

AUTOMATIC ORNAMENTAL FISH FEEDER

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INTRODUCTION

Objective



Ornamental fishes

Automatic feeder for fishes fed in family, bar, restaurants, hotels and shops.

Objective (cont)

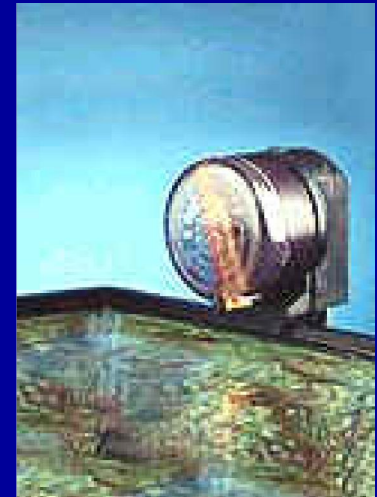


Kinds of fish food

Powder and tablet fish foods are concerned

Product Planning

- Investigate the market



The existing fish feeders are expensive and less function

Product Planning (cont)

- Mission statements:
 - Reliable, safe, expandable, portable compact and cheap Aquarium Feeder (AF).
 - Primary market: Vietnam
 - Secondary market: Overseas
 - Business goals: Complete and release the final product within 8 weeks. 10,000 products will be sold each year.

CONCEPT DEVELOPMENT

Customer Needs

No.	Customer needs	Imp.
1	Multi time point organizer	5
2	Small size.	4
3	Controllable quantitative module	5
4	Adapter.	3
5	Plastic material.	3.5
6	Buzzer	3
7	Illumination	4
8	Cleaner	3.5

House of Quality

Multi time point organizer

Small size.

Controllable quantitative

Adapter.

Plastic material.

Buzzer

Illumination

Cleaner

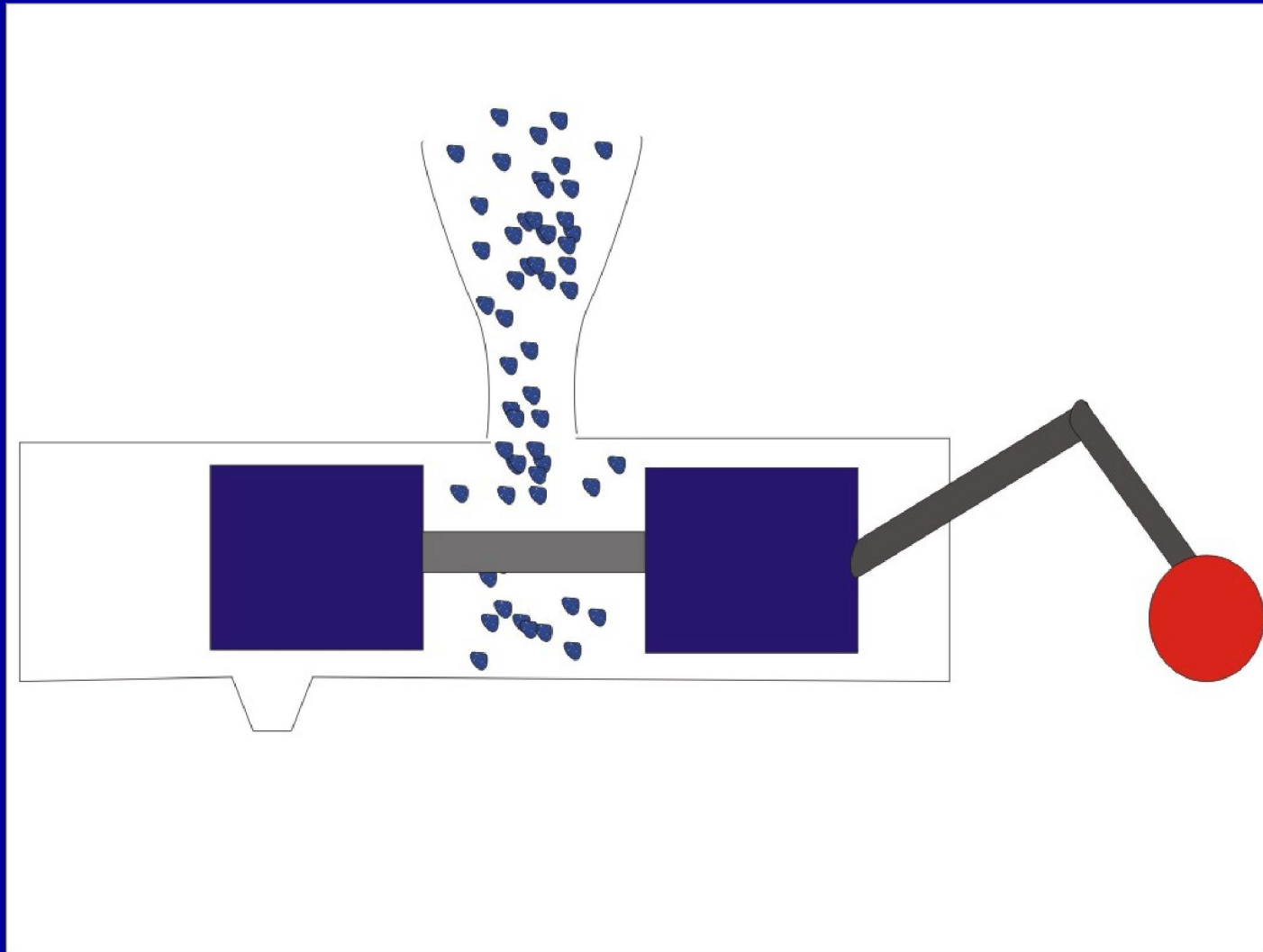
Total

%

Rank

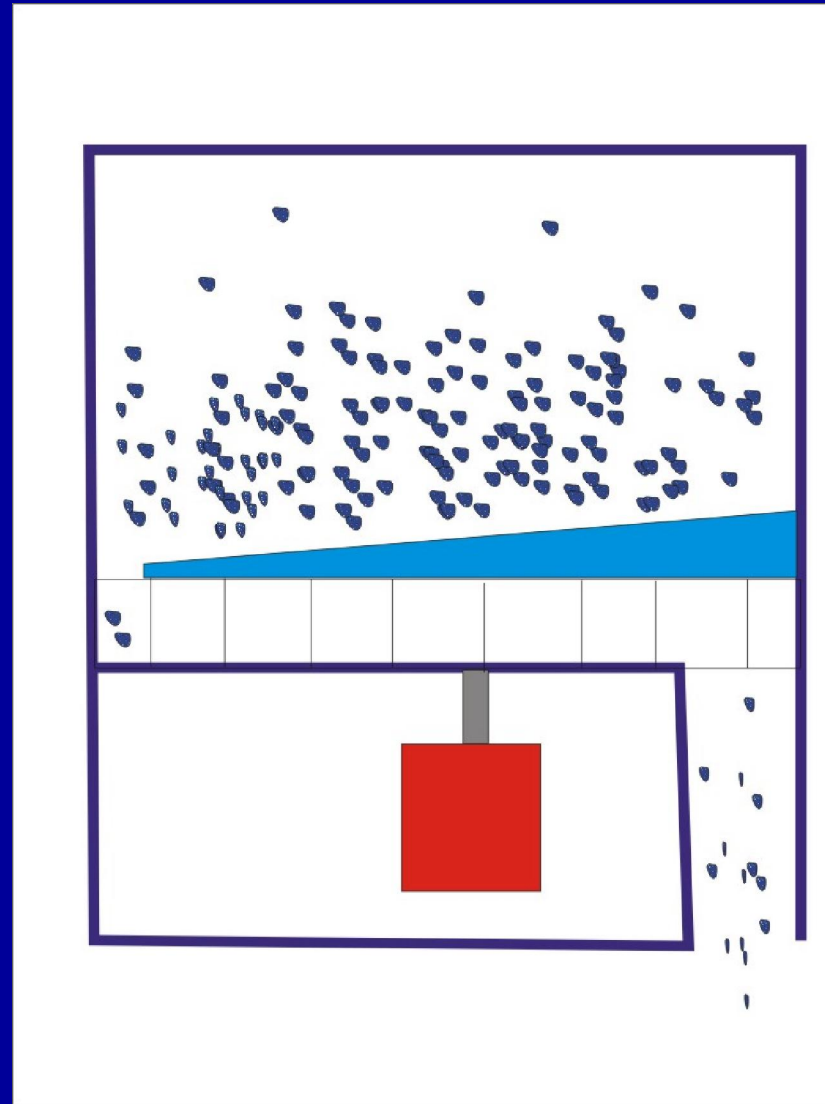
	Timer	Dimension	DC Motor	AC-DC Adapter	Flexural Strength	Speaker	Light	Mode	
	9							3	Improvement ratio
		9							Sale point
			9						Raw score
				9					Normalized score
					9				
						9			
							9		
			3					9	
	233	61	134	68	54	180	240	142	58.6 100.0
	21	5.5	12	6.1	4.8	16	22	13	
	2	7	5	6	8	3	1	4	

Concept generation



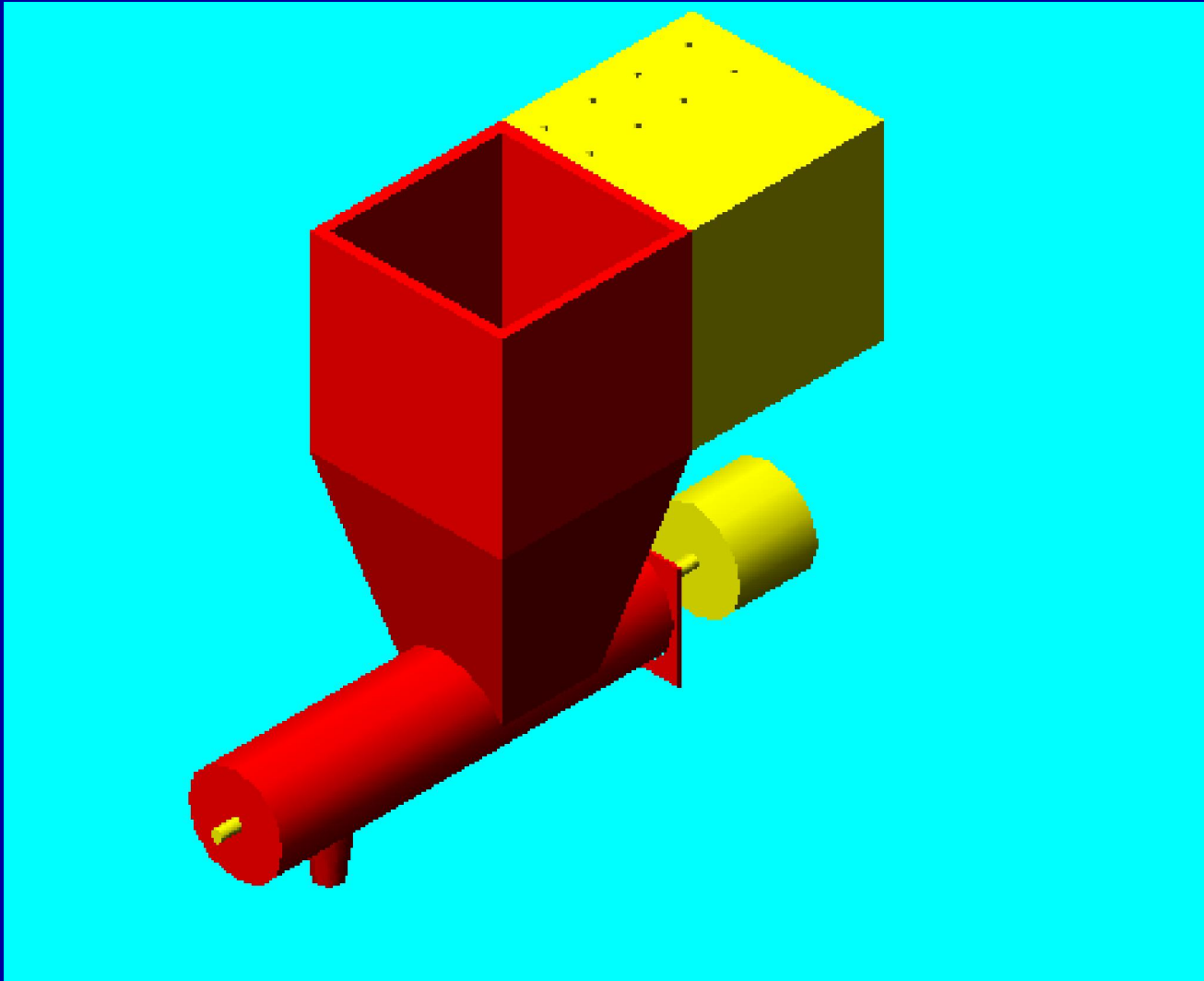
(1) Piston

Concept generation (cont)



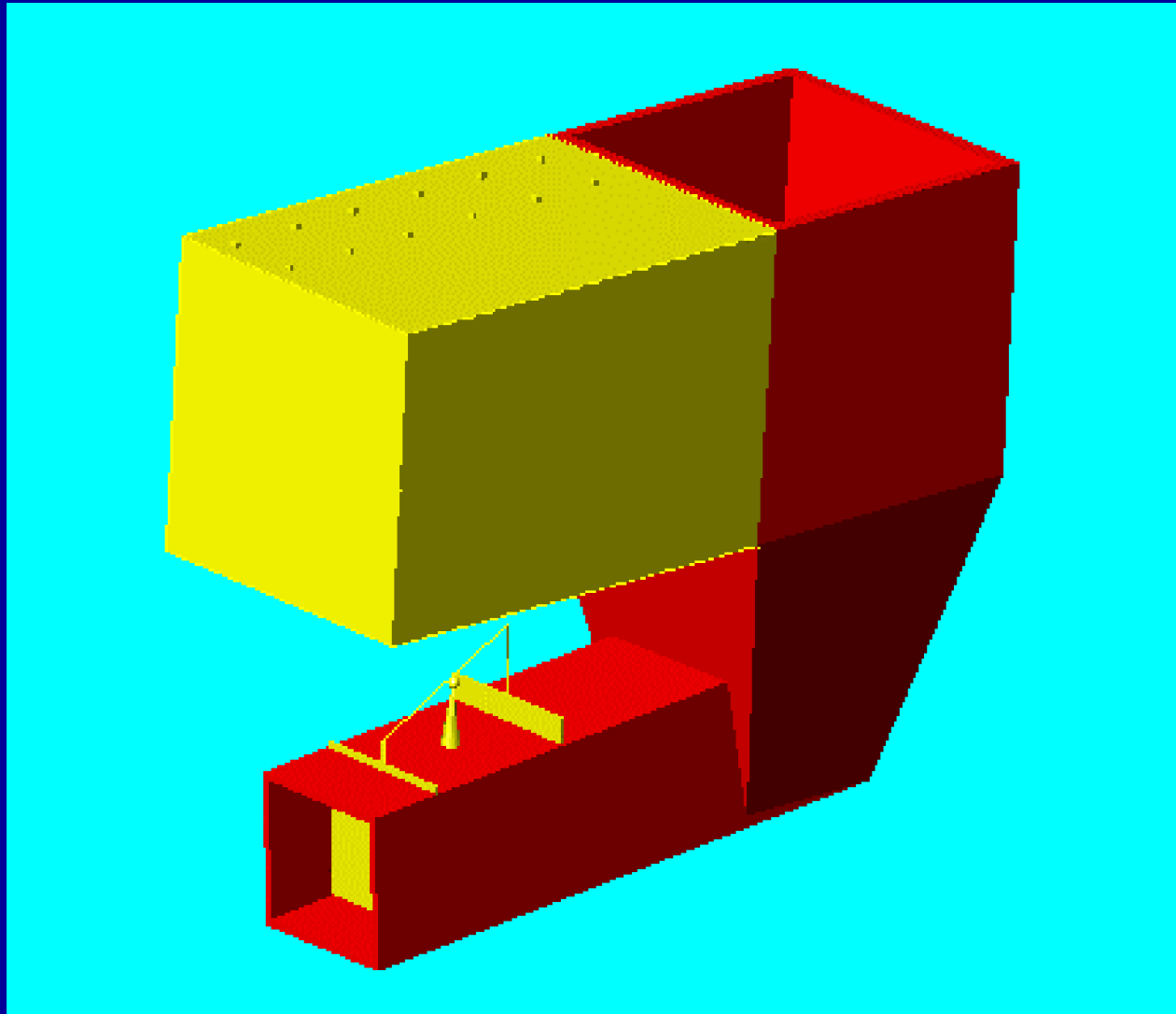
(2) Propeller

Concept generation (cont)

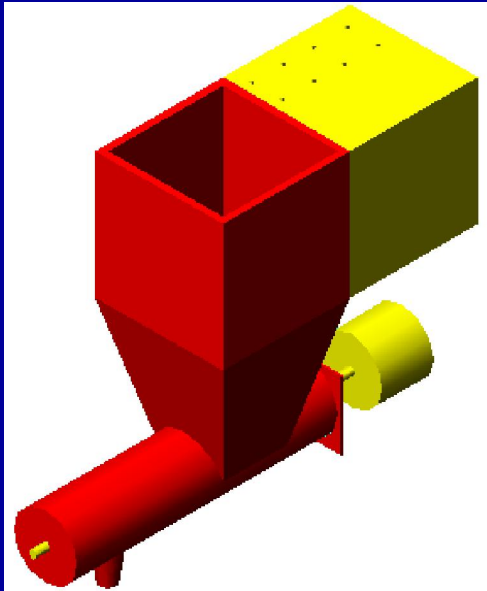


(3) Screw Shaft

Concept generation (cont)



Shutter



Concept Selection

	Weight	Concepts															
		1		2		3		4		5(ref)		6		7		8	
		Rating	Weight Score	Rating	Weight Score	Rating	Weight Score	Rating	Weight Score	Rating	Weight Score	Rating	Weight Score	Rating	Weight Score	Rating	Weight Score
Multi time point organizer	25	5	125	5	125	3	75	3	75	3	75	3	75	4	100	4	100
Small size.	5	4	20	3	15	4	20	3	15	4	20	3	15	4	20	3	15
Controllable quantitative module	25	5	125	5	125	3	75	3	75	3	75	3	75	4	100	4	100
Adapter.	10	4	40	4	40	4	40	4	40	4	40	4	40	4	40	4	40
Plastic material.	5	3	15	3	15	3	15	3	15	3	15	3	15	3	15	3	15
Buzzer	10	3	30	3	30	3	30	3	30	3	30	3	30	3	30	3	30
Illumination	10	3	30	3	30	3	30	3	30	3	30	3	30	3	30	3	30
Cleaner	10	4	40	3	30	2	20	2	20	3	30	3	30	3	30	3	30
Total score	100	425		410		305		300		315		310		365		260	
Rank		1		2		6		7		4		5		3		8	
Continue?		Develop		No		No		No		No		No		No		No	

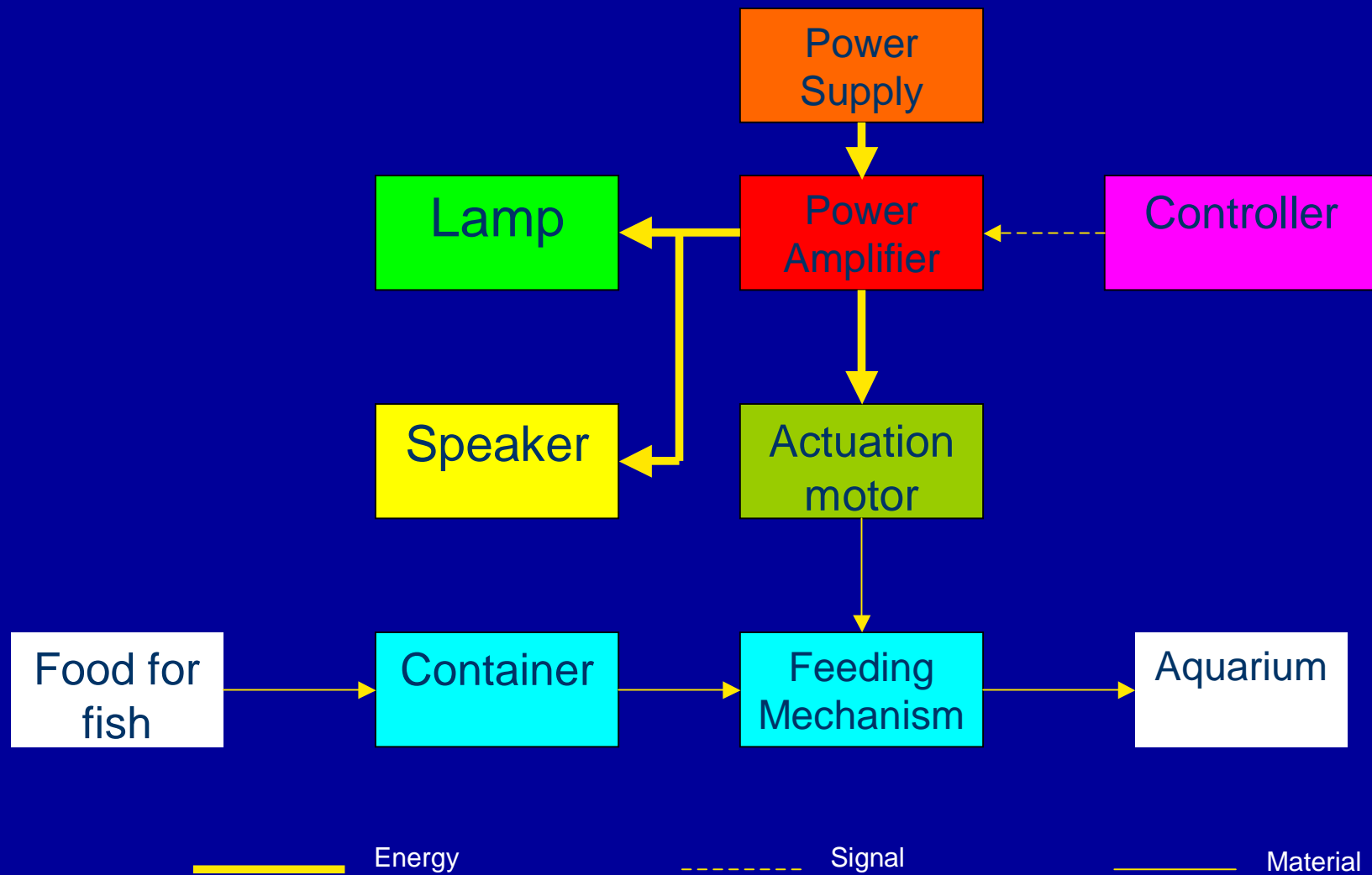
The concept Screw Shaft is chosen to develop

PRODUCT DEVELOPMENT

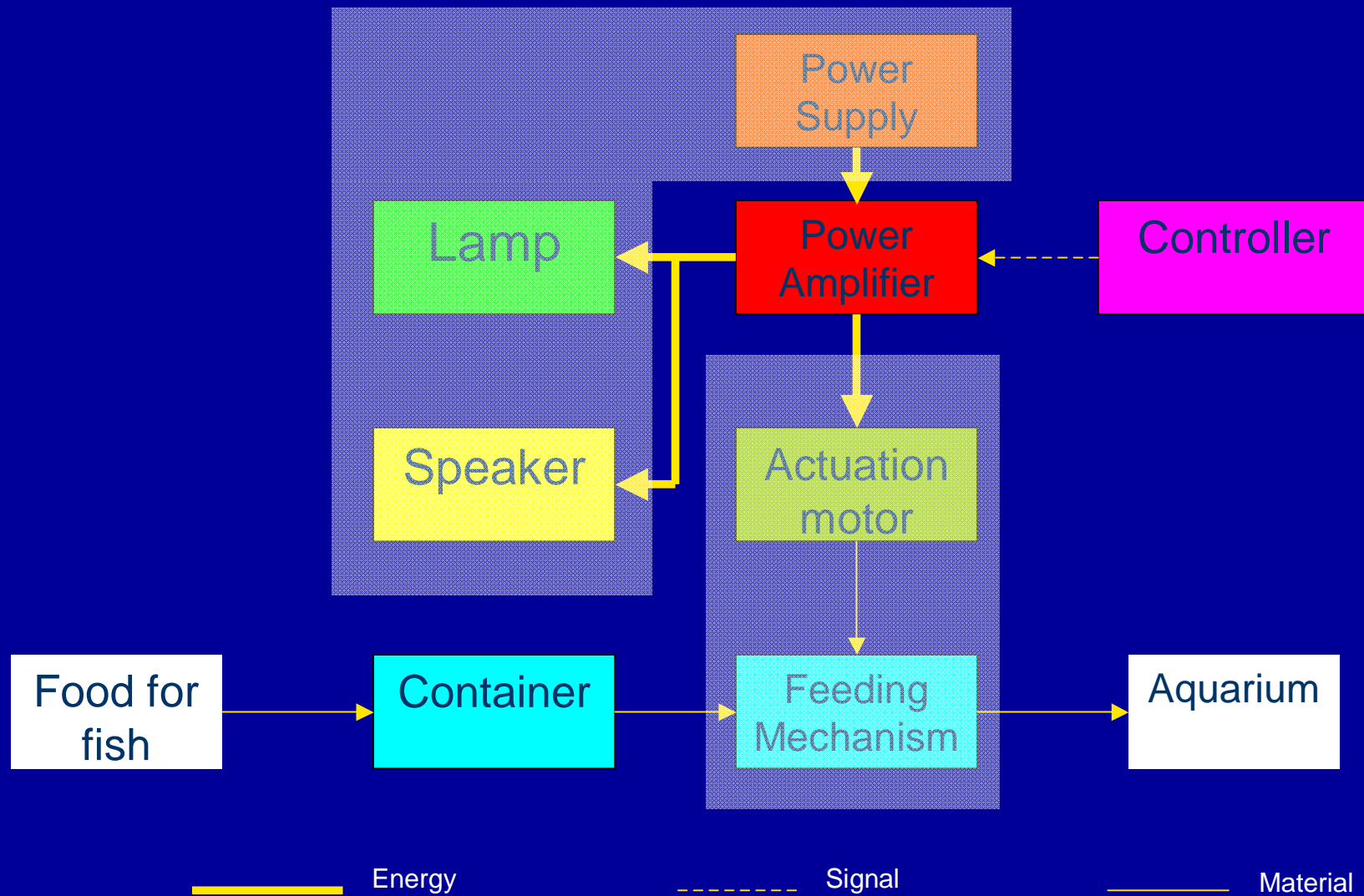
Manufacturability Design Goals

1. Minimize the number of parts
2. Simplify part types
3. Minimize and simplify assembly steps
4. Use conventional manufacturing constraints
5. Employ manual labor
6. Modularize components
7. Easy to maintenance
8. Easy to use

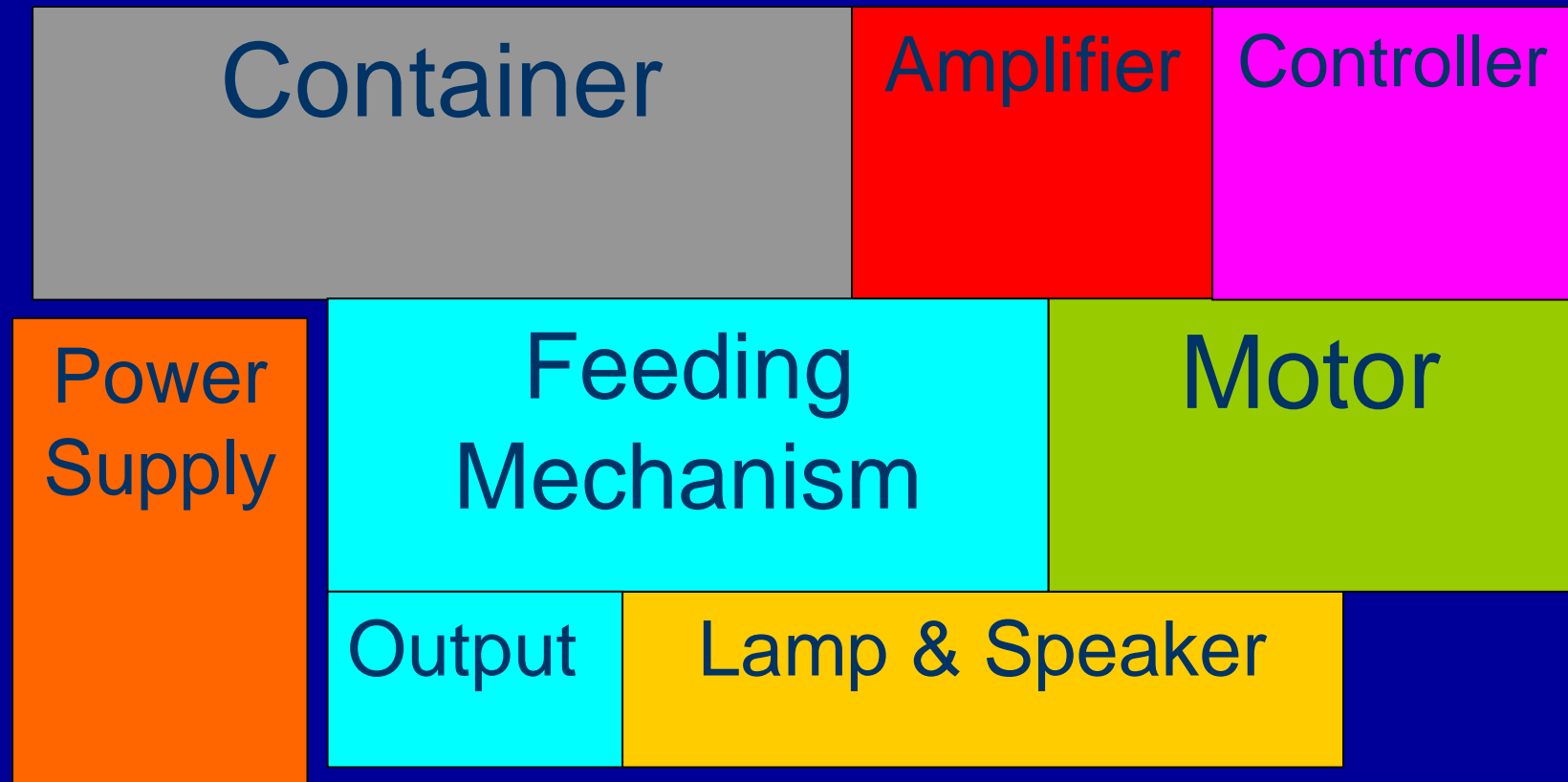
Schematic of The Product



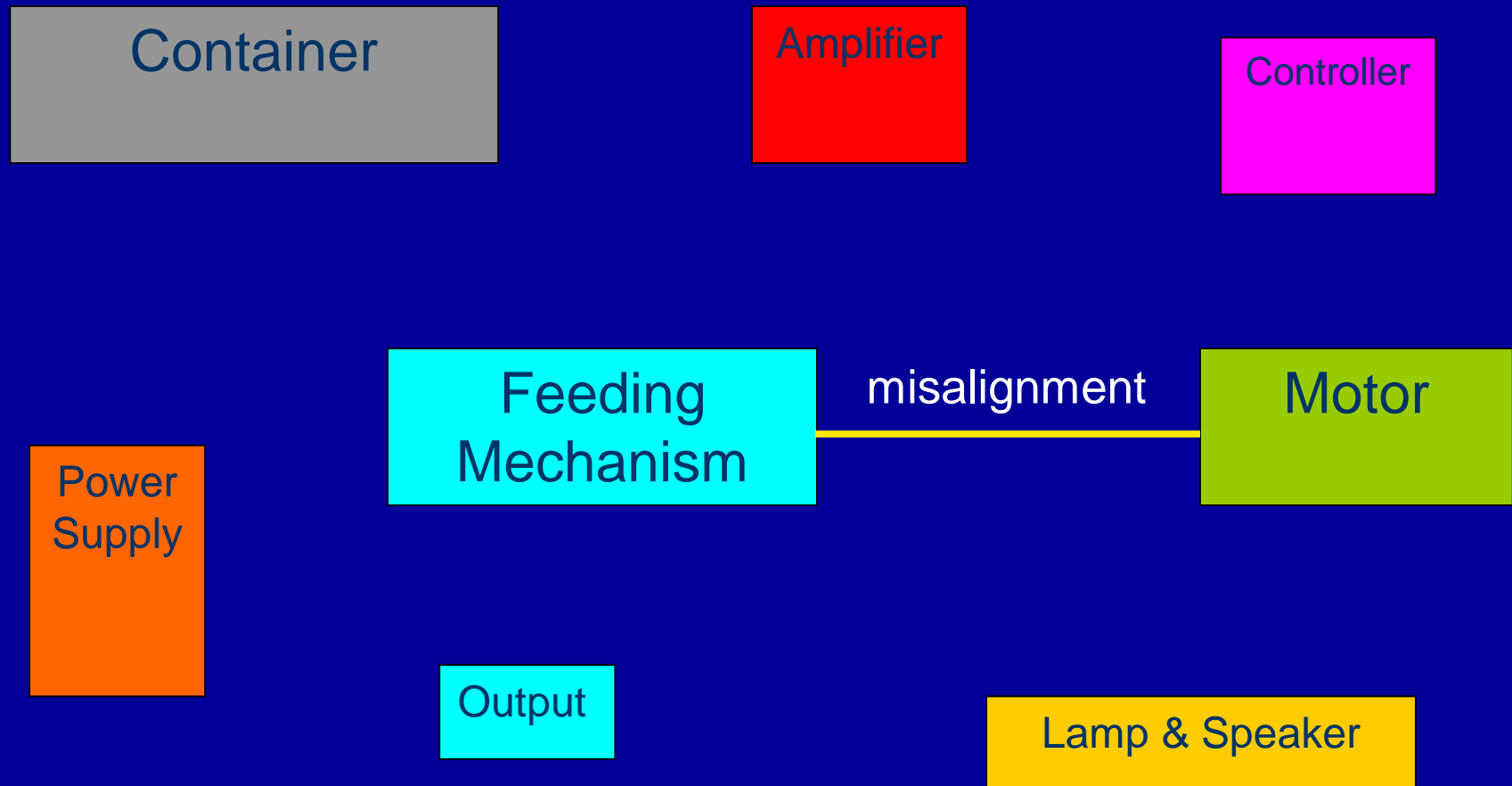
Cluster The Elements



Geometric Layout



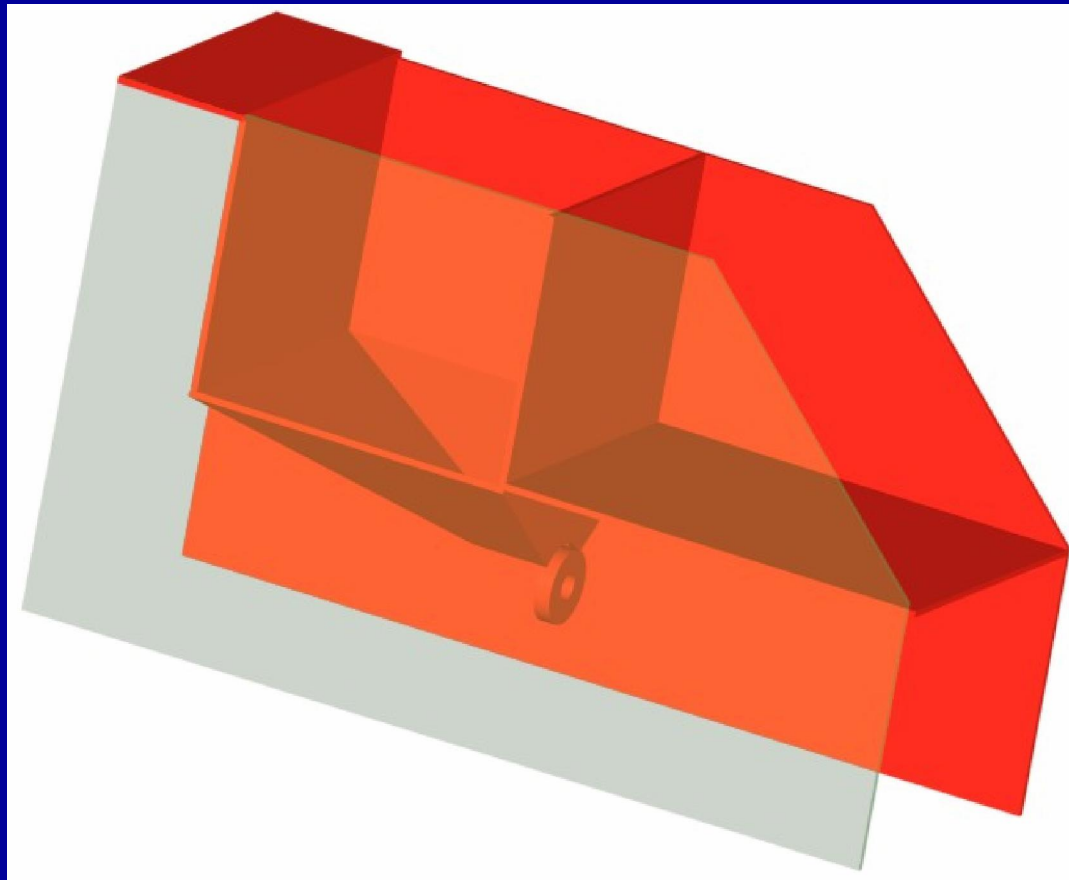
The fundamental and incidental interactions



Key Components

1. Container and Frame

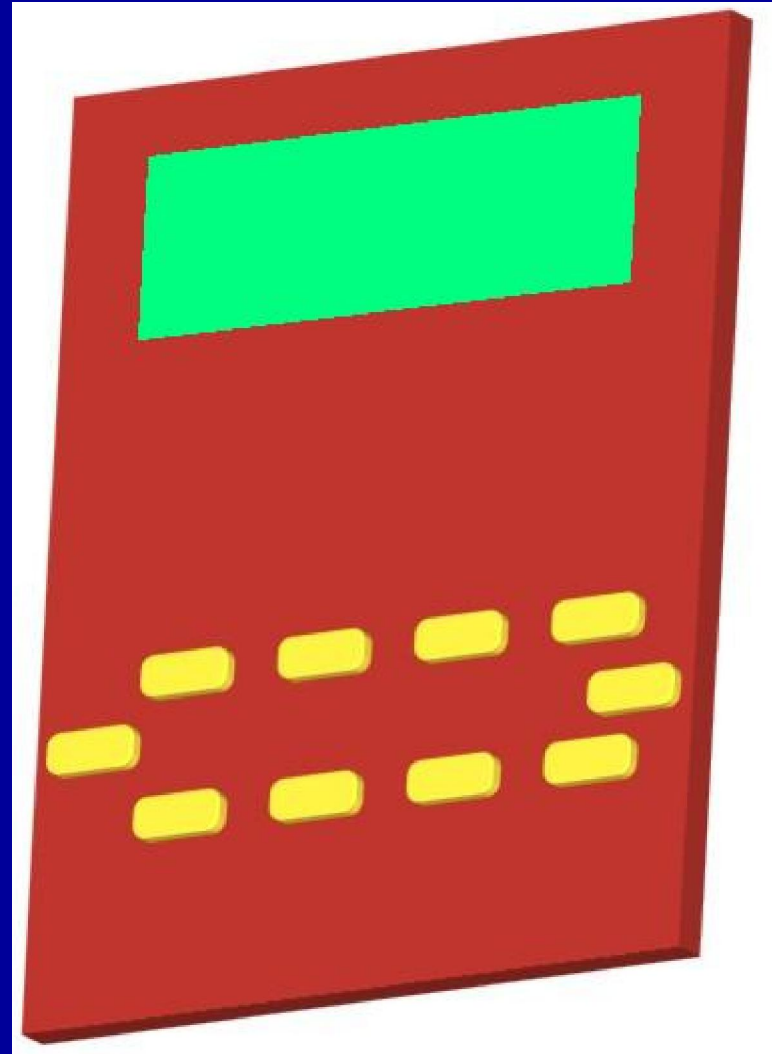
- Nylon 6,6
- Manually molding



Key Components (cont)

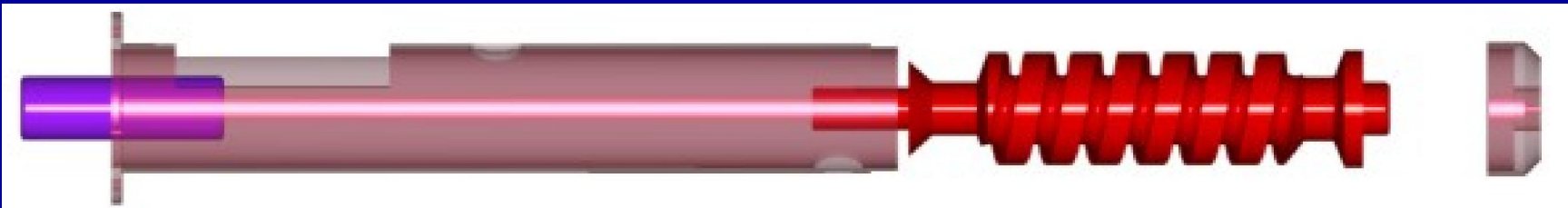
2. Controller

- Designed from available electric components.
- Manually assembling



Key Components (cont)

3. Feeding Mechanism

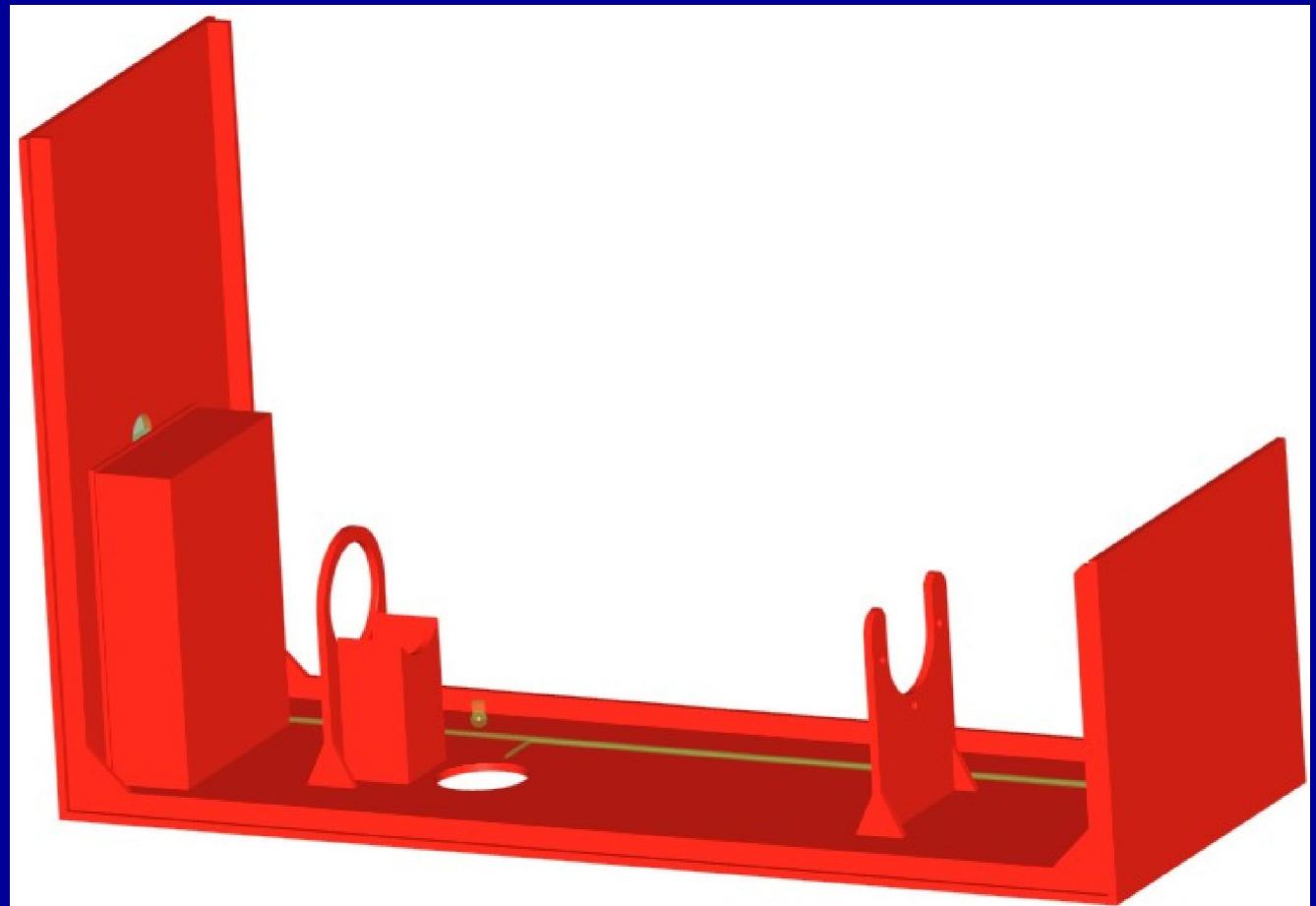


- Nylon 6,6
- Manually molding is used for all sub-components
- Sub-components are assembled by stack method.

Key Components (cont)

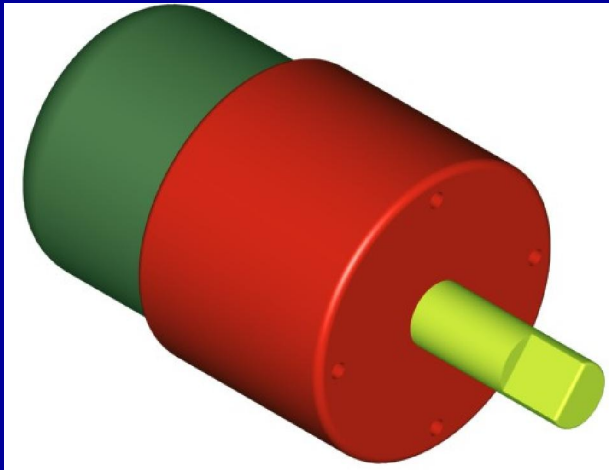
4. Bottom Piece

- Nylon 6,6
- Manually molding

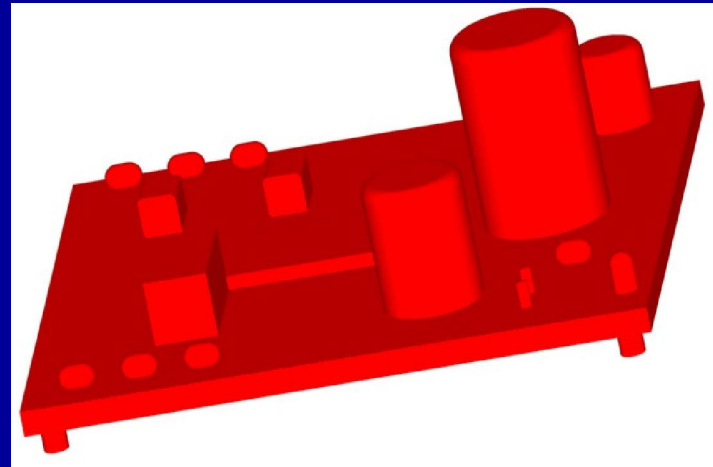


Other Components

DC Motor



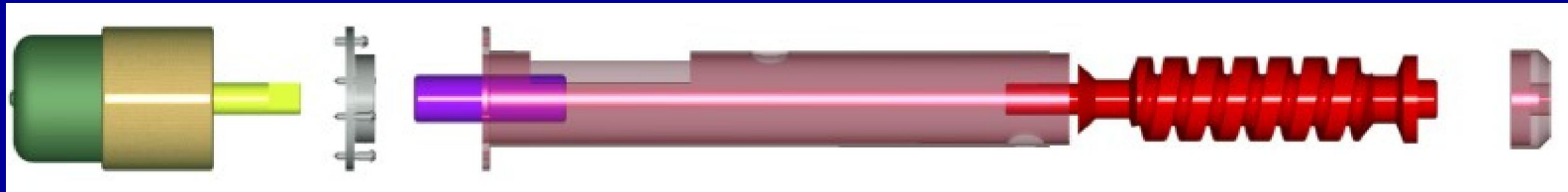
Amplifier



Take a glance at some components.

Chunks

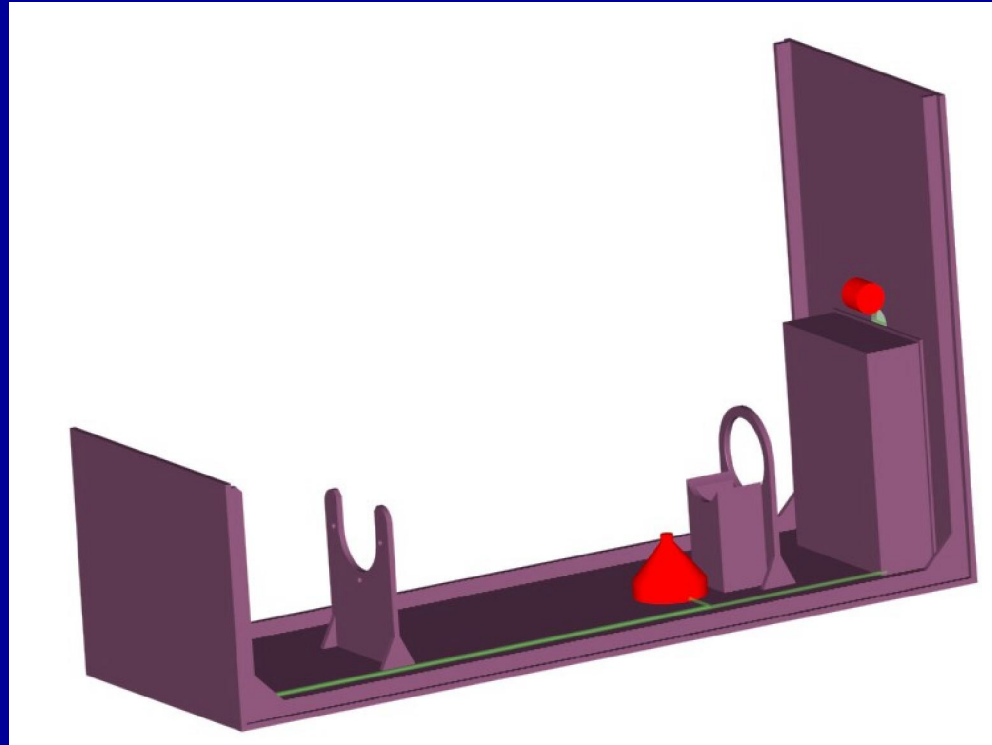
1. Transportation Chunk



- Including feeding mechanism, DC motor and glands.
- Assembly method: Using fasteners to attach DC motor and feeding mechanism.

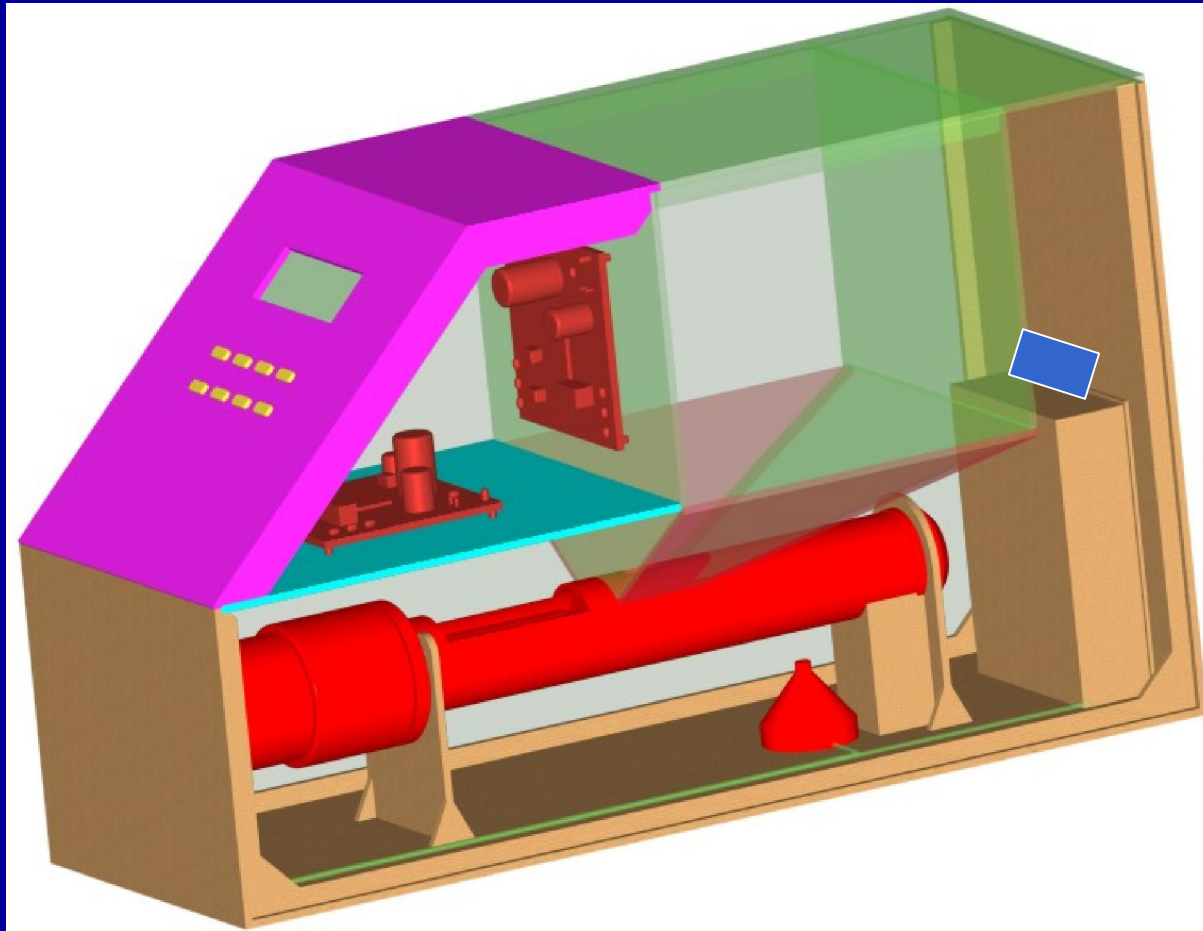
Chunks (cont)

2. Bottom Chunk



- Including bottom piece, lamp and speaker
- Assembly method: Insertion

Theoretical Alpha Prototype



Physical Alpha Prototype



Testing

- Technique aspect

Specification	Testing method	Parameter	Eff.	Eval.
Motor	Work with no load	Rpm	90%	Good
	Work with load	Rpm	80%	Fair
Timer	Times	Times per day	100%	Good
	Schedule	Work on time or not	100%	Good
	Amount of time	feeding period	100%	Good
Speaker	Run or not		100%	Good
Light	Run no not		100%	Good
Transportation	Dosage	Grams per second	90%	Good

Testing (cont)

- Customer aspect

Specification	Testing method	Parameter	Eff.	Eval.
Transportation	Dosage	Grams per second	90%	Good
Keyboard	Press keys correspond to their mode		95%	Good
Food types	Pour to the container	Powder and tablet type	90%	Good
Safety	Measure insulated resistors	MΩ	100%	Good

Design For Manufacturing

Part	Qty	Assembly					Part Elimination				Assessment		
		T	H	I	S	C	Mo.	Mat.	Ass.	CFE	V	M	UI
Cover	1	1	+	0	0	+	no	no	no	1	0	+	0
Controller	1	1	0	0	0	+	no	no	no	1	0	+	0
Screw	1	2	-	+	+	+	yes	yes	yes	0	0	+	-
Bearing	1	1	-	0	0	+	yes	no	no	1	0	+	-
Casing	1	2	-	0	0	+	yes	yes	yes	0	0	+	-
Coupling	1	1	-	0	+	+	yes	yes	yes	0	0	+	-
Gland	1	2	-	+	+	+	yes	yes	yes	0	0	+	-
Lamp	1	2	+	0	0	+	yes	yes	yes	0	2	+	0
Speaker	1	2	+	0	0	+	yes	yes	yes	0	2	+	0
Amplifier	1	1	0	0	0	+	yes	yes	yes	0	2	+	0
Cap	1	2	+	0	0	+	yes	yes	yes	0	0	+	0

Design For Manufacturing (cont)

$$\text{Count-Ratio} = 8/11 = 0.7272$$

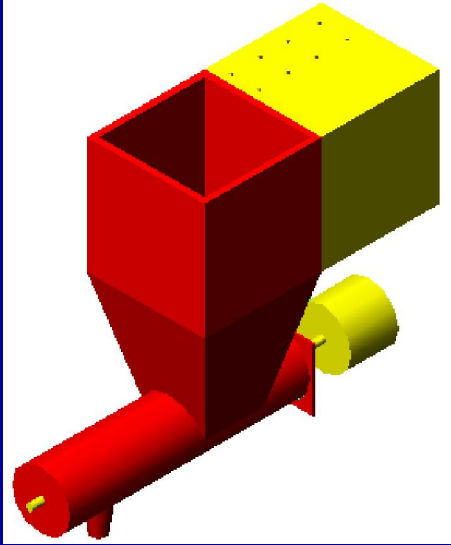
$$\text{Value-Ratio} = 6/11 = 0.5454$$

$$\text{Separate-operation-ratio} = 0$$

$$\text{Separate-fastener-ratio} = 4/11 = 0.3636$$

Conclusion: With DFM process, we see that some components must be eliminated in beta prototype because the CFE value is larger than one.

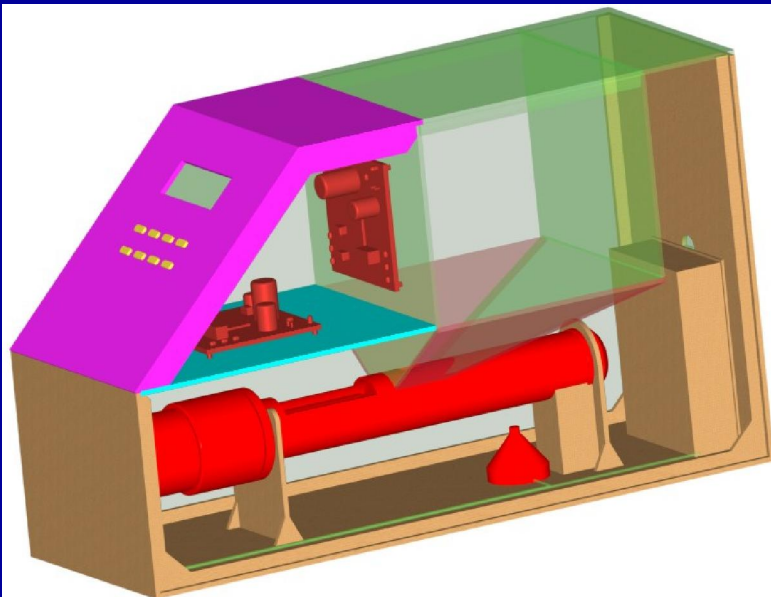
Conclusion



Concept



Design



Prototype

Conclusion

Our project started at a step of customer needs then establishing the specification, concept generation, concept selection, setting up product design objectives, product architecture, product design, prototype making, and ended at testing and refining product. We conform closely to this process to create AF prototype.

Hence, our AF prototype has both compulsory and amazed- customer function

We believe in developing AF to become a commercial product with big potentiality such as: to get a lot of profit and to enlarge domestic and international market

**THANK YOU FOR
YOUR ATTENTION!**

QUESTION?

DEMONSTRATION