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Edible, growable, infinitely reusable

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Leather has been the prime shoemaking material for a very long time. However, in a world with a rapidly growing population and dwindling resources, it is time to rethink what our footwear should be made of. Modern technology can help us to use our resources wisely and differently. This was the central theme of the Future Footwear Materials Conference organised by SLEM at Waalwijk, the Netherlands, in partnership with Jakajima, the matchmaker for innovators in high tech industry, this April. It brought together some 70 professionals from all over the world who came to listen to international experts in the fields of footwear, sustainability and design.

Each year a staggering 24 billion pairs of shoes are produced. An average shoe is made up of 40 different materials and a large proportion of these materials

also have more or less the same density. This makes recycling very difficult as most separation methods are density based. In addition, there are metal parts that add 50% to the total cost of recycling. Professor Shahin Rahimifard, professor of Sustainable Engineering at Loughborough University in the UK and founder and director of the Centre for Sustainable Manufacturing and Recycling Technologies (SMART), presented the challenges for the footwear industry in no uncertain terms.

This was exactly the point of the Future Footwear Materials Sleminar, to address those challenges and to look for alternative ways of creating footwear. As SLEM's founder and creative director Nicoline van Enter put it in her welcome speech: "At SLEM we don't do innovation, just for the innovation, it has to have a purpose. Or meaningful

innovation as we call it." Pushing the boundaries of innovation is something that the speakers at the 'Sleminar' all had in common. Professor Rahimifard's team has had great success with recycling shoes and reclaiming materials with, in some cases, 90% purity. But as far as he is concerned, the reactive approach is but a small part of the solution.

To really change the process, it is necessary to move from a reactive to a pro-active approach. This means it is no longer only about end of life scenarios in which shoes are recycled, but also a life-cycle assessment that concerns material preparation, product development and use. Creating a circular economy, striving for sustainability in a business sense, that is his aim. This is only possible if footwear companies come together to create working groups to share knowledge in



Belgium shoe designer Kristel Peters has experimented with Mycelium fungi for making shoes.

the same manner in which the leather industry already does.

This all revolves around acknowledging that no one operates in a vacuum. Sanne van den Dungen, Independent Consultant at Meshworks, RTB and FBBasics, strongly emphasised the take-make-waste principle that the world is dealing with at this very moment is a dead end street. A large number of resources are depleted to the extent that there is already a scarcity in many countries and this leads to geo-political issues as well.

What does a country do when it no longer has the necessary resources itself? There has to be a transition from an obsession with efficiency which aims to reduce negative impact to promoting one which optimises effectiveness. The focus should be on abundance and not scarcity. Footwear used to be made with the materials that were available locally. The Industrial Revolution changed that paradigm forever and ushered in an era of standardisation and efficiency. The tooling dictated the design and the speed of production created consumers instead of users always longing for the new thing even though the old thing is still usable.

Many of the speakers focused on the aspects of local, grown and waste materials. Looking indeed at what is abundant and manipulating that with modern technology into usable materials. Take for example fungi such

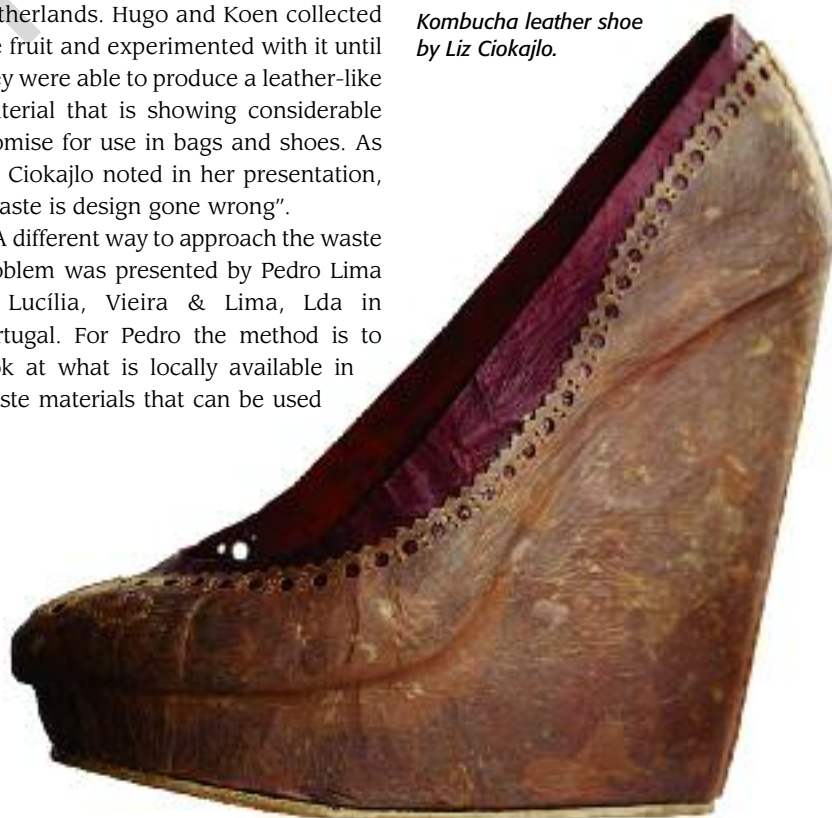
as Mycelium that has been used by Belgian shoe designer Kristel Peters. This is part of a growing movement exploring the potential of materials made from cultured organisms such as Kombucha leather by Liz Ciokajlo.

An excellent example of using waste is the Fruitleather project by Hugo de Boon and Koen Meerkerk. A staggering 3,500kg of fruit is thrown away each working day at the Rotterdam market in the The Netherlands. Hugo and Koen collected the fruit and experimented with it until they were able to produce a leather-like material that is showing considerable promise for use in bags and shoes. As Liz Ciokajlo noted in her presentation, "Waste is design gone wrong".

A different way to approach the waste problem was presented by Pedro Lima of Lucília, Vieira & Lima, Lda in Portugal. For Pedro the method is to look at what is locally available in waste materials that can be used

in industrial processes. This resulted in shoes with a 90% recycled material content and consisting of a wide array of materials including truck tyre inner tubes, waste leather from car seat cutting, PET bottles, recycled rubber soles, etc. All are sourced close to the factory and, with only slight modification, usable with standard tooling. This could be an important step

Kombucha leather shoe by Liz Ciokajlo.





Bag made from fruit leather produced by Hugo de Boon and Koen Meerkerk.

in reducing the negative effects of footwear production.

While radical methods of shoe manufacture are emerging, as for example, 3-D printing and Biofabrication, it is important not to overlook current production methods because even a small change there can have a big impact due to the massive scale. That is why it is important to look at the supply chain as well. Simplifying it or making it more transparent would be a considerable help. Mike Tomkin, the retired Director of Sustainability at chemical producer Stahl is one of the proponents of this. The leather industry is perceived by many people as being a dirty business. Much progress has been made, however, due to stricter regulations, cooperation and joint research into sustainability by various leather tanneries and chemical companies in the Leather Working Group.

A great deal can also be gained by changing perceptions about leather with manufacturers and consumers. The trend towards using leather that is totally blemish free and is indistinguishable from a synthetic due to heavy processing is wasteful and untenable in the long run. It hinges on the idea that perfection is luxury. This leads to hides where large parts are either thrown away or are heavily chemically processed. A mindshift has

to be initiated towards framing the natural as luxury, by emphasising the craftsmanship of naturally tanned leather and recoding the blemishes as the marks of a healthy active life.

Materials will become the driver of design and include a more scientific approach to material development with engineered functional features and a pre-programmed end of life script. While we have seen a glimpse of this in the design of performance footwear, this method will cross over to casual and comfort footwear.

Ms van Enter also pointed out the importance that interactivity will play in future materials by talking about and

showing examples of chemically interactive, biologically interactive and digitally interactive materials under development. This will create a world in which every surface can be turned into an interface. These interfaces mediate between the need of the user and the capability of an object to accommodate that need. An example that was shown was a suit by New Balance that has bacteria in the fibres that react to sweat and make the suit open up tiny vents that cool down the body.

The use of biotechnology in material design will only increase in the near future as was shown by Sasha Igdari, a Molecular Biologist from the US attending the SLEM Master of Footwear Innovation programme. She is developing laboratory grown leather with engineered functional features for use in footwear. Lab grown skin has already been used by cosmetics companies to replace animal testing and in the medical world to treat burn victims. The advantages are that only the material that is needed is produced and that the entire shoe could be grown into the desired shape.

What the conference made abundantly clear is that there are multiple roads to be taken. What road to take depends on the individual situation of each individual company. Working together with other companies that have chosen the same road is nevertheless the only way to travel. It ensures that you can travel further than you could have done alone, because you will certainly encounter obstacles along the way and it is easier to overcome them when you have help. 

SLEM

SLEM is an international innovation and education institute for footwear. It provides a unique full-time Masters programme for footwear innovators and a wide range of short courses and workshops for both students and professionals. Programmes are all based on the synergy of four main pillars: forecasting, design, technology and business. The forecasting and business programmes are also suitable for other industries such as leather goods, fashion and industrial design.

SLEM's Innovation Research lab is at the heart of all its activities and the continuous research and analysis carried out assures programmes offer the very latest information, presented by visionary experts in the field. SLEM also provides trend information and consulting to customers around the world, through custom-made projects and SLEMinars, which are major conferences showcasing the highlights on innovation for the footwear industry of tomorrow.