

Watchmaking in Saxony – a review

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Earlier this year there was an exhibition at the Mathematisch-Physikalischer Salon in Dresden on early precision watchmaking in Saxony seen in an international context and marking the 200th anniversary of the birth of Ferdinand Adolph Lange.¹ We invited Dr Sibylle Gluch, the curator of the exhibition and co-editor (with Peter Plaßmeyer) of the accompanying bilingual catalogue, to give a short account of the genesis of the exhibition, the research undertaken and the themes of the catalogue.²

In 1843, Ferdinand Adolph Lange (1815–1875) approached Saxon Privy Councillor Carl von Weissenbach with a proposal for opening a watch factory in Glashütte in the impoverished region of the Erzgebirge (Ore Mountains) south of Dresden. Lange asked the government of the King of Saxony to financially support his enterprise. He felt certain of its success on account of ‘the great and important perfection and simplicity that, through my thinking and diligence, I succeeded to give to the watch itself’.³ This quotation, referring to Lange but at the same time pointing at more general principles within the history of watchmaking, provided us with the title ‘Simple and Perfect’ for our project. In fact we decided not to concentrate exclusively on Lange’s work in Glashütte but rather to show where he came from and which aspects rendered his enterprise possible. This emphasis brought us to the history of precision horology and caused us to undertake considerable research to place the Saxon development in an international context.

The exhibition opened with a presentation of pendulum clocks, marine chronometers

and pocket chronometers (Figs 1 and 2). This section aimed at illustrating the context of precision horology, for instance in astronomy and navigation, as well as at illuminating the close link between the development of marine and pocket chronometers. Furthermore, it pointed at the problem of serialisation and the importance of mechanical simplification for the economical production and successful practical utilisation of portable timekeepers, thus providing the background for the more specific Saxon development of clock- and watchmaking.

The next section introduced visitors to the early protagonists of Saxon precision horology, two men probably little known until now outside specialist circles: Johann Heinrich Seyffert and Johann Christian Friedrich Gutkaes. In addition, it illustrated the crucial role of the Mathematisch-Physikalischer Salon (founded around 1728) in the development of Saxon clock- and watchmaking, and gave visitors an idea of the border-crossing exchange of ideas, objects, and people characteristic of the eighteenth and early nineteenth-century horological world.

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1. The exhibition ran from 18 February to 14 June 2015 under the title *Einfach – Vollkommen. Sachsens Weg in die internationale Uhrenwelt / Simple and Perfect. Saxony’s Path into the World of International Watchmaking*.

2. The author would like to thank Michael Korey, curator of astronomy and mathematics at the Mathematisch-Physikalischer Salon in Dresden, for his help in preparing this review.

3. F. A. Lange to C. A. H. Freiherr von Weissenbach, Dresden, 5 August 1843, Sächsisches Hauptstaatsarchiv, Staatsarchiv Dresden, 10736 Ministry of the Interior, No. 5941, fol. 2v.



Fig. 1. A view in the exhibition, with six trestle tables in the centre and four showcases against the wall. The pendulum clocks seen on the left, seen in profile in Fig. 2 below, are (from left to right): astronomical pendulum clock by Johann Gottfried Zimmer, workshop of Count Hans von Löser, Schloss Reinharz, 1744; longcase clock by Johann Gottfried Köhler, Dresden, before 1777; longcase clock by Johann Heinrich Seyffert, Dresden, 1794; pendulum clock by Johann Andres Klindworth, Göttingen, before 1787.





Fig. 3. Three products by Friedrich Gutkaes, Dresden. From left to right: chronometer No. 2, around 1818; travelling clock with detent escapement No. 40, around 1825; chronometer No. 42, around 1828.

Another important aspect was the transition of precision watchmaking from the amateur Seyffert to the professional Gutkaes. This process implied advances in the quality and quantity of watch production: while Seyffert fabricated a maximum of ten chronometers during his lifetime, Gutkaes (Fig. 3) constructed more than a hundred. Lange eventually set his manufactory the target of producing 600 high-quality watches per year. Lange's story, his apprenticeship and years of travel as a journeyman as well as his business venture in Glashütte constituted the concluding part of our exhibition. We concentrated on the early years of Lange's firm. Displays characterized his role models England and Switzerland, and explained the system of division of labour used by him from the start. Particular attention was given to the question of standardization and the requirements of cost-effective yet high quality production. The exhibition closed with illustrations of Lange's international network and the gradual extension of his product range.

One of the most challenging points raised by the exhibition concept was the visualization of technical developments. We aimed at attracting an audience as broad as possible, specialists and non-specialists alike. Hence, we sought to develop strategies that would offer material interesting to a wide variety of visitors or appealing on different levels. One such attempt, for instance, consisted of the use of two distinguishing colours within the exhibition: 'cyan' signified more technical topics, 'magenta' more personal or biographical ones. We did not try to fully explain the technology and development of the watch during the eighteenth and early nineteenth century, but concentrated on selected aspects. Since the lever escapement for pocket watches played a particular role in the beginnings of Saxon precision watchmaking and also linked early precision horology to Lange's Glashütte production, we chose this particular detail for further elucidation and developed a twofold touch-screen animation. Both screens illustrated the general function of the escapement

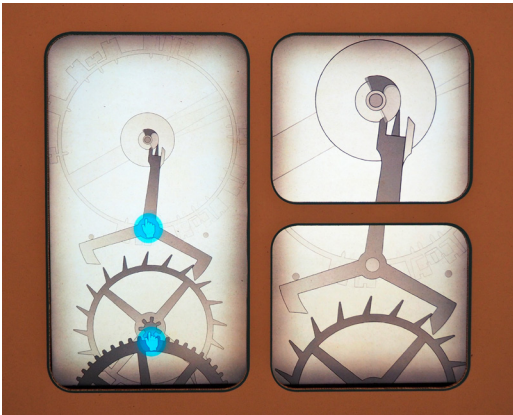


Fig. 4. Thomas Mudge lever escapement.



Fig. 5. Glashütte lever escapement.

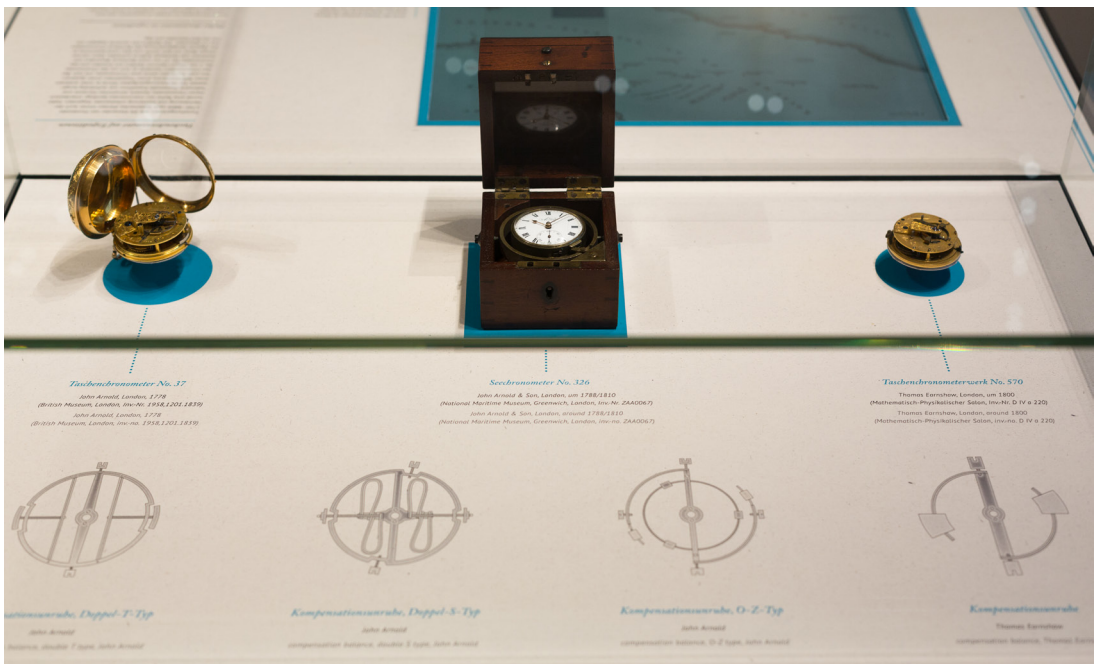


Fig. 6. Graphics to visualize temperature compensation. On display, from left to right: pocket chronometer No. 37 by John Arnold, London, 1778; box chronometer No. 326 by John Arnold & Son, London, around 1788/1810; movement of pocket chronometer No. 580 by Thomas Earnshaw, c. 1800.

within the watch train. In addition, the first screen gave details of the lever escapement as constructed by Thomas Mudge (Fig. 4), while the second showed details of the Glashütte lever escapement (Fig. 5). By touching the screens visitors could find information on the interaction of fork and balance, the engagement of the lever pallets with the escape wheel or advantages and drawbacks of the respective constructions. Furthermore, we used graphic represen-

tations to visualize different forms of the lever escapement as well as other technical aspects such as temperature compensation in pocket watches (Fig. 6). Without further – oral – explanation these components were probably more interesting to visitors with a certain technical affinity. Fascinating for specialists and non-specialist alike, however, proved to be two animations based on computed tomography, which shall now be described in some detail.

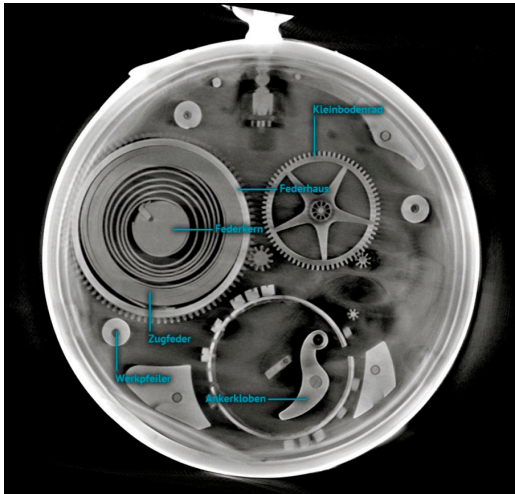
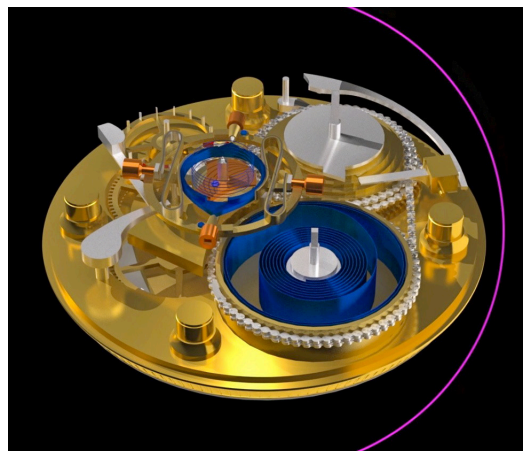


Fig. 7. Computed tomography allows us to see the insides of a damaged watch by Lange.

Within the collection of the Mathematisch-Physikalischer Salon are fifty seventeenth to nineteenth-century watches that were damaged during the aerial bombing of Dresden in February 1945. These watches can no longer be opened, and thus cannot be examined in a traditional manner. As the prototype for a planned research project we conducted multi-layered computed tomography (CT) of several of these watches (Fig. 7), and adapted some of the scans for use in the exhibition. By this means we developed an animation that permitted visitors to scroll virtually through the movement of one watch by Lange; the damaged watch itself was exhibited next to the screen. While moving through the layers of the scan a visitor saw labels popping up that named the main parts of the movement. Another animation employed CT scans as a basis for virtually replicating the watch in question, this time one by Seyffert (Figs 8, 9 and 10). Unlike the actual watch, its virtual twin was able to run. Along with our efforts directed at visualizing and explaining some technical elements of our exhibition theme, we strove to place the development of Saxon horology up to Lange in a more general historical context. To this end we included charts, graphic representations and reproductions and gave corresponding information in the texts that accompanied the exhibition. Despite all these efforts I



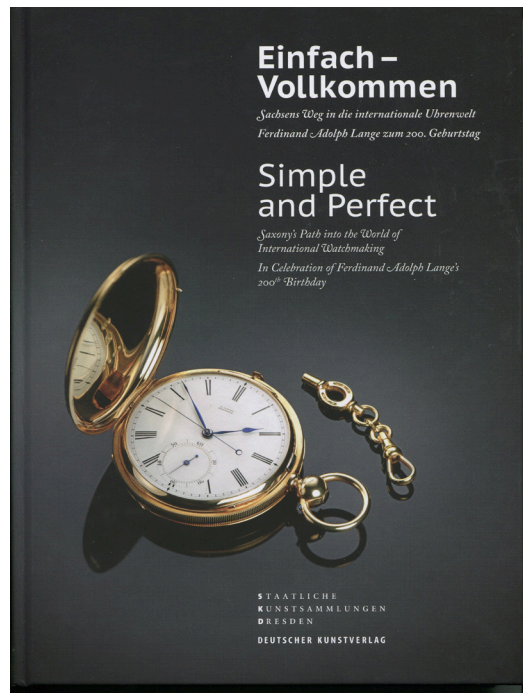
Figs 8, 9 and 10. Chronometer No. 8 by Johann Heinrich Seyffert: damaged original and virtual reconstruction of the dial and the movement.



think we succeeded only partly in reaching our initial goal of attracting as broad an audience as possible. Generally, visitors profited especially from guided tours through the exhibition. Otherwise a willingness to read was required to get the most out of the exhibition. Perhaps these difficulties are intrinsic to the topic and cannot be wholly mastered by a short-term special exhibition – I would welcome the opinion of more experienced curators on the subject.

A bilingual (German-English) book under the same title accompanied the exhibition.⁴ It is not a traditional catalogue, but can be read independently of the exhibition. Nonetheless, in planning this book we sought to augment aspects of the exhibition with both broader as well as more specific context. Hence, we included some of the exhibition headings and texts in the publication in order to provide a thematic basis for the catalogue's essays. Altogether, the book should present a broad and accessible picture of the eighteenth and early nineteenth-century watchmaking world, with intent to place Lange's Glashütte enterprise within the developments characteristic of contemporary horology. Consequently, readers will come across familiar aspects, but will also find new material.

Peter Plaßmeyer, director of the Mathematisch-Physikalischer Salon and co-editor of the publication, wrote the introduction. His essay emphasizes the role of the Mathematisch-Physikalischer Salon. During the second half of the eighteenth century this collection of mathematical and philosophical instruments became a site of observational astronomy. Thus the Salon provided an institutional incentive for the beginnings of precision clock- and watchmaking in Saxony, and, in accordance with the establishment of a time service, also ensured progress in horology. The Salon, moreover, featured in Ferdinand Adolph Lange's life. One of its directors, Willhelm



Gotthelf Lohrmann (1796–1840), played a crucial role in the creation of a technical school in Dresden that fundamentally altered the professional education of craftsmen in order to advance Saxon industrialisation. Lange entered the *Technische Bildungsanstalt* shortly after its foundation. Here he became acquainted with ideas of rationalization and standardization that were decisive for his later project of a serial production of pocket watches.

To some extent the Mathematisch-Physikalischer Salon also appears in my own essay, which recounts the beginnings of precision watchmaking in Saxony. Pioneers in this field were the amateur Johann Heinrich Seyffert (1751–1817), who had studied law at the universities of Leipzig and Wittenberg, and the professionally trained watchmaker Johann Christian Friedrich Gutkaes (1785–1845). Both at different times worked at the Salon; Seyffert held the post as a curator

4. Peter Plaßmeyer and Sibylle Gluch, eds., *Einfach – Vollkommen. Sachsens Weg in die internationale Uhrenwelt / Simple and Perfect. Saxony's Path into the World of International Watchmaking*. Published by Staatliche Kunstsammlungen Dresden, Berlin, Munich 2015. Available online at the website of the Deutscher Kunstverlag or Amazon Germany for € 29,90.

(*Inspektor*), while Gutkaes was in charge of the Salon's timepieces. This essay drew on my recent archival studies to show how and why Seyffert emulated English horology, particularly the lever watches of the London-based maker Josiah Emery. It further delineates Gutkaes' attempt to set up a manufactory specialised in the production of precision timepieces, and elaborates the parallels between Gutkaes' and Lange's strategies and experiences. However, Lange left the traditional workshop concept and embarked on a serial production of high-quality pocket watches.

Mathias Ullmann describes the early stages of Lange's project. His essay outlines Lange's original plan and highlights the previously underestimated involvement of the Saxon district magistrate of Dippoldiswalde, Gustav Adolph Lehmann. An energetic supporter of Lange's scheme, he played an important role in establishing Glashütte as the location for the nascent manufactory. Lehmann convinced the town council to contribute to the upkeep of the apprentices. At the same time, he persuaded Lange to establish practical and theoretical lessons for the apprentices in Glashütte, rather than using the technical school (*Technische Bildungsanstalt*) in Dresden for the latter purpose. In this manner, Lehmann helped to lay the foundation for the future success of Glashütte as the location of a watch industry.

In 1843 Lange first mentioned the idea of establishing a serial fabrication of pocket watches. Two years earlier he had returned from his time as a journeyman, most of which he seems to have spent in Paris. In the French capital Lange could have come across the ideas of, or even met, Pierre Frédéric Ingold (1787–1878). David Penney in his essay draws attention to Ingold's numerous attempts at establishing watch manufactories based on fundamentally altered modes of production. In fact, Ingold sought to introduce the industrial fabrication of pocket watches. For this purpose he developed a number of new and highly effective machines. Moreover, Ingold propagated the production of the complete

watch from start to finish under the same roof, instead of using a multitude of specialist workers as was characteristic for the English, French and Swiss trade. At first glance, Lange's Glashütte enterprise seems to have been much more on the traditional side. Yet, David Penney points out striking similarities between the movements made by Ingold and Lange. Thus, Lange's mode of production, the ideas and patterns he used as well as the influence he exerted are topics that certainly require further investigation.

While, unfortunately, Lange did not describe his machinery but only alluded to certain vital improvements, he left no doubt as to what type of watch he wanted to produce. As early as 1843 he declared to have constructed a calibre that combined the elegance of the Swiss cylinder watch with the precision of the English lever watch.⁵ Elaborating upon Lange's claim the catalogue includes three essays on aspects of the history of English and Swiss horology.

David Thompson offers a general introduction to the history of English watchmaking during the eighteenth century. His essay discusses important makers, overall conditions of the trade and technical developments. Thus, it provides the basis for understanding the particular role that English horology has played for Saxon clock- and watchmakers from the second half of the eighteenth until well into the nineteenth century. In addition, Jonathan Betts more specifically tackles the birth of the precision watch. He describes how the successful completion of John Harrison's H4 led to an altered concept of precision timekeeping at sea, now based on the technology of pocket watches rather than pendulum clocks. Ultimately, Harrison's pioneering work effectuated a new class of pocket watches that could be deployed as precision instruments. Until the nineteenth century English watchmakers were acknowledged masters in the field of precision timekeeping. Their constructions were emulated, as the work of Seyffert and Gutkaes shows. For Lange the English lever watch still served as a foil:

5. See note 3.

he defined the place of his own products within the international market by reference to English and Swiss horology. The latter, however, offered more than merely the above-mentioned elegance.

From the very first Lange referred to Switzerland as an example that illustrated the great potential of his project of implementing watch fabrication in an impoverished and resource-scarce region. Furthermore, Lange used the highly specialized Swiss production system as a model in order to plan the education of his apprentices and to calculate his production targets, as well as his profits. Against this background Pierre-Yves Donzé examines the ascent of the Swiss watch industry to international supremacy in the mid-nineteenth century. In addition to the Swiss capacity to adapt to changing market conditions Pierre-Yves Donzé analyses the Swiss mode of watch production called 'établissage'. This sophisticated system of division of labour facilitated an extremely flexible and economical production of watches as well as control over the complete value-added chain. By modelling his organization of labour after its Swiss counterpart Lange laid the foundation for the later establishment of the Glashütte watch industry.

Lange's ultimate success in Glashütte should not make us overlook other attempts at embarking on the serial fabrication of pocket watches. Eduard Saluz discusses two further business ventures within the field of German watchmaking during the second half of the nineteenth century. In his essay, he describes the eventful story of the watchmaker Eduard Eppner (1812–1887) of Halle, who sought to establish a watch factory in Lahn in the impoverished region of Silesia. With the financial support of the Prussian government, Eppner started to produce watch parts and later developed his own calibres of simpler lever and cylinder watches. Also in the Grand Duchy

of Baden the government took great interest in initiating the fabrication of pocket watches as a means to combat poverty. To this end the *Großherzogliche Badische Uhrenmacherschule* (Grand-ducal Baden Watchmakers' School) was founded in 1850 in Furtwangen. Despite strong efforts in the end the serial fabrication of quality pocket watches neither flourished in Silesia nor in Baden. In retrospect, it thus appears that Lange was fortunate in circumstances, skills, collaborators and decisions.

The exhibition was not the result of a long-term research project. On the contrary, time constraints were tight, and our team from the Mathematisch-Physikalischer Salon consisted of only two people: the restorer Johannes Eulitz and myself. Consequently, developing the exhibition helped to clarify some aspects of the history of Saxon horology, while at the same time posing a number of questions. For instance, Lange's interconnections, his dependence on international developments such as Ingold's ideas, his machinery and mode of production as well as his sales strategies are all topics which await further examination. Furthermore, we stumbled upon questions that concern the general history of Saxon horology during the eighteenth and early nineteenth century as, for instance, international contacts, the flow of materials and the organization of workshops. Until now, these aspects are largely obscure. Therefore I am all the more delighted to have received support from the Gerda Henkel Foundation to embark on a research project that concerns the beginnings of German precision horology and seeks to elucidate the aforementioned topics by concentrating on Seyffert and other early German makers of precision timepieces. The eighteenth and early nineteenth century horological world was certainly internationally interwoven; it remains to discover the exact mechanisms and manifestations in particular.