









Torches and Torch Relays of the Olympic Summer Games from Berlin 1936 to Tokyo 2020

08.10.2019



Cathy FREEMAN in front of the steps leading up to the Olympic cauldron at the Opening Ceremony of the Olympic Games Sydney 2000.

> SYDNEY 2000



TORCH TECHNICAL DETAILS

Description:	The torch took its inspiration from the Sydney Opera House, the blue of the Pacific Ocean and the boomerang. It is made of three layers of different materials. The inside layer is made of stainless steel and contains the fuel system. The blue middle layer is made of anodised aluminium and contained the fuel reservoir. The outer layer is made of treated aluminium. These three layers represented earth, water and fire. The emblem of the Games featured at the top of the torch.
Colour:	White, blue, silver
Length:	77.5cm
Composition:	Steel, aluminium
Fuel:	Mixture of propane and butane. The combustion duration is 20 min.
Designer / Manufacturer:	Blue Sky Design / GA & Harrington

- Did you know?
- The torch was endowed with a safety system. If it was turned upside down or lay on the ground for more than 10 seconds, it would go out automatically.

ROUTE DESIGN AND DETAILS

Lit in Olympia, the flame was carried by relay for about 10 days in Greece.

The relay then visited 12 island countries and territories of Oceania, beginning with Guam, where the flame landed on 22 May. Due to political tension, the Organising Committee cancelled the originally scheduled Fiji stop between Tonga and New Zealand. In New Zealand, the last leg before Australia kicked off on 5 June in the snow of Coronet Peak, Queenstown on the South Island. It ended on 7 June in Auckland, on the North Island.

On 8 June, the flame reached Yulara in Australia and the relay began near the sacred rock of Uluru, also known as Ayers Rock. Nova Peris-Kneebone, a hockey gold medallist at the Atlanta 1996 Games, ran barefoot in the first leg of the relay on Australian soil as a mark of respect for the Aboriginal people, of whom she was one.

The flame travelled the country for 100 days in passing through over 1,000 towns and suburbs. Modes of transport included a section on camel back in Broome, a railway journey across the Nullarbor Plain on board the *Indian Pacific* and a trip by surfboat in the rollers of Bondi Beach in Sydney.

On 15 September, during the Games Opening Ceremony, the flame was carried into the Stadium by Betty Cuthbert who sat in a wheelchair, pushed by Raelene Boyle. Then, in turn, Dawn Fraser, Shirley Strickland, Shane Gould and Debbie Flintoff-King relayed the flame to Cathy Freeman. Freeman climbed a series of steps, positioning herself at the centre of a shallow circular pool and stood level with the water to light the 150 burner nozzles placed just below it. A circle of fire surrounded the athlete before the whole cauldron was raised to the top of the Stadium where it burned for the duration of the Games.

THE RELAY: FACTS AND FIGURES

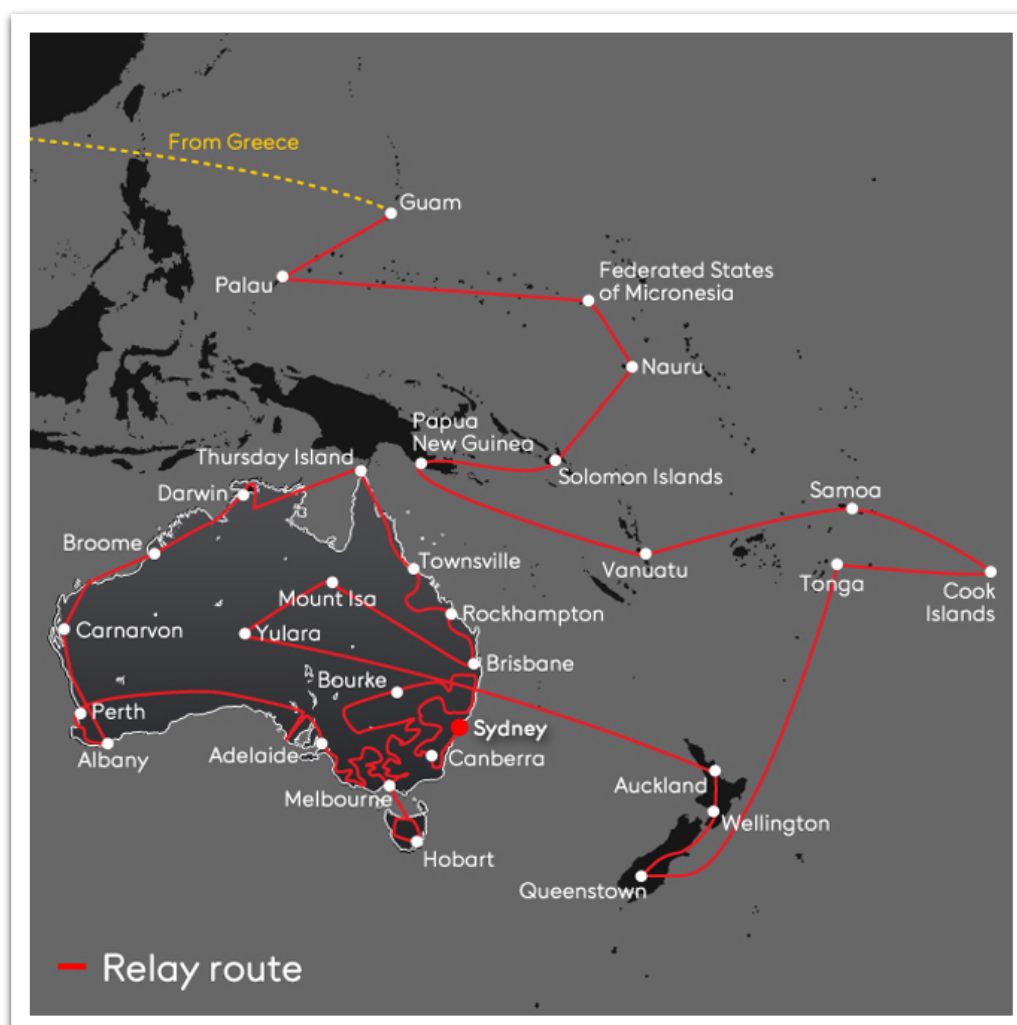
Start date:	10 May 2000, Olympia (Greece)
End date:	15 September 2000, Olympic Stadium, Sydney (Australia)
First torchbearer:	Lambros Papakostas, Olympic participant in athletics (1992, 1996)
Last torchbearer:	Cathy Freeman, Olympic participant in athletics (1992, 1996, 2000), gold medallist in Sydney 2000 and silver medallist in Atlanta 1996.
Number of torchbearers:	~900 in Greece, ~1,500 in Oceania, 11,000 in Australia
Recruitment of torchbearers:	In Australia, the <i>Community Torchbearers</i> programme allowed the Australian general public to nominate people who were notable for their achievements or worked for the common good. Through this programme, 6,000 torchbearers were selected from among a total of

over 43,000 nominations.

The rest of the torchbearers were either chosen through sponsors, media partners and the Organising Committee, or were Olympians. About 7 per cent of the torchbearers were of Aboriginal and Torres Strait Islander heritage.

Distance: 1,696km on land and 463 nautical miles in Greece, ~17,000km in Oceania, 27,000km in Australia.

Countries visited: Greece, Guam, Palau, Federated States of Micronesia, Nauru, Solomon Islands, Papua New Guinea, Vanuatu, Samoa, American Samoa, Cook Islands, Tonga, New Zealand, Australia.



DID YOU KNOW?

- Thanks to the efforts of Dr. Andy Thomas, a NASA astronaut from Australia, special version of the torch and a flag bearing the emblem of the Games was taken into space for about 10 days in May 2000 on the Atlantis space shuttle's trip to the International Space Station.
- On 27 June 2000, the flame was taken on an underwater journey of 2 minutes 40 seconds at the Great Barrier Reef, not far from Cairns. A flare system, burning at 2,000°C, maintained the flame and made it visible underwater.
- The concept for the Olympic cauldron and its lighting was already envisioned in 1993 when Sydney had just been elected host city of the Games of the XXVII Olympiad. Two years later, the concept was integrated in top secret into the architecture of the Stadium in order to put in place the structures that would allow the seven tonne cauldron to be raised to the top of the north stand.

SOURCES

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- *Official report of the XXVII Olympiad: Sydney 2000 Olympic Games, 15 September - 1 October 2000*, Sydney: SOCOG, 2001, [vol.1, p. 334](#).
- “Olympic Torch ready to return to earth”, news, website of Sydney 2000, 28 May 2000.
- *Opening ceremony of the Games of the XXVII Olympiad in Sydney, 15 September 2000: media guide*, Sydney: SOCOG, 2000, [pp. 59-60](#).
- “Torch relay: Olympic torch to bypass Fiji”, news, website of Sydney 2000, 29 May 2000.
- “Torch Relay – On the road” section, website of Sydney 2000, 1996-2000.
- “Torch Relay – Torch design” section, website of Sydney 2000, 1996-2000.

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Design - model and test it for users

What will it look like? How will it work? I've got a great idea and I want to test it out. First I need to decide what I want it to do. Then I'll make a model and see if it works.

The person who says this is about to start designing. Designing is the part of the innovation cycle that will turn the sum of your ideas and research into a product, system or environment.

Design determines how an innovation works and looks, how people use it, how it's made, what it's made from, even how it's packaged. At the end of the line, design also determines how a product is disposed of - or whether it can be recycled or reused.

The user reacts to design in two important ways: first by assigning all sorts of values (like status, sexiness and desirability) to external appearance; and second by assessing how performance measures up to expectation.

A designer needs to understand the practical and visual requirements as described in the brief. Investigating possible solutions, modelling, testing and evaluating the results ensure the final design meets as many of these requirements as possible.

Design Institute of Australia <http://www.dia.org.au/DIA2000menu.cfm>
 Design Council UK <http://www.designcouncil.org.uk/design/>
 Exploring design and innovation
<http://www.brunel.ac.uk/research/exploring/home.html>

Sydney 2000 Olympic Torch — a unique design project

The Sydney 2000 Olympic Games was an important event in the history of Sydney and Australia. Sydney's infrastructure and organisational abilities were under scrutiny from all 199 nations (10 651 athletes) attending the Games. The Games were declared the 'best games ever'. In addition to the accomplishments of athletes in the stadium, there were significant achievements in Australian design and technology leading up to the Games. One of these was the development of the Sydney 2000 Olympic Torch.

The torch featured many design and technology elements that had not been used in earlier Olympic torches. Several groups collaborated in its development. The exterior was designed by Blue Sky Design, modelling was done by Box and Dice and manufacturing by GA & L Harrington, all based in Sydney. The innovative fuel combustion system was researched and developed by Adelaide University and Fuel & Combustion Technology Pty Ltd.

The torch received recognition around the country, including an Australian Design Award. It became an icon of the Sydney 2000 Olympic Games and took its place in the collection and exhibition of the Olympic Museum in Switzerland alongside all other Olympic torches. The design of the torch was integral to the innovation and to its impact.



The Olympic torch. Gift of the New South Wales Government. Part of the Sydney 2000 Games Collection.

Introduction

Celebrations erupted on 23 September 1993 when Sydney was announced as the host city for the 2000 Olympic Games. From then until the Games opened, many Australians worked hard to make the Games succeed.

The torch relay is important in the lead-up to each Olympic Games. Every relay begins when a sacred flame is lit from the sun's rays in Greece. The flame then travels to the host city, and its arrival signals the beginning of the Games. The first torch relay of the modern Olympic Games was conducted in 1936 in Berlin. It was inspired by ancient Greek traditions described in drawings and writings.

The Sydney 2000 torch relay was the longest ever. The flame travelled 27 000km from Greece to Sydney via several Pacific

islands and many towns in Australia. Cathy Freeman, who later won an Olympic gold medal, was the last to carry the flame and used it to light the Olympic Cauldron.

Every country that hosts the Games designs its own torch. The Sydney Organising Committee for the Olympic Games (SOCOG) wanted the torch to become an icon of the Sydney 2000 Olympic Games and represent Australia's skills in manufacturing and design.

It is a policy of the International Olympic Committee (IOC) that all aspects associated with the Torch reflect the culture of the country hosting the Olympic Games. It is considered imperative that Australian organisations are involved in this design and development process to assist in the promotion of Australia's future vision and demonstration of local technical capabilities.

Olympic Torch Relay - Handheld Torch and Portable Cauldrons,
Invitation for Proposal, SOCOG, 1998.

Sydney Morning Herald Sydney 2000 Torch Relay news site (archive) <http://www.smh.com.au/olympics/torchrelay/>



Mark Armstrong.
Courtesy Blue Sky Design

The design brief

November 1998 SOCOG invited forty firms to participate in the tender to design and manufacture the Olympic Torch. One of the companies that responded to the tender was Blue Sky Design, based in Sydney.

The Olympic torch was a piece of industrial design that had a fascination for industrial designers.
Mark Armstrong, Creative Director, Blue Sky Design.

The torch design brief was a thorough document that outlined the aesthetic and technical requirements for the torch. The design had to embody the spirits of Sydney, Australia, the athlete, Olympia, innovation and sustainability. It had to be safe and easy to use, and stay alight even if it was upside down.

The torch had to be simple, lightweight (less than 1.5kg) and low in cost. It had to produce a highly visible flame that would burn for at least 20 minutes with efficient use of fuel and minimum emissions. The torch had to operate in rain or hail, winds up to 65km/h and temperatures from -5°C to 45°C. It would need to travel in different environments and via different means of transport including boat, bicycle, canoe and horse.

Production of 14 000 torches and 1000 commemorative torches had to be completed by March 2000. Prototypes needed to be ready in February 1999 to be launched in March 1999.

Our first response was to say, yes, this was something we wanted to win, so we formulated a design strategy to win the tender. In fact, it turned out that winning the tender was the actual design process.

Mark Armstrong, Creative Director, Blue Sky Design.



Concept sketches for the torch design. Courtesy Olympic Co-ordination Authority and Blue Sky Design.

The innovation

The first step for Blue Sky Design in approaching the Olympic Torch project was to assemble a team. The company quickly formed partnerships with the best people in the fields required. Blue Sky collaborated with RMIT University Centre for Design to address the environmental aspects of the torch design. Manufacturers GA & L Harrington joined the collaboration along with Box and Dice model makers. Blue Sky approached Phillips Electronics to provide financial backing for the design and development process.

When you win a tender you have to have a team with all the right skills. So that was how we responded, was first collate the very best partners we could, and have a winning team.

Mark Armstrong, Creative Director, Blue Sky Design.



The hunting boomerangs that inspired the designs

Investigation

Blue Sky Design had never designed an Olympic torch before. To understand the history and tradition of the Olympic torch, the designers began by doing research. They analysed the

design and technology used in each of the previous Olympic torches and learnt from problems other countries had experienced. For information about Olympic torches used before Sydney 2000, see the International Olympic Memorabilia Federation http://www.collectors.olympic.org/e/fimo/fimo_torches_e.html.

To address the look described in the brief the designers focused on the different 'spirits' suggested: of Sydney, innovation, Olympia, the athlete and sustainability. Blue Sky created image boards for each of the different aspects. The spirit of Sydney included the Opera House sails and the water of Sydney harbour. Innovation included the orbital engine and the Victoria lawn mower. The spirit of the athlete was 'higher, faster, stronger'.

It's something of our culture with the Opera House and the lightness. It had to be sporty like a Kevlar racing bike. It had to be unique and surprising... like a Sarich engine or a piece of biomedical equipment ... that's a little bit about Australia's culture as well.
Mark Armstrong, Creative Director, Blue Sky Design.

These image boards helped to inspire the designers when creating the initial design drawings. The senior designer for the project was Robert Jurgens. He began by making sketches to try and embody all the characteristics required of the brief.

The designers looked for inspiration in natural and built environments to help develop a strategy that would appeal to the judging committee. Another significant influence was the shape of the hunting boomerang that they had in the studio as they were developing the designs.

[We wanted to] convey the curve of the boomerang without making it too obvious.
Robert Jurgens, Senior Designer, Blue Sky Design.

All that stuff had to come out in the early sketches, and then we modelled up four designs in our tender because we weren't quite sure which way to go.
Mark Armstrong, Creative Director, Blue Sky Design.



The four designs submitted by Blue Sky. Courtesy Olympic Co-ordination Authority and Blue Sky Design.

Developing alternative solutions

Blue Sky Design submitted four designs with its tender application. Each one addressed a different combination of the design elements from the brief. The first design had a high tech approach with a carbon fibre handle. The second design was more traditional, with a wooden handle and the Opera House sails in a cup around the flame. The third design was inspired by the athlete and the shape of a boomerang. The fourth design was symbolic, with the outer layer representing the white sails of the Opera House and the inner blue layer the waters of the harbour, with the shape inspired by the hunting boomerang.



The chosen design. Courtesy Olympic Co-ordination Authority and Blue Sky Design.

Choosing a solution

It took Blue Sky Design six weeks from receiving the brief to submitting its proposal to SOCOG. It was chosen as one of four submissions to progress to the final selection round.

The designers focussed on one design in the final round. From their interviews with the SOCOG committee, they decided that the symbolic design would be the one that would most satisfy the committee and the brief.



The centre core of the model was machined from a solid piece of aluminium. Courtesy Box and Dice Pty Ltd.

Modelling

For the final selection round, Blue Sky Design decided to produce a model. This was to help the selection committee and the designers visualise the final product. Blue Sky refined the torch design using computer-aided design (CAD) and then emailed the CAD file to Box and Dice model makers.

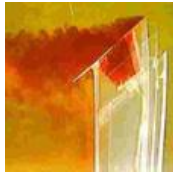
Box and Dice machined all the parts for the model. The centre core was made from aluminium and then used to form the shape of the plastic inner and outer shells. The model makers Allan Ismay and Rick Perrior decided that when the three layers were put together the torch looked too long. They also decided that the angles of the layers at the top of the torch didn't look right. So in discussion with Mark Armstrong they changed the design as they modelled it, making it shorter and changing the angle of the outside layer so more of the blue layer could be seen. The outer surface of the torch was treated using a water-based printing process that created layers and textures on the surface.



The plastic inner shell after vacuum forming. Courtesy Box and Dice Pty Ltd.



The shells were finished before being stuck together to form the model. Courtesy Box and Dice Pty Ltd.



The perspex torch model being tested in a water tunnel. Courtesy Adelaide University Turbulence, Energy and Combustion Group.



The effect of wind on the torch flame. Courtesy Adelaide University Turbulence, Energy and Combustion Group.



The wooden punch and steel die used to make prototypes for testing. Courtesy GA & L Harrington.



This draw die was used to form the torch shape during manufacturing. Courtesy GA & L Harrington.



Pat Rafter with the Olympic torch in front of the Sydney Harbour Bridge and Olympic rings. This was a fantastic promotional opportunity for the Sydney 2000 Olympics and an exciting moment for the crowd. Photo by Mike Keating. Copyright News Limited - www.newsphotos.com.au.

We knew we had to have an exotic surface - just to have anything... because just to have a metal shape, or a plastic shape is nothing... we were searching for finishes and materials that we could embody the design with, and enrich it.
Mark Armstrong, Creative Director, Blue Sky Design.

The model weighed about 5 kg. Box and Dice hollowed out the aluminium core and inserted a grille in the top to simulate a burner. The three sections were glued together, a traditional model-making technique. Box and Dice made a clear plastic stand in the shape of a hand to present the torch to the Committee.

Blue Sky Design presented the model to the SOCOG Torch Review Committee, along with a lifecycle analysis of the torch and documentation about emissions, flame burn and manufacturing costs. The design was sent to the International Olympic Committee for approval, and Blue Sky was selected as the firm to continue with the torch design and development. The winning design, conceived by Blue Sky Design senior designer Robert Jurgens and creative director Mark Armstrong, was unveiled in March 1999.

Testing

Adelaide University and Fuel & Combustion Technology Pty Ltd (FCT) were commissioned by SOCOG through a separate tender process to develop the burner system for the torch. Through an extensive research and development process, they created a system that resulted in a new patent. The torch was prototyped and tested intensively to ensure it satisfied the technical requirements within the constraints of the exterior design. The torch shape was tested in a water tunnel to check its aerodynamics. The shape of the flame and its ability to stay alight in different environments were also tested. The manufacturer, GA & L Harrington, was closely involved in the prototyping process. For more information about the design and development of the burner system see Turbulence, Energy and Combustion Group at university of Adelaide <http://www.tec.adelaide.edu.au>

Manufacturing

Once the torch design had been selected, GA & L Harrington began the manufacturing process. This presented challenges because there were no engineering drawings to work from. The engineers had to use the model made by Box and Dice, along with the design brief, to identify potential problems and solutions for the manufacture of the torch.

The problems they had to overcome included the difficulty of forming the three curved shells of the torch in the chosen materials, particularly the stainless steel inner layer. The middle and outer layers were made from aluminium. Fitting the three shells together and producing the correct colours and texture finishes was also difficult. Special micro-machining techniques were developed to manufacture the choke that regulated the gas flow in the torch. The torch design was fine-tuned in consultation with Blue Sky to ensure the combustion system fitted inside the torch. For more information about how GA & L Harrington solved these problems see <http://www.galharrington.com.au/torch.htm>.

The impacts

Olympic torches were carried by 10 000 people in Australia and another 2 000 in Oceania and Greece. The flame and torch travelled through all states to within a one hour drive of 85% of the Australian population. As the torch travelled through the country, 188 community festivals were staged around community cauldrons lit by the flame. The torch relay began on 12 May 2000 and finished on 15 September 2000 when the Olympic cauldron was lit and the Sydney 2000 Olympic Games began.

The torch relay created excitement and anticipation in the lead-up to the Games. Some of the design team were given the opportunity to run in the relay, including Mark Armstrong and John Harrington. Mark Armstrong was amazed to see the effect



The Olympic torch design project culminated in the dramatic lighting of the Olympic cauldron by Cathy Freeman at the Sydney 2000 Olympics Opening Ceremony. Copyright News Limited - www.newsphotos.com.au.

the torch had on the crowd. People clamoured to hold the torch and have their photograph taken with it. The torch was a powerful tool for building enthusiasm for the Sydney 2000 Olympic Games.

I was shocked ... that people could just be so caught up in a flame on a stick. It's still just a piece of industrial design, it's a piece of engineering, it's a nice looking thing, that's it. But... when I was there in the torch relay I really had a lump in my throat. It was just incredible to see how much it meant to other people, which I didn't realise.

Mark Armstrong, Creative Director, Blue Sky Design.

The Olympic Torch won an Australian Design Award in 2000 for Industrial Design. The SOCOG committee was so impressed with the design process used for the torch that it requested the same team of people create the community cauldrons and the Sydney 2000 Paralympic Torch.

This outstanding collaboration has resulted in a finely resolved and ergonomically sound product, which meets both the technical and symbolic requirements of the brief.

Judges' citation for the Australian Design Award for Industrial Design 2000.

For us at Blue Sky the project has been very special and uplifting. The team just "clicked" and each member from the designers to the production engineers has demonstrated a passion for the project which is quite extraordinary.

Mark Armstrong, Creative Director, Blue Sky Design.

ABC Torch Relay Archive — Stories about people's relay experience <http://http://abc.net.au/torch/>
Newsphotos Torch Relay Photo Archive
<http://www.newsphotos.com.au/>

Links and references

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Box and Dice <http://www.boxanddice.com.au>
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<http://www.abc.net.au/science/slab/torch/default.htm>
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Unpublished, Powerhouse Museum interview with Mark Armstrong, 15 January 2002.

Unpublished, Powerhouse Museum interview with Mark Armstrong and Robert Jurgens, 1 November 2000.

Key people, jobs and skills

Professor Chris Ryan, Environmental Design Specialist, RMIT University Centre for Design.

Mark Armstrong, Creative Director, Blue Sky Design

Robert Jurgens, Senior Designer, Blue Sky Design

Ian Cameron, Engineering Development, Blue Sky Design
 Alan Ismay, Principal Model Maker, Box and Dice
 Rick Perrior, Principal Model Maker, Box and Dice
 John Harrington, Managing Director, G. A & L Harrington
 Norm Smith, Prototype Manufacturer, G.A & L Harrington
 Dr Gus Nathan, Project Leader, Adelaide University/FCT
 Dr Richard Kelso, Chief designer, Adelaide University/FCT
 Prof Keith D King, Chief designer (fuels), Adelaide University/FCT
 Di Henry, Torch relay manager, SOCOG
 Joseph Buhagiar, SOCOG

Jobs and skills required

Designer
 Model Maker
 Mechanical Engineer
 Chemical Engineer
 Manufacturing Engineer
 Marketer
 Negotiator
 Team Leader
 Production Line Worker
 Office Manager
 Personal Assistant

Discussion questions

K-6

1. What is a torch? What is a cauldron? Draw a torch. Draw a cauldron.
2. What is an Olympic Torch and what is it used for?
3. The flame on the torch is fuelled by a gas. What are some of the dangers of using this kind of fuel? What safety precautions can we take when using flammable gases?
4. Collect samples of aluminium, stainless steel, wood and plastic and identify those materials which can be recycled. How many of these materials can be found in the Olympic Torch?

7-10

1. How important was the team or collaborative approach to the final design of the model?
2. What is meant by the life cycle of a product? Why was an analysis of the torch's life cycle considered an important component of the presentation to the SOCOG Torch Review Committee?
3. Discuss why you think the Torch was an important marketing tool for building enthusiasm for the Games.
4. Research ancient Greek traditions which describe the use of a torch or flame. What was the significance of fire to the ancient Greeks?

11-12

1. What is a tender? Outline the differences between an open tender and a selected tender. What advantages would there be in inviting 40 firms to participate in the tender process? What kinds of research would be required for SOCOG to make their selections? What issues might arise in an open tender?
2. Blue Sky selected one out of four original designs submitted to progress to the final selection round. How did they decide which design to develop? Imagine that you are interviewing SOCOG committee members to work out what kind of design would be most successful. What kinds of questions would you ask?
3. For what is CAD an acronym? What is CAD? What kinds of professionals use it? For what purposes and in what situations?
4. Write a brief for the design of a new product. Consider the aesthetic, technical, safety and environmental requirements.

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Bearing the flame: firing the spirit

The Sydney 2000 Olympic torch



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It is no easy task creating an Australian icon, let alone creating one to represent Australia at the world's most important sporting event. For the Sydney 2000 Olympics, Blue Sky Design was selected to create a new Olympic torch that would become an icon of sporting spirit for the new century.

Where there's smoke... – a brief history of the Olympic torch

The first time the modern Olympic flame was set alight was at the Amsterdam Games in 1928. Jan Wils had designed the tower to hold the first flame to light up the modern Games.

It was not until the 1936 Olympic Games in Berlin that the torch relay started and the tradition of bringing a nation together under the Olympic flame began.

The first Olympic torch to be created by a designer was at the Albertville Winter Games in 1992. The contemporary designer Philippe Starck was invited to incorporate his renowned 'chrome banana' design into the Olympic torch.

For the Sydney 2000 Olympics, SOCOG and the IOC drew up a set of very specific requirements. Not only would the torch need to meet stringent environmental and technical performance needs, it also had to be a symbol of modern design and an icon for Australia's second Olympic Games.

How to make an Aussie icon – the design brief

Ask any Australian for an example of a local icon and you'll soon get a list of popular answers: the Victa lawnmower, the Hills hoist, the Holden ute, the boomerang, the Sydney Opera House. But what factors create an icon?



The Victa lawnmower
Collection: Powerhouse Museum

What factors would help the Sydney 2000 Olympic torch earn iconic status? It would need to look different, original and decidedly at home in the Australian environment. It would need to perform in any weather at reasonable cost and be reliable without fault.

Not only would the Sydney Olympic torch need to meet these general criteria (as well as needing to be simple and logical enough to operate without a manual), it would also need to come up shining against an even more stringent set of requirements. Among other criteria, the 2000 Olympic torch would need to be:

- Less than 1.5kg in weight and easily carried;
- Easily reproduced (14,000 torches were required);
- Environmentally responsible in manufacture and operation;
- Able to burn for at least 30 minutes to cover each 20 minute run;
- Able to withstand 90kph winds, rain and snow;
- Free of polluting emissions or wastes;
- Easily held by torch bearers, from children to elderly people;
- Representative of the spirit of Sydney and the spirit of the Olympics.

The design process was made even more challenging by the fact that the 2000 Sydney Olympic torch relay would be the longest in Olympic history.



The international torch route*

From its ceremonial departure from Athens in May 1999, the Olympic flame would travel across the Atlantic and Pacific Oceans to Australia and then begin the relay run covering thousands of kilometres and passing within one hour of almost every Australian home.



The Olympic torch route for the Sydney 2000 Olympics was marked on this souvenir medallion packaging

The torch would also need to withstand Australia's harsh and varied environment. From scorching desert heat to freezing mountain terrain, the Olympic torch had to stay alight in the face of every environmental and physical condition imaginable.

In November 1998, SOCOG issued the brief to a selection of 40 Australian companies; directed at designers working in a range of disciplines including architecture, industrial design, graphic design and art. Within a matter of months, four of these companies would be short-listed and then one company would be awarded the final design; that accolade went to Blue Sky Design in Sydney.

A collaborative process – the design team

Blue Sky Design specialises in industrial product design and often works with a multi-discipline team on each project. The Creative Director of Blue Sky, Mark Armstrong, knew from the outset that their design strategy and their team would be the foundation if they were to win the tender. This meant that the initial phases were as important to the process as the final manufacturing.

To win a tender you have to have a team with all the right skills. And to put together a team like that we needed a whole range of disciplines, some in the studio and some beyond our studio. So, we started to form

partnerships with the best people in their field that we could find.

— Mark Armstrong

SOCOG had already commissioned Adelaide University and Fuel & Combustion Technology (FCT) to design and manufacture the torch burner components. With this technical part of the torch design in place, Blue Sky then created their winning collaborative design team:

- **Blue Sky Design**
(Mark Armstrong, Creative Director; Robert Jurgens, Senior Designer, and Ian Cameron, Engineering Development)
- **Box & Dice**
(Model makers; Alan Ismay, Model Maker)
- **G. A. & L. Harrington**
(Toolmakers and metal pressing specialists; John Harrington, Detail Engineer)
- **Royal Melbourne Institute of Technology (RMIT) University Centre for Design**
(Chris Ryan, Environmental Specialist)
- **Philips Electronics**
(financial assistance)



The Blue Sky team with early torch designs**



The team from Blue Sky Design, G. A. & L. Harrington, University of Adelaide – FCT, Box & Dice, and RMIT Centre for Design*

Once the team of specialists was in place, Blue Sky could show the SOGOC and IOC selection committees that they met each of the requirements at every stage of the design and manufacturing process.

This collaborative method of specialised working was one of the major reasons that Blue Sky were chosen to produce the Olympic torch.



The Sydney 2000 Olympic cauldron
designed by Blue Sky*



Previous Olympic torches*

Fabulous for 2000 – the initial design

From pedestrian bridges to car stereos, Blue Sky is known for their solid research in product design development. The Olympic torch would be no exception.



Other products designed by Blue Sky*

Mark Armstrong and Robert Jurgens began by researching previous Olympic torches.

We studied the ancient Olympics, we looked at the heritage of the modern Games with the 1936 Berlin torch, we looked at the history, and Robert from our office was in Switzerland so he dropped into the Olympic Museum in Lucerne and had a look at all of the previous torches and looked at the space on the wall for the Sydney torch which was there, and I think that inspired him about the importance of this project.

— Mark Armstrong

One thing that emerged from the torch research was the way of identifying cultural designs that clearly represented the time in which they were made and used: from the wick burner in the 1936 Berlin Games to the latest technology in the 1996 Atlanta Games.

What we found out early is that the torch relay is a snapshot in time, and it shows a country's culture and its technology at that time so it will date, and that's its function in a way. We weren't trying to design something timeless that would look wonderful in twenty years. We had to design something that was fabulous for 2000, that was 2000.

— Mark Armstrong

The SOCOG design brief placed importance on the spirit of the Olympics, and familiar Australian symbols such as native flora and fauna, inventions like the Sarich engine and physical locations like Sydney Harbour and the Opera House.

Using these spirit symbols, Blue Sky drew up a series of image boards to explore visual meanings and possible applications. Along with research pictures, like every model of Victa lawnmower, the team even hunted down a traditional boomerang to use as inspiration in the studio.

High tech to symbolic – the four Blue Sky design submissions

With these image boards as their backdrop, Blue Sky Design began putting to paper their first ideas.



Early Blue Sky design drawings*

In this phase of concept development, Blue Sky Design developed many hundreds of designs that reflected different ideas that were then culled into four final concepts:

- **Symbolic:** inspired by the boomerang with a white outer layer representing the sails of the Sydney Opera House and the blue inner layer for the hue of Sydney harbour;
- **Body:** inspired by the body of an athlete and with the shape of a boomerang;

- **Traditional:** using a West Australian jarrah handle and around the flame a series of sails inspired by the Sydney Opera House;
- **High tech:** with the handle of the torch being constructed in carbon fibre ducting to allow light to pass through.



Blue Sky's four torch designs*

The initial designs were then modelled in 3D using the latest state-of-the-art software. The 3D surface files were rendered to a high resolution and finally photo-realistic flames were added in Photoshop. After Blue Sky had refined the four designs, they made the decision to submit them all.

The entire conceptual process had taken Blue Sky less than four weeks.

In for a penny... – the final selection

Once the final images were ready, they were compiled along with details of manufacturing, budget and delivery times and presented to SOCOG for the first round in the selection process.

We presented DesignStudio renderings showing the torches with flames in place and with runners, all photo-montaged to give more reality to the design.

— Mark Armstrong

By submitting the four designs, Blue Sky was essentially allowing itself to present four different points of view to the SOCOG committee. In their interview with the SOCOG committee, Blue Sky felt that the symbolic design was the torch that was most likely to satisfy SOCOG and the brief.

Within two weeks of the first deadline, Blue Sky Design was chosen as one of four companies to progress to the final selection round. The project now entered a crucial stage in the design process. The concept had been partially accepted but the design was a concept, far from complete, and a package detailing all the necessary elements to take this idea into production was required.

Being in the final four, we said, "In for a penny, in for a pound – let's go for it. What does it take?" So this was the point where we said, "OK, now we need a model".

— Mark Armstrong

Paper to product – making a 3D model

Taking the torch design into a three-dimensional format required the expertise of model-makers. The final design for the symbolic torch was emailed to Box & Dice. Using numerically controlled (CNC) milling machines, Box & Dice then produced a high quality scale model, complete with realistic surface finishes.

If you've got a great idea and poorly executed model, people in high positions, board members and the like, in my view... unless they can see exactly how it's going to be you won't convince them.

— Mark Armstrong

The function of this first three-dimensional model was also for the designers to evaluate the finer points of the design. On paper certain decisions can be made, but in three dimensions a whole set of other

decisions can be made with a higher degree of certainty.

Together Blue Sky Design and Box & Dice subjected the design to further modifications: they made the body shorter and modified the angle of the external layer so that more of the blue layer became visible. During this analysis of the three-dimensional model it became apparent that a solution for the surface treatment was necessary.

To have a metal shape, or a plastic shape is nothing. We were searching for finishes and materials that we could embody the design with, and enrich it. We had to have an exotic surface. We found a company in Newcastle that used a water-based printing process that can layer textures across three-dimensional objects.

— Mark Armstrong



Sydney 2000 Olympic torch (detail)*

The printing process, called cubic printing, lays a pattern over a liquid surface. The object is immersed in the liquid where the printed pattern transfers around the product. The final print is then sealed with lacquer and buffed into a polished surface.

Blue Sky went into their final presentation with a physical three-dimensional model. They supported their bid with a lifecycle analysis of the torch and information relating to the emissions the torch would create (produced by the Centre for Design at RMIT) and a document outlining the costs of manufacture.

All Blue Sky's efforts paid off when the symbolic torch they had designed was officially selected by SOCOG to carry the Olympic Flame to the 2000 Sydney Olympics.

Making it go – the manufacturing process

The final stage of any product development is often the most time consuming and costly, involving prototyping, testing and preparation for manufacture. It is where all the small and seemingly unimportant details are

resolved. For Blue Sky, the two main issues that needed resolving were:

1. Construction and assembly; and
2. Fuel and burner technology.

Forming the three shells of the torch proved difficult. The outer and middle shell were made from sheet aluminium and the inner shell was made of stainless steel which, due to its hardness and complex shape, was particularly challenging.

While conceptualising how the shells would hold together, Harringtons (the torch manufacturers) were inspired by the hinge pin used in cutthroat razors.



The Sydney 2000 Olympic torch opened to reveal the fuel cylinder

This provided them with an easy way to open and close the torch and a way to completely lock the torch together. The hinge-pin formed the basis for the on/off switch, gave access to the gas cylinder and made it easy for all the internal components to attach themselves to the inside of the torch.

While the external design was being finalised, and another company worked on the internal components, it fell into Harringtons' hands to bring the elements together into a working product that could be replicated for the 14,000 models required.

The core of Harringtons' work was in the detailing of all the components, their assembly and validating that the product met the proper environmental and safety standards. SOCOG and the IOC would also require detailed documentation that showed how the metal and polymer torch would safely pass through thousands of hands while alight with flame. It would not be until the Opening Ceremony that everyone involved in the design and construction of the Olympic torch could breathe easy.

A gas cocktail – the fuel burner system

Through a separate tender process, the University of Adelaide in conjunction with Fuel & Combustion Technology Pty Ltd (FCT) were commissioned to develop the fuel and burner system for the torch.

FCT developed a fuel mixture of butane and propane gas, a blend that would burn cleanly and produce just enough soot so as to produce a bright yellow flame.

They also developed a completely new design for the burner that produced two flames: a large external flame that was the visible flame and a small protected flame that was utilized to ensure the large flame was kept alight at all times.



Diagram of Sydney 2000 Olympic torch construction*

One of those seemingly unimportant details that required a great deal of time and effort was the development of the choke assembly, or more specifically the 'choke cap', an element that regulated the flow of gas.



The Sydney 2000 Olympic torch (detail)

Macquarie University's Centre for Laser Applications successfully produced the 'choke cap', the function of which was to produce a flame with a specified height and burn duration. It was a small piece of sheet brass with a tiny aperture of 75 microns that had to be perfectly round to within one micron (one hundredth the width of human hair).

That was very critical to the overall performance of the torch because one little part will make the torch reliable or not reliable, will make it last the twenty-five minutes required, all the things in a lot of ways was pivotal around how well that one part was made.

— Mark Armstrong

Just to make sure – testing the final prototype

All throughout this process of detail design work, torch prototypes were constructed to confirm mechanical design solutions, material choices, reliability and functional issues.



Wind tunnel testing of the torch*

To test whether the flame would extinguish itself in the wind, a torch was placed in a wind tunnel and the flame exposed to winds of up to 65kph. In a separate tunnel, a sprinkler system was added to test the flame against wind and rain together.



Testing of the torch for extinguishment by water*

All aspects of the torch were rigorously tested so that the final product reflected or improved upon the specifications set out in the initial brief.

After 18 months of development, the final torch design was unveiled on 8 March 1999. With the subtle curves inspired by the traditional boomerang, the colours of Sydney Harbour and the sails of the Sydney Opera House, the new Olympic torch helped to ignite Australia's Olympic fever.

Burnin' up – the final Olympic torch

The new torch not only represented the spirit of the Olympics and the spirit of Sydney, but also the Australian spirit of unique innovation and creative collaboration.

The final specifications included:

- An outer layer arc of pressed aluminium component, powder coated in white and cubic printed with the Olympic logo)
- A middle layer arc also of pressed aluminium and anodised in a fluoro blue.
- An inner layer arc of high-grade stainless steel holding the copper feed lines, plastic switch mechanism and stainless steel burner components.
- A gross weight of 900 grams (more than half a kilo under the maximum)

Among the 10,000 people who ran, walked, rode, peddled, and swam with the torch in its historic relay, even Mark Armstrong was unprepared for its final impact.



Mark Armstrong**

Well, before I ran – really it's an amazing thing – I was standing in the crowd ahead of the relay, so you're sort of standing here waiting for your turn, and children, and women, and mothers, and babies, and grandfathers were all coming up wanting to be photographed with the torch, and they didn't know that I was part of the design company that worked on it or anything, they weren't interested in that, but they were fascinated by the torch just to stand near it, to have their child hold it, and have their photograph taken.

I've never seen anything like it; that people could be so caught up in just really a flame on a stick. So then I started to really understand the Olympic spirit, that's powerful, so powerful. But I didn't understand probably till then because although it's an exciting project it's still a piece of industrial design, it's a piece of engineering, and it's a nice looking thing. That's it. But when I was there in the torch relay I had a lump in my throat. It was just quite incredible to see how much it meant to other people.

— Mark Armstrong



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* These images were produced by Blue Sky for a presentation to the Sydney Organising Committee for the Olympic Games (SOCOG) related to the Sydney 2000 Olympic torch design and development process. They are reproduced courtesy of the OCA.

** These images reproduced courtesy of Blue Sky.

The other images in this case study are © Powerhouse Museum.



This torch is perhaps the most compelling object of the Sydney 2000 Olympic Games. It signifies the precise moment when the Games officially opened, and when the world focussed its attentions upon Sydney and Australian culture as a whole.

This Olympic torch was used by Cathy Freeman on 15 September 2000 to ignite the Olympic cauldron during the Opening Ceremony. It was designed by Sydney company, Blue Sky Design, and manufactured by G.A. & L. Harrington in anodised and textured aluminium. Its tiered rim emulates the sail-like roofline of the Sydney Opera House, its curving body reflects the shape of a boomerang, and its blue aluminium surface symbolises the waters of Sydney Harbour.

As the Sydney Olympic Torch Relay drew to a close to the stadium, speculation surrounding the lighting of the Olympic cauldron rapidly intensified. The media and general public alike debated who would light the Olympic cauldron, and most speculations leant towards one

of several celebrated Australian women. The final leg of the torch

relay, around Olympic stadium and to the Olympic cauldron, did in fact feature six celebrated female athletes - a gesture that honoured women's contribution to Australian sport and acknowledged 2000 as the Olympic Year of Women.

From the entrance to Olympic stadium, Raelene Boyle, a former track and field medallist, (1968, 1972 and 1976 Olympic Games) and Betty Cuthbert, a former gold medallist in 100 and 200-metre sprints, (1956 and 1960 Olympic Games) carried the Olympic flame in tandem. (Cuthbert, now suffering from multiple sclerosis, was pushed in a wheelchair by Boyle.) Dawn Fraser, swimming champion, (1956, 1960 and 1964 Olympic Games) then carried the flame to Shirley Strickland de la Hunty, a former track and field icon (1948, 1952 and 1956 Olympic Games). Shane Gould, who had a brief though successful career in swimming (1972 Olympic Games), carried the torch to Debbie Flintoff-King, gold medal hurdler at the 1988 Olympic Games. The flame then passed to the final torchbearer to complete the Sydney 2000 Olympic Torch Relay.

Emerging from the darkness in a white, flameproof bodysuit, Cathy Freeman, indigenous champion of track and field, ascended a staircase and stood within a reflective pool. Here, above the audience, she immersed the flame in the liquid surrounding her feet and ignited the Olympic cauldron. Rising upwards on a concealed machine, the cauldron became stuck for a few moments before reaching its final position above the stadium. Ric Birch, ceremony organiser, envisioned this climax in Monaco in 1993, immediately after Sydney won its bid to host the Olympic Games.

The selection of Freeman to light the Olympic cauldron seemed highly appropriate to most Australians - she excelled in her sport, protested against injustices to Aboriginal people, and spoke proudly of her Aboriginal heritage. These qualities stirred a nation that was debating reconciliation with its indigenous people. Perceptively, a columnist for the Los Angeles Times wrote during the Olympics: 'Freeman has emerged at the Sydney 2000 Games as the most potent symbol of a nation's hopes both for Olympic glory and reconciliation for sins of the past' (as quoted by Paul Sheehan in "Cathy who? Condoms and controversy make a world of difference", Sydney Morning Herald, 27 Sep. 2000, p.2). Moreover, Freeman's prominence at the opening ceremony encapsulated the Olympic ideals of promoting sport and celebrating the history and culture of the host country.

Catherine Reade, 2001

Hide ^

Summary

Object No.	2001/84/267
Object Statement	Olympic torch, metal / plastic, designed by Blue Sky Design, c. 1998, made by G A & L Harrington, used by Cathy Freeman, opening ceremony, Sydney 2000 Olympic Games, Sydney, New South Wales, Australia, c. 2000
Physical Description	Olympic torch used by Cathy Freeman. The torch is made from shaped steel with pivoting cover sleeve for access to the fuel cylinder. It has an internal burner and valve mechanism. The torch tapers towards the base. The main body of the torch is polished steel. The cover is made up of two shells; the first shell is anodised blue steel and contains a space for the fuel cylinder. The second shell has a white powder coating with a silver Sydney 2000 logo

on either side. Inside the torch is an empty fuel cylinder.

Short URL <https://ma.as/10767> (<https://ma.as/10767>)

Dimensions

Height	790 mm
Width	40 mm
Depth	100 mm

Production

Notes	Designed by Blue Sky Design. Design submitted to SOCOG on 28 February 1998. Manufactured by G.A. & L. Harrington, Padstow NSW, c.2000
Made	G A & L Harrington Pty Ltd (/search?people[0]=G%20A%20%26%20L%20Harrington%20Pty%20Ltd) Sydney (/search?places[0]=Sydney), New South Wales (/search?places[0]=New%20South%20Wales), Australia (/search?places[0]=Australia)
Designed	Blue Sky Design Group (/search?people[0]=Blue%20Sky%20Design%20Group) Sydney (/search?places[0]=Sydney), New South Wales (/search?places[0]=New%20South%20Wales), Australia (/search?places[0]=Australia) 1998

History

Notes	Used by Cathy Freeman to light the Olympic cauldron on 15 September 2000. Made for and owned by the Olympic Coordination Authority/Sydney Organising Committee for the Olympic Games, and donated to the Powerhouse Museum after use in the Games. The Sydney 2000 Olympic torch received an Australian Design Award and the Powerhouse Museum Selection in 2000.
Used	Freeman, Cathy (/search?people[0]=Freeman%2C%20Cathy) Sydney (/search?places[0]=Sydney), New South Wales (/search?places[0]=New%20South%20Wales), Australia (/search?places[0]=Australia) 2000

Source

Credit Line	Part of the Sydney 2000 Games Collection Gift of the New South Wales Government, 2001
Acquisition Date	5 October 2001

Cite this Object

Harvard	<i>Sydney 2000 Olympic Games torch used by Cathy Freeman</i> 2019, Museum of Applied Arts & Sciences, accessed 22 October 2019, < https://ma.as/10767 >
Wikipedia	{{cite web url= https://ma.as/10767 title=Sydney 2000 Olympic Games torch used by Cathy Freeman author=Museum of Applied Arts & Sciences access-date=22 October 2019 publisher=Museum of Applied Arts & Sciences, Australia}}

This object is currently on display in [Icons: From the MAAS Collection](#) (<https://maas.museum/event/icons/>) at the Powerhouse Museum.