

The background of the page features a collage of ABB industrial equipment. In the top left, there is a control panel with various buttons, switches, and a color-coded energy level indicator. In the top right, a large, grey, box-like component with the ABB logo is visible. In the bottom left, a close-up of a grey metal structure with two circular gauges and the ABB logo is shown. In the bottom right, a control panel with a green screen displaying a schematic diagram and several buttons is visible. The word "Transformed!" is overlaid in large, bold, black letters across the center of the image.

Transformed!

The story of how a distribution transformer was 'transformed' using ABB's industrial design process.

Richard Tinggren

Logos are very powerful tools that, subconsciously, force us to conjure up images of instantly recognizable products. One only has to think of Mercedes Benz, Volvo or Porche and images of cars jump immediately into our mind. We can differentiate between cars from different manufacturers thanks, for the most part, to the power of industrial design. Only after our initial attraction to a specific design do most of us delve deeper into the technical, and most revealing, specifications.

ABB realizes that industrial design plays a critical role in differentiating its products from its competitors'. But the company also knows that good industrial design is not only about looking good: It is also about perceived quality, a term used to describe the meeting point between visual and constructive quality. This is of the utmost importance, especially in the electrical power industry, where purchasing behaviour is considered to be very rational and specification oriented.

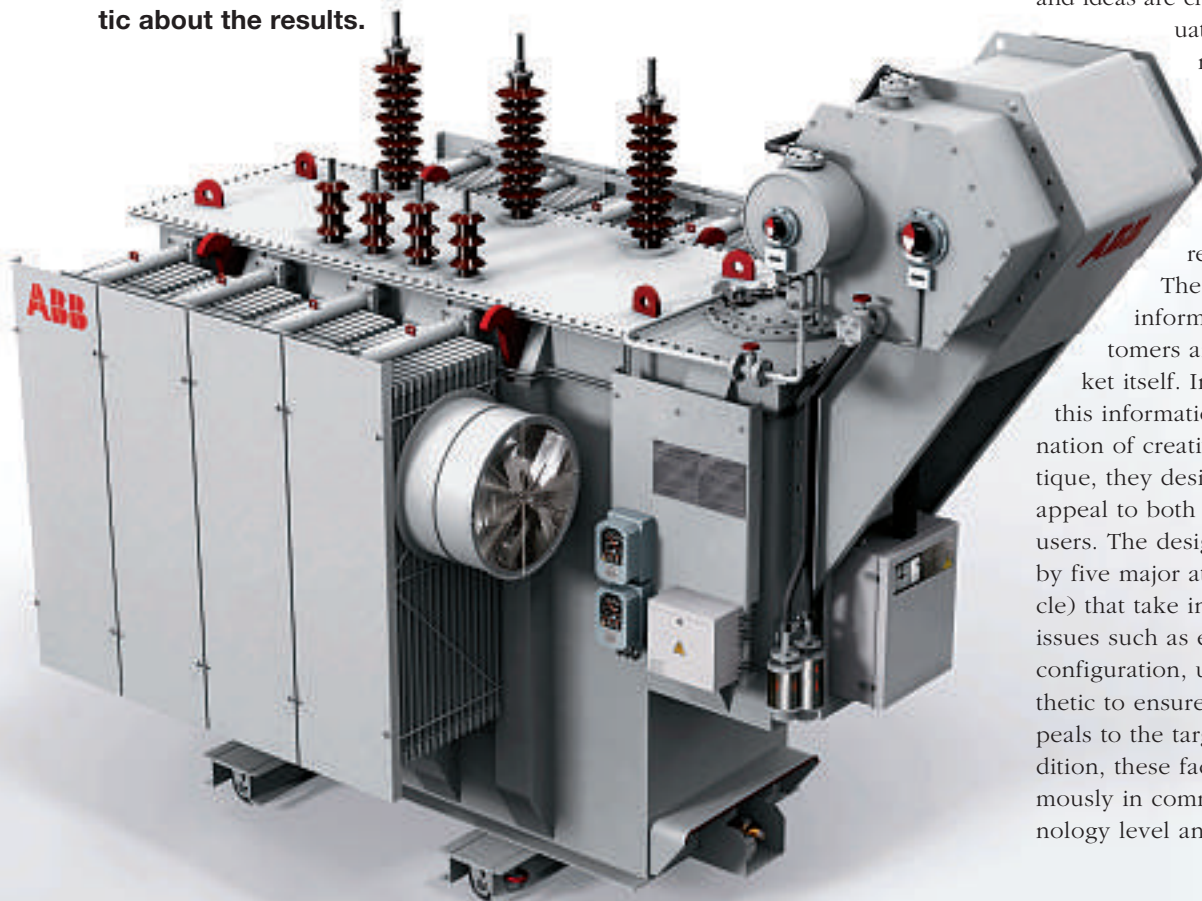
With this in mind, ABB has now started a dedicated process to review the industrial design of all its product families. This process has already been applied to a wide variety of products, ranging from pocket-sized devices to apparatus bigger than the size of a house; and so far, both customers and employees have been very enthusiastic about the results.

The strong ABB brand is a well-earned result stemming from the company's long tradition of technology, quality leadership, pioneering spirit and an excellent track record in sustainability. In the past, however, form has had a tendency to often follow function, and an attractive product appearance has not always been the result. But this thinking is rapidly changing as more and more people realize the marketing power of combining attractive industrial design with increased and effective product functionality. In fact, industrial designers, and engineers and scientists are working more closely together than ever before.

With a dedicated process to review the industrial design of all its product families in progress, ABB is discovering that customers and employees are very enthusiastic about the results.

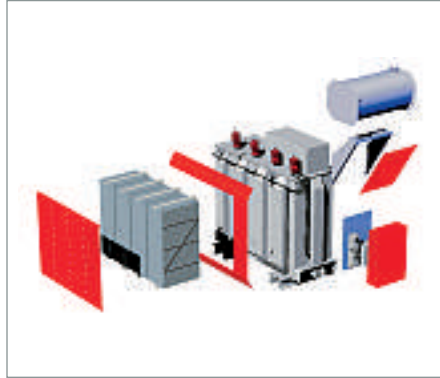
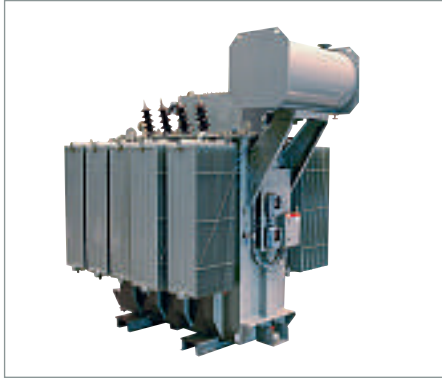
Industrial design process

There are those who consider the process of product development as being similar to that of the accelerated version of Darwinian evolution. In other words, information is gathered, analysed and ideas are created that are then evaluated, and accepted or rejected. The end result is new improved ideas. This process is repeated so that a product has evolved many times before being released onto the market. The best sources of such information are ABB's customers and, of course, the market itself. Industrial designers take this information and, using a combination of creativity and analytical critique, they design product features that appeal to both purchasers and end-users. The design process is defined by five major attributes (see lead article) that take into account important issues such as ergonomics, product configuration, user interface and aesthetic to ensure that the product appeals to the targeted customers. In addition, these factors contribute enormously in communicating ABB's technology level and brand equity.



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Factory visits and close collaboration with other teams is essential when gathering detailed product information for analysis. (Images courtesy of Design Group Italia)



Vision is a key element in any successful design, and this comes in abundance from the various product team members. Marketing and sales people, mechanical and manufacturing engineers come to the table with different sets of partisan needs that are often in conflict. In such a situation, industrial design is a great tool for crystallizing the product vision and reconciling the product team's differing requirements. It does this by first isolating each group's competing demands. Then it prioritizes and synthesizes them, before finally communicating them through easy to understand visual images rather than long product specifications.

To reap the full benefits of industrial design, it is important to include it from

early on in the development process. At this stage of development, many concepts are open for discussion, ideas flow freely and critique tends to be more honest.

To explain this more clearly, consider the pressure many businesses are under to produce superior products in shorter development times and at reduced costs. This is not an easy task to fulfil. The use of industrial design, however, significantly eases this pressure, especially in the development phase, by exploring and narrowing all possibilities up front. It seeks out common parts and solutions as well as a simplified outlook, and it strives to enhance the usability, safety and appeal of the product. These objectives fit well with the pro-

duction unit's need to develop customer-oriented products that are easy to use, install and maintain.

The first part of the ABB process was concerned with the creation of basic design guidelines that were used on design concepts for a selection of products. The resulting fine-tuned designs established the final design guidelines which are now applied to many ABB products.

To reap the full benefits of industrial design, it is important to include it from early on in the development process.

Perhaps the effectiveness of this process is best illustrated by using an example; that of a large transformer for distribution networks.

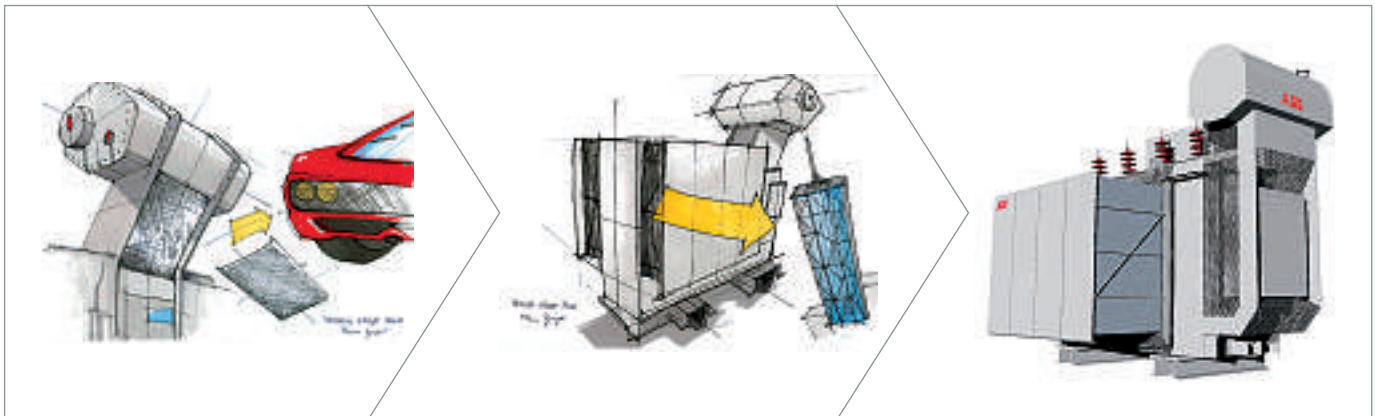
Distribution Transformer case story

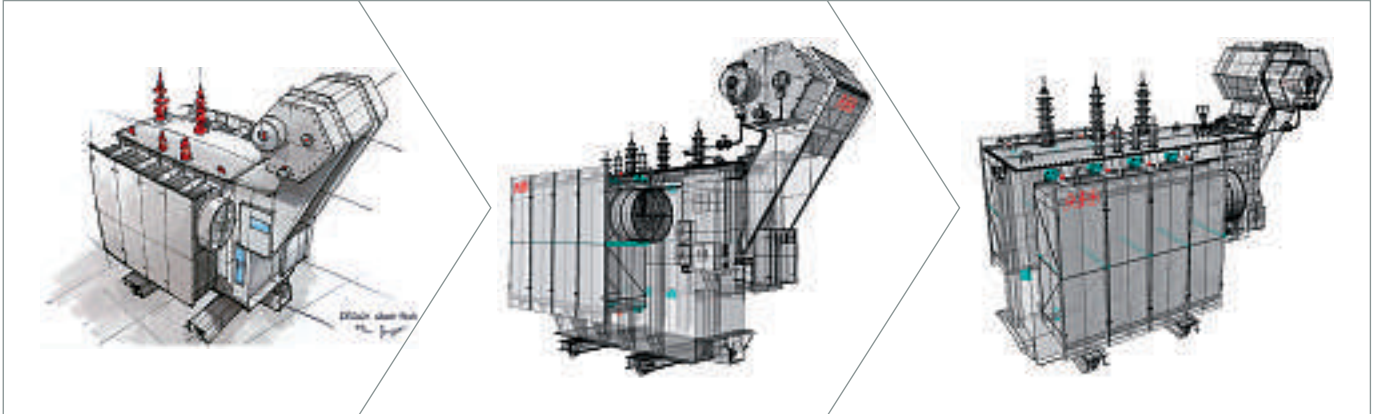
Step one: Information gathering and analysis

In this phase, all technical and marketing information about the product or product family, including differences in the product that exist due to various regional requirements, was collected by the design team. This

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The emphasis in step two of ABB's industrial design process is on the rapid generation of ideas, no matter how unrealistic, and the exploration of various design concepts. (Images courtesy of Design Group Italia)





necessitated a factory visit and close collaboration with the marketing and mechanical design departments. The information collected included photographs, drawings and three-dimensional (3-D) models of the transformer. The team completed this phase by defining areas, or components, in the product where changes could be made **1**. This task was sim-

plified by first identifying areas where changes could not be made due to certain limitations such as electrical properties and manufacturing processes.

Step two: Concept design

The emphasis in the initial part of this step is more on rapid communication and the quantity of ideas generated, no

matter how unrealistic, rather than on refinement.

Therefore, using the information gathered in step one, the team put together initial transformer design concepts using a loose and fast process. This helped generate many ideas so that different design opportunities could be explored and discussed, together with the mechanical designers and the marketing and sales team, in terms of cost and implementation complexity.



The information collected included photographs, drawings and 3-D models of the transformer.

Once these discussions were completed, chosen concepts were further refined. These refinements were then presented to other teams and then reviewed from a usability, aesthetic, cost and implementation point of view **2**.

In the final part of this phase, the preferred transformer design concept was selected, the producers, both internal and external, were defined, and contact was established between the de-



sign team and these producers. Close collaboration between the two is necessary to ensure that the final design definition is in line with good manufacturing practises. On top of this, it is needed to overcome any conflicting requirements that might exist between the engineering, manufacturing and design disciplines.

To speed up the process, 3-D computer simulated models were used to allow easier visualisation of all design concepts ³. These models were shared between all team members, irrespective of location, and they helped reduce the time spent on the verification process with the mechanical design team.

Step three: Design development

In the design development phase, dialog between the design and mechanical teams, and the internal and external producers started. The chosen concept was scrutinised and fine-tuned in terms

of design and manufacturability. Transformer dimensions, configuration variants and user interface were defined, using computer simulated models. Market feedback was integrated into the process ⁴.

Step four: Design implementation

The final phase describes the transition from industrial design to engineering. In this phase the transformer prototype was built ⁵. All details were analysed

again to ensure an optimal design was achieved. Sometimes mock-up models are used, but in the case of a large distribution transformer this was

not practical, and therefore final modifications and decisions were made based on the 3-D computer generated images.

Success?

The ultimate test of the entire design process is the building of the functional prototype. If the four steps are faithfully followed, there is a high probability that the prototype will have no unex-

pected issues requiring immediate attention. If this is the case, the pending design implementation issues are reduced to the updating of manufacturing drawings and product marketing material. All things considered, the successful redesign of a distributed transformer is a good measure of the reliability of ABB's design process.

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