11 Reliability Assurance Program

11.1 Introduction

The kernel of the excellence of engineering products in present day competitive engineering manufacture is their reliability, which has been expostulated throughout this book. The present chapter deals with a comprehensive study encapsulating the importance of optimizing reliability through analysis and design. It provides a comprehensive reliability assurance programme which should prove efficacious to both designer and product developer. It is argued that reliability assurance will in the future be the touchstone of a product’s veracity and a reliability audit will be a requisite for a product’s sale transaction.

The design of reliable products is conducted under marginal conditions which continually intensify (see Figure 11.3). Especially the large complexity of products and short development times require a more frequent and expanded use of reliability measures taken by the product developer. Well-engineered design methods and procedures alone are thus no longer sufficient to achieve high product reliability. The increased requirements can only be met under the application of special analytical reliability methods (see Figure 11.6). Such actions should encompass the entire product life cycle in order to optimize comprehensively. The result is a comprehensive reliability assurance program [11.2].

Controlling reliability consists of process steps made up of a succession of events which can be applied in each individual phase of a product life cycle. An example of such a procedure is illustrated in Figure 11.1.
1. definition of the reliability target
2. analysis of the dimension of the necessary reliability actions
3. planning of the strategy and action to achieve the reliability target
4. accomplishment of the selected reliability actions
5. analysis of the results of the selected reliability actions
6. assessment of the achieved reliability results for further improvements

Figure 11.1. Systematical process steps for the control of reliability according to DIN EN 60300-1 [11.3]

The integration of feedback loops in the various process steps allows for a continuous improvement of the product at critical points.

A further example taken from the practical field should help to clarify in detail how the application and use of a reliability assurance program can be set up. Here, reference should be made to the procedure conditions in addition to the description of the process steps, compare with Figure 11.2.

These examples illustrate the already applied implementation of reliability methods in the development process. In the future, the necessity for reliability assurance will continue to increase and most likely be valued as a prerequisite for a successful product.