

08/07/21
Thursday

SJC17CS035

MP 482

PRODUCT DEVELOPMENT AND DESIGN. (PDD).

⑦ (a) Goals of Industrial Design.

The Industrial Designer society of America defines Industrial Design as the professional service of creating and developing concepts and specifications that optimize the function, value and appearance of products.

There are 5 critical goals that industrial designers are help a team to achieve when developing a new prod.

① Utility: The product's human interfaces should be safe, easy to use and intuitive

② Appearance: ~~Form~~ form, line, proportion and colour are used to ~~at~~ integrate the product into a pleasing whole.

③ Ease of maintenance

④ Low costs

⑤ Communication.

→ Ergonomics Need

• Ease of use

— Ease of use may be extremely imp. both for frequently used prod. and for infrequently used prod. as well.

— Ease of use is more challenging if the product has multiple features and modes of operation that may confuse the user.

• Ease of maintenance

— If the prod. needs to be serviced or repaired freq. then ease of maintenance is crucial.

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- User Interaction

- The more the interactions users have with the product, the more the product will depend on the industrial designer.

- Safety Issues

All products have safety consideration. For some products these can present significant challenges to the design team.

→ Aesthetic Need

- Visual pdt. differentiation

Product with stable markets and technology are highly dependent upon industrial designers to create aesthetic product and hence visual differentiation.

- Pride of ownership, image & fashion

A customer's perception of a product is in part based upon its aesthetic appeal. An attractive product may be associated with high fashion & image.

⑦ ⑥ Yes, Ergonomics plays a crucial role in a success of a product. Its because it deals with the ease of use, ease of maintenance, user interaction and safety issues it plays a crucial role in a success of a product.

→ Ease of use

• Ease of use may be extremely important both for frequently used pdr as well as for infrequently used products.

eg: fridge (frequently), fire extinguisher (infrequently).

• Ease of use is more challenging if the product has multiple features and modes of operation that may frustrate or confuse the customer.

Shruti

③

→ Ease of maintenance

- If the products needs to be repaired or service frequently ease of maintenance is crucial.

→ ~~User Interaction~~ Safety Issues

All products have safety consideration. For some products these can present significant challenges to the design team.

~~Product Interaction~~→ User Interaction.

The more the interactions user have with the product the more the product will depend the designers.

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②

Value Engineering.

⊛ It is an application of creative techniques for increasing the value and function for new products at the design stage itself, to minimize the cost of the product.

⊛ It requires specific technical knowledge.

⊛ The changes are executed at the initial stage only.

⊛ It indicates application on the part at its design stage.

Value Analysis.

⊛ It is an application of creative techniques for increasing the value & function to an already existing product/service to minimize the cost of that product.

⊛ It is worked out mostly with the help of knowledge & experience.

⊛ It may change the present stage of the product or operation.

⊛ It indicates app. on the product that is into manufacturing.

Shirley

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- ④ It is done before the fact at pre-manufacturing stage so as preventive process.
- ④ This is like a post-mortem analysis done after the fact, so as a remedial process.
- ④ It is always done by a specific product design team.
- ④ ^{Here} all factors come together including workers, engineers to make a team with total experience and knowledge.

② (a) A customer need is a need that motivates the user to buy a product a customer may be known or unknown.

Different types of customer needs are:

- ⊗ Functional Needs
- ⊗ Emotional Needs
- ⊗ Social Needs

→ Functional Needs are the needs which are initial for a product. It defines how a product will help a user to achieve a particular task of a function.
eg: A pen to write / sign a will paper.

→ Emotional Needs are the needs which relates how a user ~~goes~~ feels when using the product
eg: for a 12 years old child achieving a playstation may be a dream which is an emotional need.

→ Social Need are the needs which relates to how a user is treated by the society when using the product.
egs An ambulance or a fire extinguisher is a social need.

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② ⑥ Types of Modular Architecture.

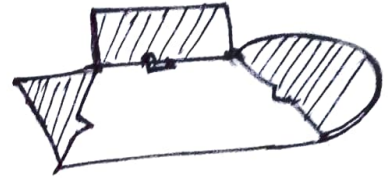
• Modular Architecture

In modular architecture the chunks implement one or few functional elements in their entirety. The interactions b/w chunks are well defined and are generally fundamental to the primary functions of the product.

→ Slot-Modular Architecture

Each of the interfaces b/w chunks in a slot modular architecture is of a different type from the others.

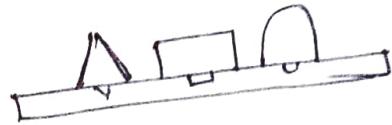
eg: car stereo & speaker.



→ Bus modular architecture

In a bus modular architecture, there is a common bus to which the other chunk's connect through the same types of interfaces.

eg: pendrive & cables.



→ Sectional-modular architecture.

In this architecture, all interfaces are of the same type but there is no single element to which all the other chunks attach.



• Integrated Architecture

functional elements of products are implemented using more than one chunk.

① ① Product Life Cycle

Product Life cycle is based on 4 states.

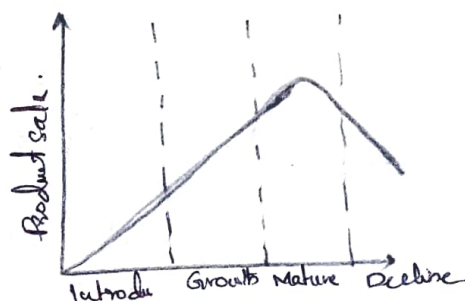
② Introduction

Here the product is introduced in the market and the objective of the stage is to create awareness & trial of the product launched. In this stage, costs are high and sales & profit are low.

③ Growth

Here the product gets into more customers & the objective is to maximise market share.

In this stage, sales are rapidly and the profit rise to peak level.



④ Maturity

Here the sales continue to rise but more slowly and then objective is to maximize profit defending market share. In this stage, profit get stable and the competition is at its peak level.

⑤ Decline

Here the sales decline permanently and the objective is to reduce expenditure and sell the brand. In this stage sales and profit decline and the product is taken off from the market.

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① ⑥ steps in formulating Target specifications of a product.

- ① identify a list of metrics and measurement units that sufficiently address the needs.
- ② collect the competitive benchmarking information.
- ③ set ideal and marginally acceptable target values for each metric.
- ④ Reflect on the results and the process.

eg: if we take an example of a mobile phone.

step 1 - the metric will be easy to use, user friendly, long lasting battery etc.

step 2 - if we note the benchmarking of two mobiles or more based on the metrics mentioned above by using different methods like using all applications and draining the battery and putting for charging simultaneously and checking which phone has fast charging.

step 3 - we set an ideal benchmark, if the mobile phone satisfies all the benchmark then we can say it's an ideal phone.

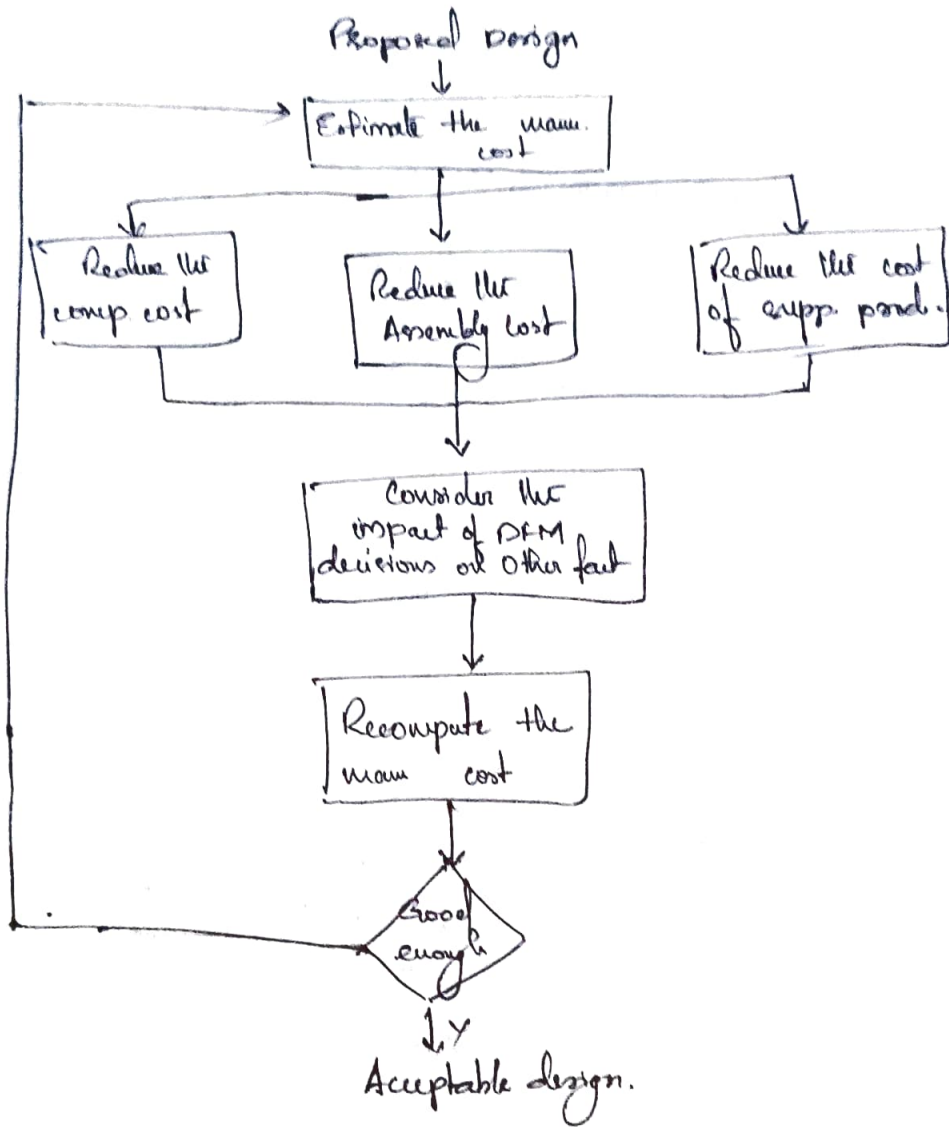
step 4 - Else repeat the process until we obtain an ideal phone.

② ①. Design for Maintenance (DFM).

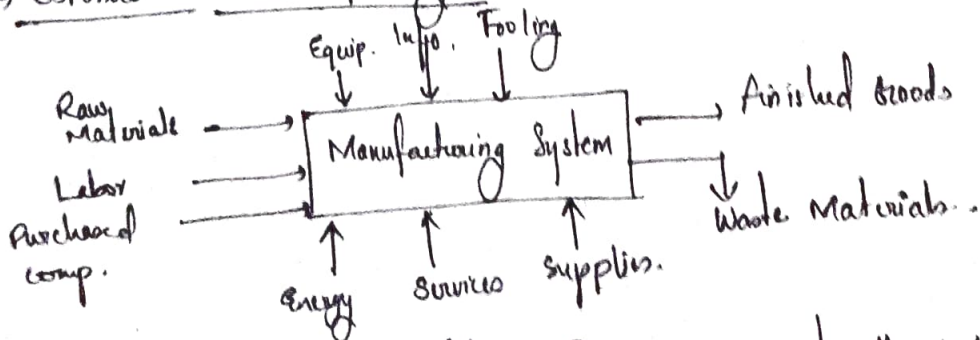
DFM is a design based on minimizing the cost of production and time to market for a product, while maintaining an appropriate level of quality.

The strategy of DFM involves minimizing the no. of parts in a product and selecting the appropriate manufacturing process.

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DFM Method.

→ Estimate the manufacturing cost.



⊕ Sum of all the expenditures for the yps of the systems and for disposal of the waste produced by the system.

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→ Maximize ease of Assembly

- Part is inserted from the top of the assembly.
- Part is self-aligning.
- Part does not need to be oriented.
- Part requires no tools.
- Part is secured immediately upon assembly.

$$\text{④ ⑥ DFA index} = \frac{(\text{minimum no. of parts}) \times (3 \text{ sec})}{\text{Estimated total assembly time.}}$$

The "3 seconds" in the numerator reflects the theoretical minimum time req. to handle and insert a part that is perfectly suited for assembly.

⑨ ⑩ Concurrent Engineering
Concurrent engineering is a business strategy which replaces the traditional prod. development process with one in which tasks are done in parallel and there is an early consideration for every aspect of a product's development process. This strategy focus on the optimization & distribution of a firm's resource in the design and development process to ensure effective and efficient product development process. Potential problems in fabrication assembly, support and quality are identified and resolved early in the design process.

Advantages.

- Decrease in time to market.
- Reduce design & development times.
- Faster product development.
- Increases product life cycle
- Less work in progress.

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⑨

⑥ Intellectual property is the product or creation of the mind.
IPR (Intellectual property rights) is the body of law developed to protect the creative people who have disclosed their invention for the benefit of mankind.

Intellectual property refers to the legally protectable ideas, concepts, names, designs and processes associated with a new product.

→ Patent.

A patent is a grant from the gov. that confers on the guarantee for a limited period of time the exclusive privilege of making, selling and using invention for which a patent has been granted. eg: lightbulb.

→ ~~Trademark~~ Trade secret.

TM is to intent to use application field of product & sm for services.

A trade secret is a info used in a trade or business that offers its owner a uniq. advantage. eg: Coca Cola.

→ Copyright.

Registration of a copyright is possible but not necessary. eg: websites.

→ Trademark.

Exclusive right given by gov. to the trademark owner to use a specific name or symbol in association with a class.
eg: Nestle.

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⑤ ^{Metallic} Regulating knob of a ceiling fan.

① Flow.

This product is used to adjust the speed of fan for cooling purpose.

• The present spec of this part and its material used are costlier than average.

② Product Information

③ Functional Analysis

④ Develop Alternate design or methods

⑤ Evaluation phase

⑥ Cost Analysis

⑦ Result

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