

Review: Science and Technology galleries at National Museums Scotland

Journal ISSN number: 2054-5770

This article was written by [Jane Desborough](#)

03-22-2017 Cite as 10.15180; 170712 Review

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Published in [Spring 2017, Sound and Vision](#)

Article DOI: <http://dx.doi.org/10.15180/170712>



Keywords

Review, National Museums Scotland, Science and Technology galleries

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In July 2016 the much-anticipated new Science and Technology galleries opened at the National Museum of Scotland (NMS) in Edinburgh. In this latest offering from the Museum, as part of its ongoing masterplan for redevelopment, visitors are treated to three floors of science and technology, in many cases shown through the lens of Scottish contributions to the field. This local focus provides an additional layer of interest and gives the galleries an edge that this collection is uniquely placed to achieve. Located at the opposite side of the Museum to the Natural World galleries, which opened in 2011, the same attention to modern relevance and simplicity of section grouping has been applied to the science, technology and medicine collections. This makes for an experience that is appealing for a broad range of visitors, regardless of their original motivation for visiting the Museum. Some may have come for the Natural History or Scottish History galleries, but then visited the Science and Technology galleries.

Overall the galleries consist of six distinct sections: two on the first floor, two on the third floor, and two on the fifth floor (see Figure 1 below). The overarching aim of the whole is to demonstrate the ways in which various scientific and technological inventions have changed our lives, from Joseph Black's work on chemistry to Stephen Salter's work on wave power; from William Hedley's work on steam locomotives to David Gow's work on articulated prosthetic limbs. Each of the six main sections is introduced by a text panel, and by reading each one it becomes clear that problem-solving is an overarching theme. The Museum team have gone back to basics to ask what problems scientists and engineers have been responding to when they have worked to develop the instruments and devices on display here.

Figure 1

dozens of galleries, a lively programme of events, special exhibitions and great places to eat and relax, the museum offers you a world of discovery on every floor.

Explore the museum

- Discoveries**
Discover some of Scotland's greatest achievements and the enormous impact of Scots around the world.
- Natural World**
From outer space to endangered species, explore the diversity and evolution of Planet Earth and the natural world.
- World Cultures**
Remarkable objects reveal how people live their lives and express themselves through art, music and performance.
- Art, Design and Fashion**
Follow an inspirational story of creativity through hand treasures, exquisite designs and cutting edge fashion.
- Science and Technology**
A world of innovation is illuminated through the scientific discoveries and technological breakthroughs which changed Scotland and the world.
- Scotland**
Explore Scotland's story across the ages through real objects found, made and used in Scotland.
- Learning Centre**
Our hub of inspiring activities for all ages. See the information screens or ask staff for details of what's on.
- Exhibition galleries**
Visit our current special exhibitions – for details of what's on today see the information screens.
- Research Library**
Explore the collections in depth in our Research Library Level 3.

Key to symbols

- Information desk
- Subtle, female



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Floorplan showing the location of the new Science and Technology galleries at the National Museum of Scotland

DOI: <http://dx.doi.org/10.15180/170712/002>

Arranging a varied collection such as this, spanning several hundred years of innovation, in a joined-up manner across three floors was always going to be challenging. NMS has managed this difficult task by creating sections which act as stand-alone case studies and, when viewed as a whole, form a cohesive group with more and more connections becoming obvious the longer one spends here. This results in visitors being free to create their own routes through the galleries. There are no predetermined or even suggested routes or chronologies. While this has made providing guided tours challenging for some front-of-house staff, it does give the visitor greater autonomy over their experience. It also means that repeat visitors can experience the galleries differently on successive visits. There is far more to see than could possibly be achieved in just one visit and yet each display has been carefully created so that even if you see just one section you will leave having seen some new objects, or new comparison of objects. For those visitors familiar with Scottish history, the aim is clearly for them to leave with an increased understanding of how these developments relate to Scottish culture and identity while for those unfamiliar with Scottish history the aim is clearly for them to leave with a better understanding of Scotland's contribution to science, technology and medicine. These aims very much tie in with the mission of the National Museum of Scotland – a sign near the entrance states that the Museum's 200 years of collecting has been conducted in order to show Scotland to the world and the world to Scotland, an aim which has certainly been achieved in the new Science and Technology galleries where Scottish and international ideas and objects are brought together.

The objects chosen for display have been arranged thematically over the three allocated floors. Each floor consists of two sections with, in most cases, catchy one-word names that both capture the content and appeal to the visitor by inviting them to share the experience. In the *Explore* section, for example, visitors can do just that while seeing how others have explored various scientific problems. In each section there is a display case which has been designed to be updated regularly. On the first floor are the *Explore* and *Making It* sections. While the Museum's website describes these as family-friendly displays, which they are, they in no way exclude the independent adult visitor. The many big-draw objects on display in the *Explore* section, such as Dolly the Sheep (now a museum classic rather than a dated example of contemporary science), the Wylam Dilly steam locomotive, not to mention three Sir Jackie Stewart Formula One cars, tick many of the boxes which make for an engaging

museum experience. They draw on the familiar, are visually striking and most importantly are displayed alongside other objects which can help tell new stories about them. I enjoyed seeing Wylam Dilly displayed next to a working model of maglev technology and observed visitors stepping back and looking at the two together, commenting that the steam locomotive would have been cutting edge in its day. Connections like this might be obvious to historians and museum professionals, but cannot always be taken for granted when communicating to visitors using objects and small display labels. These same visitors may not have made the same observations if the locomotive was displayed in isolation.

Figure 2



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'Dolly' the sheep — the first cloned mammal ever to be created from an adult cell — on display in the new Science and Technology galleries at the National Museum of Scotland

DOI: <http://dx.doi.org/10.15180/170712/003>

Figure 3



© National Museums Scotland

Formula One motor cars on display in the new Science and Technology galleries at the National Museum of Scotland

DOI: <http://dx.doi.org/10.15180/170712/004>

By far my favourite section of the new galleries was *Making It* where the focus is on manufacturing and the process of making. The museum team decided to exploit a busy space that visitors would be in already, to see Dolly the Sheep or the Formula One cars, and present them with a story that they may not otherwise have taken the time to see. Traditionally, science and technology museums have concentrated on explaining how instruments and technologies work, but there is increasing interest by historians, museum professionals and visitors alike in how such devices were made and who made them.^[1] In this section, as with the three galleries as a whole, the focus is on the local context and *Making It* showcases stories of historic and contemporary manufacturing in Scotland.

Figure 4



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A motor car made by Argyll Motor Works in Dunbartonshire, on display in the new Science and Technology galleries at the National Museum of Scotland

DOI: <http://dx.doi.org/10.15180/170712/005>

Of the numerous sub-themes within the section, one is exchangeability of parts in the process of mass production. The key object is a car made by Argyll Motor Works in Dunbartonshire. The label states that it is one of Scotland's greatest manufacturing stories. Founded in 1899, employing 1,300 people, and turning out 800 cars per annum, this was the largest car production output in Europe at the time. The story of car manufacture is given depth by the other objects displayed nearby. Situated behind the car is a Bradford lathe that was used at the Argyll factory and, as the label indicates, was an essential tool for mass production. Cleverly displayed, behind glass but retaining proximity for close viewing, and with enough space to walk entirely around it, this display, complete with push-button capacity to see the chuck that holds the workpiece turning, brings the lathe to life and is far more effective than displays where lathes are hidden at the back of display cases and only comprehensible to people that have had experience in using them. Next to this is a display of other tools, from drill bits to plugs and gauges, which were used in the mass production process – all displayed as sets of differing but standardised, interchangeable parts.

Audience research during the planning stages of the new gallery project demonstrated that visitors wanted to see a return of push-button interactivity. Staff have responded to this request and made it part of their narrative. Rather than a series of push-button models to show various types of machine tools, examples have been carefully selected and relate to the key objects through the galleries, as in the case of the car and lathe.

From the beginning of the planning process, staff were determined to ensure contemporary relevance in order to provide additional interest, but more crucially an additional layer of relevance for visitors, alongside the relevance provided by the local connections. One of the contemporary contributions in *Making It*, and my personal favourite object, is an industrial robot, made by KUKA Robotics and winner of a Red Dot design award in 2013, which is designed to cooperate with human workers without the need for safety barriers. A key object for the sub-theme of automation in manufacturing within the gallery, the robot is intriguingly displayed as a working object, a bright orange arm which moves and extends with programmed regularity. The intrinsic industrial beauty created by this display is enhanced by the lighting and associated gallery audio. A piece of techno

music was commissioned to give a background impression of manufacture and industrial processes and the movement of the robotic arm has been programmed to correspond in part with the music. I liked this connection, made between working object and sound: unfortunately, on the day I visited the gallery was so busy I couldn't hear it very clearly. (The use of sound in museums and galleries remains both challenging and exciting – see articles by J Rich and J Mansell in this issue). Overall, this issue is testament to how successful the team have been in encouraging people to visit a display that they might not have intended to had it not been for its strategic location next to the *Explore* section where Dolly the Sheep is displayed.

Figure 5



© National Museums Scotland

A nineteenth-century Jacquard loom on display in the new Science and Technology galleries at the National Museum of Scotland

DOI: <http://dx.doi.org/10.15180/170712/006>

Situated to one side of the robot is a nineteenth-century Jacquard loom, which I felt represented a tidy juxtaposition of old and new; wood and metal, demonstrating that humans have been working alongside machines for some time with the robot just the most recent iteration. I also thought the potential for inspiration it produced for either art students or visiting artists was subtle, but cleverly achieved. This was not made explicit in any of the gallery text, but was clear to me as a Curator who would also look for ways to make content appealing to different audiences. Finding beauty in industrial technology and processes is by no means new, but it continues to fascinate many people. On a smaller scale the NMS example is reminiscent of the message conveyed by staff at the Völklingen Ironworks museum in Germany^[2], which provides an entire decommissioned site to explore the theme of industry as beauty.

On the other side of the robot, and forming an intellectual bridge between the *Making It* and *Explore* sections, is a 3D-printing machine and various examples of 3D-printed objects, including an iconic Lewis Chessman, which provides a subtle link to the Scottish History galleries nearby.

Situated one floor up, on the third floor, are the *Technology by Design* and *Communicate* sections. Whereas the ground floor gallery is described as family-friendly, the pace intentionally slows a little here, as it continues to do as the visitor moves up the levels. I really enjoyed moving along the different case-study displays in the *Technology by Design* section – from lighthouses to bridge construction and from ship models to prosthetics. Local and contemporary relevance is provided in the

bridge construction case which tells the story of the Forth Bridge and also includes a model of the new Queensferry Crossing bridge due to open in 2017. Connections between floors are evident throughout the galleries. One of these is the connection made between the experimental science in the floor above and ship models, where an experimental ship model made by Robert Wilson is displayed within the array on this floor. Wilson's model was a hybrid of paddle and propeller power created in order to observe which method was most effective.

On this floor there is a display case designed to be regularly updated, which currently contains a display of prosthetics. The case demonstrates a new collecting area for the curatorial team, made possible by this gallery project. In keeping with the inclusion of objects of contemporary relevance, located nearby is a prosthetic hand with articulated fingers and thumb, the i-limb hand which was made by David Gow who pioneered the Edinburgh Modular Arm System (EMAS). Visitors can use a digital screen on the outside of the display case and click on different hand positions to operate the fingers. The update case also features a digital screen which provides three stories of different people's experiences of prosthetics – one of which is a person who was offered different devices but did not want to use them, chosen to offer a balanced view of the subject area and to show visitors some potentially unexpected viewpoints.

The *Communicate* section takes the visitor back to the basics of communication – starting from the premise that communication takes place between two people, regardless of the device used. From this point the visitor can then compare the various technologies and contexts by which, and in which, communication happens. At first glance this might seem a simple idea, but is a very effective device that invites different comparisons of objects of communication. One context is the military one and visitors can compare a carrier pigeon with various types of radios and an Enigma machine. Another is the personal communication context, and a display of mobile phones used in Pakistan is reminiscent of the *Information Age* gallery at the Science Museum in London, which showcases a mobile phone stall from Cameroon. Both galleries demonstrate that some communities experienced mobile technology before landlines, which many visitors find surprising as it is very different from their own experience. Another context of use is communication with oil rigs from the mainland, providing a link with the *Energise* section on the floor above.

As the visitor ascends the gallery floors, the pace continues to slow and the fifth floor gallery, containing the *Enquire* and *Energise* sections, is intended to provide a quieter space for visitors to contemplate the case studies presented. However, there are still opportunities for interactivity such as the big-draw activity of the giant hamster wheel in the *Energise* section.

In the *Enquire* section there are various examples of scientists asking questions about the natural world or the human body. An eye-catching subsection is the particle physics case study where visitors can see a copper cavity that was used in the Large Electron Positron collider (LEP) at CERN from 1989 to 1995. The LEP was closed in 2000 to make way for the construction of the Large Hadron Collider (LHC) in the same tunnel. Moving along through the gallery, the visitor comes to a presentation on chemistry and is treated to a fine display of Joseph Black's laboratory glassware from the eighteenth century. Again, I found the juxtaposition of old and new to be an effective device in this gallery for making links between scientific objects and endeavours, separated by time, but connected by the shared aim of problem-solving, which is in keeping with the overarching aim of the new galleries. Highlighting Joseph Black's chemical work at the Universities of Glasgow and Edinburgh provides yet another example of Scotland's contribution to the history of science at the global level. These galleries could have provided more of a generic history of science timeline, but by concentrating on the local context and how this contributed to larger-scale developments they have played to the strength of their collections.

Figure 6



© National Museums Scotland

A copper cavity from CERN's Large Electron Positron collider (LEP), on display in the new Science and Technology galleries at the National Museum of Scotland

DOI: <http://dx.doi.org/10.15180/170712/007>

The optics display further along provides some opportunities for interactivity including some well-positioned replicas such as a zoetrope, identical to one in a nearby case, which visitors can turn themselves and look through to see the apparent moving image. A small arrangement of several different types of microscope offers an opportunity for visitors to pause and reflect. On each floor there are similar opportunities to take a break and enjoy a small array of beautifully displayed objects. The display case on this floor that is designed to be regularly updated currently features different types of medical imaging device, which provides a smooth link to the optics display. A key object here is an OPTOS machine for looking at the eye complemented by a neighbouring digital screen with video of the inventor speaking about it. Nearby is a 'Pedoscope' X-ray machine. These devices were used during the mid-twentieth century to measure feet in shoe shops and were eventually discontinued as they were found to be dangerous to the health not only of customers, but to staff, who operated them every day and thus received large accumulative doses of radiation. This machine has been selected to show that solutions to problems are not always successful and are often discontinued or superseded. This display also provides a connection to the prosthetics case in the *Technology by Design* section on the floor below.

The biggest visual draw in the *Energise* section is the giant hamster wheel where visitors can find out how much energy they can generate by walking or running in the wheel. Renewable energy is the main focus of this section and is a subject particularly relevant for Scotland given the diversity and rapid change in the sector there. Alongside the interactivity of the wheel, different case studies are presented including oil rig decommission, nuclear power station decommission, and the growth of the wave-energy and wind power sectors.

Finally, returning to the galleries as a whole, the strongest aspect of the displays in my opinion was the variety of connections that it was possible to make between objects and stories. Some stories were made explicit to visitors through object labels, such as the subsection on interchangeability of parts described above. In other instances, there were more subtle connections made through the use of space. Lines of sight, for example, are very important in this very open structure and subtly help to make connections between objects on different floors, which inevitably encourage visitors to investigate. The connections are

not made explicit in gallery text and are left for the more curious of visitors to discover on their own. For the designer of the gallery it was important to keep in mind that visitors look outwards from a gallery and not just at the objects in cases that are presented to them. Indeed, visits to the upper floors have increased by 23 per cent since the redevelopment, which I imagine must in part be due to these visible connections between objects and stories, or at least the lure of intriguing-looking objects just visible through a gap in the railings or behind one of the airplanes as you look up. In the central atrium between floors, visitors are treated to the tried and tested wow-factor created by suspended aircraft, which never fails to please. From one point of view visitors can look down from a Spitfire through to the *Making It* section on the first floor, where a Ferranti milling machine which was used to make gunsights for Spitfires in Edinburgh during the Second World War is displayed. This is a further example of the connection, made explicit throughout the galleries as a set, of the importance of knowing the local, Scottish contribution to a subject of global importance such as increased industrialisation, aircraft development and the world wars.

Figure 7



© National Museums Scotland

Aircraft suspended in the new Science and Technology galleries at the National Museum of Scotland

DOI: <http://dx.doi.org/10.15180/170712/008>

Allowing for explicit and more subtle connections required dramatic rethinking of content from what was displayed before. Rethinking the content for the new galleries enabled the team to acquire new objects and build new areas of the collection, in addition to bringing objects out of storage. Proportionately, one third of the presented objects are old favourites that were on display in the former galleries, but have been rethought; one third were previously in storage and had not been seen by many visitors; and the final third are new acquisitions. The idea to include a display case in each gallery that will be regularly updated provides freshness and a degree of flexibility not always available to permanent galleries. The content of the update cases on the day I visited related nicely to the neighbouring displays, which meant that they didn't appear as an add-on or after-thought.

I enjoyed the digital interpretation, which was used sparingly but effectively. Unfortunately some of the digital interpretation panels were either not working or were slow in loading on the day I visited. However, this is no different from most other museums and is a testament to how popular and well-used they are. Digital interpretation has provided additional connections

to be made; the interview with someone who chose to not use a prosthetic in close proximity to the prosthetics case is just one example. Text panels and labels throughout the gallery were accessible to most visitors, achieving a good balance between capturing the necessary information and remaining succinct. Personally I would have liked to see accession numbers for individual objects so that I could have looked up my favourites later, but these were not present on object labels. Not displaying accession numbers creates a potential barrier to research and visitor enquiries regarding particular objects, so I think the displays could be improved if these were to be added in future.

Each section of the galleries was extremely busy on the day I visited with a range of visitors spanning the generations – a testament to the work of the Museum team who have made the content appealing to a broad audience. The ways in which the Museum team layered the connections (old and new, global and local, to name just two) and conveyed these in different ways (through the placing of objects, both close-by and further away, and by the selective use of digital interpretation) clearly enabled different visitors to find meanings that resonated for them. I would recommend a visit to these galleries, which bring a fresh perspective to some familiar history of science, technology and medicine stories, reveal some new ones and make many new connections.

Component DOI: <http://dx.doi.org/10.15180/170712/001>

Tags

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- [Museology](#)
- [Museum collections](#)
- [Science museums](#)
- [Object display](#)

Footnotes

1. The XXI Artefacts Conference held at the Science Museum in 2016 concentrated on objects and their users.
2. Völklingen Ironworks. <https://www.voelklinger-huette.org/en/welcome/> (accessed 22 March 2017)

Author information



Jane Desborough

Curator of Scientific Instruments

[Contact this author >](#)

Dr Jane Desborough is Curator of Scientific Instruments and Co-curator of *Science City 1550–1800: The Linbury Gallery*, Science Museum