

FOR ART JEWELLERS: a 3D modelling software programme

Digitally different - an antidote to CAD

Ann Marie Shillito

Designer Jeweller

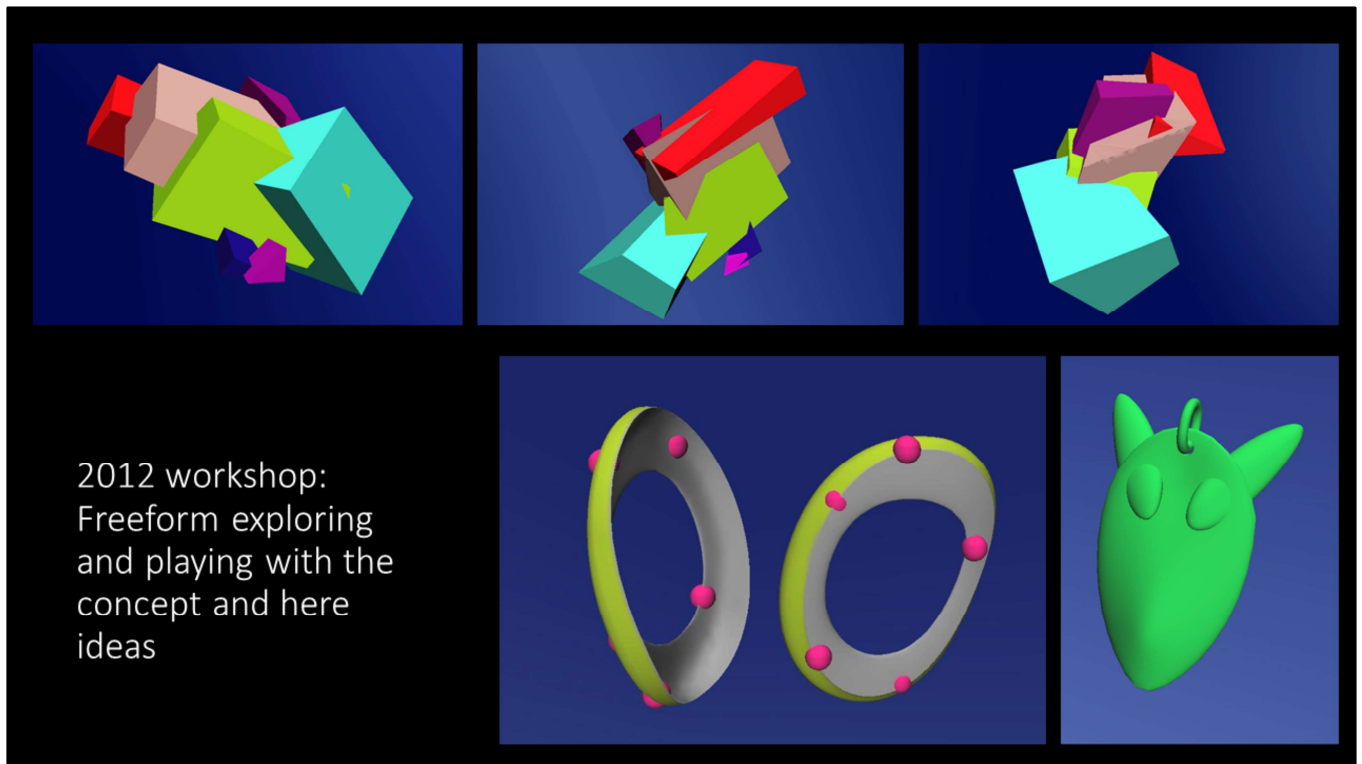
Co-founder/CEO : Anarkik3D Ltd

I am Ann Marie Shillito, a designer jeweller, co-founder and CEO of Anarkik3D Ltd, based in wonderful Edinburgh in beautiful Scotland. This presentation is about a software programme that Anarkik3D has developed that is digitally different and an antidote to many of the standard industry specific Computer Aided Design (CAD) programmes available. Anarkik3D as a company spun out of 6 years of research and development to investigate if haptics, as 3D virtual touch, would make for a more accessible way for people in the arts to design in 3 dimensions.

Birgit Laken

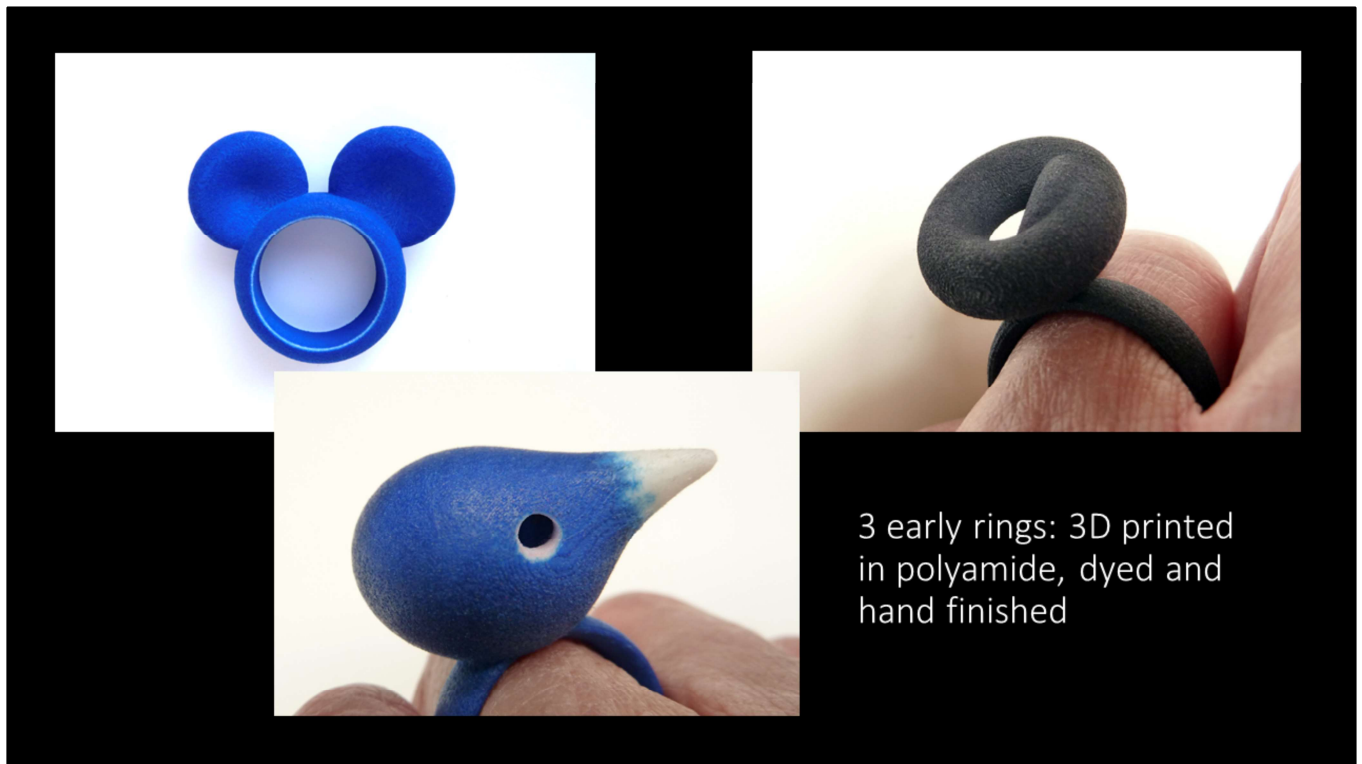


I am starting with this wonderful woman, Birgit Laken from the Netherlands. I have known her the longest of the five jewellers I am presenting here. She was one of the first applied artists in 2006 to test the novel prototype 3D modelling programme we built to trial and validate our research findings. We invited 8 people from the creative sector to use and play with the programme to test the combined 3D virtual touch, stereovisual co-located system was a good tool for 3D modelling for people who struggled to design with CAD programmes. And to get their feedback.



2012 workshop:
Freeform exploring
and playing with the
concept and here
ideas

Birgit Laken is a jewellery designer and a photographer and came to a workshop 4 years later in 2012 to trial Anarkik3D's commercial 3D modelling product, Anarkik3DDesign software. She is a major enthusiast.



During the 2012 two day workshop she designed her iconic 'ears' ring which we uploaded to her new free account at Shapeways also based in The Netherlands to be 3D printed in polyamide, a nylon type polymer that dyes well.



3D printed dyed and
hand finished
polyamide

Birgit's aesthetic combines strong, pure lines with a playful sense of humour, to create unique pieces of jewellery. Her pieces are hand-finished with judicious rubbing down to highlight details and edges.



3D printed dyed and hand painted polyamide

She shares her passion with others, surprising and inspiring them with the special character of her work, and by having the full haptic 3D modelling kit on her stand at design fairs. She both demonstrates and gives people the experience of haptics through physically touching and feeling a virtual 3 dimensional object.



3D printed
multicolour paper



3D printed dyed
polyamide



Birgit and I have explored 3D printing in paper and designing for it's specific qualities. The feel of the material is warm and velvety and although form complexity is not easy to successfully achieve, complex colouration can be printed into the surface.



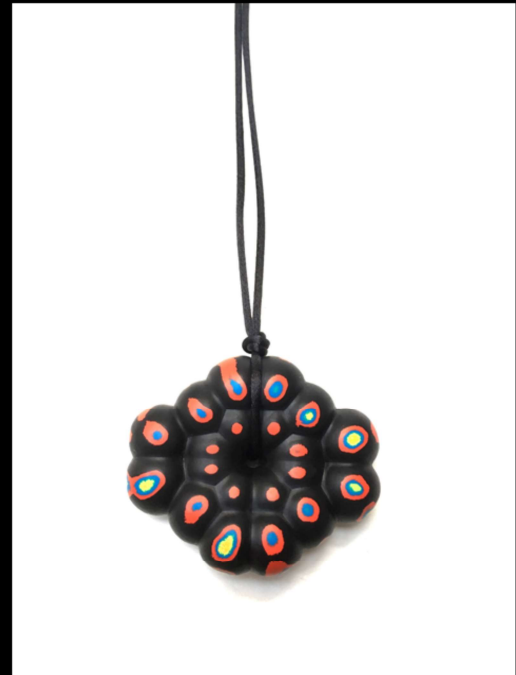
Pin and pendant: 3D printed in multicolour sandstone



These are Birgit's latest work created for a very recent exhibition at Cecile van Eeden Gallery celebrating it's 20th anniversary. The pin and pendant each have 20 coloured balls

Pendants: 3D printed in polyamide

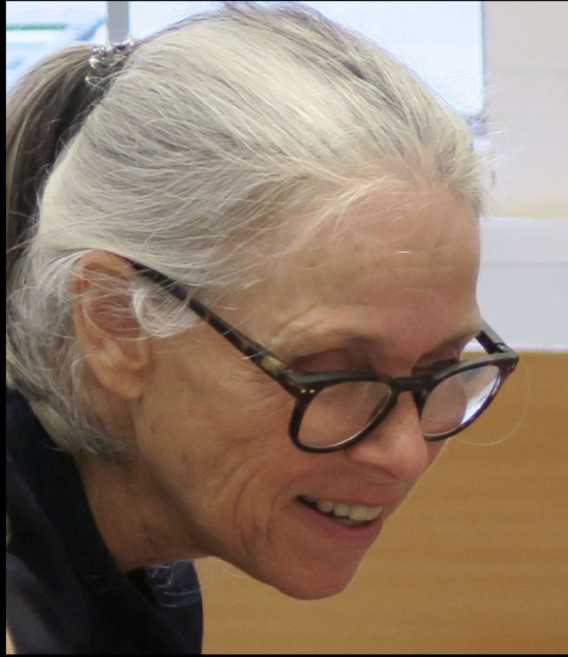
Pin dyed with two colours and pendant spray painted in multicoloured layers. Then both rubbed down through colours to white base



These were also created for the Cecile van Eeden Gallery exhibition.

You can see more of Birgit's work here: <https://anarkik3d.co.uk/our-community/anarkik-creations/birgit-laken/>

Anne Boylan



Anne Boylan is an established contemporary jeweller and lecturer at Belfast School of Art.

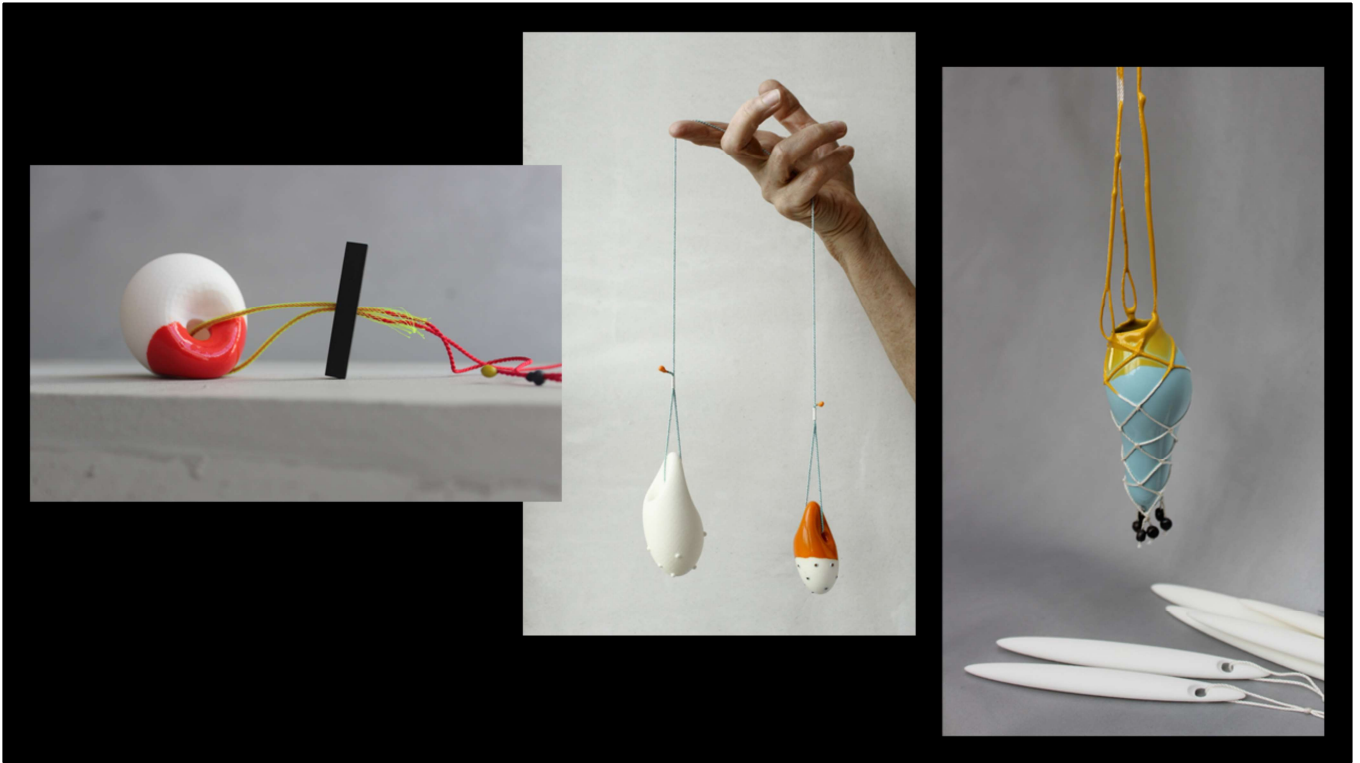


She labelled herself a technological illiterate who purchased her Anarkik3DDesign kit in January 2018, having participated in a short four hour workshop held for designer makers to try haptic 3D modelling. Within a few short weeks she created digital models she wanted to have 3D printed.



The black piece in the centre is from Anne's batch pods, 3D printed in polyamide, and dyed black. She has set moonstones in the pod, with pigmented polyurethane and carved ebony as the recessed disc, with yellow silk and silicon sheath.

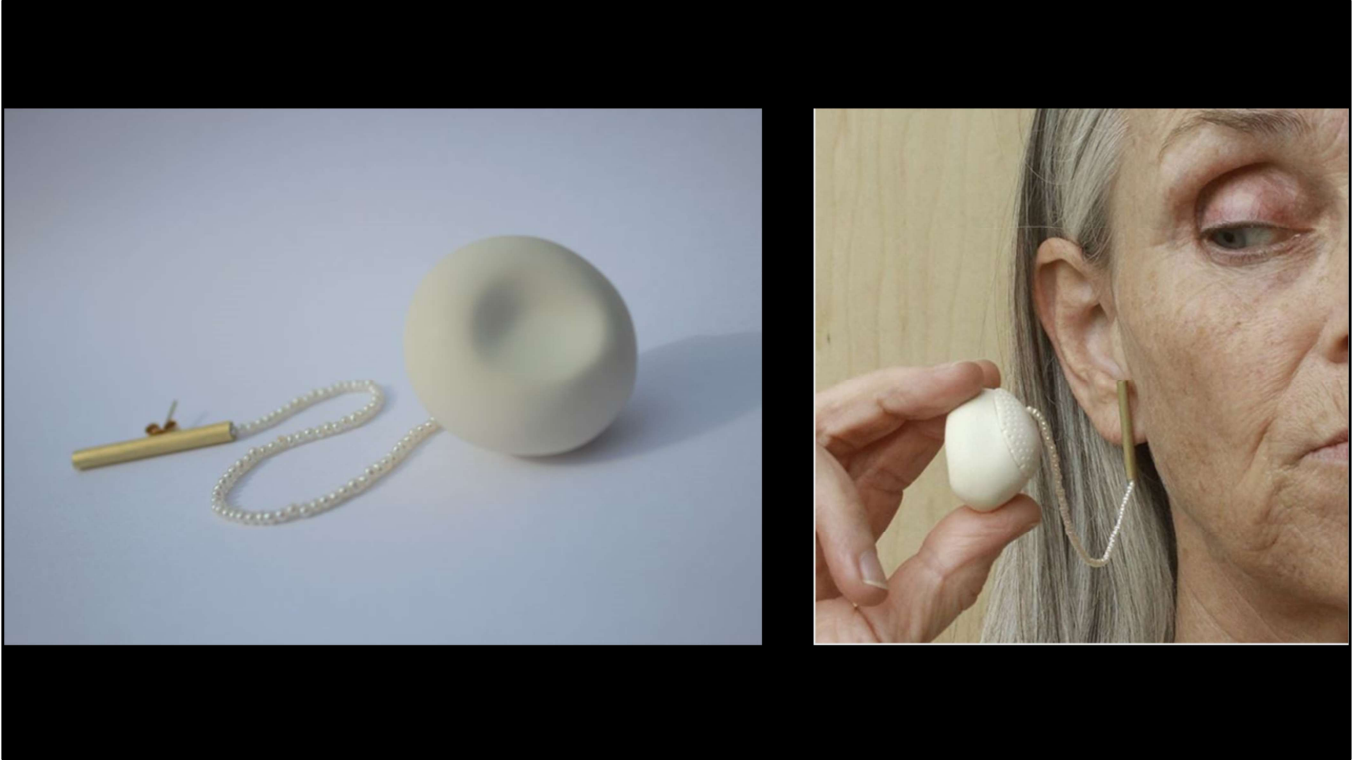
The pod on the right is 3D printed dyed polymer with gold, coral & seed pearls.



A quote from Anne: 'Using Anarkik3DDesign has added a different layer of drawing and making to my practice. It proved to be a very direct and instinctive programme that was as close to my paper-based drawing process as computer drawing could allow. The speed with which I was able to engage with its haptic nature allowed an unexpected 'flow' of ideas that came surprisingly close to experimental studio work. I can now say that Anarkik3D Design is established as part of my practice!' (AEB, March 2019)



I love the way jewellers use their 3D printed models! Anne uses gloss polyurethane paint to enhance the matt base material of polyamide and this design is set with black diamonds!



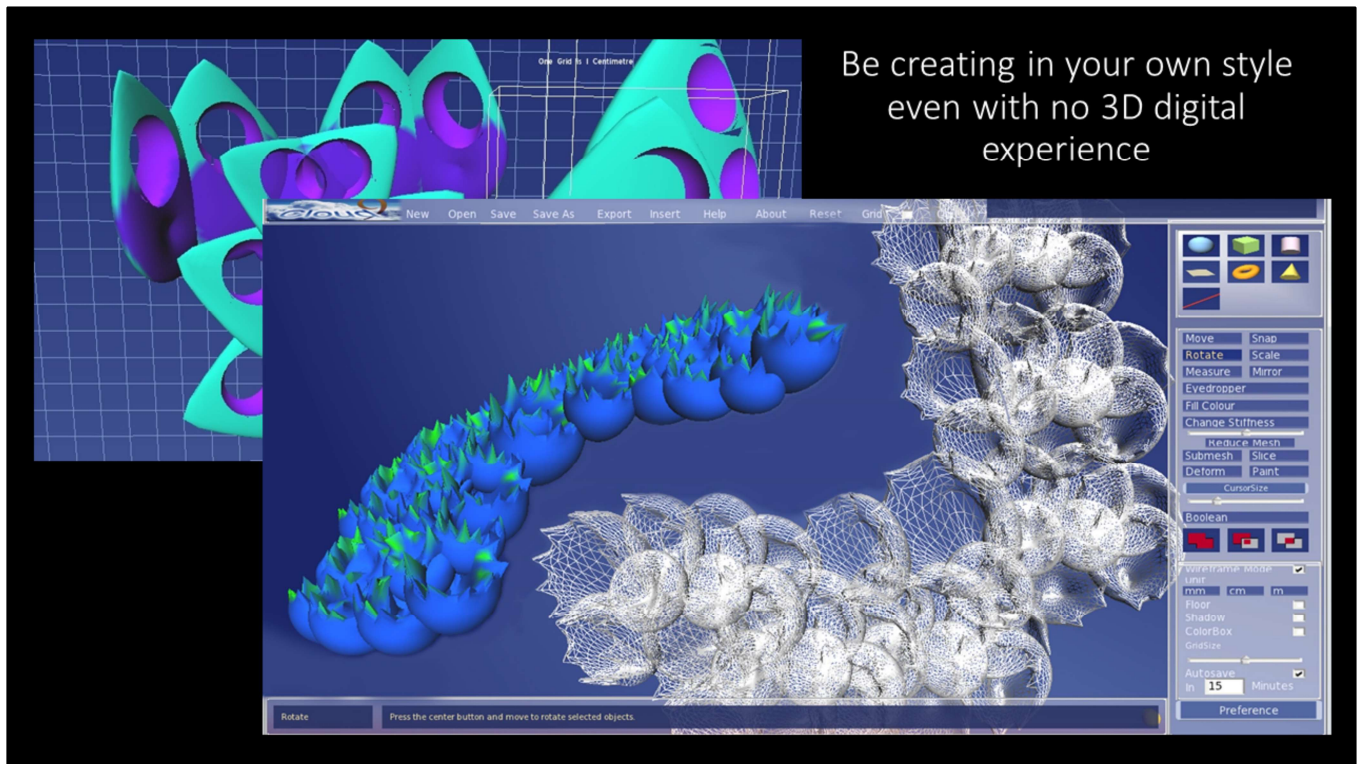
This is one of her latest 3D printed pieces: created for the 2019/2020 Association for Contemporary Jewellery exhibition 'Connections': her earpieces, in one ear & out...the other!

You can see more of Anne's work here: <https://anarkik3d.co.uk/our-community/anarkik-creations/anne-boylan/>

Elizabeth Armour



When Elizabeth Armour graduated from Art College in Dundee she was awarded funding to purchase her own Anarkik3DDesign programme. Her jewellery department at Duncan of Jordanstone College of Art was the first in an art college to have our 3D modelling system for students to use and access 3D printing.

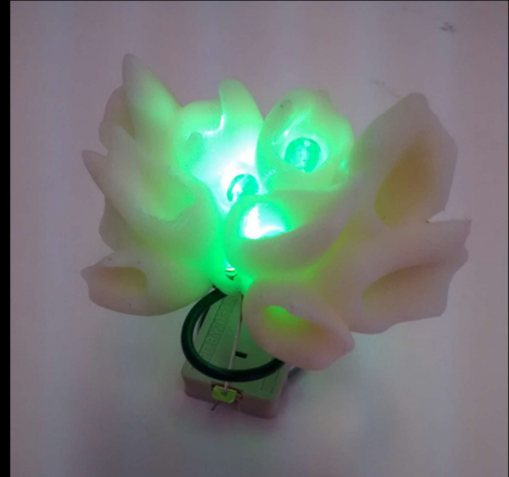


Elizabeth is inspired by science fiction and fantasy, as well as the exotic forms of sea creatures. The non-complex interface of Anarkik3DDesign has enabled Elizabeth to ‘play’ and developed her own style.



3D printed hand dyed polyamide, Set with pearls and with silver

Drawing on her knowledge of traditional jewellery-making and metal-work, she fuses digital design with hand-making techniques and hand-finishing her 3D printed models with beads and metals for a stunning effect to create unique wearable sculptures.



3D printed hand dyed polymer made into a pin and with LED lights

In addition to her personal work, Elizabeth collaborates with companies and community groups to create visually immersive events. Abertay University commissioned her to create 200 interactive wearable sculptures for the Indie Games Festival “Dare to be Digital”. For the closing ceremony, two hundred dancers wearing her pieces created light trails as they moved, becoming the ‘Northern Lights’!



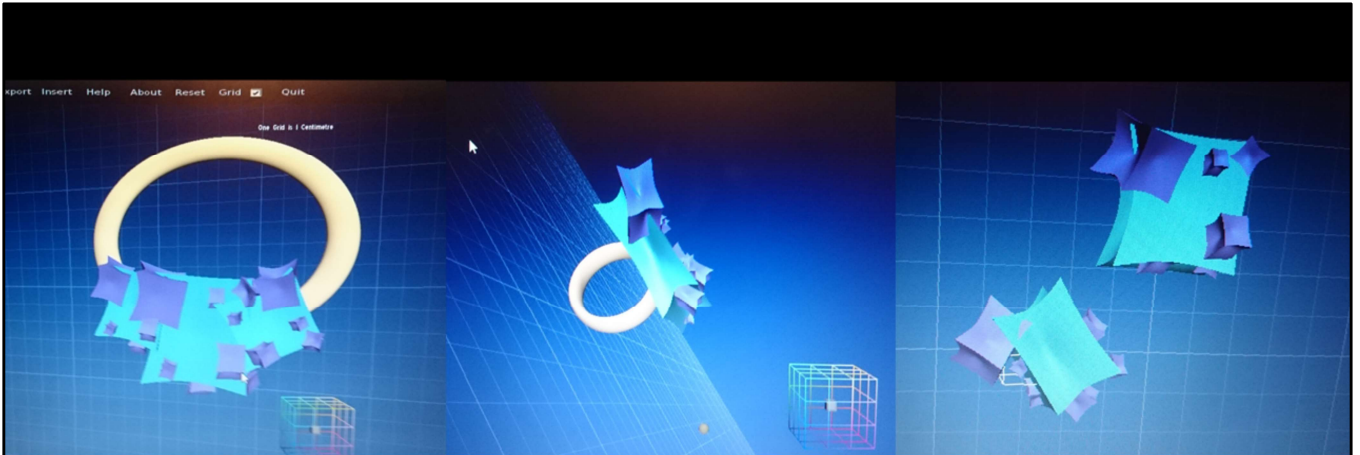
This is the collection of work that she produced for the exhibition of 3D printed jewellery at Galerie VundV in Vienna in 2017. Between then and now Elizabeth has been working in Japan, and now back in Scotland. I think her future jewellery is going to have a Japanese flavour.

You can see more of Elizabeth's work here: <https://anarkik3d.co.uk/our-community/anarkik-creations/elizabeth-armour/>

Genna
Delaney



Genna Delaney is a jeweller based in Scotland, in Dundee too. At art college she didn't enjoy using CAD programmes such as Rhino, finding them expensive and complicated.



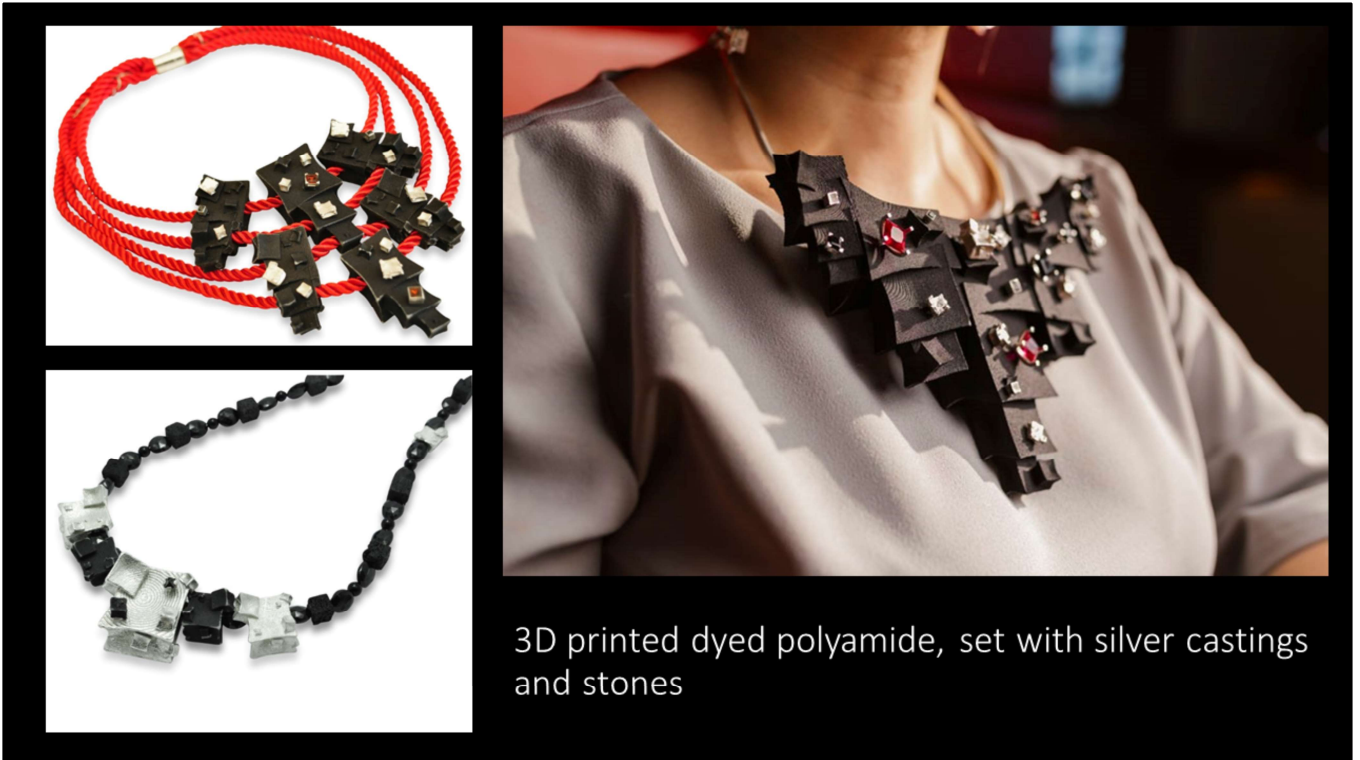
No need to learn complex Computer Aided Design programmes

Through research into other 3D CAD and 3D modelling systems, as she wanted to push her work in a new direction, she discovered Anarkik3DDesign. She received a Dundee Craft Makers Award to help her attend an Anarkik3DDesign intensive course and loving how simple and playful the programme was she went ahead and purchased her own.



3D printed dyed polyamide, set with silver castings.

She decided to incorporate 3D printing into her jewellery to expand her practice into art jewellery, design larger sculptural pieces and go for a more international client base. To quote Genna: "My jewellery had become 2D flat pieces and I wanted to create more 3D sculptural jewellery..."



3D printing has enabled her to move into art jewellery with bold, edgy shapes that are also lightweight and easy to wear. All her pieces incorporate handmade elements. Her different suites are modular so a customer can select which shape, material and stones they would like incorporated.

Genna's 3D printed range of jewellery is in polyamide and dyed. The 3D units are also scaled, 3D printed and cast in silver, and she embellishes pieces with these and with precious and semi-precious stones.

3D printed dyed polyamide



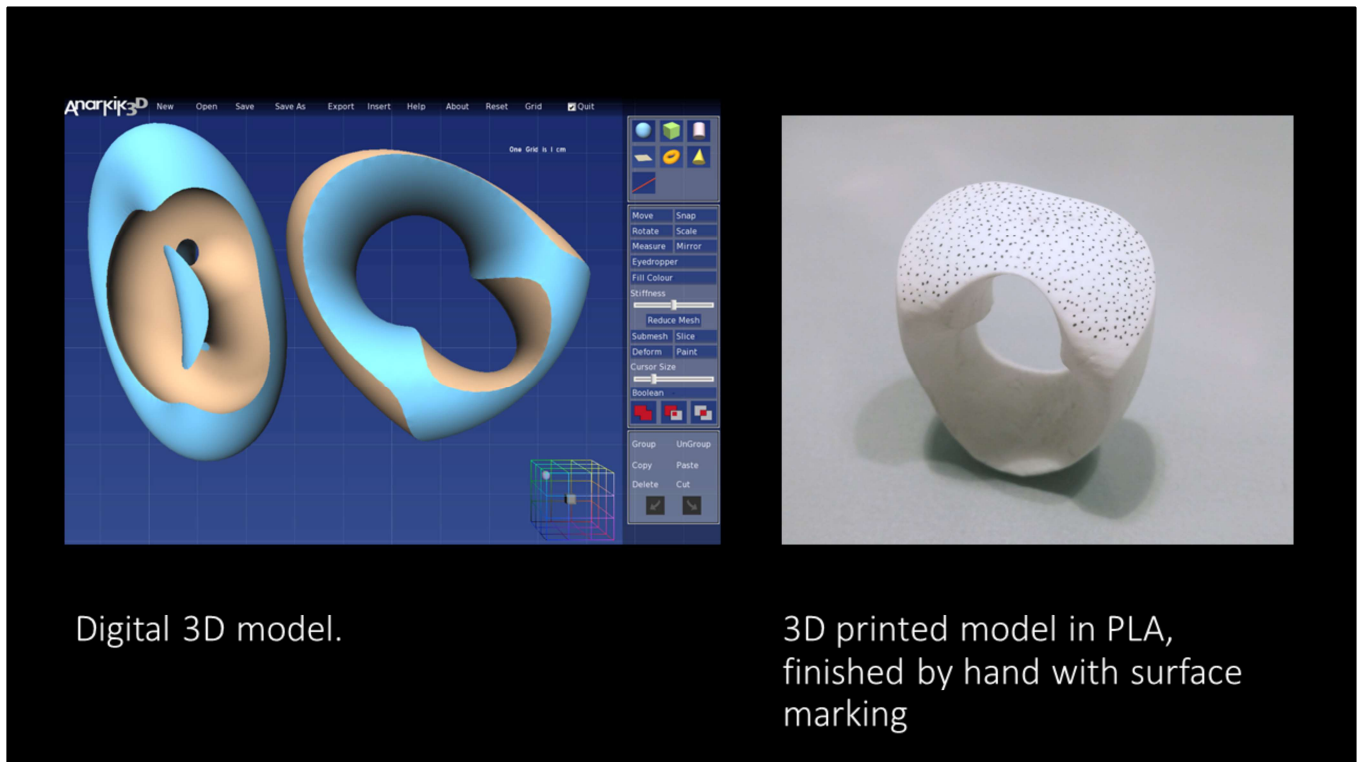
To quote Genna again: “I absolutely love this haptic programme as it’s so much more fun to use than other CAD software packages, which for me are too technical. Anarkik3D’s software allows me to really feel like I am sculpting the object in front of me – you never really know what you are going to come up with once you begin!”

You can see more of Genna’s work here: <https://anarkik3d.co.uk/our-community/anarkik-creations/genna-delaney/>

Ursula
Guttman

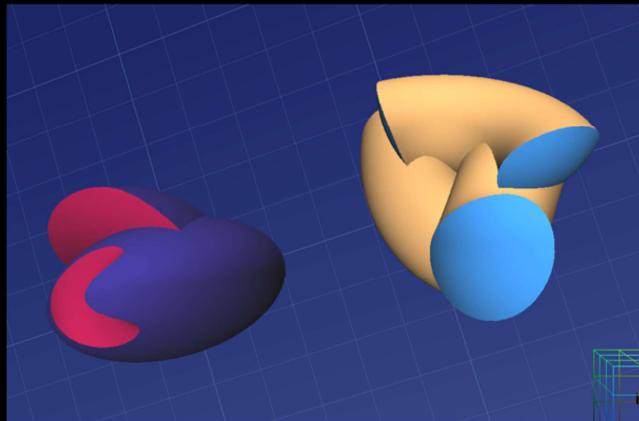


Ursula Guttman is an artist, maker, curator, living in Austria. She had collaborated with others to use digital technology and given up on Blender for creating 3D models to 3D print.



She attended a 2 day workshop on Anarkik3DDesign that we held in Vienna in 2017 and we awarded her Anarkik3DDesign software for her stunning forms. She decided to use Anarkik3DDesign to create her 3D models.

These forms in the slide were created during the workshop by using our Boolean subtraction tool which she has made her own, utilising the 'intersection' feature to produce her unique and beautiful forms. We developed this tool to be very intuitive, easy and enjoyable to use and the intersection forms are the bits remaining when two overlapping forms are subtracted from each other.



Digital 3D models.

3D printed model in
multicolour sandstone.



These digital 3D models were also created during the 2017 workshop in Vienna. Ursula had the one form 3D printed in coloured sandstone and made into a neckpiece to included in her major exhibition in Nov/Dec 2019 at Galerie VundV in Vienna.

So just 2 years after her workshop learning the basics of Anarkik3DDesign Ursula is invited to have a one-person exhibition of her new 3D printed jewellery in this Galerie renown for showing and promoting contemporary art jewellery. The following slides illustrate some of the art jewellery that Ursula created for this major exhibition.



What I love about her work is how she enhances the 3D printed form by adding other components, such as polished and painted metal discs, resin and hand finished surfaces.

It is the way that jewellers can use their skills to add value to parts made using industrial technologies that I find so very inspiring.



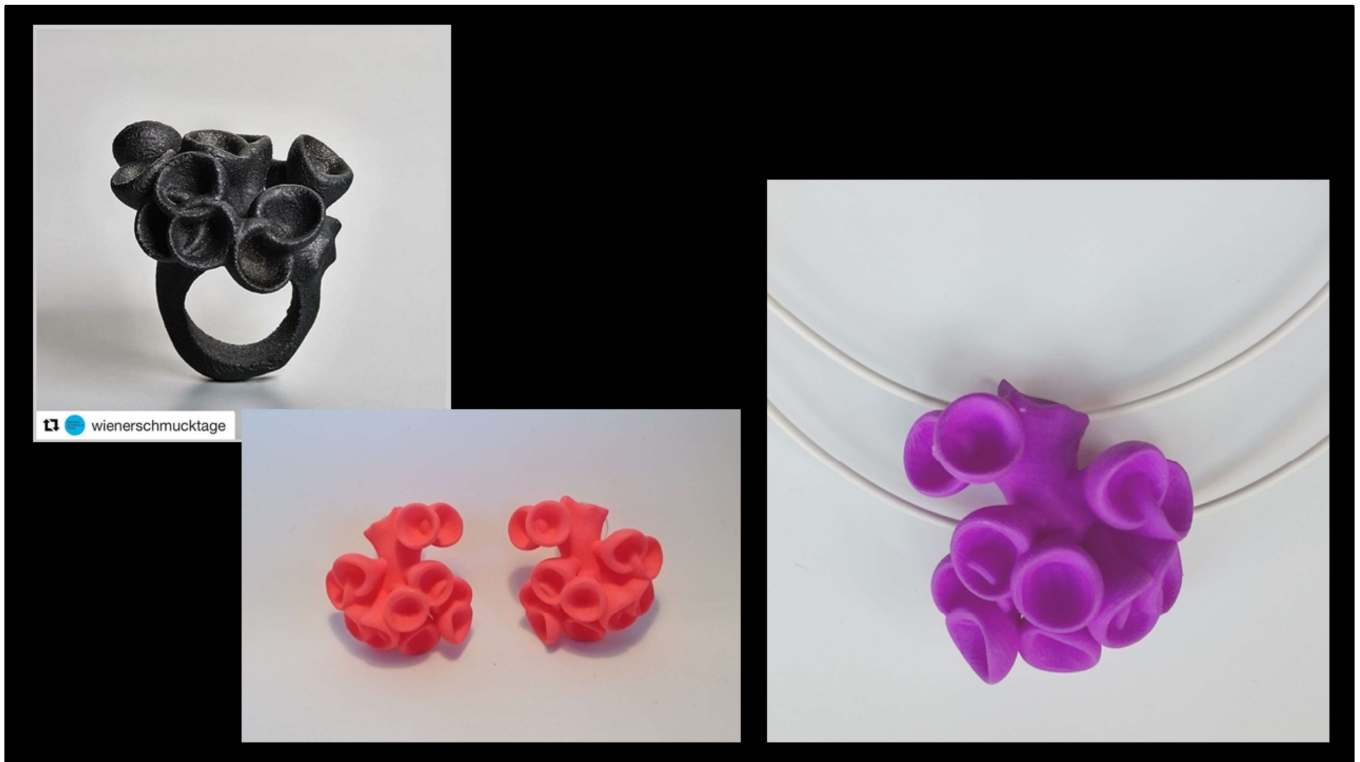
You can see more of Ursula's work here:

<https://anarkik3d.co.uk/our-community/anarkik-creations/ursula-guttmann-3d-printed-art-jewellery/>

Ann Marie
Shillito



I am a jeweller too. As a founder and CEO of Anarkik3D it is my responsibility to ensure Anarkik3DDesign is fit for purpose. One of my favourite tasks is testing development at each stage and one of the best methods is to use it on live projects. This way the programme's functions are tested in combinations that the programmers are unlikely to bring together and could be ones that might cause the programme to crash. My task is to find and avert crashes! I also have the best reason to get back into designing.



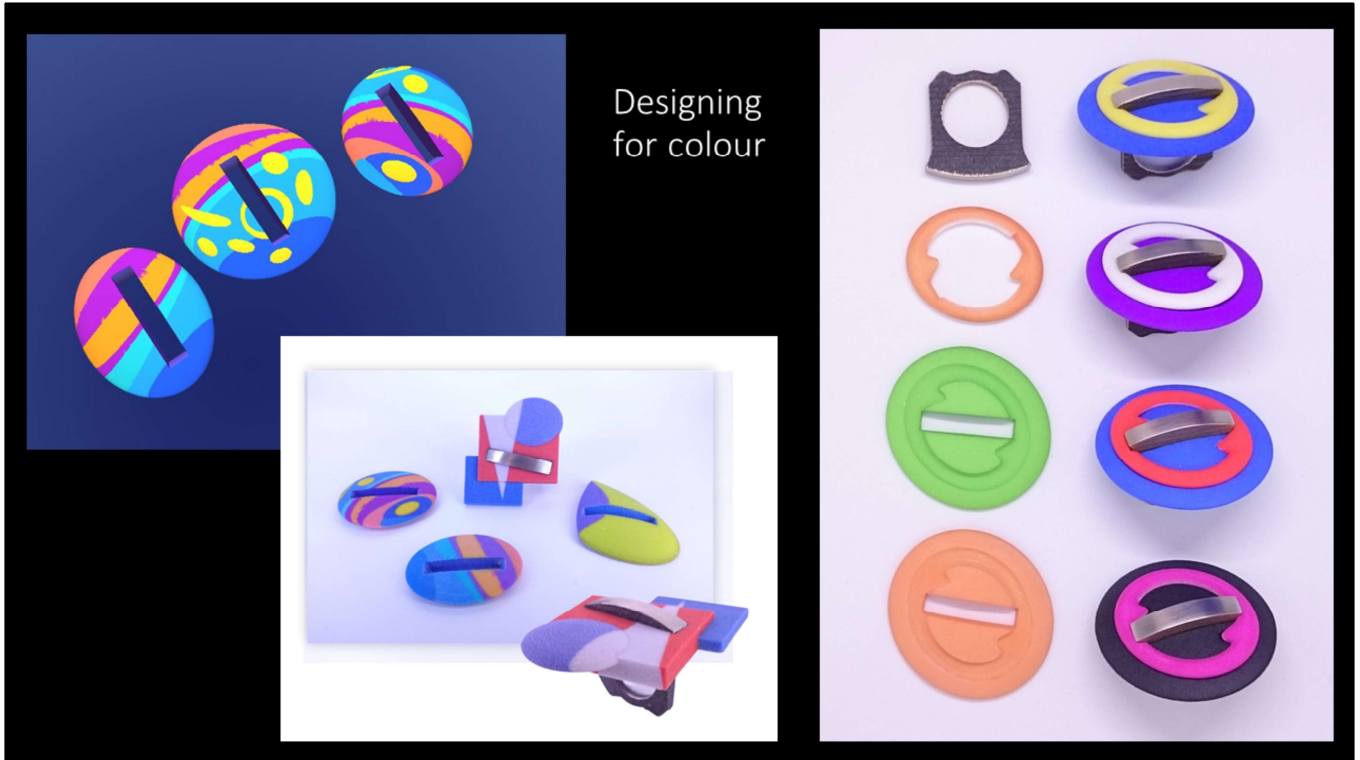
The next slides are mostly the work I do for myself and does illustrate with the work of the others the variety of styles possible with Anarkik3DDesign.

My own work also illustrates the possibilities of 3D printing in different materials such as polyamide, a white nylon type material in granular form. This material is the most popular as complex forms are easily 3D printed, and the white polyamide dyes well. It can be hand-dyed using easily accessible dyes such as Dylon.

I use commercial 3D print service companies to produce my jewellery as they offer a wide variety of 3D print materials. This black ring is in a fairly hard rubber-like material. Plus they dye polyamide in different colours.

The necklace came about from a serendipitous incident! I ordered 6 rings very late one night. I must have been very tired as I did not notice the scaled up size and price! After my initial shock on opening the parcel of huge rings, I had the idea of cutting off the ring shank part to made a chunky brooch and necklaces.

These pieces are part of the work I exhibited in Galerie V&V in Vienna in 2017. The exhibition included the 3D printed jewellery of 10 international jewellers including Birgit's and Elizabeth's jewellery.



Using the digital functions of slicing, colouring, Boolean union and non-uniform scaling I can create unusual patterns. The pieces in the centre have been 3D printed using two multi-colour systems: sandstone and paper. Here the ring shank is 3D printed in steel.

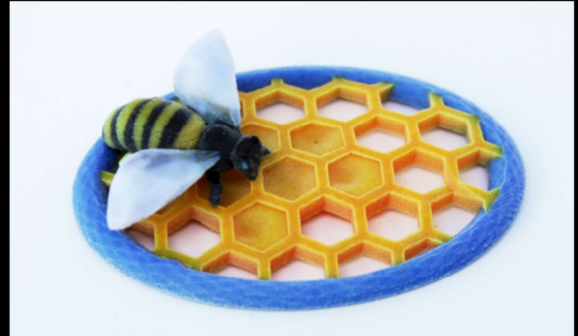
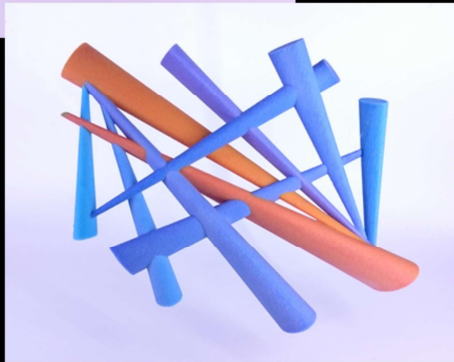
On the right a different approach to creating patterns with colour combines 3 parts: ring shanks in steel, as well as cast silver and dyed polyamide, with ring tops in two parts in different colours that can be mixed and matched.

It was an important exercise to explore Boolean subtraction to correctly taper shapes to slot together well. The information from these exercises feeds back to our programmers to improve usability.

Multi-coloured 3D printing



Sandstone.



Photopolymer.

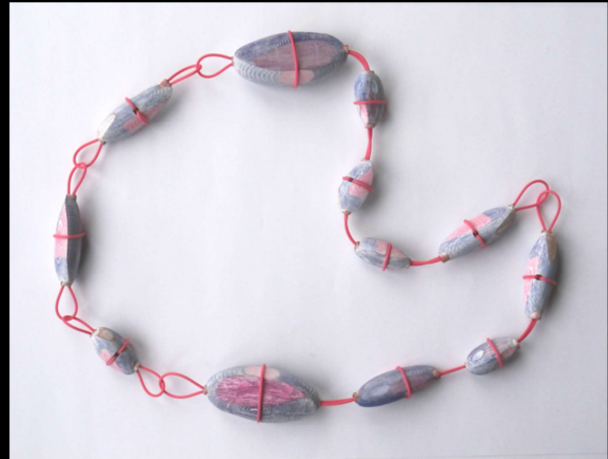
The systems for 3D printing in multi colours can be accessed at main 3D print service companies such as Shapeways, imaterialise, Sculpteo etc. Sandstone is the main one as it is great for most models but being brittle and heavy it is not so suitable for jewellery.

The material for another system which is fairly new uses PolyJet prototyping technology which jets photopolymer materials in ultra-thin layers, layer by layer until the model is completed.

Multi-coloured 3D printing

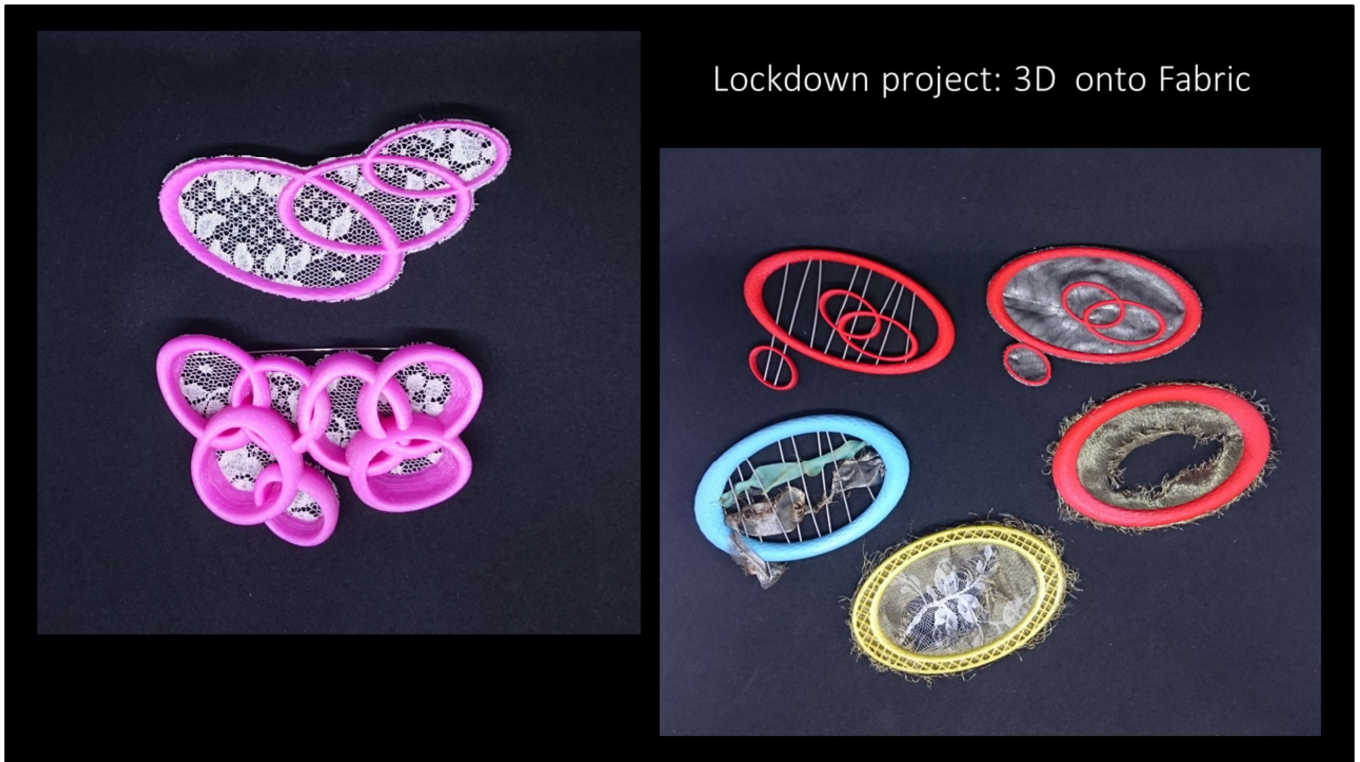


Paper.



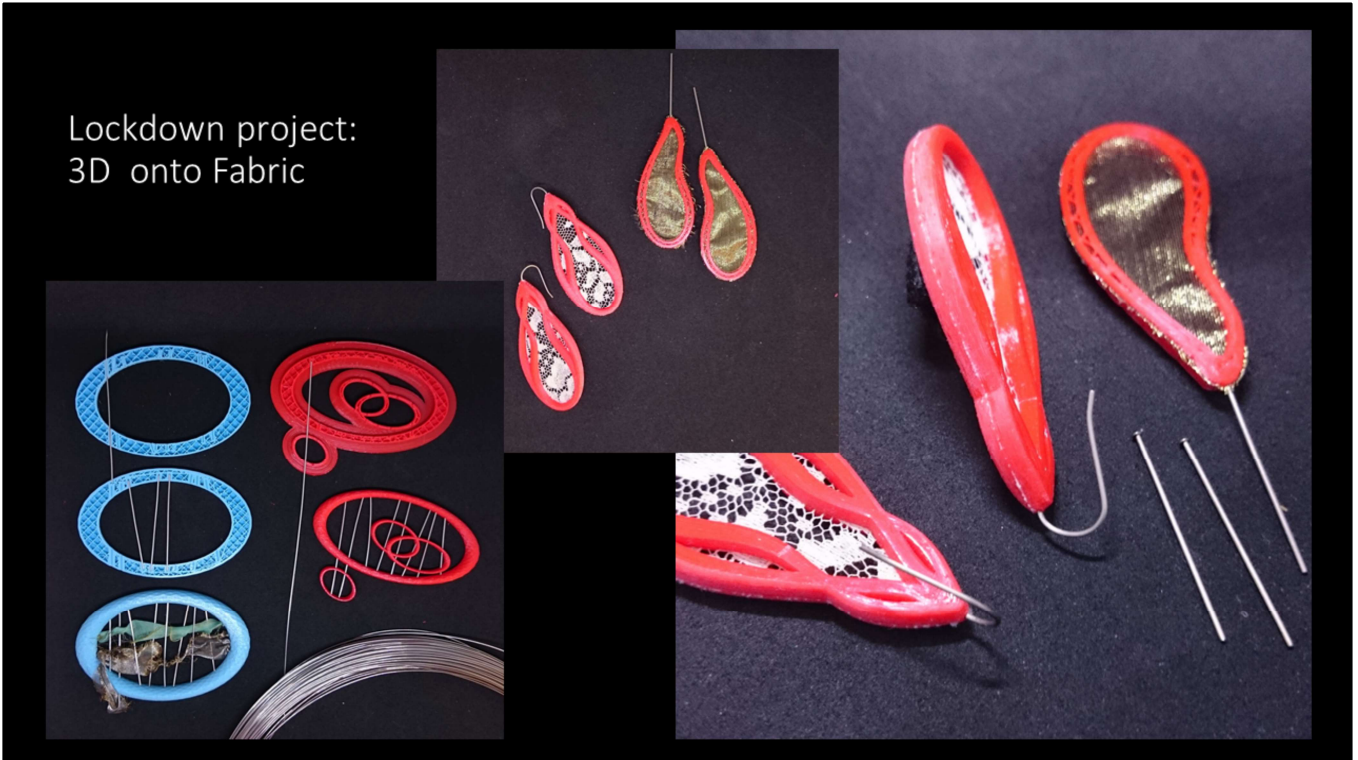
A further system for multicolour 3D printing uses sheets of paper whereby pigments are printed onto each sheet of paper over the cutting line before being layered and the profile cut.

The units making up this necklace are 3D printed in paper on the 3D printer developed by a company in Ireland with whom Anarkik3D worked to get our colour data properly aligned.



With 'Covid-19 lockdown' I finally have time to explore 3D printing on fabric. We have an Ultimaker 3D printer which is great for experimenting and combining extruded filament and fabric. I am able to investigate the possibilities in my own way and time, testing whatever materials I can get hold of that have any potential and might inspire. I am only showing the relatively successful outcomes of printing ABS and PLA polymers onto cotton based lace and silk/steel organza.

Lockdown project:
3D onto Fabric

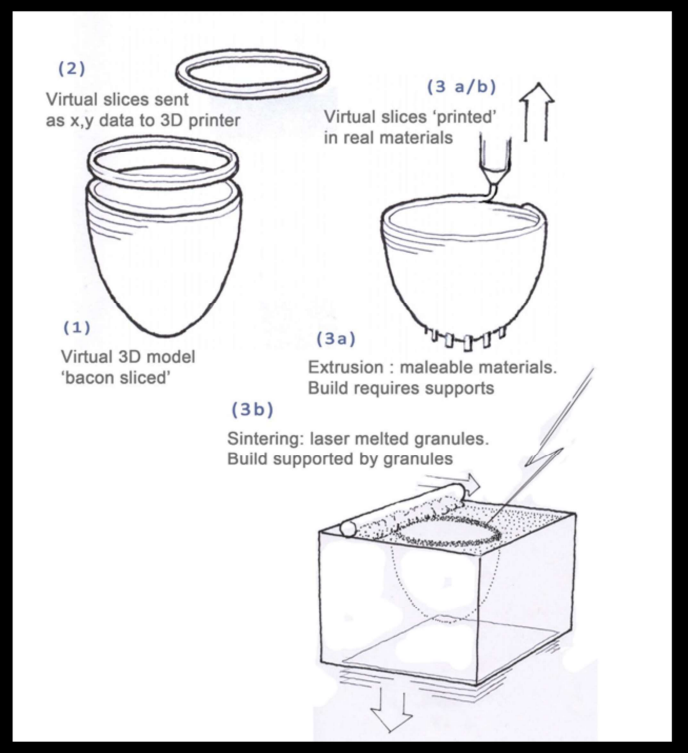


Ultimaker's Cura slicing software used to prepare digital 3D models for 3D printing has all the features I need for pausing the printing process at a specific layer to stretch the fabric over the partial print and then resume printing.

To make earrings I designed in the space needed to slot in titanium earwires into place, which are then embedded by the next layers of print material. This has led onto embedding steel wire across the oval 3D printed forms. All this experimental work will be captured into an ebook!

3D printing: basic principles.

For 3D printing a virtual 3D model is required



So what are these digital technologies?

I first heard about 3D CAD and 3D printing in 1990 when it was too expensive to contemplate using. This was at the beginning of my venture into digital technologies, first into 2D with laser cutting and then into 3D for 3D printing.

This is the most straight forward diagram of two of the types of 3D printing system I have mentioned. At the top from 1 to 3a the system uses material that is extruded, with each layer laid onto the previous one. In ceramics this is akin to using the coil pot method. This is the most used method for desktop and kit 3D printers and is the one used to print onto fabric.

The diagram at the bottom shows a method which uses powdered material, whether polyamide, nylon, sandstone, metal, etc. A laser sinters the grains that have been spread in a thin even layer so they meld into solid layers. With sandstone it is a binder that is printed into the fine layer of powder. With all methods the model is printed onto a baseplate that moves downwards to accommodate each new layer deposited. There is a lot of information online if you need to know more as there are other methods and types of material such a resin.

It does help when for designing for 3D printing to have specific skills such as those gained through being a designer maker with all the tacit and explicit knowledge we have about making processes and material properties. This helps to understand why 3D printing requires good, robust, watertight digital 3D models 3D print successfully.

My book advocating a craft minded approach to using digital technologies.

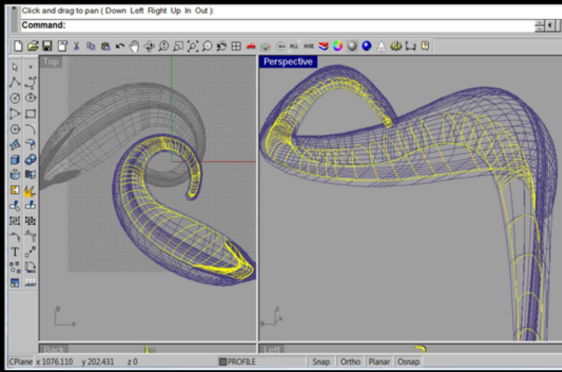


I have written a book aptly titled: “Digital Crafts: Industrial Technologies for Applied Artists and Designer Makers”. In a nutshell it is about how designer makers and applied artists are using 2D and 3D digital technologies to create and produce exciting artefacts. A chapter, titled “A craft-minded approach”, is devoted to the value of craft knowledge for designing digitally. Designer makers have the right mind-set and skills to work digitally as they bring their very practical knowledge of process and materials into the digital domain to exploit these technologies and push boundaries that benefit us all.

There are images from the book here:

<https://www.pinterest.co.uk/anarkik3d/ann-marie-shillitos-book-digital-crafts/>

Rhino CAD interface.



Below: Current range of haptic devices



Above: Tacitus Research Project



As a designer maker/applied artist I struggled with 3D CAD. I managed 2D okay but not 3D. I tried a number of different programmes including Rhino. It was difficult to justify the time commitment learning CAD which sucked too much time away bench work.

Before I became a research fellow in 1999 at Edinburgh College of Art (ECA) to investigate my issues with 3D CAD, I had encountered a haptic CAD programme, using this force feedback phenomenon from a desktop device replacing the 2D mouse. I considered this as possibly a way of working better suited to how I thought and designed as the device gave the sensation of touching a digital 3D model in all 3 dimensions. This is 3D haptics. The device also moved the cursor in 3D too.

With Arts and Humanities Council funding for 3 years for our Tacitus Project, a team of four of us set about researching the potential of haptics as a more natural tool for applied artists and designer makers to use for 3D modelling than the ubiquitous 2D 'mouse'. In the images above, the banner illustrates the current range of haptic devices.

Aims of Tacitus Project:

- ~ To explore the potential advantages of being able to work, think and respond to physical and visual stimuli, in a virtual, fully three-dimensional, non-gravity context, with particular reference to the practice of designer makers and applied artists and the development of 3 dimensional work.
- ~ To discover the degrees of haptic (touch) and other multi-sensory feedback required within digital systems to assist designers and artists to work more intuitively.
- ~ To develop viable software applications and virtual 'hand tools' to enhance the creative practice of applied artists.

Anarkik3DDesign:
3D digital
modelling for
artists

Digitally different
- an antidote to
CAD



Anarkik3D

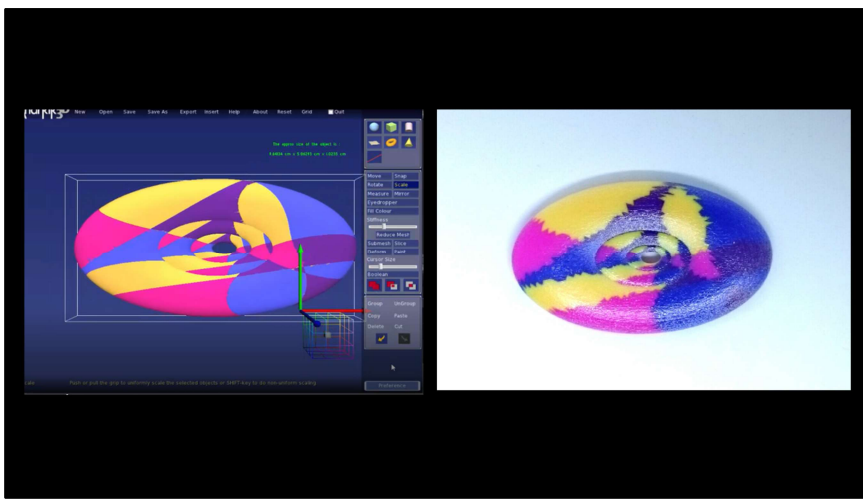
In early 2007 after 6 years of research and development Xiaoqing Cao and I founded Anarkik3D Ltd, a software development company, basing our products on the academic research of Tacitus plus Proof of Concept prototypes (DrawnReality) and market research.

Our main product is Anarkik3DDesign, a haptic 3D modelling programme using the Falcon device to give 3 dimensional forcefeedback.

We developed Anarkik3DDesign specifically for those applied artists and designer makers who, like myself, struggle with 3D CAD programmes but desperately want to engage with 3D printing technologies. We makers are not engineers, we are not industrial designers. We do not need the necessary complexity that CAD provides for designing for mass production technologies.

We need a fluid way of modelling without our cognitive flow being disrupted by complex interfaces and number crunching for precision. We definitely want to avoid long steep learning curves so we can spend as much time as possible at the bench making. One of the main foundations of the programme is that it fits into the way applied artists and designer makers think and work. Haptics makes it easier to navigate the 3 dimensional environment and demolishes one level of complexity. (The image above shows Anarkik3DDesign's straightforward interface.) Another is a less precision constrained way of creating objects as this lessens the cognitive disruption that entering numerals into the keyboard has on creative flow.

Fundamental to the programme is that digital models are 3D printable from the start. The pathway to 3D printing is straight forward and easy as Anarkik3DDesign is optimised for 3D printing. This is because modelling starts with solid 3 dimensional forms such as cube, sphere, cylinder, cone, torus and solid line. Each can be reformed and manipulated using various tools such as scaling, deforming, mirroring, copy/pasting, slicing, subtracting and constructing, all the while retaining their property as solid 'water-tight' forms.



Mostly it is jewellers who use Anarkik3DDesign for their work. The reason why is that 3D printing is most cost effective on a smaller scale as 3D prints are priced on volume. Scaling up or down by a small percentage can make a significant difference to the cost of the piece.

Further reasons are that art jewellers are unconventional in the methods and materials they select to realise their ideas and polyamide certainly fits well. Models can be complex and organic, the material is reasonably light weight, the finish on polyamide is very acceptable quality-wise and it can be hand dyed. Models can also be printed in other materials such as multi-colour polymers and metals such as steel and bronze. 3D printed models can also be used for lost wax casting for silver and gold pieces.

Hands-on demos are essential for grasping how different Anarkik3DDesign is from CAD programmes. Haptics has to be physically experienced to grasp the significance of touching and feeling your virtual objects for designing, constructing and manipulating. As touch is so fundamental to how we interact with real world objects and to navigate our environment, it really is a no brainer to integrate touch as force feedback into 3D digital designing to make this virtual world comprehensible. By doing this we enable you the user to tap into a more natural way of interacting so there is very little adapting to do to work digitally and consequently less distraction to disrupt your 'flow'.

One way you can get an inkling of what touching a virtual object is like using a haptic device is to close your eyes and with one finger poke your thigh. That sensation you have from your finger, transferred into your hand and arm, and even into your shoulder, is the sensation you would experience when you poke a model in Anarkik3DDesign. It is as amazing as that!

Introduction to Anarkik3DDesign: <https://player.vimeo.com/video/254872875>

Anarkik3D's website has links to information on Anarkik3DDesign, haptics and 3D printing here: <https://anarkik3d.co.uk/anarkik3ddesign-the-haptic-3d-modelling-system-with-3d-touch/>

Information about Anarkik3D's Loan Scheme is here: <https://anarkik3d.co.uk/our-space/anarkik3ddesign-loan-scheme/>

Links to fun videos showing Anarkik3DDesign in action:
Mini videos: <https://anarkik3d.co.uk/our-community/lovely-stuff-fun-inspiring/>

Tutorials and worksheets: <https://anarkik3d.co.uk/our-space/video-tutorials/>

3D print companies' websites have all the up-to-date information you will need to achieve successful prints and you can find links to several of them here: <https://anarkik3d.co.uk/anarkik3ddesign-the-haptic-3d-modelling-system-with-3d-touch/3d-printing-for-designer-makers/>

Thank you.