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INNOVATION

Material Witness

AUTOMOTIVE HISTORY ■ CONSUMER ELECTRONICS ■ IN HIS OWN WRITE





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Aart van Bezooyen is an optimist and motivator for materials in design. In 2005, he founded Material Stories to bridge the gap between the materials industry and the world of design. Material Stories is based in Hamburg, Germany, and supports clients, including Royal Philips Electronics, Hyundai-KIA Design, P&G, BASF and The Fraunhofer Institute with materials research, design workshops and strategic thinking. Author photo by Julia Knop.

Three Ways to Almost Save the Planet by Using Materials



Courtesy Nanaï

Salmon leather as pre-consumer waste

Anymore, doing things differently is not a virtue of the artistic world. Climate change issues, shortages of resources and a bankrupt financial world are showing us that continuing to live our lives the way we used to is no longer an option. Some say we're at the point of no return, and it is time for change. In a world where oil has become a bad word and sustainability seems to be a new religion, we realize the importance of materials as one of our most precious and limited resources. Materials are not just the stuff our products are made of but can also be used as a tool for change—a change in which designers and architects can play an important role.

As the title of this article suggests, materials alone will not save this world but there is a very strong relationship between the condition of our environment and the materials economy. People who have seen the movie *Plastic Planet* or read the book *Story of Stuff* (that's a recommendation!) will understand my love-hate relationship with materials. For instance, PlasticsEurope impresses me with facts about how plastic insulation saves energy and food packaging reduces transportation fuel costs, whereas the Algalita Marine Research Foundation reveals how packaging waste has become a serious death trap for many animals in our oceans.

As a materials consultant and a visiting professor, I am often confronted with students, designers and industry representatives who want to make things better or do less harm to our planet—but often miss an answer to the how or the what to do. This article is for them and like-minded readers who can use some practical suggestions that can offer a different approach to thinking and working with materials in design.

Why Materials?

First, materials show us the future. Material Stories believes that materials are more than “the stuff we use to make stuff.” **Materials can be the starting point of groundbreaking ideas; materials can change our expectations and change the design of our future.** In other words, materials are great tools to move this world toward a more sustainable tomorrow.

Second, materials make us feel. Materials offer sensorial properties that effect our senses, such as feeling the texture of wood, hearing the pitch of crystal glass or smelling the aroma of leather. These sensorial experiences don't stop at our fingertips or ears but go all the way to our brain. In other words, through hands-on work with materials we evoke a sensorial arousal that feeds inspiration and delivers ideas.

The following approaches come from personal practice and are not written as facts for discussion but rather to inspire your thinking. I have written these case studies in three sections that reflect my working fields. Rethink is all about the world of design, reeducate focuses on the practice of schools and recycle brings together examples from the materials industry.



Gropak mushrooms use transit time to continue maturing.

How Can We Rethink with Materials?

Rethinking why things are the way they are is the starting point for change. It is one of the key skills of designers that involves questioning given situations and finding alternative solutions that haven't been considered before. To generate alternative solutions or scenarios, materials can be a great help. Why? A closer look at materials allows designers to see products as more than finished objects. For instance, seam lines tell us how a chair is manufactured, and a simple battery lid demonstrates the possibility of future recharge. That is, material details allow us to see products in a bigger picture from sourcing the necessary raw materials to its disposal.

Rethinking products or situations with materials is not just about the material. It is important to consider a material's improvement in the right context. In the late 1970s John DeLorean thought he would make cars more sustainable by replacing carbon steel with stainless steel to avoid rust—great idea! Unfortunately, in the DeLorean DCM-12 (featured in the movie *Back to the Future*) the use of stainless steel resulted in a heavier construction, which caused higher fuel costs. This demonstrates that the “improvement” of a material only makes sense when considering its benefits (a car that doesn't rust) in the context of the product's full life cycle (the use of fuel).

Agata Jaworzka's research for her design degree was titled “Made in Transit” and demonstrates how the status quo of systems can be rethought to save time, energy and money. Her project reconsiders the manufacturing of mushrooms and, unlike keeping mushrooms as fresh as possible during transit, she uses that time to continue the growth of mushrooms until the very point of sale. That is, from “best before ...” to “ready from ...” Rethinking this system even



Ginger Krieg Dosier created a biomanufactured brick that can be manufactured on site with a 12-step process involving placing a formwork in sand, adding bacteria, cementing solutions and time.



Courtesy Ginger Krieg Dosier

turns many disadvantages into advantages, since the given heat and darkness during transport are the perfect growing conditions for mushrooms on their way to the supermarket. (This video explains it all: <http://www.youtube.com/watch?v=oWcOgzNNHIE>.)

Design is probably one of the best professions for collaborating with other disciplines. For instance, German bionics student Mareike Frensemeier was awarded the latest Visionworks Award for her work on the future of packaging. She explored the potential of using bacteria for the packaging industry. Her concept, BACS, demonstrates a package that is grown, not manufactured, by feeding sugar to bacteria to turn a flexible glucose into a stiff cellulose structure—a great idea driven by nature that should result in solid packaging that is fully biodegradable.

The use of local resources is another great challenge, especially because it requires local know-how and understanding of traditional crafts. Focusing on local materials is all about saving transportation energy, enabling decentralized manufacturing and supporting local economies. A great example comes from American architect Ginger Krieg Dosier, who was awarded last year's *Metropolis* Next Generation Award. Her biomanufactured brick demonstrates how bricks can be manufactured on site with (again) bacteria, a 12-step process involving placing a formwork in sand, adding bacteria, cementing solutions and time. Even though this tiny brick will not revolutionize the building industry in the short term, it has great potential.

Sharing ideas, instead of sharing products, is another strong way to feel the response of a global audience. Today's level of simulations and range of the Internet allows

us to make and test future scenarios with a worldwide audience in a efficient way. Brand Image demonstrated this recently with its 360 Paper Water Bottle vision, which is made of recyclable paper or sustainable sheet stock, such as bamboo or palm leaves. The bottle is offered as an alternative to the regular plastic bottle, which is wasted at a rate of 60 million bottles a day in the US, only 14 percent of which are recycled. By publishing this concept online, Brand Image not only realized more brand awareness, it also started many online discussions about the (non)sense of packaging and our throwaway lifestyles.

How Can We Reeducate with Materials?

In most schools materials are an integral part of design education. Many books have been published about materials in design, but experiencing a material with your own hands will beat any description or photo. Time to experiment and work with physical materials is often limited in order to make the curriculum more condensed and efficient. Luckily, I still enjoy teaching young designers to learn materials by doing. The following examples demonstrate how materials research and materials selection have helped to make students more aware and sensible for the art of product design.

Some consider Leonardo da Vinci one of the earliest industrial designers in history. He once said, "All our knowledge has its origin in our perceptions," which reminds us of the important role of our perception skills in growing our knowledge. I've learned that materials samples are great tools in focusing and training our senses. **Training senses helps designers to be more specific in the design of products and gives them more eye for material details.** I believe, good design requires sensitive designers.

During classes, design students often hide their thinking—also known as "the best idea"—in order to work on their design concepts until they are fully finished. The drive for perfection can be useful, but teaching a more open attitude toward design allows the sharing of ideas and the use of group intelligence in the classroom. Copying high-end products with low-end materials can be a good exercise to get used to the challenges of learning from each other. It requires us to find out which parts give (and don't give) a product its character—we might call it a kind of hands-on "less is more."

Industry (where time is money) and school (where time is endless) seem to be worlds apart, but finding common ground often leads to great projects. Industry visits help young designers see how things are made and give them more insight into the everyday business of materials and manufacturing. Factory visits show in a memorable way that materials selection also means processing selection. Further, understanding the scale, time and energy managed by the industry to make stuff changes our expectations and often creates more respect and patience in "getting our product done."

MATERIALS

History shows that great discoveries happen by accident, such as those tiny squares of paper we call Post-its. I've learned that allowing students to explore for themselves always results in a few eye-openers, including for myself. Exploring materials yourself evokes a joy of invention and powers a future desire to explore. Do-it-yourself experiments should be fostered to enable students to discover things for themselves. Of course, experiments come with mistakes, and as long as you're in school you should make as many mistakes as possible. Inventor James Dyson made over 5,000 (failed) prototypes over five years to develop a bagless vacuum cleaner that doesn't lose suction. The saying goes, "We must learn from mistakes." I'd turn this around to say, "We must make mistakes to learn."

"Materials selection" is sometimes a misleading title for teaching materials since it suggests that we can only select or choose. Making the material yourself is something that should be considered and practiced during the design curriculum to get close to the matter and learn to translate the desired product experience not only in a form definition but also in a material definition. Making, sometimes cooking, materials ourselves with basic ingredients, such as do-it-yourself bioplastics, is a great exercise to show that design is not just about exploring and defining form aspects but also the materiality of a product.

How Can We Recycle with Materials?

When we mention recycling we often consider it to mean reusing materials waste, such as packaging papers—also known as post-consumer materials. Though, recycling makes sense not only at the end of a product's life cycle. We don't often see that there is even more materials waste during the manufacturing of a product, materials that are very suitable for recycling—also known as pre-consumer waste.

Dealing with pre-consumer waste has a big potential for design. Why? Recycling post-consumer materials, such as empty PET bottles, requires sorting, washing and grinding, a time- and energy-consuming process. Pre-consumer materials are more pure, lacking additives and colorants, allowing energy-efficient and high-grade recycling. Many of this materials waste is "hidden" in the industry but is definitely worth considering for future applications.



Design with post-consumer waste (XS Chair by Nick Demarco)

For example, Kollamat is a material that was born by considering the leftover materials from manufacturing premium leather products for the automotive industry, the core business of Bader Leather in Germany. This promising compound material is made of leather fibers and a bioplastic resin. Unlike stitching leather sheets, Kollamat can be pressed or molded into durable parts with the qualitative look and feel of leather.

Nanai is also called "salmon leather," a name that reveals its true nature. Unique handcrafts and the traditional origins of the organic tanning process served as the inspiration behind this company. Salmon skins, which are usually wasted, are processed and colored with natural dyes to create unique surfaces for fashion, interior and product design. Applications, such as haute couture dresses, mobile phone covers and even car interiors, are a few of the current applications being developed.

Smile Plastics is based in the UK and is probably one of the most visually impressive recyclers we know. By melting waste materials, such as discarded mobile phones (15 million are discarded yearly in the UK alone), rubber boots and even old bank notes, it is able to create multicolored sheets that can be used for interior design and architectural applications, such as facades.

These are just a few examples that are part of my materials' activities and observations. During my career, I have enjoyed working with many design students, professionals and industry experts for whom these approaches are already part of their daily business, and I hope you'll agree that these experiences are worth sharing. The field of education deserves special interest because inspiring young designers is a very effective way to make materials thinking in the context of design and sustainability a part of their mindset. In other words, materials are my favorite tool in moving our planet toward a better future. ■

Author's note: I believe that the best way of saying is doing. At the time of writing this article, my partner Paula and I are planning a six-month project around the world beginning in March 2011, visiting local design schools and organizations to provide lectures and workshops to discover and exchange ideas on materials, design and sustainability. Suggestions are welcome at info@materialstories.com. You can read more about our project through the Material Stories website: www.materialstories.com.