



Bookmarks

In this section, we summarise the links to external resources within each chapter, to 'bookmark' it for later use:

All resources, including Langdon's presentations, can be found at www.rochesterbridgetrust.org.uk

Chapter Aii: Loads and Forces

Just For Fun – Some websites that help explain Newton's Laws of Motion http://www.physics4kids.com/files/motion_laws.html

CrashCourse Newton's Laws: Crash Course Physics #5 video on YouTube <https://youtu.be/kKKM8Y-u7ds>

Chapter Aiii: Materials

Just for Fun Rocky Road – <https://www.bbcgoodfood.com/recipes/12412/rocky-road>
Easy rocky road by Aaron Goodall from BBC Good Food (Although there are plenty of alternatives available online.)

Hot Topics – Nestle's Chocolate Teapot Experiment <https://www.youtube.com/watch?v=Y6R-9MaeSNO>

YouTube video from NestleUK on the Making of the Chocolate Teapot

Hot Topics – Reduce Reuse Recycle Plastics
One way of reusing plastics are as ecobricks: <https://www.ecobricks.org/what/>

Chapter Aiv: Working with Water

Engineering and architecture – Charles Bridge (Karlův most) – Construction 14th Century bridge construction animation <https://youtu.be/20U58-S02qw?si=X8rHKP56Y60BKktR>

Chapter Bii: Beam Bridges – Simple but Strong

The HighwayMan – The world's longest continuous bridge over water (the Lake Pontchartrain Causeway): <https://youtu.be/3ZMdIsBvMRs>

Chapter C: Truss Bridges – What is a Truss?

Sierpinski Triangles crafting website: <http://craftingwithsuzanne.blogspot.com/2012/12/how-to-make-sierpinski-christmas-tree.html>

Chapter Dii: Arches – Ancient and Strong

Engineering and architecture – Charles Bridge (Karlův most) – Construction <https://youtu.be/20U58-S02qw?si=X8rHKP56Y60BKktR>

Chapter Ei: Suspension Bridges – Hanging Tough

Clifton Suspension Bridge – <https://www.pbslearningmedia.org/resource/phy03.sci.phys.mfw.bbsuspension/clifton-suspension-bridge/>

Chapter Eii: Suspension Bridges – Tacoma Narrows Case Study

Tony C – Tacoma Narrows Bridge Collapse "Gallop'n' Gertie" <https://youtu.be/j-zczJXSxnw>

CutterNarf – The Famous Tacoma Narrows Bridge Collapse Archive Footage <https://youtu.be/NO7Lo5tS01I>

Garrett Lenz – Tacoma Narrows Bridge Collapse https://youtu.be/IXyG68_caV4

Practical Engineering – Why the Tacoma Narrows Bridge Collapsed <https://youtu.be/mXTSnZgrfxM>

Chladni Plates: <https://frugalfun4boys.com/science-demonstration-kids-sound-vibrations/>





Interesting Bridges

Erasmus Bridge

There are a few videos that show the Erasmus Bridge in action.

This one: Crazy Dutch Bridges

- The Science of Erasmusbrug • Rotterdam – THE NETHERLANDS from Oxlæy <https://youtu.be/3mz1wO5aEvA> shows various bridges, including the Erasmus. Skip to 3:38 and learn more about the structure and how it works.

This one from Sharlon Mercieca <https://youtu.be/HY7whyjSFKg> (Rotterdam ♥ 2014 – Erasmus Bridge (Opening and Closing)) shows a trip across the bridge as it opens and closes. It is clearly filmed on a phone, so is a bit loud from the wind and street noise, but neatly shows the bridge working.

Forth Bridge

Markus Duesseldorf – Crossing Forth Rail Bridge By Train, Edinburgh, Scotland https://youtu.be/iNtGnr_wo5Y

Heatherwick's Rolling Bridge

Paddington, London – Heatherwick's Rolling Bridge

[Heatherwick's Rolling Bridge](https://youtu.be/3mz1wO5aEvA)

Millennium Bridge – London

Medpablo – Millennium Bridge

https://youtu.be/eAXVa_XWZ8

Queen Elizabeth II Bridge (Dartford Crossing)

Institution of Civil Engineers – Dartford Crossings

<https://youtu.be/SkgJ2UM68iQ>

Tower Bridge

1000 Londoners – Glen Ellis, the Londoner who opens and closes Tower Bridge – Londoner #29

<https://youtu.be/46xNsUUG574>



Further Resources

At the Rochester Bridge Trust we often tell people about our free education resources because we believe they are a great way to introduce children to engineering in the real world. And because they are free, even if they aren't for your child or class, you've nothing to lose by giving them a try!

However, we fully admit there's more to engineering education than our resources can offer. We also appreciate it's not always easy to find resources when there are so many other topics and ideas clamouring for your attention.

So, we've drawn up a couple of shopping lists to help. While these are not exhaustive lists, we believe they are a good start for the development of equipment libraries for schools, youth groups and at home. Each leaves plenty of scope for adding your own ideas to create bespoke collections for your setting. The kits are similar or the same as equipment we use to run our own hands-on activities for children. These are great for encouraging children to put classroom learning into practice without even realising it.

The book list aims to encourage wider reading among children of all ages. Some of the books directly identify engineering principles, whereas others incorporate the applications of engineering through the narratives or themes of the story.

These lists contain a broad range of resources to give people the opportunity to select the things that are most suited to their audience. We also appreciate that the costs of these items add up. To help with this, grants of up to £300 are available from the Trust for the purchase of materials for use in STEM learning activities run by school and community groups. You can find out more about these at www.rochesterbridgetrust.org.uk



Scan for the resources:

BOOKS

This list offers a collection of fiction and non-fiction books which can be used to support engineering activities. They can be used to support wider reading; to enrich the STEM collection of books in your library; they could be given as prizes or used to develop literacy activities around the theme of engineering or the activities therein. Some contain ideas for activities which could be embedded in the curriculum or project programme. Where possible we have given information on the age range/suitability or ATOS level related to the Renaissance Accelerated Reader Programme®.

Ada Lace on the Case – Emily Calandrelli with Tammy Weston, Simon & Schuster Books for Young Readers ISBN 978-1481485982
A fictional tale of a dognapping and a keen scientist investigating, using science concepts and skills including observation. Age 6-10

A Galaxy of Her Own: amazing stories of women in space – Libby Jackson, Century ISBN 978-1780898360

Fifty stories of inspirational women who have been fundamental to the story of humans in space. Age 9-13

Apollo – Matt Fitch, Chris Baker & Mike Collins, SelfMadeHero ISBN 978-1910593509
A graphic novel about the first steps made by humankind on the Moon, including some of the urban legends, gossip and speculation at the time.

Boy in the Tower – Polly Ho-Yen, Corgi Children's ISBN 978-0552569163
A story of relationships and being a carer for a parent, as well as looking at science, nature, construction and civil engineering as part of society. Age 9+ ATOS 5.3



BOOKS

Bridges! – Jennifer Swanson, Nomad Press
ISBN 978-1619305915
An activity book on bridges and civil engineering, with 25 projects to complete. Age 9-13

Bridges – A History of the World's Most Spectacular Spans – Judith Dupré, Black Dog and Leventhal Publishers
ISBN 978-0-316-50794-3
A gorgeous picture-book celebrating technological and aesthetic triumphs from across the globe.

Bridges! Amazing structures to design, build and test – Carol A. Johmann & Elizabeth J. Rieth, Williamson Publishing Co.
ISBN 978-1885593306
An activity book on bridges and civil engineering. Age 9-13

Britain's Greatest Bridges – Joseph Rogers, Amberley Publishing ISBN 978-1445684413
This profiles some of the most recognisable, historic or interesting bridges from around Britain. Age 13+

Civil Engineering – David Muir Wood, Oxford University Press ISBN 978-0199578634
From the Very Short Introduction series, this explains the nature of civil engineering and profiles some of the most notable civil engineers in history. Age 14+

Counting on Katherine – Helaine Becker, Macmillan's Children's Books
ISBN 978-1529005592
An illustrated, children's biography of Katherine Johnson, the mathematical genius who helped make the historic Apollo 11 moon landings possible. Age 5-8

Clockwork (or All Wound Up) – Phillip Pullman, Puffin ISBN 978-0440866381
A spooky tale of an apprentice clockmaker and his final project. Age 9+ ATOS 5.7

Digger Dog – William Bee, Illustrated by Cecilia Johansson, Nosy Crow
ISBN 978-0-85763-129-9
Read about a very energetic and determined dog, who loves digging up bones. Features a STEM-themed surprise at the end. Age 0-5

Ellie, Engineer – Jackson Pearce, Bloomsbury Children's Books ISBN 978-1681199481
The fictional tale of Ellie, a middle-school engineer, who can make 'anything'! Illustrated with Ellie's sketches and plans, and how-to guides, this is STEM-themed fun. Age 8-12

Engineering – The Riveting World of Buildings and Machines - Tom Jackson, Basher Science, Kingfisher ISBN 978-0-7534-7311-5
A fun, brief introduction to different aspects of engineering, presenting each as a friendly character. Age 10-14

Frank Einstein and the Antimatter Motor – Jon Scieszka, Amulet Books
ISBN 978-1419724923
A tale of Frank Einstein, a 'tinkerer' who enjoys finding out how the world works, and his robots. Age 8+

Fantastically Great Women who Changed the World – Kate Pankhurst, Bloomsbury ISBN 978-1-4088-7698-5
Written and illustrated by a direct descendant of suffragette Emmeline Pankhurst, this colourful picture book is full of facts about 13 inspirational women from history, and STEM, showcasing some of their great achievements in a fun and accessible way. Age 5-11

Fantastically Great Women who made History – Kate Pankhurst, Bloomsbury
ISBN 978-1-4088-7890-3
A sequel to Fantastically Great Women who Changed the World, this picture book introduces 13 more inspirational women who achieved great things. Age 5-11

Fantastically Great Women who Worked Wonders – Kate Pankhurst, Bloomsbury
ISBN 978-1-4088-9927-4
A second sequel to Fantastically Great Women who Changed the World, 13 more inspirational women are introduced. Age 5-11

The Firework Maker's Daughter – Philip Pullman, Puffin ISBN 978-0-440-86640-4
Exploring chemistry in the fairy tale of a girl's quest to follow in her father's footsteps. Age 7+ ATOS 5.3



BOOKS

Hidden Figures (young reader edition) – Margot Lee Shetterly, Harper Collins ISBN 978-0062662378

A children's biography of Katherine Johnson, the mathematical genius who helped make the historic Apollo 11 moon landings possible. Age 8-12

Hidden Figures (True story – picture book) – Margot Lee Shetterly, Harper Collins ISBN 978-0062742469

A picture book children's biography of Katherine Johnson, the mathematical genius who helped make the historic Apollo 11 moon landings possible. Age 4-8

Kensuke's Kingdom – Michael Morpurgo, Egmont ISBN 978-1405221740
The tale of a boy's survival, relating to water filtration/cleaning. ATOS 4.7 Age 9-13

Lift the Flap Engineering – Illustrated by Lee Cosgrove, written by Rose Hall. Usborne Books for the 2018 Year of Engineering ISBN 978-1-4749-4365-9

With expert advice from Sue Threader at the Rochester Bridge Trust, among others, this is a fascinating book to discover how engineering works, the many things engineers do and how engineers are building a better world. Age 4-8

Little People, Big Dreams: Ada Lovelace – Isabel Sanchez Vegara, Frances Lincoln Publishers Ltd ISBN 978-1786030757

An illustrated children's biography of Ada Lovelace, the British mathematician credited with developing the first algorithm. ATOS 4.2 Age 5-8

The Little Red Lighthouse & the Great Gray Bridge – Hildegard H Swift & Lynd Ward, Houghton Mifflin ISBN 978-0152045739
First published in 1942, an illustrated story for younger children about how sometimes size doesn't matter. The story features the George Washington bridge in New York. Age 4-7

My Mummy is an Engineer – Kerrine Bryan and Jason Bryan, Illustrated by Marissa Peguinho, Butterfly Books ISBN 978-0-9932769-0-3
Introducing children to the exciting world of engineering, ideal for young children. Age 5-7

Operation Gadgetman! – Malorie Blackman, Yearling ISBN 978-0440863076
An exciting story about a girl, her dad, his crazy inventions and his kidnapping. Age 8+ ATOS 4.1

Rosie Revere Engineer – Andrea Beaty, Abrams Books for Young Readers ISBN 978-0419708459
A picture book telling the story of an aspiring engineer and her great aunt, exploring different inventions and contraptions. Age 5-7

Spot the Bird on the Building Site – Sarah Khan, Illustrated by Moreno Chiacchiera, QED Publishing ISBN 978-1-78493-5900
A beautifully illustrated spot activity book, with a civil engineering/construction theme, with a facts and activity section at the back. Age 4-7

Structural Engineering Learn it! Try it! – Tammy Enz, Raintree (Capstone Limited) ISBN 978-1-51576430
A colourful book exploring structural engineering basics, with some hands-on activities to find out more about the structural aspects of civil engineering. ATOS 5.1 Age 9-13

The 13-Storey Treehouse – Andy Griffiths, Macmillan ISBN 978-1-4472-7978-5
Telling the story of two boys, their treehouse and all the inventions and distractions they find there. Age 6+ ATOS 3.9

The Three Billy Goats Gruff – Mara Alperin, Kate Pankhurst, Little Tiger Press ISBN 978-1848956858
A classic fairytale with a bridge at the heart of the story. Age 3-8 ATOS ~3.0

The Tin Snail – Cameron McAllister, ISBN 978-0552574037
A story about a boy inventing the car that won the war. Inspired by true events around the development of the 2CV, this story features invention and engineering. Age 8+

The True Story of the 3 Little Pigs! – Jon Scieszka, Puffin ISBN 978-0140540567
An interesting take on the classic fairy tale, which explores the properties of materials and their suitability for a task. Age 5+ ATOS 3.0

BOOKS

The following series from Book House, You wouldn't want to live without... covers a range of STEM topics, from water purification, to electricity, to maths. All aimed at Key Stage 2 approximately.

You wouldn't want to live without clean water! Roger Canavan, ISBN 978-1910184080

You wouldn't want to live without coding! Alex Woolf, ISBN 978-1912537051

You wouldn't want to live without electricity! Ian Graham, ISBN 978-0531213070

You wouldn't want to live without gravity! Anne Rooney, ISBN 978-1910706350

You wouldn't want to live without numbers! Anne Rooney, ISBN 978-1911242291

You wouldn't want to live without robots! Ian Graham, ISBN 978-1912537068

You wouldn't want to live without satellites! Ian Graham, ISBN 978-1912537099

You wouldn't want to live without simple machines! Anne Rooney, ISBN 978-1912537082

RESOURCES

Items that are recommended for supporting STEM, engineering and bridge building activities in school, that can be purchased with a grant from the Rochester Bridge Trust. This list can be found on our website, with links to websites and prices, but products may be available from a range of retailers and this does not indicate a recommendation of outlet by the Rochester Bridge Trust.

<http://www.rochesterbridgetrust.org.uk/learning-activities/stem-clubs/engineering-education-shopping-list/>



Makedo Cardboard Construction Scrub Add-On Kit, includes 40 Reusable Scrubs and Bonus Mini-Tool. Perfect for classroom STEM, STEAM learning and at-home play for children age 4+



Makedo Cardboard Construction Toolkit, includes 30 child-friendly reusable tools. Perfect for classroom STEM, STEAM learning and at-home play for children age 4+



Dabixx Building Blocks, Da Vinci Bridge Wood Construction Model Kits



K'Nex Education 78640 Introduction to Structures: Bridges Set for Key Stages 1 and 2 Construction Education Toy, 207 Pieces. Age 8+



K'NEX Building Bridges 79433. Children's construction toys for creative play. A 207-piece STEM learning kit, Age 8-13



K'Nex 34366 Creation Zone 50 Model Building Set KNEX Box 417 DLG, Ages 5 plus

Kid K'NEX Budding Builders Tub for ages 3 and up. Preschool educational toy, 100 pieces

Fineway. 330 pieces children's building blocks



Gamez Galore Straw Builders & Connectors, Connecta Straws Tub - 400 Pieces



URBN Toys 100 Piece Wooden Construction Set



KAPLA Doos 200 Blanke Plankjes

WEBSITES

www.rochesterbridgetrust.org.uk

Our education website, where you can find all of our free resources and keep up to date with our education activities.

www.rbt.org.uk

The website for the Rochester Bridge Trust.

www.thebigbang.org.uk

An education event from EngineeringUK, for young scientists and engineers across the country.

education.theiet.org/

The Institution of Engineering and Technology's Education website is aimed at 4-16-year-olds. It provides free resources for school and home learning.

www.engineeringuk.com/

EngineeringUK is the working name for The Engineering and Technology Board, a not-for-profit organisation which works in partnership with the engineering community to inspire tomorrow's engineers and increase the talent pipeline into engineering.

www.ice.org.uk

The Institution of Civil Engineers, with lots of resources for learning more about civil engineering, including careers advice.

www.imeche.org/

The Institution of Mechanical Engineers provides links to various education resources, for careers or hands-on activities and events.

www.neonfutures.org.uk

Neon brings together the UK's best engineering experiences and inspiring careers resources to help teachers bring STEM to life with real-world examples of engineering. Neon is funded by EngineeringUK and the Shell Centenary Scholarship Fund.

www.raeng.org.uk/

The Royal Academy of Engineering is a centre of excellence for engineering, with good education resources and competitions around STEM/engineering.

www.thisisengineering.org.uk

This is Engineering is a campaign to engage more young people with engineering and to promote engineering careers. It includes examples of real life engineering, from EngineeringUK.

tomorrowsengineers.org.uk/

Another website from EngineeringUK, this shares information about careers resources, Tomorrow's Engineers Week and other engineering activities.