

**Zeitschrift:** Trans : Publikationsreihe des Fachvereins der Studierenden am Departement Architektur der ETH Zürich  
**Herausgeber:** Departement Architektur der ETH Zürich  
**Band:** - (2014)  
**Heft:** 24

**Artikel:** Bridging art and science : Semper's teaching  
**Autor:** Chestnova, Elena  
**DOI:** <https://doi.org/10.5169/seals-919439>

### **Nutzungsbedingungen**

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

### **Conditions d'utilisation**

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

### **Terms of use**

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

**Download PDF:** 14.01.2026

**ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>**

# **BRIDGING ART AND SCIENCE**

## **SEMPER'S TEACHING**

**144**

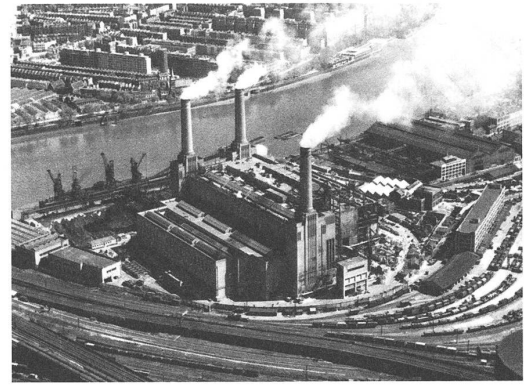
**Elena Chestnova**

The disciplines of architecture and engineering are perceived by the general public as related but distinctly separate. Among the representatives of the respective professions, however, not everybody takes this divide for granted: its usefulness has been called into question, as both architects and engineers came face-to-face with innovative technologies and aspired to new paradigms of beauty. Although the problematic of this challenge is very current, its history, on close examination, turns out to be almost as long as the history of the inter-disciplinary divide itself. This article will briefly examine one of its episodes.

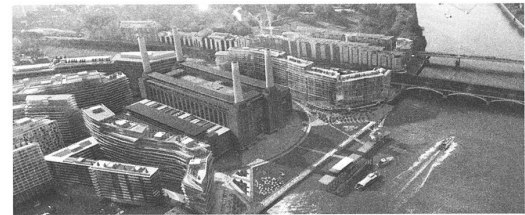
Firms with a hi-tech approach and aesthetic claim especially often to negotiate the divide between the disciplines of architecture and engineering; London partnership Wilkinson Eyre is one of them. Among recent works of the office is the refurbishment of the Battersea power station – a monumental ex-industrial structure originally designed by Giles Gilbert Scott in the 1930s.<sup>1</sup>

Since being de-commissioned in 1983, the power station has continuously been in the middle of a controversy over its re-use. Its location in a now-prestigious area of London and its sheer size make it a tempting piece for any developer, but also a large and risky investment with a strong presence both in the landscape of the city and the mind of the public. Like many previous re-development proposals for the power station, the current scheme designed by Wilkinson Eyre has attracted a great deal of criticism. Neglect of social issues, expense of the proposed housing and the bland aesthetic have been broached recently, among others, by Oliver Wainright – the architecture critic for the Guardian. His article provoked many comments from the readers of the newspaper's website where it was published and the reaction to the project was generally critical.<sup>2</sup> While the weight of blame was placed largely on the shoulders of the architects, some readers questioned the practice's affiliation with that profession. Their comments implied heavily that engineers deal merely with the technical, but also pointed to a contested issue: Wilkinson Eyre certainly identify themselves as architects and their principals had studied architecture.

Differences in education seem to underpin a large section of the divide between the two disciplines. The rise of the engineer as a profession distinct from



*Battersea Power Station during operation in 1953.  
Brunswick Group.*

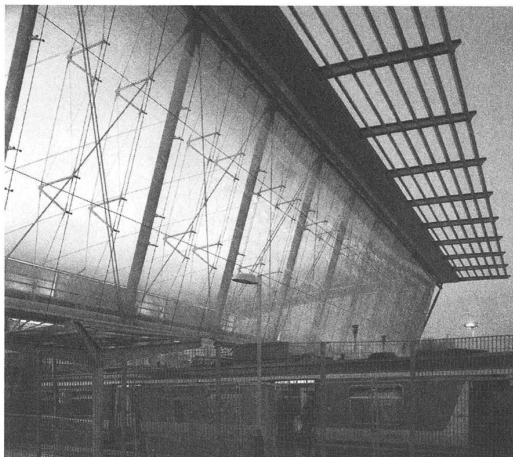


*Proposed regeneration project for Battersea Power Station.  
Brunswick Group.*

the architect is traditionally dated back to one of two events: the assessment of the dome of St Peter's for stability by R. G. Boscovich, T. Le Seur and F. Jacquier in 1743 and the foundation of École Polytechnique in Paris in 1794.<sup>3</sup> The first event signifies a point at which engineers began to employ different methods from architects as well as to work on different commissions. The second indicates institutionalisation of two separate approaches to education: engineers being taught to justify their decisions by calculation and architects – to ground theirs on experience, example and artistic license. The professional stereotypes seem to be based largely on this difference.

The case of Wilkinson Eyre, as well as many other practices, suggests that this perception is too simplistic. The practice identifies itself as architectural, but has worked on bridges and infrastructural projects.<sup>4</sup> Their proclaimed ethos is summarized by the phrase 'Bridging Art and Science' – title of the 2001 exhibition of their work and the monograph with the same name.<sup>5</sup> Several essays published within this volume by the partners make a similar point: two disciplines, seemingly separate in the past, are now converging to create an exciting multi-disciplinary practice. One of the pieces by Jim Eyre charts a history of engineering from its beginnings in the late 18<sup>th</sup> century and hails the 19<sup>th</sup> century as the 'age of

the engineer» while decrying the «utilitarian nightmare» of the middle forty years of the 20<sup>th</sup>. It is this period, according to the author, that is to blame for much of the inter-disciplinary standoff.<sup>6</sup> Eyre presents the work of his company as an attempt to continue in the spirit of the golden «age of the engineer» without drawing attention to the fact that exactly that kind of disciplinary identity, which attached a sticker of authorship to the great structures of the 19<sup>th</sup> century, was already troubling leading thinkers and educators at that time, among them Gottfried Semper (1803–1879).



*Stratford Regional Station by Wilkinson Eyre.  
Wilkinson Eyre.*



*Paddington Station in the nineteenth century,  
cited by Wilkinson Eyre as one of the great structures  
of the «age of engineer».  
Public Domain.*

Before discussing Semper's view of the relationship between architecture and engineering, it is worth saying a few words about one of the more peculiarly British aspects of the Battersea example. There is a tendency among a certain type of British architects to disassociate themselves from any projects implying monetary speculation, which can be traced back to the 1840s. Up to that time real estate development as speculative building had been more widespread in Britain than anywhere else. Some estimate that the overwhelming majority of housing dating from before the Second World War had been built

speculatively, often with the participation of architects, but later increasingly without. The form of the resulting terraced houses came to represent a combination of interests of capital and local planning laws and provided consistently poor quality of housing for both the low and the high society. John Nash is recognized as the last of the «great» British architects who had had a hand in speculation. The generation that came after him in the 1840s became increasingly concerned about their professional image and the issue of quality became important. As architects were commissioned on the basis of reputation, delivering quality became a question of professional honour and many aspects of speculative building were prohibited by the code of conduct of the newly established Royal Institute of British Architects.<sup>7</sup> Although Semper did not lack reputation as an architect when he arrived in Britain, his understanding of the complexities of the local construction market would have been limited. A combination of circumstances — his status as an outsider and failure of the Abbey Wood project (on which he was promised work originally) — made it difficult for him to continue working as an architect.

Semper was forced to come to London in 1850 after he fled Dresden — where he was widely known as an architect and professor of the academy — because of his participation in a failed revolutionary uprising. His financial situation was precarious and the difficulty of finding work on architectural projects left him only one viable choice for earning a living — teaching. At the beginning of 1851, Semper presented to his friends and acquaintances an idea to open an architectural school in London. The responses were critical. Edwin Chadwick, a prominent reformer and politician who befriended Semper on his arrival, wrote to the architect:

«I do not think, that an architectural class could soon be got together in England, and I should imagine that for its success more knowledge of the habits & wants of the class of architectural students would be required, than you would be likely to obtain readily.»<sup>8</sup>

Chadwick was reacting to an advertisement that Semper had drafted for publication in the English and Continental newspapers in which he proposed «to give instruction in all the branches of his Art. Namely in the designing of plans, in the construction, drawing and composition of ornaments [sic], furniture, vases, patterns, etc. — in perspective, and in finishing





*London's Holborn in the nineteenth century.  
Public domain.*

landscape and architectural sketches in pencil or water-colour. He also undertakes to give lectures on the history of Art...»<sup>9</sup>

**Semper's proposal must have struck his English acquaintances as somewhat naïve. One of his correspondents, perhaps Chadwick himself, had re-worked the notice to give it a more commercial twist:**

«He is also desirous of giving aid to Noblemen or Gentlemen who may either desire to study Architecture and the principles of construction as a branch of the Fine Arts, or wish to obtain such an insight into them as to enable them to judge of their application for the improvement of real property.»<sup>10</sup>

**This was not, however, what Semper had in mind. Over the two months, during which he had been pre-occupied with the proposal, a vision had developed of a boarding establishment that would simultaneously teach architecture and engineering, largely catering to young German students. This was a novel idea for Europe on the whole and for Britain especially. In 1851 the only way of becoming an architect there was to do an indentured apprenticeship, and engineering was only taught in the military context.<sup>11</sup> It would be another fifty years before professional**

**education in these two disciplines would become properly established. The situation in France, for example, was rather different as, from the beginning of the 19<sup>th</sup> century, architects were trained in the Ecole des Beaux-Arts. In addition, at least two establishments taught both architecture and engineering simultaneously: Ecole Polytechnique and Ecole Centrale des Arts et Manufactures. The former was made famous by Durand, whose method Semper acknowledged<sup>12</sup> although he openly criticized the artistic capabilities of Durand's students.<sup>13</sup> His influence can be traced in the training that Semper himself received in the atelier of Christian Gau.<sup>14</sup> The latter had been founded as a school for teaching applied arts and sciences and was cited as one of the inspirational examples for the British Department of Practical Art, at which Semper would later teach.<sup>15</sup>**

**Although he, without doubt, had been familiar with these examples, Semper's project was not, like the French schools, technical. He saw the increasing specialization and rift between the disciplines as detrimental for the subject matter. In the school proposal he presented himself «as Architect and Decorator; branches, which in harmoniously built works were always trusted to One Hand, and the separation of**





Prosper Lafaye,  
Queen Victoria, Prince Albert and three of their children  
at the Indian Pavilion of the Great Exhibition.  
oil, Victoria & Albert Museum.

which has become pernicious to Architecture». <sup>16</sup> He likewise viewed the differences between engineering and architecture as detrimental and to be avoided by focusing the teaching on similarities between the disciplines:

«... der Unterricht in beiden vorzugsweise an Uebungen geknüpft, und mit dem Können zugleich das Wissen erlangt werde. Bei diesen Uebungen, die ununterbrochen den Tag über fort dauern, ist mehr auf die enge Verwandtschaft als auf die Verschiedenheit zwischen den beiden obgenannten Fächern zu sehen und nach diesem Prinzip sie abwechselnd und gemischt vorzunehmen.» <sup>17</sup>

Semper was seeking to find a synthesis between the methods of the two professions and this effort was also reflected in the planned method of instruction. The courses for architects and engineers alike were to include drawing and construction, copying of architectural examples, drawing of ornaments and perspectives. These exercises were to be accompanied by lectures in comparative history of architecture, chemistry, physics and mechanics, descriptive geometry and the building of canals, roads and bridges. Upon completing the elementary course the students were to join an atelier of Semper himself or his engineer colleague respectively, to assist with their work

on real commissions. <sup>18</sup> The endeavour of 'bridging art and science' was centred on the idea of providing practical education, which could address the possibilities of new technologies and paradigms of structural and constructional thinking, <sup>19</sup> while embracing history and practice of architecture as an art.

As it happened, Semper found work with the Great Exhibition of 1851 and his proposal for a school was never realized. In the educational landscape of London of the 1850s it probably would have at least stood a chance. It proposed to offer a unique combination of theoretical and practical instruction that was thin on the ground at the time: while some evening courses were available at both University College and King's College, they fell short of teaching design. <sup>20</sup> This failing was certainly noted by the apprentice architects who came together in 1847 to found the Architectural Association (AA) with the aim of teaching that which was not covered by the classes on offer and only sometimes covered by whatever training the young architects received from their masters. The AA eventually began holding a sort of design workshop, but this did not occur until the later half of the 1850s. During the years that Semper had spent in London (1850–55) the activity of the Association was rather stagnant. <sup>21</sup>



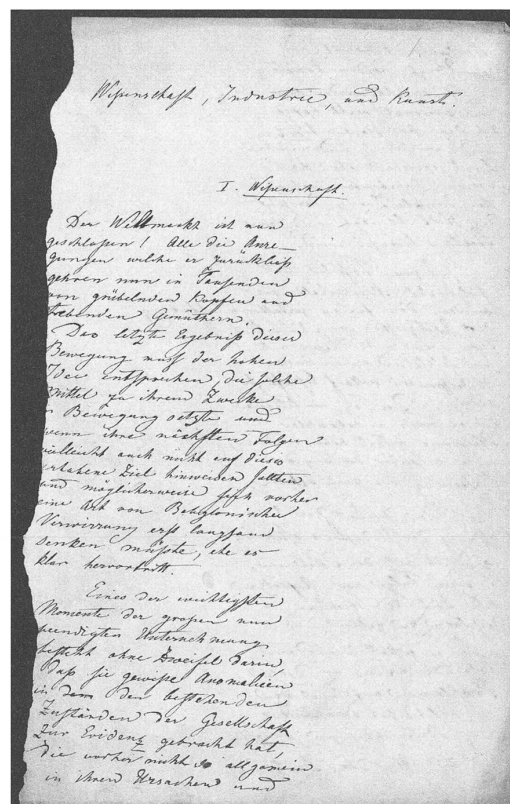
This meant that the Metropolitan School at Marlborough House, where Semper had taught and which was part of the Board of Trade Department of Practical Art (later of Science and Art), was effectively the first institution in London to teach architectural design. Semper should be at least partly credited with this because the presence of the subject in the curriculum was to a large extent a result of his enthusiasm. The German architect had started teaching there when the school had re-opened after a reform in 1852. Since its foundation in 1837, the establishment had attracted much criticism on the account of not fulfilling its original purpose – training artists for industry – and the Great Exhibition gave another impetus to change the way things were run.<sup>22</sup> Foreign design objects exhibited in the Crystal Palace were seen as superior to the British manufactures and the school was blamed for failing to teach correct principles of design. In the rearrangement that followed, Semper was initially given the class of furniture and metalwork, and he took over the class of «architectural details and practical construction» after his colleague Charles James Richardson left in 1853.

Under Richardson the architecture class had in fact dealt mostly with decoration, although its principal subject was to teach drawing «applied to Carpentry, Joiners' Work, Masons' Work, Plastering and the various branches of Constructive Architecture, Upholstery and Interior Decoration» as well as «Architectural Details as Architraves, Doors, Mouldings, Panels, Pilasters, Soffits, &c.; and the preparation of Working Drawings».<sup>23</sup> When Semper took over, he attempted to institute a mode of instruction similar to the one which he had employed in Dresden. It revolved around the atelier throughout the working day, with lectures in the evening. He complained in his reports to the Department that the system did not allow itself to be implemented well, partly because many students could only attend in the evening, and partly due to the widely varying abilities and demands, but chiefly due to lack of enthusiasm on the part of the students.<sup>24</sup> Nevertheless, the exhibition of student works in the spring of 1854 was the only one in that period to include works in the category of «architectural design». The drawings came from the students in Semper's class, four of whom received prizes, including his son Manfred.<sup>25</sup>

The way in which Semper was seeking synthesis between architecture and engineering – or history and technology, one might say – while teaching at

Marlborough House was similar to his earlier projects and it became reflected in the later ones.<sup>26</sup> The minutes of the Department from the 28<sup>th</sup> of May 1853 contain a reference to a commission for preparing teaching materials for the architectural course.<sup>27</sup> There is no reference to Semper being involved in commissioning the drawings, but he had certainly found them useful, as he eventually took several of them with him as he moved to Zurich to teach architecture at the newly founded Polytechnic school, today's ETH. They can now be examined in the rare books collection of the ETH library.<sup>28</sup>

These plates show, in exquisite diagrams, the construction of what looks like a large house or a small public building illustrating details and joints for brick masonry and timber frame. The drawings would certainly be considered «technical» now and probably were then. They claim to originate from an «Architectural Course adopted at the Royal Engineer Establishment at Chatham», an army training school for engineers, which had built a reputation for its work on cements in the 1840s. The architectural training at Chatham was established formally in 1825 when the responsibility for the construction and maintenance



Gottfried Semper, Title page from the manuscript «Wissenschaft, Industrie und Kunst» in which Semper reviews the Exhibition of 1851 and makes proposals for the improvement of arts education. gta Archive, Zurich.



# ARCHITECTURAL DRAWING PLATE XIII.

## BEING PLATE 4. ROOFS

of the Architectural Office adapted at the Royal Engineer Establishment at Chatham  
Published by permission of the Master General of the Ordnance, for the use of Schools in connection with  
THE BOARD OF TRADE, DEPARTMENT OF SCIENCE & ART.



278 DRAWING NO.

ELEVATION of DEKKER 1. and  
Dist. 2. as supporting the Rip-rap to.

Section on c-d

Section on e-f

Section on a-b

ELEVATION of the TRUSSES, A.A.

ELEVATION of the TRUSSES, B.B.B

Section on g-h

Section on i-j

PLAN

Traverse Hole and Strap for the Head of the Beam.  
Plan of Strap.

### REFERENCES

- |                                   |          |
|-----------------------------------|----------|
| a. Ashlar base                    | 81 ft. 1 |
| b. Crown Battens in Trusses B.B.B | 7 ft. 1  |
| c. Battens for Ceiling Battens    | 3 ft. 3  |
| d. Truss Battens                  | 30 ft. 6 |
| e. Battens in Truss Battens       | 4 ft. 6  |
| f. Ceiling Battens                | 81 ft. 7 |
| g. Ceiling Battens                | 3 ft. 3  |
| h. Ceiling Battens                | 81 ft. 1 |
| i. Ceiling Battens                | 15 ft. 6 |
| j. Ceiling Battens                | 8 ft. 6  |
| k. Ceiling Battens                | 1 ft. 7  |
| l. Ceiling Battens                | 20 ft. 3 |
| m. Ceiling Battens                | 2 ft. 6  |
| n. Ceiling Battens                | 81 ft. 5 |
| o. Ceiling Battens                | 8 ft. 2  |
| p. Ceiling Battens                | 81 ft. 7 |
| q. Ceiling Battens                | 8 ft. 2  |
| r. Ceiling Battens                | 8 ft. 2  |
| s. Ceiling Battens                | 8 ft. 2  |
| t. Ceiling Battens                | 8 ft. 2  |
| u. Ceiling Battens                | 8 ft. 2  |
| v. Ceiling Battens                | 8 ft. 2  |
| w. Ceiling Battens                | 8 ft. 2  |
| x. Ceiling Battens                | 8 ft. 2  |
| y. Ceiling Battens                | 8 ft. 2  |
| z. Ceiling Battens                | 8 ft. 2  |

Architectural Drawing Plate XIII - one of the illustrations that were adapted from the Royal Engineer Establishment for the architectural course at Marlborough House and were eventually brought to Zurich by Semper.  
ETH library, Zurich.



of barracks was transferred to the army. Charles Pasley, the founder of the institution at which junior officers of the Royal Engineers were taught measuring, drawing and estimates of building costs, had authored a textbook which was primarily concerned with brick construction and the advances of building technology in limes and cements.<sup>29</sup> The content of the plates probably originates from this volume.

Although it is likely that Semper had used these technical illustrations in his teaching, he was by no means a technocrat. His educational project should be understood as one of synthesis. He was cautious about the accelerating technological development of his time<sup>30</sup> and warned against the specialization of disciplines: «The pure sciences have come to dominate education. Schools no longer systematically educate human beings as such but are solely concerned with producing specialists. This system in particular affects the working class and those people who devote themselves to the arts, ... It effectively kills the very faculty that is actively responsible for the perception and, equally, the creation of art.»<sup>31</sup> **Semper's position, however, was not hostile to the machine, like that of his contemporary John Ruskin, for example. On the contrary, he advocated, that architecture as an art must embrace technology to progress, must 'bridge art and science'.**

In the context of the contemporary debates on the place of technology in architectural design, Semper's position and his teaching may provide a useful historical example. According to his theory, new materials, tools and means of production were among key factors influencing design, but they did not have the exclusive control over works of art. The example of Semper shows that the question of disciplinary identity of architects and engineers is part of a broader debate about the interaction between technology and culture, tradition and innovation, and the ideal and the real. This debate remains as pertinent in the different fields of design today as it had been in the 19<sup>th</sup> century.

- 1 Rob Cochrane, 'Landmark of London. The story of Battersea Power Station', London 1987.
- 2 Oliver Wainright, 'Will the Battersea Power Station revamp ruin the brick beast?', in: 'The Guardian', London 2013.
- 3 Dietrich Conrad and Thomas Hänseroth, 'Die «Geburtsstunde des modernen Bauingenieurwesens» vor 250 Jahren und ihre Vorgeschichte', Bautechnik, 70: 3, 1993, pp. 176-180.
- 4 See <http://www.wilkinsonseyre.com/> for examples of work.
- 5 Chris Wilkinson and Jim Eyre, 'Bridging art & science', London 2001.
- 6 Jim Eyre, 'Architecture or Engineering?', In: Chris Wilkinson & Jim Eyre (eds.), 'Bridging art & science', London 2001, p. 66-73.
- 7 Stefan Muthesius, 'Profession or Art? - Zur Entwicklung des Architektenberufs in Großbritannien', In: Winfried Nerdinger, Hanna Böhm et al (eds.), 'Der Architekt: Geschichte und Gegenwart eines Berufsstandes', Munich 2012, p. 181-194.
- 8 Edwin Chadwick, gta 20-K-1851-03-09:1, 1851.
- 9 Gottfried Semper, gta 20-DOK-undat:49.
- 10 Gottfried Semper, gta 20-DOK-undat:51.
- 11 Andrew Saint, 'Architect and engineer a study in sibling rivalry', New Haven and London 2007, p. 456-460.
- 12 Bruno Maurer, 'Lehrgebäude - Gottfried Semper am Zürcher Polytechnikum', In: Winfried Nerdinger and Werner Oechslin (eds.), 'Gottfried Semper, 1803-1879 Architektur und Wissenschaft', München, Zürich 2003, p. 306-313.
- 13 Gottfried Semper and Harry Francis Mallgrave, 'London lecture of November 11, 1853', RES: Anthropology and Aesthetics: 6, 1983, pp. 5-31.
- 14 Salvatore Pisani, «Allein vieles ist besser, leichter, zweckmäßiger, wohlfeiler als wir es kennen». Semper's Lehrzeit in Paris und das akademische Ausbildungsprogramm', In: Winfried Nerdinger and Werner Oechslin (eds.), 'Gottfried Semper, 1803-1879 Architektur und Wissenschaft', München, Zürich 2003, pp. 101-104.
- 15 Ulrich Pfammatter, «The» making of the modern architect and engineer the origins and development of a scientific and industrially oriented education', Basel 2000, pp. 112-123.
- 16 Gottfried Semper, gta 20-DOK-undat:50.
- 17 Gottfried Semper, gta 20-K-1851-02-25(S):2, 1851.
- 18 Ibid.
- 19 For the history of this kind of thinking see for example Antoine Picon and Martin Thom, 'French architects and engineers in the age of Enlightenment', Cambridge etc. 1992.
- 20 J. Mordaunt Crook, 'Architecture and History', Architectural History, 27, 1984, pp. 555-578.
- 21 J. Summerson and Architectural Association (Great Britain), 'The Architectural Association 1847-1947', London 1947.
- 22 Quentin Bell, 'The Schools of Design', London 1963.
- 23 C. J. Richardson, 'Prospectus: VIII Architectural Details and Practical Construction', In: Board of Trade Department of Practical Art, ed., 'First Report of the Department of Practical Art', London 1853, p. 383.
- 24 Gottfried Semper, 'Report of Professor Semper on Class for Practical Construction, Architecture and Plastic Decoration', In: Department of Science and Art, ed., 'Second Report of the Department of Science and Art', London 1855, pp. 147-148.
- 25 Board of Trade Department of Science and Art, ed., 'Second Report of the Department of Science and Art', London 1855.
- 26 Sonja Hildebrand, 'Theorie und Praxis in der Architekturlehre. «Und dabei dürfen wir auch den Menschen im Studenten nicht etwa vergessen»', Trans, 14, 2005, pp. 60-65.
- 27 Department of Practical Art, National Archives UK ED 28/1 A 179, 1853.
- 28 Department of Science and Art, ETH Library RAR2571 Architectural Drawing Plates, 1853.
- 29 John Michael Weiler, 'Army Architects. The Royal Engineers and the Development of Building Technology in the Nineteenth Century', Institute of Advanced Architectural Studies, University of York 1987, pp. 13-15.
- 30 See for example Gottfried Semper, 'Wissenschaft, Industrie und Kunst. Vorschläge zur Anregung nationalen Kunstgefühles. Bei dem Schlusse der Londoner Industrie-Ausstellung, Braunschweig 1852.
- 31 Gottfried Semper, 'Style: style in the technical and tectonic arts, or, practical aesthetics', Los Angeles CA 2004, p. 73.

*Elena Chestnova, born 1986, is a PhD candidate at the Accademia di architettura, USI Mendrisio. She has graduated from University of Cambridge and ETH Zurich. She works within an SNSF-funded research project under supervision of Prof. Dr. Sonja Hildebrand. Her work focuses on the writings and teaching of Semper at Marlborough House.*