Looking good

Industrial design makes ABB products more attractive, more user friendly and instantly recognizable

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It's time to replace your old music system with something more up-to-date in terms of functionality, and look and feel. At the multimedia store, you are confronted with such a variety of shapes, sizes, brands and colors, picking the most suitable system seems like it will be an arduous task. Your attention is drawn to an attractive looking product, and on closer inspection, you notice an instantly recognizable brand name connected with quality and service.

Industrial design is more often associated with consumer rather than industrial products. Home appliances, like the music system above, have long been a popular area for designers to work in. This trend is now changing, however, as the market for industrial products and machines becomes highly competitive, and the need for brand recognition and product positioning becomes increasingly important. As customer expectations grow, it is no longer acceptable for an industrial product to be purely functional; it must have style, quality, enhanced functionality and be easy to use. In addition, good and attractive design is critical for brand recognition in the global marketplace.

Inherent in the industrial design concept as applied within ABB is the recognition that appearance must be more than skin deep. Hence customer benefits, such as ease-of-use, sustainability, and health and safety aspects combined with enhanced functionality are all attributes intimately integrated as part of a holistic design process.

From the beginning of the industrial age in the 19th century, designers were aware of the importance of the look, feel and quality of manufactured goods. This culminated in an explosion of innovation and creativity in the design of consumer products in the first half of the 20th century. The explosion was typified by mass manufacturing and marketing in the US as well as art and design movements, such as the Bauhaus, in Europe. In fact, these factors contributed greatly to the form of industrial design we are familiar with today. By the end of the 20th century, industrial and applied design had become a fundamental part of product design.

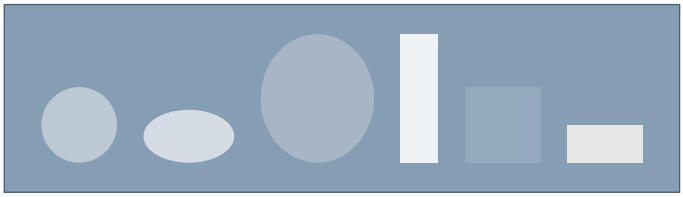
Of course, the relationship between design and engineering at the beginning was quite difficult. The sentiments expressed by C. P. Snow in his now famous 'two cultures' lecture at Cambridge University in the 1950s perhaps best reflect that relationship. Snow explored the differences between the scientific and artistic communities, and blamed the breakdown in communication between the two as a major hindrance to solving many problems.

The last 20 years, however, has seen a gradual but significant shift in this position in that the relationship between the sciences and the humanities has certainly become more synergetic: Engineers and scientists have become more aware of the real commercial value of good design, and designers have become more sophisticated in the way they present and model their ideas, often using engineering principles and tools.

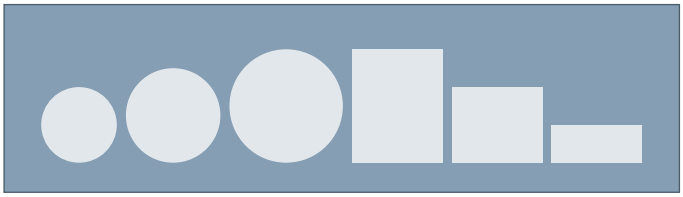
Industrial products are often typified as purely functional and unglamorous, making them less attractive to many industrial designers. Instead, they focus more on the 'glitzy' consumer products such as cars, audio visual and domestic products. But the market for industrial products and machines has become highly competitive, and the need for brand recognition and product positioning has become increasingly important. A competitive environment also means that large companies such as ABB have to continuously improve the efficiency and effectiveness of its products and processes. Customer expectation is now at a level whereby the industrial products they use or develop at work should have the same design quality in terms of style, fit, finish and human machine interface (HMI) as the products in their home. In other words, it is no longer acceptable for an industrial product to be purely functional.

Fusing artistic qualities with functionality and performance is now essential in

1 Consistency in style and quality helps to install confidence and a sense of brand loyalty.



Different product specifications can result in disjointed looking products.



Well harmonized and integrated products give confidence.

any business, and many companies are taking on the challenge of bringing industrial design and industrial products together. Good and attractive design is critical to brand recognition in the global marketplace.

Industrial design in ABB

During the last 10 years, ABB has developed a systematic approach in many of its businesses related to the use of industrial design, and as a result the company has refined its design philosophy.

This approach has resulted in product improvements such that ABB has attained a leading position in design and innovation.

In addition to a portfolio of well-designed top quality products, the group understands the importance of having a family identity, and this requires consistency in the design approach.

A history of frequent acquisitions has equipped ABB with many new and exciting products and technologies. But many of the products have been designed in different countries, in different factories, all with different design criteria. To overcome this problem, the company has developed design guidelines for the purpose of achieving its goal of having a unified appearance for its product families. The title picture on pages 6 and 7 illustrates the generation shift of sections of ABB's portfolio to which the new design guidelines have been applied.

Within ABB, industrial design is defined by 5 major attributes, which when applied should:

- Define a common style that would be associated with a family *brand identity*, and which would help to present the product portfolio as a global range.
- Ensure that the product portfolio has the style, simplicity and excitement needed to inspire our customers and employees. Easy-to-use *ergonomic designs* shall become a trademark of ABB's complete product portfolio.
- Practice the *commonality of component* design philosophy, thus making new product development more efficient.
- Encourage *modularization* for flexible manufacturing.
- Enforce the recent introduction of new *recycling directives* which call for the effective use of materials and processes. An extension of these directives takes into account health and safety aspects of product design. Adhering to this legislation is not only good design practice, but also an environmental and sustainable requirement.

2 Designing from inside out is sometimes desired to get the right result: generation shift of 2 silica analyzers.

By addressing these areas, ABB has seen how Industrial design has helped to create real improvements in its products. As a result, the company has attained a leading position in design and innovation in a highly competitive market.

Attribute 1: Industrial design and brand identity

Brand identity refers to the mental process of recognizing a name and instantly conjuring up an image of the products or properties associated with that name. On a list of the world's most recognized brand names, the top three are Coca Cola, Microsoft and IBM. Mercedes Benz sits at number 10. The common denominator among the top ten brand names is that their products are used in many homes and businesses, and are therefore familiar to many consumers. Even though ABB is not featured on this particular list, instant recognition within its different competing market segments has been, and continues to be an important goal. This is helped enormously by the size of the company's ever growing portfolio of high quality industrial products.

At a recent trade show in Germany, ABB displayed products and systems that conform to the company's design guidelines. The products on show illustrated some of the basic principles of these guidelines that are in place to ensure a high level of consistency.

- The red ABB logo is placed in a prominent position within a protective field surrounding it. This protective field creates an empty space around the logo which allows it to stand apart from other visual elements.
- The product name and/or number appears in a dark grey color in the Helvetica typeface. It also is placed in a prominent position within a protective field.
- The grey background color creates an effective contrast with the red ABB logo, the dark grey product name and/or number and with the product's human interface.

3 HMI interfaces now tend to resemble those of mobile phones.

- Flexibility is incorporated into the guidelines to allow for specific customer requirements and products with established market precedence.

This consistency in style and quality, as shown in 1, helps to instill confidence as well as a sense of brand loyalty in ABB's customers and employees.

Industrial design is more than skin deep

Although ABB's design guidelines are geared towards establishing a recognizable brand identity, they still allow for design creativity, albeit with a strong ABB flavor. Customer feedback has indicted that these guidelines have successfully made it possible to present a powerful brand identity, and at the same time, create an 'object of desire'.

Fusing artistic design features with robust functionality goes much deeper than external appearances.

Fusing artistic design features with robust functionality, however, goes much deeper than external appearances, and that means design issues must be addressed at every level of the product development. The design of industrial products must focus on ease-of-use and reduced maintenance costs for the customer. On top of this, environmental factors must be considered, and these are influenced by the choice of appropriate and effective materials and processes. The end result should be a simple, high quality functional design, manufactured by an optimized production process 2.

Attribute 2: Industrial design and *ergonomics*

Many people have experienced the frustration of having to plough through thick manuals in order to operate a product. Nowadays, many customers cannot afford the time taken in the past to do this and want products that are self-explanatory with easy-to-understand menu structures. A good example of this type of product is the mobile phone. Ensuring complex industrial products are equipped with similar features, and more, is a very demanding but essential task.

The most efficient way for a user to interact with a product is through an HMI, and ABB will continue to design this type of interface ergonomically, making it simple with logical intuitive sequences. As the art of electronics continues to advance, the quality of the HMI becomes increasingly important.

ABB's portfolio includes many different products from acquired companies, which must be integrated and harmonized with other group products. Redesigning the HMI provides a good opportunity to unify these aspects without creating extra production cost. For best results, it is important that designers and engineers study the operating sequences in close collaboration, to define exactly the minimum elements necessary to use the product or system.

One of the key characteristics ABB aims for in its product range is ease-of-use, and in its strive towards that goal, the company has developed common interface logic for many of its products. Common interface logic provides several customer benefits such as greater security, faster learning, lower training costs and

ease-of-use. These factors, combined with a superior maintenance service, are fast becoming crucial elements for customers when deciding on which company best satisfies their needs.

The use of common interface logic means users can navigate their way around the product through the HMI. The interface is similar to that of a mobile phone, ie, using two scroll keys, a select and exit key 3. This, combined with simple menu structures and consistent attractive display graphics, is an intuitive approach which many users are now familiar with. This is a huge improvement compared with previous designs where, out of technical necessity, a product may have had many variants of the front panel.

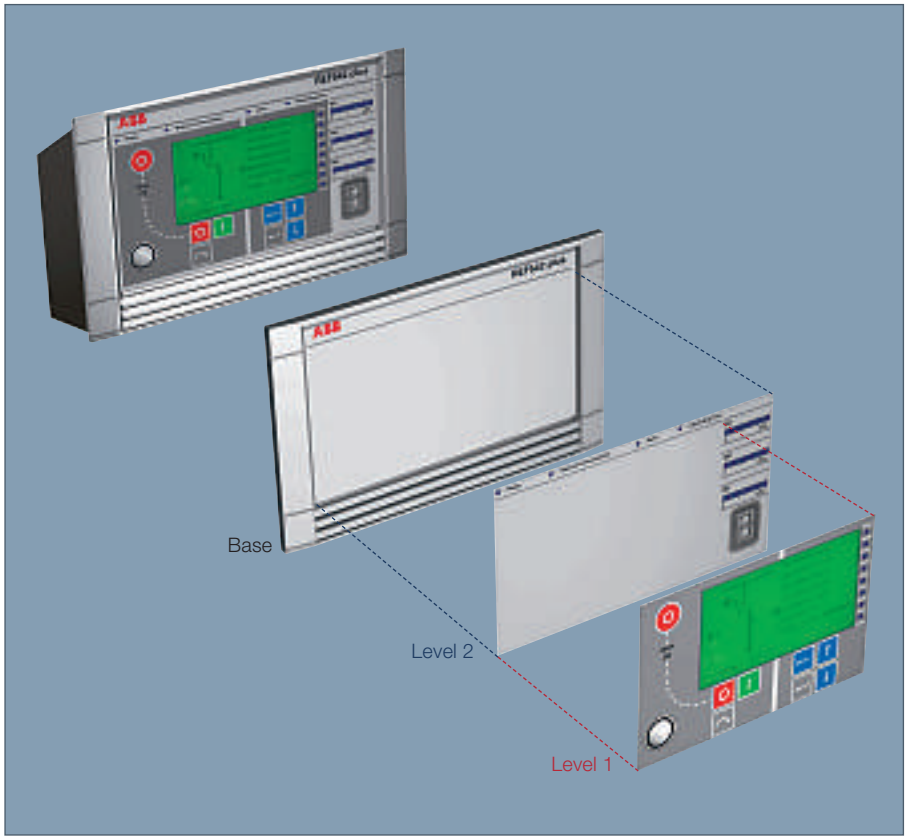
Common interface logic also permits more detailed functions that conform to a level approach 4. Level 1 is the 'action-area' where the user enters commands and receives feedback relative to these demands. Level 2 is for feedback only. In the same interface area, information can be organized into sets which can be assigned various levels of importance. The final aesthetic design must emphasize the most important functions and tone down the secondary ones. In addition, it must explain, in the simplest way possible, how to use the equipment.

Family traits

As a large company with a big portfolio, ABB customers now expect good integration and connectivity between the company's systems and devices. For some time, ABB has been working intensively to ensure that its products not only look good and consistent from the outside, but when used as a suite in a system configuration, the look and feel of the HMI is consistent with similar ease-of-use characteristics on all levels. A great deal of effort has been invested to ensure that the terminology, icons/symbols, menu structures and architecture between different products follow a logical and intuitive approach.

This means that whether a local display with push buttons, a PC tool or a fully blown system tool, such as the new 800xA is being used, the operating experience follows a common philosophy as visualized in 5.

4 Common interface logic allows detailed functions that conform to a level approach: REF542 plus HMI.



Attribute 3: Industrial design and commonality of components

Customer choice is an important parameter in any product portfolio, and the larger the spectrum of variants within that portfolio, the greater the chance of satisfying different customer requirements. For example a camera manufacturer might offer a variety of camera features such as fixed focus, auto-focus and variable zoom. Digital cameras may come with different combinations to satisfy various customer demands including price ranges. In a nutshell, the overall business goal is to design a product portfolio that offers maximum customer choice, at minimum cost, so that company profit is maximized. These two objectives, choice and profit margin, are not as contradictory as they may seem.

The third attribute of Industrial design serves to illustrate this point. This attribute promotes a systematic process of analyzing a product family for common components and then redesigning it. This helps to significantly reduce costs because new product development has been made more efficient. This process consists of three steps:

The third attribute promotes a systematic process of analyzing a product family for common components.

- *Determine the functional variety:* The product portfolio is analyzed, from the perspective of customer func-

tional requirements, by interviewing both customers and sales people. Existing functionality and future trends are mapped, thereby creating a segmentation of the market based on customer needs.

- *Determine the profitable product variety:* Profit patterns of the existing product variations are analyzed using statistical analysis methods. Functional requirements and acceptable market price levels are derived per class of product variants, and acceptable cost levels are defined for each class. These models will then give designers a business rationale, in terms of features, prices and costs, when designing a product family.
- *Design for commonality:* This step uses the output from the previous two to identify common features and components across the different classes of product variants. Design changes that maximize the scope of the product class while, at the same time, meet customer functionality requirements at minimum costs are determined. This approach also ensures that users can see a progression in the product's operating philosophy throughout the product family. In addition, the quality of the reusable, or common components, can be optimized while maximizing the throughput of new products and features.

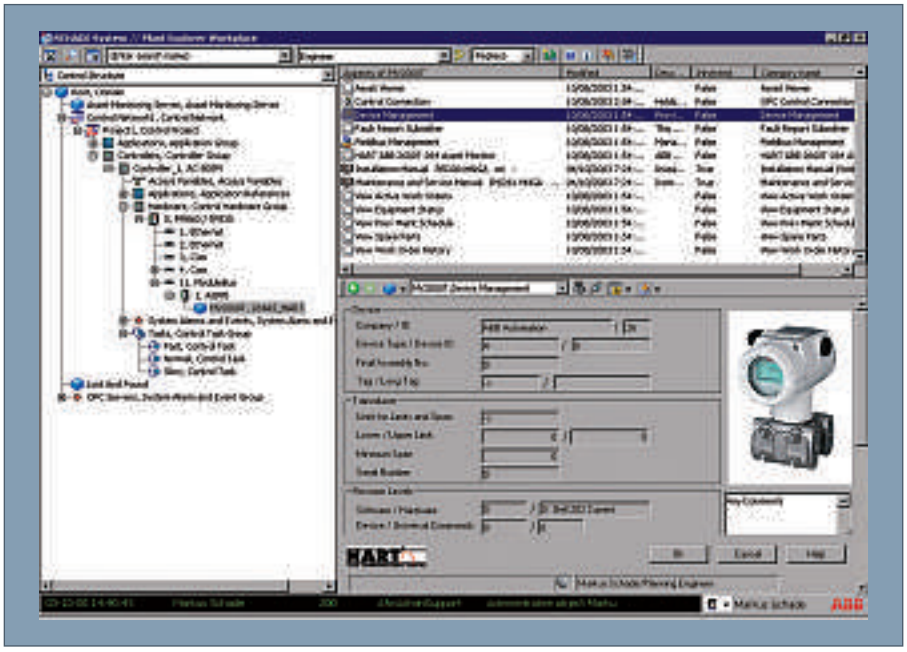
This methodology has successfully been applied to several product families such as electrical drives and robots 6. It has also been applied to the optimal sizing of flow meters, resulting in a 40 percent reduction in the number of meters in this product family with minimal revenue loss.

Attribute 4: Industrial design and modularization for flexible manufacturing

Market pressures are forcing manufacturers to meet individual customer specifications at a price level and delivery time more consistent with volume production. To meet this challenge, ABB has introduced new modular designs into its product portfolio. By definition, a module is a pre-engineered configuration of components and their interconnections. The optimal size and complexity of each module depends very much on the desired degree of flexibility in the larger product assembly. Therefore, the smaller the module, the greater the degree of flexibility allowed, but this in turn means that the manufacturing and engineering process becomes more costly.

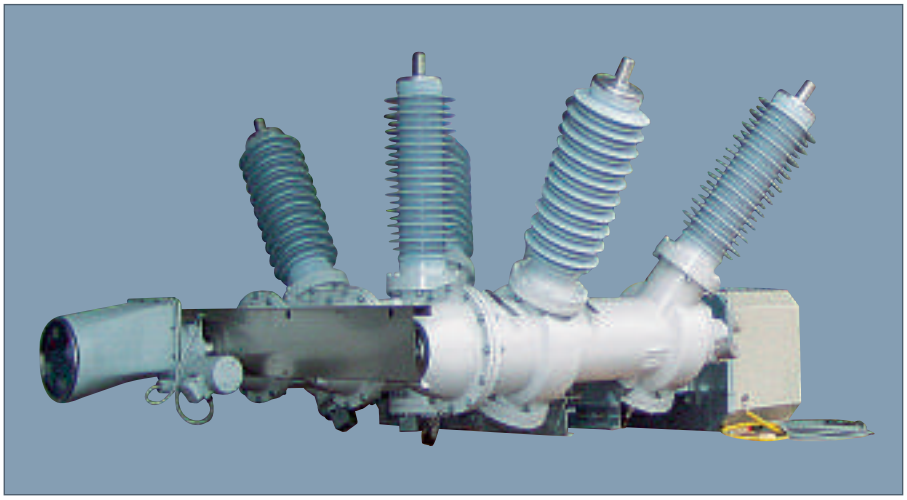
To build a house, for example, think of a brick as being the smallest module. Because of its size, it gives almost total freedom when designing the house, but considerable expense will be incurred because of the architectural and building costs. The other extreme would be a pre-fabricated building based on the

5 Field device configuration via Device Type Managers (DTMs) for the 800xA system



6 ABB drives new 'family' picture.

7 ABB's PASS M00 is a multifunctional module for high voltage substations.



'what you see is what you get' concept, with limited, if any, design freedom. But the main advantage here is that the price of this building would be considerably lower. Perhaps the solution that produces the best possible result is a compromise between the two. In other words, for a given market, an optimal module size can be found that permits sufficient flexibility to satisfy most customers' needs, while keeping the manufacturing process competitive. This modular design philosophy has now been adopted by many businesses in ABB. Complex assemblies are analyzed to determine their suitability as modules that, when combined with other modules or systems, satisfy the needs of most customers. One of the latest examples is the creation of a modular substation family 7. The benefits to customers of using a modular design system approach for substations design include shorter lead times, reduced engineering cost, reuse of proven and tested modules and quality documentation all the time. In addition, the ability to generate several alternative designs makes ABB's entire product and system portfolio accessible for any given specification.

Attribute 5: Industrial design and implementation of recycling directives

As ABB continues to develop smart products and redesign many of its older ones, the company is very conscious about adhering to the latest environmental recycling directives. Included within the Industrial design concepts in ABB is the choice of materials, paints and components that reduces the environmental burden both during the life cycle of the products and at their final stage of obsolescence. These considerations are extended to include different health and safety aspects as defined on both regional and national levels.

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Two new EU directives, the Waste Electrical and Electronic Equipment (WEEE) and Restriction of certain Hazardous Substances (RoHS), are currently being incorporated into national legislation in member countries. The WEEE directive aims at minimizing the impact of electrical and electronic equipment on the environment during their lifetimes and when they become waste. The RoHS directive will ban the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of certain substances like lead, cadmium, and mercury.

ABB anticipated the introduction of these directives and, in accordance with RoHS, it has abolished the use of hazardous materials such as cadmium in its products. As well as WEEE and RoHS, the EU is drafting a new 'Eco-design requirements for Energy using Products' directive. The directive is designed to encourage manufacturers, when designing products, to take environmental impacts into consideration throughout the entire product lifecycle. It is generally believed that over 80 percent of all product-related environmental impacts are determined during the product design phase. Integrating environmental considerations as early as possible into the product development process is seen as the most effective way of introducing changes and improvements.

Made in ABB

Industrial design fuses artistic elements with functional requirements to form industrial products of high quality and performance. Within the ABB Group, industrial design is comprised of five major attributes which should permeate all new releases of smart products and gradually replace old designs. In doing so, each product will reinforce the company's identity and support the ABB brand image. Seeing the ABB logo will conjure up an image of a product portfolio recognized as 'Made in ABB'.

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