

Design management systems —

Part 1: Guide to managing product design

UDC 658.512.2:658.273: [65:658] (083.93)

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Quality, Management and Statistics Standards Policy Committee (QMS/-) to Technical Committee QMS/4, upon which the following bodies were represented:

- Association for Consumer Research (ACRE)
- Association of British Health Care Industries
- Association of Consulting Engineers.
- BEAMA Ltd.
- British Gas plc
- British Telecommunications plc
- Cambridge University
- Chartered Society of Designers
- Computing Services Association
- Defence Manufacturers' Association
- Department of Trade and Industry
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- Energy Industries Council
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- Imperial College
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- Yarsley Technical Centre Ltd.

This British Standard, having been prepared under the direction of the Quality, Management Statistics Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 15 September 1995

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The following BSI references relate to the work on this standard:
Committee reference QMS/4
Draft for comment 87/67900 DC

ISBN 0 580 17975 3

Amendments issued since publication

Amd. No.	Date	Comments
7897	October 1993	

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Foreword

This British Standard has prepared under the direction of the Quality, Management and Statistics Standards Policy Committee.

In May 1985 the National Economic Development Office (NEDO) prepared and published a report “Quality and Value for Money” on behalf of the Task Force on Quality and Standards set up by the National Economic Development Council.

One of the recommendations of this report was that “the Design Council and BSI should develop a new standard to codify the requirements for design management systems”. A British Standards Technical Committee was set up and commenced work in January 1986 chaired by a member of the Design Council. This guide to managing product design is published as the result of the work carried out by the Technical Committee.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

0 Introduction

Product design is the formative stage of the manufacturing process. It should be used to meet the reasonable and foreseeable requirements of the market while using the available resources with economy.

Any product competes in its market according to performance, appearance, price, delivery, reliability, safety and maintainability. All of these depend fundamentally upon the design of the product.

The performance and appearance of many products could be substantially improved, which in turn would have the effect of increasing market appeal and reducing production costs. A poorly designed product may damage a company's reputation and prospects for growth, particularly if the product is unreliable, unsafe or difficult to maintain and repair. The benefits derived from improving product design are therefore considerable and, if they are to be realized, product design needs to be managed effectively.

This British Standard sets out the elements of the task for the following groups of people:

- a) senior management;
- b) project managers;
- c) design managers and designers.

In a large organization the functions will probably be undertaken by different members of staff. In a small organization they may form overlapping roles, perhaps being undertaken by a single person, but are nevertheless distinct and different. All the staff concerned should be aware of the functions and it is recommended that they should understand the full content of this British Standard while paying particular attention to the section that is appropriate to them.

This British Standard provides guidance and it is not a specification. The recommendations and check lists are believed to be generally applicable, but managers are advised to use the guidance given in accordance with the circumstances of their own operation.

The prerequisites of effective management, in the context of this standard, are:

- 1) sincere and visible commitment to good product design on the part of management at all levels, including the most senior;
- 2) the motivation of all staff involved;
- 3) the provision of clear objectives;
- 4) the provision of adequate resources in terms both of personnel and equipment;
- 5) the provision of organizational systems.

1.1 Scope

This British Standard gives guidance on the management of product design at all levels, for all design organizations and all products.

Guidance is given only on the application of general management principles and techniques to the management of design. Discussion of the techniques themselves (e.g. management of people, time, etc.) and their application to areas other than design and the design process itself are excluded. Where appropriate, reference is made to other documents for guidance on general management techniques.

Management of the design of anything other than products is not included, although the guidance given in this standard may be relevant in many other areas.

Guidance on procedures required to meet statutory requirements, e.g. health and safety or product liability, is not intended to be comprehensive and reference should be made to other documents where appropriate.

This standard is complementary to BS 5750-1, to which reference should be made.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

1.2 Definitions

For the purposes of this British Standard the following definitions apply.

1.2.1 design (in the context of product design)

1.2.1.1 (verb)

to generate information from which a required product can become a reality

1.2.1.2 (noun)

the set of instructions (e.g. specifications, drawings and schedules) necessary to construct a product

1.2.2 design review

a formal, documented and systematic critical study of a design proposal by specialists as required (who may not necessarily be engaged in the design)

1.2.3 evaluation

a systematic examination of the result of an activity to establish the degree to which the original objectives have been fulfilled

NOTE 1 The term is usually linked to a specific activity, e.g. system evaluation, project evaluation and design evaluation. Results are usually measured in terms of time, cost and achievement.

NOTE 2 Evaluation generally takes place at the end of an activity, but progress can be maintained by carrying out intermediate or stage evaluation, particularly where intermediate stage achievements have been planned.

1.2.4 conceptual design

the design process in which concepts are generated with a view to fulfilling the objectives

NOTE More than one concept may be generated and the preferred solution output or recorded in several ways, e.g. drawings or sketches, electronic data (computer), mathematical or chemical formulae and verbal or written presentation.

1.2.5 embodiment design

the design process in which a structured development of the preferred concept is carried out. The preliminary embodiment of all the main functions to be performed by the product is undertaken and the physical processes are clearly established

NOTE The output from this stage could include many functional layouts such as control, power lubrication, electrical, appearance, interface, shape, style and size.

1.2.6 detail design

the process in which the precise shape, dimension and tolerances are specified, the material selection is confirmed and the method of manufacture is considered for every individual part of the product

NOTE The output from this stage consists of information that defines, and can be used in the manufacture of, the product, or part of the product.

Section 2. Managing product design at corporate level

2.1 General

It is essential that a member of the main board or committee of an organization should take responsibility for product design activities. In the context of a manufacturing company, this section is addressed to the board of directors. However, the use of the broader term “senior management” enables this standard also to address other organizations concerned with product design. This section is concerned with issues that relate to the organization as a whole. Matters that are product specific are described in subsequent sections of this standard.

2.2 Corporate objectives

Corporate objectives should be precise and should, if possible, be quantified.

To manage design effectively the following information needs to be known:

- a) what business the organization is in;
- b) the quantified targets for growth and profitability;
- c) the identity and market position sought.

This information should be communicated to, and understood by, all concerned.

2.3 Corporate planning

Meeting corporate objectives requires several different types of plan. All of which bear on product design and on how it should be managed as follows.

- a) A business plan is required to set the targets to be met. This defines the constraints within which design management is to be conducted.
- b) A product plan is required that:
 - 1) is compatible with the business plan;
 - 2) meets predicted market demand;
 - 3) specifies products that can be produced at the right price and the right time. It may be necessary to evaluate several product plans in order to choose the most effective.
- c) A resource plan is required. For the design function to meet its obligations, forecasts are needed of requirements for the following:
 - 1) the design and design management skills;
 - 2) the equipment;
 - 3) systems.

A company's most valuable resource is its staff, especially its design staff, whose output in terms of both quality and quantity largely depends on their skill, training and motivation. By ensuring that attention is paid to these factors, senior management can radically affect the performance of the design team. Particular attention should be paid to the training in general management techniques of all design managers (as most of their problems are common to those of all managers). While managers at all levels need to be involved in the motivation of their staff, the process should be initiated at the most senior level.

Much of the planning of items 1), 2) and 3) is carried out at project and design level, but senior management should ensure that it is done and is reviewed.

d) Financial plans are required. Design requires investment, and senior management should consider the cash flow implications of the product plan to ensure that funds are available when required.

e) Management plans are required. Senior management needs to decide how the design function is to be managed and by whom. This would involve deciding the style of management that is best suited to the needs of the organization (e.g. line matrix or management).

Senior management should ensure that organization-wide policies are established for the following:

- 1) design protection;
- 2) product liability;
- 3) recording design data;
- 4) change control¹⁾;
- 5) training and retraining of design managers and designers¹⁾;
- 6) use of design consultants;
- 7) designers' environment;
- 8) evaluation of the design process;
- 9) establishing performance incentives and appropriate career paths for design staff;
- 10) product evaluation, including third party product certification or approval;
- 11) assessing new product ideas;
- 12) quality assurance procedures¹⁾.

¹⁾ See BS 5750-1.

2.4 Corporate communications

Effective management requires sound communication. A well understood and effective procedure is essential if the communication that is required is to take place, and senior management should ensure that such procedures are defined.

2.5 Monitoring and controlling at corporate level

All plans should be monitored during their implementation. Every manager concerned should watch progress, so that timely corrective action can be taken if required. In particular, the manager with responsibility for the organization-wide design function should ensure that there is a procedure to monitor implementation of every corporate plan and policy relevant to product design, preferably against identifiable targets.

Casual monitoring and spot checks can be useful. However, a disciplined approach to monitoring and reporting is advised. Review points announced well in advance will enable staff to plan their own work schedules and prepare for such reviews in good time.

2.6 Evaluation

It is necessary to investigate the success of the plans and whether the objectives were appropriate. It is the responsibility of senior management to ensure that there is a procedure for such evaluation.

2.7 Check list for senior management

The following is a check list for senior management.

- a) Define, and periodically redefine, the corporate objectives.
- b) Make the objectives known and understood by all involved.
- c) Ensure that the chosen product plan is compatible with the corporate objectives.
- d) Provide resources to match the product plan.
- e) Ensure that the organizational policies and procedures are adequate.
- f) Ensure that those responsible for design have clear objectives, are personally motivated and motivate their staff.
- g) Ensure that achievement and expenditure are monitored against time.
- h) Maintain a sincere and visible commitment to high standards of product design.
- i) Evaluate achievements and communicate this evaluation to all concerned.