

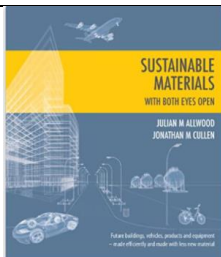


Key Stage 4



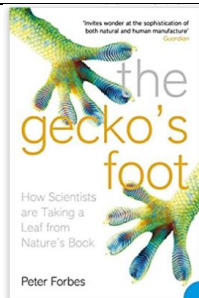
The Essential Engineer: Why Science Alone Will Not Solve Our Global Problems

From the acclaimed author of *The Pencil* and *To Engineer Is Human*, *The Essential Engineer* is an eye-opening exploration of the ways in which science and engineering must work together to address our world's most pressing issues, from dealing with climate change and the prevention of natural disasters to the development of efficient automobiles and the search for renewable energy sources. While the scientist may identify problems, it falls to the engineer to solve them. It is the inherent practicality of engineering, which takes into account structural, economic, environmental, and other factors that science often does not consider, that makes engineering vital to answering our most urgent concerns.



Sustainable Materials - With Both Eyes Open

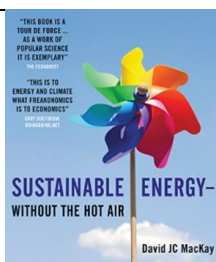
The world target is to reduce industry's carbon emissions by 50% by 2050. However, projections are that world demand for materials will DOUBLE by 2050, so to meet our emissions target, we have to achieve a 4-fold reduction in emissions per unit of material used. The book presents a vision for change, backed by comprehensive real-life experience. The book is based on scientific detail. But it's practical, not pie in the sky: everything in the book is backed by evidence and commercial experience. The solutions presented here are ahead of the game now. By providing an evidence-based vision of change, the book can play a significant role in influencing our future. The book is written for a popular audience as well as specialists and is beautifully produced with full colour throughout.



The Gecko's Foot: How Scientists are Taking a Leaf from Nature's Book

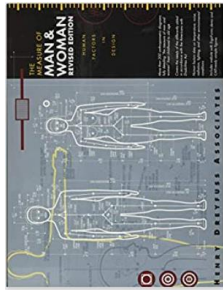
Bio-inspiration is a form of engineering but not in the conventional sense. Extending beyond our established and preconceived notions, scientists, architects, and engineers are looking at imitating nature by manufacturing 'wet' materials such as spider silk or the surface of the gecko's foot.

The amazing power of the gecko's foot has long been known – it can climb a vertical glass wall and even walk upside down on the ceiling – but no ideas could be harnessed from it because its mechanism could not be seen with the power of optical microscopes. Recently however the secret was solved by a team of scientists in Oregon who established that the mechanism really is dry, and that it does not involve suction, capillary action, or anything else the lay person might imagine. Each foot has half a million bristles, and each bristle ramifies into hundreds of finer spatula-shaped projections. The fine scale of the gecko's foot is beyond the capacity of conventional microengineering, but a team of nanotechnologists have already made a good initial approximation.



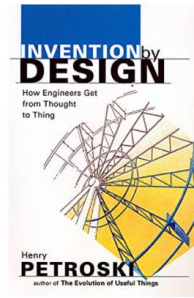
Sustainable Energy - Without the Hot Air

Addressing the sustainable energy crisis in an objective manner, this enlightening book analyses the relevant numbers and organizes a plan for change on both a personal level and an international scale--for Europe, the United States, and the world. In case study format, this informative reference answers questions surrounding nuclear energy, the potential of sustainable fossil fuels, and the possibilities of sharing renewable power with foreign countries.



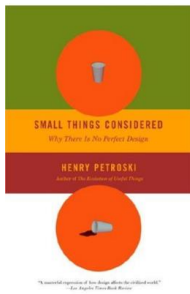
The Measure of Man and Woman: Human Factors in Design

Human factors research impacts everything from the height of kitchen counters to the placement of automobile pedals to a book's type size. And in this updated and expanded version of the original landmark work, you'll find the research information necessary to create designs that better accommodate human need. Featuring more than 200 anthropometric drawings, this handbook is filled with all of the essential measurements of the human body and its relationship to the designed environment. You'll also discover guidelines for designing for children and the elderly, for the digital workplace, and for ADA compliance. Measurements are in both English and metric units.



Invention by Design – How Engineers get from Thought to Thing

Engineering entails more than knowing the way things work. What do economics and ecology, aesthetics, and ethics, have to do with the shape of a paper clip, the tab of a beverage can, the cabin design of a turbojet, or the course of a river? How do the idiosyncrasies of individual engineers, companies, and communities leave their mark on projects from Velcro® to fax machines to waterworks? *Invention by Design* offers an insider's look at these political and cultural dimensions of design and development, production, and construction.



Small Things Considered: Why there is No Perfect Design

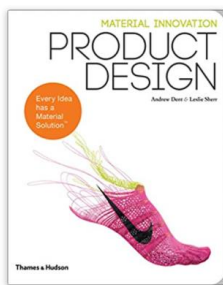
Why has the durable paper shopping bag been largely replaced by its flimsy plastic counterpart? What circuitous chain of improvements led to such innovations as the automobile cup holder and the swivelling vegetable peeler? With the same relentless curiosity and lucid, witty prose he brought to his earlier books, Henry Petroski looks at some of our most familiar objects and reveals that they are, in fact, works in progress. For there can never be an end to the quest for the perfect design.



Product Design (Portfolio)

Product Design offers a broad and comprehensive introduction to the field of product design and the key role of product designers. It follows through all the stages and activities involved in the creation of a new product – from concept design to manufacture, prototyping to marketing. It encourages the reader to challenge conventions and to think about the subject in new and exciting ways.

The book also explores the diverse nature of product design, including new and emerging forms of practice. A rich overview of influential design movements and individuals are covered, together with interviews and examples from prominent product designers, and working practices and career guidance relevant to today.



Material Innovation: Product Design

For the first time, materials technology – the single most important agent of change in our designed landscape, from the buildings in which we live and work to the clothes we wear – is analysed to show its transformation, volume by volume, of ten creative disciplines. It is being produced in association with Material ConneXion, keeper of the largest materials and processes library in the world. This volume is on Product Design and features carefully selected products that showcase the innovative use of a particular material. It includes six specially commissioned 'visual narratives' by experts in the field, and an extensive illustrated materials directory with detailed information on almost 100 materials. With a preface by Michele Caniato, the President of Material ConneXion, and an introduction by Allan Chochinov, Chair of the School of Visual Arts MFA in Products of Design Program in New York, this book can be used both as the basis for new course structures and as the authoritative reference for professionals.



Process: 50 Product Designs from Concept to Manufacture

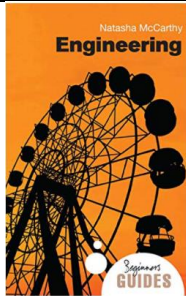
This book provides an in-depth study of the creative and manufacturing processes behind 50 contemporary domestic design objects. Chosen from all around the world, they span furniture, lighting, tableware, textiles, and products. Featuring the work of both long-established and emerging designers, each product is selected for its significant use of new technology, unorthodox or complex production process, use of innovative materials (or traditional materials adapted in new and unexpected ways) and, in some cases, for the creative concept behind it. Beginning with a general introduction, each project is then presented through explanatory text as well as inspirational image, sketch, detail shots of production processes and the completed product. A glossary of production methods is also included. "Process" offers an interesting and useful insight into how products are designed for students and professional designers alike.



Engineering in Society

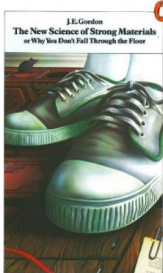
Students often have misconceptions about a career in engineering. They often underestimate the importance of communication and negotiation, or don't realise the amount of responsibility that they are likely to have, and the extent to which they will have to use their own judgement and make their own decisions.

The purpose of this book, therefore, is to give students new to engineering an initial insight into the profession of engineering and some idea of what their future career might look like.



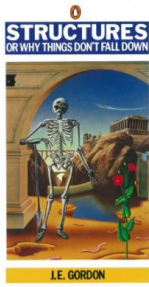
Engineering: A Beginner's Guide

Focusing on the impact of engineering on society and the world, McCarthy details the development of the discipline, explains what makes an engineering mind, and shows how every aspect of our lives has been engineered: from gadgets to our national infrastructure. Long considered tinkerers, problem solvers, and visionaries, engineers hold the keys to our real and virtual future.



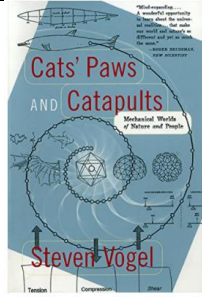
The New Science of Strong Materials - or Why You Don't Fall Through the Floor

Why isn't wood weaker than it is? Why isn't steel stronger? Why does glass sometimes shatter and sometimes bend like spring? Why do ships break in half? What is a liquid and is treacle one? All these are questions about the nature of materials. All of them are vital to engineers but also fascinating as scientific problems. During the 250 years up to the 1920s and 1930s they had been answered largely by seeing how materials behaved in practice. But materials continued to do things that they "ought" not to have done. Only in the last 40 years have these questions begun to be answered by a new approach. Material scientists have started to look more deeply into the make-up of materials. They have found many surprises; above all, perhaps, that how a material behaves depends on how perfectly - or imperfectly - its atoms are arranged. Using both SI and imperial units, Professor Gordon's account of material science is a demonstration of the sometimes curious and entertaining ways in which scientists isolate and solve problems.



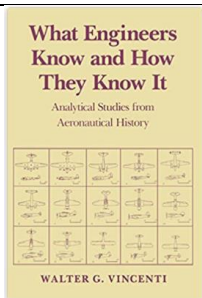
Structures – or Why Things Don't Fall Down

In "The New Science of Strong Materials" the author made plain the secrets of materials science. In this volume he explains the importance and properties of different structures.



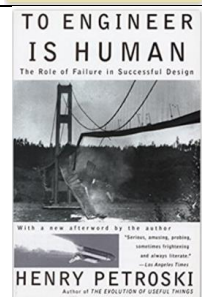
Cats' Paws and Catapults: Mechanical Worlds of Nature and People

Nature and humans build their devices with the same earthly materials and use them in the same air and water, pulled by the same gravity. Why, then, do their designs diverge so sharply? Humans, for instance, love right angles, while nature's angles are rarely right and usually rounded. Our technology goes around on wheels—and on rotating pulleys, gears, shafts, and cams—yet in nature only the tiny propellers of bacteria spin as true wheels. Our hinges turn because hard parts slide around each other, whereas nature's hinges (a rabbit's ear, for example) more often swing by bending flexible materials. In this marvellously surprising, witty book, Steven Vogel compares these two mechanical worlds, introduces the reader to his field of biomechanics, and explains how the nexus of physical law, size, and convenience of construction determine the designs of both people and nature.



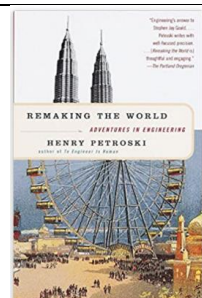
What Engineers Know and How They Know It: Analytical Studies from Aeronautical History

"The biggest contribution of Vincenti's splendidly crafted book may well be that it offers us a believably human image of the engineer". - Technology Review.



To Engineer is Human: The Role of Failure in Successful Design

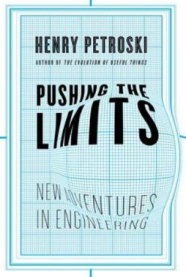
How did a simple design error cause one of the great disasters of the 1980s - the collapse of the walkways at the Kansas City Hyatt Regency Hotel? What made the graceful and innovative Tacoma Narrows Bridge twist apart in a mild wind in 1940? How did an oversized waterlily inspire the magnificent Crystal Palace, the crowning achievement of Victorian architecture and engineering? These are some of the failures and successes that Henry Petroski, author of the acclaimed *The Pencil*, examines in this engaging, wonderfully literate book. More than a series of fascinating case studies, *To Engineer is Human* is a work that looks at our deepest notions of progress and perfection, tracing the fine connection between the quantifiable realm of science and the chaotic realities of everyday life.



Remaking the World

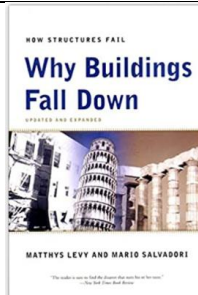
From the Ferris wheel to the integrated circuit, feats of engineering have changed our environment in countless ways, big and small. In *Remaking the World: Adventures in Engineering*, Duke University's Henry Petroski focuses on the big: Malaysia's 1,482-foot Petronas Towers as well as the Panama Canal, a cut through the continental divide that required the excavation of 311 million cubic yards of earth.

Remaking the World tells the stories behind the man-made wonders of the world, from squabbles over the naming of the Hoover Dam to the effects the Titanic disaster had on the engineering community of 1912.



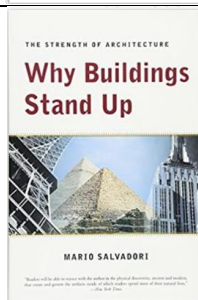
Pushing the Limits: New Adventures in Engineering

Here are two dozen tales in the grand adventure of engineering from the Henry Petroski, who has been called America's poet laureate of technology. **Pushing the Limits** celebrates some of the largest things we have created—bridges, dams, buildings--and provides a startling new vision of engineering's past, its present, and its future. Along the way it highlights our greatest successes, like London's Tower Bridge; our most ambitious projects, like China's Three Gorges Dam; our most embarrassing moments, like the wobbly Millennium Bridge in London; and our greatest failures, like the collapse of the twin towers on September 11. Throughout, Petroski provides fascinating and provocative insights into the world of technology with his trademark erudition and enthusiasm for the subject.



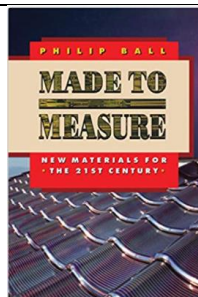
Why Buildings Fall Down

The stories that make up *Why Buildings Fall Down* are in the end very human ones, tales of the interaction of people and nature, of architects, engineers, builders, materials, and natural forces all coming together in sometimes dramatic (and always instructive) ways.



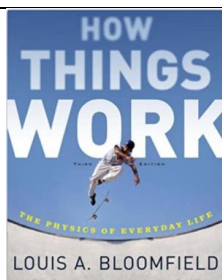
Why Buildings Stand Up

Between a nomad's tent and the Sears Tower lies a revolution in technology, materials, and structures. Here is a clear and enthusiastic introduction to buildings methods from ancient times to the present day, including recent advances in science and technology that have had important effects on the planning and construction of buildings: improved materials (steel, concrete, plastics), progress in antiseismic designs, and the revolutionary changes in both architectural and structural design made possible by the computer.



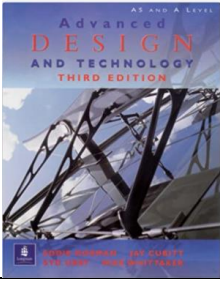
Made to Measure: New Materials for the 21st Century

Made to Measure introduces a general audience to one of today's most exciting areas of scientific research: materials science. Philip Ball describes how scientists are currently inventing thousands of new materials, ranging from synthetic skin, blood, and bone to substances that repair themselves and adapt to their environment, that swell and flex like muscles, that repel any ink or paint, and that capture and store the energy of the Sun. He shows how all this is being accomplished precisely because, for the first time in history, materials are being "made to measure": designed for particular applications, rather than discovered in nature or by haphazard experimentation. Now scientists literally put new materials together on the drawing board in the same way that a blueprint is specified for a house or an electronic circuit. But the designers are working not with skylights and alcoves, not with transistors and capacitors, but with molecules and atoms.



How Things Work - The Physics of Everyday Life

This book is an unconventional introduction to physics and science that starts with whole objects and looks inside them to see what makes them work. It's written for students who seek a connection between science and the world in which they live. How Things Work brings science to the reader rather than the reverse. Like the course in which it developed, this book has always been for non-scientists and is written with their interests in mind. Nonetheless, it has attracted students from the sciences, engineering, architecture, and other technical fields who wish to put scientific concepts into context.



Advanced Design and Technology

Fully updated, *Advanced Design & Technology* not only provides a practical guide to modern designing, but also covers both the scientific principles and the technical information required.