V. NEW PRODUCT PLANNING

CONTENTS

1. Design of Prototype
2. Testing
3. Quality Standards
4. Marketing Research
5. Introducing New Products

1.DESIGN OF PROTOTYPE

(i) DEFINITION

1. Why to make ? - Need aspect / Purpose.
2. What is the role? - Function.
3. When to deliver? - Target date.
4. How does it work? - Mechanism.
5. Who will do? - Skill set.

1. Design of Prototype

(ii) CHARACTERISTIC FEATURES

1. Function.
2. Novelty.
3. Aesthetic.
4. Technology.
5. Value.

1.Design of Prototype

(iii) REQUIREMENT DOCUMENT

1. Definition of Function.
2. Configuration and Envelope.
3. Performance parameters.
4. Operating / Service conditions.
5. Environmental factors.
6. Design parameters.
7. Design margins.
8. Technology / type.
9. Testing aspects.
10. Product lifecycle.

1. Design of Prototype

(iv) DESIGN DOCUMENT

1. Definition of Function.
2. Design parameters and margins.
3. Detailed Design computations & standards.
4. Detailed Design Drawing & dimensions.
5. Interfaces of envelope.
6. Performance parameters with Dispersions.
7. Definition of Operating / Service conditions.
8. Definition of Environmental parameters.
9. Test Requirements.
10. Product lifecycle.

1.Design of Prototype

(v) PROCESS DOCUMENT

1. Flowchart showing the Sequence of Operations.
2. Philosophy of Manufacturing, Quality & Scalability.
3. List of Materials.
4. List of Machines.
5. List of Tools & Accessories.
6. Inspection Plan – Receiving, Intermediate & Final Stages.
7. Assembly and Integration.
8. Test philosophy.
9. Packing & Transportation.
10. Delivery conditions.

1.Design of Prototype.

(vi) PRINCIPLES OF FUNCTIONAL DESIGN

- Functional decomposition is a popular system design technique. Top level / core function that the system must perform is identified.
- This core function is decomposed into sublevels.
- This decomposition is continued until the functions that can be implemented with commercially off-the shelf products.
- The sub functions are designed based on certain principles.

1.Design of Prototype

- *1. Allocate each function to only one component so that each function will have only one owner.*

In case of two owners for one function, any change in one would change the other also.

Therefore do not allow multiple components to have the same function.

One function allocated to two components is a *Bad Design.*

1.Design of Prototype.

- But, like any rule, exceptions are applicable here too.
- They are:

  -Different modes of operation.

  -Deliberate Redundancy to enhance Reliability.

  -Distributed Functionality.

Some others are:

-One system with 2 subassembly & 2 functions-OK

Pencil, Stapler

1.Design of Prototype

-One system with 2 functions : OK design.
air conditioner- cools , dehumidifies.
road bridge over river- car and boat
-One system with 2 functions : marginal design
washer, drier: twin, single, separate.
-One function with 2 purposes: OK design
MW oven; heating – cooks , warms.

1. Design of Prototype.

- *2. Make Functions Independent.*

  - Functions should not depend upon each other

  -If they are independent, change in any one will not affect the other.

  Bad design: phone no: 9-external,1-trunkline

  Limit side effect : car ignition, music system

1.Design of Prototype

(vii) DESIGN MARGINS

There are Four different properties.

1. Safety factor.
2. Mass budget reserve.
3. Tolerances allowed.
4. Performance capabilities.

- Parameters with large uncertainties are to have larger safety margins. e.g. ASME boiler code for pressure ratings change are given below.
- Year-1915 factor was 5.0

  Year-1951 factor was 4.0

  Year 1999 factor was 3.5

- Budget Reserve for mass in aerospace.

Module	Target mass	Allowable mass	Reserve mass
A	15	20	5
B	20	30	10
C	40	50	10

Total of 25 Kg can be reserve with programme manager.

- Manufacturing process is selected to meet the critical design / performance tolerances.
- Based on review of requirement, design tolerance can be widened to accommodate production / inspection practices in certain cases.
- Safety margin Vs Design margin is a matter of continuous debate.

FUNDAMENTAL PRINCIPLES OF DESIGN OF PROTOTYPE

- Design is a creative activity……. Design of prototype is a wonderfully creative activity.
- Consequently, there is no process that will ***generate*** good designs, but there are some principles that will increase the probability of getting a good design.
- There are dozens of fundamental principles of good system design that should help make a product better.

- Some of these principles are given below:

1. Use of hierarchal, top-down design.
2. Use of models to design system.
3. Work on high risk items first.
4. Prioritize activities.
5. Adopt concurrent engineering.
6. Control the level of interacting teams.
7. Identify and design interfaces.
8. Visualize all the options early.

9. Produce satisfactory designs.
10. Do not optimize early.
11. Use evolutionary development.
12. Understand the enterprise.
13. State what, not how.
14. Refine the details of functional uses.
15. Allocate each function to only one component.

16. Never allow undocumented functions.
17. Provide observable states / conditions.
18. Rapid prototyping is vital.
19. Develop iteratively and test immediately.
20. Create / configure modules.
21. Use open standards.
22. Identify things that are likely to change.
23. Write down extension points.

24. Group data and trends.
25. Maintain a glossary of relevant terms.
26. Create design margins.
27. Design for testability.
27. Build up analysis tools.
28. Develop simulation models.
29. Identify commercial / bought out items.
30. Create new design processes.

These design principles come from the experience of hundreds of designers, engineers and managers. These are examples as lessons learned from a large number of projects / products development.

THANK YOU