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Marius Mutz

Early modern instruments for testing the quality and safety of black powder and gun barrels

The use of black powder has always been associated with safety risks, and its optimal usability with quality issues. These problems became more significant with the widespread establishment of firearms in wars and pyrotechnic displays in cities and at royal courts in the 16th century. One solution was the development of measuring instruments that were intended to make the quality and safety of gunpowder and guns more precisely measurable. The first part of this article discusses powder testers from early modern technical literature and the second part focuses on two measuring instruments developed around 1567 at the Dresden court for testing gun barrels.

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Claudia Sutter

Control by experts? Legislation governing Schaffhausen blacksmiths in medieval and early modern times

In the pre-modern town of Schaffhausen, a climate of equal opportunities prevailed for craftsmen for a time. Regulations for blacksmiths and closely related craftsmen were created at three different hierarchical levels – the municipal constitution, guilds, and trade associations – and accordingly originated from three different groups of people. To belong to one of these groups, different conditions had to be met – and yet they could overlap in terms of personnel. In the end, however, it was always the political bodies that had to approve all the regulatory proposals, and not the competent men of the trade.

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Manfred Rasch & Bernd Lychatz

Quality management in science and industry using the example of ferrous metallurgy in Germany: From the beginnings to the introduction of non-destructive analysis methods

Trade in products gave rise to quality testing, initially limited to the product itself, then extended to the respective manufacturing process. For iron and later steel, this quality management, which began in prehistory and early history, was initially limited to the five human senses. This article shows how the Industrial Revolution in Europe brought new fields of application for iron and steel with new technical risks and promoted the institutionalization of quality control. With the use of X-ray machines and ultrasound, the previous realm of the visible was finally abandoned at the beginning of the 20th century and new methods of quality assurance were applied in the steel industry.

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Panagiotis Pouloupoulos

Optimizing operation, reducing risk: Aspects of quality and safety in the development of the steam engine

Arguably the most iconic symbol of industrialization, the steam engine was a driving force that revolutionized diverse sectors, from mining to printing. However, the gradual development of steam engines that were more powerful – and consequently more dangerous – also created new demands regarding quality and safety. From the late 18th century onwards, the efforts of engineers and manufacturers alike aimed, on the one hand, to enhance performance and maintenance and, on the other hand, to minimize energy losses and hazard, enabling steam engines to be used in a wide variety of applications. The history of the steam engine illustrates the constant attempts to improve efficiency, durability, and security in order to make steam a more controllable and thus marketable source of power.

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Sybilla Nikolow

“To create a replacement limb suitable for work”: Demands on arm prosthetics during the First World War

Prostheses are usually intended to remedy a condition of the body that is perceived as a deficiency. They are therefore particularly suitable for discussing the changes in the demands placed on the use of technology close to the body. The demands placed on them and the criteria by which they were judged changed over the course of the 19th and 20th centuries. Before the First World War, the main expectation was that prosthetics would help to achieve a natural appearance, however that was defined. Due to the social conditions and consequences of the war, the perspective shifted from the singularity of the individual case to the mass phenomenon in all participating countries. This article sheds light on these developments and highlights the processes of change.

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Ludwig Bauer & Frank Dittmann

Electricity and safety – a long history

Today, the use of electricity in everyday life is considered safe. The road to modern safety technology, however, was long and difficult. At the end of the 19th century, electrical energy was first used to light streets and interiors or to operate machines. The harnessing of electricity not only brought numerous new opportunities, but also unknown dangers. With the growing number of electrical installations and the increased use of electricity in households, the question of how to protect people and animals from electri-

cal accidents became ever more important. This article considers the early stages of the historical development of the safe use of electricity and the challenges that came with it.

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Simon Lobach

Environmental regulation and corporate offshoring in the aluminium sector

Aluminium has been produced on a large scale since the 1880s. Since the beginning, local populations have noted and protested against the environmental impacts of the processes by which bauxite is transformed into aluminium. Environmental regulation implemented to reduce such impacts often only led to aluminium companies offshoring their production to third countries. To show the underlying mechanisms, this article discusses three cases of environmental conflict involving the aluminium industry: fluoride emissions, red mud deposition, and CO₂ emissions.

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Nicole Hesse

Safety, guiding principles, practices: On the tension between resource conditions and technical change in wind energy utilization

The article uses the guiding concept of safety to look at the history of wind energy utilization in the 20th century (mainly in Germany) and identifies fields that could be relevant for research into the extent to which safety concepts and practices interact with technological change. The focus is directed toward a user-orientated historiography of technology and opens up new dimensions of safety claims and processes in the context of the diversity of wind energy use. In addition to a cursory examination of discursive constructions of safety, the main focus is on the safety requirements and needs of turbine builders, who are also operators and therefore have a personal interest in the safety of the turbines. In particular, the German self-build scene of the 1970s and 1980s is analyzed.

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Guillaume de Syon

Dialoguing speed and new standards: The Concorde prototypes and the establishment of a new culture of safety

The Franco-British supersonic flight project Concorde, which operated between 1976 and 2003, boasted a safety record that reflected its 15-year engineering gestation, notwithstanding the famous crash in 2000. It was likely one of the most tested technological projects, of necessity

because of the enormous safety challenges posed by supersonic commercial travel. These challenges required transformations in the culture of both safety and engineering. Issues around cockpit ergonomics and visibility, notably the idea of the droop nose to increase visibility, as well as the technical problem of air intake surges, were only resolved thanks to laborious testing and the involvement of the pilots. The case suggests that the sociology of technology needs to be further widened to include, beyond engineers, pilots as well as mechanics and management.

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Timo Leimbach

The silver bullet, or how to kill the quality “beast”

Software projects are often examples of projects that fail to meet quality, time, and cost constraints. Despite substantial efforts to enhance the development process, there is no simple solution. Improving the process has remained a pivotal question and sparked heated debates. It covers a broad set of problems and solutions ranging from the unique attributes of software and the formal correctness of code to different approaches in project management. Originally, emphasis was placed on detailed specification and rigorous upfront planning, known as the waterfall model, while in recent years alternatives focused on incremental/iterative concepts, now called agile methodologies. For both, quality and its different conceptualizations have played an important role.

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Bernhard Droste

Books for the Iron Library: Reflections on books donated to expand the library's collection

Bernhard Droste, longtime director of the Federal Institute for Materials Research and Testing (BAM) in Berlin, has donated 228 titles from his private library to the Iron Library. In addition to professionally and scientifically relevant specialized literature on materials science and materials testing, Droste also collects bibliophile treasures from related areas of the history of technology. In this article, he presents various works from the donation to the Iron Library.

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Franziska Eggimann

Johann Conrad Fischer (1773–1854): Pioneer – Citizen – Entrepreneur. A Schaffhausen biography in the early days of modernity

Johann Conrad Fischer was one of the most important Schaffhausen personalities of the first half of the 19th century. As an entrepreneur, politician and scientist, he united

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within his person the fundamental driving forces of modern Switzerland. He was particularly famous in his time for his numerous and far-reaching metallurgical developments. A celebration was held in Schaffhausen on 13 September 2023 to mark the 250th anniversary of Fischer's birth. This article is based on an extended version of the speech given by the author.

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Christopher Zoller-Blundell

Readings of a pioneer: Johann Conrad Fischer and the books of the Iron Library

Johann Conrad Fischer lived a very literary life. His own published writings, the seven brilliant travel journals, are scattered with references to works read, taken along as travel companions, or acquired during a journey. However, the extensive library he is thought to have accumulated is now dispersed and no index survives. As part of the special exhibition at the Iron Library marking the 250th anniversary of his birth, research was undertaken to identify and display titles in the library's collection either that were Fischer's or that he is known to have read. Hints in the journals combined with provenance research have so far identified 47 titles. Though a partial reconstruction of an otherwise vast reading history, it has revealed captivating fragmentary glimpses into an intellectual landscape and personal reading history that went far beyond the particulars of metal alloys and industry.

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Nicolau Lutz

Fischer's journals as testimonies of technical knowledge between craft and science

In 2023, the Iron Library realized a digital edition of the travel journals of the Schaffhausen pioneer Johann Conrad Fischer. On his travels, Fischer experienced and described the industrial transformation in Europe in the first half of the 19th century. The research for the edition brought new insights into technological development, but also into the technical vocabulary that changed and developed in parallel. Fischer's journals provide valuable material for a more detailed study of the transfer of technology between "lived" craftsmanship and writing in encyclopedias and manuals in the context of an Enlightenment culture of knowledge.