MAKING MATERIALS COUNT

Exploring materials' functions and properties when met with design is key to developing new innovations. Natalie Daniels talks to two speakers at the Make:Shift:Do event, in London, about the challenges ahead.

Dr Sarat Babu, materials scientist and designer, is working as a research associate in medical engineering at Imperial College London and is founder of Betatype – a company focused on developing materials for future processing.

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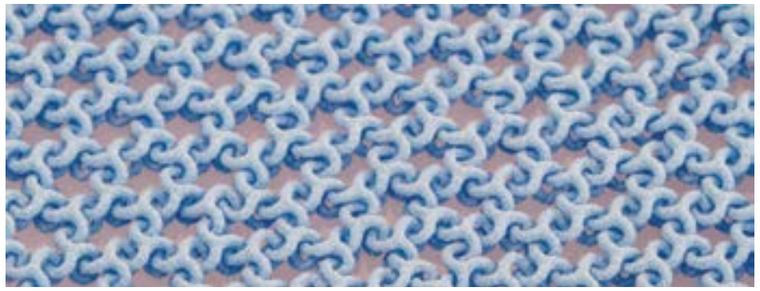

HOW DO YOU BEST COMBINE MATERIALS AND DESIGN INTO ONE SINGLE PRACTICE?

The trick is to tackle material development right from the design concept stage. Traditionally, we deal with materials and processes either as a present parameter in the design brief or in a post-design selection process. By developing a material at the design stage, we can have a far more synergistic and complex approach when looking ahead to design the final product.

WHAT ARE YOU WORKING ON AT THE MOMENT?

We are doing a lot of internal R&D on products and materials in the biomedical and consumer electronics markets, as well as a range of sports applications.

TELL US ABOUT YOUR PRODUCTION PROCESS?

Our focus with respect to manufacturing has always been upon freeform processing that enables us to fabricate the complex materials we design. Currently we're using a range of laser sintering additive processes, but there is considerable work to be done in understanding these.

HOW DO YOU SEE THE FUTURE FOR MATERIALS AND DESIGN?

From a design aspect, new technologies and new thinking in materials science is greatly challenging our current thinking about how materials are used. Our understanding of material properties is getting to the point where we're fairly fluent at modifying materials as we require. The challenge, then, is understanding how to develop materials in the context of more complex designs, which requires communication between the materials scientists and designers.

Amy Congdon is a designer and researcher in biomaterials. Amy is studying for a PhD with the Textile Futures Research Centre based at Central Saint Martins, in collaboration with Kings College London.

> I think the biggest challenge facing the materials industry is that of trying to innovate sustainably.

TELL US ABOUT SOME OF THE PROJECTS YOU ARE WORKING ON.

I'm currently working in collaboration with a tissue-engineering department at Kings College London. The project is looking to produce both new materials and products in the laboratory. The work is in collaboration with Professor Lucy Di Silvio at Kings. We are exploring growing cells over digitally embroidered scaffolds to create embroidery coated in bone or skin for example – in essence, leather.

Professor Di Silvio and I are also looking to experiment growing two different materials concurrently on one scaffold, with the aim of creating unique hybrids. The finished pieces for this project are currently intended to be a small collection of lab-grown jewellery, and/or textile trims. The reason we are looking at growing items such as jewellery is because the cost and size of the materials aligns with that of a luxury product. However, in the future these materials and production methods could have implications for numerous disciplines – from product design to architecture.

HOW HAVE YOU COMBINED MATERIALS AND TEXTILES WITH MEDICAL APPLICATIONS?

The work I'm carrying out in the laboratory is to develop new products and materials, however the inspiration for it very much came from techniques used in the medical sector. The use of embroidery as a scaffold was inspired by work in digital embroidery to create an implant for a patient who needed

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reconstructive surgery in his shoulder. Nicknamed 'The Beautiful Snowflake', the piece by Ellis Developments was designed to allow the muscles to be stitched onto it and then grow into the structure. Although we are currently exploring applications outside of the body, there are definite crossovers between the two fields. Much of what we're looking at developing could just as easily be explored to create medical implants for treating injuries such as anterior cruciate ligament damage.

YOU MENTIONED USING NATURAL MATERIALS TO MIMIC BONE. HOW ARE YOU DOING THIS?

The process looks at how we can mimic natural structures within the body using digital embroidery to then grow bone onto these scaffolds. These completely embroidered scaffolds are designed to give cells the information they need to orientate and to continue to grow and divide.

WHAT WOULD YOU SAY ARE THE MAIN CHALLENGES FACING THE MATERIALS INDUSTRY?

I think the biggest challenge is sustainable innovation. We are currently making and consuming as if we have infinite resources, when many are very definitely finite. I believe the biggest challenge is to change how we design and use materials.

The technologies of the life sciences have the potential to be much more sustainable, but some of the newest developments could be ethically problematic – with something like synthetic biology, scientists are designing living organisms from scratch. These types of technology offer the ability to use organisms such as bacteria to grow everything from silk to scents. However, the challenge is how to embrace the potential of these self-renewing technologies while being mindful of their wider implications.

WHAT CAN WE EXPECT IN FUTURE FOR NATURAL MATERIALS? WHAT DO YOU HOPE CAN BE ACHIEVED OR PRODUCED?

I think our interpretation of the term natural may well need to shift – we have been selectively breeding both animals and plants for centuries to achieve specific characteristics. Biotechnology offers us a new – albeit more radical-way of doing this. With any new technology, it is about using the right material for the job. For example, mammalian cells are what you use if you wanted to grow leather, whereas there are already computers being shipped in packaging grown using mushrooms. For me, the future is about understanding the potential of living materials for a world that is by nature much less resource-heavy and more self-replicating.

HOW CAN WE ENGAGE THE SCIENCE AND DESIGN COMMUNITIES TOGETHER?

The best way to get two different disciplines to engage is to get them to work together. When you try to explain to one another what you do, so much is lost in translation. However, once you start to get hands-on, that's when the possibilities open up and the exciting things happen. I believe it's important to have a skill and training in a certain area, but I also believe we should be pairing people from different disciplines, as it is that friction of varying ideas and approaches that often yields the most innovative results.