



Jonathan Keep *Iceberg Field* 2012 Artist 3D printed porcelain clay and glaze



Dr Michaella Janse van Vuuren *The Rocking Springbuck*

Welcome to the 3D Revolution

3D print technology is revolutionising the way in which we create and design items, and the field of art and design has not remained untouched. *Classicfeel's* Tamaryn Greer spoke to various 3D artists and designers about how this new technology is being used to create art, and how these works fit into the traditional view of art.

Additive manufacturing, rapid prototyping, or 3D printing, a technology developed by Charles W. Hull in the 1980s, has long been used as a means to create prototypes in architectural and engineering firms, but only over the past few years has it become a viable tool for commercial and private use. The doors have been blown wide open, and 3D printing is now being used to create customised implants, food items, clothing, shoes, jewellery, musical instruments, sculptures, artworks and functional designs. As with any new technology, there have been both early adopters and laggards, which has led to debates between art traditionalists and proponents of 3D printing over whether 3D printed objects and sculptures can be considered true art.

With a wide variety of machines on the market, which print with an assortment of different materials, in a diversity of ways, 3D printing is a hard concept to nail down without oversimplifying. 3D printing is an additive process whereby a solid object is formed by a 3D printer from a modelled design, created using Computer Aided Design (CAD) software such as SketchUp. A 3D printer melts or deposits the manufacturing material layer by layer (in very thin layers), from the bottom up. Printers print in varying ways, with the two most common methods being depositing materials with a print head, or by binding the material, generally through the use of a laser. 3D printers can create objects out of food-products (such as cake



Dr Michaella Janse van Vuuren *Birdman*



Rob and Nick Carter *Black Tulip*

decorations from sugar, or sculptures out of chocolate), plastics, metals (including gold and silver), ceramics, stem cells, with other materials being added as the technology grows and develops.

Due to this unique manufacturing technique, we are now able to make objects that were never possible before, whether due to the intricacy of the designs or the prior lack of viable materials or methods. As the technology grows, so do the possibilities, with techniques and materials being added and updated constantly. An altogether separate element of 3D printing, which is changing the future of 3D printing, as well as the way that we view commercial items, is 3D scanning, a process whereby a physical object is scanned. From the scan, a digital design file is created, allowing for a copy of the scanned object to be printed. There are of course still technical limitations – you cannot simply scan and reprint working iPads in your home – but copying sculptures and statues and other less technical objects is viable. 3D scanning has taken on a photographic element of late, where certain companies are offering customers the opportunity to stand in a 3D scanning booth and later receive a miniature life-like copy of themselves.

Mary Huang, of Continuum Fashion (a company that has created 3D printed shoes and bikinis), states that, with regards to new technologies such as 3D printing, ‘artists are always the first adopters,’ a statement that is proving to be true around the globe, with artists from a variety of backgrounds creating a multitude of 3D printed sculptures out of various materials. The first widely known exhibition of 3D printed art in South Africa took place from 6 – 22 July this year at the FADA Gallery, Johannesburg, by a group of artists known as the Agents of the 3D Revolution. The Agents are Dr Michaella Janse van Vuuren of South Africa, Jonathan Keep, Geoffrey Mann, Professor Keith Brown and Dr Lionel T. Dean of the United Kingdom, and Joshua Harker and Nervous System (Jessica Rosenkrantz and Jesse Louis-Rosenberg) of the United States.

Dr Michaella Janse van Vuuren, a qualified electrical engineer and 3D print designer, creates incredibly intricate 3D printed sculptures, jewellery and marionettes with working parts. Janse van Vuuren sees 3D printing as the ‘opportunity to challenge myself both technically and creatively in the same design piece. A perfect marriage between my seemingly disparate talents and interests,’ she says, explaining how 3D printing allows her to draw on her background in engineering and her love for art. She explains though, with the costs of printing still so high, that to be sustainable artists have to sell their works for quite high prices – something that doesn’t always make sense to the buying public. ‘[3D printing] cannot compare with the cost of clay or paper and aligns closer in price to metal sculptures, even if it is manufactured from materials such as nylon,’ explains Janse van Vuuren, whose beautifully complex *Horse Marionette* is currently on display at the London Museum of Science. The response to her work has been overwhelmingly positive – partly, she believes, due to the fact that the human touch is still so visible in her work – and as a result, the Agents of the 3D Revolution have been invited to exhibit alongside Southern Guild at the V&A Waterfront as part of World Design Capital (WDC) Cape Town 2014.

In response to those who are still wary of 3D technology, Janse van Vuuren says, ‘I believe 3D printing is just a tool, like an etching press, a camera or a paintbrush. It takes time to find your true expression in the medium and the creative process and struggle to achieve your ‘vision’ is the same. However, entering the buying or exhibiting of 3D art with caution is justified. As more 3D artists and artworks enter the scene it will be difficult for people to know if the work is truly original, as it is so easy to download a 3D file or generate files automatically from online applications. The artist’s track record will become very important.’

Joshua Harker, who is known for his elaborately detailed filigree skulls, first began working with 3D printing in the early 90s. Harker then opened a design and development studio in the late 90s and, through his clients, became increasingly involved in the technical aspects of projects and so learnt CAD. Eventually he owned his own 3D printers and began to design and print parts himself. The leap to art wasn’t an immediate one, but it



Professor Keith Brown *Dive*

was always there in the back of his mind. Harker explains, ‘I immediately knew I wanted to make art with it but the early CAD programmes were more like programming than anything creative. The materials were terrible in the beginning as well and the technology very limited and expensive. Over time, that has changed and I increasingly added it into how I worked as an artist.’ Harker, whose work is available online at Shapeways for reprinting by anyone, has been criticised for his lack of exclusivity, as there are normally strict controls over how many copies of an art work is reproduced. To ‘traditionalists’ and those against using 3D printing as a way to create art, Harker says, ‘the medium is what it is and people are going to have to adjust their definition about what art is.’

Aside from this though, Harker states that the response has been overwhelmingly positive and that, ‘people are very blown away when they actually see something that pushes the limits of the technology. The forms really bring the realisation of how powerfully imaginative the medium can be.’ He believes that the future of 3D printing is ‘revolutionary and will redefine many long held canons about art. It’s very democratising with regards to design and functional objects. I can’t stress enough how empowering it will be as it moves into the future.’

‘First of all,’ says Professor Keith Brown, Professor of Sculpture and Digital Technologies at the Manchester Metropolitan University, ‘I am a sculptor, who through my research and practice engages directly with 3D computer modelling for the purpose of exploring the virtual environment to discover new sculptural forms not possible to envisage using analogue methods.’ Brown, who creates incredible flowing wave-like forms, such as *Dive* and *Sweep*, has been using the computer as a design tool since 1981, where he had access to the Quantel Paintbox (one of only three in the UK). Although the technology back then is incomparable to what we have access to in our homes today, Brown reveals that it ‘gave insights into the potential application of computer graphics as a sophisticated design tool.’ ‘By the early nineties,’ Brown explains, ‘my work became completely virtual and I ceased making real objects. My main output at this time took the form of 3D computer generated animation, video and installation.’ As technology developed, it led to Brown’s first 3D print in 1997, an object called ‘*Continuity of Form*’ which was printed using Durafoam.

With regards to the question of 3D printing as art, Brown states that, ‘for me the art occurs in the modelling process, where one’s senses are applied intuitively, along with emotion and intellectual

accompaniment.’ ‘It’s not so much the qualities of the process or materials themselves but rather what one does with them,’ he adds. ‘As a professional practitioner of some 45 years I have worked with a wide range of sculptural processes, materials and techniques, from miniature to monumental. In all of these, including 3D print, it is my belief that the ‘art’ (whatever that might be) transcends the ‘medium’. However, in many instances one must acknowledge (in the Marshall McLuhan sense) that the medium is the message. In facilitating the creation of objects never before possible, this is certainly the case with 3D printing, whatever is made with it; the good the bad and the mediocre. For me it’s not so much giving up traditional craft skills as it is embracing the possibilities made available through this amazing new computing technology.’

Jonathan Keep, creator of organically inspired ceramic prints and ceramic printers, began using computers and code in his work in 1999, and worked on using computer code to mimic the patterns, structures and systems underlying the natural world. ‘Ultimately, it is this

what is important is how the creative mind comes to use it. Both are tools at our disposal,’ whereas the reaction from the public has been ‘Confusion, on the whole the public just don’t get it and I can understand, it’s all very new. At a very basic level just the word ‘print’ is misleading. People think of a letter, script or an image. Then what do you mean by ‘3D’? Working in the ceramic world I find it easier to suggest the public think of it as computerised coil building – like how a traditional African pot is made, layer by layer.’

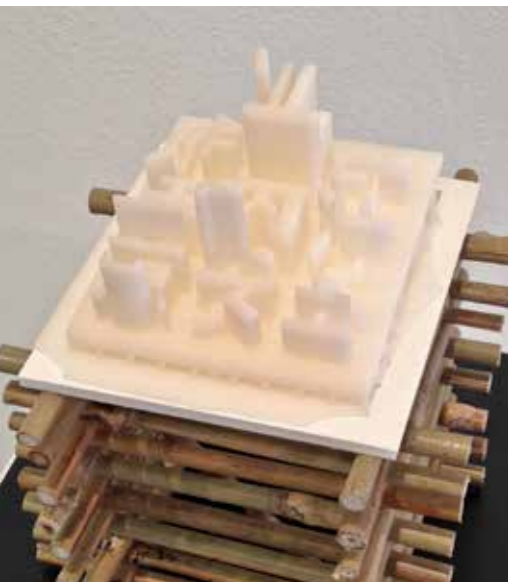
Adam Nathaniel Furman, although not an Agent of the 3D Revolution, is also an artist based in the UK, 3D printing ceramics. Furman has been involved since the early days of rapid prototyping through his background in architecture, although mostly creating representational models for presentation to clients. Of the field of architecture, Furman says, ‘it is an extremely liberating field to begin one’s training in because it teaches you to bring together the latest technology and the oldest forms of craft, the newest synthetic materials with the most ancient of those extracted

from the tyranny of the medium, but also from the tyranny of the market.’ Technology is also liberating, Furman believes, as it makes it more accessible to all, and the start-up is much cheaper than other more traditional methods of creating art, as there is free software that is downloadable off the web and printing through an online site such as Shapeways is relatively inexpensive and doesn’t require you to own your own machine.

Furman has received mixed reactions to his work: ‘the work tends to polarise people, so I mostly get either people who are fascinated by my practice and want to know more, drawn to it like a monstrous car crash, and then on the other hand people who get very angry and say that this is ‘not art’ or ‘not design’ or ‘not architecture’, which I think is mostly the confusion caused by works which are transgressive and cross disciplinary boundaries, something which I think is integral to being a 21st century artist,’ he explains.

Brendan Copestake, photographer, project manager and owner of Parts and Labour, situated in Arts on Main in central Johannesburg,

Stephen Hobbs is another South African artist currently working and experimenting with 3D printing as an art form. Hobbs, with a degree in Fine Arts, has a more artistic background than a lot of the more science based 3D print artists, although most of his work is based in architecture and the built environment. Hobbs found his way to 3D printing through Brendan Copestake, and the two have collaborated on Hobbs’ *New Town*, his rendering of the proposed *Tatlin Tower*, *Dazzle Cube* and *Dazzle Cloud* (which was exhibited with the *Tatlin Tower*). *New Town* is a fascinating artwork that might not have been as easily created prior to 3D printing. The side-view is a cityscape placed on top of bamboo sticks, but when viewed from above, the buildings are transformed into Chinese characters. Hobbs believes that the key to addressing the 3D printing as art debate, is for the artist to approach and use the technology ‘in a self conscious way.’ He prefers to refer to it as rapid-prototyping as he feels this better expresses his uses for the technology, to create miniatures and prototypes of artworks



Stephen Hobbs *New Town* 3D Print



Dr Michaella Janse van Vuuren *Horse Marionette*



Joshua Harker *Crania Revolutis*



Professor Keith Brown *Sweep*



Stephen Hobbs *Tatlin Tower* 3D Print



Adam Nathaniel Furman *Identity Parade*

relationship between art and nature and how computers can be used to explore this relationship that got me started,’ explains Keep. Keep uses unique algorithms to generate his work, as with his *Iceberg Field*, ‘the algorithm has an inbuilt randomness set within natural parameters as with the formation of icebergs.’ Keep believes that 3D printing is currently going through a novelty phase, resulting in visually intriguing objects that most likely won’t stand the test of time, but once this phase has passed, Keep reckons that, ‘the 3D printer is just another tool to add to the toolset available to the artist, maker, designer.’

With regards to the reception of his work, or rather the reception of the concept of 3D printing, Keep’s experience has been slightly different to others’. In his field of ceramics ‘people are horrified that I am making things with this ‘machine’, what is happening to the creativity? I then point out the potters wheel is a ‘machine’,

from mountainsides.’ Furman, whose series of colourful ceramic sculptures, *Identity Parade*, features elements of art, design and architecture, tying in his philosophy that ‘the more mediums you are expert at, the less your ideas and praxis is defined by any given process, so I think the more technology we can use as artists, the more transparent our work can become to the complexities of our creative explorations, our ideas, our personalities. It’s an approach very much in opposition to the traditional notion of the artist-as-craftsman working with an ‘authentic’ technique which he or she becomes allied to and somehow embodies their practice.’ Furman says that within literature, there is the AltLit movement, which is causing a revolution in the way prose is crafted, and what subject matter is allowed, and he believes 3D printing forms part of this revolution of self-expression, ‘in which the artist could both be freed

is the owner of a 3D printer, and has worked to create various prints with artist Stephen Hobbs, as well as various engineering firms and an American film company. Copestake points out, like Janse van Vuuren, that 3D printing can be an expensive exercise for artists, especially as it is hard to attribute value to an item not made out of expensive materials, so selling prices can seem elevated to buyers. Copestake also explains that there is a fine line between art and design when it comes to 3D printing, and artists need to ensure that only limited numbers of their works are printed in order to avoid crossing over to design. He compares the precision required in 3D printing art, to that required by a business like David Krut Publishing when printing their prints – the printer needs to be calibrated the same way for every print, or the artist needs to then emphasise that the works are different editions.

and sculptures and to get a feel for certain designs. Hobbs points out that 3D printers do not always work exactly as one would hope, and through trial and error you learn to make fewer mistakes, but that a printer will still print the works with certain faults – something that an artist can use in a creative way, adding an element of exclusivity for collectors.

Although it has been around since the 1980s, 3D printing is still a relatively young technology, and as a result the machinery and methodology becomes out-dated at a fairly rapid pace. 3D printed art is a fairly new concept and as yet there are no standards when it comes to 3D printing and art, meaning that some of the works that are currently being produced fall more on the side of design than art. That being said, there is an exciting future ahead for those who perfect the technology and use it to create works with longevity. **CF**