

Industrial Design

Design Brief - User Case study - Concept Drawings - Prototype - Final Product

Have you ever wondered where ideas for products come from? Perhaps you're a design student or just starting out as a product design professional and are wondering a bit more about the real world.

This document outlines and explores the various early stages of the industrial design process that a product goes through, and more specifically a product being created within a relatively large company in the Consumer Product and Industrial Design world.

What is Industrial Design:



Industrial Design (ID) is the professional service of creating products and systems that optimize function, value and appearance for the mutual benefit of user and manufacturer.

Industrial designers develop products and systems through collection analysis and synthesis of data guided by the special requirements of their client and manufacturer. They prepare clear and concise recommendations through drawings, models and descriptions. Industrial designers improve as well as create, and they often work within multi-disciplinary groups that include management, marketing, engineering and manufacturing specialists.

How They Do It:

The Design Process

The design process is the transformation of an idea, needs, or wants by consumers or the marketplace at large, into a product that satisfies these needs. This is usually accomplished by adventurous people that are willing to take it on. Sometimes an engineer will be involved on some levels but not always.

Design is basically a problem solving exercise. The design of a new product consists of the following stages:

- Design Brief
- Product Design Specifications
- Concept Design
- Testing
- Detail Design
- Manufacturing and Further Testing
- Refinement and Sales

The development of a new product may also require the development of a prototype to prove that new technologies work before committing resources to full-scale manufacture. If you do desire to develop a prototype you should have the product tested by as many people as you can possibly work with.

The traditional view of the design to manufacture process is that it is a sequential process, the outcome of one stage is passed on to the next stage. A better approach is for the designer to consider the stages following design to try and eliminate any potential problems. This means that the designer requires help from the other experts for example a manufacturing expert to help ensure that any designs the designer comes up with can be made.

So what factors might a designer have to consider in order to eliminate iteration?

- Manufacture - Can the product be made with our facilities?
- Sales - Are we producing a product that the customer wants?
- Purchasing - Are the parts specified in stock, or do we have to order them?
- Cost - Is the design going to cost too much to make?
- Transport - Is the product the right size for the method of transporting?
- Disposal - How will the product be disposed at the end of its life?

Design Brief

The design brief is typically a statement of intent. I.e. "We will design and make a Formula One racing car". Although it states the problem, it isn't enough information with which to start designing.

Product Design Specification

This is possibly the most important stage of the design process and yet one of the least understood stage. It is important that before you produce a 'solution' there is a true understanding of the actual problem. The 'PDS' is a document listing the problem in detail. It is important to work with the customer and analyse the marketplace to produce a list of requirements necessary to produce a successful product. The designer should constantly refer back to this document to ensure designs are appropriate.

To produce the PDS it is likely that you will have to research the problem and analyse competing products and all important points and discoveries should be included in your PDS.

Concept Design

Using the PDS as the basis, the designer attempts to produce an outline of a solution. A conceptual design is usually an outline of key components and their arrangement with the details of the design left for a later stage. For example, a concept design for a car might consist of a sketch showing a car with four wheels and the engine mounted at the front of the car. The exact details of the components such as the diameter of the wheels or the size of the engine are determined at the detail design stage. However, the degree of detail generated at the conceptual design stage will vary depending on the product being designed.

It is important when designing a product that you not only consider the product design specification but you also consider the activities downstream of the design stage. Downstream activities typically are manufacture, sales, transportation etc. By considering these stages early, you can eliminate problems that may occur at these stages.

This stage of the design involves drawing up a number of different viable concept designs which satisfy the requirements of the product outlined in the PDS and then evaluating them to decide on the most suitable to develop further. Hence, concept design can be seen as a two-stage process of concept generation and concept evaluation.

Concept generation

Typically, designers capture their ideas by sketching them on paper. Annotation helps identify key points so that their ideas can be communicated with other members of the company.

There are a number of techniques available to the designer to aid the development of new concepts. One of the most popular is brainstorming.

This technique involves generating ideas, typically in small groups, by saying any idea that comes into your head no matter how silly it may seem. This usually sparks ideas from other team members. By the end of a brainstorming session there will be a list of ideas, most useless, but some may have the potential to be developed into a concept. Brainstorming works better if the members of the team have different areas of expertise.

Concept evaluation

Once a suitable number of concepts have been generated, it is necessary to choose the design most suitable for to fulfil the requirements set out in the PDS. The product design specification should be used as the basis of any decision being made. Ideally a multifunction design team should perform this task so that each concept can be evaluated from a number of angles or perspectives. The chosen concept will be developed in detail.

One useful technique for evaluating concepts to decide on which one is the best is to use a technique called 'matrix evaluation'

With matrix evaluation a table is produced listing important the features required from a product - usually this list is drawn up from the important features described in the product design specification. The products are listed across the table. The first concept is the benchmark concept. The quality of the other concepts are compared against the benchmark concept for the required features, to help identify if the concept is better, worse than, or is the same as the benchmark concept. The design with the most 'better than' is likely to be the best concept to develop further.

Most people who use the matrix technique will assign points, rather than simple, better, worse, same, so that it is easier to identify which concepts are the best. It is also likely that some features of the design will be more important than others so a weighting is used.

Detail design

In this stage of the design process, the chosen concept design is designed in detailed with all the dimensions and specifications necessary to make the design specified on a detailed drawing of the design.

It may be necessary to produce prototypes to test ideas at this stage. The designer should also work closely with manufacture to ensure that the product can be made.

Product Development

Once the form and function is confirmed, you can develop the technical details of your product. This includes validating the manufacturing feasibility of the product, the system design and the internal component integration.

You must follow the Design Process:

- The Brief
- Research
- Sketch Design (Generation of Ideas)
- Design Development (Refinement)
- Product Development
- Product Presentation

and include annotations throughout the process which look at your use of elements & principles of design and your choice of media, materials.

All the Best!

Reference from:

- <http://www.beejaymolding.com>
- <http://blog.digitaltutors.com>
- <http://www.innovate-design.com>