

Integrating sustainable design into the design process



By Luke Robbins, Sustainable Design Specialist at IDC

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Sustainable design can be challenging; knowing when to start, how to consider it and what to take into account. In product design many commercial challenges exist and there are several reasons why companies are not willing to design sustainably. Typically time and cost constraints have meant that little consideration is given to sustainable design. Commercial effectiveness has traditionally been the main focus, without reflection on social and environmental factors.

However leading companies are increasingly viewing sustainable product design as an important strategic issue. This is partly due to pressures from legislation, but also as a key factor in becoming more competitive and as a way of saving money during manufacturing. Corporate and Social Responsibility (CSR) is also an important issue for stakeholders and investors who are becoming more interested in the non-financial performance of companies and brands.

Consumer demand is causing companies to rethink their sustainability policy, with many consumers switching to more sustainable products and brands with a reputation for environmental friendliness. There are also plans for mandatory carbon labelling on products, so consumers can compare the eco values of products. Yet many of the social and environmental impacts that arise from the products people choose are already designed-in long before they reach the end consumer. 'It is estimated that as much as 75% of the environmental impacts (as well as the costs) that a product throws off throughout its lifetime is determined at the design stage.' (IDSA, Design: Green 2004, www.designgreen.org)

Until now, sustainable product innovation has mainly involved making incremental changes to existing products through technological improvement. But being sustainable means more than just being environmentally friendly. Social and economic factors must also be fully considered. A balance between the three areas must be achieved for sustainable design to be truly effective.

Sustainable design should be used in deciding how to meet the brief and the client and end users' needs. The earlier economic, social and environmental issues are

considered, the greater the opportunity for reducing environmental impact – and increased cost reductions and profit can be made. In order to apply sustainable design successfully, it must be viewed as an integral part of the design process. It is often considered as an add-on, which is then very difficult to implement or change towards the end the product development. Retro fitting sustainability will always result in compromise.

The Sustainable Design Process

Integrating sustainable design into the whole design process requires significant change. Designers and engineers need to be educated and guided in making the correct decisions. Different projects will require different sustainability strategies, but this can be simplified with sustainable design tools being incorporated into the design process, helping designers to select the strategy that will offer the most benefits.

The first stage of the process is to consider the entire life cycle of the product. This can be done by undertaking a Life Cycle Assessment (LCA), which provides a full understanding of the energy inputs during manufacturing and the carbon output during its lifetime. The knowledge provided by the LCA provides an opportunity to make decisions on how to improve products for reduced environmental impact, as well as producing goods that cost less to manufacture.

Traditionally Life Cycle Assessments have tended to be time consuming and difficult to perform. With this in mind, IDC produced a system which helps companies to undertake this key step of the process and provide the knowledge to help make sustainable design decisions.

Called the LCA Calculator, this online tool provides a quick and simple way to assess the environmental impact of a product by calculating its energy input and carbon output from cradle to grave (available at www.lcacalculator.com).



To further integrate sustainable design into the whole design process, IDC has produced an in-house design manual that includes sustainable design tools and information including eco-design checklists, rules of thumb and expert information on various sustainable design strategies. This is used as a device to give IDC's designers and engineers the knowledge and tools to consider sustainable design right from the beginning of the design process.

One of the key features of IDC's design manual is the Design Compass, which can be used to prioritise and balance all the requirements and impacts of the product - economic, social and environmental. It can be used as a comparative tool to examine two similar products, and as a prioritising tool for indicating the areas where the most significant improvements can be made within the product, the production process and for the client business as a whole.

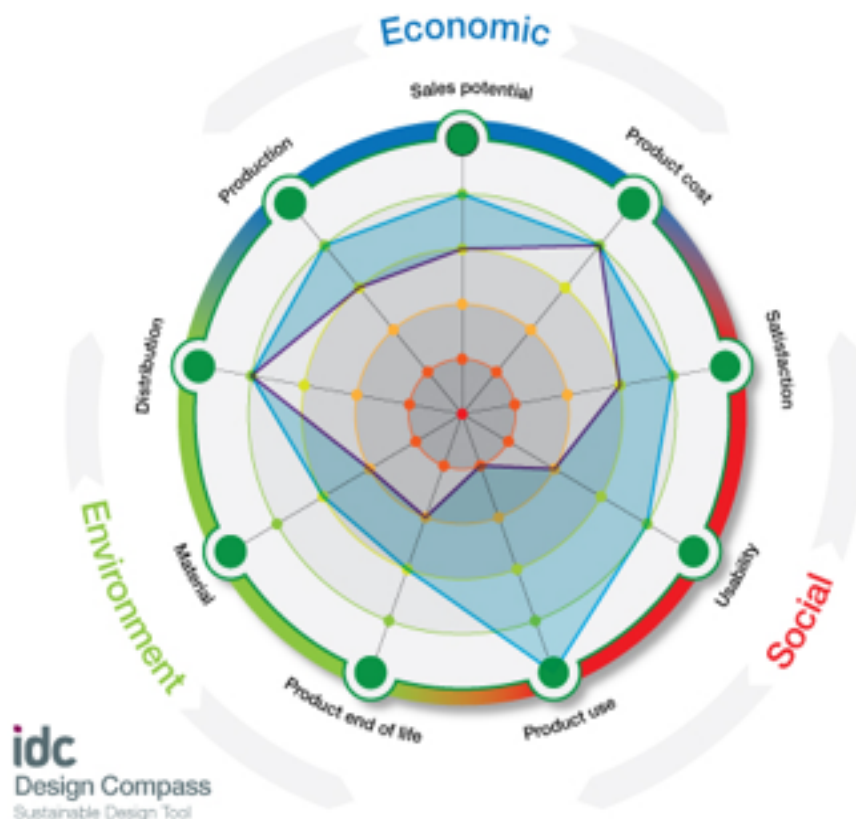
Case Study: Prioritising Economic, Social and Environmental Factors



ColorMatrix Metrix™

The diagram below displays IDC's Design Compass being applied to a product which was recently designed by IDC. Called the ColorMatrix Metrix™ system, this product is a dosing management system for liquids with properties that cause handling difficulties. The grey centre section of the Design Compass displays the product before development, while the larger blue area displays the final design. The tool is scaled so that the closer to the outside edge, the better the performance.

This example shows that the largest improvements were made in the areas of product use, usability, satisfaction, production and sales potential. The final product incorporated a large reduction in liquid wastage, better usability and increased user satisfaction through easier operation and a more intuitive interface, a streamlined production process, and as a result higher sales potential.



To summarise, designers, engineers and manufacturers bear a responsibility to create products with significantly reduced environmental and social impacts. Companies that opt for sustainable products will be able to reap the rewards long-term, through cost savings and in the market place. Sustainable design is an approach that must be applied throughout the design process and by considering environmental, social and economic factors. At IDC we have seen that when designers and engineers take the step to implement a sustainable design process, the benefits soon become apparent.

Sustainable Design Checklist

- **Integrate sustainable design into the design process as early as possible.**
- **Analyse the impact of the design decisions.**
- **At the initial stages of the project consider the trade-offs.**
- **Measure the impact of your product - Life Cycle Assessment allows the impact of decisions to be assessed and improvements tracked.**
- **Focus on the greatest area of impact - whether this is energy usage, toxic materials, or recyclability - it will vary from product to product.**
- **Design in sustainable behaviour - sustainability is about the way people use products as much as the products themselves. Consider this at the concept stage.**
- **Check out suppliers - the environmental and social impact on the product will depend on the practices of suppliers. You should understand these.**

Further LCA information is available from: www.idc.uk.com