

**Shape 2020**  
**Showcase of HSC**  
**Technology Works**  
Large Print Guide

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Shape 2020  
Large print guide

Powerhouse Museum  
Museum of Applied Arts and Sciences  
500 Harris Street  
Ultimo NSW 2007  
Australia  
+ 61 2 9217 0111

**maas.museum**

# Shape 2020

## Showcase of HSC Technology Works

A selection of outstanding major projects by NSW Higher School Certificate (HSC) Design and Technology, Industrial Technology, and Textiles and Design students.

Behind each project is a process of investigation, research and evaluation in response to an identified need. Students apply their creativity and skills using a wide range of materials and technologies to complete their projects over the course of the year. The development from idea to final realisation is described in the students' folios (accessible via the QR code displayed with their work).

From bushfires to floods to COVID-19, completing the HSC in 2020 was more challenging than ever before with students adapting to new ways of doing things.

The Powerhouse Museum and NSW Education Standards Authority congratulate the Shape 2020 students for their resilience and the exceptional execution of their major work under these circumstances.

Presented in association with NSW Education Standards Authority



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Applied Arts  
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# Textiles and Design

In the HSC Textiles and Design course, students develop confidence in the selection, design, manufacture and application of textile items. The focus is on meeting a design specification for a textile product through creative problem-solving and documenting the design and management of their project. Students develop a design in one of five focus areas: apparel, furnishings, costume, textile arts, or non-apparel.

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## Her Story

**Maria Argyropoulos**  
SCECGS Redlands

Maria drew inspiration from stylistic elements of tarot cards for her design, and women's changing position in society for her concept. While the three-piece garment references a traditional suit, its lustrous fabrics, digitally printed silk lining and decorative techniques, such as ornamental pintucking, smocking, flouncing and embroidery, place the emphasis on aesthetics and the suit's political and social statement rather than functionality.

*I aim to encourage my audience to reflect on the restrictions placed on women throughout history.*

## Coral-reef inspired wearable art

**Emma Collinson**  
St Vincent's College

To create the coral on her bodice, Emma used a range of natural fibres including cotton, bamboo, merino and alpaca wool, which she then crocheted, hand felted, latch hooked and manipulated with cornstarch. She made dyes from vegetable sources to colour some of the coral. Fabrics for the bodice, peplum and skirt include silk and wool mesh.

*The embellished bodice represents coral reef while the peplum and skirt, devoid of coral, reflect the environmental issue of coral bleaching in the Great Barrier Reef.*

## Luxe Couture

**Yianna Nikos**

Presbyterian Ladies' College Sydney

This evening gown with strapless corset, straight skirt and smocked cape was influenced by the figure-hugging, asymmetrical silhouette and luxurious fabrics of 1940s haute couture (high fashion). Yianna incorporated the geometry of 18th-century French architecture into her garment — in the patterning of the smocking, the parallel lines of the draping and the structured boning. She used floral motifs in the handmade lace appliqué and lace insertion.

*Perseverance, drive and innovation are qualities that will assist my design studies beyond the HSC.*

## Bushfire-inspired dress

**Lillyrose Watson-Cooper**

Kirrawee High School

Every feature of Lillyrose's dress points to its inspiration: the bushfires of 2019–20. Metallic silver and copper thread embroidery running vertically down the bodice represents burnt and smouldered tree trunks. An appliqué textured flame blazes off one side of the bodice near the collarbone, and the rolled overlapped hem creates the illusion of the movement of a live flame.

*I was able to develop my design to reflect the best features of my initial vision so that it was both time and cost effective.*

## Fibrous Seascape

### Zoe McNamara

Danebank – An Anglican School for Girls

Wall hangings are traditionally two-dimensional but Zoe has used three dimensions to represent many forms of sea life. She made the translucent jellyfish with crinoline material, embellished with hand-bound ostrich-wing feathers and long threads of delicate tentacles. The clusters of bluebottles are represented by crochet buttons. She coloured many of the fibres using natural dyeing techniques.

*I fell in love with Textiles and Design and am now looking to pursue a career in this field.*

## African-inspired Sustainability Coat

### Zebedee Maguire

Sydney Distance Education High School/Glenaeon Rudolf Steiner School

Zebedee's coat uses the A-line silhouette popular during the 1960s. It is made of offcuts and eco-friendly fabric, reflecting principles of sustainability. The base fabric is diamond jacquard while the shibori inner lining was constructed from cotton. Zebedee created the shibori print as one of the garment's main features, presenting a surprise when the coat is opened. The elephant motif was hand embroidered.

*Experimentation played a big role in my final choices.*

## EPHEMERA

**Meabh Nash**

Warners Bay High School

Referencing collections that feature complex surface decoration, Meabh stitched vintage beverage caps from the 1930s–60s in grid squares into the layers of her structured PVC raincoat. The straight-legged pants are embellished with appliqué houses and hand-embroidered lettering on the waistband. They are tailored with a lined hem finishing at the ankle.

*I learnt many new skills and valued the experiences and time spent collaborating with my peers and teacher.*

## Expressive Illumination

**Zarie Dawson**

Inaburra School

Captivated by Tokyo streetwear, Zarie designed and manufactured this outfit consisting of cargo pants, a cropped jacket, sports crop top and face mask. Its features include buckles on an open sleeve and leg, a folded-star patchwork on one knee, machine-embroidered Japanese kanji symbols on the back of the jacket and contrasting materials — a neon orange stretch and a woven teal — for the jacket and pants.

*I learnt the importance of time management, and that designs are never set in stone.*

## Women in Suits

**Laura Tighe**

Cheltenham Girls High School

Laura's two-piece suit, inspired by the Women's Liberation movement of the 1960s, puts a feminine edge on the classic black men's suit. The suit, and mask, are made from grey cotton/poly/lycra blend Prince of Wales fabric, featuring a tailored structure and self-made lining pattern pieces for the jacket. Embellishments include pearl beading on the pockets of the pants and honeycomb smocking on the jacket.

*I enjoyed spending full days sewing at school with my classmates during lockdown.*

## The Raven

**Rebecca Salem**

St Ursula's College

Inspired by the ravens at the Tower of London, Rebecca created this suit that features feathers along the arm, a tail-like peplum, laser-cut motifs handsewn onto the skirt and beaded appliqué. She used scuba knit fabric to make the jacket for a bold and theatrical style.

*My project gives women a suit that echoes its feminist birth, with its classic silhouette accentuating and empowering the feminine shape.*

## The Drought

**Kaitlyn McMahon**

Merewether High School

Kaitlyn's quilt uses a wide range of techniques to express the devastation of a drought-torn paddock. The pieces of fabric for the cracked earth were made using natural dyes such as rust, tea and coffee, with decorative machine stitches representing the roughness of dirt. The gentle gradation to the blue of the sky was achieved using a dip-dyeing method. The fence line is hessian fabric, pintucked for texture.

*Textiles and Design was my most rewarding HSC course, giving me a creative outlet while still being stimulating and challenging.*

## Organic Fusion Headpiece

**Georgia Rich**

Northern Beaches Christian School

Georgia's headpiece incorporates natural elements to give an impression of strength and power. She used the techniques of felting, Solvy machine embroidery, heat setting and beading to represent leaves, twigs, bark, moss and vines. The horns are entangled with extravagant vines that spill down the back and lines of small beaded droplets that twinkle in the light.

*The process challenged the limits of my creativity and allowed my imagination to roam wild.*

## Anderson's Attic

**Zoe Scott**

Springwood High School

Inspired by characters in Wes Anderson films, Zoe's rabbit wears a cotton-drill scout uniform, with patches appliquéd and embroidered by hand and machine. It carries a backpack holding a tartan rug, ginger felted cat, fishing pole and fish, and felted flowers. All the elements for the project were designed and constructed by Zoe, using organic materials where possible.

*Looking back on my project, I see that in being dedicated and having faith in your ideas, you can achieve amazing results.*

## Postcards from My Travels

**Rachael Turner**

Northern Beaches Secondary College  
Freshwater Senior Campus

The postcards on Rachael's bags are constructed from brightly coloured fabrics and use decorative techniques such as hand and freehand-machine embroidery, appliqué, Inktense blocks, digital printing and dissolvable fabrics. They also feature passports and stamps, which are lined with digitally printed fabric displaying scanned images of her family's postcards from around the world.

*I was inspired by postcards from my great aunt, Louis Vuitton travel bags, famous landmarks and the quirky bag brand Vendula London.*

# Industrial Technology

The HSC Industrial Technology course focuses on developing knowledge and understanding in one of six industry areas: automotive technologies, electronics technologies, graphics technologies, metal and engineering technologies, multimedia technologies, or timber products and furniture technologies. Students gain knowledge of project management, resource use and practical engineering design through the application of traditional and contemporary technologies.

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## The Laser-cut Lounger

**Flynn Poelmann**

Barrenjoey High School

Making this sun lounger and side table provided Flynn with a welcome challenge to learn new technological processes. The lounger's ergonomic design gives it good functionality, while its aesthetic features include the struts charred with a black edge to create contrast, and the lamination of multiple veneers to provide complexity and detail.

*The challenges I faced in my design helped me to develop and hone my problem-solving and innovation skills.*

## Desk

**James Milburn**

St Edward's Christian Brothers' College

James set himself the task of building a piece of furniture that would demonstrate his skills in making curves and angles. The project's complexity was increased by incorporating half-blind dovetail joints that merge into the curve on the top edge of the desk. Other features include the legs shaped from one piece of timber and drawers that become deeper at the back.

*I did sketches and used rendered models on Autodesk Fusion 360 software.*

## Custom chairs

**Sophia Maltman**  
Barker College

When an oak tree fell on the property of Sophia's family, it was milled into slabs. Following the principles of a sustainable and circular economy, Sophia used this wood for her two chairs, focusing on elegant and ergonomic design and a blend of modern and traditional chairmaking techniques. She constructed the parts and joints with a laser cutter, further shaping them with hand tools.

*I developed skills in CAD/CAM, dressing slabs, shaping, joinery and resin pouring.*

## Entertainment unit

**Selena Cardillo**  
Crestwood High School

Selena designed this unit with curves and sleek, minimalistic silhouettes to incorporate a mid 20th century retro style into a modern piece of furniture. American white oak is used as a veneer to cover the plywood carcass and in solid form for the other components. Zebrawood in the doors creates contrast. There is a drawer for storing small items and three shelves to display decorative items.

*Constructing the curves and veneering the carcass were the most challenging processes.*

## LED geometric table

**Mark Robinson**

Armidale Secondary College

The top of Mark's coffee table is filled with coloured resin and smart LED lights placed under the pattern that react to sound. The two woods used, Purpleheart and American hard maple, are contrasted in the 52 inlaid dovetails, where the slats join the rails (horizontal pieces of the frame), and the interlocking finger joints, where the rails join the legs.

*Carving out the top was done using a hand-held router with a fixed base and an assortment of chisels.*

## Rocking chair

**Majin Manoj**

Marist College Kogarah

Majin intends to pursue a career in industrial design, so this project was a good opportunity to gain a range of woodworking skills. This included learning how to use the bandsaw, sander and angle grinder with safety and accuracy. Designing and constructing a functional rocking chair that was also aesthetically pleasing involved long hours of work.

*I achieved my goals of managing finances and putting together a time plan.*

## Contemporary Polish house design

**Gabriel Snoch**  
St Mary's Cathedral College

For his project, Gabriel used traditional materials found in Polish homes, such as wood, stone and calcium plaster, and inserted modern features, like a built-in fireplace, spiral staircase and sunken lounge. His design includes 3D models, floor plans, an exploded view to show different components, elevations and section views of the house. Professional-grade renderings create realistic images of certain rooms.

*I incorporated my Polish heritage into my project and created a modern house that feels like a Polish home.*

## Ultra-modern grandfather clock

**Sam Archer**  
Kinross Wolaroi School

Sam's design piece has a highly polished stainless-steel case with seamless joins. The sides are made of glass, with a clear dial and shelf so that the entire clock mechanism can be seen operating. The stainless-steel interior reflects the clock mechanism and surroundings, making the device seem even more intricate and detailed.

*I hand-forged sculptures of flowers and a sword on an anvil, and made aluminium ingots in the crucible.*

## Jewellery box

**Alice Wilson**

Killara High School

Alice wanted to explore the intricacy that can be achieved in creating a jewellery box. Her project features decorative marquetry on the side and top, a tray with a removable ring box, and three drawers that run along handmade brass runners. A secret drawer is concealed by a stripe of curly maple wood that circles the box.

*I developed my skills working with hand tools, such as my construction of dovetails in the drawers.*

## Mountain bike

**Jeremiah Lee**

Castle Hill High School

Jeremiah's project consists of a model and extensive working drawings, including isometric, detailed and sectioned views of individual parts. He also produced photorealistic rendered images using a 3D computer graphic technique known as raytracing. Jeremiah created an animation to show an exploded view of extracted individual parts, ending with a reassembly of the model.

*I was able to develop new skills through research and building on my existing CAD program knowledge.*

## Electronic tank robot

**Nicholas White**

Toronto High School

Nicholas designed this remote-controlled robot to gain a greater understanding of how electronic circuits work, and to improve his soldering, coding and CAD skills. He used 3D-printing for clips, hinges, small enclosures, mechanisms and supports. Recycled components include fans, capacitors, heatsinks, joysticks, motors, limit switches from microwave ovens and a small speaker.

*My biggest challenge was designing a 3D frame with over 5000 lines and curves making hundreds of pieces that fit.*

## Mini loader

**Harry Kermode**

Kinross Wolaroi School

Initially conceived to clean out underneath shearing sheds, Harry's remote-controlled mini loader can be used for a wide variety of landscaping uses. Completing the project gave him many opportunities to learn new skills in lathe machining and software programs AutoCAD and Inventor. Harry also discovered how to make a wiring harness and how hydraulic systems work as well as improved his welding techniques.

*I enjoyed coming up with considered solutions to problems.*

## Batman's Day Off (5:34)

### Jaiden Collins

De La Salle College, Revesby Heights

This stop-motion film was inspired by a previous project in Shape and the many LEGO stop-motion videos online. While Jaiden's planning included a storyboard, improvisation was a big part of the project, and as a result many scenes had to be added or cut. Much attention was paid to the set designs and incorporating action into the background to bring the scenes to life.

*I learnt that creating stop motion requires a lot of patience and dedication.*

## Bubba the Elephant (3:40)

### Nirel Dimaunahan

Macarthur Girls High School

With the COVID-19 lockdown restrictions, Nirel's project had to change enormously. Discovering a much-loved childhood toy sparked her imagination. Her film is about the importance of retracing comforting childhood memories to reflect upon our growth as individuals. It creates a playful atmosphere with warm tones and bright colours, accompanied by a mellow song.

*I enjoyed trying to be creative using the resources within the one room.*

## A Gift (2:26)

### Zoe Fraser

Northern Beaches Secondary  
College, Freshwater Senior Campus

When Zoe's brother Luka was diagnosed with Asperger syndrome at the age of six, he said to her, 'I want people to know how I feel'. This request motivated her film, which uses advanced techniques such as 3D and cell animation. Zoe expresses her brother's perspective on the world through creative drawings, representing autism in a positive light by focusing on the gift this disorder provides.

*A Gift advocates for a group of people who don't have the capabilities to express their struggles.*

## Heroes of Tomorrow (2:03)

### Amy O'Toole

Northern Beaches Secondary  
College, Freshwater Senior Campus

Amy's project is a proposal for a television series in the Japanese anime genre, starring action heroes with special powers. She developed an opening sequence set to music for the pilot episode, along with concept art for the main characters, settings and key themes of the show. She also provides examples of the mood, artistic style and types of sequences to appear in the series.

*I wanted to improve my skills in drawing, animating and editing.*

# Design and Technology

The HSC Design and Technology course focuses on creativity, innovation and the successful implementation of ideas. The project each student selects can be a product, system or environment. The course aims to develop students' conceptual understanding; their appreciation of the historical and cultural influences of design and the interrelationships of design, technology, society and the environment.

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## Backyard Bees

**Emma Smart**  
Stella Maris College

Emma designed her native beehive to be both aesthetically pleasing and easy to use. Her aim was to encourage people to install beehives and increase the population of native bees, which are vital for natural ecosystems and agriculture. She focused on native bees for her project because the hive would be sustainable and simpler to manage, and honey could be collected from it.

*I learnt valuable lessons in resilience, problem solving and time management.*

## Electronic prosthetic hand

**Paolo Atas**  
Mount Annan Christian College

A prosthesis is a physical aid that also affects a person's self-perception, so Paolo's project to make prosthetic hands more affordable and customisable meets a mental as well as a financial need. This is particularly important for young people, who can rapidly outgrow their prosthetic devices. In Paolo's design, expensive components have been substituted with force sensitive resistors, removable sockets are replaceable and push-fit 3D printable cases can be easily swapped.

*I found it especially challenging to design compact housings for the motors and electronics.*

## Waterproof wearable asthma device

**Charlotte Bergman**  
Queenwood

Charlotte's lightweight device helps people with asthma to engage in (water) sporting activities safely, knowing that they can use their medication at any time and reduce the chance of an asthma attack. The device is constructed with soft neoprene material so that it is comfortable to wear, and has been designed and tested to deliver a standard dosage of medicine to the user.

*I learnt the importance of collaborative design as well as experimentation and prototyping.*

## OXYREEL

**Matthew Langsam**  
Cranbrook School

People using oxygen machines often find that the tubing that delivers the oxygen can become debilitating and hazardous as it can wrap around their legs, causing reduced mobility and serious injury. Matthew's project is an ergonomic, portable device that seamlessly retracts oxygen tubing. This eliminates a tripping hazard and supports the environmental safety of people with respiratory failure.

*Problem solving allowed me to break down my project to its core components and understand what was needed.*

## Solar Desalinator

**Valentius Wirjana**  
Waverley College

Valentius was motivated to find a method for desalination that turned saltwater into fresh water without using unsustainable energy such as fossil fuels. The Solar Desalinator has a reflector positioned to use the sun's rays to heat saltwater in the pipe. This is then condensed into safe drinkable water. The device is able to heat the pipe to 96°C in under seven minutes.

*Managing my time and working regularly was the key to completing my project.*

## Lockable mooring buoy

**Max McMurray**  
Mater Maria Catholic College

Boat moorings cost thousands of dollars a year to service and maintain, and can be damaged or used by people who do not own them. With Max's lockable mooring buoy, the owner can close off access to the mooring rope via a bluetooth connection controlled within their vessel. It is a self-contained system powered by solar, devised to suit the marine environment.

*I valued my experience interviewing the CEO of a yacht club who saw great potential in my design.*

Provisional patent application: 2020904698

## RoboRan

**Olivia Hannell**

Turrumurra High School

Olivia was motivated to address the issue of plastics in the ocean which threaten marine and human life. She designed a plastic-waste collection unit that floats along the surface of the water. The device uses both forward motion and negative pressure from the rear propellers to draw waste into the mouth, capturing it in a net.

*I learnt many hands-on skills, and important lessons in resilience and determination.*

## ThrowSmart

**Olivia Hayes**

St Andrew's Cathedral School

Inspired by her love of the sport, Olivia designed this javelin that measures the distance, speed and angle of the throw and records the data in an app on the athlete's electronic device. ThrowSmart improves on the current technique of measuring javelin throws, which is done manually using a tape about 40–50 times within a training session, and doesn't calculate any other aspects of a throw.

*I learnt that resilience and patience are the most important skills for a designer to have.*

Provisional patent application: 2020904751

## Helio+

**Yijia Zhou**

Pymble Ladies' College

Yijia's research showed that seven million people die each year due to air pollution. To reduce the carbon dioxide emissions from burning fossil fuels which contaminate the air, Helio+ allows users to recharge their mobile devices using solar energy from panels that track the sun. Modelled after the sunflower, its biomimicry design of bright natural colours makes Helio+ visually appealing to use.

*This project has inspired me to pursue an engineering career to make positive changes to the community.*

## Eco Plate

**Connor Burke**

Jamison High School

P and L driving plates regularly fall off moving cars. After discovering that these plastic plates were found in gutters, footpaths and waterways, Connor was inspired to design a plate that will break down in the environment. Eco Plate is made from recyclable board embedded with native flora seeds, and covered in a biodegradable wax. The plate will decompose and germinate in the right conditions.

*Made with local materials, Eco Plate can save thousands in future environmental issues.*

Provisional patent application: 2020902801

## Tactile ground surface indicators

**Genevieve Bryant**  
Wyndham College

The majority of visually impaired people experience difficulty navigating the world around them using existing aids. With an ageing population, this is a growing problem. Genevieve has developed tactile ground surface indicators that communicate directional or geographical information to a probing cane or via the feet. Her functional design is cost-effective, easy to detect, durable and environmentally friendly.

*I learnt to think outside my own experiences, and to listen and learn from others.*

Provisional patent application: In progress

## DoseGuardian

**Fox McDonald**  
Sydney Grammar School

Fox's device helps a person keep track of their medication, eliminating the problems of simply forgetting as well as the risks of underdosage and overdosage. It measures the weight of a user's medicine then uses a simple three-colour traffic-light system to tell them whether or not they should take their medication.

*The most challenging part was the coding, having taught myself C+ in order to use the Arduino [programmable platform] as the logistic system in my design.*