Project 1: Disposable Camera Redesign – FunSaver+

Engineering Design 100

Section 016

Team 2

Submitted to: Professor Jeonghwan Jin

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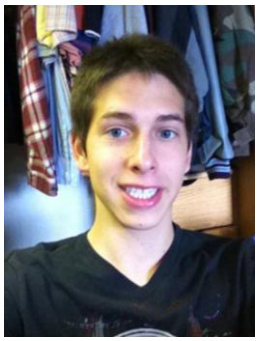

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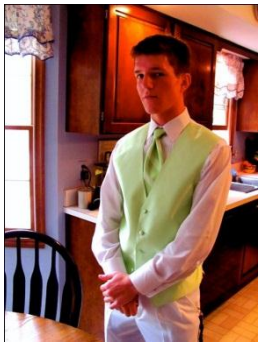

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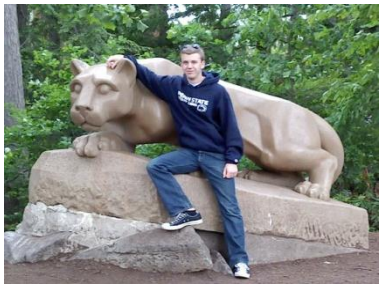

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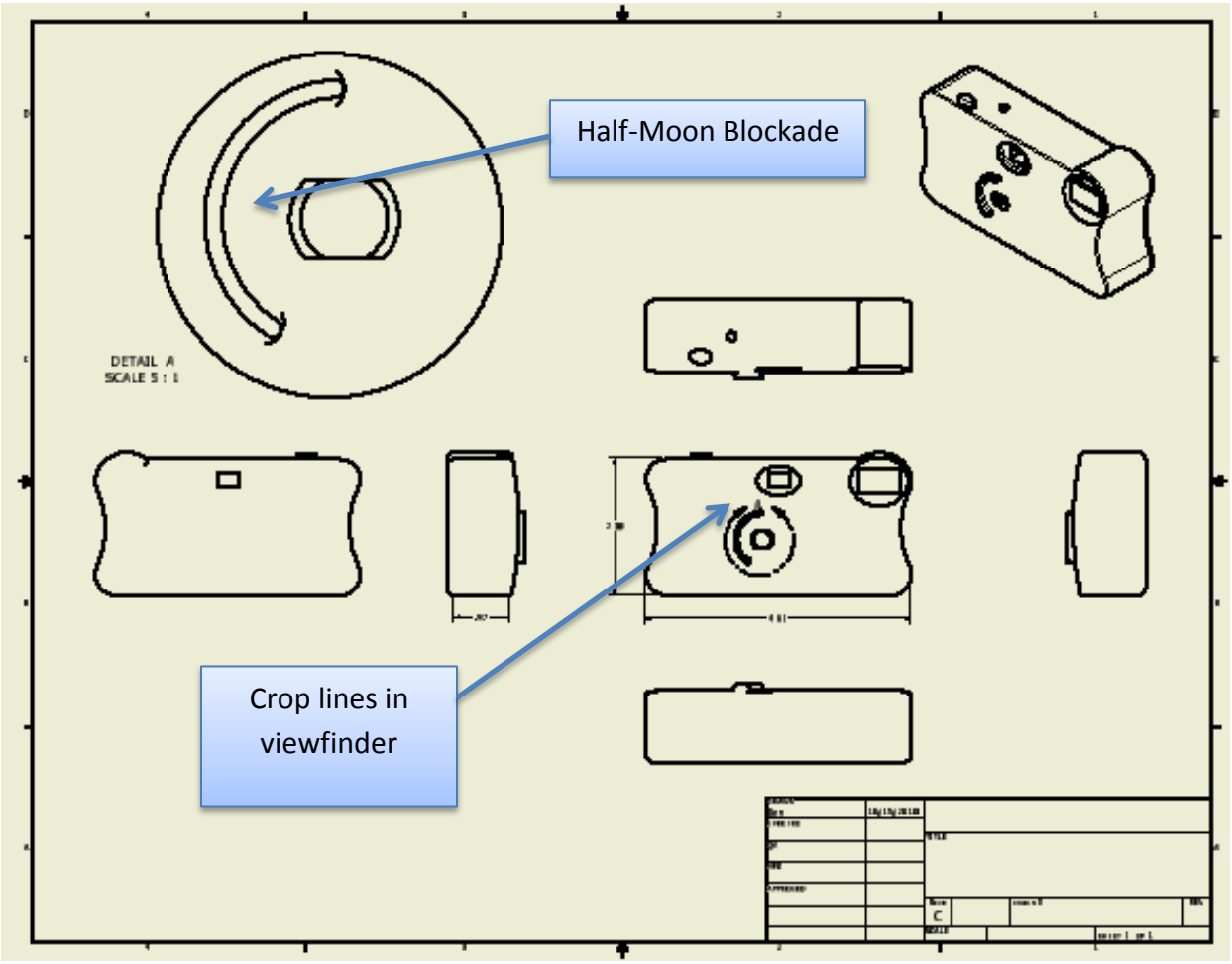
I. Prototype Model



The drawing above is a prototype model of the FunSaver+. It shows the new features including crop lines in the viewfinder and the half-moon blockade around the lens.

II. Abstract

Team 2 redesigned Kodak's FunSaver disposable camera in order to create a product that will better serve camera users. The new model, the FunSaver+, will not only make disposable cameras more convenient and easier to use, but will inspire more people to take advantage of the benefits of disposable cameras. All of the existing qualities of a disposable camera will be combined with new features to create an inexpensive, reliable devise. Lastly,

this product is eco-friendly and a majority of its parts can be recycled to reduce waste in our precious environment.

III. Introduction

Team 2's product, the FunSaver+, was developed using a redesign process involving extensive time and research. This process involved procedures including external research on similar products and companies, customer needs analysis, internal research and concept generation, along with many other measures in order to develop a satisfactory product.

To begin, the team developed a list of customer needs that they thought were essential for their new product. Ultimately, it is the customer who determines if a product is successful or not. Because of this, customer needs greatly affected the direction the team took toward developing a product.

The next steps involved external research. Members of the team researched information about other companies and patented inventions. The findings were examined in order for the team to better understand their product and to help them cultivate new ideas.

After the external research, internal research and work began. This involved product dissection of the existing Kodak FunSaver, concept generation, and concept selection. Ideas were generated, and then a selection process was used to select the best option.

IV. Mission Statement

For those who are in need of a quick picture, the Kodak FunSaver+ is a disposable camera that is affordable, efficient, and environmentally friendly. Unlike the original Kodak FunSaver, our product includes key features that will heighten the consumer's camera experience.

V. Customer Needs Analysis

We identified a number of factors as important to the customer in our customer needs assessment. Easy to hold means the camera is ergonomically designed and fits comfortably in the customer's hand. The camera should take quality pictures, it should have some mechanism in place to reduce the number of accidental pictures taken, and the view finder should accurately show the image that will appear on the film. The camera should be durable and have an appropriately strong flash, although not one that causes excessive redeye. The camera should be attractive-looking to the average customer, should include a mechanism to prevent individuals from taking a picture with their fingers over the camera lens, and should notify the customer how many pictures are remaining on the film.

The team used these customer needs as a basis for concept generation. Specific targets were not set for the new product, but it was important to try to satisfy as many customer needs as possible.

VI. External Research

The competitive market for disposable cameras is a diverse one in that several manufacturers and suppliers are producing the cameras, and the cameras being released to the market vary greatly with respect to the features of the cameras. Companies producing disposable cameras range from household names, such as Polaroid, Fuji, and Kodak, to little known companies that supply the product directly from the manufacturer, such as Zhejiang New Fine Industry Co. Ltd. and Henwei Industrial Co. Ltd. (globalsources.com). Disposable cameras are now being custom made to match the demand of the consumers with variations that include underwater cameras, "Place Logo Here" cameras (the camera serves as an

advertising tool for companies, services, etc.), disposable camera kits that include materials to create reports (useful for collecting data after incidents such as car accidents), and even special disposable cameras made elegant for weddings (disposabledigitalcameras.org). Just as the camera itself varies in design, so does its price tag. Individually, disposable cameras can range from $5.20 (generic Kodak) to $12.95 (Gold Rose Wedding Disposable Camera). Disposable cameras can also be bought in bulk online from the manufacturer for prices that range from $199.99 for a case of 24 (Polaroid Flash) to $299.99 for a case of 24 cameras (AmeriCamera) (disposabledigitalcameras.org). Most disposable cameras come with certain generic features, such as a flash, generally 27 35mm exposures (pictures to be taken), but the addition of features such as waterproofing and "Custom-Designing" make the market highly diverse and all the more competitive.

VII. Library/online/patent research

The Kodak Funsaver single-use camera is composed of several features with United States patents. The first is the spool drive for film cartridge in single-use camera. This apparatus helps prevent the unauthorized recycling of disposable cameras. The patent number is 5,471,270 and the date of the patent is Nov. 28, 1995.

The second device is the single-use photographic film package and cartridge. The patent number is 5,325,366 and the date of the patent is Aug. 10, 1993. This product gives single-use cameras a packaging in which the camera cannot be reused without replacing key components. This also prevents the unauthorized recycling of single-use cameras.

The third patented feature of a single-use camera is the lens-fitted photographic film package. This device includes a light-tight film case which prevents the film from being exposed

to light, which in return would ruin the film. The patent number is 4,890,130 and the date of the patent is Dec. 26, 1989.

VIII. Benchmarking

The following chart, the house of quality, illustrates Team 2's customer needs, engineering metrics, and benchmarking findings.

		Engineering Metircs									
	Importance (1 High)	size of camera (in.)	film resolution (lines/inch)	manufacturing quality of spring (spring constant k in Hooke's Law)	clarity of plastic (n-value in snells law)	plastic dampening rating (ftlbs)	flash power (lx)	online customor rating	size of blockade around lens (in.)	focal length of lens (in.)	**Benchmarking Polaroid Flash =P Zhejiang New Fine Industry Co. LTD. Waterproof =Z Kodak Funsaver+ =K**
Customer Needs											1 2 3 4 5
Easy to hold	3	X									ZKP
Takes quality pictures	2		X		X		X				ZP K
No accidental pictures	4			X							KZP
Accurate view finder	1				X						Z P K
Durable	3					X					Z KP
Appropriate Flash	5						X				Z KP
Reduce Red Eye	4						X				KPZ
Good looking	5							X			ZKP
No finger over lense	2								X		ZP K
How many pictures are left	3									X	ZPK

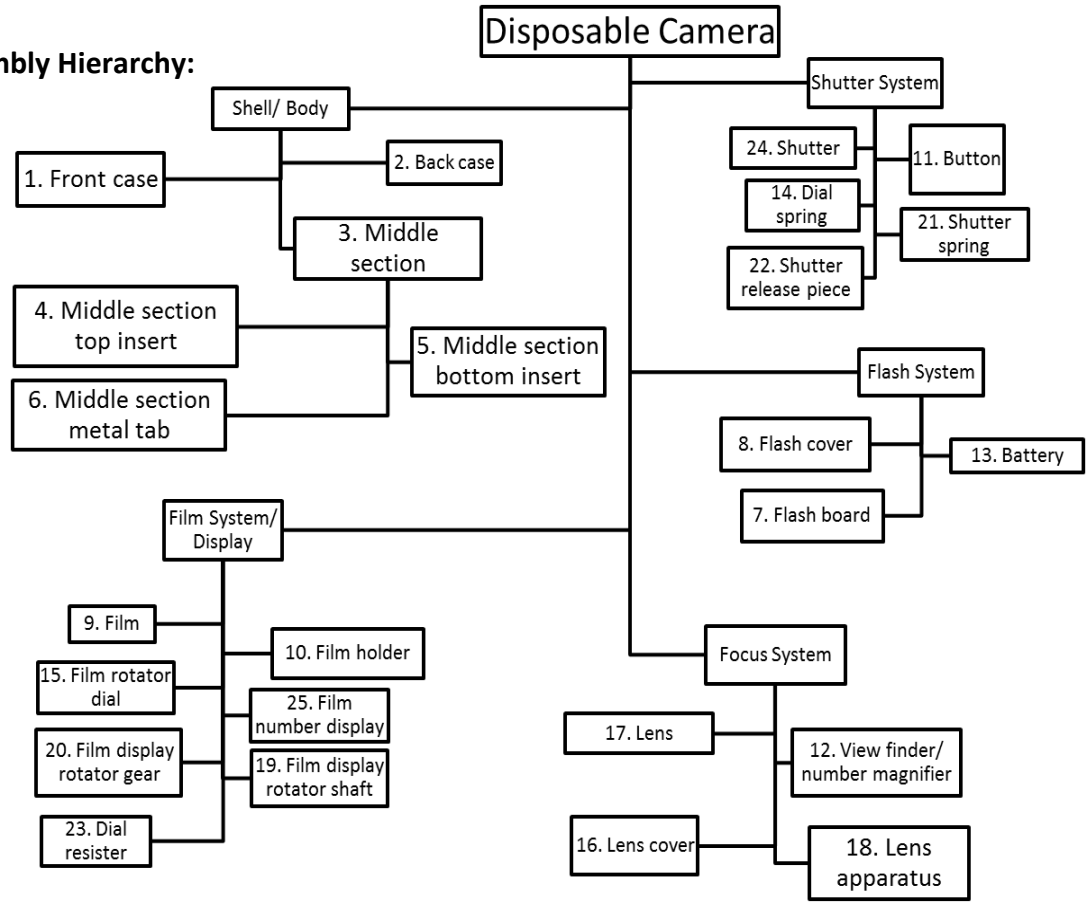
Additional benchmarking information was discussed in the external research category.

IX. Product Dissection

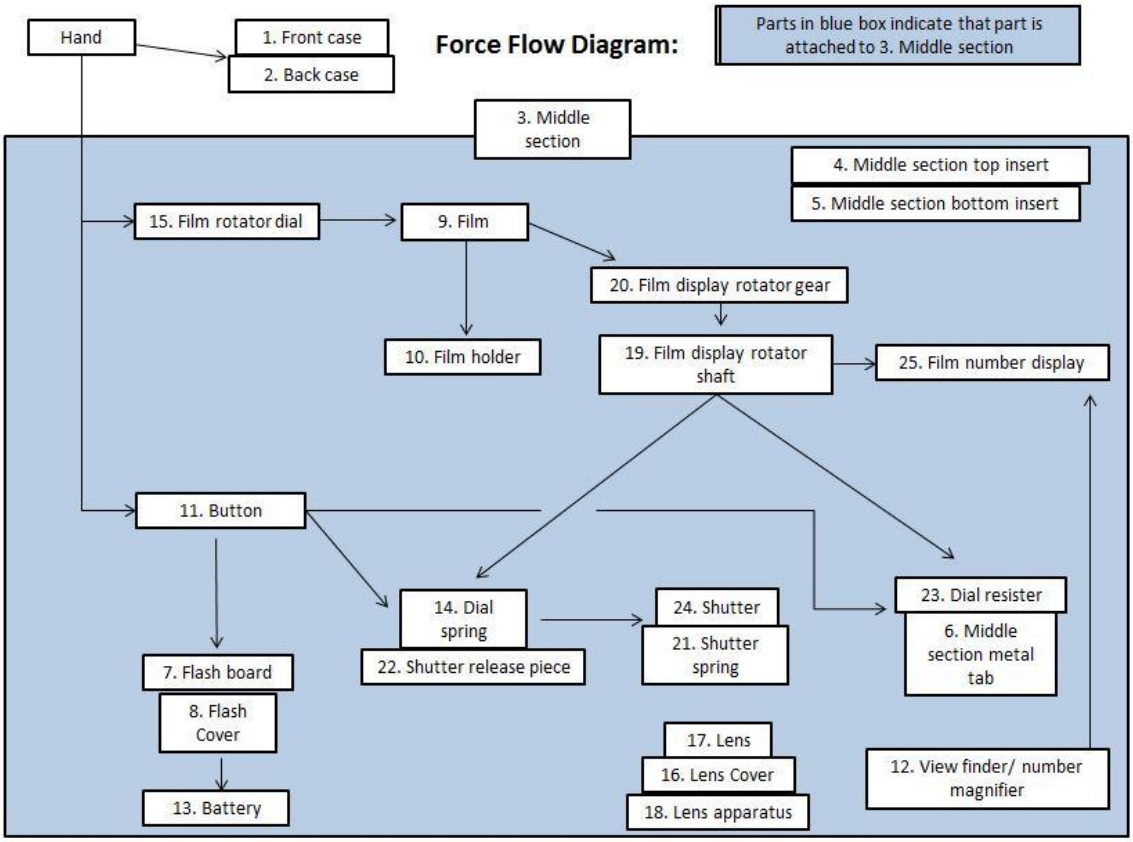
Dissection pictures of the original Kodak FunSaver.

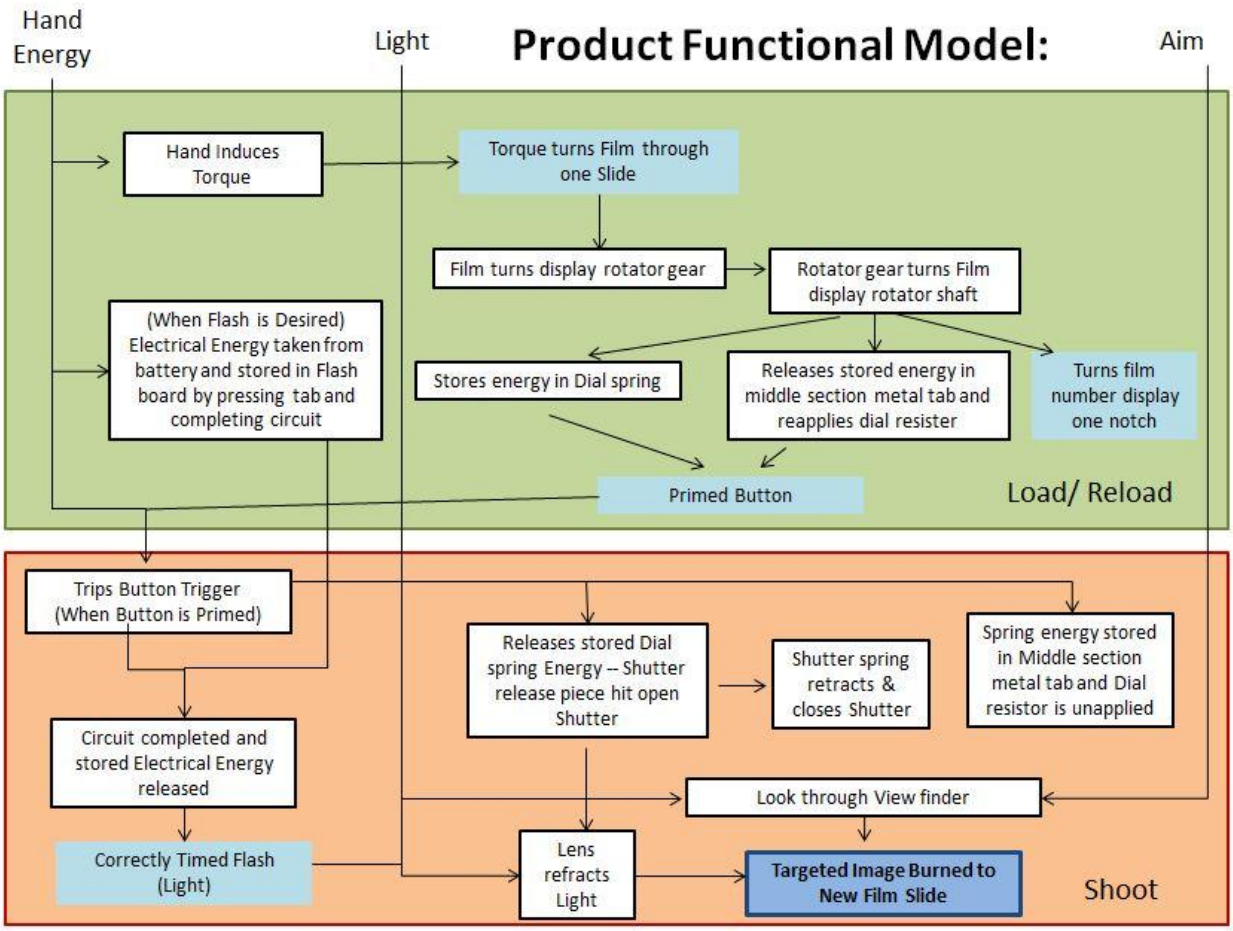
Part#	Part Name	QTY	SOP Effect	Function	Material	Manuf. Process
1	Front Case	1	No	Holds parts together; keeps light out	Plastic	Injection Molding
2	Back Case	1	No	Holds parts together; keeps light out	Plastic	Injection Molding
3	Middle Sect.	1	No	Keeps parts in designated areas	Plastic	Injection Molding
4	Mid. Sect. Top	1	Yes	Improves image quality on film	Plastic	Injection Molding
5	Mid. Sect. Bottom	1	Yes	Improves image quality on film	Plastic	Injection Molding
6	Mid. Sect. Metal Tab	1	No	Helps dial process; creates resistance against part #23	Metal	Metal Injection Molding
7	Flash Board	1	No	Operate and power flash	Silicon/Metal	Silicon Etching
8	Flash Cover	1	No	Protect flash	Plastic	Injection Molding
9	Film	1	No	Store/record pictures	Plastic, Metal	Chemical Application
10	Film Holder	1	No	Hold film	Plastic	Injection Molding
11	Button	1	No	Initiate picture process/flash	Plastic	Injection Molding
12	View Finder/ # Magnifier	1	No	Magnify film number, view picture area	Plastic	Injection Molding
13	Battery	1	No	Power camera(flash)	Metal	
14	Dial Spring	1	No	Assists in advancing film	Metal	Coiling, Hardening
15	Film Rotator	1	No	Manually rotate film and number display	Plastic	Injection Molding
16	Lens Cover	1	No	Holds lens on lens apparatus	Plastic	Injection Molding
17	Lens	1	No	Captures area in picture	Plastic	Injection Molding
18	Lens Apparatus	1	No	Hold lens in place	Plastic	Injection Molding
19	Film Display Rotator Shaft	1	No	Rotates dial resister	Plastic	Injection Molding
20	Film Display Rotator Gear	1	No	Assists in rotating dials	Plastic	Injection Molding
21	Shutter Spring	1	No	Moves shutter (pulls into place)	Metal	Coiling, Hardening
22	Shutter Release Piece	1	No	Triggers shutter	Plastic	Injection Molding
23	Dial Resistor	1	No	Moves dial/shutter	Plastic	Injection Molding
24	Shutter	1	No	Allows light to hit film	Metal	Metal Injection Molding
25	Film # Display	1	No	Shows how many pictures are left on the film	Plastic	Injection Molding

Assembly Hierarchy:



Force Flow Diagram:




Hand Energy
Light
Product Functional Model:
Aim
Hand Induces Torque
Torque turns Film through one Slide
Film turns display rotator gear
Rotator gear turns Film display rotator shaft
(When Flash is Desired) Electrical Energy taken from battery and stored in Flash board by pressing tab and completing circuit
Stores energy in Dial spring
Releases stored energy in middle section metal tab and reapplies dial resister
Turns film number display one notch
Primed Button
Load/ Reload
Trips Button Trigger (When Button is Primed)
Releases stored Dial spring Energy -- Shutter release piece hit open Shutter
Shutter spring retracts & closes Shutter
Spring energy stored in Middle section metal tab and Dial resistor is unapplied
Circuit completed and stored Electrical Energy released
Look through View finder
Correctly Timed Flash (Light)
Lens refracts Light
Targeted Image Burned to New Film Slide
Shoot

X. Concept Generation/ Selection

Concept Screening

The camera with a larger viewfinder was used as the reference.

	Concepts					
Selection Criteria	FunSaver with viewfinder borders **A**	Waterproof FunSaver **B**	Edible FunSaver **C**	FunSaver with zoom **D**	FunSaver with half-moon lens protector **E**	FunSaver with larger viewfinder **F**
Easy to hold	0	-	-	0	+	0
Takes quality pictures	+	0	-	+	+	0
Accurate viewfinder	+	-	-	0	-	0
No finger over lens	0	0	0	0	+	0
Good looking	0	-	+	0	0	0
Shows # of pictures left	0	0	0	0	0	0
Price	+	-	-	-	0	0
Sum +'s	3	0	1	1	3	0
Sum 0's	4	3	2	5	3	7
Sum –'s	0	4	4	1	1	0
Net Score	3	-4	-1	0	2	0
Rank	1	6	5	3	2	3
Continue?	Yes	no	no	yes	yes	yes

The potential concepts that were generated through brainstorming included an underwater/waterproof camera, an edible camera, a camera with crop lines, a camera with a larger viewfinder, a camera with a small blockade to prevent one's finger from covering the lens by accident, and a camera with a zoom lens.

After the concept screening, the team decided to continue developing the camera with crop lines, the camera with the larger viewfinder, the camera with the finger blockade, and the camera with a zoom lens.

Concept Scoring

		Concepts					
		FunSaver with viewfinder borders and half-moon lens protector **AE**		FunSaver with zoom **D**		FunSaver with larger viewfinder **F**	
Selection Criteria	Weight	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score
Easy to hold	10%	3	.30	3	.30	3	.30
Takes quality pictures	15%	4	.60	4	.60	3	.45
Accurate viewfinder	20%	5	1.0	3	.60	4	.80
No finger over lens	20%	5	1.0	3	.60	3	.60
Good looking	5%	3	.15	3	.15	3	.15
Show # of pictures left	5%	3	.15	3	.15	3	.15
Price	25%	3	.75	1	.25	2	.50
	Total Score	3.95		2.65		2.95	
	Rank	1		3		2	
	Continue?	Yes		No		No	

In the concept scoring, price was weighted with the highest importance. The other selection criteria were weighed according to their significance.

The team decided to combine two of the products into one; the camera with the viewfinder borders was combined with the camera with a half-moon barricade protecting the lens. After rating the three products and calculating their weighted scores, the camera with the two combined features was ranked first. The team took this product and finalized their ideas to create the finished product.

XI. Embodiment Design and Final Design Description

Throughout the concept selection process, we took a lot of care in choosing the concepts that were most cost efficient. The underwater/waterproof camera was eliminated because of cost and because it was simply unnecessary to our targeted market. The edible camera was eliminated both due to cost, and safety. The camera with a larger viewfinder was mainly eliminated due to cost as a feasibility factor. The zoomable lens concept was also eliminated to due cost as a feasibility factor. Our final design encompassed the two concepts that were not eliminated; those included the viewfinder border/crop lines and the half-moon lens protector. These two concepts will affect only two parts of the camera, and no others. Because only two parts will be altered from the original Kodak FunSaver, the cost will only slightly increase. We believe that this small increase in price is justifiable by the large increase in customer satisfaction with our model, the FunSaver+.

XII. Conclusions

Through extensive research, selection, and evaluation, we believe that the FunSaver+ has advanced the Kodak FunSaver into a more user friendly disposable camera. At the same time, we believe that our camera has successfully avoided adding unnecessary costs or altering the original product so much as to create an entirely new product. Furthermore, because only

two pieces were altered slightly, the original FunSaver's recycling process will not need to change to accommodate for the FunSaver+.

XIII. Works Cited

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