

## Product Design Specification

PDS is the basis for all design decisions, it may serve as a contract that must be fulfilled; PDS is dynamic rather than static; PDS must be established with consideration of all aspects of the product and its interactions; systematic and thorough in formulating PDS;

Poor PDSs lead to poor designs; good PDSs are necessary, but not sufficient for a good design.

At the first stages of design it is essential to cover ALL the aspects of the product even if at a superficial level. The specificity of details can be honed as more is learned about the product and the interactions of different aspects of the PDS.

Figure 3.1, page 46 Pugh shows the totality of aspects to be considered in formulating the PDS.

Elements of a PDS should include (but may not be limited to)

- Performance – Gain, input impedance, S/N ratio – Measurable, Often conflict between different performance specifications.
- Environment – Temperature, pressure, noise level during mfg, storage, use.
- Service Life – What is the service life of the product? Continuous? Intermittent?
- Maintenance and repair – Frequency and type, ease of access, special tools/materials.
- Target Product Cost – Design, production, distribution, marketing and sales, end-of-life disposal?
- Competition – What similar products will be the competition?
- Shipping – Time sensitive, conventional means.
- Packaging – Fragile, special packing/handling, protection during shipping.
- Quantity – One of a kind or 20 million?
- Manufacturing Facility – New plant, special equipment, training for staff, out-source?
- Size – Small enough, convenient for handling during shipping and use?
- Weight – Easily handled by proposed users?
- Aesthetics, appearance and finish – Appealing,
- Materials – Readily available, durable, cost
- Production Life Span – Two years or two decades
- Standards and specifications – Testing standards, protocol standards,
- Ergonomics – Man-machine interface
- Customer – Familiar with this type of product, will need training for its use, turnkey operations.
- Quality/Reliability – Life tests, MTBF, MTTR,
- Shelf-Life – Storage time without degradation, storage conditions
- Processes – Special techniques, materials, or machines?
- Time-scales – Three months or three years to get product to market
- Testing – Protocol to ensure that product meets PDS, required test equipment, facilities, time.
- Safety – UL testing, warning labels, built-in safety switches/over-rides.

Company constraints – Competing products, limits on funds, facilities, personnel  
Market constraints – Different locales require different features.  
Patents, literature, product data – Do you have to license someone else's patent  
Political and social implications – Will it cause layoffs or be opposed by a religious group?  
Legal – Liabilities,  
Installation – Delivered and installed, technical assistance.  
Documentation/Training – Ease of use of the product  
Disposal – Green engineering, toxic, OSHA standards.

**PDS Document** – Several guidelines from Chapter 3 Pugh.

1. The PDS is a control document; it represents what you are trying to achieve; it is not the achievement itself.
2. The PDS is for you and by your colleagues; it should be written succinctly and clearly.
3. Never write a PDS in essay form; use short, sharp definitive statement; leave space for amendments.
4. From the beginning quantify parameters, even when they are estimates.
5. Always date the PDS and put an issue number on it.
6. Clearly document amendments.
7. To gain flexibility, each time start preparing a PDS starting from a different specification.