of a camera and the resulting type of photograph are ultimately interdependent, I could not have a clear understanding of how to redesign the camera without first deciding on the resulting image from this camera.

I began this 'image' stage of research with exemplars of the types of image from past and present before a visual research exploration of ways to provide an alternate experience of photography through image.

// PINHOLE PHOTOGRAPHY

Pinhole photography is one of the most primitive forms of photography. The pinhole image can require anything from a few seconds to hours or weeks of exposure depending on the chemical make up of the film used. Pinhole photography captures a photograph by exposing onto film (of any format) or straight onto a photosensitive surface (such as a photosensitive paper) through a very small 'pin' hole. Of course, the size of the 'pin' depends on the size of the camera and/or required exposure area. Even a space as large as a room can be converted into a camera by blocking out all windows with black plastic and using a penny sized hole as an aperture. (Renner, 2004: p. 38) Pinhole photography allows manipulation through methods such as double exposure or using colour filters. This purity and often dream like aesthetic of the pinhole photograph appealed to me; however, I did not want to use an existing film in my redesigned camera, as I wanted to use more unconventional or unseen methods maximize the effect of the alternate experience I wanted to offer.

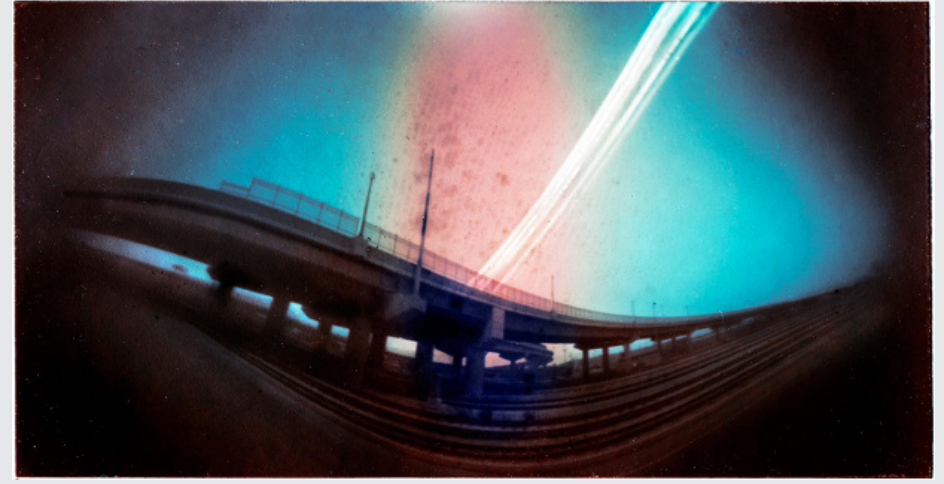


Top Row: fig. 4.1, fig. 4.2 Bottom Row: fig. 4.3, fig. 4.4, fig. 4.5, fig. 4.6: PINHOLE PHOTOGRAPHS BY IMRE BECSI
<http://chriskeeney.com/blog/2010/03/imre-b%C3%A9csi-march-2010-%E2%80%93-featured-pinhole-photographer>

// PINHOLE SOLOGRAPHY

A solograph shows the path of a light source (usually the sun, moon or stars) over a long period of time. Often, we can observe multiple lines of light a solograph, highlighting the change in the path of light over time. Pinhole Solography is much like regular pinhole photography, except that Solographs are exposed straight onto paper and not film for months or even a year. The major difference between solography and regular pinhole photography is that the photograph must not be treated with darkroom chemicals as the image is imprinted through discoloration onto the photosensitive paper from the extended exposure time. Treating a solograph with chemicals will reduce in a pure black 'overexposed' photograph. Instead, to 'fix' the solograph (which is captured on the paper in negative form) it must immediately be scanned once removed from the camera before stark daylight causes the image to degrade. Once scanned, a solograph is digitally reversed to produce subtly coloured static images of the dynamic movement of light over time.

I particularly appreciate the way in which creating a solograph is in some ways the ultimate form of 'slow photography' where generally, more time invested in the exposure and photographic process leads to more spectacular image. It also appealed to me how the 'fixing' of a solograph requires a digital process; therefore a successful solograph must be created through using a fusion of both analogue and digital processes.



Top Row: fig.4.7, fig.4.8 Bottom Row: fig.4.9, fig.4.10: "HELIOGRAPHS" BY MATTHEW ALLRED
<http://petapixel.com/2013/02/13/photog-captures-time-in-stunning-color-pictures-using-a-pinhole-camera/>

// CYANOTYPE

A cyanotype is created by either placing the subject directly onto the cyanotype 'blueprint' paper to create 'pictograms,' or by superimposing the negative of an existing photograph on transparency paper. Cyanotype paper is activated by UV light (such as from the sun) and physically changes colour to indicate its current stage of exposure or development. A cyanotype is 'fixed' after being bathed in water. I found the cyanotype process extremely interesting as it did not require the use of a darkroom or darkroom chemicals in its 'development' process and therefore would not require a user to understand darkroom processes. However, the resulting image of the cyanotype created by the pictogram method (not requiring an existing photo to be superimposed upon it) suffers too much of a loss in quality after going through the 'fixing' process; the only exception to this was if the object used for superimposing onto the paper had a large variation in opacity.



"CYANOTYPES" BY ANNA ATKINS

fig. 4. 11 Cyanotype by Anna Atkins, <http://www.abbeville.com/blog/?p=880>

fig. 4. 12 Cyanotype by Anna Atkins 1843, <http://altfotografcilik.blogspot.co.nz/2010/05/cyanotype-derin-mavi.html>

fig. 4. 13 Aging Alone by Alan Sockloff. All Rights Reserved <http://blog.voxphotographs.com/2012/>

fig 4. 14 <http://jafferartmaterial.blogspot.co.nz/2011/05/07-cyanotype.html>



The Cyanotype Process, Author's Own Images
fig.4.15, fig.4.16: The exposure process fig.4.17: Removal of image subjects



The Cyanotype Process, Author's Own Images

fig. 4.18, fig. 4.19: 'Fixing' process of the cyanotype in water fig. 4.20 The resulting cyanotype

// LYTRO LIVING IMAGE

After exploring the viability of the previous three analogue processes of photography, I looked into three more recent interpretations of the photographic image. In 2012, Lytro introduced a new type of photograph- the 'living photograph'. Lytro's pioneering software allows for never before seen dynamic ability to adjust the focus in your image after taking the photograph. Lytro describe their Illum camera as:

A consumer Light Field Camera which offers photographic capabilities never before possible, such as focusing a picture after it's taken, changing the perspective in the picture and creating interactive living pictures that can be endlessly refocused and enjoyed by friends and family online. (Lytro, 2014)

Lytro was an interesting case study as their intent for the 'living photograph' is to transform 'the camera into a powerful computational photography platform, forever changing the way everyone takes and experiences pictures.' (Lytro, 2014) Though I knew that I wanted to create my own alternate experience of photography around tactility and physicality, Lytro had achieved their own take on an alternate experience of photography through extensive development of digital software.



Setting a photos focus/depth of field after the fact with a camera that creates a 'living image' by Lytro
fig.4.21, fig.4.22, fig4.23 The same photographic image with 3 different points of focus, adjusted after the photo was taken.
Image by Lytro, <https://pictures.lytro.com/lytro/collections/41/pictures/832622>

// 3D PRINTED PHOTOGRAPH

A 3D printed photograph is created using the digital data of an existing photograph. By tweaking the contrast of a photograph in a program such as Photoshop and editing in a digital 3D program such as Rhino (Palandjoglou, n.d.) where the value and extrusion height or thickness of the photograph can be assigned based on data from the varying grey tones of the original photograph. This brings a heightened level of tactility to a photograph compared to a photographic print on paper.



fig.4.24, fig.4.25 3D Printed Version of A 2D Photograph. Photos from Instructables tutorial by Alejandro ('alepalan')
<http://www.instructables.com/id/3D-Printing-Photographs-using-3DS-MAX/>

// 3D PRINTED REPLICA

The idea of a 3D printed replica has become a reality very quickly with the advancement and accessibility of both 3D scanning and 3D printing. The method of obtaining digital data of a form through 3D scanning and using this data to create a 3D photograph can be seen in this series of 3D printed fetuses by Brazilian design graduate Jorge Lopes Dos Santo. Dos Santo utilizes data from ultrasounds, CT and MRI scans to create the exact physical image of a human fetus in utero.



fig.4.26: 3D Printed Embryo Portrait, fig.4.27: Raw Scan Data fig.4.28: Computer Model for Editing Mesh fig.4.29: 3D Printed Version of Scan <http://www.dezeen.com/2009/07/16/the-fetus-project-by-jorge-lobes-dos-santos/> Project by Jorge Lobes Dos Santos in collaboration with a paediatric cardiologist at Imperial College while studying on the Design Products MA course at London's Royal College of Art.



fig.4.30, fig.4.31, fig.4.32 Japanese 3D Printed Portrait Photo Booth <http://www.spoon-tamago.com/2012/11/09/worlds-first-3d-printing-photo-booth-to-open-in-japan/>
Limited time exhibition at the exhibition space EYE OF GYRE in Harajuku. The project was brought to the public by the creative powerhouse PARTY/Omote3D.

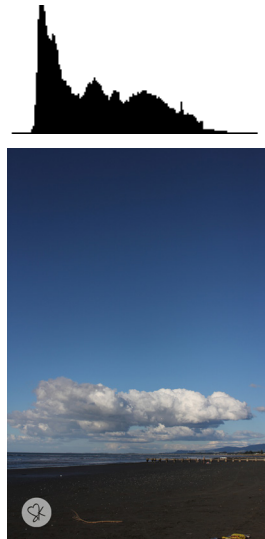
// 3D PRINTED MINIATURES

3D photographs that are anatomically exact miniature self-portraits have become popular around the world. The 'photographs' below are from a 3D portrait 'photo booth' project in Japan.

I found the 3D printed replica photographic process interesting it offers a tactility and physical interaction with the resulting photograph that is not seen in a regular digital photograph. In some respects, 3D printing a photograph draws parallels to 'slow photography' (Wu, 2011) as the printing process requires time and temporal investment.

fig.4.33 (set of 9 images) Observation Digital Data, Author's Own Images

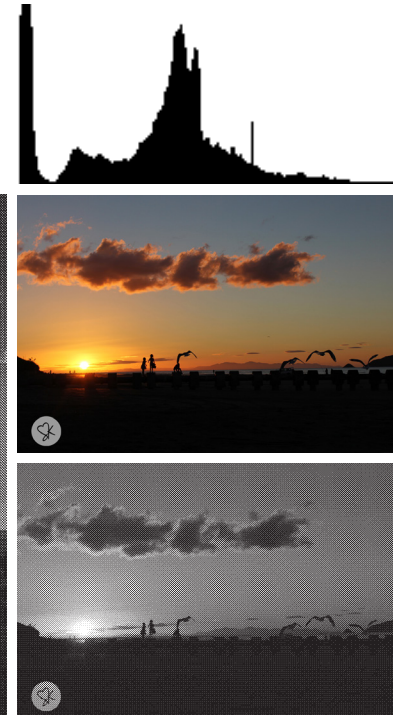
Left: 4.33A



Centre: 4.33B



Right: 4.33C



// REDEFINITION OF IMAGE

At this stage in my research, I became particularly interested in the potential of 3D printing as a photographic process and decided to begin experimentation into creating a 'new' type of image. However, I wanted to deviate from the existing 3D photographic processes such as the above, but still utilize digital data in order to provide a unique alternative experience of photography, utilizing the tactility of a 3D printing to create a tangible physical image.

Digital photography is digital data- hundreds of thousands of pixels make up each and every digital photo. Each photo carries data in the form of histograms (related to exposure,) colour values, exposure times, aperture and much more. I hypothesized that I could repurpose and utilize this data in a new way to create a completely new evolution of image with the data from an existing photograph. In this series of experiments I investigated the potential of utilizing digital data from digital photographs in three different ways to create a 'new' or 'redefined' photographic image with the potential to provide an alternate experience of photography. The first (4.33A) investigates the potential of data from colour values within the photograph, the second(4.33B) explores parametric modeling from bitmap data within the image and the third (4.33C) looks at growing an analogue image onto a scaffold generated from digital data.

4.2// COLOUR VALUE DATA AS PHYSICAL IMAGE

I focused on looking at the data from colour values and histograms embedded within a digital photograph. At this stage, I crudely created an abstract 3D 'graphical' model in Solidworks based on five colour values from an existing photograph, as this was a very logical first step to begin to three-dimensionalize photographic data. The two very abstract objects on the right represented a manifestation of the original photographs based on the data from colour values.

However, I found that this crude system reassigning of data created a 3D image that was far too abstract as it failed to highlight the relationship between the new image and the original digital photograph. Therefore I proceeded to explore other methods of using digital photographic data to create a new 3D image that would fulfill my brief of offering an alternative and unique experience of photography.

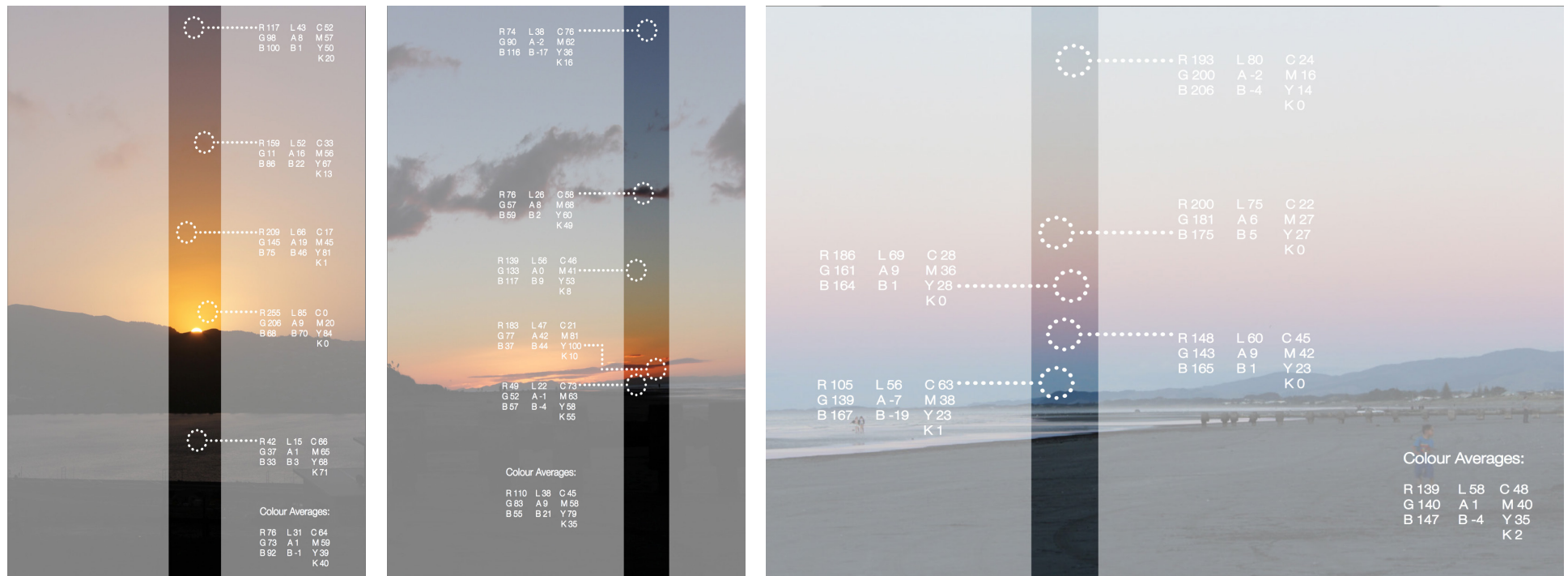


fig.4.34, fig.4.35, fig.4.36, Colour Value Investigation, Author's Own Images

4.3// PARAMETRIC BITMAP SAMPLING

It became evident that parametric modeling could be an extremely useful way to utilize digital data and create a new 'image' and alternate experience of photography. I discovered it was possible to efficiently use existing photo data to create new, three-dimensional photographs using digital modeling software 'Rhinceros' and a parametric modeling plugin called 'Grasshopper.' Once the initial 'logic' (tree of commands that provides programming instructions and parameters) was set up, I could very quickly explore the outcomes of form related to a particular set of data by changing one or more of the parameters (height, density, photograph feeding data, bounding box, etc.)

This Grasshopper logic was set to identify the tones and contrast of the photograph in the 'image sampler box' using bitmap sampling based on the data from that photograph. I found that this process had the potential to become part of a system creating a new experience of photography. Hypothetically, I could use this process to convert an existing photograph (uploaded by a user through the internet) into an alternate, three-dimensional version of itself (to be sent to the user by mail) thus providing a new way to experience the original photograph. At this stage, I thought that the natural logical step in developing this process was to make this image physical and tangible through 3D Printing.

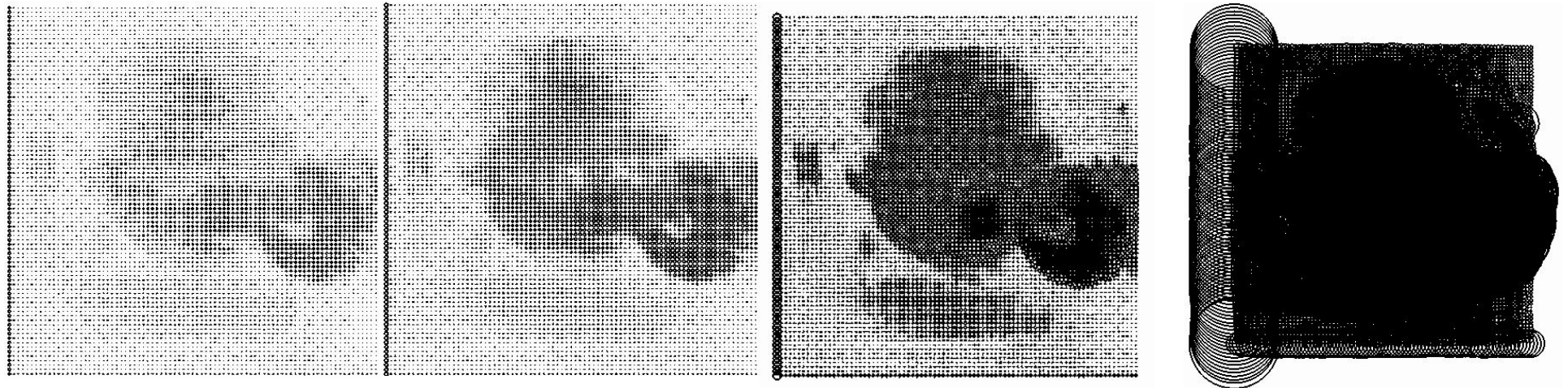
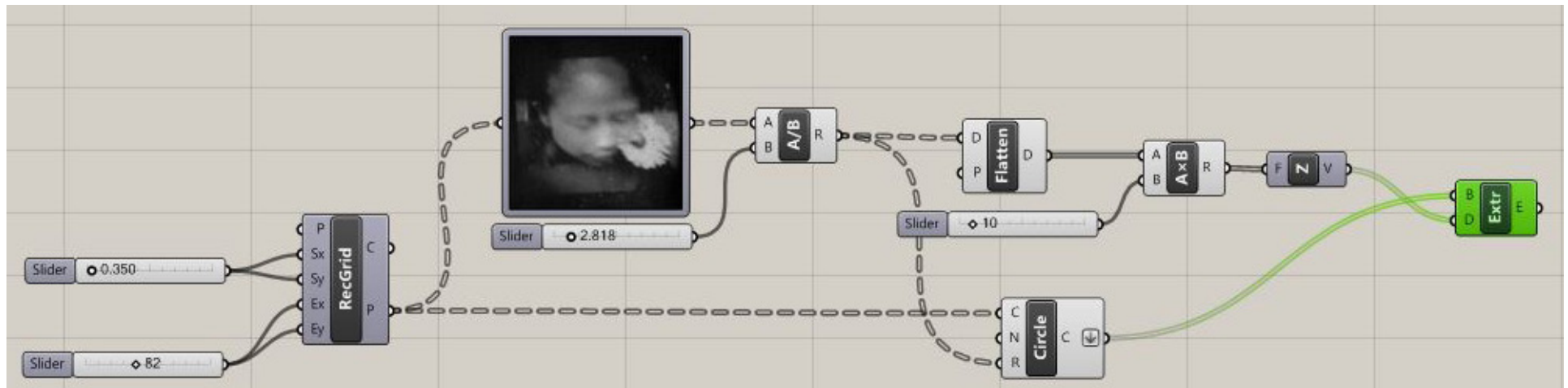


fig.4.37, fig.4.38, fig.4.39, fig.4.40 (above) Logic to create 3D form, (bottom) forms as outcomes for different parameters in + Include image showing 3 dimensionality of these models. Far right: Ideal parameters being exceeded leads to an Image appearing “digitally overexposed.” Author’s Own Images.

4.4// A PHYSICAL PHOTO

Using an UP! 3D printer, I printed variations of parametrically generated 3D ‘photographs’ to experience their tactility as physical objects. Although the quality of each three-dimensional photograph was low due to the resolution of the UP! Printer; I found that it felt really comforting to have a solid object to tangibly interact with.

Despite the fact that this image was created using the data from a digital photograph by a digital process, having a tangible physical representation of that photograph provided a different connection to the original photo in a way that the digital photograph could not. However, I was unsure about proceeding with this as a photographic output for my redesigned camera because I wanted the user to be more involved and present in the ‘slow’ process of creating their image rather than only interacting with the process through a computer.



fig.4.41: 3D Printed Parametric Portrait Models. Author's Own images



fig.4.42: Author's Own Photograph

4.5// GROWING IMAGES

After investigating the potential of utilizing 3D printing ('additive manufacture') to create a photograph, I became interested in how I could incorporate the analogue while still using a process of additive manufacture. I remembered 'growing' crystals in my childhood and thought of how the natural forming of crystals could be likened to 3D printing, and was in essence an analogue form of additive manufacture.

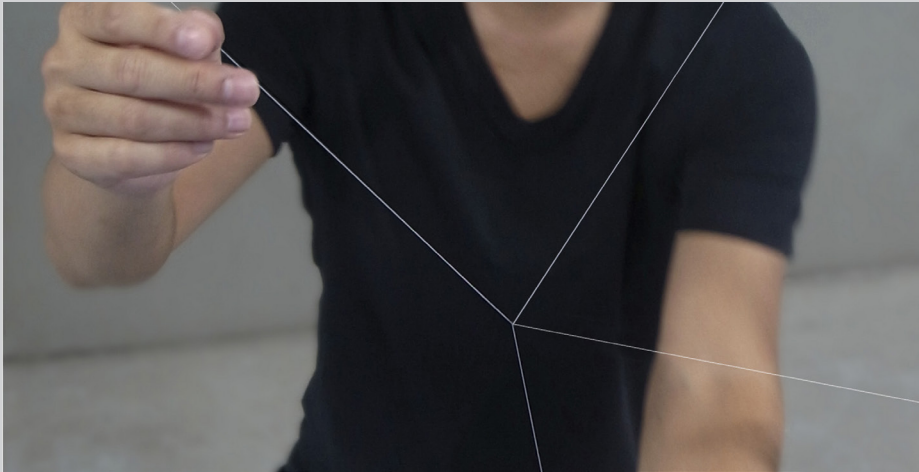
I felt that creating 'photographs' made up with crystal 'pixels' would fulfill my desire to provide the tactility, physical relationship and temporal investment of analogue photography to a user. My reasoning was that the physicality of the crystals would create a three-dimensional photograph and waiting for the crystals to form that image was a process that demanded a 'slow photography' approach, requiring patience and temporal investment.

Crystals can be formed from many substances, each substance providing a different crystal shape, size and colour. In this investigation I chose to use Borax, as this substance is known to form good-sized crystals effectively within a short manner of time.

The process I used to form crystals involved dissolving the powdered Borax in a glass of warm to hot water (70-80 degrees Celsius) until the liquid becomes fully saturated and no more powder will dissolve. Once the solution was saturated I dropped a scaffold tied onto a piece of nylon string into the solution as a guide for the crystal to begin forming upon. I left the saturated solution to cool to room temperature before finally placing the solution in the refrigerator. Refrigeration causes 'super saturation' of the solution which optimizes the occurrence of crystals forming (MIT, n.d.)

The scaffold plays an important role in the forming of crystals, as they tend to be opportunistic and begin to form where it is easiest for them to grip to. I decided to use a digital 3D print as a scaffold for the crystals to form upon not only because I would be mixing digital and analogue processes but also because I could theoretically use data from a 'photograph' to create the digital 3D form. My hypothesis was that I could somewhat guide where the crystal would grow by generating more surface material in the area of the scaffold where I wanted more crystals and use more 'blank' space within the scaffold where I wanted less crystals to create a stippled effect. The overall outcome would be a three-dimensional 'photograph' (or representation of a photograph) rendered in crystals.

CASE STUDY // TOKUJIN YOSHIOKA, SPIDERS THREAD CRYSTAL FURNITURE



Tokujin Yoshioka's use of crystals to create furniture and exhibition landscapes shows the importance and influence of using a scaffold in his crystal grown furniture and how a scaffold paired with different types of crystals changes the aesthetic feel and overall outcome of his work.

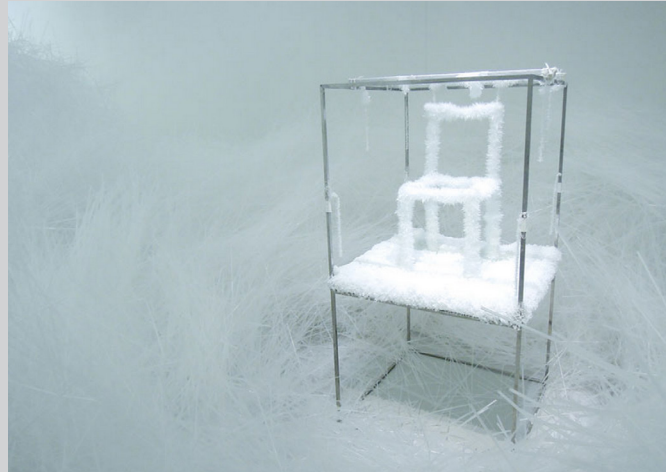


fig.4.43, fig.4.44, fig.4.45, fig.4.46, fig.4.47, fig.4.48, fig.4.49: Tokujin Yoshioka's Spider Thread and Venus. Images from Tokujin Yoshioka's personal portfolio website: <http://www.tokujin.com/en/art/installation>

For this experiment, I did not use data from a photograph to create the 3D prints, reasoning that the fine details of how the 'camera' for this process gathers the data for creating crystal 'photographs' could come later. At this time I simply wished to observe the nature of borax crystals and how they would form on a 3D print. In my test file for these scaffolds I deliberately added crevices, negative space, flat surfaces and various angled surface transitions to observe how the crystals would form under different surface conditions. I chose to print the scaffolds on an UP! Printer using black ABS material because I wanted the low-fi nature of the print to complement the low-fi nature of the crystal growing process. The black of the 3D print would also contrast and accentuate the presence of the Borax crystals, which are clear.

After two hours of refrigeration I could see crystals forming in the solution. Small crystals had begun forming upon my scaffold, whilst even smaller ones had formed on the bottom of my glass. I prepared a new, clean glass and I transferred the scaffold with the newly formed crystals to the new glass before carefully transferring the super-saturated solution. This process was important, as the tiny crystals on the original glass would have continued to grow, detracting from the growth of the crystals forming upon the scaffold. The solution spent a further 48 hours in refrigeration⁵ before the scaffold filled with crystal growth was removed from the solution and left to dry.

⁵ To create bigger, or even more crystals if a bigger surface area needed to be filled, the scaffold can be transferred into a new batch of saturated solution at this point, and the process repeated.

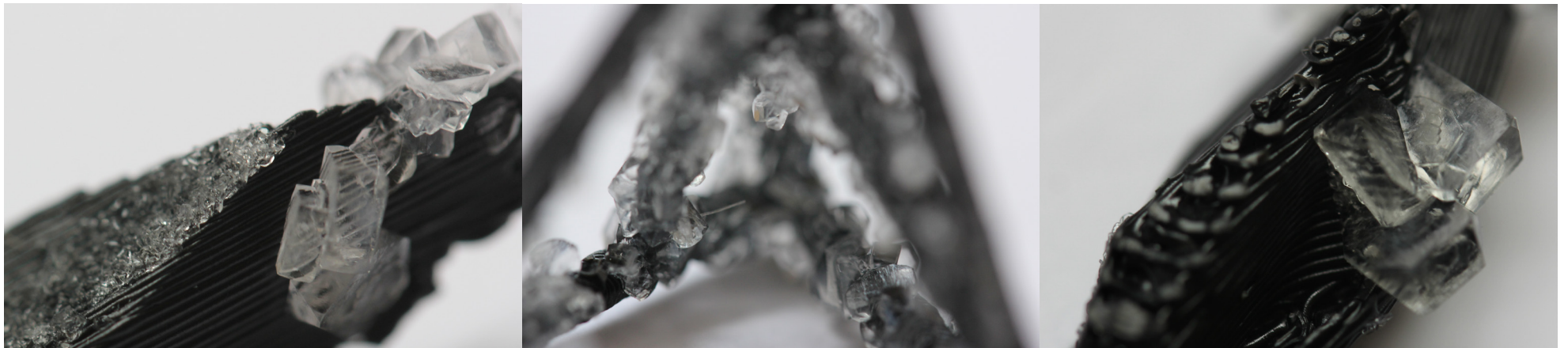


fig.4.50, fig.4.51, fig.4.52 : Methods of Additive Manufacture, Author's Own Photographs



fig.4.53, fig.4.54, fig.4.55: Methods of Additive Manufacture, Author's Own Photographs



fig.4.56, fig.4.57, fig.4.58: Methods of Additive Manufacture, Author's Own Photographs

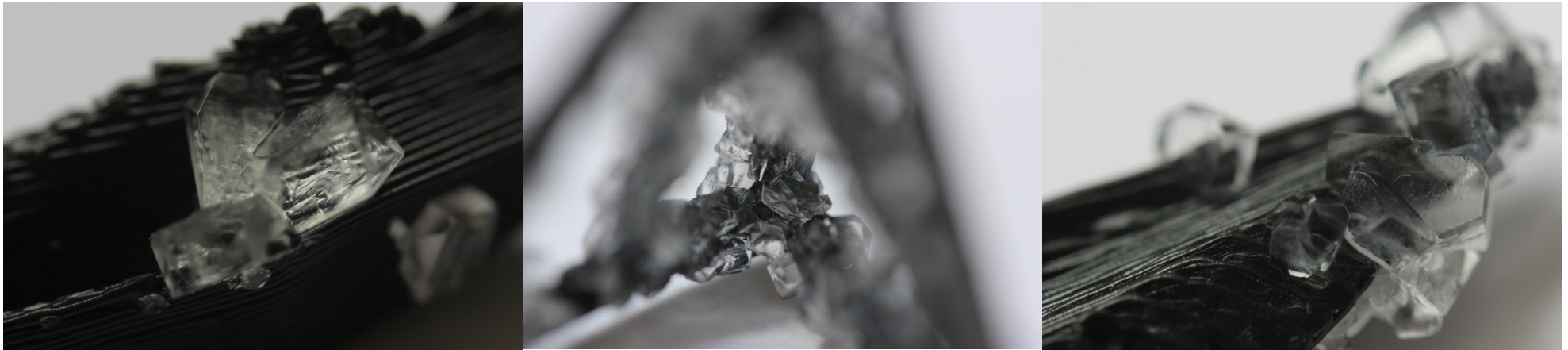


fig.4.59, fig.4.60, fig4.61: Methods of Additive Manufacture, Author's Own Photographs

I found the crystals preferred to form on the sharpened edges of the scaffolds, rather than the face. I had thought that the crystals would prefer to grow on the more textured areas of the 3D print as there was more grip but found that they were indiscriminate to how textured the surface was, preferring instead to grip onto interior edges and corners. Overall, I found there was good growth in crevices, with the largest cluster of crystals from this experiment forming in a crevice. I also noticed smaller crystals forming upon large crystals. These small crystals would have formed after the larger ones and were either not given long enough to grow larger or the solution was no longer saturated enough to promote further growth. I thought this was interesting and it sparked the idea that, if further pursued I could deliberately form and layer different sized crystals formed from different substances (different crystals carry different traits of size, shape and colour.) I could then create variations in my crystal 'photographs' representing features of an image such as light, shadow, hue and more. I believed that beautiful thing about this process was the potential for serendipity of each 'photograph.'

Though I thought that the aesthetic of crystals grown on 3D printed scaffolds was eye catching and unique I still had doubts over whether this would be an appropriate process of creating an alternate experience of photography. Unlike the aforementioned parametric process of 3D printing an image, the process of growing crystal photographs would allow the user to have a much more first hand approach of the photographic growing process. However this process would require a user to learn a fair amount about cultivating crystals and require that user to prepare multiple saturated solutions making the process in general difficult to learn and therefore unfit for the alternate experience for a user that I wish to provide.

4.6 // DISSCUSSION AND SUMMARY

Ultimately, from the experimentation shown in this chapter, I came to the conclusion that any attempt to redefine image would be beset with technical obstacles and difficulties. Though the idea of utilizing digital photo data to create a new image was fascinating, my experiments with colour values, bitmap sampling and parametric modeling to create a new image relied too heavily on software and would not allow the tactile in-process connection with a while my investigation into a fusion of analogue and digital additive manufacture required an undesirable and somewhat steep learning curve for a user. None of these experiments led me to believe that they could be utilized to provide the alternate experience I intended. Therefore, I decided to take a step back to explore an existing analogue photography technique and focus more comprehensively on redesigning the camera and its form to provide a more tangible and tactile alternate experience of photograph.

CHAPTER FIVE | A RETURN TO PRIMITIVE PROCESSES

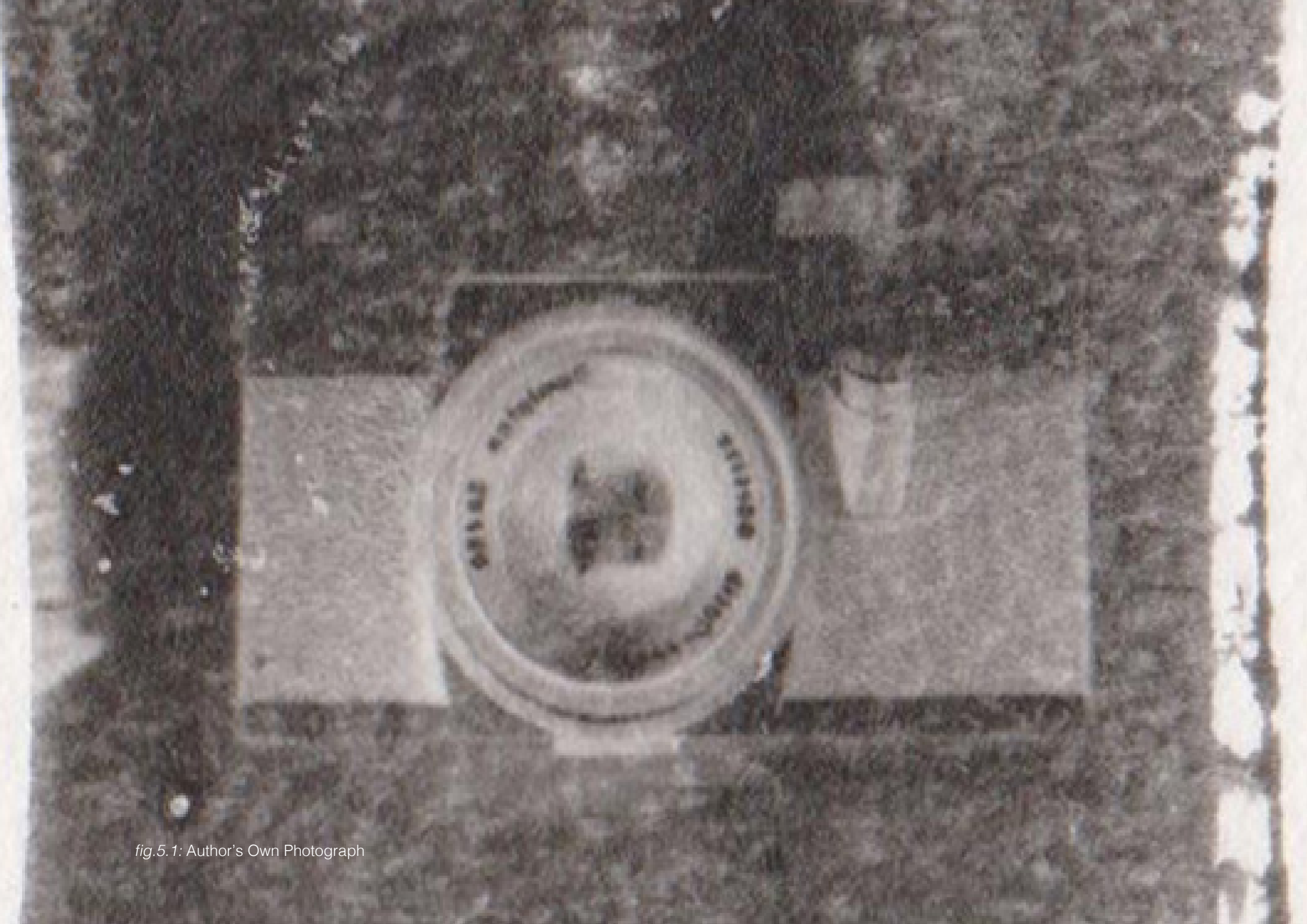


fig.5.1: Author's Own Photograph

5.1// A RETURN TO PRIMITIVE PROCESSES

At this point in my design research, I discovered photographic emulsion, a gelatin like substance which allows virtually any surface to be light sensitive. I was interested in primitive photography, and became curious to see if I could intertwine a primitive photograph process with the very modern process of 3D printing from my experimentation in chapter 4.4. I believed that there was value in this approach, as it could provide an interesting contrast of aesthetic whilst merging digital and analogue processes.

Photographic emulsion is typically used in the darkroom with an enlarger and existing negatives; however I wanted to use the emulsion in a pinhole camera as enlargers are very uncommon in 2014. The interesting thing about using photographic emulsion in a pinhole is that it would produce a negative image- but I thought that this could add to an alternate experience. Negatives were commonplace in analogue photography;⁶ but, photographic negatives are rarely seen today as digital photography does not naturally produce a negative.

⁶During the late 1820s, the wealthy French Photographer Joseph Nicéphore Niepce and his brother Claude made trials with a camera obscura and sensitized paper to produce pictures for a hot-air, engine powered lithography press they had designed. These first experiences resulted in tonally reversed pictures, known today as negatives (Trachtenberg, 1980.)

5.2// THE DARKROOM

For the purpose of photographic experimentation, I set up a small portable darkroom with a safelight lamp. I found that the darkroom and photographic chemical essentials were difficult if not impossible to find in New Zealand or even the wider Australasia. This perhaps emphasizes how uncommon the practice of analogue photography is today, particularly in New Zealand.

The photosensitive chemical used to create a light-sensitive surface was Rockland's Liquid Light Photographic Emulsion. Photographic emulsion offers much more versatility than any type of photosensitive paper, because it can be used on virtually all types of surfaces. I used a red/amber ("red") safelight as the photographic emulsion required the classic red safelight. For a chemical developer, I used Ilford Multigrade Paper Developer as it came in liquid form making it easy to mix (1 part concentrate to 9 parts water.) The emulsion required a hardening fixer to ensure the emulsion hardened properly upon the surface. I used Kodak Professional Fixer, a general-purpose hardening fixer that had to be imported from America.

At this stage, having finally gathered all the required materials for a makeshift darkroom⁷ I had some reservations as to how this experimentation would play out as various people with significant darkroom expertise had warned that photographic emulsion was notoriously difficult to work with. I decided to approach experimentation very systematically, and did not hold out high hopes for good results, or whether I would get results at all. What I had not anticipated, was the beauty of the images that would result from such a primitive form of photography- my records of these experiments and the experimentation process is outlined in the following subchapters.

⁷Please refer to Appendix 5 (A.5.) for full equipment and pricing list.



fig.5.2: Darkroom, Author's Own Photographs



fig.5.3: Darkroom, Author's Own Photographs

5.3// EARLY EMULSION EXPERIMENTATION

As I had never used liquid emulsion before, the aim of these first experiments was purely to gage the quality of a photograph on emulsion and to ascertain whether emulsion would be a suitable photographic medium to provide the alternate experience of photography that I wished to achieve.

Liquid emulsion is gelatinized at room temperature, and must be heated up to liquefy before it could be applied to a surface. I found that the key was to only work with the emulsion after leaving it to rest and liquefy in a bath of warm water between 65 and 70 degrees Celsius.

I started by painting the emulsion onto a heavy grade watercolor paper using a wide paintbrush to create test 'film.' Unsure whether I would obtain results from this series of experimentation, I began by simply exposing the emulsion in a pictogram manner to test the response of the emulsion and the chemicals. After establishing that the emulsion and chemicals were both responsive, I tried to expose an existing 35mm negative onto the emulsion on a whim using a torch as a light source. This turned out an unsuccessful result perhaps due to my lack of enlarging equipment.

I decided to use a pinhole method of exposing the emulsion 'film' that I had prepared. For the first 6 experiments, I tried using my own 'tinhole' (pinhole in a tin with a focal point to 50mm) but I did not manage to get any photographs from it, so I decided to switch to a tried and tested camera in order to eliminate as many variables to the photographic process as I could.

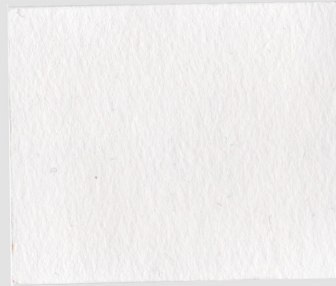
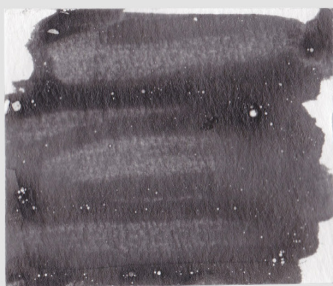
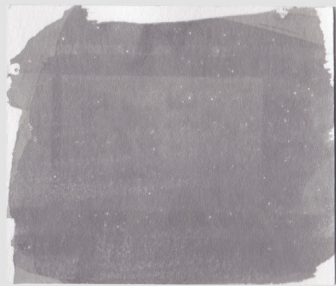
The camera that I chose to use for this series of experimentation was a Lomography Diana+ (*fig 5.4*) due to its simple 'pinhole-esque' mechanics with 4 basic aperture options. The deciding factor to use this camera was the ability to leave the aperture open for any amount of time, so long as the shutter release remained triggered. For most of the images I tied a string to the shutter release and pulled on this to keep the shutter open, whilst minimizing camera shake.



My first successful attempt at creating a photograph with Liquid Light Emulsion depicts a view of The Beehive. This photo led to great excitement as the quality of the photograph Liquid Light produced was far better than I had anticipated, even though the photograph looked underexposed. Naturally, this initial excitement was then followed by 9 consecutive 'failed' experiments as I tested various exposure times and aperture sizes. Despite these experiments being unsuccessful in obtaining a coherent image, the variations of tone and light leaks in these photographs remained visually interesting.

In the documentation that follows, the top row represents the negative photograph out of the camera, the second row provides experimentation notes and brief explanations of process and the bottom row shows a digitally reversed 'positive' version of each photograph.

All Emulsion Series figures that follow in this chapter are the Author's own photographs



1. 42 SECOND EXPOSURE
(IMPRINT)

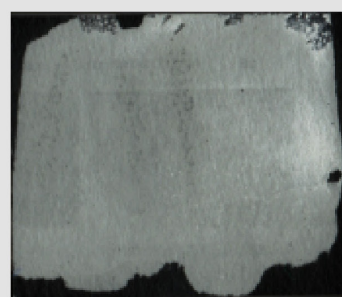
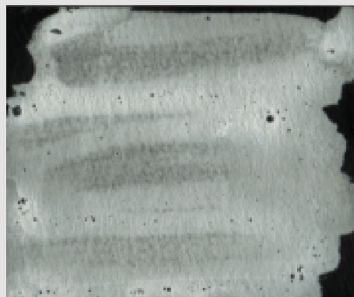
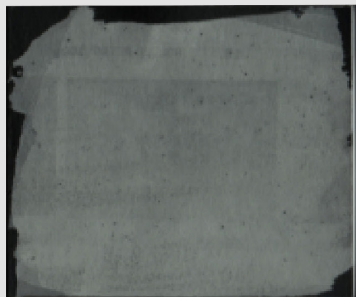
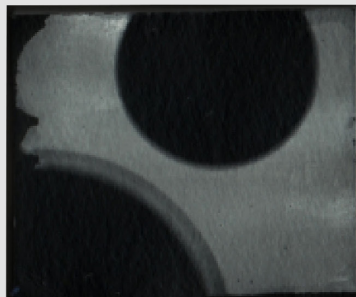
30 SECOND DEVELOPER
DEVELOPER CHEMICAL MAY
BE WEAK

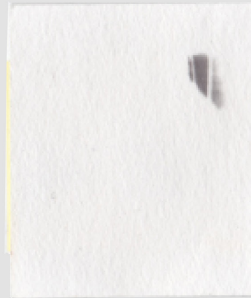
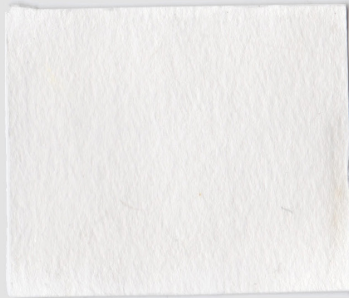
2. 45 SECOND EXPOSURE
NEGATIVE PLACED ON
PAPER.
UNDEREXPOSED - BUT CAN
MAKE OUT OUTLINE

3. 75 SECOND EXPOSURE -
MAY BE OVEREXPOSED
MAJOR BUBBLES IN LIQUID
EMULSION COAT!
NOT ENOUGH / NOT THICK
ENOUGH WITH EMULSION -

4. PINHOLE - 1 MINUTE -
NOTHING HAPPENED.
REALISED THAT PINHOLE
IS LIGHT-PROOF
(NO "PIN")

5. RULING OUT DEVELOPER
ISSUE...
1 MINUTE EXPOSURE
CONTACT PRINT - NEGATIVE
CAN SEE WRITING!!!
(DIDN'T REALISE TO START)





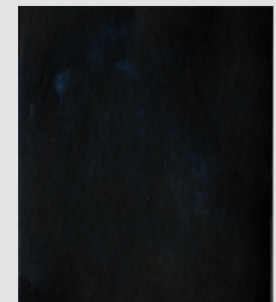
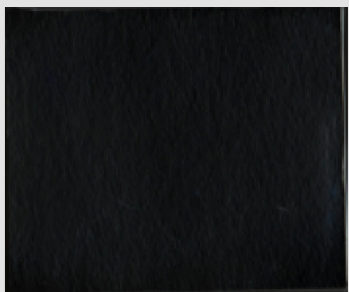
6. PINHOLE.
2 MINUTE EXPOSURE.
NOTHING HAPPENING...
FAULT W/ PINHOLE? OR,
WAAAY UNDEREXPOSED??

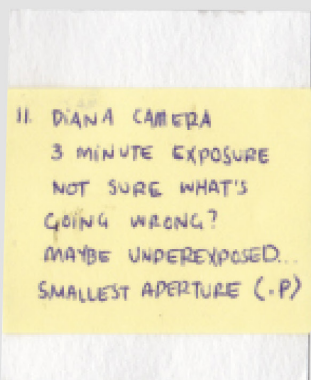
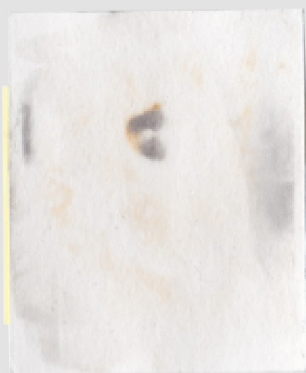
7. PINHOLE,
5 MINUTE EXPOSURE.
SOMETHING MIGHT BE
HAPPENING?? ...
MAY BE WAY UNDEREXPOSED
???

8. PINHOLE. 2 MINUTE
EXPOSURE.
IMAGE SEEMS TO BE
SMALL... GOING TO TRY
A DIFFERENT CAMERA

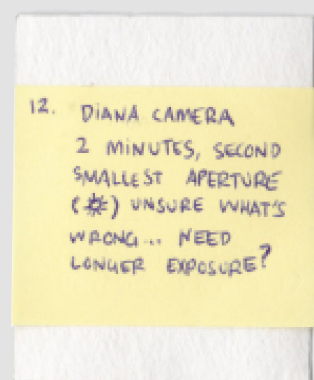
9. 2 MINUTES, DIANA,
SMALLEST APERTURE (f/16)
GREAT CONTRAST
SHARPER THAN EXPECTED
BRIGHTING WAS BRIGHT,
OVERCAST.

10. DIANA CAMERA
SMALLEST APERTURE (f/16)
3 MINUTE EXPOSURE
MAY HAVE NOT LEFT
IN DEVELOPER FOR
LONG ENOUGH.

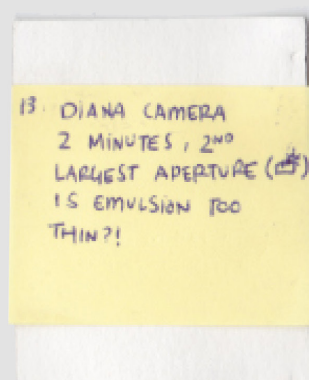




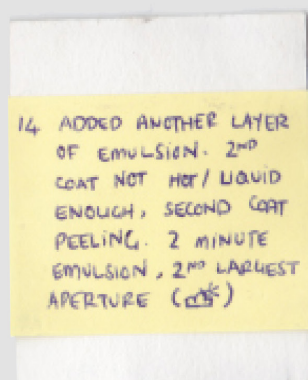
11. DIANA CAMERA
3 MINUTE EXPOSURE
NOT SURE WHAT'S
GOING WRONG?
MAYBE UNDEREXPOSED...
SMALLEST APERTURE (-P)



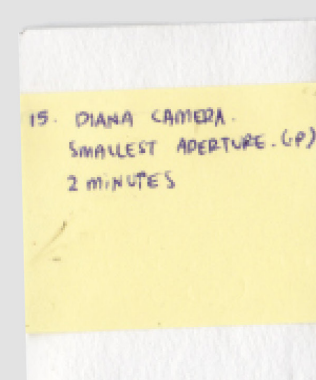
12. DIANA CAMERA
2 MINUTES, SECOND
SMALLEST APERTURE
(*) UNSURE WHAT'S
WRONG... NEED
LONGER EXPOSURE?



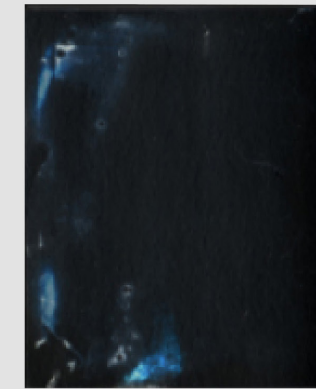
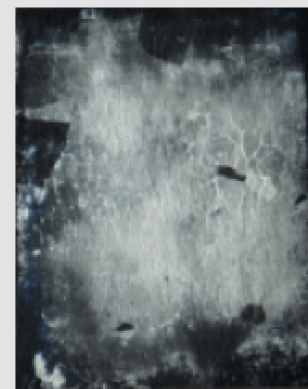
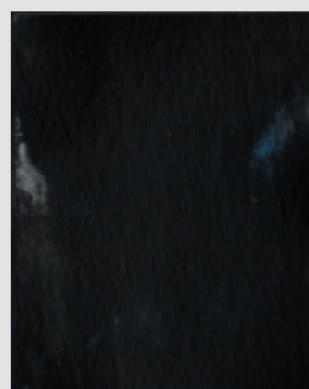
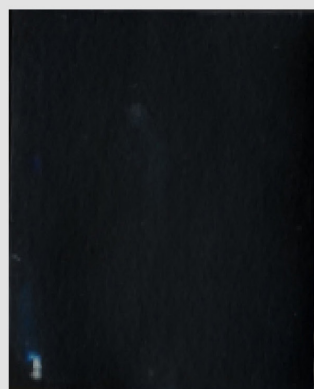
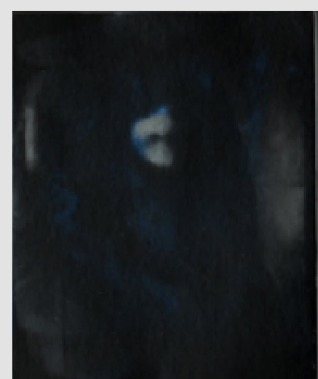
13. DIANA CAMERA
2 MINUTES, 2ND
LARGEST APERTURE (++)
IS EMULSION TOO
THIN?!



14. ADDED ANOTHER LAYER
OF EMULSION. 2ND
COAT NOT HOT / LIQUID
ENOUGH, SECOND COAT
PEELING. 2 MINUTE
EMULSION, 2ND LARGEST
APERTURE (++)



15. DIANA CAMERA.
SMALLEST APERTURE. (-P)
2 MINUTES





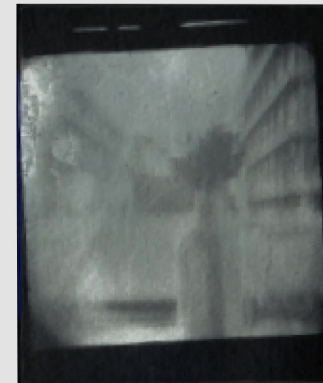
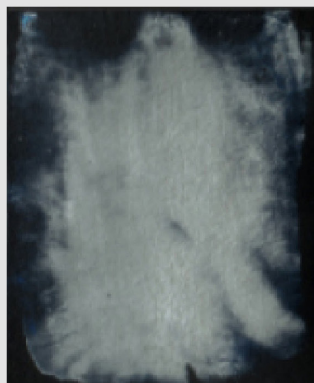
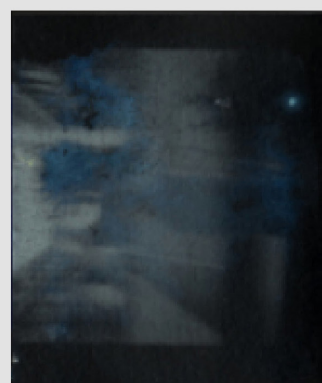
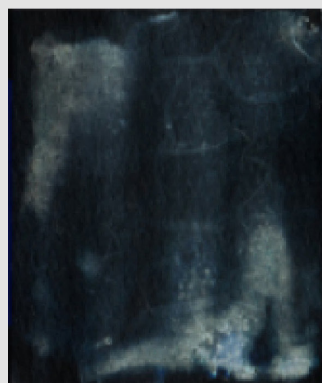
16. DIANA CAMERA
2.5 MINUTES, SECOND
LARGEST APERTURE
POTENTIAL DEVELOPMENT
/DEVELOPER ISSUE?

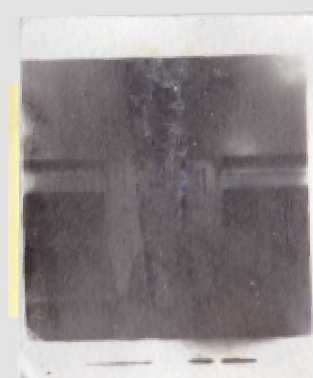
17. DIANA CAMERA
3 MINUTE EXPOSURE,
SMALLEST APERTURE
(-P) IN BRIGHT
DAYLIGHT

18. 3 MINUTE EXPOSURE
SMALLEST APERTURE
(-P) INDOOR PORTRAIT
TEST... UNEXPLAINED
FAIL? MAYBE LIGHTS
TURNED ON TOO EARLY

19. 4 MINUTES AT
SMALLEST APERTURE (-P)
DIANA CAMERA.
SLIGHTLY UNDEREXPOSED?

20. DIANA CAMERA
SECOND SMALLEST
APERTURE (⊙)
3 MINUTES





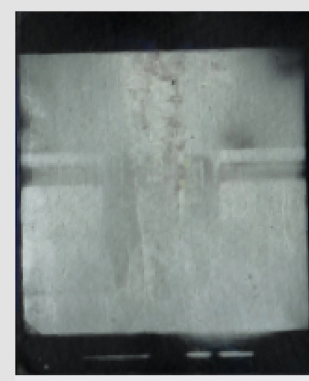
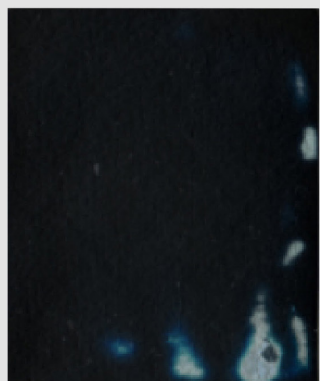
21. DIANA CAMERA
2 MINUTES,
LARGEST DIANA
APERTURE (f/16)

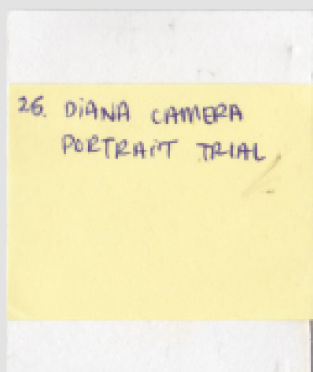
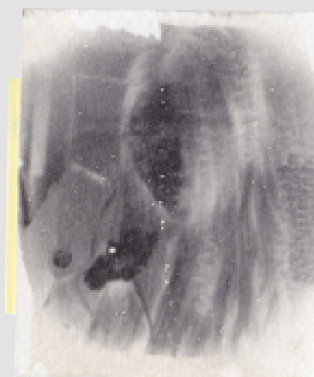
22. WAS SHUTTER
CLOSED??! WHOOPS!
2 MINUTES, LARGEST
APERTURE (f/16)
CHEMICAL MARKS??

23. 3 MINUTES AT LARGEST
APERTURE (f/16) IN
DIANA CAMERA.
-SLIGHTLY UNDEREXPOSED?
(FACE WILL BE DARK?)

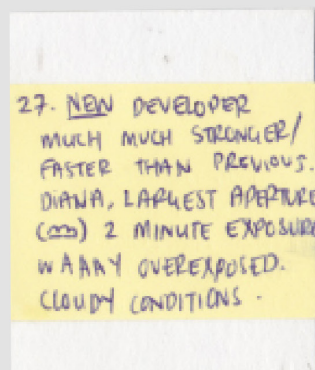
24. DIANA INDOOR
PORTRAIT ATTEMPT.
3 MINUTES AT
LARGEST APERTURE (f/16)
FAIL - UNDEREXPOSED...
OR FAILED TO EXPOSE??

25. DIANA, WIDE OPEN,
3 MINUTES.
OVEREXPOSED -
BIT OF PAPER STUCK
TO FRONT...

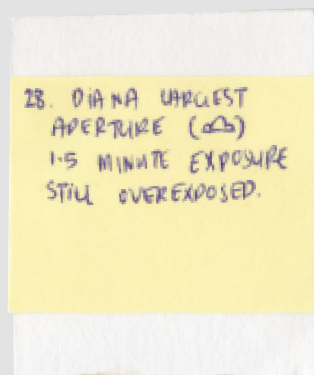




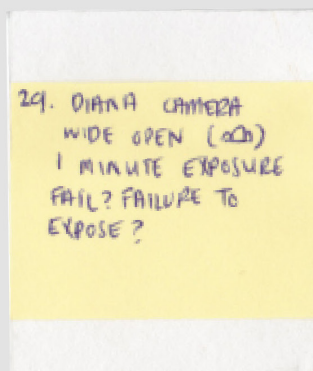
26. DIANA CAMERA
PORTRAIT TRIAL



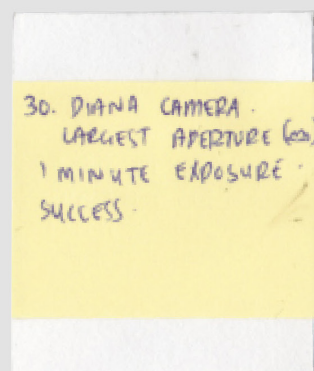
27. NEW DEVELOPER
MUCH MUCH STRONGER/
FASTER THAN PREVIOUS.
DIANA, LARGEST APERTURE
(∞) 2 MINUTE EXPOSURE
WAY OVEREXPOSED.
CLOUDY CONDITIONS.



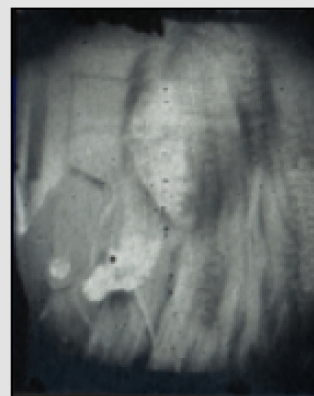
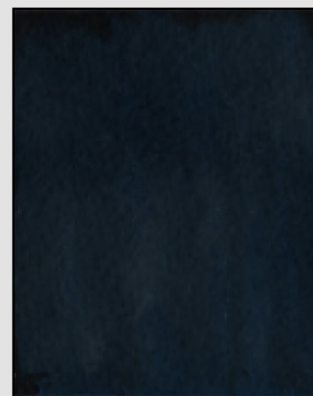
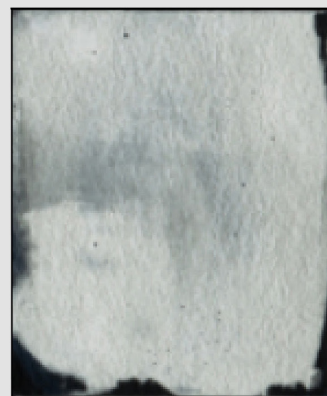
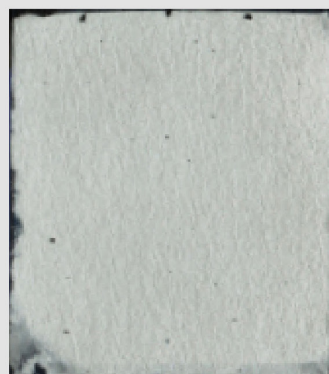
28. DIANA LARGEST
APERTURE (∞)
1.5 MINUTE EXPOSURE
STILL OVEREXPOSED.

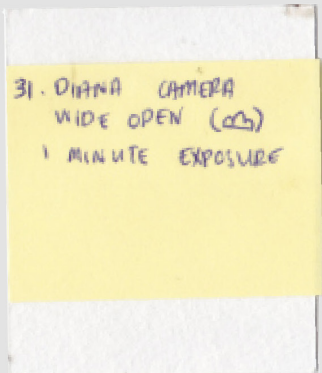


29. DIANA CAMERA
WIDE OPEN (∞)
1 MINUTE EXPOSURE
FAIL? FAILURE TO
EXPOSE?



30. DIANA CAMERA.
LARGEST APERTURE (∞)
1 MINUTE EXPOSURE.
SUCCESS.





5.4// EXPERIMENTATION OF EMULSION ON 3D FORM

After experiencing some success in creating 2D emulsion portraits I decided to take this a step further and try to incorporate this analogue photography process with the digital. The following set of emulsion experiments looked at ways to combine both analogue and digital processes as well as 3D and 2D image.

In this set of experiments I wanted to explore the potential of utilizing 3D scanning to create a photograph. 3D Scanning creates a type of digital 'image' with data that can be manipulated using programs including Rhinoceros, Grasshopper, Solidworks or 3DS Max. My hypothesis was that I could combine digital technology and analogue photography by superimposing an analogue photograph onto a digitally created 3D print of the same subject, thus creating a physical photograph. I chose to focus on portraiture at this stage, as there is a rich history of the painting and sculpting of busts and photographic portraiture.

My first task was to convert the Diana+ into a camera that could take a thicker, 3-dimensional image. I created an extended back from 1.5mm black card that slotted into camera body, further secured by a single strip of black fabric tape. This allowed the thickness of the 'photo' to be up to 40mm within the (extended) camera body.⁸

These 3D prints were created from a 3D scan of the human bust (a special thanks to Julian Goulding for providing the digital 3D scan files.) I edited the scanned busts using Rhinoceros, reducing the polygons of the file, as I did not want the prints to be too detailed. This was because I had hypothesized that the overlaid analogue photograph would fill in some of the fine details such as facial features. Once printed, the 3D images were coated with resin in order to help the liquid emulsion bond to the non-porous surface.

⁸ Photos of the modified Diana+ camera can be found in Appendix 6 (A.6.)



31. FIRST IMAGE ON 301
 FAILED TO REMEMBER
 THAT IMAGES TAKEN
 BY PINHOLE ARE INVERTED
 SO FACE UPSIDE DOWN.
 1 MINUTE @ LARGEST (a)



32. DIANA CAMERA
 WIDE OPEN (a)
 1 MINUTE EXPOSURE
 ON MIRROR PLASTIC.
 NOTE CRACK/ SCRATCH
 = TRYING TO PULL
 AWAY FROM SURFACE



33. ANOTHER UNEXPECTED
 FAIL.
 DIANA CAMERA
 WIDE OPEN (a)
 1 MINUTE EXPOSURE
 SHUTTER FAILURE??



34. "FACE ON BACK"
 DIANA CAMERA (a)
 1 MINUTE EXPOSURE
 PORTRAIT W/ CURTAIN
 BACKGROUND.

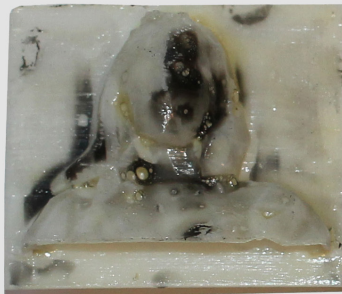


35 1 MINUTE EXPOSURE
 DIANA, WIDE OPEN (a)
 OVEREXPOSED
 TEST PRINT FOR CHANGE
 IN CONDITIONS (NEWAY)





36. 50 SECOND EXPOSURE.
"FACE ON FELT"
EXPERIMENTING ON A
SOFT MATERIAL.
IMAGE BLURRY.
(LARGEST APERTURE 220)



37. 50 SECOND EXPOSURE
NECK AREA WELL
ALIGNDED. LIGHT
DOES NOT HIT FULL
PRINT.
APERTURE WAS WIDE
OPEN (220)



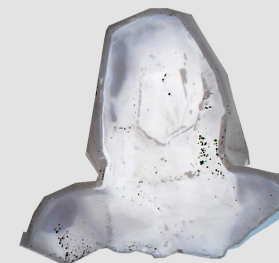
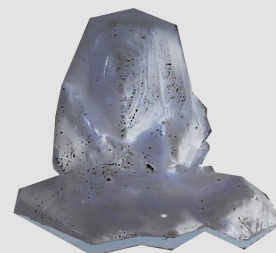
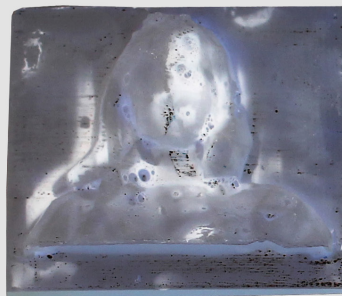
38. 50 SECOND EXPOSURE
DIANA CAMERA
LARGEST APERTURE (220)
PINHOLE, 3D CONTOURS.



39. 50 SECOND EXPOSURE
DIANA, LARGEST APERTURE
(220)
PINHOLE ON FLAT 3D
PRINT FACE



40. 50 SECOND EXPOSURE
DIANA, LARGEST APERTURE
(220) PINHOLE INTO
PRINT CAVITY.



These experiments revealed that it would be difficult to superimpose an image using analogue pinhole photography. The 3D form of the digital images was too three-dimensional and the more prominent parts, such as the nose, created an undesirable shadowing that made the overall 'photograph' difficult to read. The most successful of this series of experiments was the print where I exposed the emulsion on the smooth back of the 3D print, where you can faintly but clearly make out a face, but the projection surface was flat (see *fig. 5.5.*) Therefore, this process proved to be unsuccessful in combining 2D analogue photography with 3D digital image.

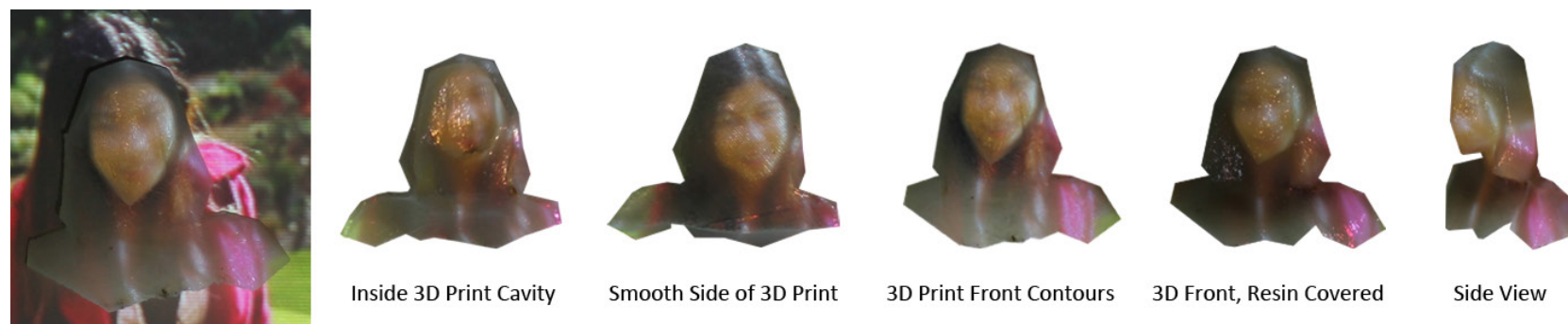


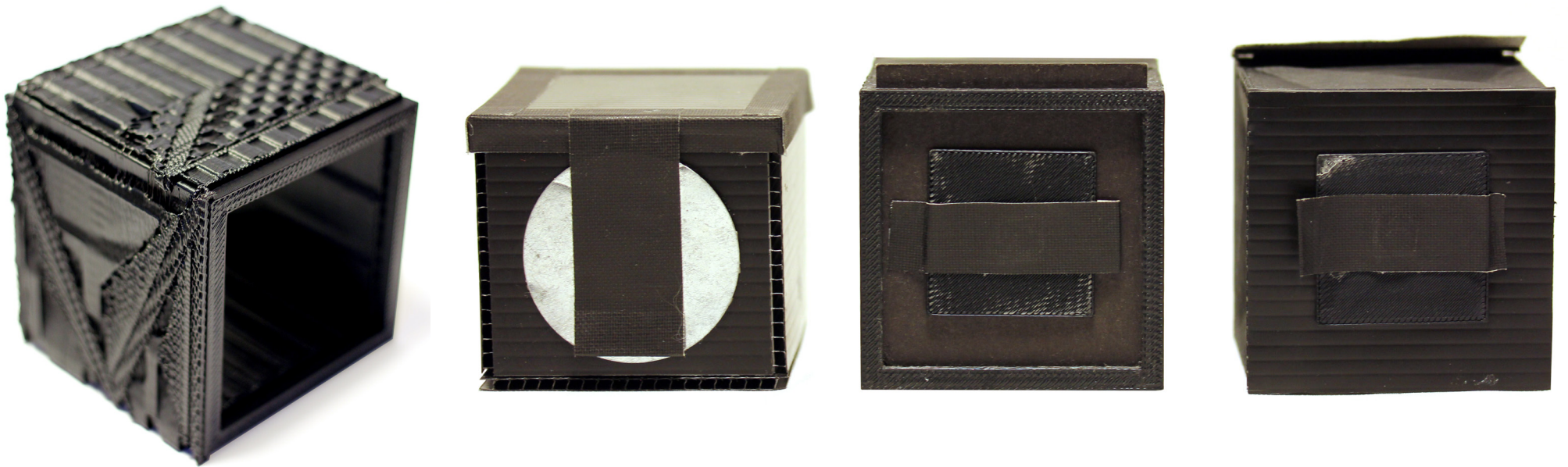
fig.5.5: The results from superimposing a 2D image onto a 3D surface, Author's Own Photograph

Out of curiosity, I projected a digital image onto the 3D printed images. This produced a much clearer overall 'photograph.' This was how I had expected the emulsion-projected images to turn out. However, this projection process did not provide the analogue experience I wanted. At this point I decided to return to experimenting with the emulsion to get an idea of another way of utilizing liquid emulsion to provide an alternate experience of photography.

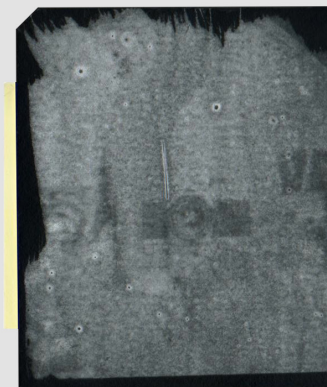
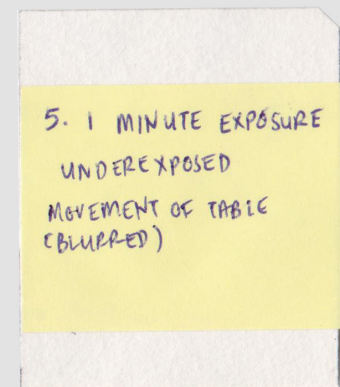
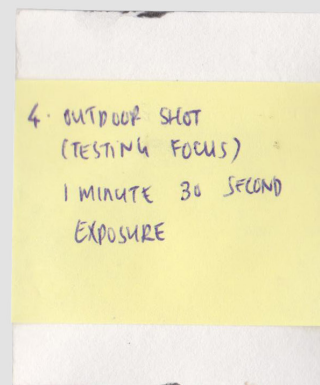
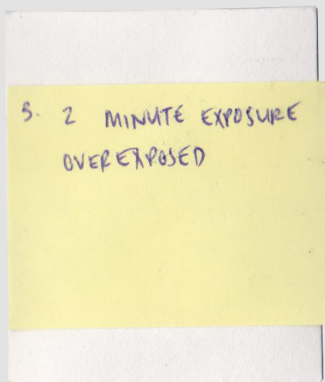
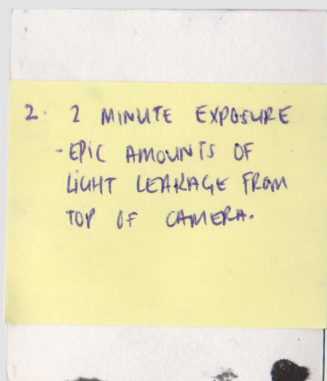
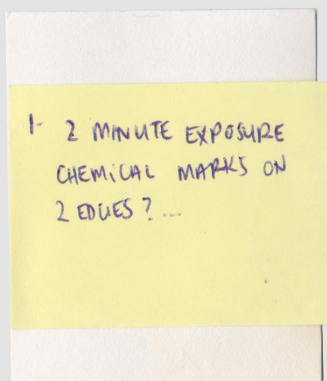
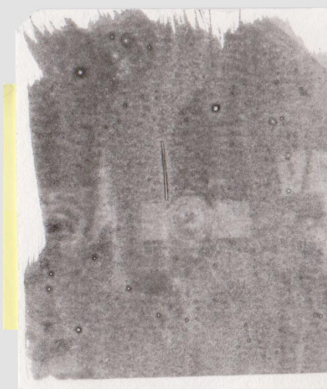
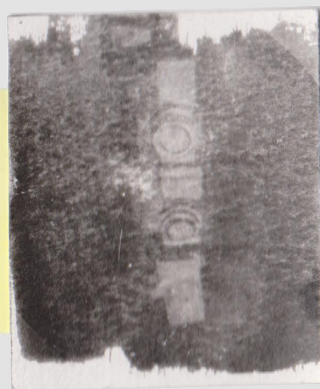
5.5// REINTRODUCING THE CAMERA VARIABLE + EXPOSURE TESTS

With the knowledge that the emulsion could be successfully exposed to create relatively detailed photographs it was time to reintroduce the variable of a custom made camera, as ultimately I wanted to make a camera and utilize photographic emulsion. Therefore it was paramount to ascertain whether I would be able to take emulsion photographs using a camera that I created.

For my 'test camera' I 3D printed a very basic, square box camera with a 4mm aperture. As a lens, I used a +22 plastic lens with a focal length of 50mm recycled from an old toy camera. I chose at this stage not to make a true pin-hole camera (which would involve a smaller size hole with no lens) as the exposure time for my tests would be dramatically shorter using a 4mm hole.







1- 2 MINUTE EXPOSURE
CHEMICAL MARKS ON
2 EDGES? ...

2- 2 MINUTE EXPOSURE
-EPIC AMOUNTS OF
LIGHT LEAKAGE FROM
TOP OF CAMERA.

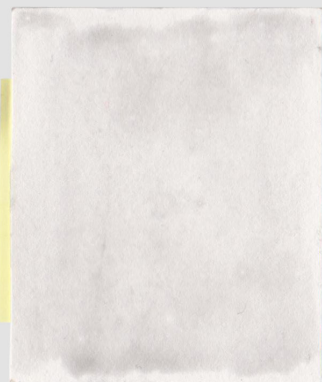
3- 2 MINUTE EXPOSURE
OVEREXPOSED

4- OUTDOOR SHOT
(TESTING FOCUS)
1 MINUTE 30 SECOND
EXPOSURE

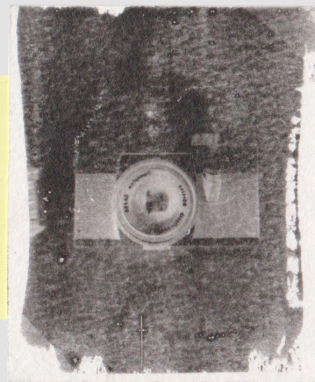
5- 1 MINUTE EXPOSURE
UNDEREXPOSED
MOVEMENT OF TABLE
(BLURRED)



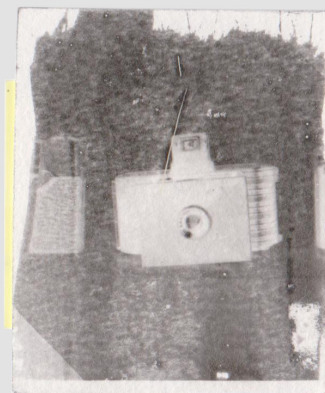
6. 1 MINUTE EXPOSURE
UNDEREXPOSED



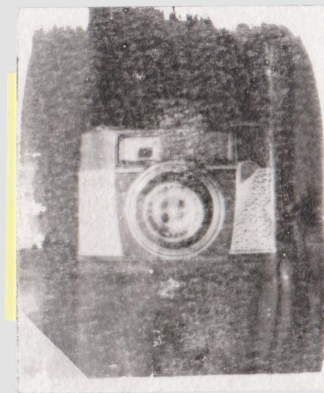
7. 1.5 MINUTE EXPOSURE
EXPOSED WRONG SIDE
OF PAPER?...



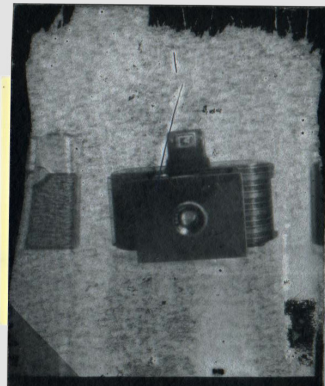
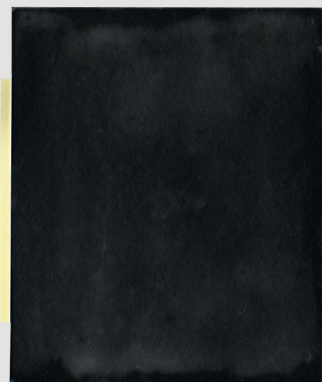
8. 1.5 MINUTE EXPOSURE
CRISP IMAGE!!!
OVER EXPOSED...



9. 1 MINUTE EXPOSURE
SLIGHTLY UNDER-
EXPOSED.
CRISP IMAGE, SHARP
LINES. UNDEREXPOSURE IN
SHADOW ON LEFT SIDE...



10. 1 MINUTE, 15 SECONDS
EXPOSURE
BEST SO FAR, EXPOSURE
TIME WISE BUT LEFT
SIDE STILL A BIT
UNDEREXPOSED - SHUTTER
FLAP VISIBLE ON LIGHT SIDE





Arguably the world's first phootgraph by Joseph Nicéphore Niépce.
fig.5.8: <http://www.personal.psu.edu/sca5056/ART101/firstPhoto.jpg>

After a few fuzzy attempts, I discovered an even higher level of crispness and quality could be achieved than what I had initially achieved.

From this series of experiments, I noticed a similarity in photographic qualities to one of the first ever photographs; The View from the Window at Le Gras taken by Joseph Nicéphore Niépce. This ties in tp the primitive aesthetic of photographic emulsion and adds a historic link to the past in the alternate experience of photography that I wished to provide.



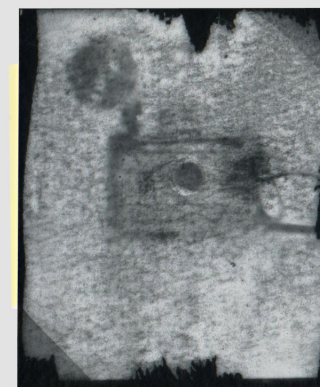
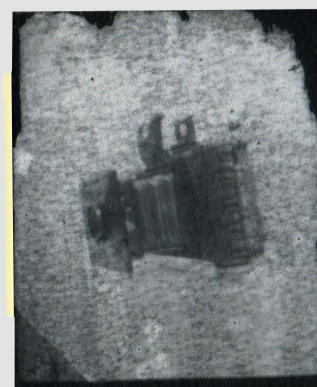
11. UNEXPECTED FAILURE.
1 MINUTE, 15 SECONDS
EXPOSURE TIME.
UNSURE WHAT HAPPENED.
DO NOT THINK I EXPOSED
THE WRONG SIDE? OUTLINES
SEEN FAINT.

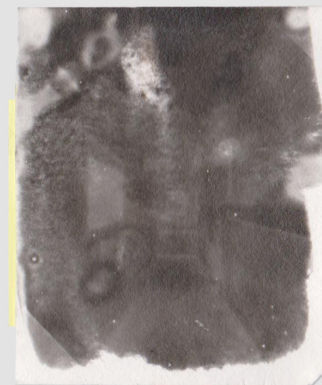
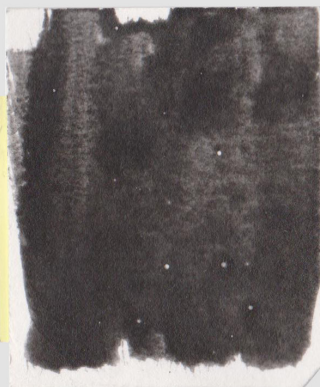
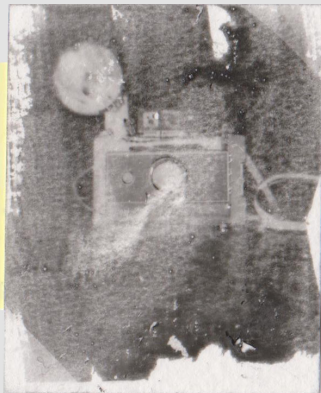
12. 1 MINUTE, 15 SECONDS
EXPOSURE TIME
"CLOSE UP" - SLIGHTLY
OVEREXPOSED ON RIGHT
SIDE.
LEFT SIDE MAY BE TOO CLOSE
TO LENS? IS IT BLURRED?

13. 1 MINUTE, 15 SECONDS
EXPOSURE TIME
UNEXPECTED,
UNEXPLAINED ERROR.

14. 1 MINUTE, 15 SECONDS
EXPOSURE.
ADEQUATE DETAIL,
ADEQUATE EXPOSURE

15. 1 MINUTE, 15 SECONDS
EXPOSURE.
WHY SO BLURRY?...
IS IT THE LENS?





16. 1 MINUTE, 15 SECONDS.
EXPOSURE.

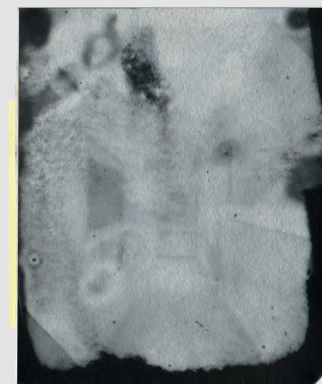
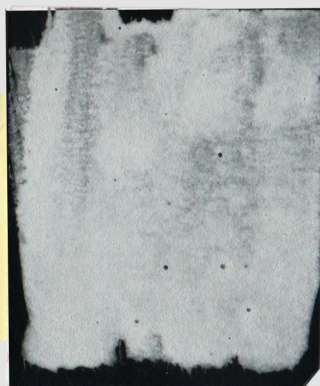
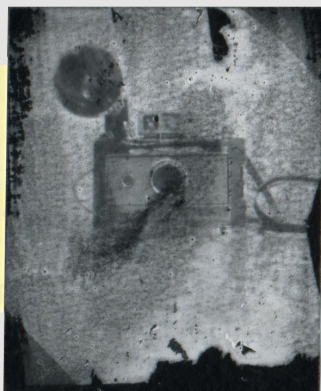
MUCH BETTER WITHOUT
CHANGING OTHER VARIABLES
MAYBE TABLE WAS BUMPED,
OR MAYBE ITS SOMETHING TO
DO WITH THE WAY EMULSION'S APPLIED

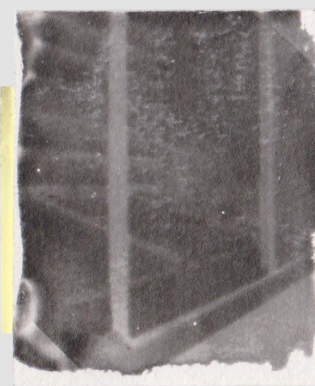
17. 1 MINUTE, 15 SECONDS
EXPOSURE.
OVER EXPOSED

18. 1 MINUTE EXPOSURE
OVEREXPOSED.

19. 45 SECOND
EXPOSURE
OVER EXPOSED.

20. 30 SECOND EXPOSURE
SLIGHTLY OVEREXPOSED





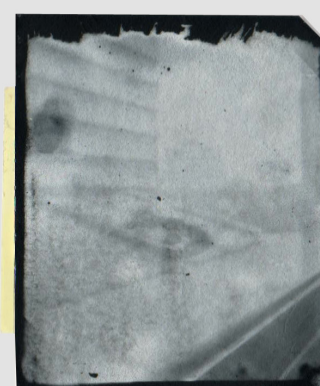
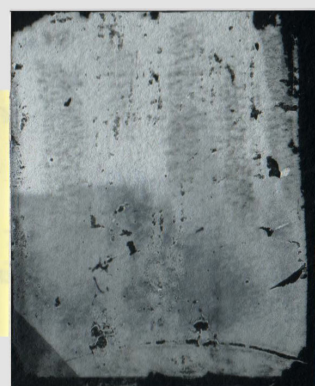
21. 25 SECOND EXPOSURE
ACCEPTABLE / GOOD
EXPOSURE

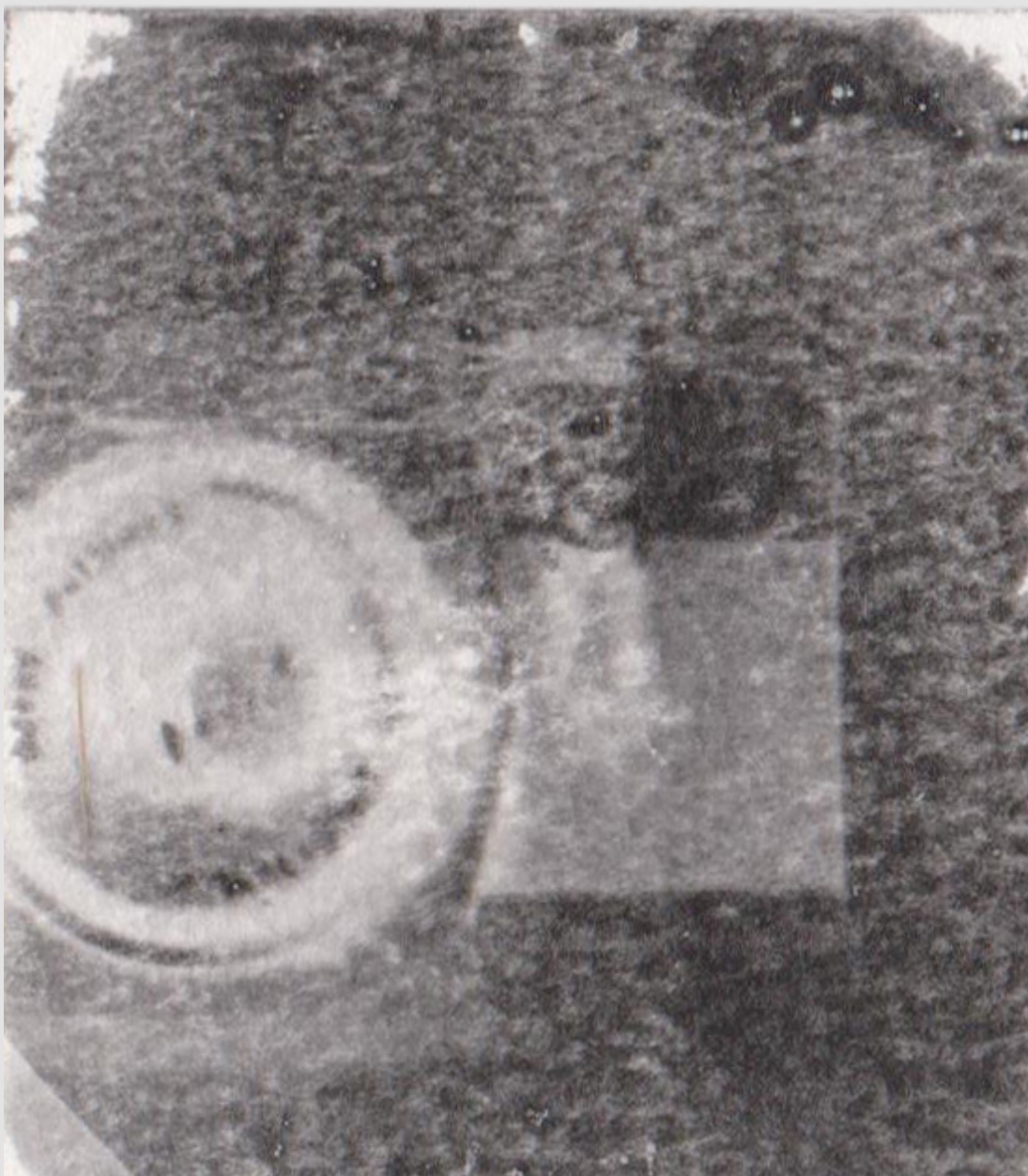
22. 30 SECOND EXPOSURE
(THOUGHT THIS LOCATION
WAS LESS BRIGHT
THAN STAIRS)
OVEREXPOSED

23. 20 SECOND EXPOSURE
MESSED UP, EMULSION
MUST NOT HAVE BEEN
DRY WHEN INVERTED
INTO CAMERA - SCRATCHES
+ CHUNKS OUT OF EMULSION

24. 25 SECOND EXPOSURE
OVEREXPOSED. LOOKS
IN FOCUS... BOTH NEAR +
FAR. WINDOWS DISTANCE
1M, BUILDINGS, APPROX.
15-20 METRES

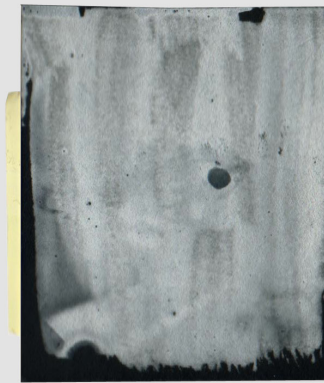
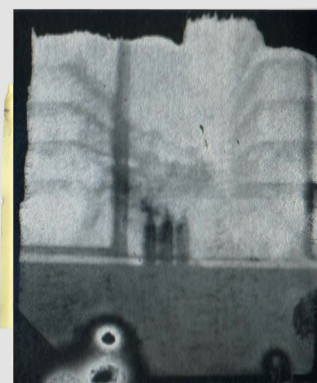
25. 20 SECOND EXPOSURE
OVER EXPOSED - AGAIN,
LINES LOOK STRAIGHT
+ IN FOCUS. BUILDINGS
15-20 METERS AWAY





26. 15 SECOND EXPOSURE
OVEREXPOSED, BUT EVERY-
THING DOES LOOK IN
FOCUS WINDOWS APPROX 2M,
BUILDINGS APPROX 15-20M,
TREES, APPROX 50 METRES
AWAY.

27. 10 SECOND EXPOSURE,
LIGHT LEAKAGE FROM
TOP OF CAMERA -
FAILED ATTEMPT.





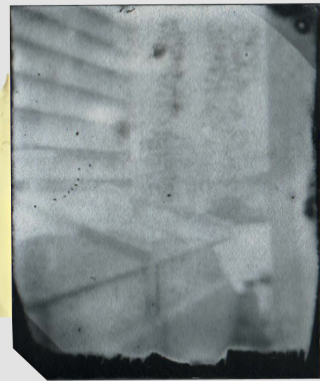
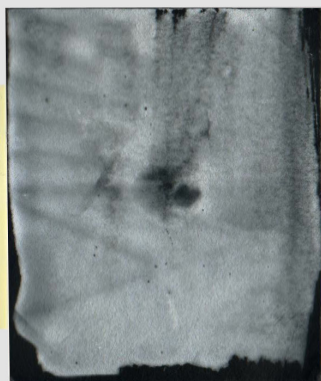
28. 10 SECOND EXPOSURE
OVEREXPOSED - BLURRED
AS CAMERA WAS BUMPED
DURING EXPOSURE.
RE TRY.

29. 10 SECOND EXPOSURE,
OVEREXPOSED, LINES
CRISP. FOCUS SEEMS
GOOD.

30. 7 SECOND EXPOSURE.
OVEREXPOSED. POTENTIAL
LIGHT LEAKAGE?

31. 5 SECOND EXPOSURE
GOOD VARIATION OF
GREYS!
BEHIVE NICE M, BUILDING
20M AWAY. ALL IN FOCUS

32. 5 SECOND EXPOSURE
CRISP LINES, AT ALL
DISTANCES DEFINITELY IN
FOCUS!



5.6// EMULSION APERTURE EXPERIMENTS

Having ascertained that I could indeed produce photographs from my own camera design, I wanted to determine the types of image qualities I could achieve through the use of different aperture sizes. This set of experimentation aims to find the impact and effectiveness of different 'pinhole' aperture sizes on the final photograph.

To create the different aperture sizes, I created a new 3D printed test camera that allowed for interchangeable custom inserts at varying aperture diameters. The aperture sizes tested were 4mm (this was used as the aperture in my previous camera experiments, thus was the 'control' aperture) 2mm, 1mm and 0.5mm. All 4 aperture sizes were tested both with and without a lens.



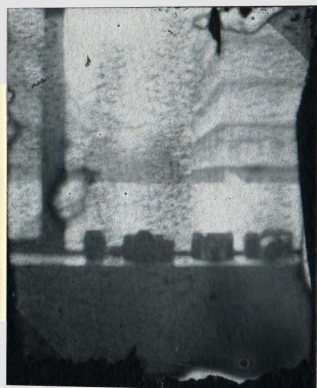
1. 7 SECOND EXPOSURE
4 mm (LENS) APERTURE
WITH LENS

2. 5 SECOND EXPOSURE
4mm APERTURE W/ LENS

3. 6 SECOND EXPOSURE
4 mm APERTURE W/ LENS

4. 12 SECOND EXPOSURE
2 mm APERTURE W/ LENS
!!! HIGH DEFINITION
- HDMI 1080P OF PINHOLE
CAMERAS! - DRAMATICALLY
CLEARER THAN WHAT I'M
USED TO...

5. 14 SECOND EXPOSURE
2mm APERTURE W/ LENS





6. 12 SECOND EXPOSURE
2MM APERTURE WITH
LENS.



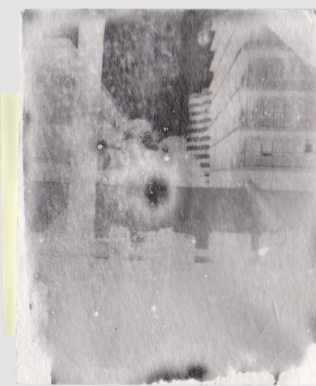
7. 24 SECOND EXPOSURE
2MM APERTURE W/ LENS
LIGHT LEAKS FROM LEFT
SIDE...



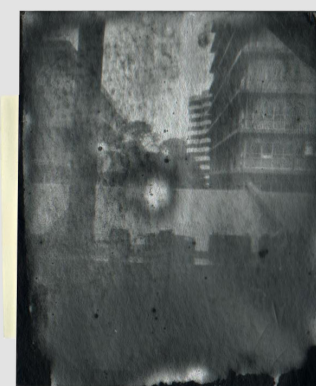
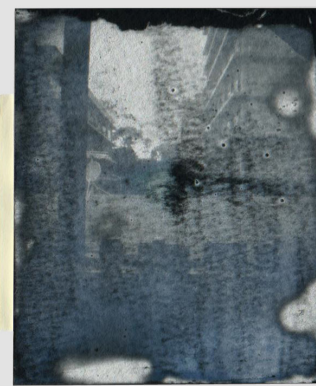
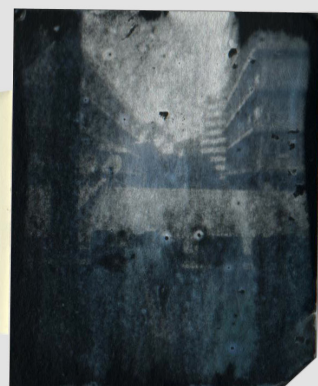
8. 28 SECOND EXPOSURE
1MM APERTURE W/ LENS
NOTICIBLE INCREASE IN TONES?
EXTRA SHAPES OF GREY?...

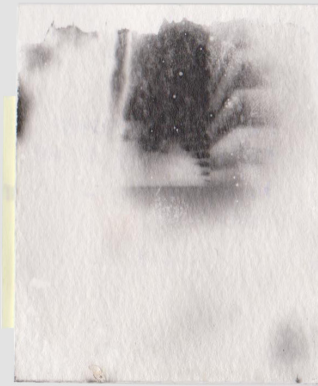
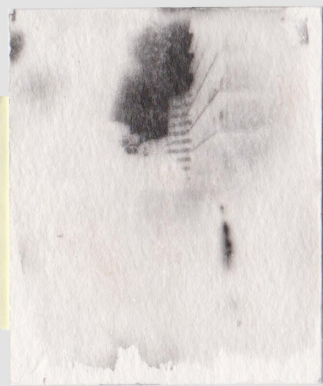


9. 26 SECOND EXPOSURE
1MM APERTURE W/ LENS
VERY CLEAR DETAILS
(NOTE SKY DISH)
LIGHT LEAKS - CHEMICAL
STAINED - NOT WASHED
LONG ENOUGH?



10. 26 SECOND EXPOSURE
1MM APERTURE WITH
LENS





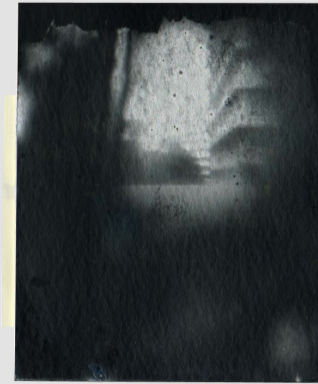
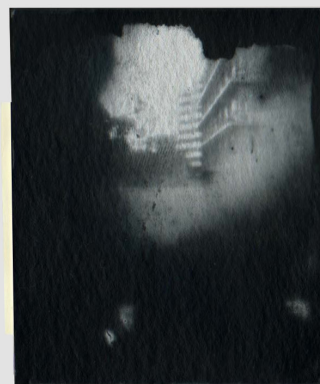
11. 48 SECONDS
0.5mm APERTURE
WITH LENS.

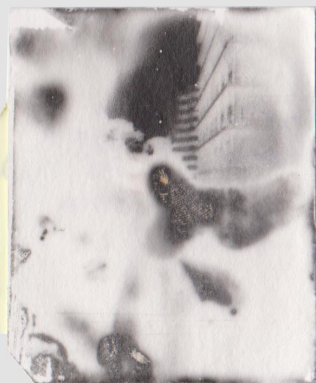
12. 56 SECONDS, 0.5mm
APERTURE, WITH LENS

13. 1 MINUTE, 24 SECONDS
EXPOSURE (28x3)
0.5 MM APERTURE
WITH LENS

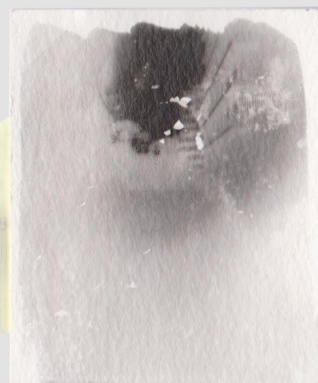
14. 1 MINUTE, 52 SECONDS
EXPOSURE (28x4)
0.5mm APERTURE WITH
LENS

15. 1 MINUTE 24 SECOND
EXPOSURE (28x3)
0.5mm APERTURE WITHOUT
LENS





16. 1 MINUTE 36 SECOND
EXPOSURE (4 x 24 SECOND)
0.5mm APERTURE
WITHOUT LENS.
(24 x 4 SECONDS)



17. 1 MINUTE 30 SECOND
EXPOSURE (BETWEEN
4 x 24 SECOND + 28 x 3
SECOND) 0.5mm APERTURE
WITHOUT LENS



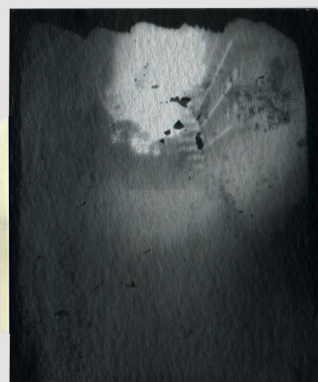
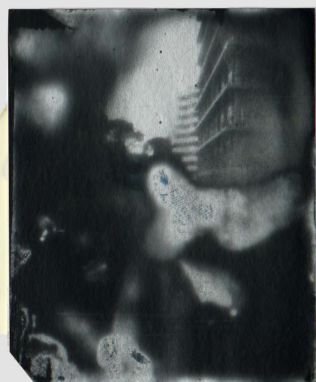
18. 28 SECOND EXPOSURE
1mm APERTURE
WITHOUT LENS

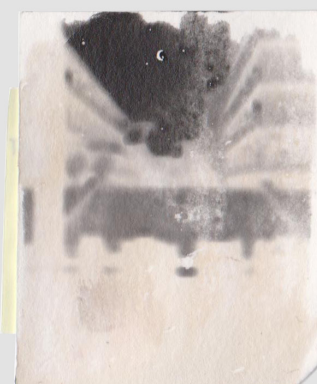
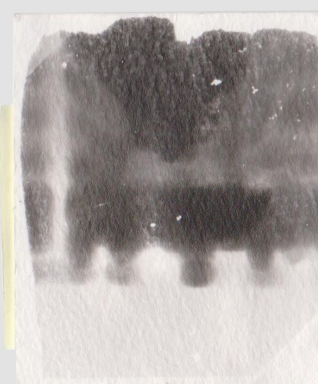
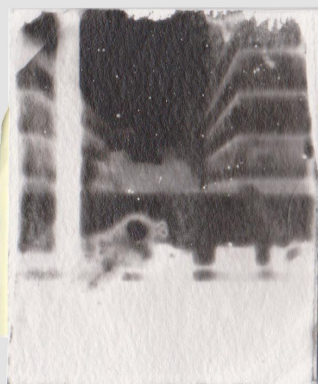
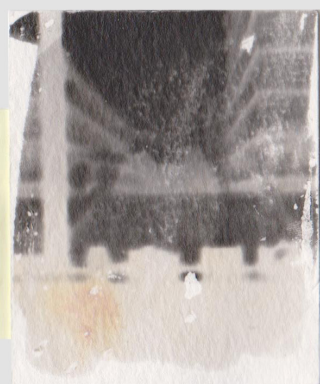


19. 26 SECOND EXPOSURE
1mm APERTURE
WITHOUT LENS



20. 24 SECOND EXPOSURE
1mm APERTURE WITH
OUT LENS.





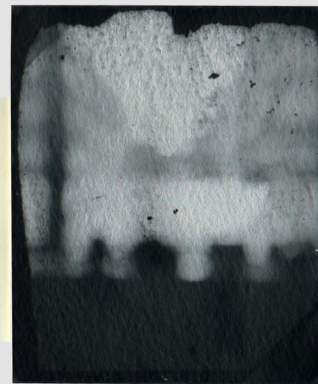
21.12 SECOND EXPOSURE
2 mm APERTURE
WITHOUT LENS.

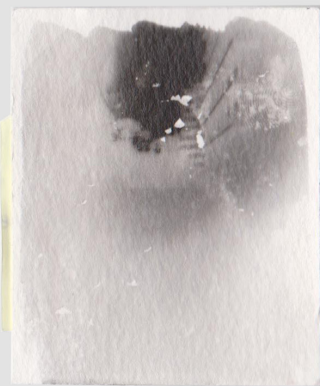
22.10 SECOND EXPOSURE
2mm APERTURE WITHOUT
LENS

23.8 SECOND EXPOSURE
2mm APERTURE WITHOUT
LENS

24.7 SECOND EXPOSURE
4 mm APERTURE W/OUT
LENS

25.5 SECOND EXPOSURE
4 mm APERTURE W/OUT
LENS





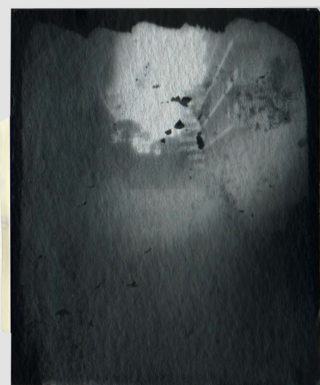
26. 6 SECOND EXPOSURE
4mm APERTURE W/OUT
LENS

17. 1 MINUTE 30 SECOND
EXPOSURE (BETWEEN
4 x 24 SECOND + 28 x 3
SECOND) 0.5mm APERTURE
WITHOUT LENS

18. 28 SECOND EXPOSURE
1mm APERTURE
WITHOUT LENS

19 26 SECOND EXPOSURE
1mm APERTURE
WITHOUT LENS

20. 24 SECOND EXPOSURE
1mm APERTURE WITH
OUT LENS.



// GENERAL FINDINGS

The general findings of this investigation in relation to aperture are as follows:

Firstly, The amount of time it takes to expose the photograph was generally double the time for half the size. To achieve a well exposed image using a 4mm aperture on a cloudy but bright day, an exposure time of between 6-7 seconds was required, a 2mm aperture in similar light conditions required a 12-14 second exposure, and a 1mm aperture required a 24-28 second exposure. The 0.5mm aperture was the one exception to this rule, taking an exponentially longer time of between 1 minute 24 seconds and 1 minute 36 seconds to achieve a similar exposure. (see pages 117-122)

Secondly, the smaller the aperture the sharper the image generally became. Emulsion image number 4 (see page 117; 2mm aperture with lens with an exposure time of 12 seconds) redefined the standard in which I considered to be 'sharp' for an emulsion image offering exceptional detail. As I moved to the smaller apertures, the quality of focused images (with lens) became better and better.

Thirdly, a smaller lens provided a larger variation in the grey tonal range of the photograph. In the larger aperture sizes, the contrast between the blacks and whites in the photograph were very apparent whereas the smaller sizes tend to show more 'greys,' making images look better exposed. I believe this is because the images had longer to be exposed with less light being let in at once thus decreasing stark contrast and increasing tonal range. (This is somewhat like slow cooking over a low heat, where food would be more evenly cooked, rather than having parts that are burnt and other parts that are raw like in quick cooking over high heat.)

Finally, A 0.5mm lens in a camera with this focal range provided a very small image, producing photos that only take up only $\frac{1}{4}$ of the paper, making 0.5mm an unsuitable aperture for a camera with specification of this size and focal length.⁹ (see page 119)

At this stage, I was confident in creating photographs in a range of conditions using photographic emulsion but I had yet to decide how I would use this knowledge to provide the proposed tactile and tangible alternate experience of photography. In the following subchapter, I shift my focus to determining three-dimensional application utilising and possibilities with liquid light.

⁹Please find a full breakdown of results, including aperture specific observations both with and without a lens in the Appendix 7 (A.7.)

5.7// THE PIN-EGG

I first discovered the Pin-Egg by Francesco Capponi on a Lomography website forum. I found the idea of using an egg as a camera an extremely interesting concept that happened to utilize photographic emulsion.



The Pin-Egg concept particularly appeals to me as it fulfills many of the key criteria for my ideal analogue experience. Creating a photograph within a physical form addresses the loss in tactility and physicality that I wish to revive. The requirement of breaking open the shell of the 'camera' to access the photograph within provides a sense of anticipation and sacrifice. The PinEgg also highlights temporal investment with a gestational, natural and organic narrative. I decided to recreate the pin egg as a way to understand the physical tactility and tangibility of this three-dimensional photograph.

I began by draining eggs using a pin and nail to create a small fingernail sized hole (surprisingly, I did not break a single egg!) After rinsing the egg with water, I applied liquid emulsion to the inner surface in the darkroom by pouring the emulsion into the egg and rotating the egg to ensure an even coating. After a few minutes of rotation, any excess emulsion was poured out.

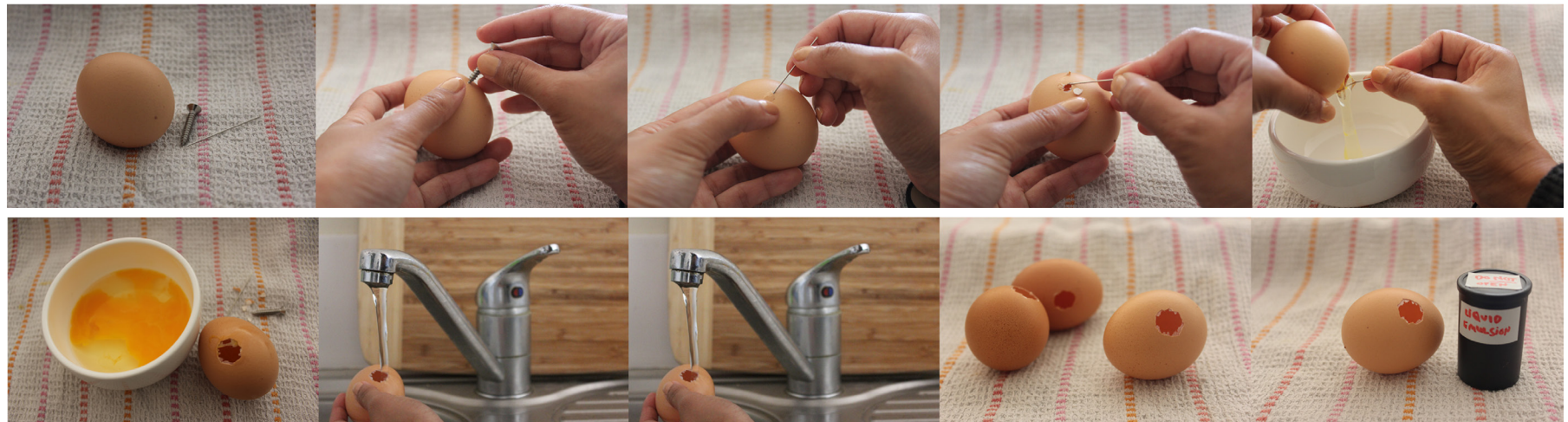


fig.5.12, fig.5.13: Author's Own Photographs

As an eggshell is naturally translucent, I created a lightproof box for the egg to sit within to protect against accidental light exposure. I also tried a 'sleeve' approach, but found the black box easier to work with.

After the Pin-Egg had been exposed, I developed the photograph in the dark room and began peeling back the edges of the hole in the eggshell to reveal the photograph within. Finally, I left the egg photographs to 'wash' in a bath of water before leaving to air dry.

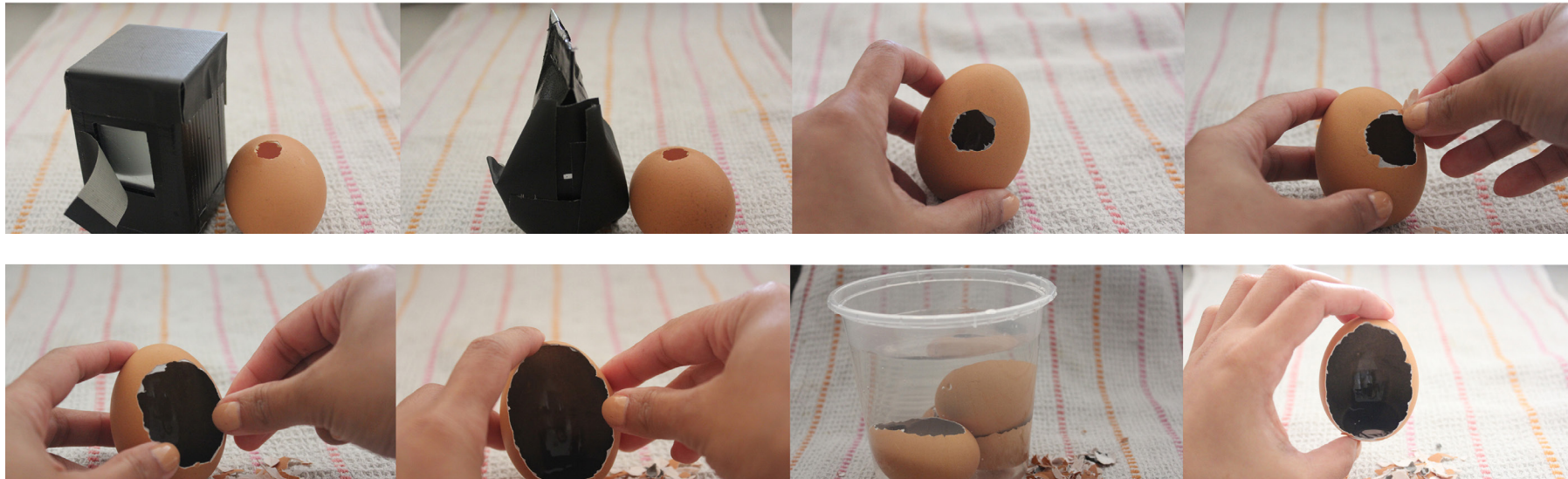


fig.5.14, fig.5.15: Author's Own Photographs



fig.5.16: Author's Own Photographs

My batch of Pin-Eggs turned out mostly overexposed, (see above for the best of this series), but the hands-on approach of physically breaking the egg really resonated with me and provided a satisfying tactile relationship to the photograph within.

From recreating the Pin-Egg, I became aware of the beauty in the idea of physically sacrificing the camera that gave life to the photograph within; adding a definite intent to revealing the photograph and contrasting the mindless 'point-and-shoot' mentality facilitated by digital photography. I realized that this underlying narrative of a camera and image that could not exist apart fit hand in hand with the tactile, physical and tactile alternate experience of photography I intended to create.

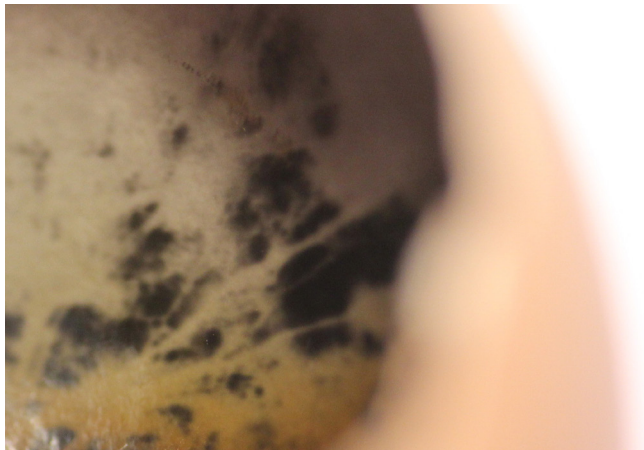


fig.5.17, fig.5.18, fig.5.19: Author's Own Photographs



fig.5.20, fig.5.21, fig.5.22: Author's Own Photographs

5.8// REITERATED DESIGN DIRECTION

I believed that an object which functions as a camera, photograph and analogue chemical processing chamber in one enclosed unit would be a simplistic way for a user to experience the tactile and tangible alternate experience of photography I wished to provide. An 'all-in-one' camera would also help to minimize what the user would have to learn in order to be able to experience analogue photography traditionally as this would cut out the need for access to a darkroom.

Because the photograph would be one with the camera, the user must choose when to sacrifice and break the camera to access the photograph. The act of breaking the camera ultimately forces a transition of value from the value of the camera as an object or tool, to the value of the photograph within. Naturally, this system would mean that each camera would only ever be able to take one photograph.

The success of this all-in-one 'sacrificial' camera depended on whether I could come up with a design solution for the photographic emulsion chemical process to be simplified enough that a person with no prior dark room experience could still find the camera easy to use. This would be a major design challenge, as I would need to allow for the entrance and drainage of photographic chemicals into the camera without exposing the undeveloped photograph to light.

Parallels can be drawn between my proposed camera and a Polaroid photograph in the sense that the chemical process in a Polaroid is one with the photograph and the way the processing chemicals are sacrificed to create the photograph.

The Polaroid instant camera used the “principle of diffusion transfer to reproduce the image recorded by the camera’s lens directly onto a photosensitive surface — which now functioned as both film and photo” (Linderman, 2010).

However, my camera will differ from the Polaroid, as it will incorporate the user in the chemical development process, but still require no prior darkroom or analogue photography knowledge. Though primitive, the beauty of the analogue image lies in the ‘Lo Fi’ nature of the emulsion photograph and its process. The image produced on photographic emulsion is sharp yet holds a ‘dream-like’ quality. The serendipitous light leaks add interest and character to emulsion photographs. Though there is a margin of failure in taking a photograph with photographic emulsion, I believe this shows the true nature of analogue photography where not every photograph will work out.

CHAPTER SIX | RE-ITERATED DESIGN CRITEREA

6.1// RE-ITERATED DESIGN CRITEREA

With my camera design, I wanted to encourage users of this camera to take a step back and experience a form of slow photography, where there is no time pressure to compose the photograph and the scarcity of having just one single shot creates a perception of increased value for the resulting photograph. Ultimately, this concept camera would promote connection- between the user and the camera, the user and the subject and the user and the photograph.

The following is a list of five key criteria that I identified were important for my redesigned camera to successfully provide a unique analogue experience of photography:

- Be physically tangible and tactile to promote interaction
- Promote a feeling of scarcity
- Provide a sense of sacrifice
- Direct the user into providing temporal investment to the camera a photographic process
- Be deigned in a manner equipped for longevity

I decided to utilize 3D printing to create the camera. 3D printing would be an appropriate manufacture method as it will allow for my camera to be 'sacrificed' in a way where you have to physically break it, not just disassemble it. Using 3D printing to manufacture this camera also incorporates a digital aspect into the analogue photographic emulsion process.

The manner in which the photograph is revealed in my experimentation with the Pin-Egg provides a poetic, yet tangible physical representation of sacrifice. I believed that this concept was extremely relevant and would be utilized in my camera design. I wanted the camera to be able to be broken apart in a way similar to the Pin-Egg and ultimately be "more beautiful for having been broken."
(Pustelnik, 2013)

6.2// INTRODUCTION TO THE IMPRIMŌTYPE

Imprimō: /im.pri.mo/ *verb*

Latin: from in- + premō (“to press”).

-to print

-impress, imprint

See also, imprimere, impressi, impressus

Imprimōtype: /im.pri.mo.tʰlp/ *noun*

A camera that provides an alternate experience of photography through physical tangibility; rich in tactility, anticipation, reward and emotional connection

Imprimōgraph: /im.pri.mo.gra:f/ *noun*

The pentagonal image created by an Imprimōtype camera

This camera was coined the imprimōtype (literally ‘print’ type) for the way it provides a physical photographic ‘print’ and the way the camera is manufactured, by 3D printing. To make this camera successful, I knew that I must minimize the photographic learning curve for users and maximize the success rate of the photographs taken; by ensuring the affordances of the camera design made it simple to understand how to use it.

<http://www.latin-dictionary.net/definition/22934/imprimo-imprimere-impressi-impressus>) <http://www.wordsense.eu/imprimo/>

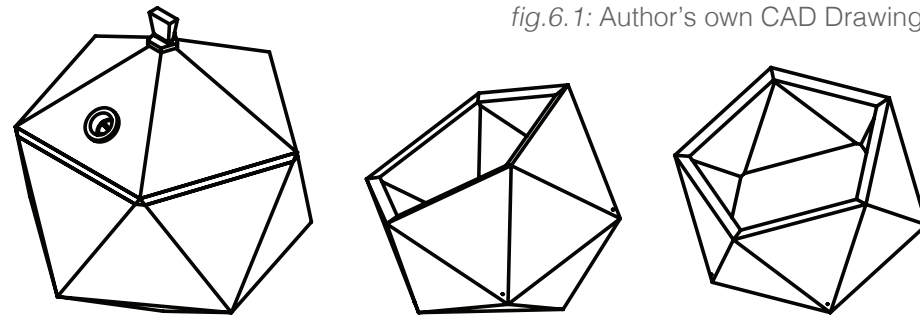


fig.6.1: Author's own CAD Drawing

The image captured by emulsion manifests as a negative, and a photograph imprinted within the three-dimensional walls of the camera itself would not allow the photograph to be turned into a positive image. However I believed that leaving the photograph in its raw negative state will serve to emphasize the difference in process and experience for the user from conventional photography and offer an alternate way of seeing.

Because the processing chamber (“darkroom”) is a part of the camera, the camera must remain light proof throughout the chemical process. However, chemical fluid must be drained from the camera before the next chemical can be added. This dilemma led me to design a partially double-walled camera with built-in drainage system, where photographic chemicals would be injected into the ‘top’ and drained by tipping the camera upside down and slowly tilting it upright again, allowing the liquid to flow between the walls and out through a drainage hole in the bottom without exposing the image. This double walled design would also allow me to sacrifice and break the outer wall of the camera whilst keeping the photograph imprinted upon the inner wall intact.

6.3// AUDIENCE AND CONTEXT

As stated in my initial research interest (Chapter 1.2), this camera is not intended to be a camera for day-to-day photography, but to provide a user with an experience of analogue photography.

This camera will be targeted at people with an interest in experiencing analogue photography, or an interest in alternative and experimental photography. The user may wish only to experience this camera one time, or they may wish to experience it a multitude of times, but it is not my intent to replace other forms of photography.

Based on my earlier experiments on aperture, (Chapter 5.6) I have decided to use three different apertures to create three versions of the Imprimotype, each best for a particular type of photography

Landscape: The 4mm aperture with a lens could be suitable for use when photographing a landscape or scene, as it provides an even focus of the subject and aged aesthetic.

Portrait: A 2mm aperture with lens, was suitable for portrait photography due to the higher variance in tonal qualities (greys). The variance in tones would capture the subtle colour variation of the face, yet provide a somewhat 'dreamy' aesthetic.¹⁰

Abstract: The 2mm aperture without lens would provide an extra lo-fi, soft and dreamy aesthetic.

¹⁰ A 1mm lens was proven to be unsuitable for the form of the Imprimotype as it did not provide a sufficient range to cover the designated pentagonal photograph area.

CHAPTER SEVEN | DESIGN ITERATIONS AND REFINEMENT

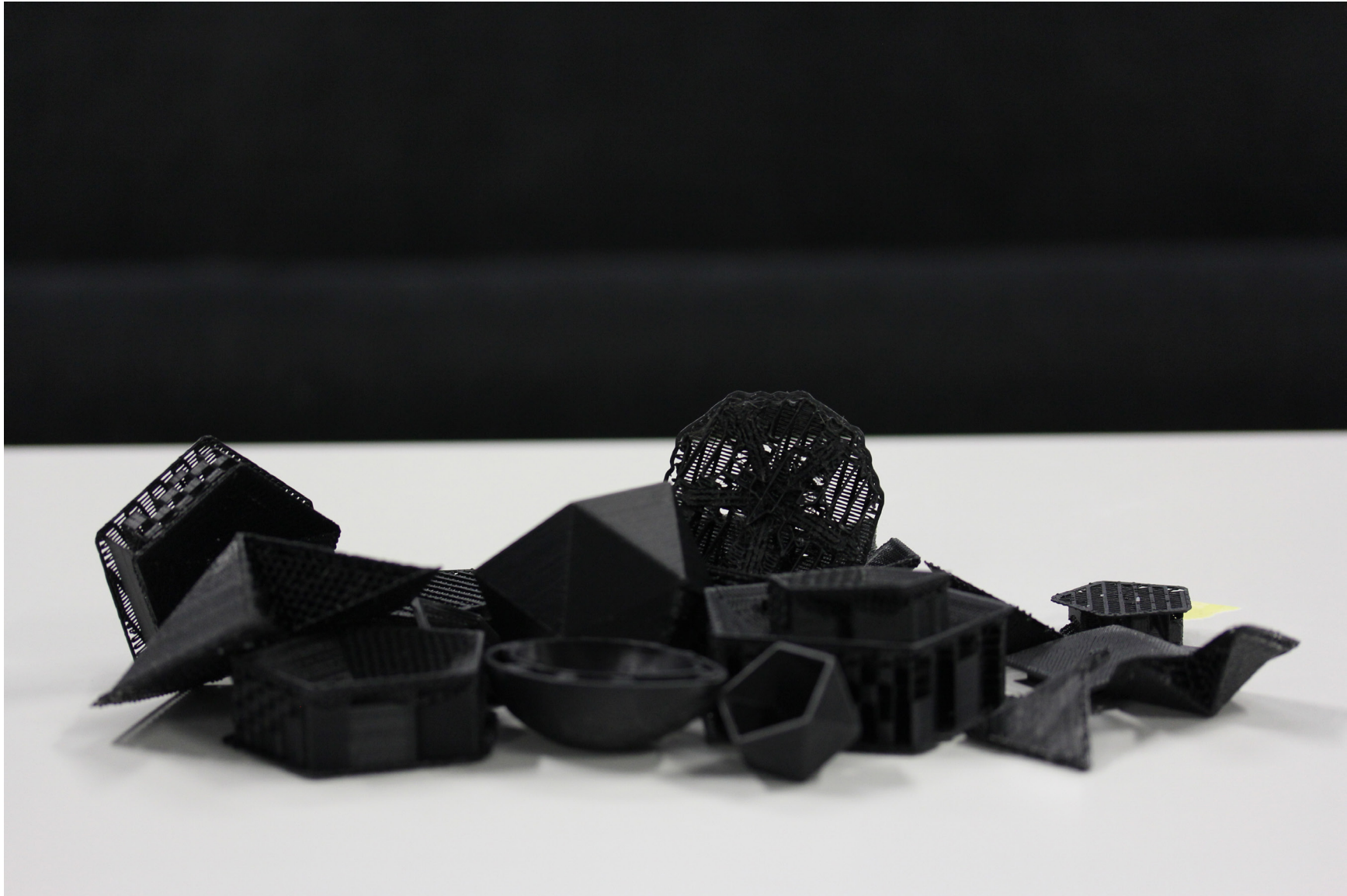


fig.7.1: Quick 3D printed prototyping to get a feel for form and scale. Author's Own Photograph

7.1// DESIGN ITERATIONS AND REFINEMENT

FORM

The first step in the development of the camera was to decide on the form which the camera would take. I wanted my camera to take an unusual or uncommon form to further set the experience of using the Imprimōtype apart from using any other pinhole or existing camera. I was confident that using an unusual form for my camera would still make the camera easy to use from my prior Capture pinhole investigation about objects being unfamiliar yet easy to use (refer to Chapter 3.3.).

I made paper prototypes to quickly gauge the suitability of various forms. I found that an icosahedron was the ideal form for the Imprimōtype due to the way its faceted sides would allow the camera to be used at multiple angles without a tripod.

DESIGN

I 3D-printed an icosahedron to gauge the physicality of the form when made in a solid material. I found that the one I printed looked too small, and that the overall form would need to be much bigger in order for the inner wall layer photograph to be larger and have more presence. I also experimented with surface texturing, as I wanted to use the texture around a camera's surface to differentiate the various aperture sizes so that each camera, no matter the aperture size, would look identical at first glance.

An ongoing issue I had with my design was how the Imprimōtype would break apart. I really wanted an organic 'break' but struggled as I initially wanted to print the whole camera as one unit, which would have required the versatility of the Objet Connex 350 multi-material 3D printer to print in multiple materials and colours.

Using the Objet Connex 350, I printed tests to gauge how lightproof the material was at various thicknesses. Frustratingly, I found that the material did not become lightproof until it was more than 4mm thick- far too thick to easily break apart, even with rubber mixed in to make the resin more flexible.

I experimented with plastic 3D printing to get an understanding of how plastic might break and what it would look like broken. At 1mm thick, strips of plastic were thin enough to break but thick enough to be light proof. I experimented with printing various forms to test how easily they could break using a 1mm thickness. However, despite continued iterations of different structures (perforations, indenting etc.) I found that the structural integrity of the triangles making up the icosahedron would prevent it from breaking easily in an organic way.

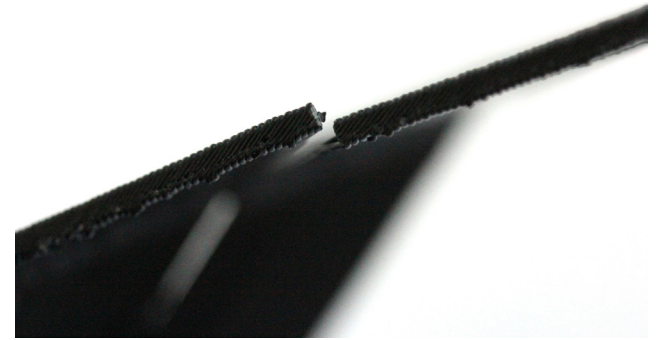
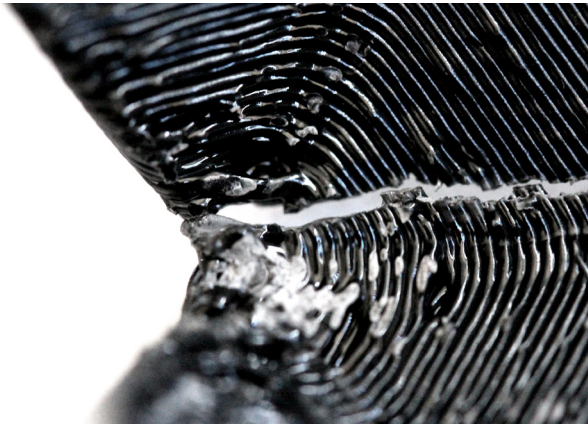


fig.7.2, fig.7.3, fig.7.4: *Breaking Open*. Author's Own Photographs

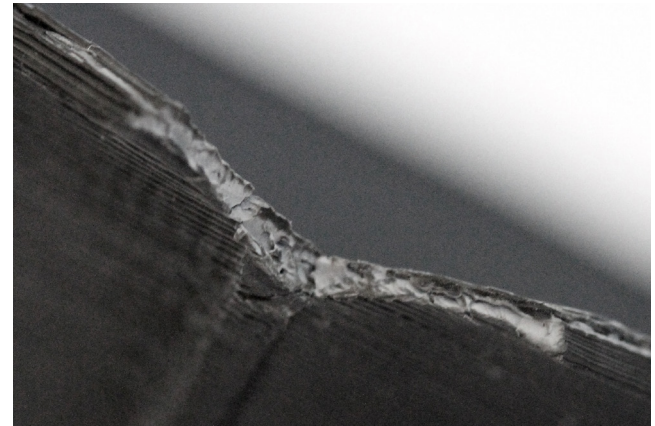
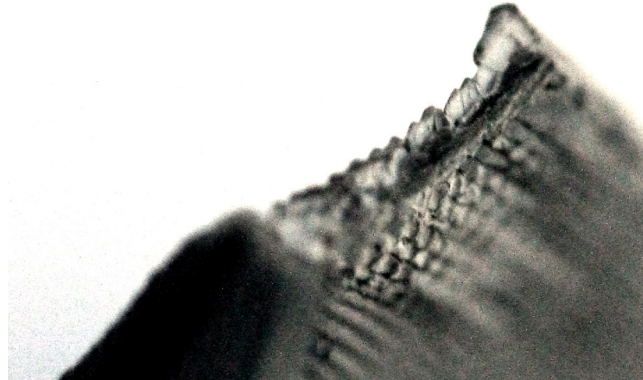
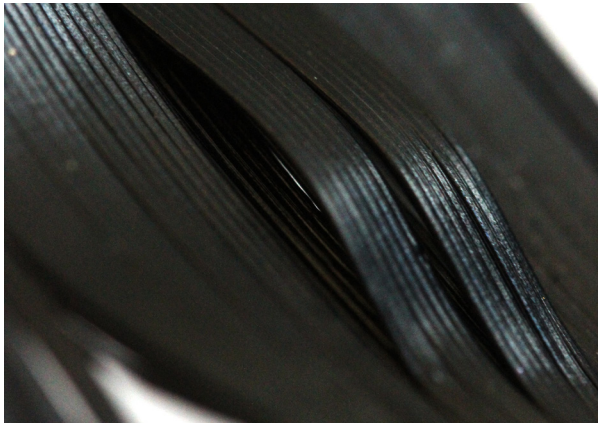


fig.7.5, fig.7.6, fig.7.7: Author's Own Photographs

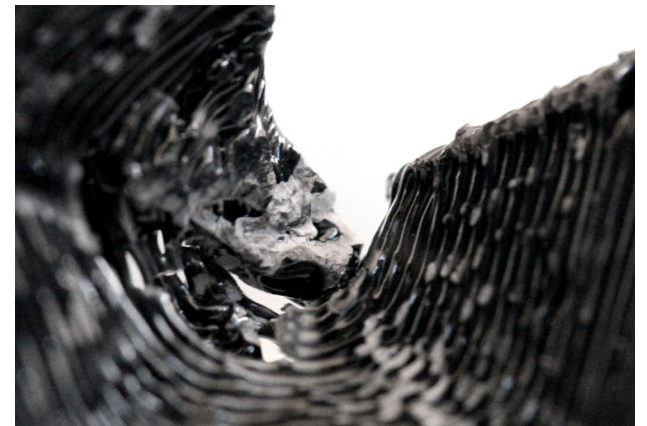


fig.7.8, fig.7.9, fig.7.10: Author's Own Photographs

SURFACE FINISH INVESTIGATION

In parallel with this structural investigation, I began experimenting with material finishes, looking for a contrasting detail for my final design. I printed tests to vacuum metalize using an Up! 3D printer. I wanted to see the aesthetic of 3 materials, based on their use within historic photographic processes.

(A special thanks to John Hawkins, Workshop and Model Making Technician for carrying out the vacuum metalizing) The materials I chose were copper, silver and brass: as some of the first photographs were printed on silver-plated copper plates and brass due to its prevalence as a material or material accent for historic cameras.



fig.7.11: Author's Own Photograph

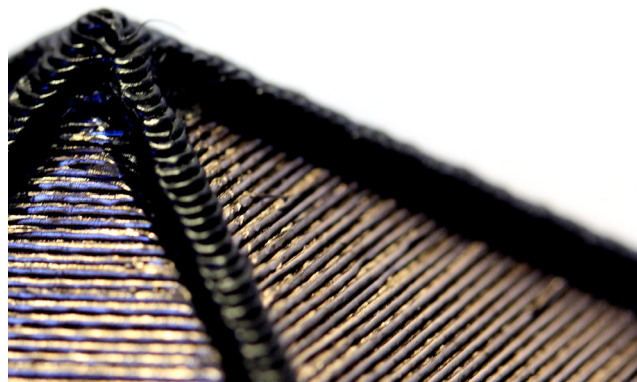
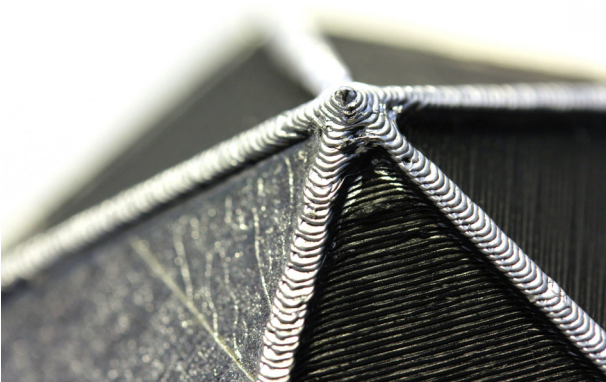


fig.7.12, fig.7.13, fig.7.14: Author's Own Photographs



fig.7.15, fig.7.16, fig.7.17: Author's Own Photographs

DESIGN DEVELOPMENT

I found that the materials I had experimented with to date would be inappropriate for the Imprimōtype. The Objet Connex 350 could have offered the versatility of printing parts with multiple materials or multiple colours, but the material needed to be 4mm thick, which was too thick to break, and furthermore, would not break in an aesthetically pleasing manner. Plastic would have been easier to break, but would only be ideal for a “skeleton” and not the surface of the icosahedron.

I decided to solve this design challenge by making the Imprimōtype out of a material that would both break organically and in an aesthetically pleasing manner- ceramic. Ceramic made the perfect material choice because it breaks in a way similar to an eggshell. Ceramic would not break the same each time and was also a material that could be 3D printed.

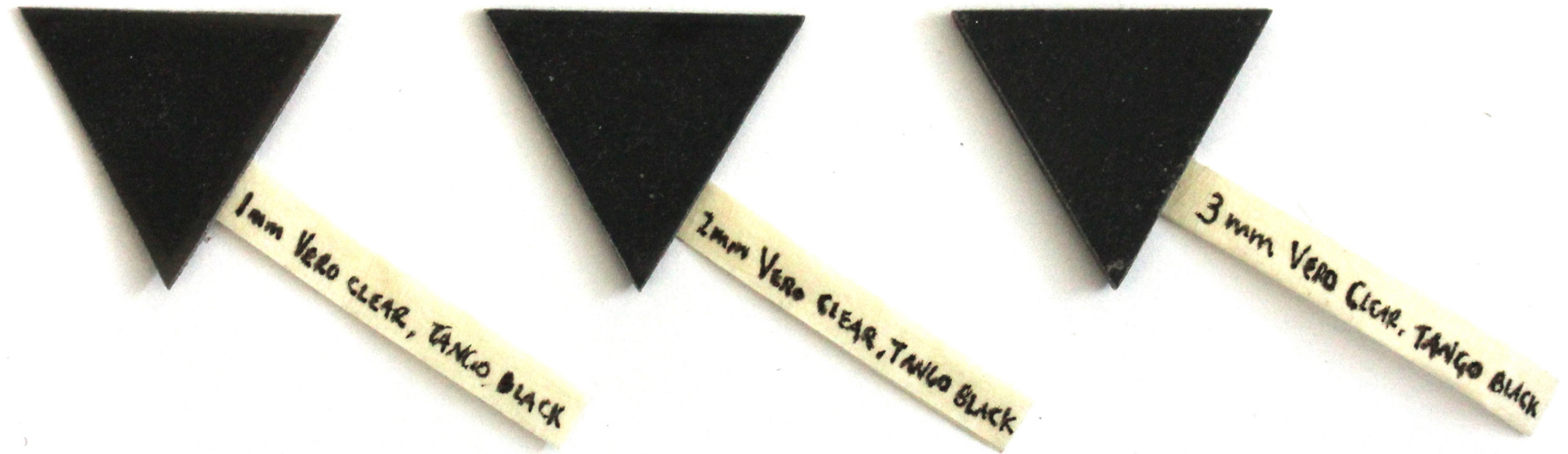


fig.7.18: Multi-material 3D-printed thickness tests. Author's Own Photograph

The biggest design challenge that using ceramic presented was that it is not a light proof material. I decided to resolve this issue by treating the internal wall of the imprimŏtype with a lightproof coating to ensure full darkness. It is important to note that the criteria for 3D printing ceramic is much more strict due to the nature of the material and the making process requiring more steps, including glazing.

The use of ceramic to sacrifice and break my camera reminded me of Kintsugi, an ancient Japanese art of restoring broken china and ceramics using adhesives mixed with a powdered precious metal- most commonly gold (Kwan, 2012; p.7). The underlying ideology of kintsugi ceramics relates to the imprimŏtype as they can both be regarded as more beautiful for having been broken. Kintsugi offers a beautifully fixed, unique item with a history and the imprimŏtype reveals a photograph within, rich in emotional history.

The minimum thickness for an object with the Imprimŏtypes' surface area in 3D printed ceramic is 4mm, making the object very strong on the exterior. To break through the ceramic, I will need to provide a tool, a small hammer similar to a toffee hammer. To encourage the imprimŏtype to break easier, I created a network of valleys on the interior of the outer wall.

7.2// FINAL IMPRIMŌTYPE DESIGN

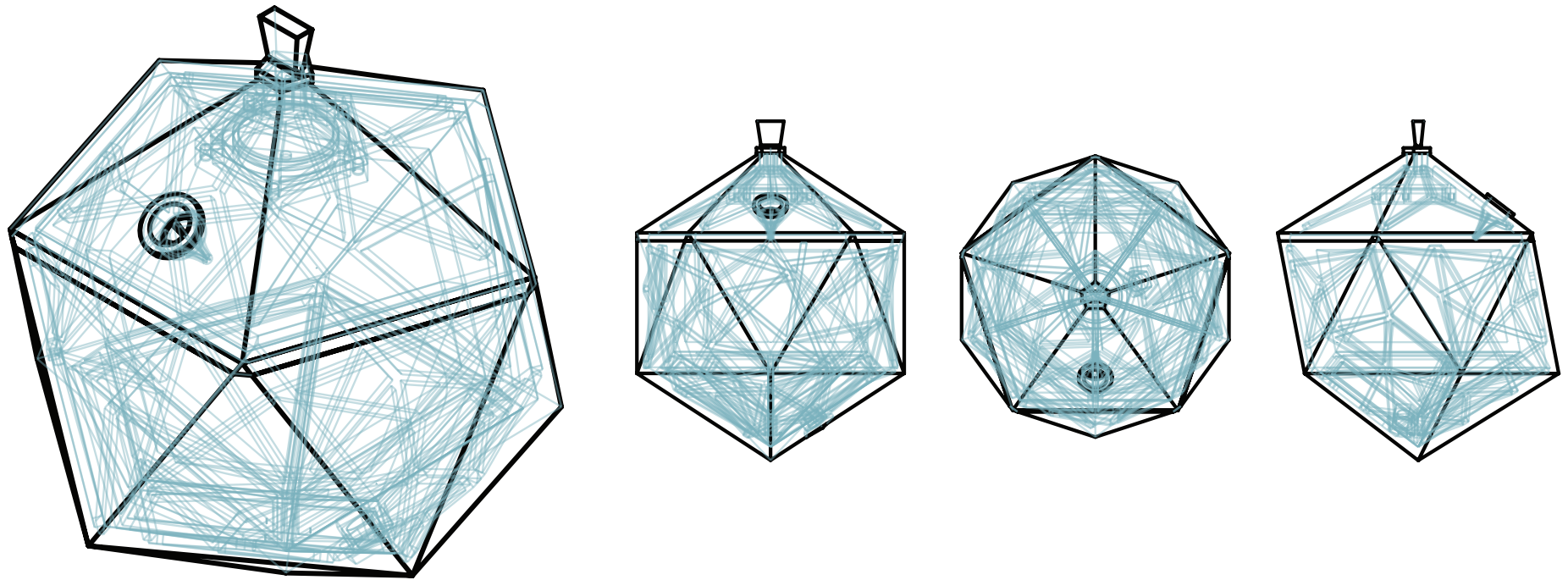
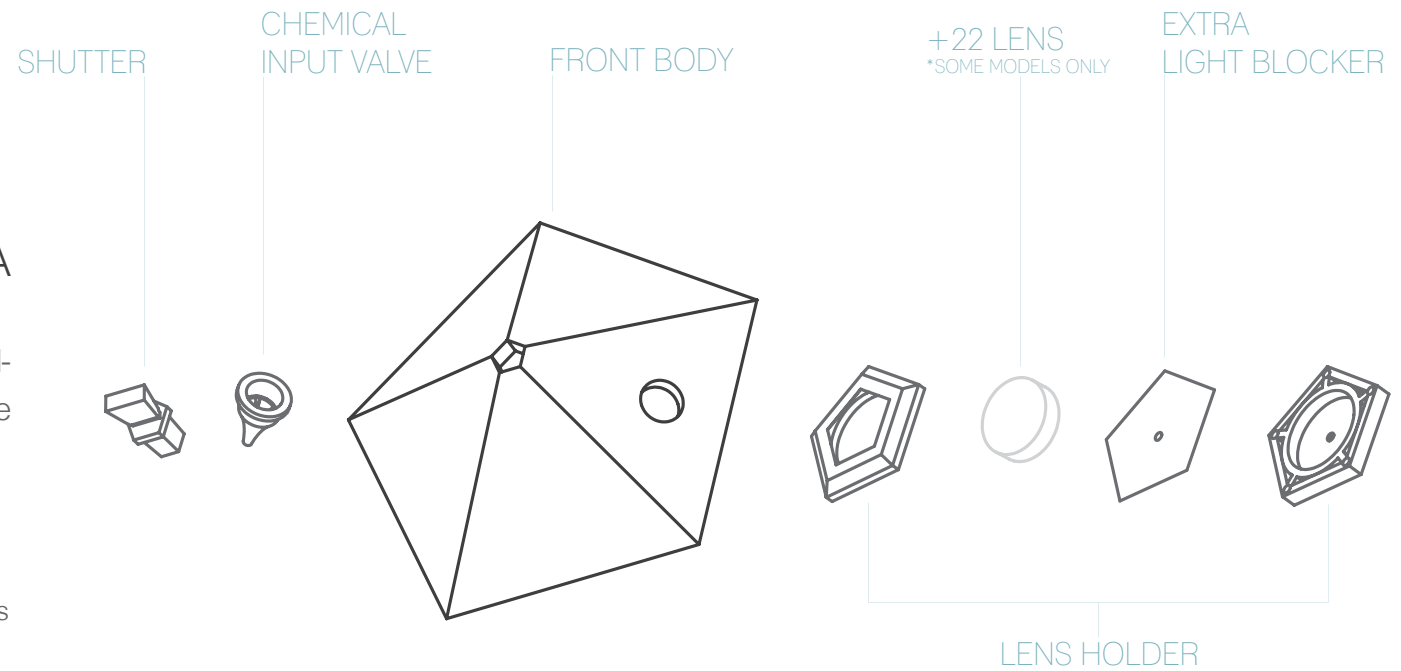


fig.7.19: Author's Own CAD Drawings

FINAL DESIGN // CONSTRUCTION OF CAMERA

Parts of Imprimōtype created in Solid-Works. Modelled and assembled to be ready for manufacture by 3D Print.

Right: fig.7.19a: Author's Own CAD Drawings



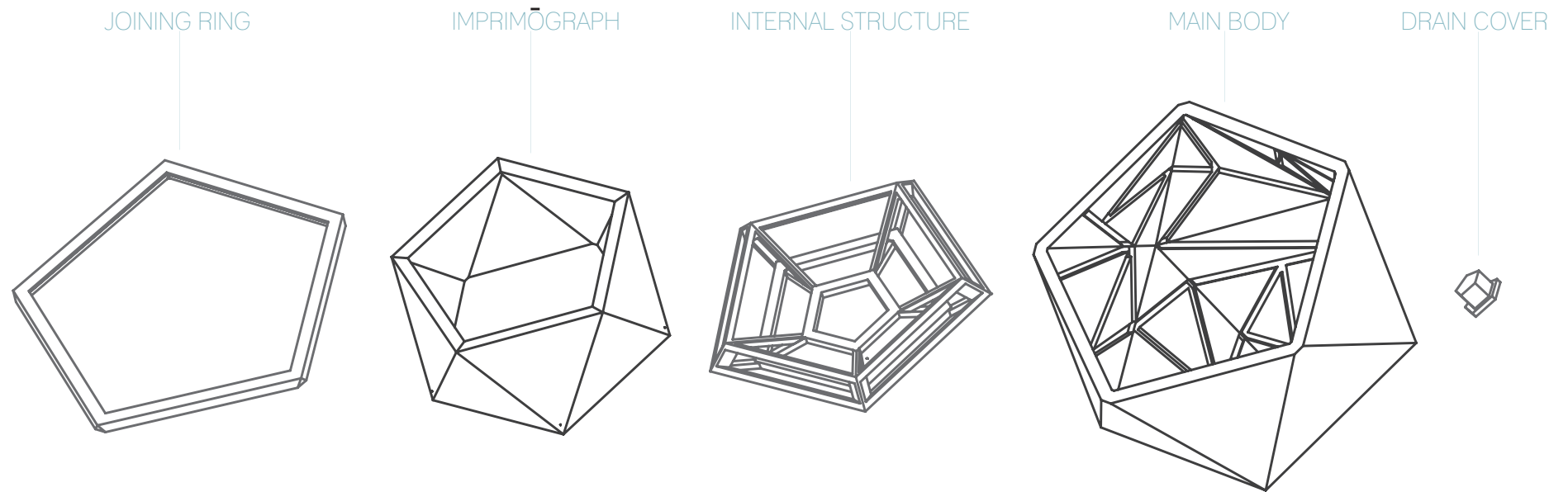
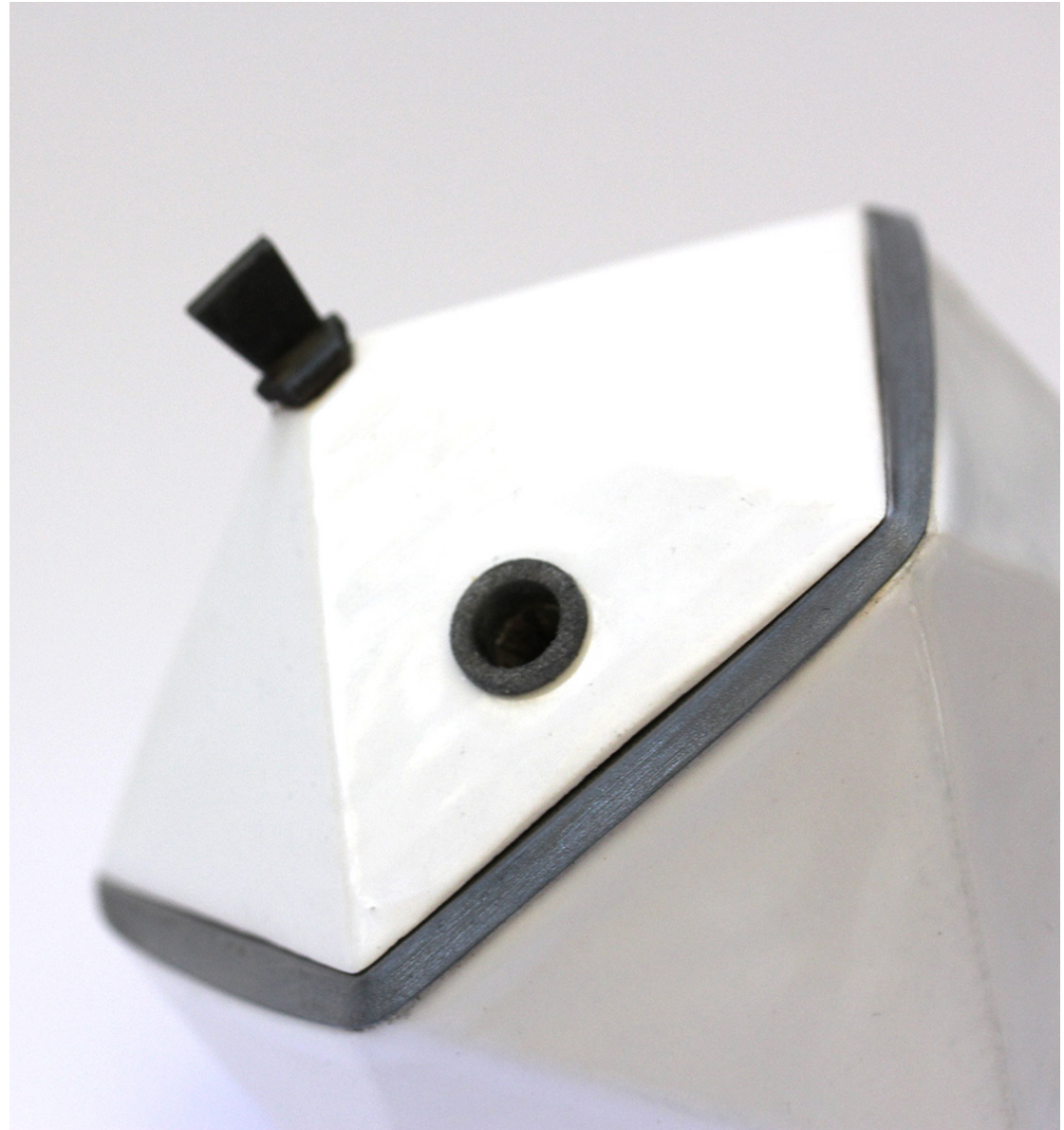
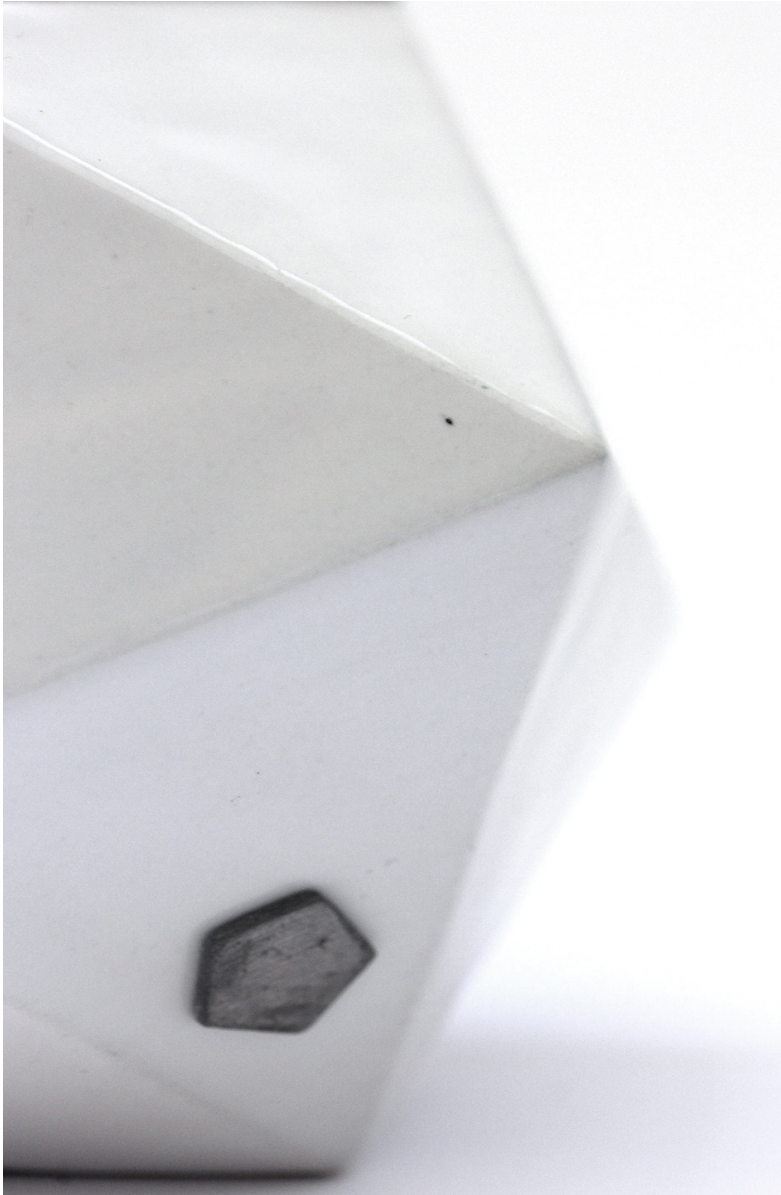


fig.7.19b: Author's Own CAD Drawings





fig.7.21: Author's Own Photograph



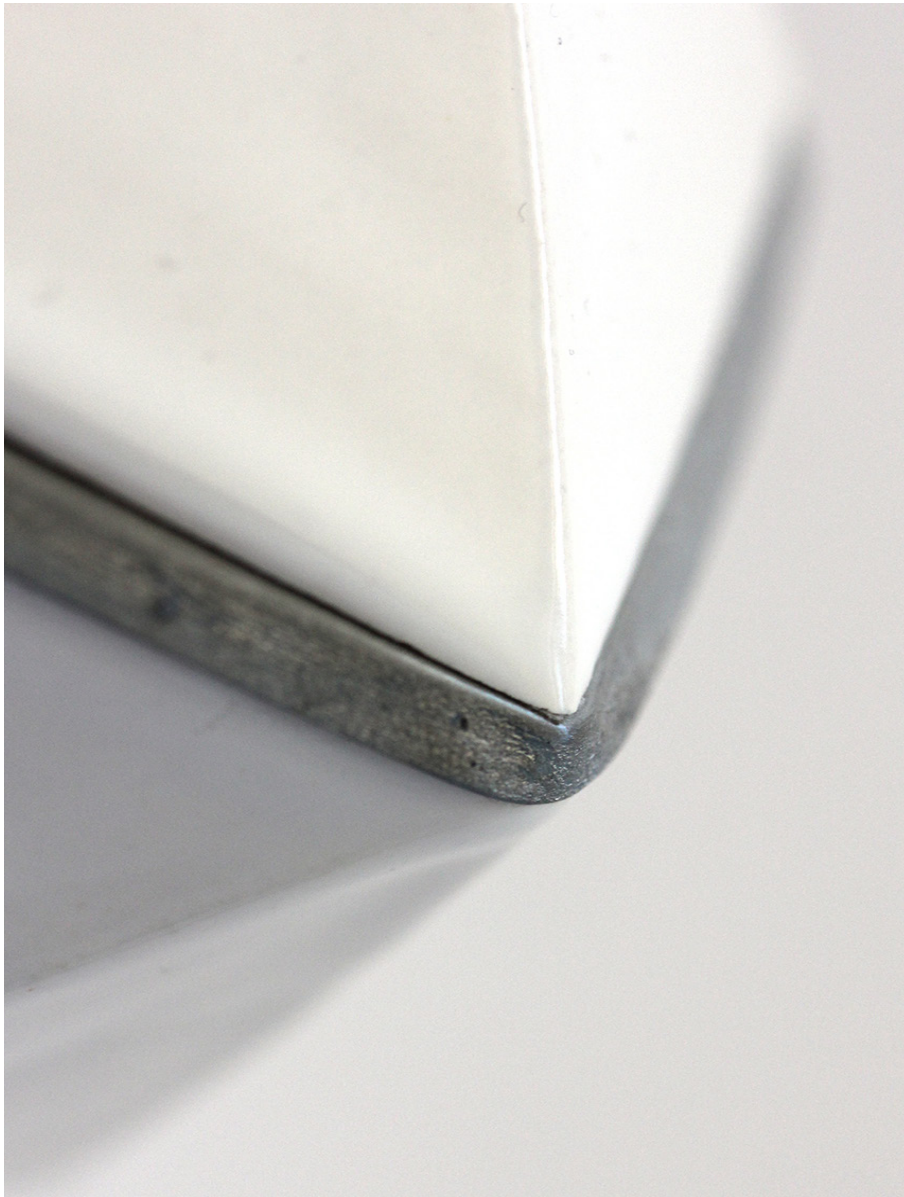
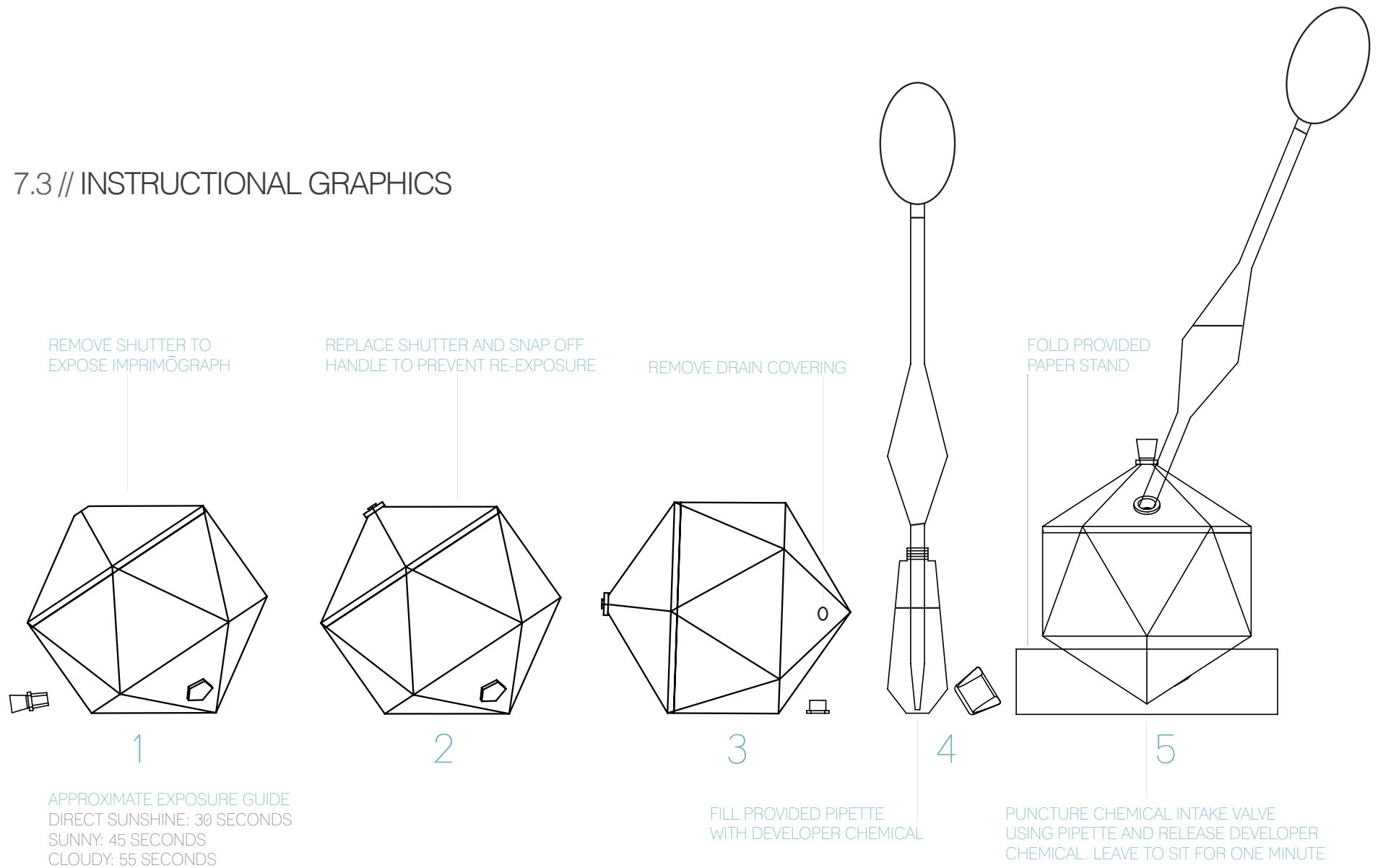


fig.7.24, 7.25: Author's Own Photographs

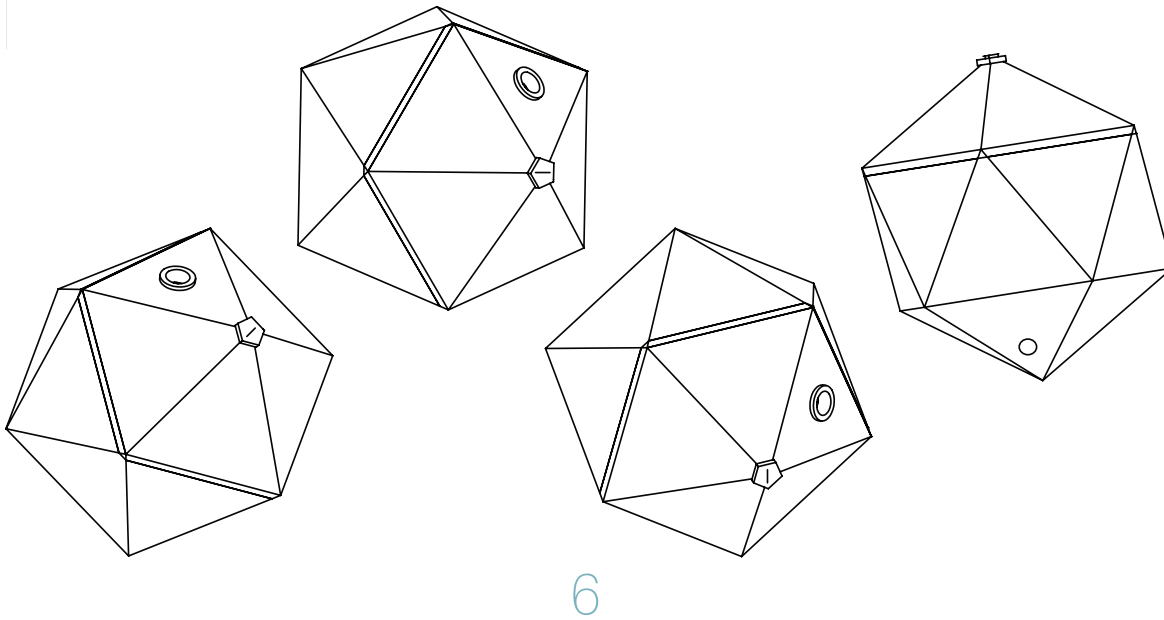


fig.7.26: Author's Own Photograph, Custom Blown Glass for Imprimotype Kit with Unmarked Beaker.

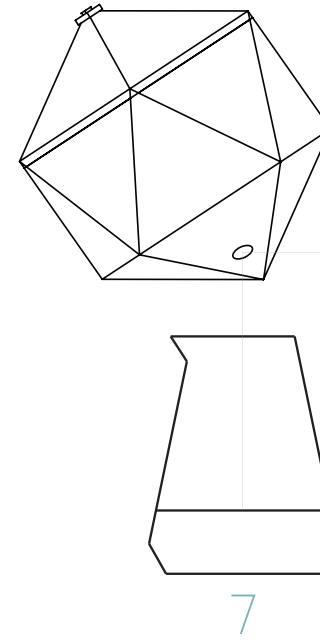
7.3 // INSTRUCTIONAL GRAPHICS



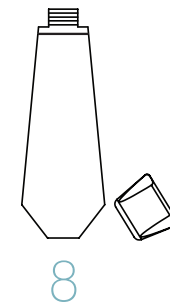
GENTLY ROTATE IMPRIMOTYPE TO TIP CHEMICALS INTO DOUBLE WALL CHAMBER,
THEN ORIENTATE UPRIGHT OVER BEAKER TO DRAIN CHEMICALS FROM CAMERA



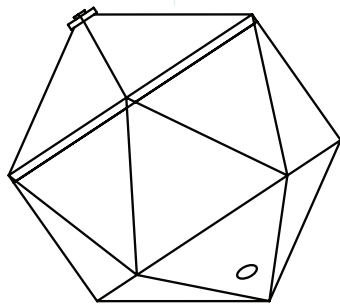
DRAIN CHEMICAL



REPEAT STEPS 4-7 WITH FIX 1
AND FIX 2 CHEMICAL VIALS
THEN TWICE MORE WITH
PURE WATER (SOAK IN FIX
AND WATER FOR 5 MINUTES
EACH TIME)

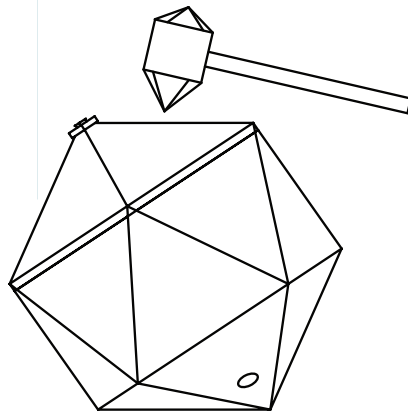


YOUR IMPRIMOTYPE HAS NOW
BEEN COMPLETELY PROCESSED



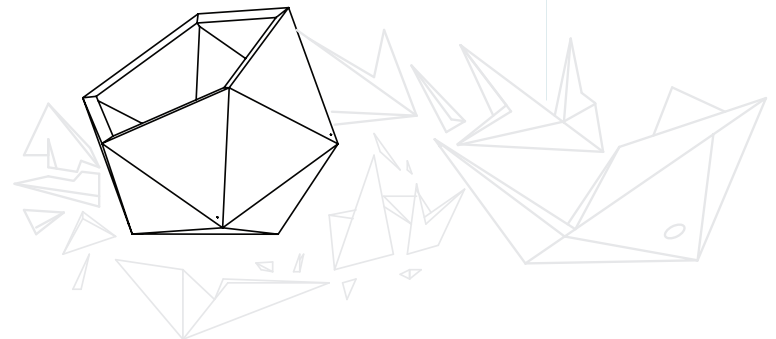
9

WHEN THE TIME IS RIGHT, REVEAL
IMPRIMOGRAPH BY SACRIFICING CAMERA



10

DISPOSE OF BROKEN CERAMIC CAREFULLY



A PASSING OF TIME

7.4 // SACRIFICING THE IMPRIMŌTYPE



fig.7.27, fig.7.28, fig.7.29: Sacrificed Imprimotype. Author's Own Photographs



fig.7.30, fig.7.31, fig.7.32: Author's Own Photographs



fig.7.33, fig.7.34, fig.7.35, Author's Own Photographs



fig.7.36, fig.7.37, fig.7.38, Author's Own Photographs





fig. 7.40: Author's Own Photograph

7.5 // IMPRIMŌGRAPHS

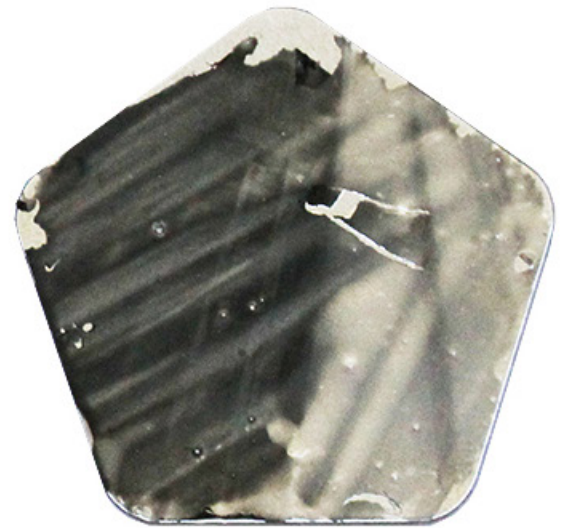
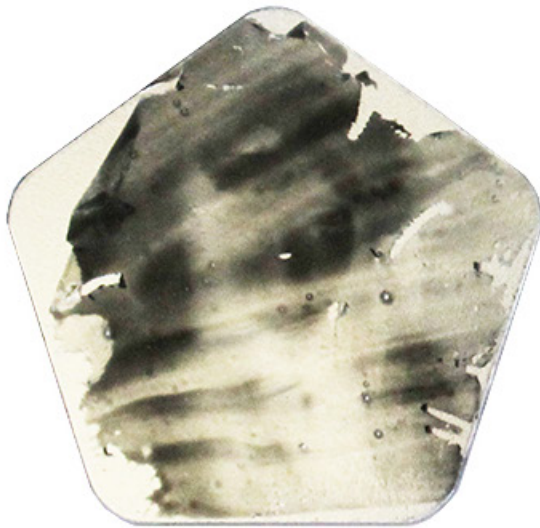


fig.7.41, fig.7.42, fig.7.43: Author's Own Photographs

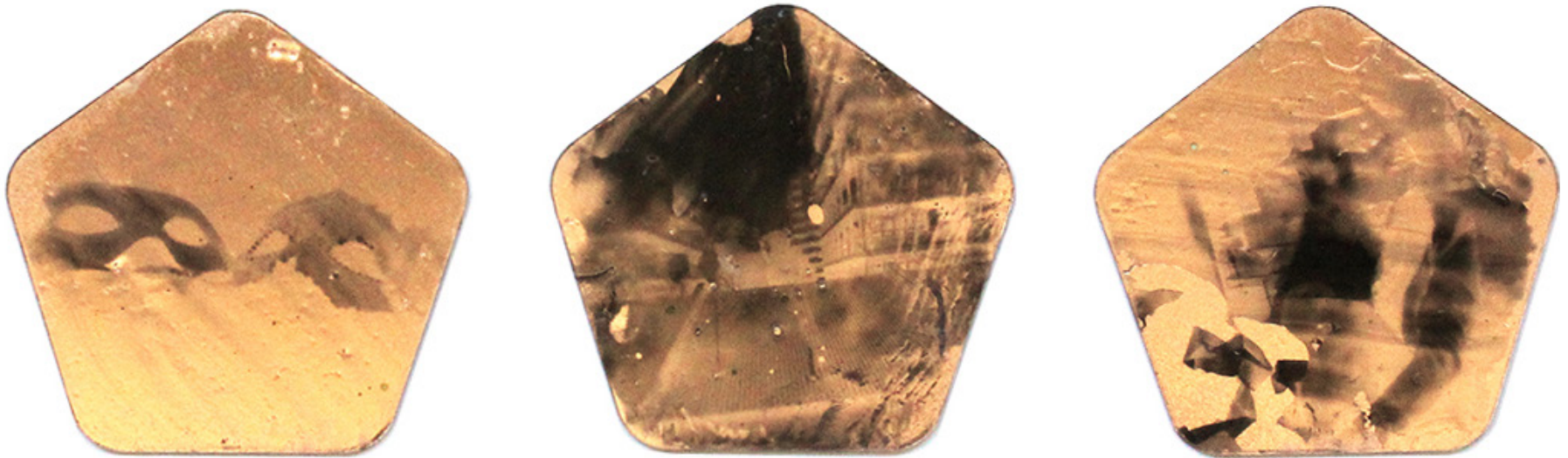


fig.7.44, fig.7.45, fig.7.46: Author's Own Photographs



fig. 7.47: Author's Own Photograph



fig.7.48: Author's Own Photograph

CHAPTER EIGHT | DISCUSSION AND CONCLUSION

8.1 // DISCUSSION AND CONCLUSION

The Imprimōtype reintroduces the ritual of photographic chemical development whilst eliminating the need for darkroom knowledge. The analogue photographic process itself allows for variation and serendipity of the resulting photograph. The Imprimōtype has been successful in satisfying all five of the design criteria that I had set out to achieve (tactility & tangibility, scarcity, sacrifice, investment and longevity.) It offers tactility & tangibility through a physical photograph and a hands-on photographic process involving the user. Scarcity and sacrifice are felt as each camera produces just one single photograph and the user must partake in the deliberate act of breaking the camera to reveal the Imprimōgraph within. In terms of longevity, once chemically fixed, the Imprimōgraph camera can remain 'un-opened' indefinitely until one decides to reveal the image within. Also, the Imprimōtype is made from ceramic, a material that does not decompose or decay over time.

The current cost to create each camera kit is just over NZ\$500.00, although this cost will reduce as 3D printed ceramic becomes more common and accessible. I believe this price reflects the Imprimōtype's status as a bespoke and boutique item. Experiencing the alternate experience of photography that the Imprimōtype offers requires both financial and temporal investment. This further plays on the sense of sacrifice and solidifies the intent required to break the camera in order to reveal the photograph at the heart of the camera.

In future iterations of the Imprimōtype, further attention needs to be placed on the connection between the lens and body pieces of the design. In terms of 3D printing, ceramic is a difficult material to allow tolerances for due to the manufacturing process requiring firing, which causes parts to shrink, and glazing which adds up to 1mm of thickness, thus each piece of ceramic is unique and although my process of flatbed scanning helped to create a better-fitted joining piece, further development is required to ensure a seamlessness that makes the Imprimōtype impenetrable except through intentionally shattering the outer later of ceramic.

I believe the Imprimōtype is successful in creating a process and environment that allows the user to utilize darkroom photography practices without requiring a darkroom, but the small printed components such as the chemical valve entrance require slight tweaking in the thickness of the Objet Connex material to ensure an even more reliable lightproof environment in future iterations.

In conclusion, the Imprimōtype offers the alternate experience of photography that I set out to provide. I believe the Imprimōtype offers more than 'slow photography' as slow photography dubs the resulting image as 'secondary.' However, the photographs from the Imprimōtype are not secondary to the process due to the transition of value from the camera to the value of the image, as the user must consciously decide that it is time to reveal the photograph by choosing to break the camera. The photograph therefore holds its own value and is in that way not secondary to the process of its creation.

8.2 // FUTURE DEVELOPMENT

At present, the Imprimōtype focuses very much on a personal experience between the user and the camera. In future, it would be interesting to expand on this experience and add a social aspect to it by encouraging users to share their photographs with one another. This development could come in the form of a specialised social platform used to share Imprimōgraphs from around the world. However, a constraint such as only being able to upload one Imprimōgraph per year should be implemented to preserve the integrity and feeling of scarcity surrounding the Imprimōtype and imprimōgraphs, and prevent the imprimōgraphs from being moved “out of the way to make time room for the new, which creates a sense of temporariness for the photographs.” (Murray, 2008: p. 155)

It would be interesting to encourage users to capture an image and then swap their Imprimōtype with one another. When the Imprimōtypes are opened, they could be uploaded to an Imprimōtype social platform and eventually the user who took the photo can view the photograph they took and have an insight on how their photograph had an impact on others.

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// LIST OF FIGURES

Cover, IV, VI, X, XI: "EMULSION PRINTS" Authors Own Images.

fig.1.1 'LITTLE SARAH' From the Family Album, Used with Permission

fig.2.1: <http://pixsylated.com/blog/stepping-inside-havana-camera-obscura/> | Accessed 26/06/2014

fig.2.2, fig.2.3: <http://www.abelardomorell.net/posts/camera-obscura/> | Accessed 26/06/2014

fig.2.3 - fig.2.8: 'POLAROID'S' By Minanne Kong, Used with Permission

fig.2.9: <http://www.lomography.com/photos/cameras/3314900-lomography-diana-f-plus/popular/11931157> | Accessed 26/07/2014

fig.2.10: <http://www.lomography.com/photos/countries/192-singapore/popular> | Accessed 26/07/2014

fig.2.11: <http://www.lomography.com/photos/cameras/3314900-lomography-diana-f-plus/popular/11852196> | Accessed 26/07/2014

fig.2.12 - fig.2.14: 'TRANSITORY' By Sam Carew, Used with Permission

fig.3.1 - fig.3.8: Author's Own Images

fig.3.9: <http://i0.wp.com/www.gcubedofficial.com/wp-content/uploads/2014/04/lytro-camera-group-stacked.jpg> | Accessed 26/06/2014

fig.3.10: <http://www.wired.com/wp-content/uploads/2014/04/Lytro-Illum-81.jpg> | Accessed 26/06/2014

fig.3.11: <http://petapixel.com/2014/04/22/lytro-unveils-illum-light-field-camera-features-1-inch-sensor-costs-1600/> | Accessed 26/06/2014

fig.4.1 to fig.4.6: <http://chriskeeney.com/blog/2010/03/imre-b%C3%A9csi-march-2010-%E2%80%93-featured-pinhole-photographer>
| Accessed 27/06/2014

fig.4.7 to fig.4.10: <http://petapixel.com/2013/02/13/photog-captures-time-in-stunning-color-pictures-using-a-pinhole-camera/>
| Accessed 27/06/2014

fig.4.11 Cyanotype by Anna Atkins, <http://www.abbeville.com/blog/?p=880> | Accessed 27/06/2014

fig.4.12 Cyanotype by Anna Atkins 1843, <http://altfotografcilik.blogspot.co.nz/2010/05/cyanotype-derin-mavi.html> | Accessed 27/06/2014

fig.4.13 Aging Alone by Alan Sockloff. All Rights Reserved <http://blog.voxphotographs.com/2012/> | Accessed 27/06/2014

fig 4.14 <http://jafferartmaterial.blogspot.co.nz/2011/05/07-cyanotype.html> | Accessed 27/06/2014

fig.4.15 to fig.4.20: Author's Own photographs

fig.4.21 to fig.4.23: <https://pictures.lytro.com/lytro/collections/41/pictures/832622> | Accessed 27/06/2014

fig.4.24, fig.4.25: <http://www.instructables.com/id/3D-Printing-Photographs-using-3DS-MAX/> | Accessed 28/07/2014

fig.4.26 to fig.4.29: 3D Printed Version of Scan <http://www.dezeen.com/2009/07/16/the-fetus-project-by-jorge-lobes-dos-santos/>
| Accessed 28/07/2014

fig.4.30 - fig.4.32: <http://www.spoon-tamago.com/2012/11/09/worlds-first-3d-printing-photo-booth-to-open-in-japan/>
| Accessed 28/07/2014

fig.4.33: Author's Own Images

fig.4.34 - fig.4.36: Author's Own Images

fig.4.37 - fig.4.40: Author's Own Images

fig.4.41: Author's Own Photograph

fig.4.42: Author's Own Photograph

fig.4.43 - fig.4.49: Thread and Venus <http://www.tokujin.com/en/art/installation> | Accessed 28/07/2014

fig.4.50 - fig.4.61: Author's Own Photographs

fig.5.1: Authors Own Photograph

fig.5.2, fig.5.3: Author's Own Photographs

fig.5.4: Author's Own Photograph

fig.5.5: Author's Own Photograph

fig.5.6 - fig.5.7: Author's Own Photograph

fig.5.8: <http://www.personal.psu.edu/sca5056/ART101/firstPhoto.jpg> | Accessed 28/07/2014

fig.5.9 - fig.5.11: <http://www.lomography.com/magazine/lifestyle/2011/04/23/the-pinhegg-my-journey-to-build-an-egg-pinhole-camera>
| Accessed 28/07/2014

fig.5.12 - fig.5.22: Author's Own Photographs

fig.6.1: Authors Own CAD Drawings

fig.7.1 - fig.7.10: Author's Own Photographs

fig.7.1 - fig.7.10: Author's Own Photographs

fig.7.11 - fig.7.18: Author's Own Photographs

fig.7.19: Author's Own CAD Drawings

fig.7.20 - fig.7.26: Author's Own Photographs

fig.7.27 - fig.7.48: Author's Own Photographs

// APPENDIX

ALL PHOTOGRAPHS IN THE APPENDIX SECTION ARE THE AUTHOR'S OWN IMAGES

CONTENTS

+A.1 / Full Capture Pinhole Investigation.....	191
+A.2 / An Early Look at Camera Optics.....	195
+ A.3 / Light and Shadow.....	197
+ A.4 / Conceptual Form.....	199
+ A.5 / Basic Darkroom Setup.....	201
+ A.6 / Modified Diana+	203
+ A.7 / Full Aperture Investigation.....	204
+ A.8 / Folded Chemical Processing Stand Net.....	206
+ A.9 / Full Camera Form Investigation.....	207

A.1 // CAPTURE PINHOLE

Abstract

Capture is a design driven research project for Design and the Human Mind which challenges T. W. Allan Whitfield's theory that familiarity is integral to understanding an object and therefore ease of use. Whitfield stresses the importance of identification and familiarity of an object so the brain is able to categorize the object; Whitfield therefore theorizes that to understand a 'new' object we need to "position it in terms of categorical meaningfulness" (Whitfield, 2005, p. 10)

Through Capture I aimed to understand whether objects that are unfamiliar can also be easy to use (and understand.) The object that was focused on in this research is a pinhole camera. Capture pays particular attention to the way in which it communicates with and to a user through visual cues and affordances, defined by D. A. Norman as "the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used." (Norman, 1990, p. 9)

In general, all participants reacted in a positive manner to the Capture pinhole prototype. I acknowledge that the sample of people surveyed was a small sample of 7 candidates (due to strict ethics consent criteria), however many of the responses were similar and a few of the participants even gave the same or similar feedback. I observed that ALL participants acknowledged '3 key components' of the model, (Aperture Lens, Pull Mechanism and Film Advance Lever) despite never being explicitly asked. Users described and physically interacted with each of these parts to understand the function of the camera trial after trial as a rational while using the camera and giving real time 'think out loud' descriptions of their experience.



There was a spread of opinions on whether or not the camera was easy to use to capture and image, though 71% of results were in the 'somewhat agree' to 'strongly agree' categories whilst only 14% disagreed. 86% of participants believed they understood how the object functioned just by looking at it and having the knowledge that it was a camera. This understanding jumped up to 100% when the participants had the chance to physically interact with the camera indicating that the camera possesses an easy to use quality due to understanding visual, tactile and kinetic feedback cues.

When asked about familiarity 43% of reported that they 'strongly disagreed' to 'somewhat disagreed' that there was "a familiar feeling about the way to use the camera," while 29% somewhat agreed, 14% were between 'somewhat agreeing' and 'neither agreed nor disagreeing' and 14% 'neither agreed nor disagreed' Surprisingly, when this question was reversed to 'the way to use this camera felt unfamiliar' 43% disagreed indicating that they did not think the camera's interaction is unfamiliar while 43% somewhat agreed and 14% had no opinion.

When asked if the participants had "previously used other cameras that used the same interactive movement to capture images" all but one of the participants 'strongly disagreed' to 'disagreed' while just one agreed that they had used a camera with a similar interaction before. Unfortunately as I analyses the surveys after the sessions I was unable to find out which other camera had a similar interaction for capturing images or whether this user had misunderstood the question.

Another slightly contrasting result regards whether or not the participant had interacted with other objects in the same way as the camera. For this category 43% 'somewhat disagreed' to 'disagreed' whereas 57% 'somewhat agreed.' However, when asked what the camera and using the camera reminded him or her of, each participant had an answer to which other object looked or operated similarly to the {capture} camera.

Participants mostly thought the camera reminded them of an eye or an eyeball- an unexpected response, as this was not a consideration in the design of the camera; rather it took its spherical form through dictation from the pulling interaction. Other responses included "A flower,"

“A Slingshot,” “A Spinning Top” “A plant pod” and “An eye camera toy for PlayStation II” (*note: some participants offered more than one response) Regarding what using the camera reminded the user of, participants responses ranged from “yo-yo,” “slingshot,” “to a robot voiced by Steve Merchant in Portal 2.”

The final questions from the survey encouraged participants to give some suggestions as to what would make using the camera, and capturing an image easier to understand where the design might have failed to explain itself through visual cues. Responses included: Having a viewfinder, An indication of film change, A responsive cue to let you know when a photo has been captured, and an indicator to let you know how much light has been let in.

For the future design, the camera will indicate that you have captured an image when the pull mechanism has been completely pulled back by playing a sound. The pull stings will be mostly internal so not to get in the way of holding the camera but will be visible externally when the back component is pulled. The camera will feature a “target/viewfinder” area and a different aperture lens composed of six separate pieces attached with hinges as the current 3D printed rubber one can become deformed easily with fingers prodding the lens. It is not possible to redesign for showing how much light is let in as this is not a feature with pinhole type cameras- you only let in a pinhole of light but control how much by how long you expose the hole for.

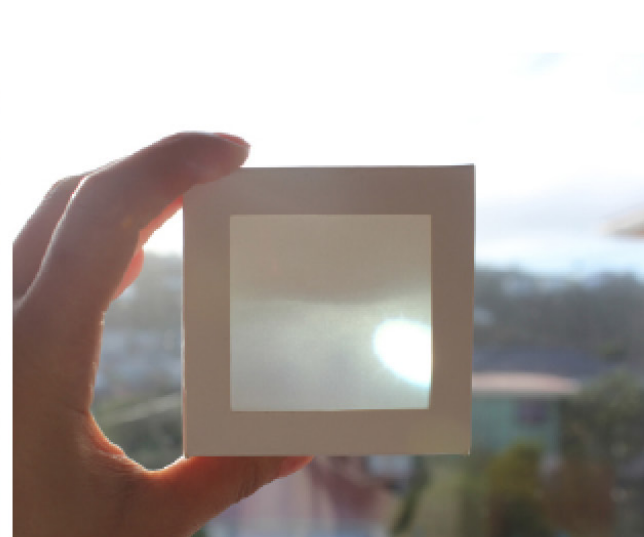
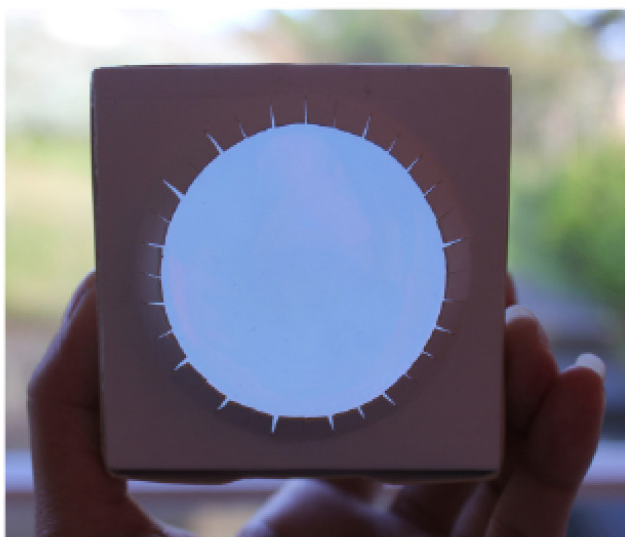
In conclusion, I believe my result points to the fact that an object can in fact be unfamiliar but easy to use.

The results regarding ease of use are relatively conclusive to Capture being relatively easy to use. Part of this is due to its simple form and easy to identify, simplified, prominent functional components. However the results gathered for whether or not the camera and the interaction for capturing an image could be described as inconclusive. I believe that even though a user had not previously used a camera like the Capture

A.2 // AN EARLY LOOK AT CAMERA OPTICS

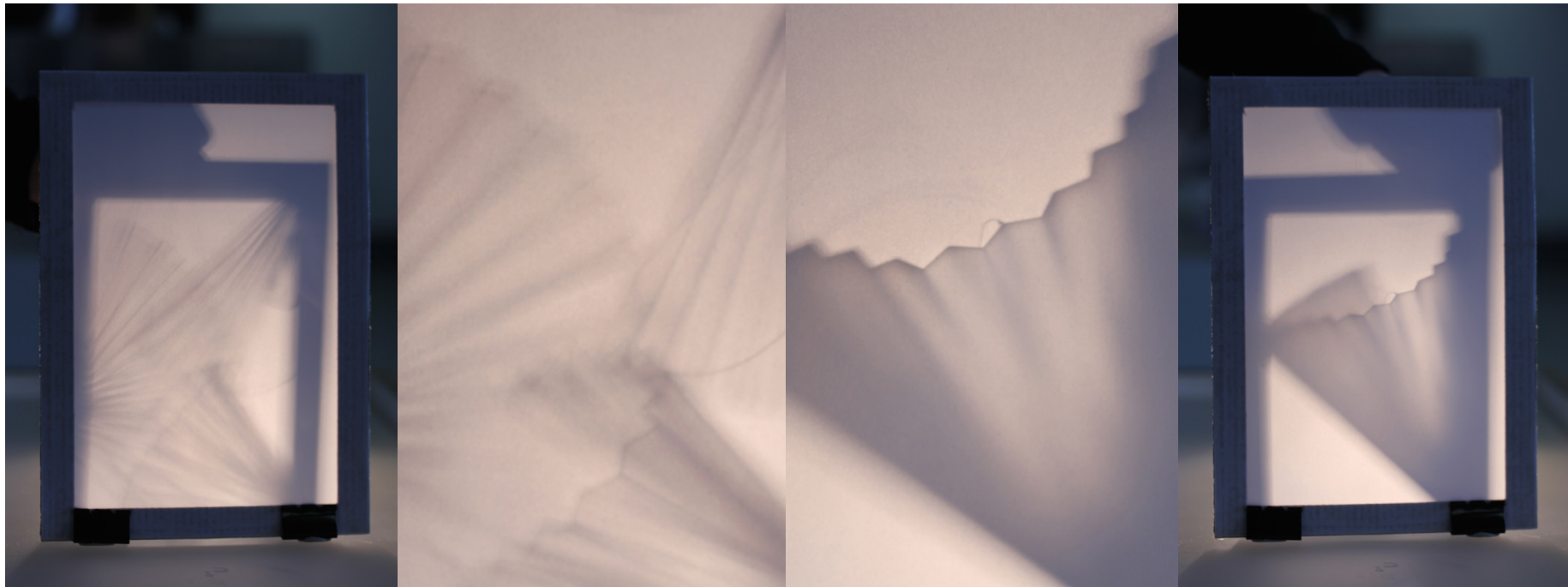
The Camera Obscura, (Latin for “dark room”) (James, 2002) was originally derived from a very simple and primitive drawing tool used by artists to gain an indication of perspective for painting and drawing. The magic of the camera obscura comes in the simplicity of its construction. Here, I made a camera obscura using cardboard, with a small mirror, old projector lens and translucent paper as a screen. This experiment shows the beauty and intrigue of optics pre-dating photography.

This optical phenomenon is simple but effective- it's simplicity promotes curiosity and the way it projects the image onto the translucent paper 'screen' gives a soft, dreamy quality offering an alternate way of seeing.

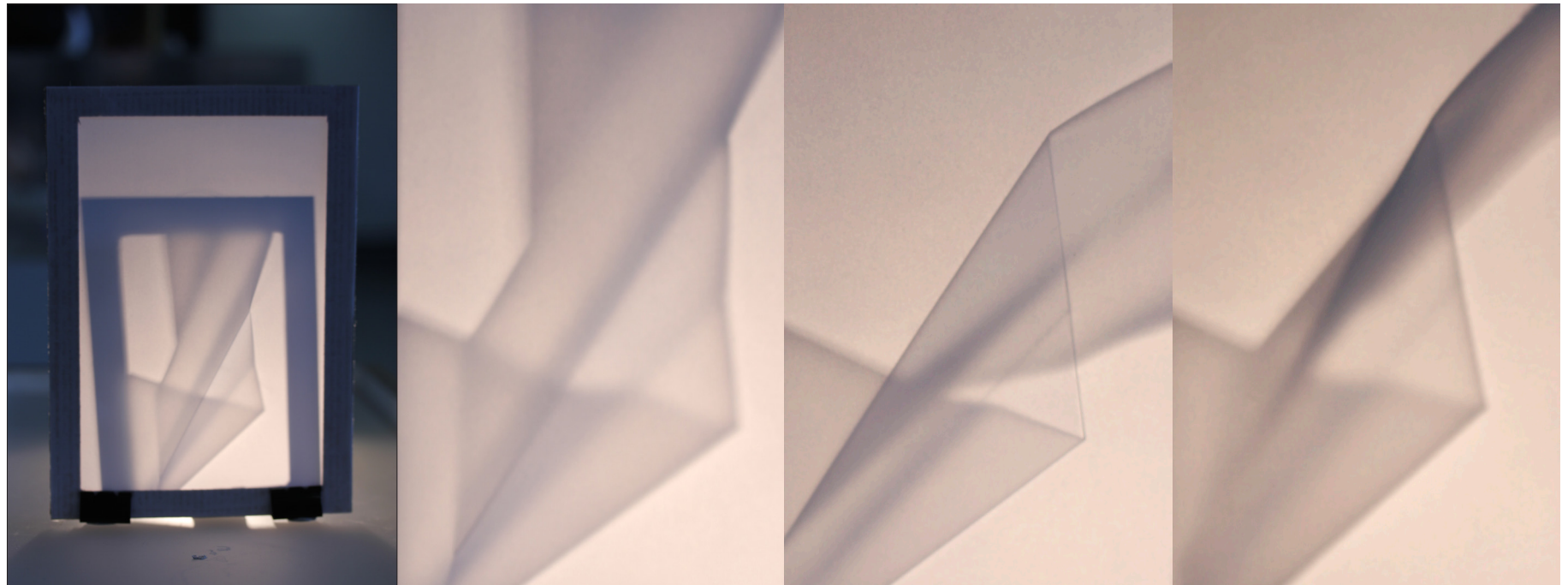


A.3 // LIGHT AND SHADOW

This experiment was about making images through the use of light toward an interactive display. Photography is essentially the capturing of light from a moment in time. This experiment explores the possibility of creating an abstracted interactive 'photograph' as a display of light; creating an output of light from what is traditionally information input from light.

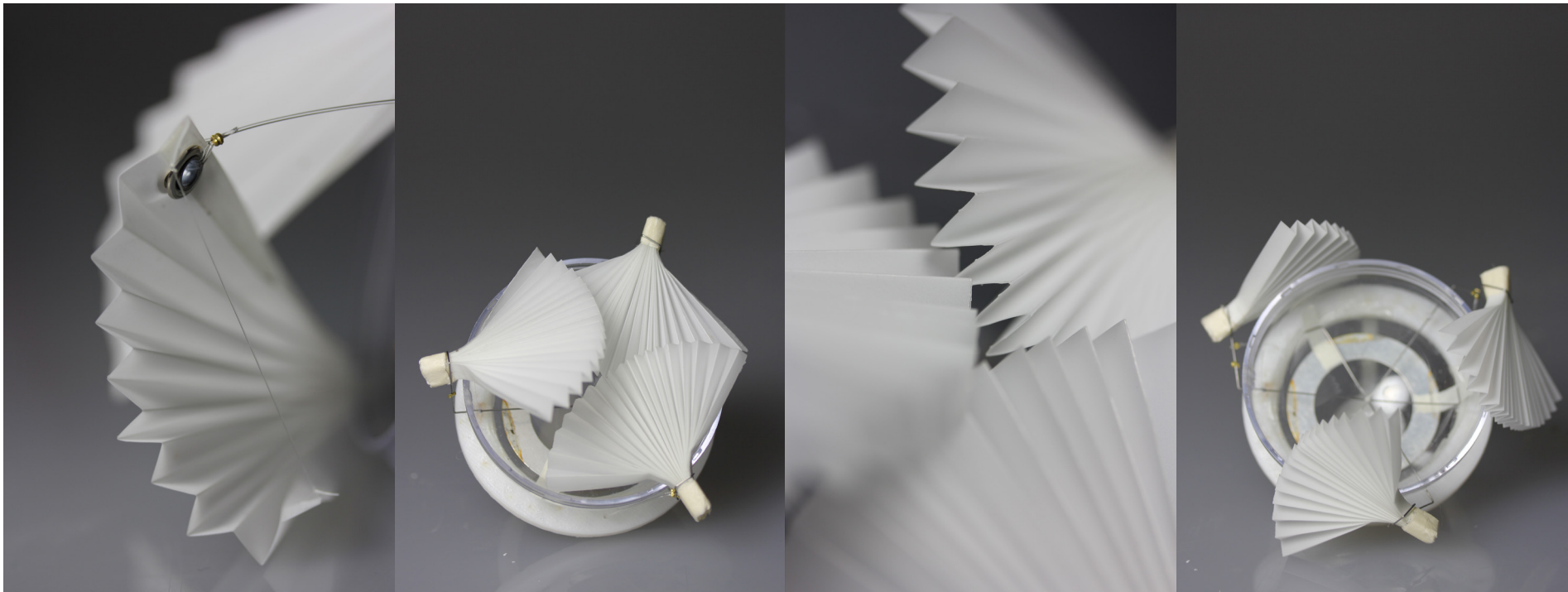


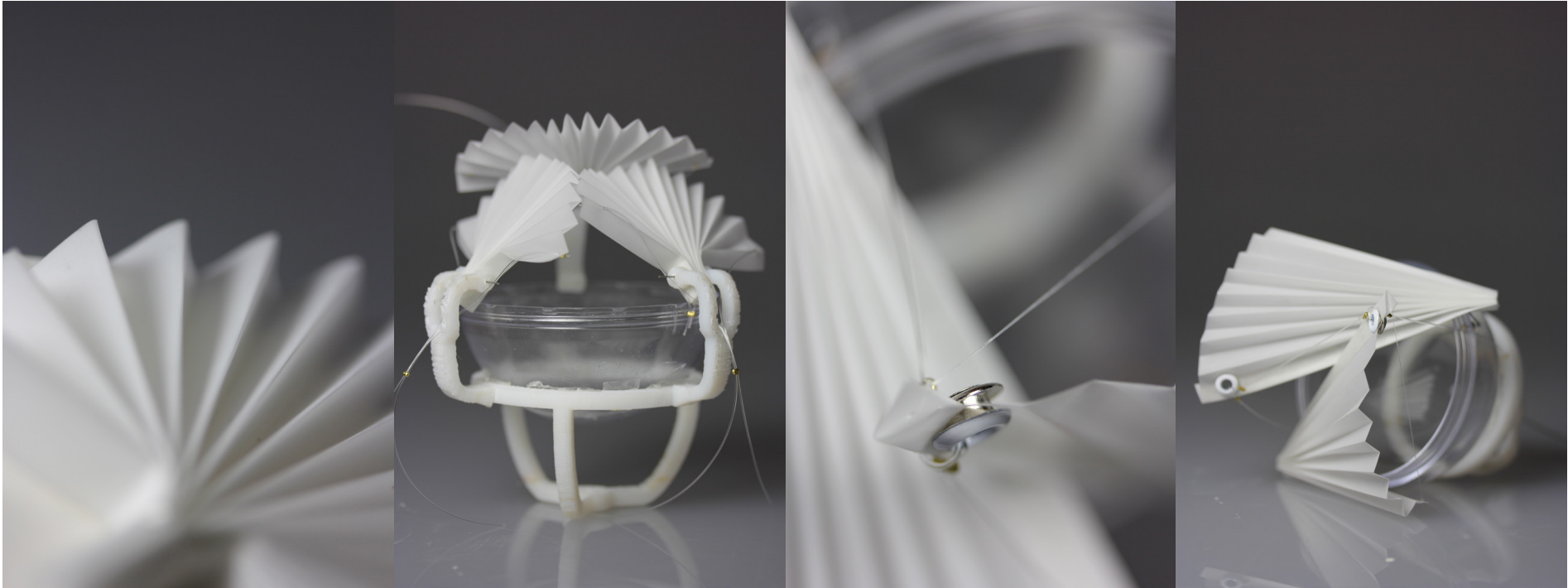
Though the results of this experiment are interesting to behold visually, an output of a light display lacks the physical connection that I to provide the experience I want. One way to incorporate physical connection would be to have the user manipulate how the light portrays the image, however that only encourages users to physically connect with the process and not the image itself.



A.4 // CONCEPTUAL FORM

Following the previous light investigations, I created a conceptual range of potential camera forms which could theoretically be programmed to be automated using muscle wire or similar.





A.5 // BASIC DARKROOM SETUP

Many of the photographic tools and chemicals needed to create a small darkroom were difficult to find in New Zealand, below is a full rundown of where I sources each of the components in my darkroom.



The photosensitive chemical I used to create a light-sensitive surface is Rockland's Liquid Light Photographic Emulsion. Photographic emulsion will offer much more versatility than any type of photosensitive paper, and can be used on almost any surface.

The safelight bulb I used was a red/amber ("red") safelight, Impact PF712B 230V 15W purchased online from BLT Direct, a company based in the United Kingdom. Though movies always depict a red safelight in darkrooms, there are many channels of safelight colours and the red safelight has become very uncommon and difficult to purchase in New Zealand.

Most companies in New Zealand carry orange/yellow or green safelights, incompatible for use with Liquid Light I did find one single local retailer selling red safelights by Phillips, (RRP NZ\$80.00 /at a cost of 10+ times more than an average energy saver light bulb)

Photographic emulsion requires a hardening fixer to ensure the emulsion hardens properly upon the surface. I found it impossibly difficult to find any type of hardening fixer in New Zealand. There was an option to add a hardener to a non-hardening fixer, as some non-hardening fixers' can be mixed with a hardening chemical. However, after days of searching and contacting both New Zealand and Australian suppliers directly I found I could not source this hardener in Australasia. Some online research revealed that hardening fix is available from the United States of America and is very inexpensive; in fact, I ended up paying 12x more for shipping than for the fix itself. The hardening fixer I used with Liquid Light is Kodak Professional Fixer; a general-purpose hardening fixer for film, plate and paper.

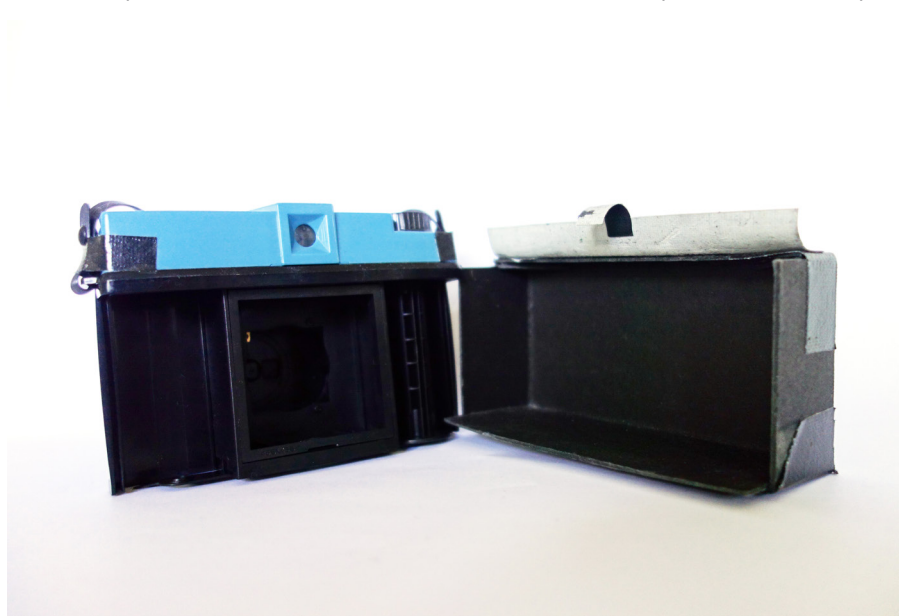
The developer for Liquid Light was much easier to source and readily available at local specialist photographic retailers. I originally attempted to use Kodak Professional's Dektol Developer (Powder) for Black and White Paper but I found it too difficult to mix due to the powder being soluble only in very specific conditions (and even then, the solution would separate overnight.) Eventually I settled on Ilford Multigrade Paper Developer as it came in liquid form and was easy to mix, requiring 1 part concentrate to 9 parts water.

PRODUCT / SOURCE / COST / COST NZ\$

- Red Safelight / <http://www.bltdirect.com/darkroom-safelight-red-15-watt-bc> ~NZ\$15.15
- Plastic Container / x3 Japan City, Plastic box etc / ~NZ\$3-\$12
- Lightproof Box / Medium container w/ black lightproof plastic sheeting taped in ~NZ\$2.00-\$5.00
- Developer / <http://www.wps.net.nz/store/all/306926.ilford-multigrade-1lt-paper-developer.html> / NZ\$24.90
- Fix / www.bhphotovideo.com/c/product/27603-REG/Kodak_1971746_Fixer_for_Black.html / US\$5.50 / with shipping ~NZ\$70.00
- Liquid Emulsion / www.bhphotovideo.com/c/product/45028-REG/Rockland_LLE8_Liquid_Light_Photo_Emulsion.html / US\$35.99 / with shipping ~NZ\$60.00 (I used Rockland's Liquid Light but other brands are available)

A.6 // MODIFIED DIANA+

I converted the Diana+ into a camera that could take a thicker, 3-dimensional image by creating an extended back panel. I created an extended back from 1.5mm black card that slotted into camera body, further secured by a single strip of black fabric tape. This allowed the thickness of the 'photo' to be up to 40mm within the (extended) camera body.



3D prints were created from a 3D scan of the human bust (a special thanks to Julian Goulding for providing the digital 3D scan files) and edited using Rhinoceros to create the 3D printed image. Once printed, the 3D images were coated with resin in order to help the liquid emulsion bond to the non-porous surface.

A.7 // FULL APERTURE INVESTIGATION

Aperture Size Specific Observations:

(With and without +22 Lens)

4mm: The 4mm aperture with lens produces a clear image, which I had thought was 'good enough' to be used as a final output level image, but after doing tests with other aperture sizes, I have found a new level of crisp clear images. After experimenting with other aperture sizes, I am unlikely to use the 4mm aperture with lens in my final camera(s.) The 4mm aperture without lens is completely out of focus, therefore would be an unlikely solution for my final camera(s).

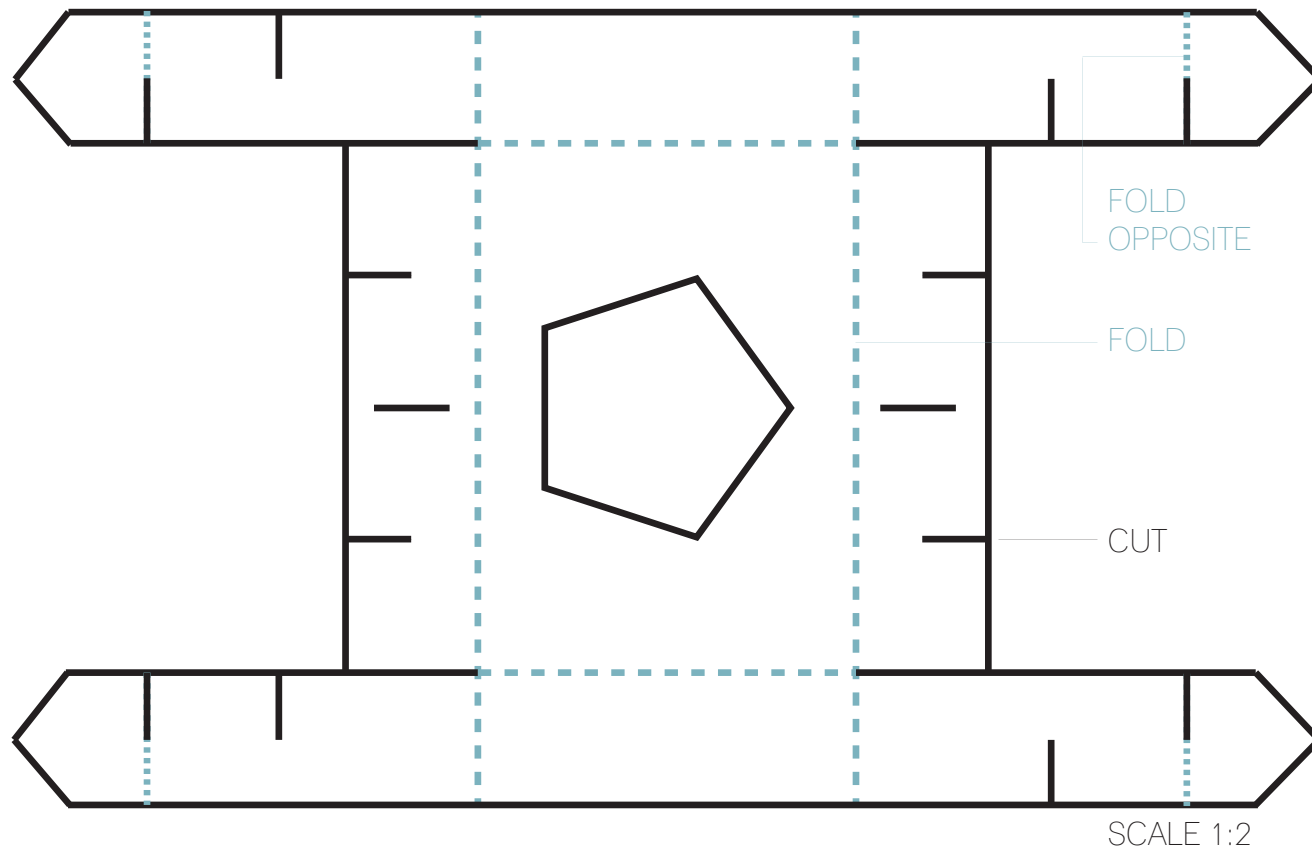
2mm: The 2mm aperture with lens is capable of producing an impressively sharp image. This is really useful for a situation where everything must be in focus to make sense, such as photography of landscapes. With a lens, the 2mm aperture showed up objects in the field of view that I didn't really notice when looking through the window in real life, such as sky dish on the roof in front of the window (of course, I could SEE this sky dish, I just never really LOOKED at it to notice it was there.) The 2mm without lens produces images which are slightly too out of focus to be of practical use, but they did have a somewhat 'dreamy' quality about them.

1mm: I think the 1mm lens produces a beautiful range of grey tones, which can be useful for photography of subjects where there is less contrast- such as portrait photography. The 1mm aperture seemed to produce comparable sharpness both with and without a lens which is quite interesting. On close inspection, I would say the 1mm aperture with lens has slightly better focus than the 1mm aperture without lens, however the 1mm aperture without lens seems to have better tonal exposure overall, with slightly more contrast but without appearing both over/underexposed in different parts of the same image as with some of the other aperture sizes.

0.5mm: The 0.5mm did not follow the trends of the other 3 aperture sizes tested. Firstly, the amount of time required to adequately expose an image took exponentially greater than the other aperture sizes, which had followed a pretty predictable formula for exposure time. This aperture size took approximately double the time that I had predicted based on the data from previous aperture sizes. This aperture size also did not fill up the whole 48x59mm emulsion coated paper, instead making a tiny image on just one side. At first I thought that the aperture whole was partially covered, but after many tests I realized that that was all that the camera could see with this small sized aperture. Another surprising result was that the 0.5mm aperture produced comparable sharpness both with and without a lens. Overall, this aperture size produced the most unexpected results, but also happened to give the most serendipitous results. The light leaks that occurred in the images taken with this aperture are intriguing and beautiful in their own right but I am not sure how practical this is for application with the camera(s) I will be making. The one practical advantage of this smaller aperture size is that this size aperture has a much more forgiving range of exposure time than the larger apertures (All the exposure times from 48 seconds to 1 minute 52 seconds produced a visible, clear image though in the testing light conditions though between 1 minute 24 and 1 minute 36 appeared to give the best exposure.

A.8 // FOLDED CHEMICAL PROCESSING STAND NET

Folds into a sturdy processing station for the Imprimotype camera



A.9 // FULL CAMERA FORM INVESTIGATION

Twin Lens Reflex (Remodel) c1870 (Original Design)

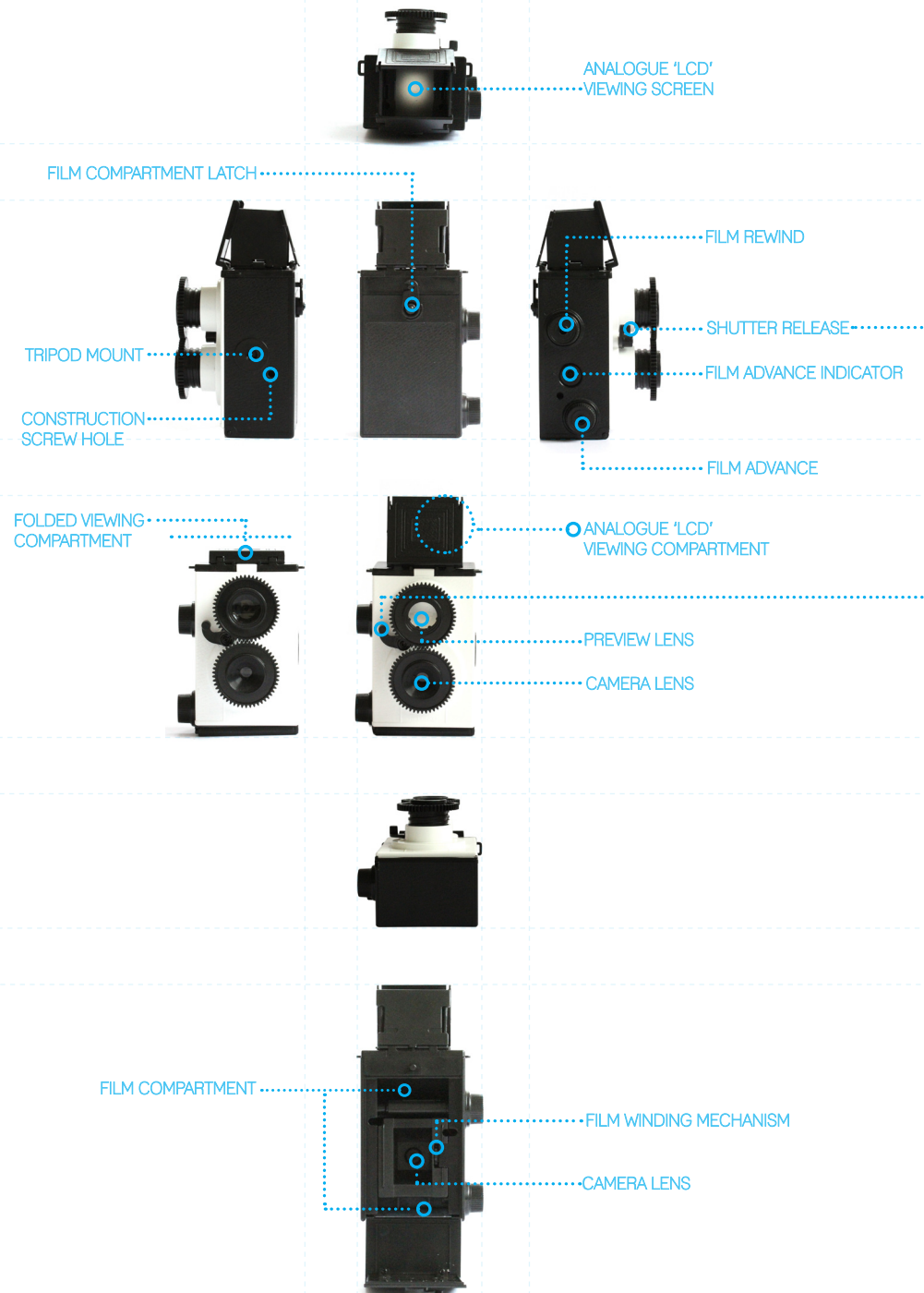
Production Dates: Original designed
c1870

Type: Film, n/a

Lens: n/a

Dimensions: ~80 x 155 x 80

Materiality: Model is Plastic



This is a kit-set remodel of a twin lens reflex (TLR) type camera which originated from the late 1800s. TLR camera's have two lenses, where one captures the image and another is reflected by a mirror to a panel for the user's to see what they could be capturing. There's a beauty to the way that you use these cameras, as you hold them upright and look down into the viewfinding lens. It offers a really personal connection which is interesting and relevant for my thesis.

Kodak Bantam 1935

Production Dates: 1930's - 1940s

Type: Film. Kodak 828 Film Cartridge

Lens: Anastigmat 35mm f6.3 (fixed)

Dimensions: ~110 x 75 x 65 (open)

Materiality: Metal



Agfa Silette L 1956

Production Dates: 1956 - late 1950s

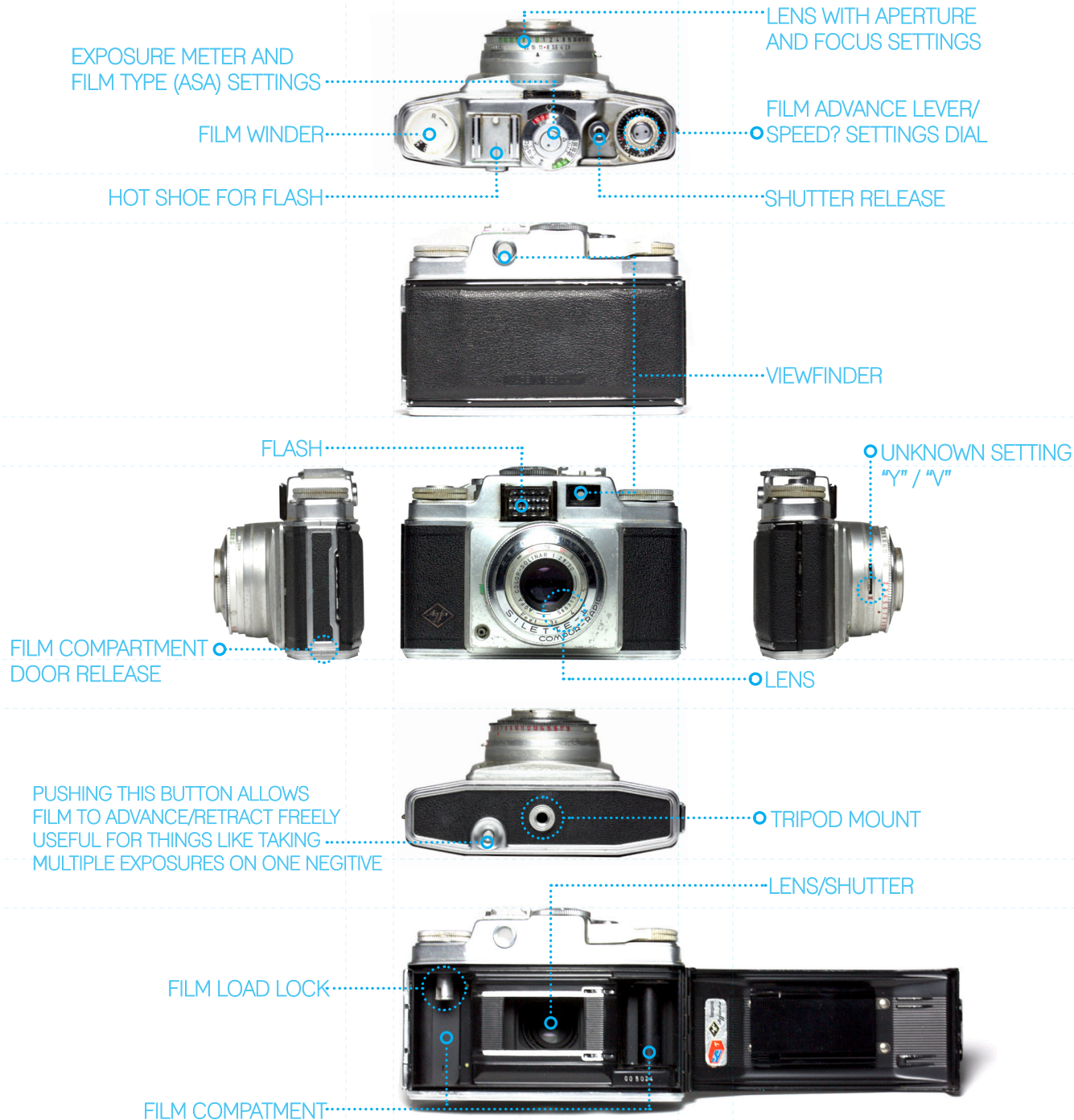
Type: Film. 35mm Film Cartridge

Lens: 50mm f1:2.8 (Fixed)

Dimensions: ~125 x 85 x 65

Materiality: Metal, Plastic

The precision on this camera is so great!! When you pull the film advance lever and click the shutter release it feels so substantial- Like you're really doing something which has value. The dials all move very precisely and some have been designed to be harder to manipulate than others, communicating which settings are more commonly used. The plastic body does not offer grip or feel very nice at all but the metal means it is still quite weighty.



Kodak Retinette IIA 1959

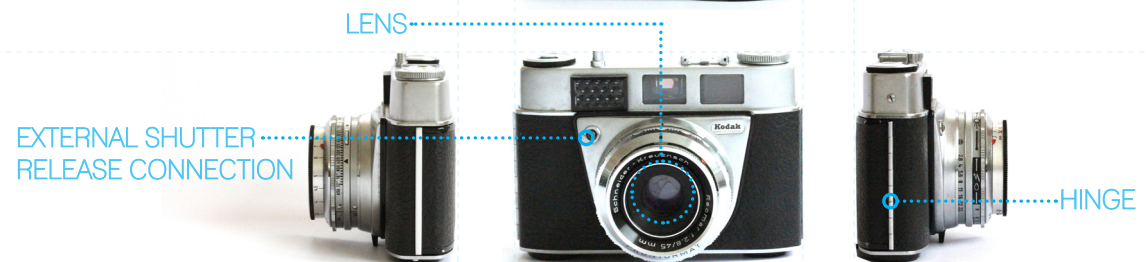
Production Dates: 1959 - 1960

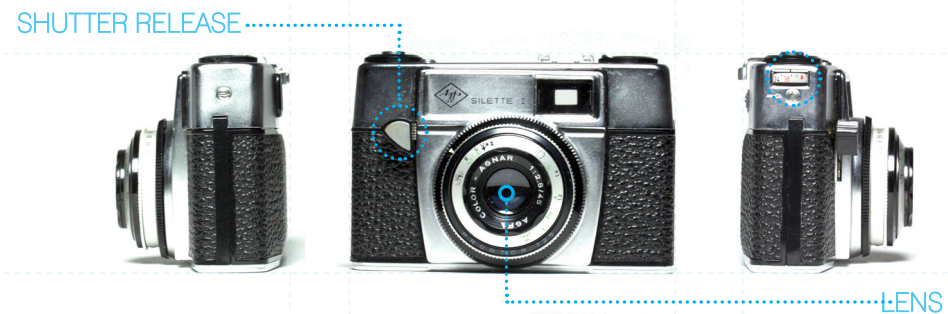
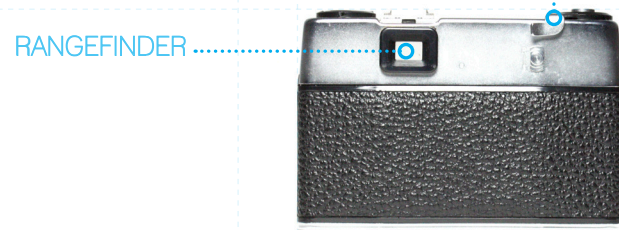
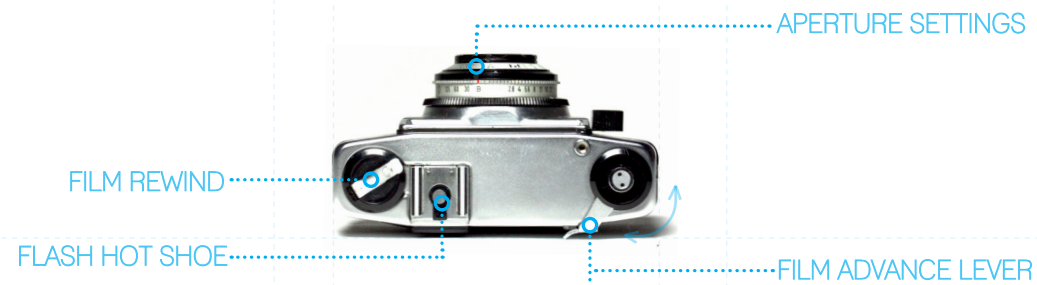
Type: Film, 35mm Film Cartridge

Lens: 45mm f2.8 (fixed)

Dimensions: ~125 x 90 x 70

Materiality: Metal





Agfa Silette I 1962

Production Dates: 1962

Type: Film. 35mm Film Cartridge

Lens: 1-8m 62.8 (Zoom)

Dimensions: 120 x 80 x 65

Materiality: Aluminium, Plastic

Dacora Dignette I 1963

Production Dates: 1963 - unknown

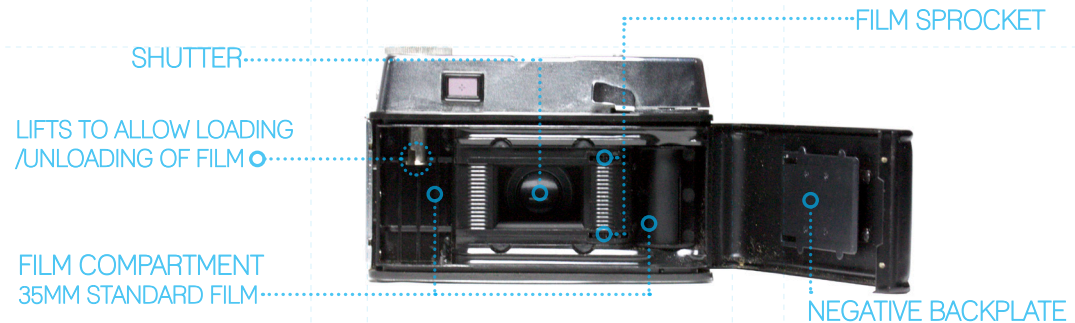
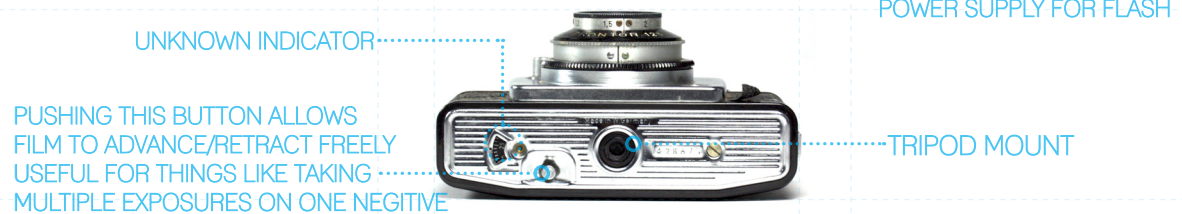
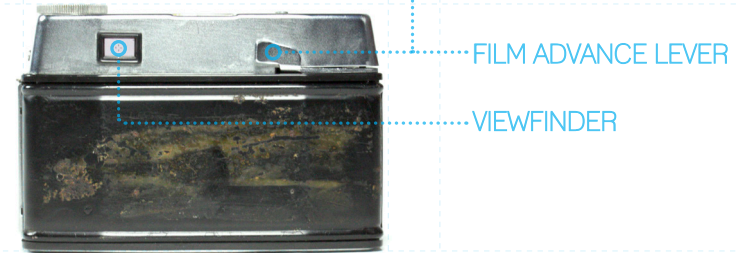
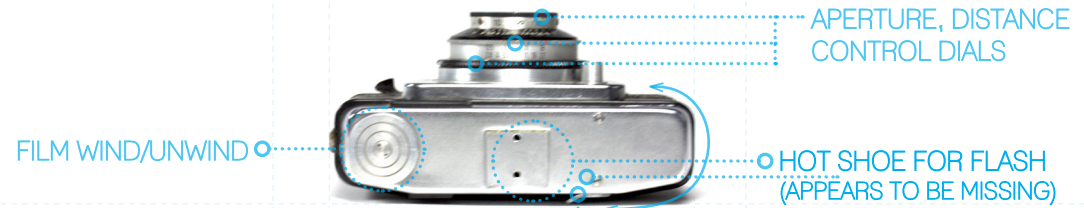
Type: Film - 35mm Film Cartridge

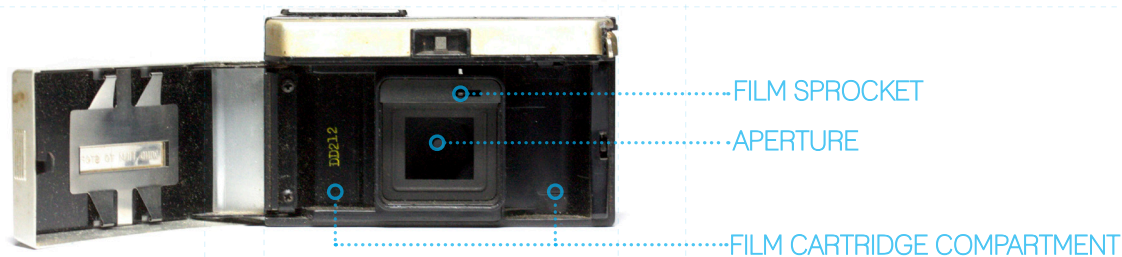
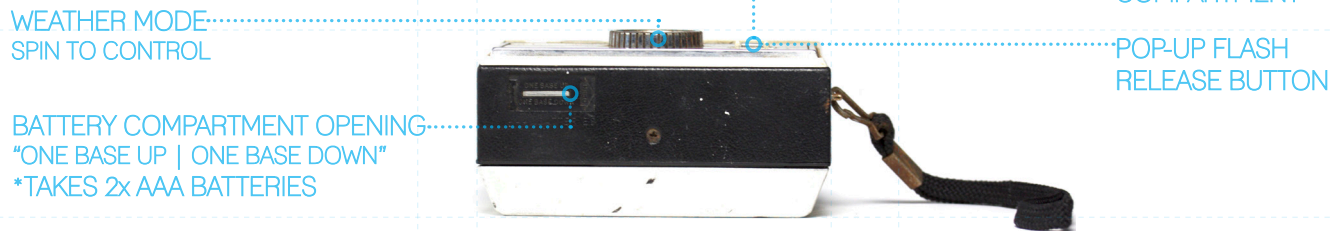
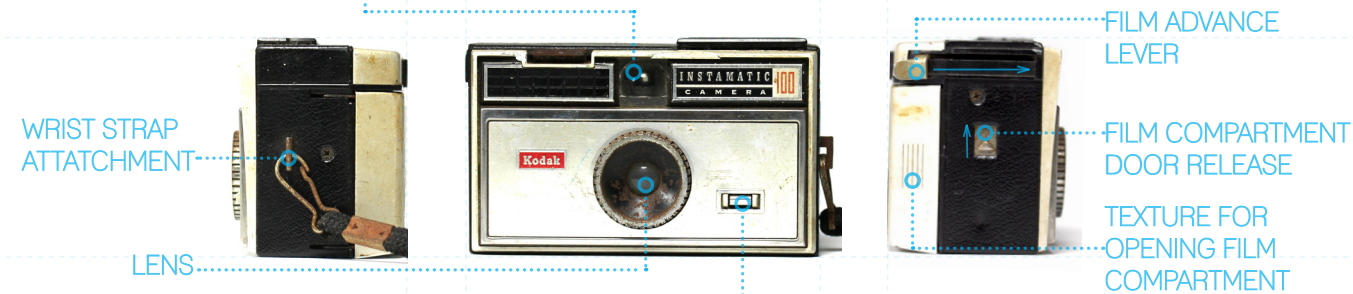
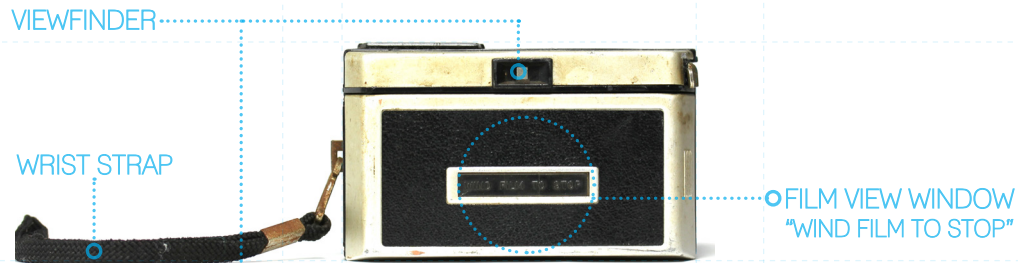
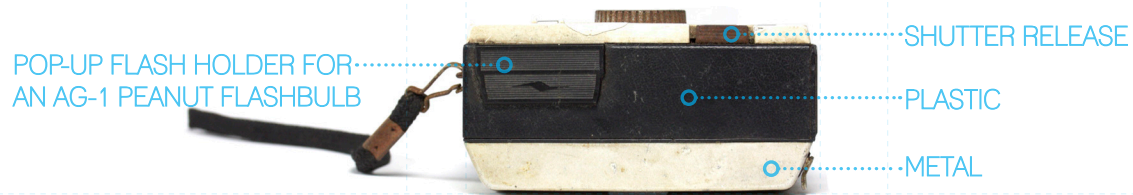
Lens: 1:2.8 45mm (Fixed)

Dimenitions: ~125 x 82 x 60

Materiality: Aluminium / Leather?

It looks like this camera has had a long hard life. Though it is a beauty with it's precisely turned lens and metal body, it's had all of it's overlay texture ripped off exposing the glue that once bonded it to the metal surface. The Dacora's film advance lever also speaks of precision and is so satisfying to pull due to the incredibly satisfying wind-up noise. I can see that much consideration has been put into this camera's design by observing the precise texturing of the aluminium that you only see when you pull the film advance lever and the engraving on the lens





Kodak Instamatic 100 1963

Production Dates: 1963 - 1966

Type: Film - 126 Cartridge

Lens: 43mm f/11 (Fixed Focus)

Dimensions: ~105 x 63 x 50

Materiality: Plastic, Metal

The use of metal on the camera body gives the camera a substantial weight. The metal has tarnished over time, with the shutter release and lens rusted in place. In use the camera is somewhat awkward as the viewfinder is extremely small and your nose gets pressed up against the back face.

Diana F+ (Remake) 1960s

Production Dates: 1960s - 1970

Remodeled Model: 2007

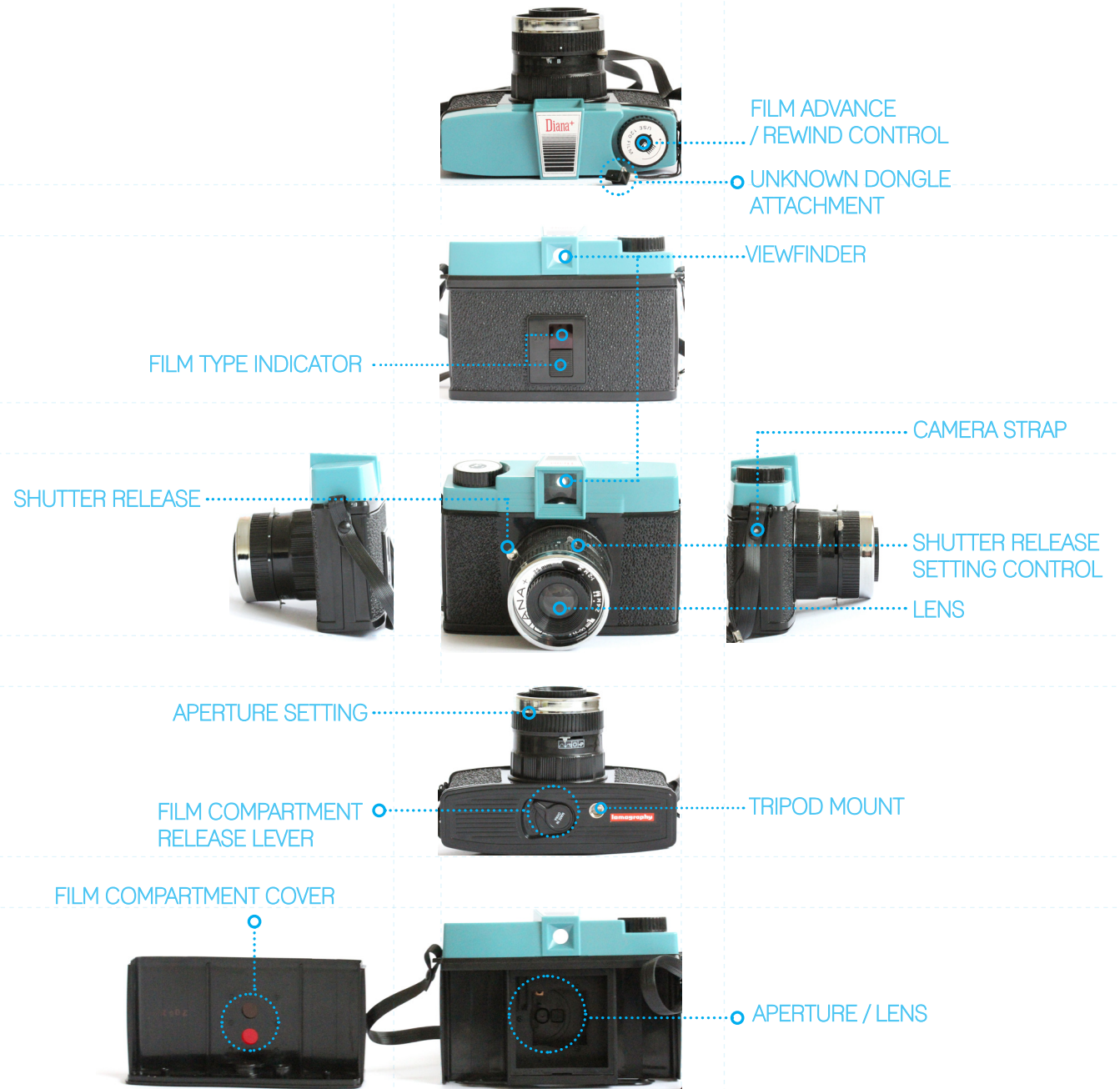
Type: Film. 120 Film Cartridge

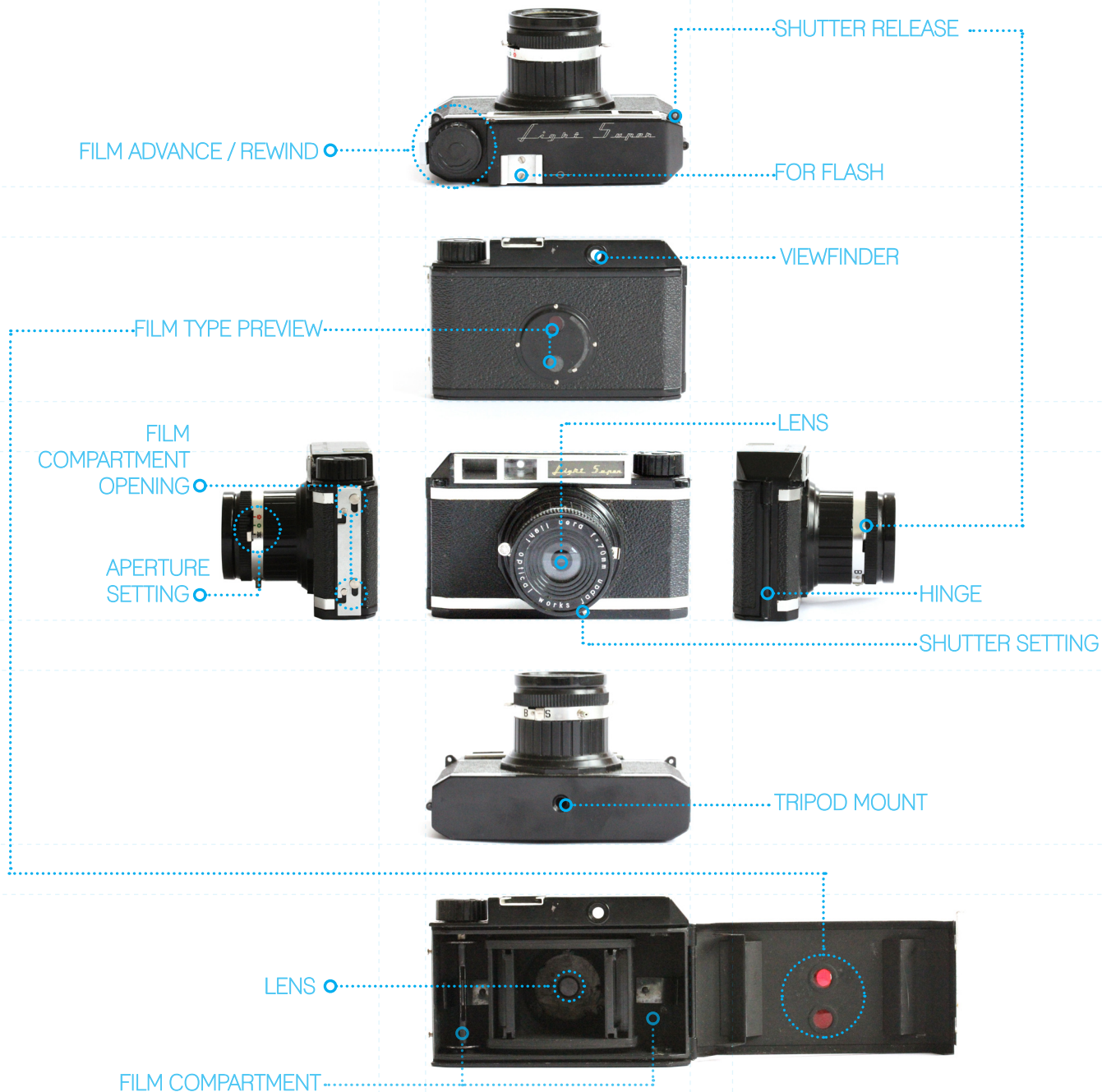
Lens: 75mm (fixed)

Dimensions: ~120 x 85 x 90

Materiality: Plastic

This camera was originally produced in Hong Kong in the 1960s. Sold for ~\$1 each, they turned out to be a huge disaster, but people have since become quite nostalgic about the dreamy image it offers due to its light leakage and the Diana has come back in and been recreated for Lomo photography lovers. This camera is so light and unsubstantial. The film winder is surprisingly well constructed. The whole back comes off to unload/load film.





Light Super 1960s

Production Dates: unknown

Type: Film. 127 Film

Lens: 70mm (fixed)

Dimensions: 122 x 78 x 75

Materiality: Metal

Kodak Instamatic 25 1966

Production Dates: 1966 - 1972

Type: Film, Kodak 126 Film Cartridge

Lens: n/a

Dimensions: ~100 x 70 x 50

Materiality: Plastic

This camera is probably one of the most basic of the camera's from pre 1980s that I've come across in this investigation. The camera only offers 2 modes, sunny and not sunny and the rest is automatic. As a minimalist object, this camera is beautiful, It is completely stripped back to complement it's basic, ease of use, and in this way the object is very truthful- it does not try to be fancy when it isn't.





Kodak Instamatic 233-x 1968

Production Dates: 1968 - 1970

Type: Film. 126 Film Cartridge

Lens: 1.2 - 4m (zoom)

Dimensions: 110 x 65 x 60

Materiality: Plastic, Aluminium Ring

This Instamatic camera is, like the rest of its family very simple. It has modes on it which are weather dependent and a film advance lever, shutter, viewfinder, and not much else. This camera is somewhat dull to interact with as it does not offer much in the way of feedback or reward whilst using it.

Kodak Instamatic 133 1968

Production Dates: 1968 - 1970

Type: Film - 126 Film Cartridge

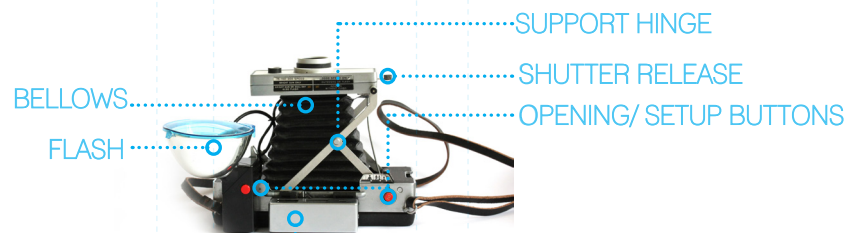
Lens: 1:11/43mm (Fixed Focus)

Dimensions: ~110 x 67 x 45

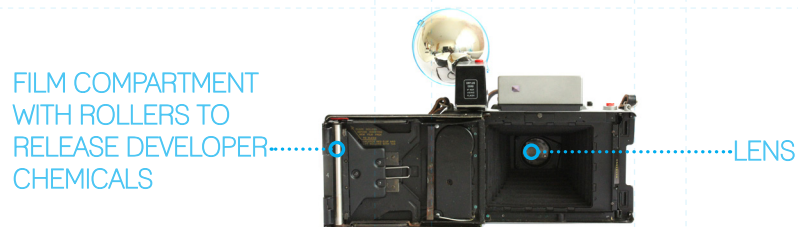
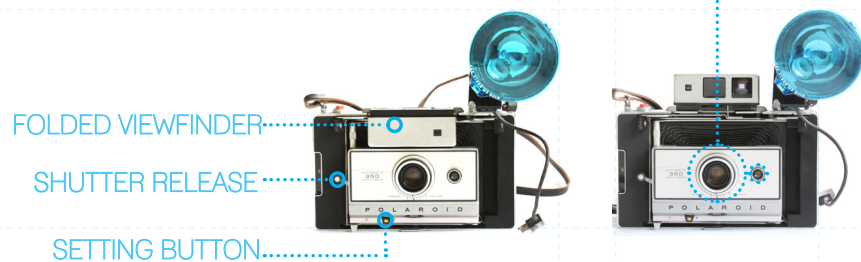
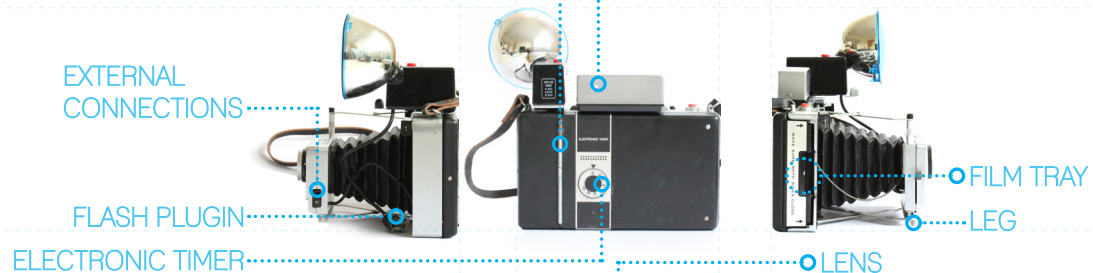
Materiality: Plastic, Metal Frame

This camera was marketed as an affordable and easy and the build quality of this camera definity reflects this. The camera offers two modes: "Sunny" and "Not so Sunny" which you twist the lens to switch between. The viewfinder is located on one side which doesn't really give you an accurate idea of the shot being framed. The film advance lever is rather interesting, being a dial as opposed to a lever like other camera, however, this makes it really easy to use the camera with just the right hand.





HINGE VIEWFINDER



Polaroid Land 350 1969

Production Dates: 1969 - 1971

Type: Film. Polaroid 100 Film

Lens: n/a

Dimention: 190 x 150 x 145

Materiality: Metal

Polaroid Colorpack 80 1971

Production Dates: 1971 - 1976

Type: Instant. Polaroid 600 Film

Lens: 3.5 - 50+ feet

Dimensions: ~150 x 140 x 140

Materiality: Plastic, Aluminium

This camera's shutter is located in a place that feels a bit unnatural to press. When looking through the viewfinder there is a red square, presumably as a guide for portraits. The dial controls on this camera are large and feel nice to rotate. This camera has a 'cold plate' as a tool for developing images when it is 18degrees or cooler, which conveniently tucks onto the back on the camera.

75-3000 UNKNOWN SETTING



SHUTTER RELEASE
WITH LOCK FUNCTION

VIEWFINDER

FILM COMPARTMENT LOCK

HAND STRAP



"COLD CLIP" FOR DEVELOPING
WITH INSTRUCTIONS FOR USE

ROTATIONAL SETTING
WHICH APPEARS BROKEN



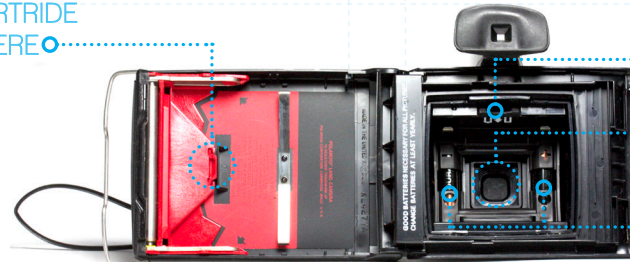
LENS



DARK/LIGHT SETTING



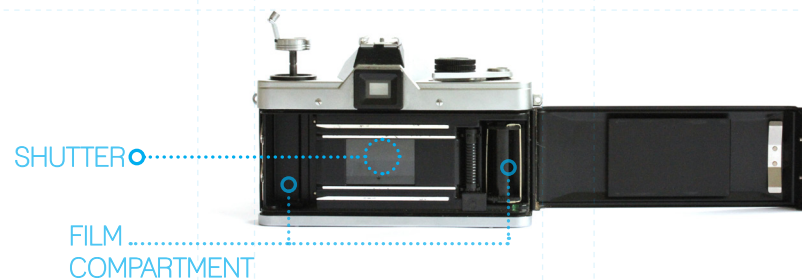
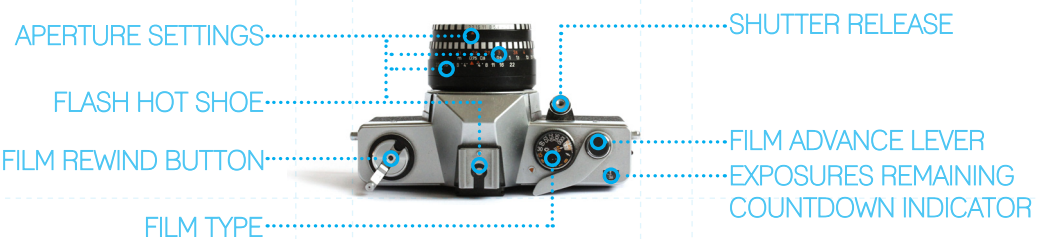
FILM CARTRIDGE
GOES HERE



CLIP TO REMOVE
BATTERY COMPARTMENT

SHUTTER

2 X AA BATTERIES



Practica L 1977

Production Dates: late 1970s

Type: Film, 35mm Film Cartridge

Lens: 50mm f2.8 (fixed)

Dimensions: ~140 x 80 x 90

Materiality: Metal

Kodak Colorburst 50 1979

Production Dates: 1979

Type: Instant. Kodak PR10 Film

Lens: n/a

Dimensions: 160 x 130 x 100

Materiality: Plastic, Aluminium

This is a very heavy camera for the fact is it portable. The inner workings are very similar to Polaroid instant camera's which would have been it's competition. The viewfinder is well placed, The shutter does not give fantastic feel in terms of feedback.



Minolta Weathermatic A 1980

Production Dates: 1980 - unknown

Type: Film - 110 Film Cartridge

Lens: Rokkor 1:3.5/26mm

Dimensions: ~190 x 50 x 72

Materiality: Plastic / Rubber



This camera screams durability through its design language. The dials and levels are solid and large, presumably so you can use it while wearing gloves underwater. The bright yellow colouring insures visibility of the camera while the strap is made to float. There is a table on the bottom of the camera with Flash-Range and Distance tables as advice for setting the camera mode. The shutter release is a simple rubber button but there is tactile feedback when pressed making it seem more substantial.

Pentax Zoom-70 1986

Production Dates: 1986 - 1988

Type: Film - 35mm Film

Lens: f35-70mm Tele-Macro (Zoom)

Dimensions: ~140 x 75 x 55

Materiality: Plastic

The buttons on this camera are like lego pieces, They do not feel appealing or particularly comfortable to use. The viewfinder again does not line up with the lens and therefore gives an inaccurate view of the composition of the image you are taking. Overall as an object, this camera is very bland and lacks any type of character. Nothing about the design of this camera provokes any interest to interact it.



Nikon L35 AF 1980s

Production Dates: Early 1980s - 1985

Type: Film - 35mm Film Cartridge

Lens: 35mm 1:2.8 (Fixed)

Dimensions: ~120 x 72 x 42

Materiality: Plastic, Electroplated, Metal

This camera has an interestingly placed shutter release which is located on the side of the lens. This camera feels sturdy and strong. It has really well placed texture on the hand grip and body which help carry it's semantic form language. You can set the ASA of the film by twisting the ring on the front of the lens but this must not be intended for use often as it requires a really firm, intentional movement.



Minolta AF-E 1980s

Production Dates: Late 1980's

Type: Film, 35mm Film Cartridge

Lens: 35mm 1:3.5 (fixed)

Dimensions: ~130 x 62 x 35

Materiality: Plastic

This camera has a lens cover slider which slides from the side. It is really lightweight. The shutter button feels fantastic to press as it indents really deep. The viewfinder is located almost exactly in line with the lens. There is a flap on the bottom which appears to open but I can not figure out how to do so. Other than the deep shutter, this camera is pretty bland and uninteresting. There is not much on this camera and I can not pinpoint it's production dates.



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Production Dates: Early 1980s - 1985

Type: Film - 35mm Film Cartridge

Lens: 35mm 1:2.8 (Fixed)

Dimensions: ~120 x 72 x 42

Materiality: Plastic, Electroplated, Metal



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Polaroid Close Up 636 1980s

Production Dates: 1980s/90s

Type: Instant. Polaroid 600 Film

Lens: n/a

Dimensions: ~120 x 140 x v150

Materiality: Plastic





Kodak Star 35 1980s

Production Dates: unknown

Type: Film. 35mm Film Cartridge

Lens: n/a / Ektanar Lens.

Dimensions: 130 x 70 x 40

Materiality: Plastic

Ricoh TF-900 1980s

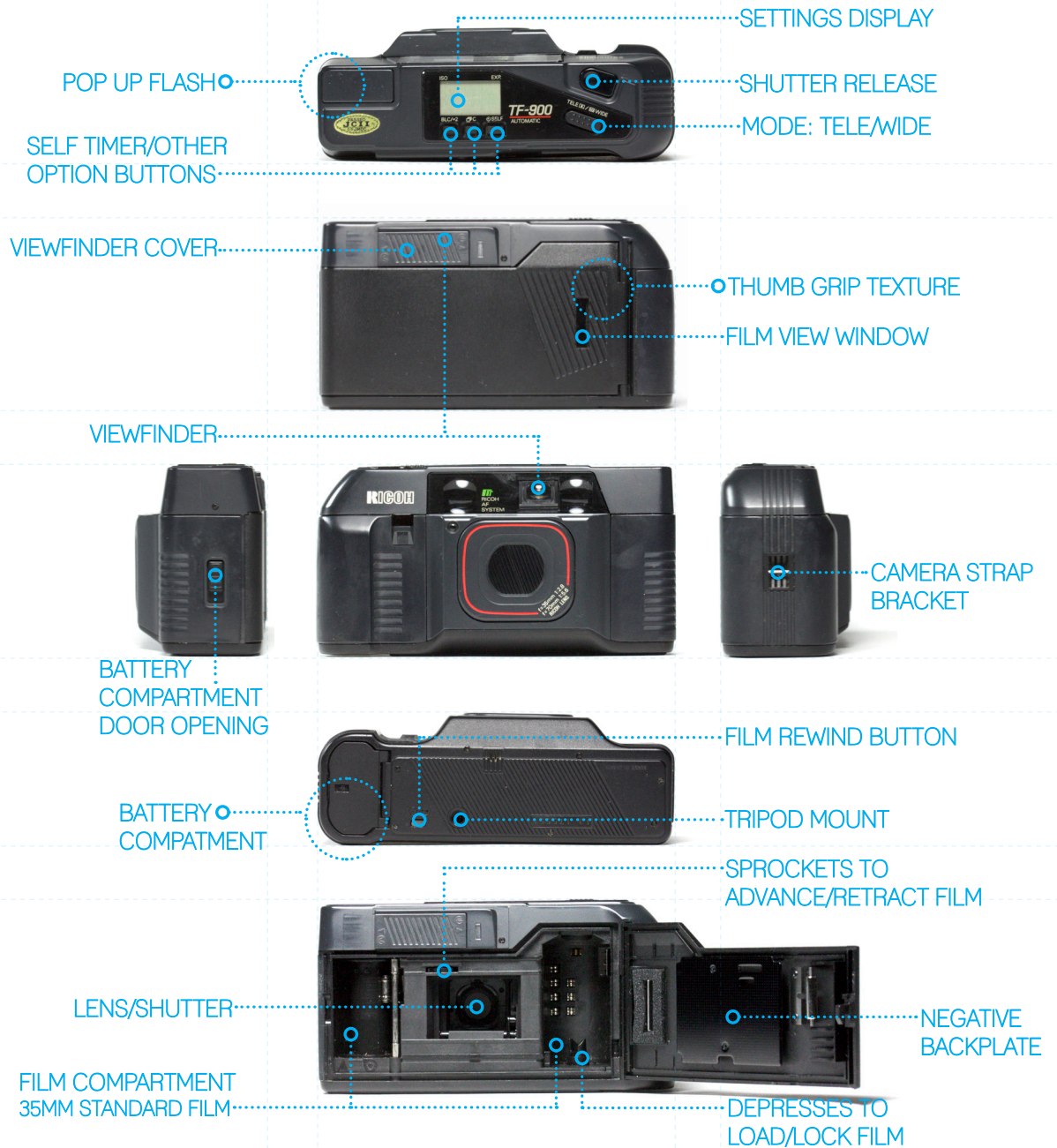
Production Dates: unknown

Type: Film. 35mm Film Cartridge

Lens: 30-70mm (Zoom)

Dimenitions: 130 x 70 x 45

Materiality: Plastic



Polaroid Impulse 1988

Production Dates: 1988 - unknown

Type: Instant- Polaroid 600 Film

Lens: n/a

Dimensions: ~ 125 x 120 x 155

Materiality: Plastic

This camera takes on the character of a little friend or robot. To open the lens cover you have to press to pop it's little flash up. In a way this mechanism is like a blink. The film is in the form of a cartridge which sends the picture out through a set of rollers, activating the chemicals that bring out the image. All the buttons and slots about this camera are very sturdy and definite, you know you're put something in the right way by the tactile feedback (and sounds.) The viewfinder is in a good place in terms of your nose but you seem to lose visibility really easily if you tilt slightly off angle.



Pentax IQZoom 900 1989

Production Dates: 1989 - unknown

Type: Film - 35mm Film Cartridge

Lens: 38-90mm Tele-Macro (Zoom)

Dimensions: ~140 x 75 x 60

Materiality: Plastic / Rubberised Grip

This camera, though dull in design was the top of the pentax line and offered the largest zoom range at the time it was introduced. The zoom, power and shutter buttons though soul-less are easy to use. There is a "Quartz Date" clock on back of the camera, allowing a user to set the time and date so their image will come up timestamped. The notion of time-stamping could be an interesting idea to explore.





Pentax Zoom 90 1989

Production Dates: 1989 - unknown

Type: Film - 35mm Film Cartridge

Lens: 38-90mm Tele-Macro (Zoom)

Dimensions: 140 x 75 x 60

Materiality: Plastic / Rubberised Grip

Hanimex 110 LF Tele 1980s

Production Dates: Early-Mid 1990s

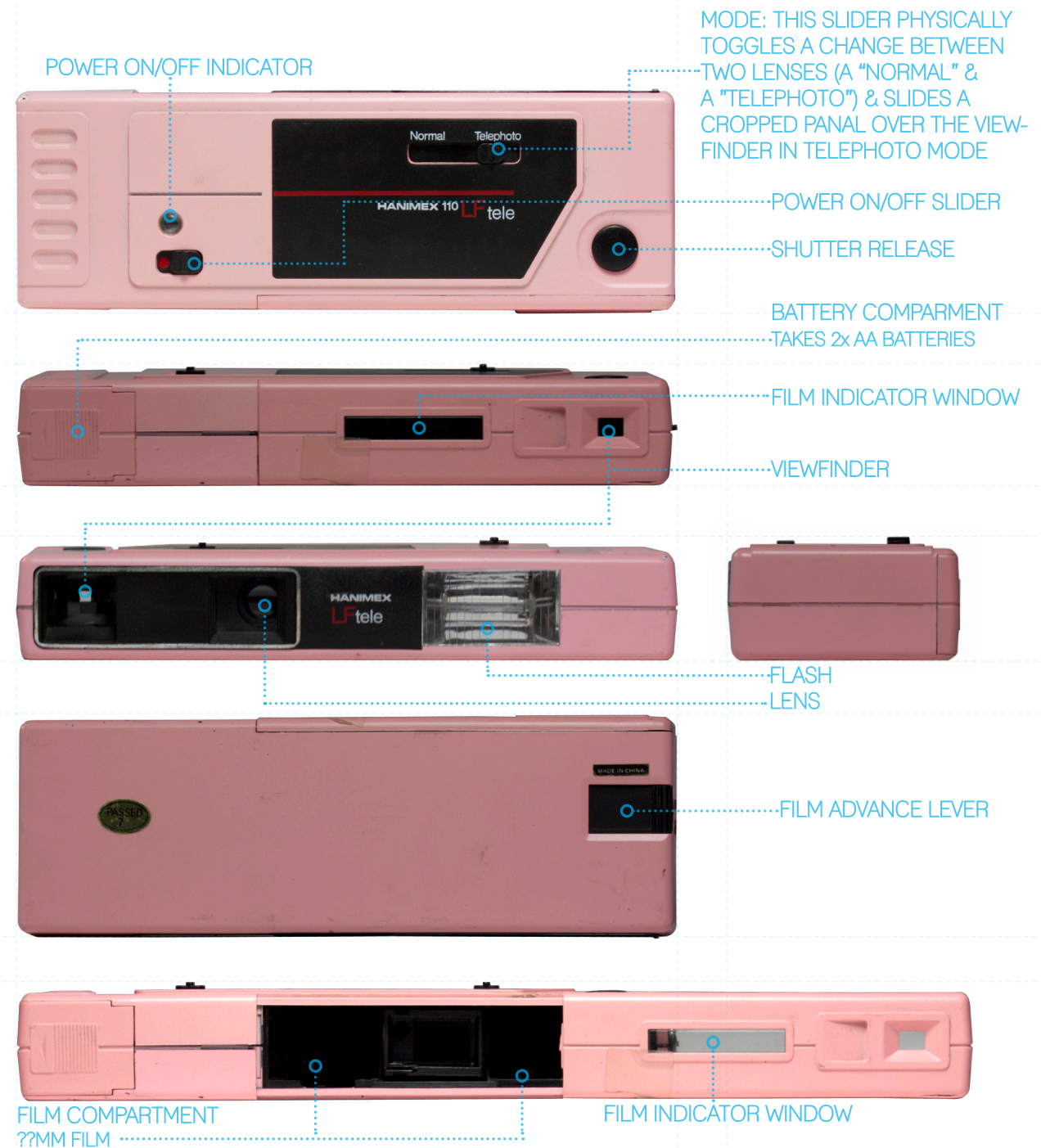
Type: Film - 110 Film Cartridge

Lens: Dual Lens (Normal/Telezoom)

Dimensions: ~172 x 60 x 50

Materiality: Plastic

This camera has two lenses which you physically interchange by sliding between the two lenses. When toggled to "zoom" mode. The viewfinder also switches with the lens, when in zoom mode; part of the viewfinder is blocked out, only showing the 'zoomed' section of the frame. The film advance lever is different to most cameras as you push it 'into' the camera as opposed to pulling it away. The design format of this camera requires two hands to operate. For some reason this camera looks like it could belong in a toolbox... Perhaps it's the pink paint.



Fujifilm Espio 105G 1990s

Production Dates: unknown
Type: Film. 35mm Film Cartridge
Lens: unknown
Dimensions: 115 x 70 x 55
Materiality: Plastic



Vivitar Focus Free Unknown

Production Dates: unknown

Type: Film. 35mm Film Cartridge

Lens: 28mm (fixed)

Dimenitions: ~95 x 63 x 28

Materiality: Plastic



FILM COMPARTMENT
OPENING

FILM REWIND
BUTTON

SHUTTER / LENS

FILM COMPARTMENT



Hannimex 35MP 1990

Production Dates: 1990 - 1992

Type: Film. 35mm Film Cartridge

Lens: 38mm (fixed)

Dimensions: ~125 x 70 x 50

Materiality: Plastic

Pentax Espio 120 1991

Production Dates: Circa Early 1990s

Type: Film - 35mm Film Cartridge

Lens: 38-120mm (Zoom)

Dimensions: ~120 x 70 x 60

Materiality: Plastic

The most interesting feature of this camera is the teardrop zoom toggle which is surprisingly ergonomic. For some reason you can blur the viewfinder. This camera boasts a "panaramic zoom" mode and the toggle to change to that mode gives very nice tactile feedback.



Zoom Super 70 QD 1991

Production Dates: 1991 - unknown

Type: Film - 35mm

Lens: 35-70mm (Zoom)

Dimensions: ~140 x 80 x 65

Materiality: Plastic / Rubberised Body

This camera has a quartz date/time feature on the back which adjusts the time stamp that appears on the image. The most interesting feature of this camera is the lens cover, which flicks up like an eyelid.



Vivitar Series 11 1990s

Production Dates: unknown

Type: Film - 35mm Film Cartridge

Lens: 38-70mm Autofocus (Zoom)

Dimentions: ~135 x 75 x 50

Materiality: Plastic

There is very little information on this camera. It appears to have Tele and Wide angle modes which you hold down a button to access. It doesn't have a typical zoom dial or lever and looks like it may have been a lower model, basic camera. My guess at the era of this camera is 90s. Overall, this camera seems so unsubstantial that it could almost be disposable.



Hanimex 35 HS 1990s

Production Dates: unknown

Type: Film - 35mm Film Cartridge

Lens: 33mm (Fixed)

Dimensions: ~115 x 70 x 45

Materiality: Plastic

This camera's form illudes to it being a sturdy, strong camera but that image is let down by it's materiality. The film advance lever is a winder like on a disposable camera. It has 3 modes: flash, cloudy and sunny. The lens cover is on a slider and the shutter will not press unless it is completely open.

ADVANCE/REWIND FILM
SMALL HANDLE LIFTS
UP FOR TURNING

SHUTTER RELEASE

FILM EXPOSURE INDICATOR

FLASH HOTSHOE

FILM ADVANCE LEVER

FILM INDICATOR WINDOW

TEXTURE FOR THUMB GRIP

LENS COVER, OPEN/CLOSE
BY SLIDING. SHUTTER
RELEASE DOES NOT RELEASE
UNLESS THIS IS OPEN

VIEWFINDER

HINGE FOR FILM
COMPARTMENT
DOOR

LIGHT MODE

LENS BEHIND COVER

CAMERA STRAP / BRACKET

PUSHING THIS BUTTON ALLOWS
FILM TO ADVANCE/RETRACT FREELY
USEFUL FOR THINGS LIKE TAKING
MULTIPLE EXPOSURES ON ONE NEGATIVE

LIFT TO OPEN FILM
COMPARTMENT, PUSH DOWN
TO LOCK DOWN FILM

SPROCKETS TO
ADVANCE/RETRACT FILM

LENS/SHUTTER

FILM COMPARTMENT
35MM STANDARD FILM

Kodak Advantix T550 1990s

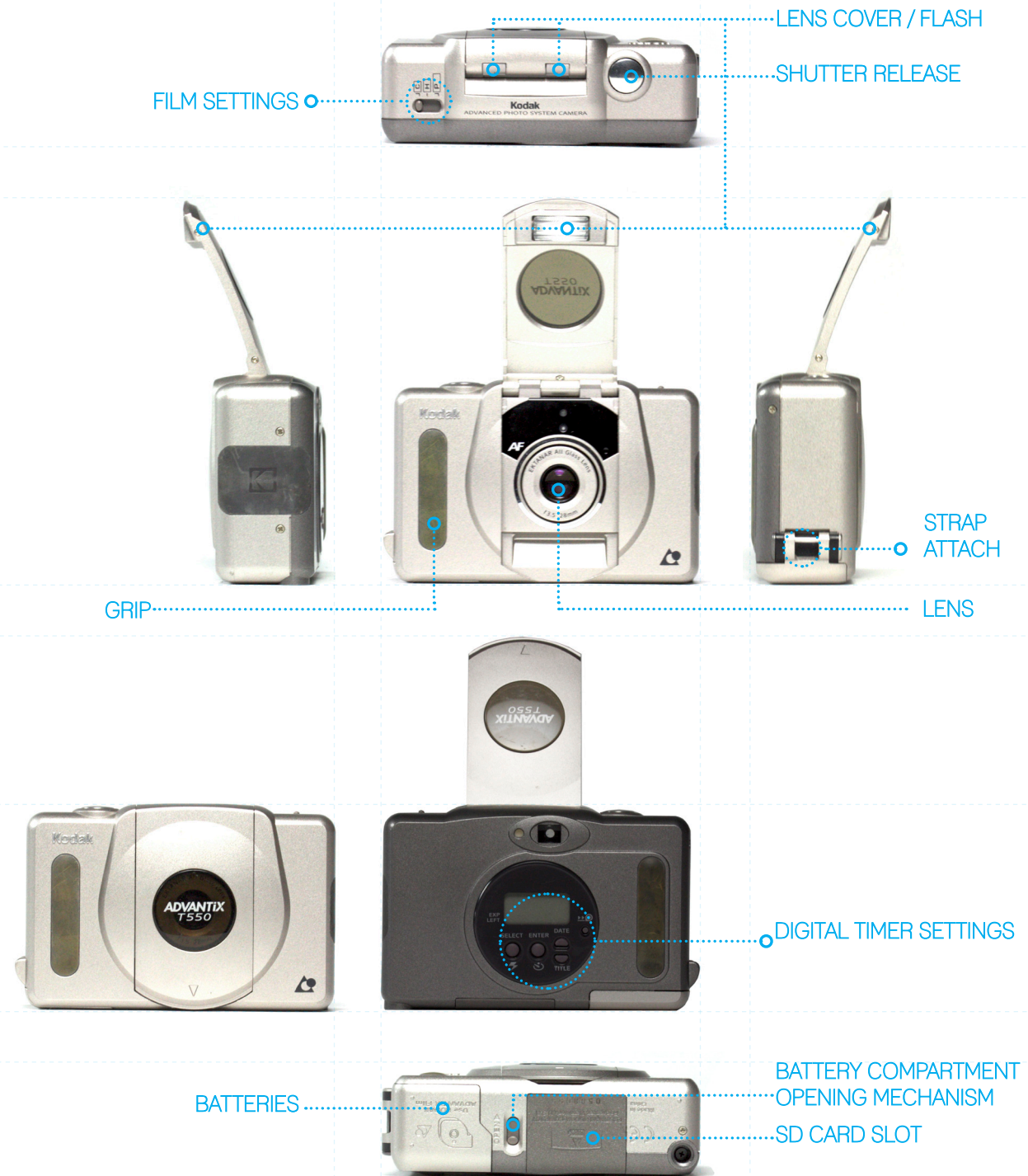
Production Dates: unknown

Type: Film. Kodak Advantix

Lens: 28mm f3.5 (fixed)

Dimensions: ~90 x 115 x 30

Materiality: Plastic



Pentax Espio 24EW unknown

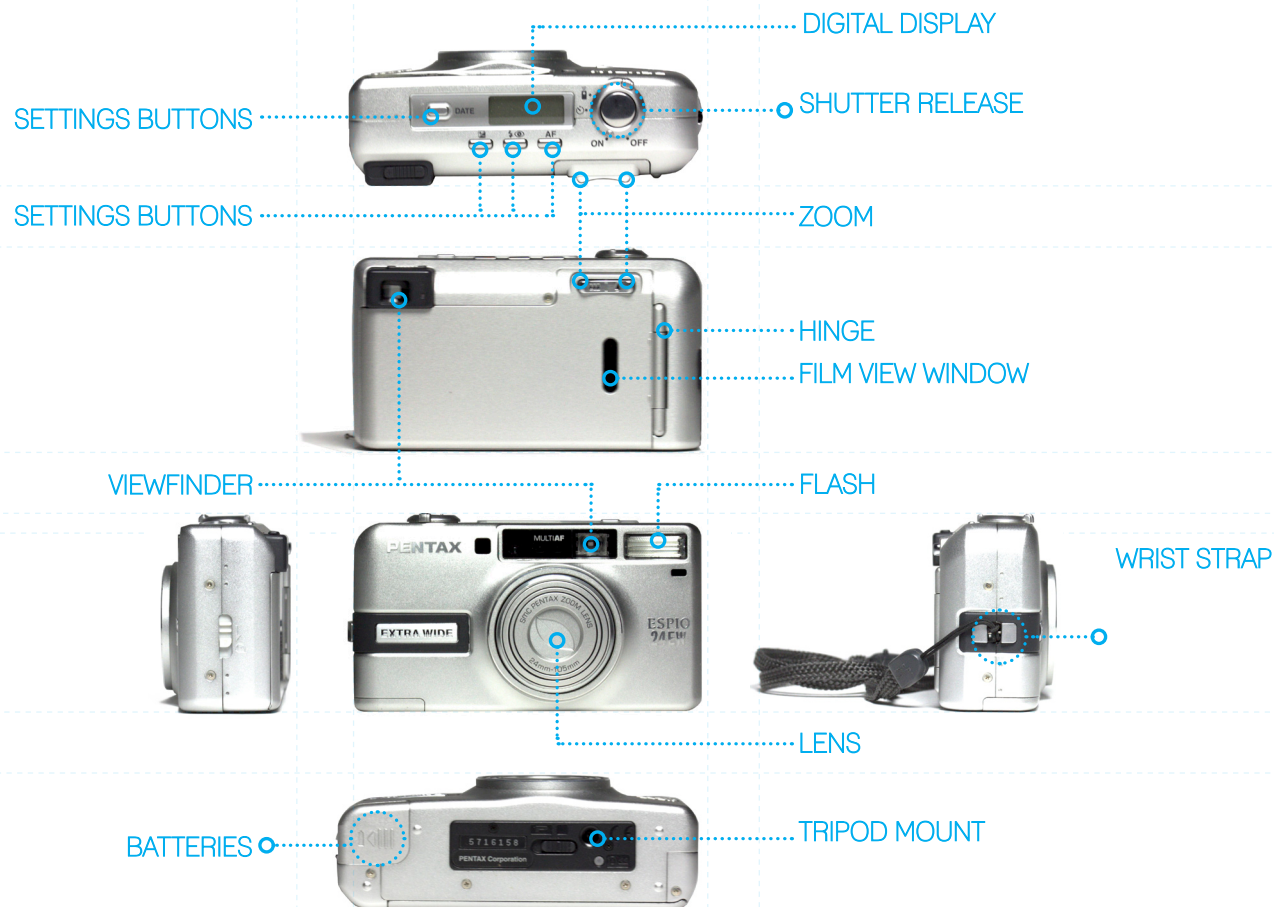
Production Dates: unknown

Type: Film, 35mm Film Cartridge

Lens: 24-105mm (zoom)

Dimensions: ~110 x 63 x 40

Materiality: Plastic / Metal / Electroplate



Polaroid 600 2000

Production Dates: Early 2000's

Type: Instant - 600 Film Cartridge

Lens: n/a

Dimensions: ~165 x 155 x 160

Materiality: Plastic

This camera is a later release of the popular Polaroid instant camera that takes Polaroid 600 film. It's curvacious design differs from the original Polaroid cameras in it's catagory. It has 2 shooting modes, single person and people mode. When you switch the slider to single person mode a piece of plastic with a cut out for you to align with the person's face appears as a guide.





Canon EOS 3000 2000

Production Dates: 2000

Type: Film. 35mm Film Cartridge

Lens: SLR

Dimentions: ~140 x 90 x 65

Materiality: Plastic

Fujifilm Finepix A330 2004

Production Dates: 2004

Type: Digital, X-D Card

Lens: 5.7-17.1mm (zoom)

Dimensions: ~102 x 62 x 32

Materiality: Plastic, Electroplating





Sony Cybershot (DSC-P73) 2004

Production Dates: 2004

Type: Digital. Memory Stick Pro

Lens: 6-18mm f1:2.8 (zoom)

Dimensions: ~118 x 58 x 38

Materiality: Plastic, Electroplating

Olympus M1040 2010

Production Dates: Late 2000's to 2010

Type: Digital. SD Card

Lens: 6.7-20.1mm f1:3.5 (Zoom)

Dimensions: ~

Materiality: Metal

Lightweight but has a feeling of solid materiality. This camera is turned on by exposing the lens. The design is sleek and compact. The way to turn the camera on gives the object a bit of character / personality.



Samsung ST66 2012

Production Dates: 2012

Type: Digital. Micro SD Card

Lens: 4.5 - 22.5mm f1:2.5 (Zoom)

Dimensions: ~90 x 53 x 22

Materiality: Metal, Plastic

Such a tiny camera, Very light. very typical of what is around today in the lower class market. Menu is completely digitally interfaced. Auto modes only.



Sarah Rhonda Kong | 2014 | Victoria University of Wellington

This book is submitted as a commentary of design research by composition
for the degree of Master of Design Innovation in Industrial Design

