Disposable Camera Redesign

EDSGN 100 Section 016

Team #4

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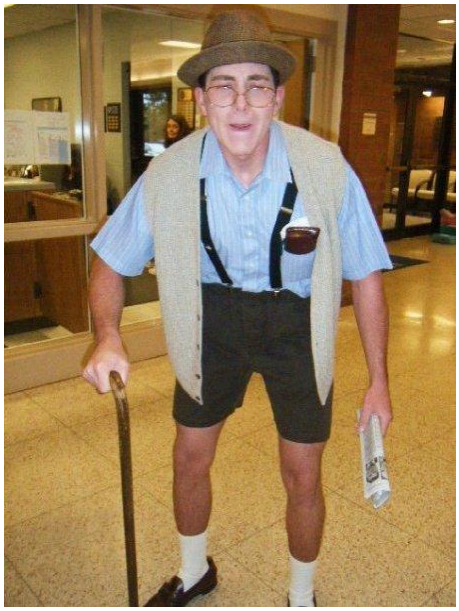

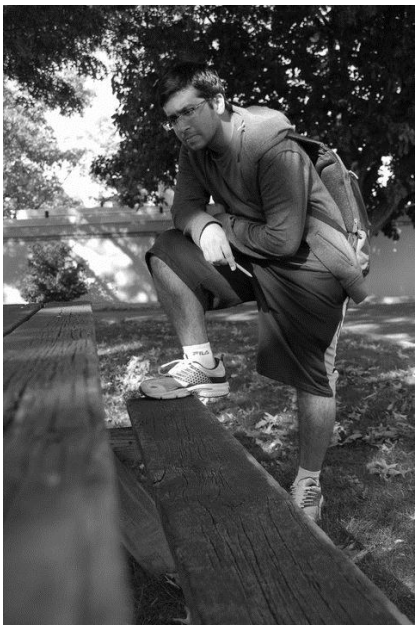

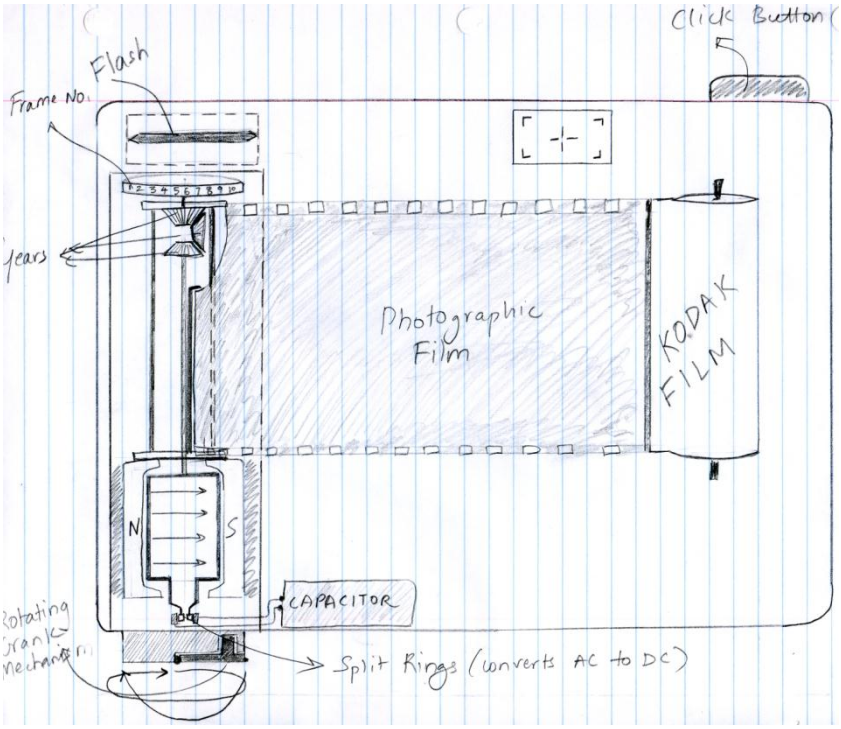

Abstract:

This report evaluates the commonly known disposable camera and proposes redesigns of its engineering. Particularly, this redesign places emphasis on the concept of recyclability and environmental safety. From a manufacturer's point of view, the disposable camera design focuses on the removal of batteries, introduction of hand-operated dynamos, and the integration of all mechanical gearing into one single recyclable piece.

Introduction:

The purpose of this redesign is to acclimate oneself with the engineering design process and to learn to integrate concept designs into tangible solutions. As a whole, the product of interest – the Kodak FunSaver disposable camera – is relatively flawless. Note, however that this product does have observable flaws. In observing these flaws one can generate concept designs, facilitating the engineering design process and the creation of a better market product. This report details precisely one example of a generated conceptual solution to the observable flaws in the Kodak FunSaver and the engineering design process linked to that solution.

Mission Statement:

*"For consumers who want to save the Earth, the **DynaPro Plus** is a new-wave, green product that will reduce waste and increase the size of your wallet. Unlike the traditional battery-operated disposable camera, our product eliminates battery dependency and integrates sustainable human-produced mechanical energy. Our goals in the design involve environmental stability while maintaining low price to the consumer and manufacturer. The estimated selling price for the **DynaPro Plus** is approximately $5.59. This estimate is based on the removal of the battery which costs of $0.49, the addition of a dynamo generator costing $1.13, producing a $0.64 increase in price from the base price of $4.95."*

Customer Needs Analysis:

A customer needs analysis was completed by implementing a general public survey in West Halls on the Pennsylvania State University campus. Pedestrians were asked a series of simple questions such as what brand of disposable camera they bought and used, the purpose of buying and using the disposable camera, how often they purchased or used a disposable camera, and the price paid for the camera. Their responses were recorded and evaluated. Through data evaluation, it was found that many only buy a disposable camera annually for a random event and that the most sought quality of the camera is economic price and functionality. With that information, various concepts concerning price reduction and functionality were generated. Through concept selection and combination, an environmentally safe and recyclable disposable camera was developed.

(This survey information is listed below.)

Brand	How Often	Why Buy	Price ($)	Quality to Look For
Kodak	Once A Year	Spontaneous	8	Cheap
Kodak	Never	Spontaneous	8	Flash
Kodak	Never	Traveling	5	Cheap
Kodak	Never	Sports	7.5	Cheap
Kodak	Never	Vacation	5	Flash
Cannon	Never	Wedding	5	Attractive Design
Kodak	Never	Price	5	Flash
Kodak	Never	Digital Broke	5	Waterproof
Cannon	Everyday	Porno	5	Picture Quality
Nikon	Never	Vacation	15	Flash
Kodak	Never	Don’t Want To Lose	6	Cheap, Easy
Fiji	Never	Camera Broke	5	Durability
Kodak	Once A Year	Dances	10	Flash
Kodak	Never	Don’t Want To Break	10	Cheap
Kodak	Never	Take Pictures Underwater	20	Waterproof
Kodak	Never	Don't Want To Break	3	Amount of Pictures
Kodak	Never	Don't Want To Break	5	Nothing
StoreBrand	Never	Don't Want To Break	5	Cheap
Kodak	Never	Dances	8	Flash
StoreBrand	Never	Forgot Camera	10	Easy To Use
Kodak	Never	Forgot Camera	10	High Speed
Kodak	Never	Forgot Camera	5	Flash
Kodak	Never	Forgot Camera	8	Cheap
Kodak	Never	Don't Want To Lose	7	Flash

External and Patent Research:

The first disposable camera was invented by Photo-Pac beginning in 1949 which took eight pictures and was required to be mailed-in for processing. Soon after, H. M. Stiles invented a way to enclose 35mm film in an inexpensive plastic enclosure. It cost $1.29 to produce and although it was incredibly similar to a single-use camera today, the Photo-Pac failed to make a permanent impression on the market. The currently design of disposable cameras was developed by Fujifilm in 1986. Their QuickSnap line used 35 mm film enclosed in a plastic component with a flash receptacle. In 1987, Eastman Kodak invented the Fling, which was based on 110 film, and shortly after, in 1989, Kodak released a 35 mm version called the FunSaver and discontinued the 110 Fling. By 2005, disposable cameras were a staple of the disposable camera market and flash-equipped disposables were the norm.

Disposable Camera - Patent 3650194
A camera comprising the combination of a box camera which is open on one side, and a self-contained film cartridge which is detachably secured to the camera to close its open side and thereby form a light tight enclosure. The camera has a photographic lens to expose the film in said cartridge, and a spring-urged apertured diaphragm shutter which is rotatably mounted between the lens and the cartridge. The camera is of simple, inexpensive construction and may be discarded following use with only a single cartridge, or it may be repeatedly used with other cartridges.

Application Number:
04/816499
Publication Date:
03/21/1972
Filing Date:
04/16/1969

Disposable Camera - Patent 5045871
In accordance with the present invention, a disposable camera is provided. The disposable camera preferably includes a disposable camera housing and an elongated attachment member detachably attached to the camera housing. When the camera's user is threatened by another individual, the user can use the camera to deter any criminal acts contemplated by the other individual by recording an image of the individual and propelling the camera away from the vicinity. Preferably, the housing is generally spherical in shape and includes a shock-resistant outer layer which minimizes the damage to the housing when the housing is propelled away from a user. The elongated attachment member preferably is configured as a key chain or other attachment member for attachment to personal items such as keys, wallets, purses, handbags, belts, buttons, personal clothing, book bags, carryalls, nap sacks and the like. Preferably, the camera housing will include an image recording device equipped to record a plurality of images which may later be used to produce a plurality of pictures. The camera will also include flash bulbs for creating artificial light with which to take a picture.

Inventors:
Reinholdson, Mark R. (5040 Madison St., NE., Minneapolis, MN, 55421)
Application Number:
07/375272
Publication Date:
09/03/1991

Filing Date:
06/30/1989

Disposable Camera - Patent 5576781
A disposable and disinfected still frame camera for use in contamination sensitive areas includes an inner camera portion for securing still frame film, exposing frames of the film and for advancing the film. A camera housing is also provided for enclosing the inner camera portion. The invention also includes a fluid impervious casing which substantially encases the camera housing for protecting the camera and environment from contamination. The disposable camera may also include attachments for connecting the camera to optical medical devices, a measuring device for measuring the distance between the camera lens and the object being photographed, and sterilized or disinfected packaging.

Inventors:
Deleeuw, Paul (181 Crandon Blvd., #301, Key Biscayne, FL, 33149)
Application Number:
08/243371
Publication Date:
11/19/1996
Filing Date:
05/16/1994

Product Dissection:

The Kodak FunSaver disposable camera provided in EDSGN100 was, thus, disassembled for product dissection. At this point, a systematic record of the functionality and purpose of each individual part was conducted. The criteria included part name, function, SOP effect, dimensions, weight, and price among others. As a whole each component functioned in a manner that benefited a greater system – each component was a part of a subsystem. These subsystems and the product hierarchy were also determined and recorded.

(This component observation can be observed below, along with the product force flow chart, product hierarchy chart, and component subsystem flow chart.)

Part#	Part Name	QTY	SOP Effect	Function	Mass (lbs.)	Material	Manuf. Process
1	Button	1	Yes	User input. Actuates components for one picture.	.004	ABS Plastic	Injection Molding
2	Film Advance Lock	1	Yes	Ensures no more than one cycle is advanced.	0	ABS Plastic	Injection Molding
3	Shutter Spring	1	Yes	Pulls shutter into place.	0	1040 Steel	Extrusion
4	Actuating Spring	1	Yes	Provides force for one advancement..	0	1040 Steel	Forming
5	Shutter	1	Yes	Opens to let light in for image capture.	0	1040 Steel	Stamping
6	Camshaft	1	Yes	Allows parts to advance one cycle.	0	ABS Plastic	Injection Molding
7	Sprocket	1	Yes	Pulls film ahead as film advance wheel is turned.	0	ABS Plastic	Injection Molding
8	Number Labeled Gear	1	No	Lets the user know how many pictures they have taken.	0	ABS Plastic	Injection Molding
9	Advance Gear	1	Yes	Allows user to advance film after a picture has been taken.	.003	ABS Plastic	Injection Molding
10	Film Rotating Gear	1	Yes	Advances the film after a picture	0	ABS Plastic	Injection Molding
11	Viewfinder	1	Yes	Allows user to see image that will be captured.	.004	ABS Plastic	Injection Molding

12	**Lens**	**1**	**Yes**	Focuses light on the film.	**0**	Acrylic	**Injection Molding**
13	**Lens Lock**	**1**	**Yes**	**Connects lens to lens holder**	**0**	ABS Plastic	**Injection Molding**
14	**Lens Holder**	**1**	**Yes**	Holds lens in place.	**.002**	ABS Plastic	**Injection Molding**
15	**Receiving Film Shaft**	**1**	**Yes**	**Receives the advanced film**	**.006**	ABS Plastic	**Injection Molding**
16	**Battery**	**1**	**Yes**	**Provides energy for the flash**	**.05**	AA Alkaline Battery	**Varied**
17	**Film**	**1**	**Yes**	Provides medium for capturing the image.	**.042**	Film	**Varied**
18	**Circuit-board**	**1**	**Yes**	Provides flash of light.	**.032**	Flash Unit Circuit-board	**Varied**
19	**Flash Bulb**	**1**	**Yes**	**Produces light of flash**	**0**	Flash Unit Circuit-board	**Injection Molding**
20	**Flash Contact**	**1**	**Yes**	**Provides connection between bulb and circuit-board**	**.002**	1040 Steel	**Injection Molding**
21	**Inner Lens Chassis**	**2**	**Yes**	**Holds the lens in place**	**0**	ABS Plastic	**Injection Molding**
22	**Central Frame Chassis**	**1**	**Yes**	Holds components of camera in contact with each other.	**.04**	ABS Plastic	**Injection Molding**
23	**Back Cover**	**1**	**Yes**	Protects and houses the mechanical and chemical components of the camera.	**.032**	ABS Plastic	**Injection Molding**
24	**Front Cover**	**1**	**No**	Protects and houses the mechanical and chemical components of the camera.	**.03**	ABS Plastic	**Injection Molding**

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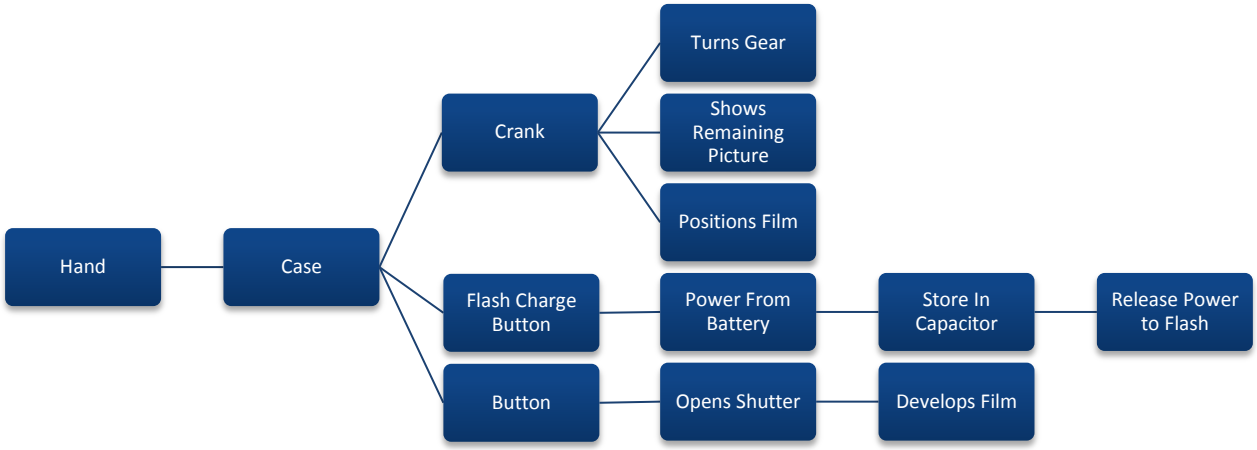
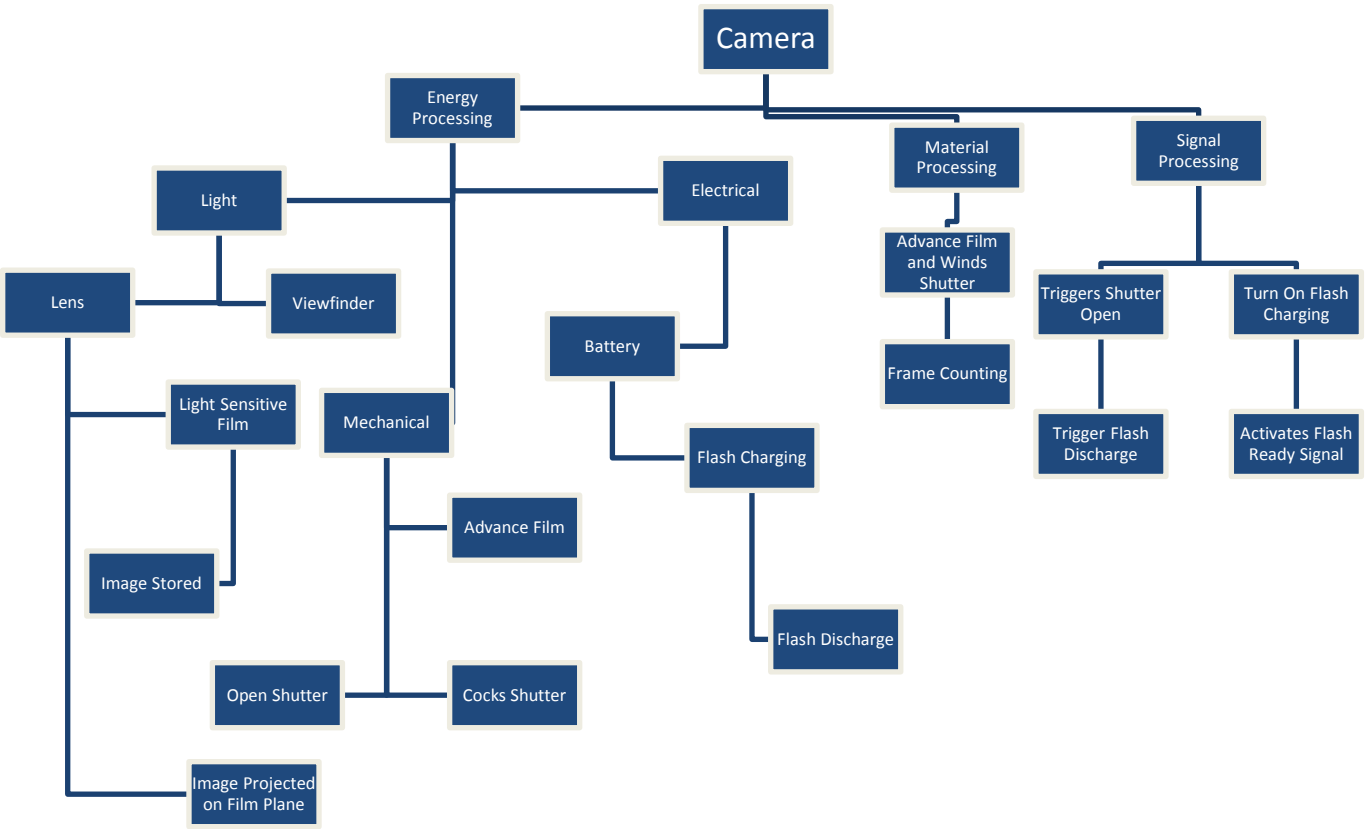
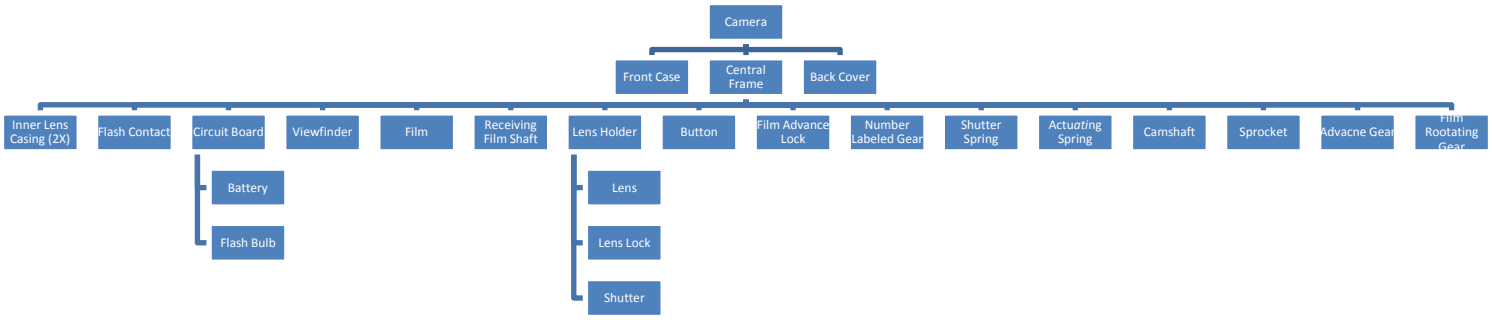
SEP 29 2010

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19
SEP 29 2010

11 12 13 14 15 16 17 18 19
20 21 22 23 24 25
SEP 29 2010


Hand
Case
Crank
Turns Gear
Shows Remaining Picture
Positions Film
Flash Charge Button
Power From Battery
Store In Capacitor
Release Power to Flash
Button
Opens Shutter
Develops Film


Camera
Energy Processing
Material Processing
Signal Processing
Light
Electrical
Advance Film and Winds Shutter
Lens
Viewfinder
Battery
Frame Counting
Triggers Shutter Open
Turn On Flash Charging
Light Sensitive Film
Mechanical
Flash Charging
Trigger Flash Discharge
Activates Flash Ready Signal
Advance Film
Image Stored
Flash Discharge
Open Shutter
Cocks Shutter
Image Projected on Film Plane


Camera
Front Case
Central Frame
Back Cover
Inner Lens Casing (2X)
Flash Contact
Circuit Board
Viewfinder
Film
Receiving Film Shaft
Lens Holder
Button
Film Advance Lock
Number Labeled Gear
Shutter Spring
Actuating Spring
Camshaft
Sprocket
Advacne Gear
Film Rootating Gear
Battery
Flash Bulb
Lens
Lens Lock
Shutter

Benchmarking/Concept Generation/Selection:

Through observations in our survey, and external research, certain criterion was taken into account for the conception of a new product. Many find that price and functionality are the greatest factors in their selection of a disposable camera. Thus, our redesigns were based on reducing the cost of the camera while improving its functionality overall. Our concepts were also based on general factors such as size, weight, and handle – among others. These generated concepts included a camera with decreased size and weight, a camera with the added functionality of zoom, and a camera with an improved energy source, based on a hand-operated dynamo generator.

Our selection was the camera with the improved energy resource of a hand-operated dynamo. This decision was a result of the benefit of removing the battery and reducing the overall economic waste that a battery produces in its lifetime. By removing the battery, the camera thus becomes more eco-friendly. Note, removing the battery also decreases a large portion of the camera; however, the addition of the dynamo would negate this reduction and would more than likely increase the camera cost. Conclusively, the removal of the battery would save time and energy in the long run while providing a 'green' means of taking pictures.

(The benchmarking research table and concept generation and selection tables are below. Also, our concept design picture is below.)

Benchmarking Research Table:

	Fuji Disposable Camera (Reference)	**Fun Saver Camera**	**Sport Single Use Camera**
Size	0	+	0
Weight	0	+	-
Zoom	0	0	0
Handle	0	0	0
Operation (Battery Powered or Not)	0	0	0
Durability	0	0	+
Recyclable	0	0	0
Eco-Friendly	0	0	0
Cost	0	+	+
Sum +'s	0	3	2
Sum 0's	9	6	6
Sum -'s	0	0	1
Net Score	0	3	1
Rank	**3**	**1**	**2**
Continue?	No	**Yes**	No

Concept Selection:

	Fun Saver Camera (Reference)	DynaPro Plus	Light Weight Camera	Zoom Camera
Size	0	+	0	-
Weight	0	+	+	-
Zoom	0	0	0	0
Handle	0	0	0	0
Operation (Battery Powered or Not)	0	+	0	0
Durability	0	0	0	0
Recyclable	0	0	0	0
Eco-Friendly	0	+	0	0
Cost	0	-	-	-
Sum +'s	0	4	1	1
Sum 0's	9	4	7	5
Sum -'s	0	1	1	3
Net Score	0	3	0	-2
Rank	**2**	**1**	**3**	**4**
Continue?	No	**Yes**	No	No

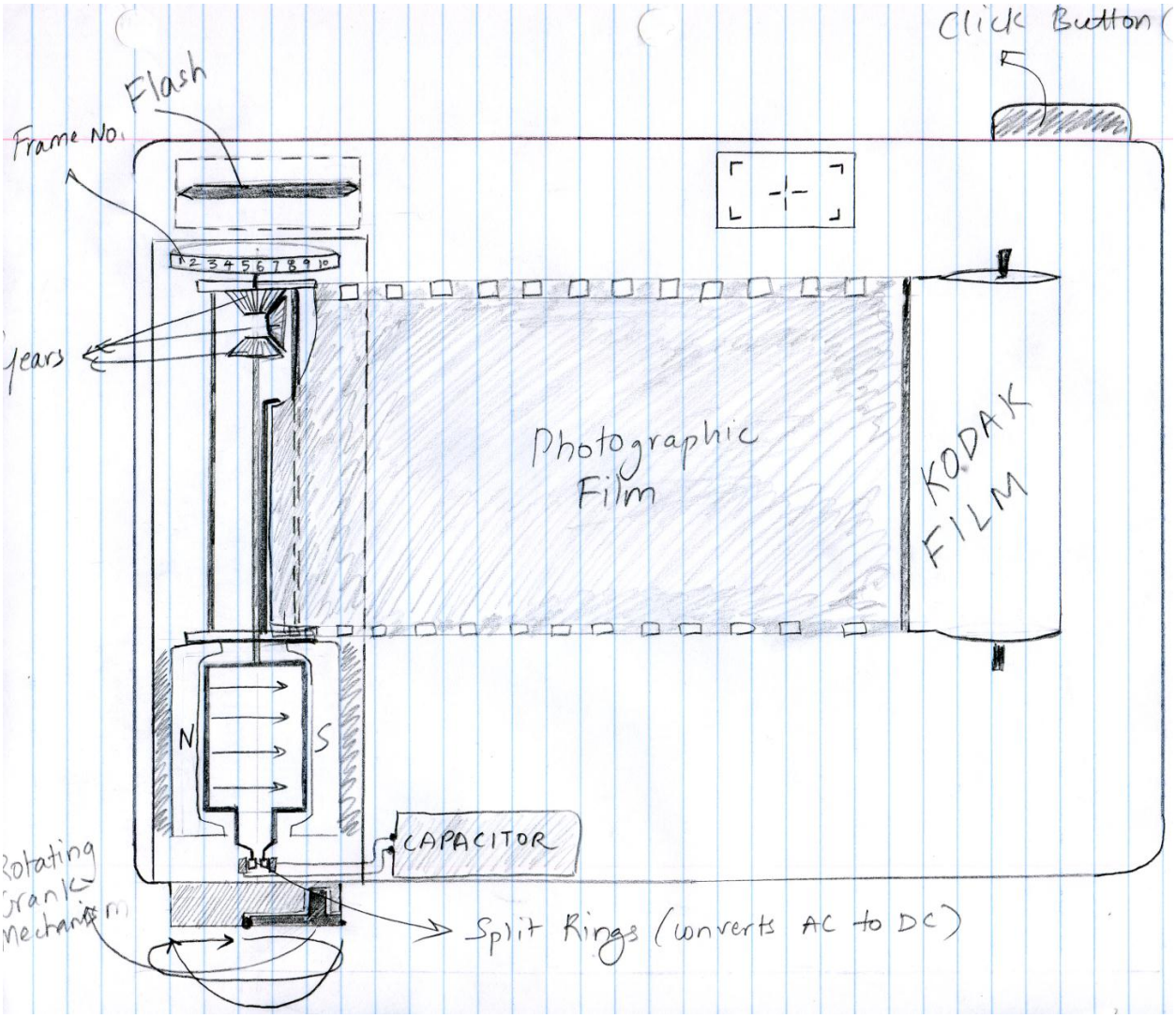
Product Matrix:

		Fun Saver Camera (Reference)		DynaPro Plus	
	Weight	**Rating**	**Weighed Score**	**Rating**	**Weighed Score**
Size	10%	*3*	*0.3*	*4*	*0.4*
Weight	10%	*3*	*0.3*	*4*	*0.4*
Zoom	5%	*3*	*0.15*	*3*	*0.15*
Handle	5%	*3*	*0.15*	*3*	*0.15*
Operation (Battery Powered or Not)	15%	*3*	*0.45*	*5*	*0.75*
Durability	5%	*3*	*0.15*	*3*	*0.15*
Recyclable	10%	*3*	*0.3*	*5*	*0.5*
Eco-Friendly	20%	*3*	*0.6*	*5*	*0.5*
Cost	20%	*3*	*0.6*	*1*	*0.2*
Total Score		3		**3.7**	
Rank		2		**1**	
Continue?		No		**Yes**	

Design Description:

The redesign of the camera was based on three major criteria: size, weight and greenness. One of the major constraints of the redesign was that we could not remove the Kodak Film roll. The battery was a major issue in terms of size and weight. So in order to solve these issues, it was ideal to use a dynamo. The idea of using it came from the Dyno Torches. By using this dynamo, we can reduce the size and weight substantially. The battery used in the camera is a non-rechargeable battery, which means after use, it is dumped into landfills and causes environmental problems due to excess waste, and leakage. On the contrary, using a dynamo is eco-friendly because it is completely recyclable. Although the cost of the DynaPro Plus may be more than that of the FunSaver, it is worth it on a macroeconomic scale compared to the cost of leaving a massive ecological footprint.

(An enlarged detailed image of our final concept can be seen below)



Conclusion:

Our product design will save the Earth from the hazard of battery waste and will ultimately provide a green means of power and production of disposable camera manufacturing. By transforming mechanical energy into electrical energy and removing the dependency on stored power, the DynaPro Plus will revolutionize the disposable camera market. The ease of only having to turn a simple crank and simultaneously powering and preparing the camera for the next photograph simplifies consumer needs. In this new century of green alternatives, who steps up to the plate to deliver incomparable products? The DynaPro Plus's complex, innovative technology stored in a simplistic plastic shell truly proves that this product is a new generation of camera, and it will help save countless resources, materials , and lives in the future to come.

References:

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