



Education
Kit



Australian

Design

Shapeshifters: 3D Printing the future	
Centre	

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Shapeshifters: 3D Printing the Future

Teachers Notes

This education resource is designed to support learning outcomes and teaching programs associated with viewing *Shapeshifters: 3D Printing the Future* by:

- Providing information about the artists and their key works
- Challenging students to engage with the works and the exhibition's themes
- Encouraging students to research beyond the immediate exhibition into the realm of the exhibiting designers and their place in the design world and the broader community.

Australian Design Centre and Western Plains Cultural Centre aim to engage with teachers and students in a dialogue that includes thinking, experiencing, tinkering and learning beyond what is currently possible. Although the resource has been developed to support the Year 7-10 Design and Technology syllabus outcomes, it can be adapted for use by Visual Arts and Visual Design teachers.

A video has been produced to accompany the exhibition. The video is a fantastic introduction to the topic and a recommended resource.

<https://vimeo.com/152913020>

There are 4 sections to the kit:

Our Appearance

Our Home

Our Health

Our Habits

Throughout the kit you will find reference to these symbols:



Explore

The exhibition,
artists and find out
about
3D printing



Enquire

Investigate &
research



Extend

Your knowledge by further
research,
making, creating and
designing

How will 3D printing change my future?

About the exhibition

Shapeshifters is a playful exploration of 3D printing. It's all about imagination, innovation and new methods of making. In it you'll find a collection of fascinating objects that embody a sense of excitement with what's happening in technology and design right now. 3D printers are in the headlines - a weapon printed at home, organs manufactured in labs, 3D printed clothing - but how does it work? Put simply, the printer converts a 3D digital model into horizontal slices. These slices are then layered (printed) on top of each other and a 3D object is formed!

And the best bit? 3D printing is made for sharing. Open source software and shared maker spaces mean anyone can try their hand at creating. Now mass production is replaced by mass customisation. Forget shopping. Why not download and redesign your own products?

The designers, makers, tinkerers and creators included in *Shapeshifters* all begin with a real world idea. That idea is translated into a digital something - a piece of code, a CAD model or perhaps a chorus of music - before being transformed into the final physical form. By experimenting with digital fabrication technologies, the designers build on their traditional modes of making to create something entirely new.

So remember, *Shapeshifters* is just as much about you as it is about our makers. We hope the exhibition inspires you to think differently, and most of all - design playfully.



Our Appearance

How will 3D printing affect our appearance?

For fashion and jewellery designers, 3D printing bursts open new possibilities for creative self expression. 3D printed garments, accessories and jewellery adorn the body in ways never seen before. Shoes can now be individually customised for the perfect fit. Metal powders allow gold, silver and titanium to be printed.

Digital technologies are not used to replicate what already exists, but rather to make things that don't exist yet. Take for example, designer Cinnamon Lee. She was one of the very first contemporary jewellers to utilise digital technologies in advanced ways. Over a 20-year career, Cinnamon has specialised in combining traditional skills with emerging technologies, harnessing the powerful tension between the hand and the machine. Her jewellery would be impossible to make using conventional methods. Computer generation, high-definition rapid manufacturing and lost wax casting techniques enable incredibly complex forms to be realised. Her experiments with digital metal fabrication cement her as pioneer bringing traditional silver-smithing practices into the digital age.

Cinnamon explains, "In my practice I blend the past with the future. I embrace technology to inspire new ways of creating objects while respecting the tradition that has come before me". Technology has pushed the boundaries of possibility for many jewellers following her charge.

Designers are transposing ideas from digital design practices to tangible consumer experiences and products. Innovative and experimental wearables now react to environmental and sensory stimuli, transforming with movement or even the wearer's emotions. 3D printing is also becoming a more integral part of the design process. It gives the designer a completely new toolkit. Several iterations of the same design can be quickly produced and tested in different materials. With the open source movement, more and more designers are offering their CAD files for others to customise.

XYZ Workshop

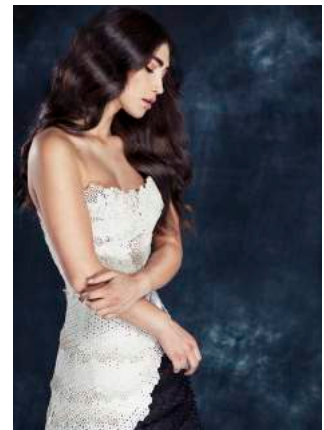
Kae Woei Lim and Elena Low

inBloom, 2014, Polylactic Acid (PLA)

At 2.1 metres long, XYZ Workshop has created one of the world's longest 3D printed dresses using (only) a desktop printer.

Blending traditional dressmaking techniques with digital technology, *inBloom* makes Polylactic Acid (PLA) function like textile. The open source files of the dress are free to download, encouraging people to 'hack' the dress and make it their own. *inBloom* hints at a future where one day, printing off your own garments could be as easy as X,Y,Z.

In 2014, *inBloom* made it into the White House for the Fashion Education Workshop organised by Michelle Obama (fashion heavyweights like Anna Wintour attended)! Remarkable indeed, given that XYZ Workshop was born only one year prior when architects Lima and Low became interested in desktop manufacturing. In the same way they approached architecture - by merging art, sculpture and technology, the pair were intrigued by the potential of 3D printing.



Images: Courtesy of XYZ Workshop

“We believe we have successfully proven that 3D-printed fashion is not only accessible but also highly affordable. We believe we may have created the longest ever 100% fully 3D-printed gown using a desktop 3D printer.”

- Kae Woei Lim and Elena Low

Look closely at the dress



1. What patterns can you see? Do they reference any particular style or culture?
2. Does it look like any other fabric you have seen? Write a paragraph on what it reminds you of.
3. How was the shape of the dress created?

Visit XYZ website: <http://www.xyzworkshop.com/inbloom/>
Read about the dress and watch the video link.



1. What other designers or companies have they worked with?
2. What do you think is meant by, “ iTunes for the feet”?
3. Do you think that one day all clothes could be completely tailored to you?
4. Can you describe the way art, technology and sculpture are linked in this work?



1. Imagine you have been commissioned to design a 3D printed dress. Create a drawing of your design and a sewing pattern. Consider how you might customise it.
2. Imagine you could easily download and print your own clothes and print them. Will 3D printing destroy copyright?
3. Write a list of questions you would like to ask Kae Woei Lim and Elena Low, what most intrigues you about the dress?

Lousje Skala

Calgary Necklaces and Link Bracelets, 2015

3D printed nylon, hand dyed, CNC milled, vacuum aluminum

Lousje Skala is a silversmith. Trained traditionally, she has expanded her skills and resources to include non-traditional tools, such as computer-aided design software, 3D printing and CNC milling.

Lousje is fascinated with language, social disconnection, and the negative social impact of digital media. So, it is her intention that when people wear her bold jewellery, the pieces encourage real social connections. This series draws inspiration from the architecture of bridges - quite literally, the purpose of linking communities.

In 2013, Lousje featured in Melbourne Now at the National Gallery of Victoria's major exhibition. She exhibits across the globe from Australia to Europe and Japan. Her works will continue to inform new practice as some special pieces have already been snaffled for collections including The Museum of Applied Arts and Sciences in Sydney, and the Musée des Arts Décoratifs in Paris.



Images: Courtesy of Lousje Skala

“My intention for the wearable objects that I make is for them to act as mediators so that in their own small way they can counterbalance the disconnection, which I assert digital/social-media is having on interpersonal relationships today.”

- Lousje Skala

Look closely at the jewelry



1. What material does it look like it's made of? Does it look light or heavy?
2. How do you think the work would “encourage social interactions”?
3. What does it make you think about?
4. Do you think the pieces are unique? Why or why not?

Watch the video: <https://www.youtube.com/watch?v=hGvI9QbIDME>
Go to: <http://www.cinnamonlee.com/subsection.asp?ssID=101> and research this designers work.



1. In the first video Skala describes the relationship between wearer and viewer, write a short story based on this relationship
2. Compare and contrast the work of Lee to Skala's work. Can you see any common connections?
3. Why do you think it is important for designers to embrace this new technology?
4. What do silversmiths do? Describe their practice
5. How does Skala incorporate 3D printing technology? How does this assist with her craft practice?



1. Research a bridge that you really like. Sketch parts of the bridge and think about how you could incorporate these into your own jewelry design. Now design that piece of jewelry.
2. What information would you need in order to customise a piece of jewelry? Explain why you need these things.
3. What materials and processes have been used in Skala's work? What problems would 3D printing jewelry potentially cause?



How will 3D printing affect our homes?

Imagine a world where the cost of building your own home was dramatically reduced and it was commonplace to design a rapid response solution for communities affected by natural disasters, or even temporary homes for refugees. 3D printing and other digital technologies hold massive potential to solve many design and manufacturing challenges in architecture and engineering – meaning the way we live in our homes will be transformed.

While there is strong debate about the upsizing of 3D printing from small objects to large ones (like houses), many architects agree that additive manufacturing will certainly transform their work in the near future. Designers are already creating important architectural components with 3D printers. Not only this, but they are also doing it more efficiently (financially and environmentally) not only changing the construction industry but how cities are built.

Across the world, teams of architects are competing to produce liveable 3D-printed structures. Everyone is exploring and experimenting with different materials and methods. Standard building components can be replaced by highly customised, locally made structures. Facades and formwork are now being printed in plastics, sand and concrete. Essentially, 3D printing could have huge implications for the way we fabricate buildings. Printing on site almost entirely skips the

fabrication process. Algorithms allow material to be placed only where it is required and most structurally efficient – making buildings more efficient and sustainable. Architect and engineer, Dr. James Gardiner, has developed a 3D-printed wax system that could transform the building industry.

In downtown Sydney, Australia, Gardiner is currently Lead of Design Innovation with the Engineering Excellence Group at the Laing O'Rourke innovation lab. It is here where he invented *FreeFAB Wax*. From Sydney to London, where a construction scale 3D printer (L 30m x W 4.5m x H 1.5m) is located, he leads a team designing wax moulds for concrete. Gone are the days of plywood rectilinear moulds, Gardiner has invented a system to 3D print large volumes of wax at high speeds to create moulds for wall, floor and roof structures. By using CNC milling on the surface of the wax, James has created a very efficient way to create very smooth concrete. Once the concrete has set, the wax is melted off and re-used for the next mould, making it one of the fastest, most inexpensive and sustainable systems around. #zerowaste

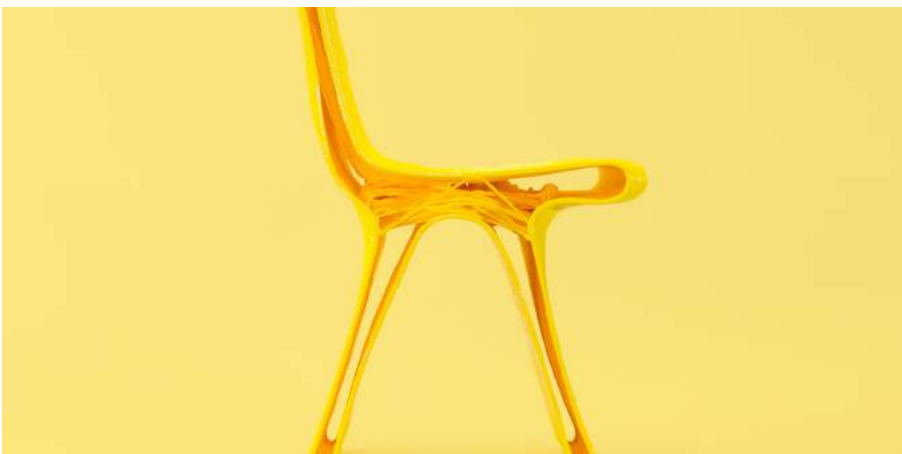
The *FreeFAB Wax* project started production in the UK during 2015. It is making many of Gardiner's construction 3D printing inventions a commercial reality.

Ryan Pennings

The Percy Stools, 2015

Polylactic Acid (PLA)

The Percy Stools were the result of a design research project undertaken for the honours component of the Bachelor of Industrial Design (Honours) at RMIT University, Melbourne, Australia. Each stool is 3D printed using PLA by an industrial robot and weighs 5-6kg. PLA is a biodegradable polymer derived from renewable resources such as corn starch. The robot is programmed with a combination of strict and loose rules (algorithms). The strict rules guide the building of the main structural parts of the stool and less predictable algorithms guide the internal construction leading to unique and striking shapes. The result is that each piece is different. Ryan Pennings is continuing to investigate the exciting design opportunities created through the combination of algorithmic design and robotic fabrication. Perhaps custom printing furniture for our homes will be a reality in the near future.



Images: Courtesy of Ryan Pennings

“The combination of algorithmic design and robotic fabrication showcases the possibilities that are opening up to industrial designers in digital design and fabrication techniques.”

- Ryan Pennings



Look carefully at the stools

1. What is the texture of the stools like?
2. Do they look comfortable?



1. How can you tell that the stools were manufactured using a 3D printing method?
2. Describe some of the furniture in your home that could be recreated using 3D printing.



1. Explain the benefits, in terms of sustainability of using a biodegradable material derived from a renewable resource to make furniture as opposed to making the furniture from a polymer derived from a fossil fuel.
2. Imagine if you could design your own bed to incorporate a slide that would take you into the family room. Describe the possible changes to the interior design of your home if 3D printing meant that your family could afford custom made furniture.



Our Health

How will 3D printing affect our health?

3D printing in biomedical applications is the stuff of science fiction. From prosthetics to pre-surgical models for the rehearsal of complex procedures to the printing of living cells, the progress of 3D printing and related technologies is having tremendous implications to medicine.

This quick and relatively inexpensive method of producing customised devices is of enormous value to biomedical engineers designing prosthetics and orthotics for patients. Prototypes can be produced using a patient's medical scans, then tested and refined to create an optimal customized product quickly and relatively cheaply compared with traditional methods of manufacture.

The flexibility offered in terms of printable materials is also a major advantage. Printable

materials include plastics, metals and living cells. It is currently possible to manufacture living human tissue which can be used to help scientists test the toxicity of experimental drugs and it is predicted that it will be possible to create bone and muscle for implantation within the next ten years. The time span for implantable complex organs such as the kidney will be much longer but as with everything else in 3D printing, it seems only a matter of time.

Dr. David C. Ackland

A Novel 3D-printed Prosthetic Joint Replacement for the Human Jaw, 2015

Grade-5 titanium and high-density polyethylene

In 2015, a young man's rare congenital jaw deformity was surgically corrected using a 3D-printed jaw joint designed and created in Melbourne. Prior to the procedure the young man was unable to chew properly as his facial expression was lopsided and he was suffering considerable pain. Dr. David Ackland and his bioengineering research team at the University of Melbourne collaborated with surgeon George Dimitroulis and medical devices company 3D Medical (ASX:3DM) to design the prosthetic jaw joint replacement.

The patient's medical scans were used to create a joint which would fit and computer simulations were performed to determine the forces on the implant during biting and chewing to ensure that the joint would be strong enough. The final joint was 3D-printed in titanium, a metal which would not degrade in the body before being implanted into the patient.

The patient is now able to chew without discomfort and his face is no longer lopsided. Replacement joints are usually created by making a mould and casting the new joint. However, the cost of creating replacement joints in this manner is very time consuming and costly. Consequently, it is common for manufacturers to create a few joints of different sizes and designs, and offer surgeons a limited selection to choose from, for example small, medium and large. It is rare for a new joint to fit the patient perfectly. 3D printing enabled the engineers to create a customised joint which would fit perfectly, without the need to build an expensive mould. Furthermore the joint could be relatively easily and quickly modified and re-printed until the optimal design had been created.

3D-printed prosthetics have been so successful in helping people recover from physical injury and damaged joints that enthusiasts say that there should be a 3D printer in every hospital so that customised prosthetics can be produced upon demand.



Images: Courtesy of Dr David Ackland

“We believe the techniques we have developed and the latest 3D printing technology will facilitate a new direction in research and manufacture of implantable devices. This case highlights the talents and capabilities we have here in Australia to design, develop, and manufacture our own high-tech medical devices.”

- David Ackland

Look closely at the replacement joint



1. How many parts were used to make the new joint?
2. What materials were used to make it?
3. How is the new joint secured to the patient's jaw and skull?
4. How was the titanium part of the joint created?
5. Who designed the new joint? What was his profession?
6. Who carried out the surgical procedure? What was his profession?

Watch this video:

<https://www.youtube.com/watch?v=29WXNhHZWsl>

Read this article:

<http://www.abc.net.au/news/2015-06-20/melbourne-man-receives-titanium-3d-printed-prosthetic-jaw/6536788>



1. Why was the success of the project dependent upon the engineers and the surgeon working together?
2. Why was it important for the engineers to study X-rays of the patient's skull before designing the new joint?
3. Why was it important for the engineers to work out the forces on the patient's jaw during biting and chewing before designing the new joint?
4. What different manufacturing methods could have been used to create the titanium part of the joint?



1. If you were managing a project to design a replacement leg for a patient who would you invite to be on your team? Explain their roles.
2. What information would you need about the leg before designing a new one? Describe how you would get this information.
3. What materials would you use for it? Explain your choice.
4. Why would you use 3D printing to do this rather than using other methods?



Our Habits

How will 3D printing change our daily habits?

3D printing combined with an exponential growth in computer power and easy to use software makes product customisation cheaper, faster and more accessible. Anybody can now produce complex, original objects in their home, studio or at their business without having to engage the help of a skilled artisan or technician.

Access to this new manufacturing method has excited artists and designers and encouraged a cross-disciplinary approach to design leading to new ideas and innovative solutions to complex problems.

Forms and structures previously impossible to make by traditional means are being created in fine materials, such as ceramics, precious metals, metal alloys and even glass. It is anticipated that 3D printing's impact upon the design industry and upon society will continue to increase. The nature and enormity of the impact of this technology is still unfolding as designers, engineers and scientists test and push its boundaries.

Some are claiming that the technology is contributing to a new digital age in which geography and ownership are no longer limitations. The open source movement has generated collaborations across the world and a sharing of resources including greater access to 3D printing facilities.

3D printing is also less wasteful than many traditional forms of manufacture and building construction methods. The potential to save money and reduce detrimental environmental impact has excited designers across all disciplines.

In his 2013 State of the Union Address, U.S. President Barack Obama described 3D printing technology as "having the potential to revolutionise the way we make almost everything."

Lukasz Karluk

HoloDecks, 2014, Polylactic Acid (PLA)

Could 3D printing change the way we experience sound? *HoloDecks* adds another dimension to listening by offering an interactive visual experience.

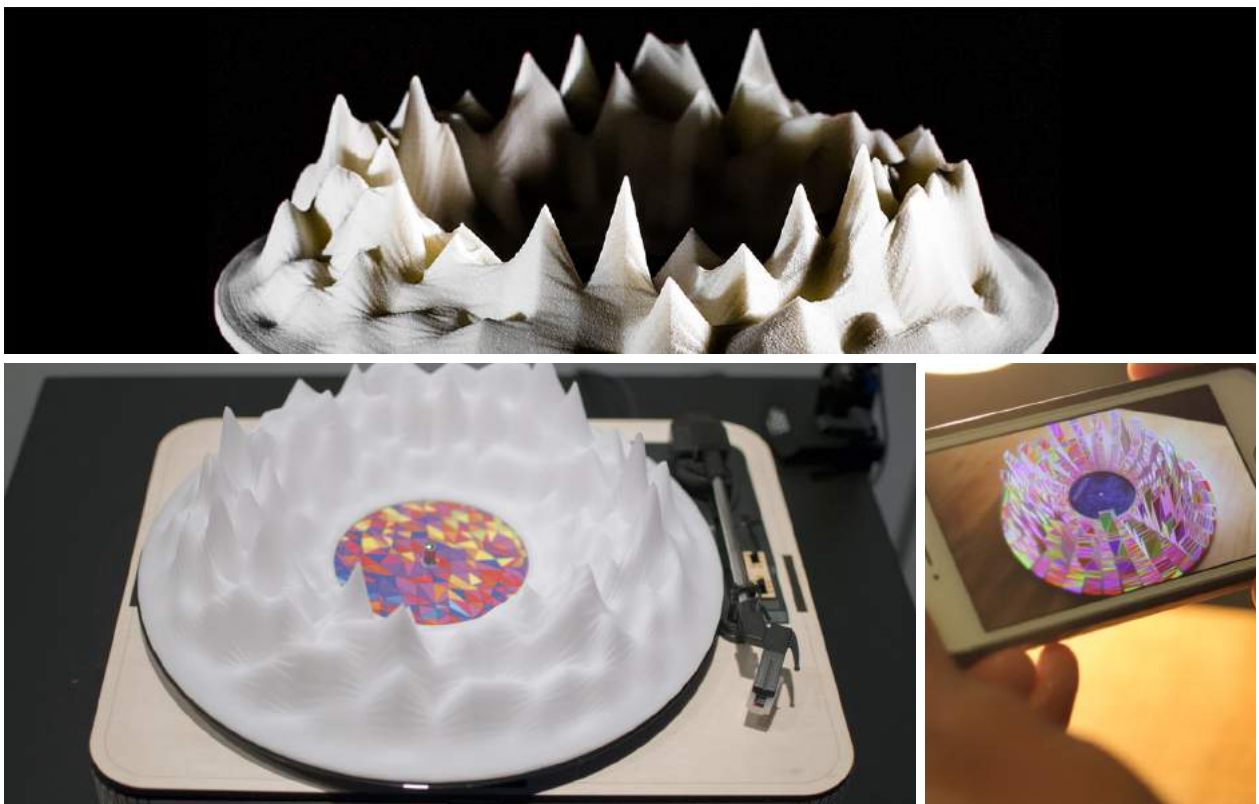
Lukasz Karluk is a digital artist working in the fields of interactive installation and computer art. *HoloDecks* is a series of "sound sculptures" created by representing music as a series of solid objects created using a 3D printer.

Using a computer generated code, each sculpture is a representation of an audio file of a selected song. An augmented reality app tracks the rotating sculpture and overlays a virtual 3D model, giving the effect of an audio reactive sculpture. Lukasz is playful as he flirts with the real and the virtual at the same time. His work is all about discovery. His interaction design company, Code on Canvas, have produced installations and generative computer art for Sydney Festival, Vivid Light and Australian Fashion Week

HoloDecks Swirls, 2014 features Still Life (2013) by Oneohtrix Point Never

HoloDecks Peaks, 2014 features Problem Areas (2013) by Oneohtrix Point Never

HoloDecks Tubes, 2014 features Zebra (2013) by Oneohtrix Point Never



“My aim is to create a stronger relationship between music and the physical world by drawing on the relationship of the disc shape seen in compact discs and vinyl records as the bridge between the two worlds”

- Lukasz Karluk

Look carefully at this series of sculptures:

1. What are the sculptures made of?
2. What do you think of when you look at the sculptures?
3. Do the sculptures on their own (without the sound and music) enable you to predict what the music will sound like and what colours may be used?



Look and listen to the artworks:

1. Does the use of different colours enhance your enjoyment of the music?
2. Do you think that the different shapes and different sizes match what you are hearing?



1. The sculptures are highly individual. Describe why 3D printing was a better way of producing the sculptures than other methods such as carving the pieces individually or casting them.
2. If you showed someone one of the sculptures without the sound and music would that person would know what the music sounded like?
3. Describe how the combination of physical form, colours and sound change your experience of music.



Choose one of your favourite pieces of music and create a colourful design describing the music using three dimensional objects of differing size and shape. Explain how the colours and shapes of your design would improve the experience of listening to music.

Michael Eden

A Twisted Oval Wedgwoodn't Tureen, 2012

Nylon with mineral coating

Josiah Wedgwood an 18th Century English potter who founded the famous Wedgwood company is credited with being one of the fathers of the Industrial Revolution. His willingness to embrace new ideas and manufacturing techniques led to a transformation in the industrial production of ceramics. Michael Eden, a potter with over 25 years experience believes that if 3D printing had been available in the 18th Century, Josiah Wedgwood would have explored and capitilised upon its potential.

According to Michael Eden 3D printing heralds a "second Industrial Revolution" so he has chosen to re-interpret one of the iconic objects produced by the Wedgewood company, the Wedgewood tureen. Wedgewood ceramic designs have been reproduced using or imitating many different types of materials. Michael Eden decided to re-interpret a Wedgewood tureen imitating bone. Although bone has a hard smooth surface it's internal structure looks a bit like a sponge.

Imitating a bone-like structure would be difficult, time consuming and expensive to do using traditional techniques but is relatively easy using 3D printing. Eden chose the basic design from an original Wedgewood Company catalogue and then recreated it on his computer using digital design software giving it a bone-like structure. The artwork was produced from nylon using a type of 3D printer that performs selective laser sintering and then was given a mineral coating to create a functional product. Michael Eden has paved the way for many other artists wishing to participate in the second Industrial Revolution.



Images: Courtesy of Michael Eden

“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.”

-Michael Eden



Look at the artwork very carefully:

1. What does the colour remind you of?
2. Is the surface dull or shiny?
3. Does it look heavy or light?
4. What do things made of bone remind you of?



1. A tureen is a dish from which soup is served. Expensive tureens are made from bone china. Eden's tureen imitates bone. Why do you think he chose to do this?
2. Why do you think Michael Eden chose the colour? Would the impact of the artwork be different if it was red or black?
3. Why do you think Michael Eden chose to call the artwork "A twisted Oval Wedgwoodn't Tureen"?



1. Explain why Michael Eden referenced a design produced during the Industrial Revolution and re-interpreted it using a new manufacturing method.
2. Explain why the artwork is not merely a copy of an earlier design but rather a new artwork in its own right.
3. How would Michael Eden have created this artwork if 3D printing were not available? What are the advantages and disadvantages of using a different manufacturing method.

Louis Pratt

King Coal, 2015

Coal and coal dust, resin, fibreglass and steel

Louis Pratt uses 3D scans of people and digitally sculpts them into new forms. In the case of *King Coal*, Louis Pratt used the digital information to create 3D-printed moulds so that the artwork could be cast. Creating a sculpture by casting using traditional methods is a complex, time consuming, multi-stage process requiring a highly skilled artisan. The process usually begins with a physical model – often made from clay – from which a wax replica is created before the final mould is made. Almost all sculptures need to be cast in a number of pieces and then re-assembled to create the final artwork.

By using 3D printing and computer aided design, Louis Pratt was able to create the moulds without having to make a physical model or a wax replica. This saved a considerable amount of time and money. Having said that, the 3D-printed moulds for *King Coal* still took 2000 hours to print. *King Coal* has been cast from a combination of coal, coal dust, resin and fiberglass to create the upper body of a man. The arms are crossed over his chest signalling resistance and the eyes look away in stubborn arrogance as he avoids engagement, putting him on the defensive as he leans back so far that he is in danger of falling over. Pieces of coal have been allowed to fall away from the sculpture to reinforce an impression of disintegration and potential collapse.

Louis Pratt uses *King Coal* to warn against complacency and denial with respect to the use of fossil fuel.



Images: Courtesy of Louis Pratt

“Coal is an important issue for Australia. It has helped us enjoy the quality of life we have today and will continue to do so for some time. But a future with coal will lead to environmental disaster. My work depicts an arrogant character unwilling to change and unaware of his impending doom.”

-Louis Pratt



Look carefully at the sculpture

1. What colours and textures can you see?
2. What does the sculpture look like it is made from?
3. What emotions do you think King Coal is feeling?
4. Louis Pratt is using King Coal to communicate a point of view. What is Louis Pratt warning us about?



1. Take it in turns with a partner to pretend to be King Coal. Fold your arms over your chest and put yourself in the same position as the sculpture. While one of you is pretending to be King Coal try and have a discussion about what you both like and dislike about the sculpture. Is it easy to talk with someone who is behaving like King Coal?
2. Compare King Coal with another famous sculpture (depicting a human) of your choice. What information can the posture of a sculpture provide?
3. The material that King Coal is made of reinforces the artist’s message about the danger of relying upon a non-renewable and polluting energy source such as coal. Would the impact of the message be changed if the sculpture was made from a different material, for example bronze?



You are an artist concerned about waste and how it degrades the environment. You have been commissioned to create a sculpture of a person dropping litter to raise awareness of the issue.

- What materials would you use? And how will these materials help convey your message?
- Would you choose a child, a youth, an adult or a senior citizen to be the subject? Explain your choice.
- How would you strengthen the message you are trying to communicate through the posture of sculpture?

Glossary

3D Printing

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the entire object is created. Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual Object.

Linotype machine

A 'line casting' machine, which along with letterpress printing, was the industry standard for newspapers, magazines and posters from the late 19th century to the 1960s and 70s. The name of the machine comes from the fact that it produces an entire line of metal type at once.

Offset lithography

Offset printing is a printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, the offset technique employs a flat image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a film of water, keeping the non-printing areas ink-free.

Screen printing

Screen printing has its origins in simple stencilling, most notably of the Japanese form Katasome. Ink is forced on to a surface through a prepared screen of fine material so as to create a picture or pattern.

Modem (modular - demodulator)

A device that modulates one or more carrier wave signals to encode digital information for transmission and demodulates signals to decode the transmitted information. This allows communications between computers via the internet.

Laser printer

Based on a modified xerographic copier, the laser printer uses an electrostatic digital printing process that produces high-quality text and graphics repeatedly passing a laser beam back and forth over a negatively charged cylindrical drum to define a differentially-charged image. The drum then selectively collects electrically charged powdered ink (toner), and transfers the image to paper, which is then heated in order to permanently fuse the text and/or imagery.

Inkjet printer

The inkjet technology works by spraying very fine drops of ink on a sheet of paper. These droplets are 'ionised', allowing them to be directed by magnetic plates in the ink's path. As the paper is fed through the printer, the print head moves back and forth, spraying thousands of these small droplets on the page.

Stereolithography

(also known as Optical Fabrication, Photo-Solidification, Solid Free-Form Fabrication, Solid Imaging, Rapid Prototyping, Resin Printing, and 3D printing) is a form of additive manufacturing technology used for creating models, prototypes, patterns, and production parts. A computer-controlled moving laser beam is used to build up the required structure, layer by layer, from a liquid polymer that hardens on contact with laser light.

Selective laser sintering (SLS)

An additive manufacturing technique that uses a laser as the power source to sinter powdered material (typically metal), aiming the laser automatically at points in space defined by a 3D model, binding the material together to create a solid structure. SLS is a relatively new technology that so far has mainly been used for rapid prototyping and for low-volume production of component parts. Production roles are expanding as the commercialisation of AM technology improves

ABS

Acrylonitrile butadiene styrene is a common thermoplastic polymer and is commonly used for household and consumer goods.

Open source

May relate to software or hardware. In the case of open source software the original source code is made freely available and may be redistributed and modified. In the case of open source hardware, drawings, schematics, HDL source code is made freely available so that others can make and modify it.

Fab Labs

Fab Labs (fabrication laboratories) are small-scale workshops offering digital fabrication and are equipped with an array of flexible computer controlled tools that cover several different length scales and various materials. Fab labs have shown the potential to empower individuals to create smart devices for themselves. These devices can be tailored to local or personal needs in ways that are not practical or economical using mass production.

Polylactic Acid (PLA)

Polylactic acid or polylactide (PLA, Poly) is a biodegradable thermoplastic polymer derived from renewable resources such as corn starch and sugarcane.

CNC

Computer controlled milling machines perform both drilling and cutting.

Visit

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NSW Australia

Post

PO BOX 595
Potts Point
NSW 1335

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