**Q & A.**

**These are a series of questions asked by students and colleagues over the past few years. There’s probably some repetition, but I hope the answers help to give an insight into the thinking underpinning my practice.**

What has 3d printing allowed you to do technically and conceptually that you were not able to do before?

To put it simply, it has allowed me to make the impossible object.

When making pots by hand, I was limited by certain material and physical constraints, such as centrifugal force and gravity. Digital design and manufacturing has removed the majority of those limitations, allowing me to create objects that I cannot imagine making in any other way. However, the new tools do not lead the way, I firmly believe that the idea is the starting point and that the appropriate set of tools are chosen in order to translate that idea into a physical reality. I also believe that these new tools do not replace any others and that, as makers we simply have a larger toolbox.

In what ways do you consider the technologies you are currently using as limiting?

I use Rhino 3D software and a bureau using the latest Selective Laser Sintering usually manufactures the pieces that I create.

Rhino 3D, like most CAD programmes was designed for engineers, not artists and makers, so I have found that there is a need to develop my own approach to using some of the tools, particularly in creating a sequence of actions in order to achieve what I have in mind. Rhino developers have now realised that there is a growing community of artists and makers using the software and have created various plug-ins addressed to their particular needs.

I don’t actually see much difference between learning and adapting these digital tools to learning and customising physical tools. Both involve haptic skills and tacit knowledge, though there’s obviously a physical disjoint when using a mouse. However, I think the underlying thought processes are closely related. The feedback process where evaluation of work-in-progress is a result of direct contact with a physical material has to be adapted and replaced by my previous experience of the 3-dimensional form, as the virtual object on the screen can be misleading.

Powder printing, such as SLS is a liberating technology as objects are supported by excess powder during the build process, allowing complex forms to be made that could not support themselves if I was attempting to produce them by hand in clay. Alongside that, the software tools allow me to create geometries that I could not even begin to draw, let alone make.

Do you see the further development of printing with ceramic materials as a threat to traditional practices of working in clay?  Why or why not? And if so, in what way?

No, not at all. If I wish to make a cup and saucer, I am not going to use Rhino 3D and SLS. I will most likely throw some on the wheel, as they will have particular qualities that cannot be achieved with digital technologies. As I said before, these new tools do not replace anything, so making by hand or employing traditional industrial techniques still have their place.

What do you see as the future of ceramics and 3D printing?

The use of new technologies has fundamentally changed my practice from one where function, aesthetics and material properties were the focus, to one where I have far more creative freedom. That isn’t a value judgement, I simply saying that working in the way that I do has allowed me to bring together wider interests, and positioned me somewhere between art, design, craft and technology. I can no longer call myself a potter, though that experience is fundamental to who I am; I simply call myself a maker, though some would read that as a provocative title!

How did you get involved with digital technologies (and what, if any, programs do you use)?

It started with a fascination for the potential of computers (after we were given an Amstrad in the early 90's!). As I mention in my essay, it was learning to write HTML that 'woke up' another part of my brain to alternative ways of creative thinking. I then heard of 'rapid prototyping' as I was then called and could see the almost unlimited potential of the technology.

I primarily use Rhino 3D software, mostly the free beta Mac version, though I also have the Windows V5 version.

Coming originally from a more traditional craft/maker background, was there any hesitation when opting to produce work digitally (i.e. the possibility of risking harming the artistic integrity of your work)?

None whatsoever! I firmly believe that ideas lead the way and that tools of one form or another need to be utilised in order to realise the idea as a tangible object. There is a misconception that the ability to engage with new technologies doesn't require a similar development of skills to that of learning any other craft. The interaction with a virtual, onscreen object via a mouse requires the same conceptual leap of imagination as when a material is directly manipulated. That probably sounds contentious, so in addition I would say that I heavily rely on my previous experience of making by hand and firmly believe that knowledge of materials and processes is fundamental to the creation of meaningful objects.

Do the limits and capabilities of your chosen technologies ever inform or affect the design/nature of your work?

They often frustrate me! However, I am fairly dogged and will persevere to work out ways of using the software in ways that it wasn't intended. The ability to combine the software and hardware to produce these 'impossible' objects still fully engages me, and I enjoy observing and engaging in the frequent advances in the capabilities of the technology.

Do you produce the digital versions of the work yourself or do you hire a specialist to produce it for you from concepts/maquettes?

I design the objects, and then send the data to a bureau that print the work for me. That sounds as though the bureau simply process the work in an anonymous way, but I need a close working relationship with the technicians as they know their machines and look out for any potential problems. There is a craft to 3D printing in exactly the same way as with the use of any tool.

Have you ever received any negativity towards digitally produced work from those involved with more ‘traditional’ hand-made craft?

Definitely! The majority of the studio pottery community that I used to show with do not want to know. However, one or two 'get it' and can see the attraction and excitement of working in this way. I'm not at all worried about the negativity, they go their way, and I’ll go mine. I think some falsely see what I'm doing as some sort of threat, but the tools that I use don't replace the tools they use. If I want to make a cup and saucer, I'll use the wheel not the 3D printer.

The things that you have made are perceived as objects of art. Do you think that this definition (which I acknowledge is not an easy one) is based on the intellectual rigour behind the methods used, or is there something else involved and was this an intention of yours?

The short answer is yes. As you say, the definition is not an easy one, so the longer answer is that my practice inhabits a territory or grey area somewhere between the disciplines of art, craft and design. However, having recently been to the workshops where Gormley, Quinn, Chapman Bros., Kapoor etc have some of their work fabricated, I would say that their work inhabits the same territory, but the methods used to manufacture their art is rarely questioned.

It was a risky and courageous decision to move away from a successful ceramics practice to explore a new type of work. Where you given any advice, support or funding to take this step? Did you speak to anybody in particular before you leapt?

No, no-one at all. My parents helped fund my studies and my wife was phenomenally supportive. Staff at the RCA guided the application process and the community of staff & fellow research students were invaluable. I had no idea of the outcome, but felt a strong need to explore the ideas that had been developing over the previous few years. It took a lot of hard work and a great deal of rigorous examination, but I was fortunate that I was at the right place at the right time for me.

I can see from your website that the pots you were making had developed over time. Had your career as a potter come to a natural point of change or was there a sudden revelation that things needed to move on?

As I said above, the ideas had been developing over a period of time; I simply had an overwhelming desire to adopt emerging technology to make ‘impossible’ objects.

How important has it been to study in London and with the Royal College in terms of contacts, exposure and influential support?

My reason for going there was to be able to study in a rigorously critical and supportive environment. I wanted to have my [embedded] thinking challenged. And it was!

I didn’t think at all about how it would affect my career. I can’t deny that it gave me more exposure than I could possibly have imagined which has been tremendously helpful to my career, but the work has to be able to withstand scrutiny, simply having the RCA stamp is definitely not enough.

I am interested in the idea of an art fair. Having only really experienced craft and ceramics fairs, what is the difference? Do you think that an arts market has fundamental differences to a ceramics market beyond the price? Have you purposefully courted this or is it coincidental?

I was very lucky to be approached by the dealer Adrian Sassoon at my final show. I am now represented by AS and have been very well initiated into the world of the Art Fair. The clientele are completely different, either museums, collectors of the contemporary [art and design] or of antique [art and artefacts]. The big difference is that there is far more interest in the concept underpinning the work than at the craft fairs we used to attend.

In what way in particular does your experience as a traditional studio potter benefit the way that you work now?

I think that knowledge and experience of materials and processes is fundamental in order to realise an idea as an object. For instance, it’s important to know that ash is a much more flexible wood than oak and therefore more suitable for steam bending or making tool handles. Practice also develops a makers understanding of working in 3 dimensions, where proportion, scale and volume become part of tacit knowledge.

I rely on this familiarity to guide me when creating my artworks on the Rhino 3D software. Though it’s possible to pan, zoom and inspect the pieces in minute detail, there’s still a huge amount of sensory information missing that can only be experienced when we handle the real thing. In other words, I have to translate what I see on the screen, because I know the piece is going to be different when it is manufactured.

Do you ever miss the immediate feedback that you get when working and engaging directly with physical materials?

No, is the short answer. As I said above, I cannot divorce my actions in the virtual world of CAD software from making in the actual world.

Having said that I explore the fact that we increasingly engage with the real world through the 2 dimensions of a screen. I have chosen to re-interpret objects that I haven’t actually seen, basing my designs on images available through Google Image searches. So details are missing, the scale is wrong, it might be round instead of oval etc.

It’s an opportunity to make artworks that raise the very issues that you are researching here.

In relation to Donald Schon’s theories surrounding ‘reflection-in-action’, at what point do you tend to reflect on your work and ideas? Do you find working with digital technologies to be an inquisitive and contemplative process?

Hmm, good question. Though a great deal of research and thought goes into the pieces before I even switch on the computer, I rely a lot on intuition. The starting point is often historical, but reinterpreted to make a comment or encourage debate around technology and making. I also find myself writing notes about things I have seen or sticking images into my sketchbook without really knowing why. It’s only later, when reflecting that I understand how those gleanings have underpinned or contributed to a piece. It might not be tangible or physically apparent, but it’s there in the ‘feel’ of the piece, or the way that viewers react to it.

More pragmatically, I find that the challenge of bending and manipulating the software to my needs can be all consuming. I have a dogged determinism to find and apply tools in the way I require in order to realise the ideas that I have in mind. (This is making it sound almost animate, which it obviously isn’t, I suppose I am simply attempting to use it in the way that clay can be manipulated).

The other method of reflection is through having to articulate my work for a presentation or publication. (And in answering questions like yours!). Having had the rigorous discipline of writing a thesis for my MPhil, I don’t feel so intimidated about attempting to clearly express myself in words. It’s still quite a challenge, and I'm sure it doesn’t always succeed, but that’s life.

In what way do you feel that digitally based methods of production alter ideas of the intrinsic value of ceramic work created, both in terms of its commercial value as well as its value as a part of the contemporary ceramic lexicon?

In theory the tools and processes used to produce the work should have little bearing on the value of the object in both the senses you describe. Obviously the skills of the maker/artist will have a bearing on the perceived value, but the fact that 3D printing, in particular, allows the making of previously impossible objects, means that there is both a novelty value and the ability of the maker/artist to create objects that are both self-referential and look outwards, making comment on the history of ceramics and our relationship to those objects.

Is the term ‘hand-made’ a label that you would associate with digitally made ceramic objects, created either as a result of industrial processes or as the result of independent designer maker / artists engaging with digitally based production techniques?

That’s a tricky one! In one sense, yes and I say that because I’m not quite sure what ‘hand-made’ actually means. How many makers simply use their hands? I can’t think of any that don’t employ simple or sophisticated tools of some sort.

Which is more important, the expression of an idea in material form or the application of skill in batch production? Both have a place. My use of new tools (software) has been enabled by the development of new haptic skills (via mouse and screen), but underpinned by my previous experience and understanding of the 3 dimensional form.

In short, the definition of hand-made, if there is such a thing needs to be amended.

What do you think might be the limits and consequences of the hand-made within a technologically rich contemporary ceramic design context?

I’m afraid I’m not a clairvoyant! It will be some time before we reach that point, as the technology is still in its infancy.

I am confident that there will still be a place for the ‘hand-made’ (non-digital). The new tools do not replace the old, they simply give the maker more choices, hopefully, in time the viewer will be less concerned about the difference between digital and non-digital making, particularly as I think some of the most exciting work will utilise hybrid processes.

An area of your practice appears to be concerned with extending the context in which traditional forms can be produced, enabling a dialogue between notions of accustomed practice and traditions with entirely new ideas of what it means to create.

As your practice is both grounded in a traditional and modern narrative, to what extent do you believe that your work is able to transcend the digital nature of its conception and production, and become seemingly ‘hand-made’ by proxy of its foundations within the understood norms of ceramics?

To a certain extent I think I have answered the question in my comments above. The fact that my work often references historical objects is a device I use to engage the viewer, in order to engage them in a number of issues, including the cultural and financial value of the objects that we choose to surround ourselves with, the craft of digital technology and its relationship to non-digital etc.

In the act of seducing the viewer, I expect them to respond to some extent to the aesthetics and the narrative, but in what way and to what level is up to them.

In practice I find that some are intrigued by the capabilities of the technology, for others it is of no interest whatsoever.

Q. How long have you done active craftsmanship? And what inspired you to use the 3D print technology, except the intricacy?

Part-time since 1981, full-time since 1984, so 24 years making pots, then 2 years at the Royal College of Art [2006 - 08]. Since then my practice has employed Additive Manufacturing.

Fundamentally, it allows me to make the ‘impossible’ object. In other words, the removal from the constraints of ‘design for manufacture’ allows me almost total creative freedom.

Q. Could you take me Step-by-step by your process? Mentioning the name of software and Bureaus.

I use Rhino 3D software, but occasionally employ MeshLab to fix problems. All my pieces are made for me by 3TRPD, a bureau in Newbury, Berkshire. For a step-by-step intro take a look at [this blog](http://wedgwoodnt.blogspot.com/). It’s an archive of the process of producing my first digital piece.

Q. What part of the process do you experience the most enjoy and what part you face difficulty in?

I feel fully engaged in the whole process, form starting to think about the subject of new work, gathering ideas, researching themes. And then the challenge of creating a meaningful object and devising ways to make the software do what I want it to do. It’s all a challenge.

Q. Since you are an active user of this additive technology, where do you see the gap in the market for creative makers as you?

I don’t see a ‘gap’, though I’m not entirely sure what you mean. It’s all out there for the taking, but like any skill or profession, takes a great deal of time to become competent, let alone to use the tools in a poetic way.

Q. In your opinion, if the gap were a product, are 3D scanners a potential area to be improved?

Yes, though things are improving. I’m not that impressed with my Sense scanner, but I like the free 123D Catch App for smartphones.

Q. You must have heard of a product by 3D systems called GeoMagic Sculpt. What are you thoughts about it?

I have used a haptic arm with Freeform software, but haven’t trialled GeoMagic Sculpt. However, I am sat on the train to visit 3D Systems in Boston as I write this, so will ask them about it. It looks like it could bridge a gap.