4 The Design/Manufacturing Interface

4.1 Introduction

A large proportion of a company's income can be absorbed by research, development and design work, particularly in certain industries such as aerospace and electronics. To avoid waste and to ensure that competitive designs are produced at the appropriate time there must be a sound research, development and design programme. This programme should be integrated with the financial and commercial policies of the company and fully load its production facilities.

Before design work starts the designer must be given clear objectives. These objectives are formulated as the result of product development policies determined by senior management and influenced by infeeds from the engineering, sales and production departments. In addition there could also be infeeds from consumers and environmentalists. The formal interface between design and manufacture is the design specification, consisting of drawings and parts lists, which specify what is to be manufactured. In this chapter a number of topics close to this interface are examined.

4.2 Value Analysis

Value analysis is an organised way of challenging unnecessary cost in design. It is also concerned with providing increased value to the user, therefore the re-design does not always result in reduced manufacturing costs; utility may be increased, or there may be some specialised advantage gained, such as weight saving in aircraft. The ideas used in value analysis are not new, but they were first codified in a generally applicable form in the United States in the late 1940s. Because many new designs do not provide the best value, and because most designs are not fully updated to take account of changes in technology, there is usually ample scope for the application of value analysis. This, coupled with the fact that the technique is readily understood and provides a vehicle for group participation, has meant that value analysis has received wide industrial acceptance.

The term value engineering is often used synonymously with value analysis. However, value engineering is specifically used to imply the application of value
analysis in the design office, before the product reaches the manufacturing stage. Large companies frequently employ consultants to introduce value analysis; specialists in this technique are referred to as value engineers or value analysts. The basis of value analysis is, however, teamwork; the membership of the teams will vary, but a typical team could consist of representation from design, production, accounting, purchasing and work study. In some instances value analysis teams are constituted on a full-time basis, but a far more usual arrangement is a full-time value engineer co-ordinating the work of a part-time team.

Six stages can be identified in a value analysis study

1. setting objectives
2. collecting information on the cost and function of the existing design and its component parts
3. speculating on ways of improving value
4. investigating proposals
5. recommending design changes
6. implementing design changes.

**Setting Objectives**

It is desirable that broad objectives be set in consultation with senior management; in this way the team do not waste time on unacceptable proposals. For instance, if a company is manufacturing electrically operated water heaters, is it going to be interested in other water-heating methods? The team should acquaint themselves with any particular design limitations, such as size or operating environment. They may also have to be informed of a time limit by which the value analysed design should be ready.

**Collection of Information**

This preparatory work should be organised by the value engineer, who provides an analysis of the design that indicates the function, cost and source of each part. Information is also provided on the expected rate of production and on the sales life of the product. If a part is made in the factory, details of the division of costs

---

**Figure 4.1 Distribution of parts value (Pareto distribution)**