

The choice of materials in the design process

24 February 2003

Ladies and gentlemen

It is a great honor for me, as an industrial designer, to be invited to speak a few words to you on this occasion.

I did already speak a few times by invitation of the Dutch Aluminum Institute, and that was already a great honor, let alone this one.

Nevertheless it is completely clear to me why Aluminum institutes ask me to talk about aluminum, and that is not a good reason. I am namely a big fan of aluminum and therefore very prejudiced. There is only a little chance that I would say something negative about aluminum.

At this occasion, however, I will do my very best to be critical.

The title I have given to my presentation reads "The choice of materials in the design process".

First I would like to explain how the choice of materials is embedded in the design process, and that there are several strategies available.

Next I would like to elaborate on the parameters which are important in the decision process of designers with respect to materials. I will conclude with relating these parameters to aluminum and my bottom line will be that this material not only has advantages with respect to product functionality and manufacturing options, but also with respect to coping with it in the design process.

Embedding in the design process

Ladies and gentlemen, the times have changed. In the past, when I was young, material selection was no issue of importance. There were only a few options: wood, steel, textile, ceramics... that was about it. Industry was organized around these materials: wood-industry, steel-industry, textile-industry and ceramics industry. It is not amazing that the profession of industrial design, as far as it existed, was organized around those materials. Mechanical designers were associated with steel, furniture designers were associated with wood and fashion designers were associated with cotton and wool. Material selection did not play any role of importance in the design process.

Things are different today. Material options have grown rapidly and materials have become independent of applications. For example: Steel was in an early stage applied in furniture too (e.g. by Gispen). Textile was in a later stage applied in bicycles (e.g. carbon fibre). Wood was replaced by steel in ships, but some years later, advanced laminated wood constructions competed with steel in architecture.

A designer could not be specialized in a material anymore. A designer became therefore specialized in applications. Now we have furniture designers, car designers, kitchen designers etcetera.

But...did the design process change because of the fact that the material was not the core of the design-process anymore? No ladies and gentlemen! Many designers still start with the material, although you never can select a material in a stage that there is no concept of the design at all. Designers design with a certain material but, in theory, they should not. What they should do, according to modern design theory, is that they design a product according to how the product should function, how it should be used and how it should look like. Afterwards, when this so-called formal design is ready the design should be materialized by choosing the materials in dependency of the role it can play in the design.

People like Manzini, managing director of the Domus Academy even argues that, when necessary, the material itself should be designed.

Quote: The design should not be dependent on the material, but the material should be dependent on the design. This may-be sounds a little bit provocative to material experts, but this is the way things develop.

Resuming this part of my address about "embedding of material selection in the design process" I would like to claim that the material, in a growing extent, plays a serving role in the design of a product. It is not anymore accepted automatically that the material determines how a product looks like, however in some cases this can be welcome.

Parameters for material selection

Having said that, now let us look to the parameters which are important for designers in the selection process of materials. I distinguish four kinds of parameters:

1. parameters which have to do with availability of information
2. parameters which have to do with functionality of the material
3. parameters which have to do with manufacturing of the product
4. parameters which have to do with the engineering of the product.

Ladies and gentlemen, please do not underestimate the importance of availability of information. A marketing guru once told me that in a shop you have only milliseconds to your disposal to wake up the interest of a customer. And when he is interested you have a big chance of losing him, because of the fact that another product is easier to obtain. The same counts for designers. You have not too many opportunities to wake up the interest, and when information about another material is easier to obtain you may loose the designer.

My opinion is that, at least the Aluminum Institute in the Netherlands does a great job in spreading the news about aluminum. I also think that this exhibition is extremely useful with respect to bringing aluminum at the top of the 'google-like' materials browser which is in the brain of every designer.

Still, it is sad too see that teachers in engineering schools still focus on steel in there lessons and projects.

The second parameter which I mentioned has to do with the functionality of the material.

Here we have a problem with aluminum. It is namely a multifunctional material and there is always a problem with multi-functional products. They are difficult to communicate.

The two faces of aluminum are:

- a. it is an excellent construction material, e.g. for space-frames.
- b. it is a beautiful material, just as it is, in particular color and glow.

In fact, steel is just a construction material and most plastics do not have any charisma either. But aluminum is different, so you can observe in this exhibition.

This aspect turned out to be very important when we assessed Dutch companies in aluminum casting industry. They were mainly aimed at the casting of products with a pure technical function and there is nothing wrong with that. All the finishing for esthetic purposes was contracted out. The companies studies were certainly not goldmines.

In Germany however, the same industry had in many cases invested in machinery for finishing aluminum casted products like polishing and even chromium plating.

For visual quality of aluminum there is a vast market, and not every company recognizes that and some diehards even do not believe in it.

The third parameter which I mentioned had to do with manufacturing. Here aluminum scores very high. It can easily be machined, casted, extruded, welded, anodized etcetera. For every form a manufacturing method is available. This is good, but there is also a danger lying in wait. The designers are supposed to know about these manufacturing technologies, but in many cases they don't.

It is extremely necessary that design-schools pay more attention to these technologies. I myself was a member of a Dutch assessment committee for schools in mechanical and industrial design. I found out that this kind of subjects form a stepchild in design education. No wonder the technologies are new and the teachers are mostly old. It is necessary that people from the aluminum industry help educational institutes to improve there programs at this point.

Ladies and gentlemen, the fourth parameter I mentioned had to do with the engineering process. Here aluminum has a great advantage. It is namely quite easy to make prototypes out of aluminum. On every hobby machine aluminum can be drilled, sowed and milled.

Only for very sophisticated material specifications rapid prototyping is still difficult.

The plastics engineering tools seem to be more developed in this context. Furthermore you can conclude that aluminum is a material with few constraints as far as it concerns shape. It is like clay; it is easy to make any form out of it, and it can be produced to, for example using lost-foam technology.

Advantages in the design process

The last part of my little speech has to do with the advantages of aluminum in the design process. I already mentioned the fact that the material has the advantage of being an easy material to work with. It is possible to produce nice prototypes in simple workshops. But that is not the only advantage of aluminum in the design process. One important advantage has to do with imagination. For designers imagination is a key success factor.

Some materials are easy for imagination and some materials are not.

Old fashioned DIN-profiles of rolled steel are easy for imagination. It is easy to imagine what kind of products you can realize with it. Plastics however are difficult for imagination. The freedom of form with plastics is so immense that it does not help your imagination too much. That is one of the reasons that it is very difficult to design plastic products with strong unique image. One of the few companies which succeeded with that is Kartell.

A beautiful thing of aluminum is that it is in the middle. It has the advantages of steel in the sense that profiles can be applied in structures which are easy to think up. You do not have to be an artist to design a window frame. However, aluminum has also the advantage of plastics. The freedom of form is nearly endless.

However, the designer gets one important bonus applying aluminum: the character the image of the material. Use another material and, as a designer, you have to work hard to give your product.

Saying that, at the end of my speech, I would like to put question marks at the statement that, in the modern views on the design process, the selection of the material should be postponed to the end of the process. Aluminum is not only a functional material in the technical sense. Aluminum has emotional value on its own and the decision to use aluminum is not only an engineering decision, but, in many cases, it is a decision for image. Aluminum does not only solve engineering problems, but it inspires designers to develop new visual statements, as can be seen on this exposition.

Thank you very much