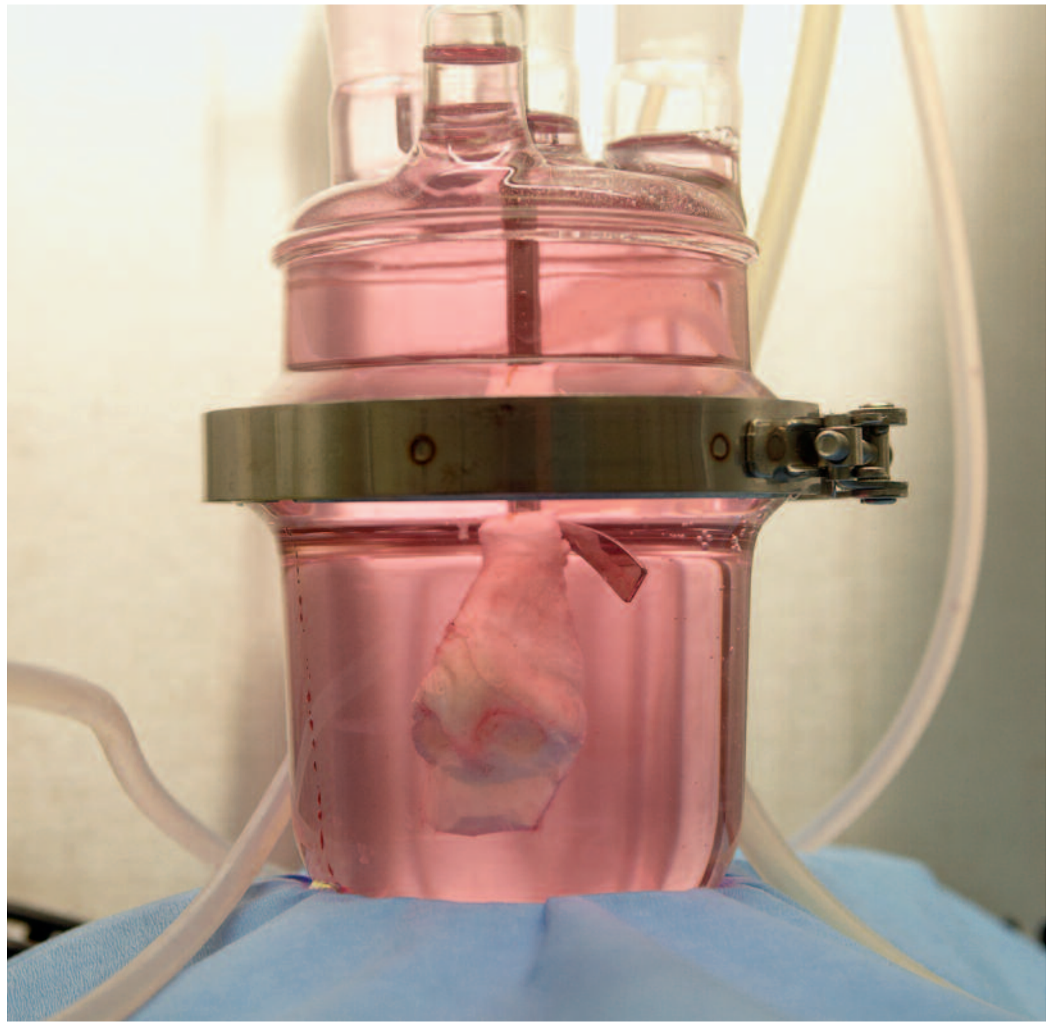
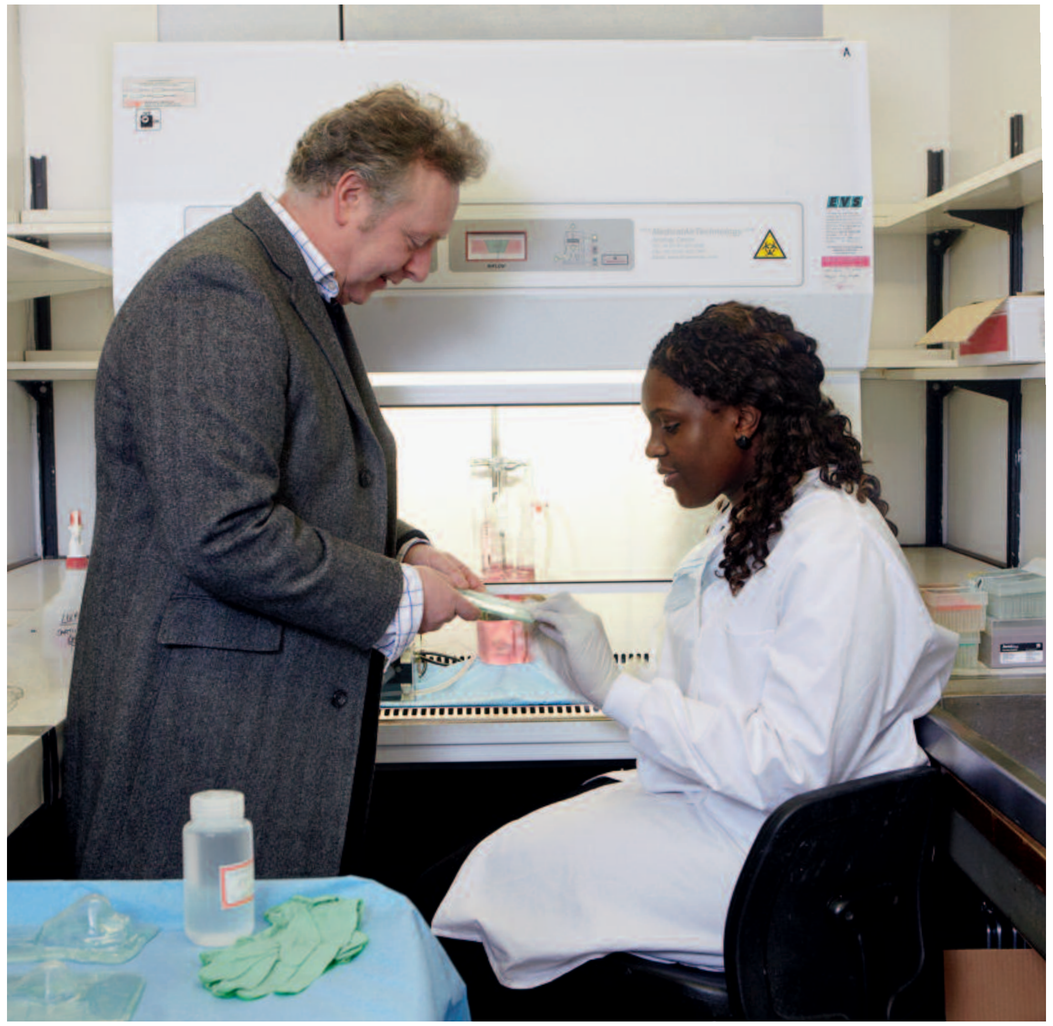


Left: the nose inside the bio-reactor
Right: Matt Durran in his studio

THE APPLIANCE OF SCIENCE

Glass artist Matt Durran is working with the surgical research department of the Royal Free Hospital to tissue-engineer a human nose. But how? Teleri Lloyd-Jones donned a white coat and found out. Photography by Tina Hillier



Left: Matt Durran and Lola Oseni in front of the bio-reactor at the Royal Free Hospital
Right: glass moulds

Every time Lola Oseni pops her head around the door she's wearing another layer of protective clothing. When she's finally ready for glass artist Matt Durran and me, she's sporting apron, gloves and a mask over the pre-requisite white coat. In a studio this would be unnerving but in the surgical research department of the Royal Free Hospital it is becoming alarming.

We're here to see Oseni's PhD research in action. Her given task (for UCL's Division of Surgery & Interventional Science) is to tissue-engineer a human nose. Before images of noses on the backs of mice flash before your eyes, let me put you at ease. This is not that, but rather a myriad of lab- and studio-based processes, to grow a cartilage scaffold which is then surgically inserted into the face.

But why should such a research project belong in the pages of *Crafts*? Well, it all began with an over-reactive polymer. Said polymer is used to create the scaffold for the cartilage cells to adhere to, but annoyingly, it reacts to pretty much any material, making it difficult to set into a mould. Look around any lab and you'll notice that glass is often the answer, and so it was here. A scientific glass company that Oseni approached recommended Durran, and on her first visit to his studio the two began working on solving the problem.

Knowing he could give Oseni's noses more accuracy, Durran made the moulds in glass blocks, but found that changes in the heat that the lab technicians subjected them to caused these to crack. So currently he makes each mould by slumping glass over a plaster form in a kiln. His part in the process seems simple in comparison to the futuristic marvels that follow, but it is also completely fundamental – so much so in fact, that on our introduction Oseni happily proclaims, 'He saved my PhD!'

It's obvious Durran takes pleasure from his involvement in real-world applications of his skills. And when Oseni describes her current practice, you get goosebumps at the possibilities: 'You've got a patient who is technically healed from cancer – great. But in the process he's lost a vital part of his identity. So psychologically he's not able to regain his function in society, and he's at home, depressed. What can we do for him? Current methods are sub-optimal: they might involve three, four, even five revision surgeries to make the nose look decent. Though the process we're working on seems more convoluted, it's actually more straightforward.'

When the glass mould is delivered to the hospital, it is filled with the polymer and given about a week to coagulate. The resultant spongy nose then forms the scaffold for the true tissue-engineering process which takes place in a bio-reactor set up in a flow cabinet, vacuum-sealed and germ-free. This is what Oseni has spent her morning putting together for us – and it's a whirring, whizzing, dramatic set-up. The coagulate nose is suspended in a glass jar filled with a generic 'culture medium', as gases are pumped through preventing the contents from becoming static. To those with only GCSE-level science to fall back on, it's hard not to find some magic in a process that grows human tissue in a glass jar.

During the month spent in the bio-reactor, cells adhere to the nose scaffold and secrete cartilage

Current methods may involve three, four, maybe five surgeries to make the nose look decent

creating a firm but flexible tissue. Having created the basic structure of the nose, you'd be forgiven for thinking that we're racing to the finish line. But this tissue needs a long period of bio-integration: when it becomes part of the body, blood vessels populate it and skin fixes to it, a process that takes months. For Oseni's research, the nose bio-integrates on the interior side of the forearm. Earlier in this process, the recipient will have had an expander inserted into the site on the arm – in simplest terms a balloon made using the original glass mould that, over time, is pumped up to gradually create the bespoke space in which the bespoke nose-to-be will fit. After a successful bio-integration, the nose is surgically removed from the arm and sutured into place on the face, and the blood vessels are connected.

Seeing the process as a whole, the materials move incrementally from hard to soft, macro to micro, with a mind-boggling number of moves from positive to negative moulds and vice versa. In marked contrast, the traditional methods for reconstructing a nose seem crude, taking cartilage from the rib and bone from the hip, shaping the pieces into a structure and then rotating a flap of skin from the forehead above. The time-consuming shaping process means a lot of theatre-time for the patient, as well as skills more akin to a sculptor than a surgeon. Oseni explains: 'In the old days the principles of plastic surgery were robbing Peter to pay Paul: you took one piece from one place and stuck it on another place. Forget Peter, Paul's all right. Now we're in an age where we don't need to rob, we can grow it ourselves and we can make it bespoke for each person.' It is an undeniably attractive vision of future possibility.

For Durran, it's the real-world application of a bespoke craft practice that interests him. Throughout the collaboration he's been struck by the similarities rather than the differences between him and Oseni. At the most elemental, both are driven by practical problem-solving via trial and error, making a process as efficient and simple as possible, manipulating materials toward an aesthetic end. Indeed some of the technologies overlap; it turns out the hospital has a rapid-prototyping machine in the basement. The day I visit, Durran is collecting one of his first real-world nose commissions in the form of a 3D-printed model of a section of a patient's face. From this he will make a glass mould – although often the patient will have had the nose fully removed, a rhinectomy, owing to skin or nasal cancer. So far, Durran's moulds have been made from his own nose. (His mother jokes that she should get a credit: after all, it is her work too.)

What is most appealing about meeting Oseni and Durran is the combination of their mutual respect for their distinct areas of knowledge, mixed with their willingness to discuss and share. Collaboration is the status quo in scientific research, but for Durran it's also very much part of his practice. 'It's good not to be precious about your work,' he explains, 'and to allow someone else to play with it. I come across so many artists that are so reluctant and so sensitive about it all that they miss the point. Historically, people have always worked with other people. Very rarely has just one person worked on their own on one thing. Collaboration is what I enjoy.'

To an outsider there's a disorienting breadth to Matt Durran's career. But the thread pulling it all together is a material curiosity. He loves the act of discovery, in places one wouldn't expect to find a glass artist: the week before we meet, he was mining obsidian in rural Hungary, for a project to be viewed at *COLLECT* (see supplement for details). He creates all manner of work, curates, lectures and collaborates – and some of his work goes uncredited. He makes pieces for other fine artists, and recalls a group exhibition at the Frieze Art Fair when he realised he'd made all the glass pieces in the room. 'There's no career plan,' he declares. 'Even people I've known for years can't quite work out what I do and how I do it, and where I'm going with it.'

Fabricating work for other artists gives Durran the space and access to materials that he mightn't have otherwise (one project found him 'working with platinum lustre like it was a tin of emulsion paint'). His lack of career plan lays bare his contagious faith that things just work out – people he's met, materials he's tried, places he's been, all find some relevance to his practice, maybe not now but at some point they will. Durran relishes playing in the gaps between definitions, and you get the feeling he enjoys his enigmatic role as artist one minute, technician the next. For this mercurial practice, he's got one piece of advice: 'You've got to be strong in yourself, strong in your work and strong in the belief of what you're doing and then you can be open to things.' This philosophy finds a fit with the Royal Free project reaching across the boundaries of art and science. 'That's what I'm always arguing with students or collaborators or artists,' he explains, 'the fact that we undervalue what we do so much because we only see it in the context of what we're doing, but there will be applications that we haven't made the jump to.' Indeed, bringing the Royal Free project full circle from one side of the science-art divide to the other, part of the process will be on show at the Victoria and Albert Museum.

From beginning to end, the creation of a new nose relies not only on multiple processes but on the practical skills of many different professions, from researcher to glass artist to lab technician to surgeon. It's difficult, complicated and – for the time being – expensive, but as Oseni underlines the advantages are simple because 'It's all about the patient.' And it's that basic truth that beats at the heart of this cross-disciplinary collaboration.

'Face Saving' will be part of the 'Power of Making', a Crafts Council and V&A partnership exhibition opening 6 September. See Crafts Guide for details.

Left: glass moulds
Right: glass moulds in Durran's kiln. The glass is slumped over a plaster/quartz mix

A balloon is pumped up to create the bespoke space in which the bespoke nose-to-be will fit