Design Brief

The process of **designing** and **making** something is called ‘the design process’ (yep!). The whole process can take a while — so, like many pineapples, it’s usually broken down into smaller **chunks**.

### The Design Process is Similar in Industry and School

It’s no accident that the things you’ll have to do for your Design and Technology project are **pretty similar** to what happens in **industry**.

- The best products are those that address a **real need**.
- That’s why companies spend so much **time** and **money** on **customer research**. The more people there are who would actually **use** a product, the more chance it stands of being a **roaring success**.
- The **best ideas** for Design and Technology **projects** are also those that meet a genuine need.

The rest of this section describes a **typical design process**. It shows the sort of thing that happens in **industry** every day. It also shows the stages you need to go through while you’re putting a Design and Technology project together.

### First get your Idea for a New Product

First things first... whether you’re working in the research and development department of a multinational company, or you’re putting together your project, you need to explain why a new product is needed.

It could be for one of the following reasons:

1. There are **problems** with an existing product.
2. The **performance** of an existing design could be **improved**.
3. There’s a **gap** in the market that you want to fill.

### The Design Brief explains Why your Product is Needed

The design brief explains why there might be a need for a new product. It should include the following:

1. an **outline** of the problem and who it **affects**
2. the **need** arising from the problem
3. what you **intend** to do about it (e.g. design and make...)
4. how your product will be **used**
5. the **environment** it will be used in

Basically, the design brief should concentrate on the problem you’re trying to **solve**.

### Remember — your project doesn’t have to involve turnips...

Your design brief should be **simple** and **concise**, and allow you room for development. A design brief should **not** be a detailed description of what you intend to make — you can only say this after you’ve designed it and tried stuff out. Get that... **describe the problem** first. The rest comes later.
Research

Once you’ve written your design brief, you can start researching your project. This is what life is all about.

Research can help you get Ideas

It’s worth doing your research carefully — it can give you loads of ideas for the rest of the design process.

The point of doing research is to:
1) check that people will actually want your product (although you might have done this already when you chose your project).
2) find out what makes an existing product good or bad — talk to people who actually use this kind of product, and see what they like or dislike.
3) find out the materials, pre-manufactured components, techniques and ingredients that you can use, and how they will affect the manufacturing and selling costs.
4) give you a good starting point for designing.

There are Different Kinds of Research

You can do different kinds of research. This might include:

1) Questionnaires — to find out people’s likes/dislikes and so on. This will help you identify your target group and find out market trends (e.g. what things are becoming more popular).

2) Disassembling a product (i.e. taking it apart) — this will help you find out how a current product is made and how it works. It could also give you information about different materials and processes used, and how existing products meet potential users’ needs.

3) Measuring — to find out the weights and sizes of current products. This might give you an idea of the possible size, shape and weight of your product. You could also do some kind of sensory analysis (e.g. you could see how it tastes, feels, looks and smells).

Research Analysis means Drawing Conclusions

Once you’ve done your research, you’ll need to come to some conclusions. This means deciding how to use the information to help you with your design. This is called research analysis.

Try to do the following:
1) Pick out the useful information.
2) Explain what impact the research will have on your designs.
3) Suggest ways forward from the research gathered.

By the time you’ve done all this, you should have some ideas about how to tackle your project.

I disassembled my dog — he doesn’t work any more...

Research is important. Trust me. More important at this stage than cutting wood or moulding plastic. And one more thing while I’m ranting... you could also spend some time doing ‘book research’, e.g. finding out about any British or European standards your product will have to meet.

Design Specification

Once you’ve picked out the main points of your research, you’re ready to put together a design specification. So put that chisel away... you’re not ready to do anything practical yet.

The Design Specification is a List of Conditions to Meet

The design specification describes the restrictions and possibilities of the product. It’s a good point to start from when you get round to doing the more creative stuff.

1) The design specification gives certain conditions that the product will have to meet. Try to put your specification together in bullet form as specific points, rather than a paragraph of explanations.

E.g. if your research tells you that people would never buy a backscratcher weighing 300 grams or more, then your design specification might include the statement, “Must weigh less than 300 grams.”

2) Once you’ve come up with a design, you need to compare it to the specification and confirm that each point is satisfied.

E.g. if your design specification contains these two points, then all of your designs should be at least 400 mm long and have a variety of colours.

3) Some points might be harder to compare simply by looking at the product.

E.g. “The product should feel comfortable.” For this, you’ll need to get someone to test the product once it’s been made/modelled.

4) Include points to describe some or all of the following:

- a description of how it should look
- details about what it has to do/be
- materials, ingredients and joining methods
- details of size/weight
- safety points to consider
- financial constraints

You might need to make More than One Specification

You’ll probably need to produce several specifications as your project develops:

- Initial Design Specification — this is your first design specification. It should be done after your research analysis.

1) As you develop your design, you’ll probably want to make some changes to your design specification. This is fine, as long as your design brief is being met and you have taken your research analysis into account.

2) Maybe as a result of some of your modelling (see page 6) you’ll find that certain materials aren’t suitable. You can add this information to an updated specification.

3) You can keep doing this until you end up with a final product specification.

I’d never buy a backscratcher that didn’t glow in the dark...

If I told you that design specifications were going to get your pulse racing, you’d probably suspect I was lying. And of course, I would be lying. To be honest, they’re a bit dull. But making a design specification is a vital step in designing and manufacturing a new product. So learn about it.
Generating Proposals

Now hold on to your hats, my wild young things — this is where it all starts to get a bit more interesting. This is the creative bit. This is where you start generating ideas.

There are a few Tricks that can help you Get Started

The following are suggestions to help you get started with designing:

1) Create a mood board — this is a load of different images, words, materials, colours and so on that might trigger ideas for your design.

2) Brainstorm — think up key words, questions and initial thoughts relating to your product. (Start off by just writing whatever ideas come into your head — analyse them later.)

3) Work from an existing product — but change some of its features or production methods so that it fits in with your specification.

4) Break the task up into smaller parts — e.g. design the ‘look’ of the product (aesthetics), then look at the technology involved and so on.

You need to Come up with a Range of Designs

1) You need to annotate (i.e. add notes to) your designs to fully explain your ideas. These notes could be about:

- materials
- shape
- production method
- size
- cost
- functions
- user
- advantages and disadvantages

2) You need to produce a wide range of appropriate solutions that you think could actually be made.

3) Try to use a range of techniques for presenting your design. A good thing to do is to use different drawing techniques — for example:

- perspective
- orthographic projection
- freehand sketching
- digital camera photos
- cross-sections
- isometric projection

4) Once you’ve got a few possible designs, you need to check that each one matches your specification — any that don’t will not be suitable.

5) Finally, you need to choose one of your suitable designs to develop further.

Write whatever comes to mind — no hope for me then...

Think what someone will need to know to fully appreciate your design, and include this information on your proposal. And remember — you need to do quite a few of these so that you can choose the best one to develop and improve. This is the bit where you need to get your creative head on.

Development

Once you’ve decided on a design, you can begin to develop it further. This is when your design should start to really take shape.

You can Develop your Design in Different Ways

Depending on the type of product that’s being produced, further development might involve:

1) producing further sketches — but in more detail e.g. recording the sizes of fittings and components, and dimensions for component positions. Also sketching how parts should be constructed and fitted together.

2) modelling and testing your idea. Or experimenting with different aspects of the design. E.g. you could try various materials, sizes and production methods.

3) using people’s opinions about developments to help you arrive at a satisfactory solution.

Modelling means Trying Things Out

It can be useful to prototype or model your idea, especially if it’s difficult to draw.

1) Try out different aspects of your design. If your design is quite complex it may help to break it down into smaller, more manageable parts and test them individually.

2) Use a camera (digital or otherwise) to record your models.

3) Evaluate the models (see next page), identifying reasons for selecting or rejecting different designs.

This is a vital part of the design process. Ideally you should solve all the potential problems with your design at this stage.

Use the Results to Make Modifications

1) Results from your modelling and from your evaluation (see next page) will help you make important modifications (changes) to improve the product, and help it meet the design specification.

2) Suggested improvements could be:

- ways to make the product itself better,
- suggestions to make it more suitable for mass production (see page 48).

3) But make sure you keep a record of whatever it is you find out (see next page).

4) Once you’ve made a modification to your design, you’ll need to try it out to see if it actually improves things.

5) You might find that you end up modifying something, then trying it out, then making another modification and trying that out, then making another modification and trying that out, and so on. That’s just the way it goes sometimes.

Modification — wear a parka and ride a scooter...

Modelling and evaluation (see next page) go hand in hand. It’s pointless building a model and trying it out if you’re not going to bother learning anything from it. So keep your thinking trousers on at all times and make the most of your modelling time.
**Evaluation**

Evaluation is an important part of any product development process, and needs to be done at various stages along the way.

**Keep Records of your Research and Testing**

1. As you develop your product, keep records of any testing or market research you do. Write it all down, keep it, and refer back to it.
2. You might have tested materials for suitability, or tested components to see how well they work — but whatever you did, you need to write down all the results.
3. Compare the good and bad points of existing products with your model or prototype. Ask yourself if your product does the job better. Record your results.
4. Find out people's opinions and preferences about your models and prototypes (see previous page). This will help you to refine your ideas so you can arrive at the best solution.
5. Questionnaires help here — relevant market research questions might include:
   - Does the product work well?
   - Does the product work as well as similar products on the market?
   - Does the product look good? Is it well styled and modern-looking?
   - Are you unsure about any of the features? If so, which ones and why?
   - If this product were on the market, would you consider buying it?
   - If you were buying it, which price range do you think it would fall into?
   - Do you prefer another similar product to this one?

Now you should Know Exactly What You're Making

By the time you've finished developing your ideas and have arrived at a final design, you should have found out / worked out:
1. The best materials, tools and other equipment to use (and their availability).
   This might include identifying any pre-manufactured components you're going to use.
2. The approximate manufacturing time needed to make each item.
3. How much it should cost to manufacture each item.
4. The most appropriate assembly process — this is going to be important information when it comes to planning production, and can be in the form of a flow chart (see page 8).

If you don't know what you're doing now, you never will...

At this stage of the process it should be crystal clear in your own mind how your final product should look, and how you're going to make it. But you're not finished yet. No, no, no, no, no...
There's still the little business of actually making your pride and joy. Oh what fun... what fun...

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**Manufacturer's Specification**

Now that you know exactly what you're going to make, you need to communicate all that info to the person who's actually going to make it.

**You need to produce a Manufacturer's Specification**

A manufacturer's specification can be written in the form of statements, or working drawings and sequence diagrams. It has to explain exactly how the product will be made, and should include:
1. Clear construction details explaining exactly how each bit's going to be made,
2. Sizes — precise measurements of each part,
3. Tolerances — the maximum and minimum sizes each part should be,
4. Finishing details — any special sequences for finishing,
5. Quality control instructions — where, when and how the manufacturing process should be checked. (See page 8 for time planning and page 41 for quality control.)
6. Costs — how much each part costs, and details of any other costs involved.

**Plan how long the Production Process should take**

When you get to this stage of product development, you also need to plan:
1. How your methods might have to change to produce the product in volume
2. Each stage of the process in a great deal of detail
3. How long each stage will take
4. What needs to be prepared before you can start each stage
5. How you will ensure consistency and quality

See the next page as well for some different ways to help with this planning.

Clear construction details — "Insert tab A into slot B...

You know what they say... the devil's in the detail. Yeah, well, I don't know exactly what that means, but it's probably got something to do with being really precise. And that's what you've got to do with your manufacturer's specification, or your masterpiece could end up as a dog's dinner.

*...which doesn't fit, so try it in every other slot before widening slot B until it actually fits. Repeat for tabs C, D and E.*
Planning Production

Making one or two examples of your product is (relatively) easy. But mass-producing it is a whole different ball game. And it takes a hell-load of careful planning.

Use Charts to help you

You need to work out how long each stage will take, and how these times will fit into the total time you’ve allowed for production. There are different ways of doing this:

1. Work Order
   - This can be produced as a table or flow chart. The purpose of a work order is to plan in sequence each task to be carried out. This will also include: tools and equipment, quality control stages, safety, and so on.

<table>
<thead>
<tr>
<th>Day</th>
<th>Process</th>
<th>Tools needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cut main block of wood</td>
<td>Panel saw</td>
</tr>
<tr>
<td></td>
<td>Cut 4 tumbler holes</td>
<td>Drill, fret saw</td>
</tr>
<tr>
<td>2</td>
<td>Paint main block of wood</td>
<td>Paint, paint brushes</td>
</tr>
</tbody>
</table>

   Start and end a flow chart with a sausage-shaped box.

   Processes: go in rectangular boxes.

   Decisions: go in diamond-shaped boxes. These let you show where quality should be checked.

2. Gantt Chart
   - This is a time plan showing the management of tasks. The tasks are listed down the left-hand side, and the timing plotted across the top. The coloured squares show how long each task takes, and the order they’re done in.

Test that the Product Works and Meets the Specification

1) When you think you’ve got the final product, it’s vital to test it. Most important of all, you have to make sure it works, and meets the original design specification.
2) More questionnaires or surveys may help here. Ask a wide range of people to give their opinions about the finished product.
3) If your product fails to match any part of the specification, you must explain why. You really have to stand back and have a good hard think about your work. If you aren’t satisfied with the way any part of the process went, think of how you could put it right for next time. Write it down in the form of a report.
4) This type of final evaluation is called summative evaluation — it summarises what you’ve learnt.

There’s nothing like a good chart...

So, that’s all you have to do when it comes to your project. Just do it in a few short weeks pretty much what it takes people in industry several months to complete, and you’ve got no worries.

Revision Summary for Section One

So that’s the section over with, and what a roller-coaster ride full of fun and excitement it was. Yeah, well, the fun’s not over yet, so don’t look so disappointed. There’s still some exciting revision questions for you to teekle. So try the questions, and then have a look back through the section to see if you got them all right. If you did — great. But if you got any wrong, have another careful read of the section and then try the questions again. And keep doing this until you can get all the questions right. That way, you know you’re learning stuff.

1) What is the name given to the whole process of designing and making something?
2) Give three reasons why a new product might be needed.
3) Describe the kind of information you should put in your design brief.
4) Give three ways in which research can help you when you’re designing a new product.
5) Explain how a questionnaire can be useful.
6) Give two other methods you could use to carry out research.
7) What is the name given to the process of drawing conclusions from your research?
8) Explain what is meant by a design specification.
9) Why might some points in a design specification be hard to assess just by looking at the product?
10) When would you compile an initial design specification?
11) Give three ways of getting started on your ideas.
12) What does the word ‘annotate’ mean?
13) What information should you include in your designs?
14) Why should you aim to produce a number of design ideas?
15) Give three techniques for presenting your designs.
16) Name two ways of developing your designs further.
17) Explain why it’s useful to model your designs.
18) Describe two kinds of improvement you could make to your design.
19) When should you make an evaluation of your design? a) at the end of the project b) throughout the project c) evaluation is for wimps and sissies.
20) Describe two ways of evaluating your work.
21) What is meant by the phrase ‘formative evaluation’?
22) Explain why a manufacturer’s specification needs to be very precise.
23) Give four kinds of information that need to be on a manufacturer’s specification.
24) When using a Gantt chart, what information goes down the left-hand side?
25) Describe two methods of planning how long the manufacturing process should take.
26) Describe the process of ‘summative evaluation’.