Design for environment (DfE)

Design and environmental objectives

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DfE defined

Design for Environment (DfE), also known as eco-design, recognizes that environmental impacts must be considered during the new product design process, along with all of the usual design criteria. It is defined as a systemic consideration of design performance with respect to environmental, health, and safety objectives over the full product life cycle.

Five steps of the DfE Process

1. Assess environmental impacts;
2. Research the market;
3. Run an ideas workshop;
4. Select design strategies; and
5. Design the product.

DfE strategies

1. Selecting environmentally low-impact materials;
2. Avoiding toxic and hazardous materials;
3. Choosing cleaner production processes;
4. Maximizing energy efficiency in manufacture and use;
5. Maximizing water efficiency in use; and
6. Designing for waste minimization.

Use of LCA as a DfE tool

The value of Life-Cycle Assessment (LCA) is in its ability to map a product's environmental impact across its whole life-cycle. Use of LCA as a DfE tool can:

- Benchmark the environmental performance of existing products;
- Develop environmental targets for the product development team to pursue;
- Provide a work-in-progress' assessment tool to review how a concept or detailed design might perform environmentally;
- Help the product development team make decisions regarding materials and components; and
- Identify previously unknown impacts associated with a product and associated consumables.

Outline of a design brief

Introduction

- Define the aim of the design project; and
- List specific objectives.

General requirements

- Define the primary function of the product;
- State the durability requirements;
- List aesthetic considerations;
- Define ergonomics requirements;
- List the safety requirements and issues; and
- Outline the required performance and quality.

Environmental objectives

- List specific strategies relating to materials, efficiency, recovery at end of life and so on; and
- Include quantitative targets where relevant.

Production requirements

- Specify manufacturing requirements and limitations; and
- Include any objectives or targets.

Regulations and standards

- List any mandatory regulations, standards or codes of practice relevant to the product.

Cost

- Specify limits on costs of production to ensure that the product is competitive. ❐

The what and the why

Environmental management systems

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What is an Environmental Management System (EMS)?
Over the last five years, "establishing an EMS" has become one of the basic steps in improving environmental performance. But what is an EMS? At its most basic, an EMS is a set of internal policies and procedures that helps your organization systematically assess and reduce the environmental impact of its activities.

The best known EMS is the ISO 14001 standard, which provides a commonly accepted guideline for the design of a comprehensive environmental management system. Companies that choose to establish an EMS in accordance with ISO 14001, usually also decide to hire external auditors who will certify that the company's EMS conforms with the ISO 14001 standard.

Establishing an EMS has become standard practice for most major companies, and those choosing to obtain ISO 14001 certification has continued to grow steadily in numbers . As of June 2001, there were approximately 30,300 organizations worldwide certified under ISO 14001, about 33 per cent of which were in Asia.

Why do organizations use an EMS?
The main purpose of an EMS is to help an organization control its environmental risks and improve its environmental performance, but it is also becoming an important factor in terms of overall corporate image and competitiveness in the marketplace.

Most companies find that establishing an EMS helps them save money by identifying opportunities to prevent pollution and improve resource efficiency.

Certification to an international standard such as ISO 14001 or EMAS can also help improve a company's image, and is becoming increasingly important as a competitive factor in the marketplace. Large companies, particularly multinationals, are increasingly requiring that their suppliers implement an EMS as a pre-condition to developing a business relationship, and some prominent companies have begun to require that major suppliers obtain ISO 14001 certification.

The limitations of EMS
However, simply establishing an EMS does not guarantee better performance. An EMS is a tool that only functions if an organization puts time and effort into its implementation. Developing policies and procedures to track environmental impacts does not help if nobody in a company's facility follows the system. Similarly, ISO 14001 certification does not prove that a company's environmental performance is good. ISO 14001 certification merely shows that the company has a set of policies and procedures in place to address environmental concerns.

Making improvements and finding cost-saving opportunities requires allocating staff and resources to EMS implementation. However, most companies have found the process to be rewarding enough to merit support.

How is a system designed?
The policies and procedures of EMS systems are typically designed around the concept of the Plan-Do-Check-Act (PDCA) cycle, meaning that you: 1) Assess current environmental impacts and set objectives and targets for improvement (plan); 2) Implement your plan for improvement as well as any necessary supporting measures such as defining internal responsibilities, training staff, etc. (do); 3) Monitor your progress and take corrective actions if your EMS isn't working properly (check); 4) Review your progress, audit your EMS to ensure that it is working properly, redefine your objectives and targets, and start the next cycle of PDCA.

Where can I get more information?
Most companies require some technical support from external consultants in developing their EMS, particularly if they intend to seek ISO 14001 certification. However, as a starting point, there are numerous detailed manuals describing how to implement EMS and ISO 14001 available through the Internet and organizations such as the International Green Productivity Association (IGPA).

In addition, many national governments sponsor training seminars and courses on ISO 14001. After getting an overview of the process through courses or manuals, you will be in a position to decide how best to approach implementing an EMS in your organization. ❐

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