

Conference Report:

Good, Durable, Safe. Quality and Safety Requirements of Technology in History.

43rd History of Technology Conference of the Iron Library¹

17-18 November 2023, Schlatt (TG)

Organised by : The Iron Library Foundation

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Theorists such as Luc Boltanski and Bruno Latour have pointed out that technology often becomes conspicuous when a malfunction occurs, or an accident happens. It is preferably at these moments that it emerges from the shadows of specialized discourse and silent functioning, becoming the subject of social negotiation. Accordingly, many of the efforts made by technicians in their everyday lives are aimed at ensuring that everything runs smoothly, as far as this is possible. The 43rd History of Technology Conference at the Klostersgut Paradies in Schlatt, Switzerland, focused on this complex of topics. The conference is organized by the Iron Library, a foundation of the technology and industrial group Georg Fischer Ltd (GF). The academic advisory board, whose members are **GISELA HÜRLIMANN** (Dresden), **MARCUS POPLOW** (Karlsruhe) and **FRIEDRICH STEINLE** (Berlin), is responsible for the program. In addition to the presentations in English and German, the 43rd edition offered an elaborately curated supporting program with guided tours of industrial history exhibits, bibliophile rarities and the latest developments from GF's own laboratories. In the panels, the speakers explored how technical products and processes are produced with consistent quality. On the other hand, they explored questions about the safety of technologies. **MATTHIAS HEYMANN** (Aarhus), who was newly appointed to the conference's scientific advisory board, made two interesting observations on the thematic focus of the conference in his closing remarks. Research into the history of technology has largely been able to move away from a heroizing perspective on the individual, male, supposedly ingenious inventor. Nevertheless, the non-functioning of technology remained a little underexposed. Secondly, Heymann put forward the thesis that the two terms "quality" and "safety" belong together conceptually and lend themselves to joint research, even if there is no overarching term for both. Following the conference, this can only be endorsed.

On the eve of the actual start of the conference, **FRANK DITTMANN** (Munich) gave a public lecture on safety standards in the German electricity industry. The lecture was jointly organized by the Iron Library and the Schaffhauser Vortragsgesellschaft. The speaker offered a conceptual clarification that would prove relevant for many of the presentations at the conference: "Safety" in the history of technology should always be understood in relative terms – only those events that had been thought of in advance were controllable. In this context, safety could not be understood as the complete

¹ A German version of this conference report was previously published on HSozKult : <http://www.hsozkult.de/conferencereport/id/fdkn-144496>

absence of threats, but rather as the ongoing management of residual risks. In his material-rich presentation, Dittmann addressed safety in the electricity industry both from a historical perspective and with a view to current developments. Historically, the cut-throat competition between various forms of energy—natural gas, petroleum, and electricity—proved to be both a driver and an obstacle to technical development. Interestingly, safety in the first half of the twentieth century was often conceptualized as system safety rather than user safety. In other words, early safety measures were aimed at ensuring that the damage caused by a short circuit in a private household remained localized, for example, but did not necessarily offer protection for the user of the electrical appliance. Using the example of a possible conceivable failure of the protective circuits in German households, Dittmann made it clear that risks can still occur without it being clear in advance what safety margins are socially acceptable.

After welcoming speeches by **GEORG NEUSCHÜTZ** (Schaffhausen) from GF Casting Solutions and **FRANZISKA EGGIMANN** (Schlatt), Corporate Archivist and Head of the Iron Library, **MARIUS MUTZ** (Augsburg) gave the first presentation of the actual conference. He focused on military technology at the court of Elector Augustus of Saxony in the sixteenth century. Augustus collected a wide range of technical knowledge in order to ensure the quality of his large gun battery. The prince presented himself in letters as a technical expert and was thus able to lend his court considerable charisma.

CLAUDIA SUTTER (Schaffhausen) brought local color to the conference, reporting on the guild of blacksmiths and related professions in Schaffhausen in the Middle Ages and early modern times. The conclusion of the presentation was that the guilds were able to enforce strict quality control, but at the same time were very hostile to innovation. The craftsmen's associations known as guilds were essentially concerned with keeping out foreign craftsmen. This argument stood in some contrast to Sutter's description of the long journeys made by journeymen, which were made possible by cross-town professional solidarity. **REINHOLD REITH** (Seekirchen) remarked in the discussion section that an overly anti-innovation image of the guild system had become questionable after the economic-historical works of Stephan Epstein and Sheilagh Ogilvie. Sutter replied that she found it difficult to compare guild regulations across different cities.

RALF SPICKER (Munich) presented the contribution of the German engineer August Wöhler (1819-1914) to the development of materials testing. Among other things, Wöhler investigated axle fractures in railroad wagons, which became more frequent with the expansion of the rail network. A traditionally static approach relied on fixed values such as the maximum load of wagons and could hardly do justice to such safety risks. Wöhler dynamized material testing by inventing various testing machines.

BERND LYCHATZ (Freiberg) contributed a presentation that he had prepared together with **MANFRED RASCH** (Bochum). The presentation covered a broad historical panorama of metallurgy, from quality control using the body's senses to the examination of steels using ultrasound. The wealth of material was somewhat lacking in conceptual cohesion, despite the attractive examples.

PANAGIOTIS POULOPOULOS' (Munich) presentation was dedicated to the steam engine. By explaining exhibits from the Deutsches Museum in detail, the speaker showed the evolution of the engines towards improved stability and safety. On the one hand, he made this visible in details such as the riveting of the steam boilers.

NICOLE HESSE (Karlsruhe) dealt with a technical-historical subject of considerable topicality with her presentation on the use of wind energy in electricity generation from 1900 onwards. Similar to electricity in Frank Dittmann's lecture, wind energy was in competition with other forms of energy at the beginning of the twentieth century. Hesse's presentation had a strongly explorative character and was not very problem-oriented. Friedrich Steinle, who left the advisory board at the end of the conference and was thanked, suggested in the discussion that the various categories such as security of supply and plant safety should be differentiated further conceptually.

In a fascinating presentation, **SYBILLA NIKOLOW** (Bielefeld) described how prosthetic arms underwent a standardization process in Germany from 1915 onwards, initially prompted by a "competition for a replacement arm" organized by the Association of German Engineers (VDI). Various safety and quality criteria were applied to the prosthesis, including low manufacturing costs. The main aim was to "create a replacement limb that could be used for work", as the competition stated. The prosthesis was to prove itself in everyday working life in manual and agricultural activities. The VDI competition resulted in a "testing center for replacement limbs" recognized by the War Ministry. Its members included doctors, technicians and experts from industry, but no prosthesis wearers. The test center designed an actual course with various tasks for the test subjects, in which the "replacement limbs" were tested in continuous use during various operations. After years of further development, the prosthesis wearers expressed mixed reactions: The "replacement limbs" had remained "work aids". While they might enable specialized work processes, they were often perceived as less useful or even alien outside of everyday work. The focus on restoring users as workers came at the expense of the quality of their physical sensation.

GUILLAUME DE SYON (Reading PA) told the story of the French-British cooperation in the development of the supersonic airplane Concorde. Divergent ideas of appropriate quality control and safety testing clashed on various occasions. Among other things, De Syon focused upon the example of the airflow on the Concorde's turbines. The airflow caused problems when the airplane operated with a velocity around twice the speed of sound. On the one hand, these problems related to safety, as the airflow at the speed limit could destroy the turbines in extreme cases. On the other hand, the flow behavior of the air could affect the quality of the flight experience, as penetrating bangs could be heard in the passenger cabin at a certain speed. The French test pilots dealt with these challenges differently to their British colleagues. They insisted on mathematically calculating the aerodynamic problem in advance, whereas the British were more open to tackling the problem in practice step by step. During the discussion, it was noted that Nikolov's and De Syon's presentations had converged in their perspective on the limits of the human body and the technical handling of it. In response, De Syon contributed an interesting observation based on his personal experience of a supersonic flight

in the Concorde. A decisive challenge when designing the aircraft was to reproduce the phenomenological quality of a subsonic flight for the passenger. Nevertheless, the acceleration at the beginning of the flight was physically demanding and the cabin seemed very cramped.

TIMO LEIMBACH's (Aarhus) full, fast-paced presentation showed the repeated failure of efforts to establish standardized processes for quality assurance in software development. The wide geographical range of the approaches presented should be emphasized. Leimbach observed that software companies with market power were often able to set standards on their own and evade regulation by state authorities.

SANDRA SCHILLER-MAUZ (Schaffhausen) from GF Piping Systems spoke about the establishment of quality and safety standards in current product development at GF. The professionalism, informality and pleasant pace of Schiller-Mauz' presentation deserve special mention. She gave an engaging account of the interaction between the wishes of the user and the intentions of the product developer.

BOYD RUAMCHAROEN (Cambridge MA) presented material from his ongoing dissertation project. His presentation dealt with the "tropicalization" of durability standards using the example of India after independence. Important parameters for the adaptation to the tropical context were the higher temperature and fluctuating humidity compared to temperate climates. Ruamcharoen made the suggestion to interpret this as the technical content of non-alignment in contrast to US standards.

A highlight at the end of the conference was **SIMON LOBACH's** (Geneva) presentation on aluminum production. The speaker discussed the past and present of aluminum ore extraction and refining. He was able to show that in the Amazon region, large hydroelectric power plants are often located close to aluminum production sites. The former cover the considerable electricity requirements of aluminum production. Lobach drew a differentiated picture of the ecological assessment of these power plants. Where the link between hydroelectricity and aluminum production is weakened by ecological criticism, producers using fossil fuels often take their place. With regard to the expansion of the production volume of Chinese aluminium producers, the speaker spoke of an actual "refossilization" of the aluminium sector. Paradoxically, a key driver of its growth is the demand for electrically powered lightweight cars. The speaker conveyed the metallurgical details concisely and confidently.

In summary, the 43rd History of Technology Conference offered a comprehensive, stimulating examination of the topics of quality and safety. In particular, Pouloupoulos', de Syon's and Lobach's presentations had in common the careful discussion of technical objects and processes. Arguments based on such a detailed consideration of technical dispositives were not self-evident. The intended interdisciplinarity of the conference also benefited from some contributions that offered a social and economic history of technology, alongside presentations that traced the finely ramified effects of technicity in society. In some presentations, however, the audience might have wished for a stronger connection to the respective state of research. The discussions within and outside of the

formal discussion section were lively, collegial and productive, and the moderators of the individual panels deserve great praise for this. In addition to the conceptual suggestions mentioned at the beginning, closing speaker Matthias Heymann offered pointers for a possible continuation of the conference theme. The views of the users could have been emphasized more strongly in distinction from those of the engineers. The planned obsolescence of products was also not addressed. There is therefore no shortage of suggestions for future History of Technology Conferences. It is to be hoped that they can maintain and further develop the high standard of the 43rd edition.

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Conference Overview :

Frank Dittmann (Munich): Electricity and safety – a long history (Pre-conference lecture)

Quality control by municipal and court authorities in the early modern period

Marius Mutz (Augsburg): Quality, quantity and order. The testing of technology at the Electoral Court of Saxony and the establishment of a dynastic trademark

Claudia Sutter (Schaffhausen): Control by experts? Legislation for the Schaffhausen blacksmiths in the Middle Ages and early modern period

History of knowledge and institutionalization of materials testing

Ralf Spicker (Munich): A history of knowledge of the experiments of A. Wöhler and their establishment as a method of materials testing

Bernd Lychatz/Manfred Rasch (Freiberg/Bochum): Quality management in the steel industry. From the beginnings to the introduction of the electron microscope

Control over steam and wind: the operational safety of power machines

Panagiotis Pouloupoulos (Munich): Optimising Operation, Reducing Risk: Aspects of Quality and Safety in the Development of the Steam Engine

Nicole Hesse (Karlsruhe): Safety & Efficiency: A Tension between Resource Conditions and Technological Change since 1900

Negotiation processes in product development: prosthetics and aviation

Nikolow Sybilla (Bielefeld): "To create a substitute limb suitable for work". Demands on arm prosthetics in the First World War

Guillaume de Syon (Reading PA): Safety, Speed and New Standards: Building an Engineering Culture around the Concorde Prototypes

The establishment of quality standards by the state and industry

Timo Leimbach (Aarhus): The silver bullet or how to kill the quality "beast"

Sandra Schiller-Mauz (Schaffhausen): Safe is safe? Quality and safety standards in product development at GF Piping Systems

The environment as a disruptive factor in regulatory processes?

Boyd Ruamcharoen (Cambridge MA): Testing Environments: American Standards for Communications Technology in the Tropics in a Decolonizing World, 1950s–1980s

Simon Lobach (Geneva): Environmental regulation and corporate off-shoring in the aluminium sector