

Application of Structured Methods for Product Development

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Introduction

Performance Assessment of Product Development

- Product quality
- Product cost
- Development cost
- Development time
- Development capability

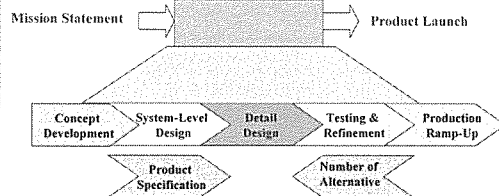
Functions for Product Development

- Marketing
- Design
- Manufacturing

Benefits by A Structured Method

- A customer-focused product
- A competitive design
- Better product-process coordination
- Reduced time to product introduction
- Effective group decision making
- Documentation of the decision process

Product Development Process



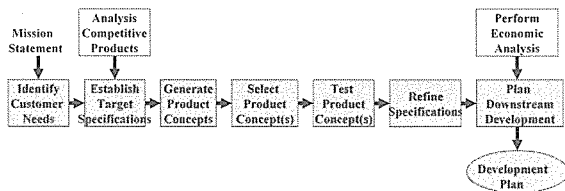
The Product Planning Process

The product planning phase precedes the product development process

Mission Statements:

- Brief description of the product
- Key business goals
- Target market(s) for the product
- Assumptions and constraints that guide the development effort
- Stakeholders

Concept Development Process: The Front-End Process



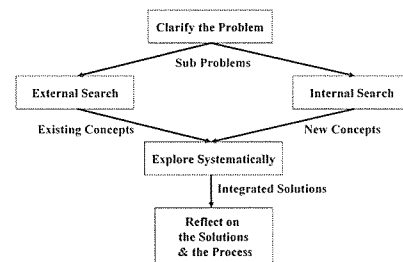
Five-Steps for Identifying Customer Needs

1. Gather raw data from customers
2. Interpret the raw data in terms of customer needs
3. Organize the needs into a hierarchy
4. Establish the relative importance of the needs
5. Reflect on the results and the process

The Product Specifications Process

- Set Target Specifications
 - Based on customer needs and benchmarks
 - Develop metrics for each need
 - Set ideal and acceptable values
- Refine Specifications
 - Based on selected concept and feasibility testing
 - Technical modeling
 - Trade-offs are critical
- Reflect on the Results and the Process
 - Critical for ongoing improvement

Five-Step Concept Generation Methodology



General Procedure for Structured Concept Selection

1. Prepare the selection matrix
2. Rate the concepts
3. Rank the concepts
4. Combine and improve the concepts
5. Select one or more concepts
6. Reflect on the results and process

System-level & Detail Design

System-level Design

- Define the product architecture
- Decompose the product into subsystems and components
- Develop the assembly scheme for the production

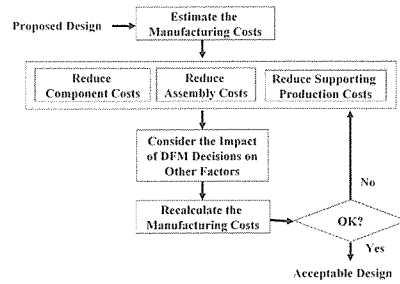
Detail Design

- Complete the specification of the geometry, materials, and tolerances of the unique parts
- Identify the standard parts to be purchased
- A process plan is established and tooling is designed

Four-Step Methodology for Establishing the Architecture

1. Create a schematic of the product
2. Cluster the elements of the schematic
3. Create a rough geometric layout
4. Identify the fundamental and incidental interactions

DFM Methodology



Prototyping

A process of developing an approximation of the product along one or more dimensions of interest

Purposes of Using Prototypes

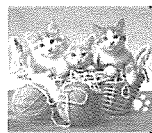
- Learning : Will it work?
- Communication : Look&Feel
- Integration : Components work together
- Milestones : Achievement

An Illustrative Example: DESIGN AN AUTO - PET FEEDER



Introduction

- ◆ Company - ThinkPet®
 - Established in 2002
 - Designs & develops PET related products
- ◆ Main products
 - Pet households
 - Pet entertainment
 - Pet feeder
- ◆ The company's development team is designing and developing the pet feeder model PFD01

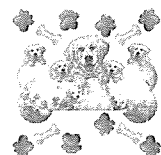


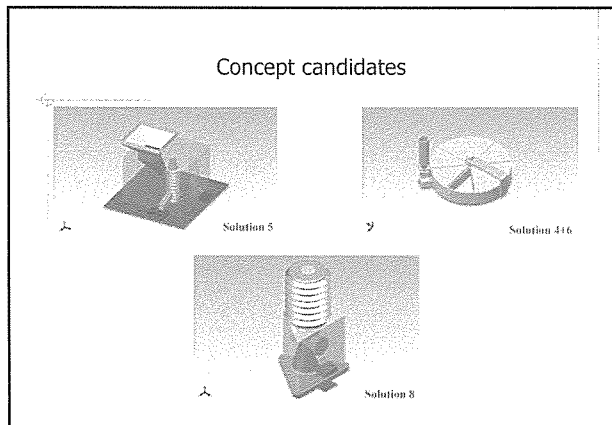
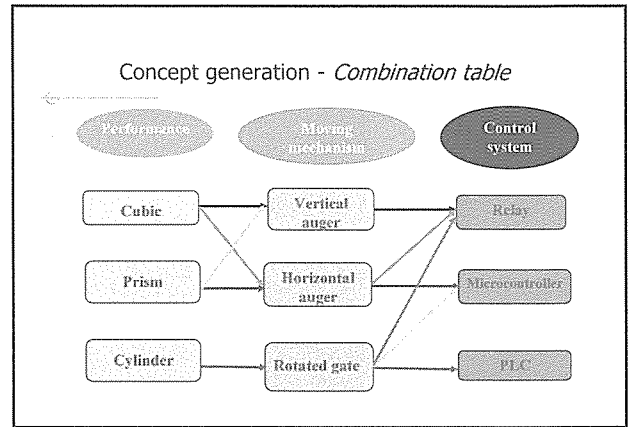
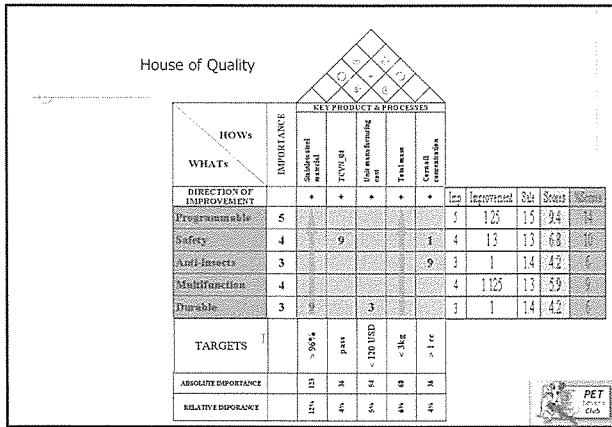
Mission statement

Product description: 7 days Programmable Automatic Pet Feeder for small - medium dogs and cats

Assumptions and constraints:

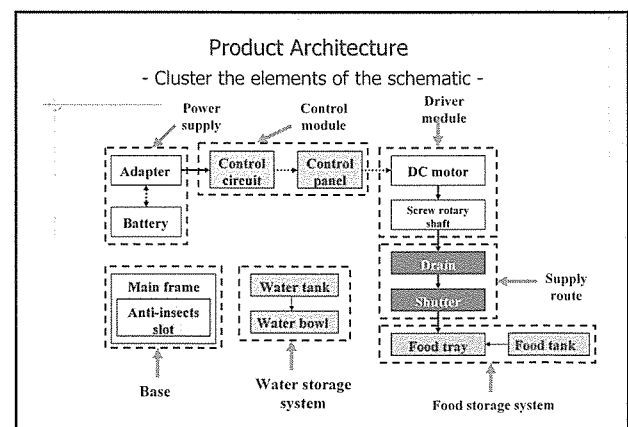
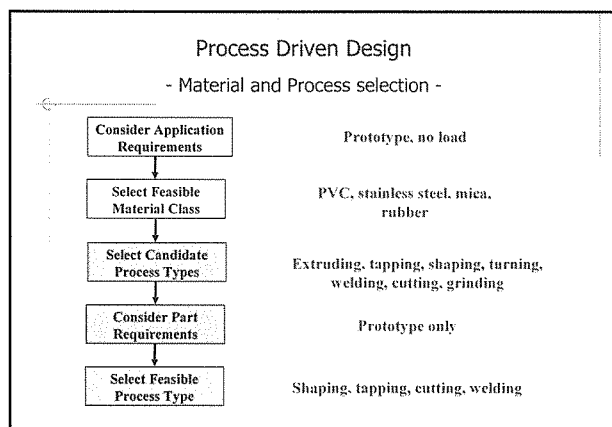
- Both supply food and water
- Programmable ability
- Affordable price
- Portability
- Easy installation and removal





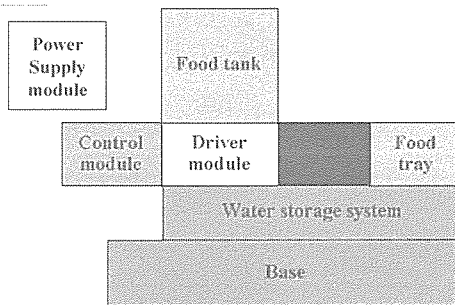
Concept selection - Concept scoring

Selection criteria	Weight	Concept					
		Selection 5 (Reference)		Selection 8		Selection 4 + 6	
		Rating	Weighted score	Rating	Weighted score	Rating	Weighted score
Performance	10%	2	0.2	3	0.3	1	0.1
Ease of use	20%	3	0.6	4	0.8	3	0.6
Reasonable price	20%	3	0.6	4	0.8	2	0.4
Durability	30%	3	0.9	4	1.2	2	0.6
Portable	10%	2	0.2	3	0.3	3	0.3
Programmable	10%	3	0.3	4	0.4	4	0.4
Total score			1.54		2.9		2.4
Rank		3		1		2	
Continue?		No		Develop		No	

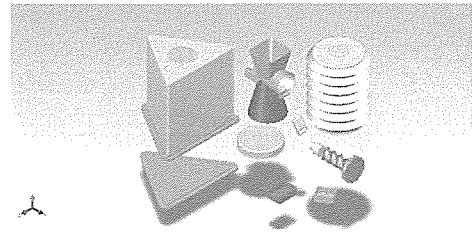


Product Architecture (Cont.)

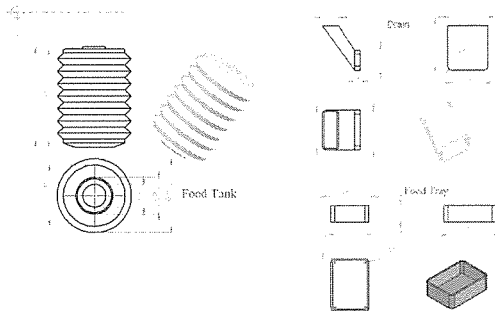
- Create a rough geometric layout -



Detail Design



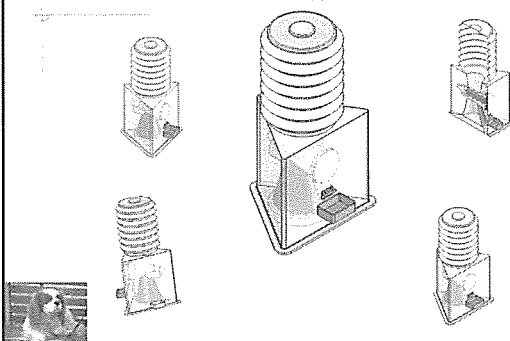
Detail Design



Bill of Material (BOM)

No.	Part name	Unit	Quantity	Material	Standard
1	Food tank	pcs	1	PVC	
2	Water tank	pcs	1	PVC	
3	Food tray	pcs	1	Stainless steel	
4	Water bowl	pcs	1	Stainless steel	
5	Main frame	pcs	1	Mica	
6	Anti-insects oil	cc	1		
7	Drain	pcs	1	PVC	
8	Shutter	pcs	1	PVC	
9	Motor	pcs	1		British standard
10	Control circuit board	pcs	1		TCVN
11	Switch	pcs	5		
12	Screw rotary shaft	pcs	1		
13	Screws	pcs	12		
14	Gasket	set	1	Composite plastic	
15	Adapter	pcs	1		TCVN
16	Battery	pcs	1		TCVN
17	Accessories	set	1		
Optional					
18	Roof	pcs	1	PVC	
19	Handle	pcs	1	PVC	
20	Small tank	pcs	1	PVC	

Prototype



Conclusions

- ◆ Structured methods in product development process
- ◆ Concept development process
- ◆ Product architecture, prototyping, DFM and DFMA
- ◆ ID, testing and refinement of the product
- ◆ Potential for implementation of the methods for larger and more sophisticated products