

Common elements of the PDS

This sample of a PDS for a child's bicycle shows the types of information contained and how it is grouped.

Product: Fictional "X-Cross" Kids Bicycle		
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1. Performance

- 1.1 Must be easy to operate – it is expected that the user age group is 5 to 13 years.
- 1.2 The product should withstand rough handling.
- 1.3 Operating conditions [see Environment].

The performance demanded of any product should always be fully and precisely defined.

2. Environment

- 2.1 Resistant to adverse weather conditions.
- 2.2 The product should perform in the temperature range -20°C (-4°F) to 70°C (158°F).
- 2.3 The product should be resistant to corrosion from salt water.
- 2.4 The product should withstand a shock load of 2268 kg (5000 lb).
- 2.5 The product should be able to withstand vandalism.
- 2.6 Dust and dirt should be easily cleaned from the product.

All aspects of the environmental conditions that the product is likely to come into contact with, and have a bearing on, need to be considered and investigated at the outset of the project. Environmental hazards may occur during a number of stages in the design and development.

3. Life in Service

- 3.1 A minimum of 10 years is required for this product and 15 years is desirable.

The service life of the product and how this is to be measured needs to be stated.

4. Maintenance

- 4.1 Screws, bolts and washers used must comply with British Standards.
- 4.2 Parts that require lubrication must be accessible.
- 4.3 The replacement of spare parts must be easily done.

You should be aware of the maintenance issues surrounding the product at all stages of its life, including the need for spare parts or special tools.

5. Target Product Cost

- 5.1 The product is aimed at the mid price range. Retail cost is £95.00 and target cost for manufacture is between £30.00 and £35.00.

Establish targets for production, supplier, contractor and retail costs as early as possible. Checking competitor or like products will help.

6. Competition

- 6.1 Raleigh BMX.
- 6.2 Hood BMX.
- 6.3 Apollo Urchin.

You will need to conduct a comprehensive analysis of competing and like products; this will typically involve literature searches, patent and product searches.

7. Packing

- 7.1 Size must be kept to a minimum.
- 7.2 Cost must be kept to a minimum.
- 7.3 Weight must be kept to a minimum.
- 7.4 Must be waterproof.
- 7.5 Must be easily unpacked by the customer.
- 7.6 Company logo must be clearly shown on package.

It is likely that the product being designed will need some form of packaging even if this is merely to protect the product while it is being transported from one place to another. The cost of packaging can have a significant impact on the final cost to the customer.

8. Shipping/Transport

- 8.1 Packages will be stored 10 to one box.
- 8.2 ISO containers will be used to carry the boxes.
- 8.3 Transport will be by sea then road or rail.

Do you envisage the products' delivery by land, sea or air? Consider the type of truck, pallet container, or aircraft.

9. Quantity

- 9.1 10,000 units to be produced annually initially.
- 9.2 Long production run expected.

Consider how many products you wish to manufacture, which will affect costs and schedule.

10. Manufacturing Facility

- 10.1 There are no constraints on the manufacturing facility.

Where is the product to be made and what facilities and expertise will be available?

11. Size

- 11.1 Length is not to be greater than 1800 mm (71 in).
- 11.2 Breadth not to be greater than 75 mm (3 in).
- 11.3 Height not to be greater than 500 mm (19½ in).

Are there any constraints on the size of the product? Ensure that the size and shape of the product make it easy for the end-user to handle and operate.

12. Weight

12.1 The weight of the product should be no greater than 10 kg (22 lb).

Consider weight: should you break down the manufacture into smaller modules if a problem?

13. Aesthetics

13.1 The "Fictional" brand values should be highly visible.
13.2 The company logo should be clearly seen in bold lettering at least 10 mm ($\frac{1}{3}$ in) high.
13.3 A robust image must be projected to the customer.

As a product designer, the colour, shape, form, texture and finish are major ingredients directly under your control that can lead to a product's ultimate success or failure.

14. Materials

14.1 The use of existing materials for manufacture is imperative.
14.2 The materials selected must withstand the environmental conditions.
14.3 The materials should not oxidize in any way.
14.4 All the materials should be non-toxic.

These must be readily available, easily processed, and comprise the required properties. If special materials are required, specify to the appropriate standard. Harmful materials, such as lead-based paint, must not be used in consumer products.

15. Product Life Span

15.1 This should be as long as possible with possible passing from one sibling to another.

How long will the product that you are designing stay on the market? The longevity of the product will affect important decisions including funding.

16. Standards/Specifications

16.1 BS EN 14872:2006 Accessories for bicycles.
16.2 BS EN 14764:2005, BS EN 14766:2005, BS EN 14781:20 Specification for safety requirements for bicycles.
16.3 BS EN 14766:2005 Mountain-bicycles. Safety requirements and test methods.
16.4 BS EN 14765:2005+A1:2008 Safety requirements for bicycles for young children.

Most products need to adhere to national and/or international standards. Bear in mind that standards are useful and essential in many areas but they should not be allowed to hinder real innovation.

17. Ergonomics

17.1 Controls must be positioned at a height suitable to the user.
17.2 Hand-operated controls must not need a force of more than 1 Nm to operate.
17.3 No sharp edges to be exposed [see Safety].
17.4 It is preferable if controls are different colours for easy use.

All products have a user-product interface. Ensure it is easy to operate, requiring little physical effort for both left-handed and right-handed people, for example. Ergonomic elements can also cover cognitive issues as well as physical ones.

18. Customer

18.1 It is expected that the customer will be a boy from age range 5 to 13 years.

Understand your customers' needs, wants and preferences as fully as you can.

19. Quality and Reliability

19.1 This product will be designed to comply fully with BS 5750.
19.2 The company will offer a 3-year full warranty with this bicycle.

Quality and reliability are difficult elements to assign measurable values to.

20. Shelf Life Storage

20.1 The product will be stored 10 units to one box within the company's warehouse.
20.2 The product will be packaged in their own individual box within retail units.
20.3 There are no limitations on shelf life as this is a non-perishable product.

Shelf-life storage is often overlooked in design specifications. Consider if products can stay unused for some time.

21. Processes

21.1 There are no limitations to the manufacturing processes [see Manufacturing].

Are special manufacturing processes required, such as plating or finishing requirements?

22. Timescale

22.1 Design Process complete – 1 June 2010
22.2 Commence Manufacturing – 1 December 2010
22.3 Delivery of first Bicycle – 1 March 2011

When you schedule your project, be sure to allow enough time at the beginning for the design phase.

23. Testing

23.1 Batch inspection to be used for the final product.
23.2 Batch test of 1 in every 1000 will be adopted.

After your product has been made, it will need a factory test to see whether it complies on every point with its PDS. You may also need to plan for acceptance and witness tests too.

24. Safety

24.1 The product must comply with all relevant parts of BS 3456 and the Home Safety Act (UK).

Consider all aspects of safety, such as statutory legislation and product labelling or instructions.

25. Company Constraints

- 25.1 There are no manufacturing constraints, so there should be no company constraints.
- 25.2 Depending on product sales, more production staff might have to be employed.

Ensure that the necessary expertise will be available within the company for each stage of the product's development.

26. Market Constraints

- 26.1 The product will be marketed on a worldwide basis.

Be mindful that local conditions, especially overseas, can constrain your design.

27. Patents

- 27.1 The following European Patent Office (EPO) patents should not be infringed:
 - B62K1/00 to B62K17/00
 - B62K19/06
 - B62M25/02
 - B62K19/36

You must search all relevant information, including patents, relevant literature and competitors' product information. You need to check that you are not infringing on other individuals' patents or products.

28. Political/Social Implications

- 28.1 The name of the product should be thoroughly checked when considering exportation to non-English speaking countries.
- 28.2 Logos and colours used in the product should be checked against individual countries' tastes.
- 28.3 Product should be manufactured to company's social and ethical guidelines.

Be sensitive to any political and social effects that your product might have in the country for which it is to be designed and manufactured. This includes local by-laws and regional trends.

29. Legal

- 29.1 Product adheres to company's product liability procedures and product liability legislation.

An important consideration is that of product liability legislation, particularly in terms of defects.

30. Installation

- 30.1 Product is ready assembled and does not require user assembly for use.

Many products form part of assemblies into larger products and systems or need to be installed.

31. Documentation

- 31.1 Product accompanied by appropriate comprehensive documentation for use and maintenance.

Product documentation is an increasingly important aspect of product design.

32. Disposal

- 32.1 Product and constituent components are able to be disassembled for disposal and recycling where at all possible.
- 32.2 Product components are clearly labelled for appropriate recycling/disposal.

The design of products has a significant effect on the environment. Your PDS, therefore, must include information on what is done with the product after its life. This will include things like how you best design for disassembly, dispose of any associated waste, and recycle the product.

Conclusion

This chapter has described a number of methods and techniques that will help you undertake research, construct a comprehensive design brief, identify customers' needs and establish a PDS. The next stage of the design process – concept design – is covered in the following chapter, where details of the tasks commonly associated with drawing up a number of different viable concept designs that satisfy the requirements of the PDS are explained.