Kraftwerk der ehemaligen Textilfabrik «Rote Fahne», Pionerskaja Ulica 53, St. Petersburg (Photo: Rüdiger Kramm, 2007).

Mendelsohn in Leningrad. Ein editorialer Nachruf

Im März 2017 fand die fast zehn Jahre währende Hoffnung auf einen Weg zum Erhalt und zur denkmalgerechten Entwicklung des Mendelsohn-Areals «Rote Fahne» in Leningrad / St. Petersburg ihr Ende. An einem Runden Tisch zum Stand der Bebauung des Areals, zu dem auch das städtische Amt für Denkmalpflege und docomomo Deutschland eingeladen waren,[1] haben die Vertreter örtlicher Fachkreise, Margarita Stiglitz und Boris Kirikov, in deutlichem Gegensatz zu ihren bisherigen Stellungnahmen und Publikationen, gutachterlich begründet, dass die dort erhaltenen Industriebauten aus den Jahren 1926 bis 1932 keinen architekturhistorischen Wert als Restensemble besitzen. Das Recht auf Denkmalschutz wurde nur den Außenwänden des in sich bis in die Konstruktionsdetails original erhaltenen Kraftwerks von Erich Mendelsohn gewährt. Dies wurde vom aktuellen Bauherren – der das Gutachten in Auftrag gegeben hatte – als ausreichend betrachtet, die inzwischen fast abgeschlossene, doch nach wie vor durch lokale wie internationale Kritik in Frage gestellte Verdichtung des Areals durch eine mehrstöckige Wohnbebauung endgültig als legitim zu betrachten.

Gewissermaßen als Nachruf zu dieser Entwicklung, die vom Anfang an eine breite Unterstützung seitens deutscher Kollegen (u. a. Hermann Parzinger, Jörg Haspel und Adrian von Buttlar) sowie des «Petersburger Dialogs» erfahren hatte, werden im hier veröffentlichten, ausführlichen Beitrag die seit 2007 erfolgten Voruntersuchungen und Projektstudien vorgestellt, die erhaltenen Bauten Mendelsohns und Areal als Ganzes zu erfassen und architektonisch weiterzuentwickeln.

Im Zeitraum 2007 bis 2014 wurden die Verfasser des vorliegenden Aufsatzes, die an der Fakultät für Architektur der Universität Karlsruhe den Schwerpunkt «Der aktuelle Umgang mit den Bauten der Moderne» mitbegründet haben, durch den damaligen Eigentümer des Areals «Rote Fahne» Igor' Burdinskij gebeten, Machbarkeitsstudien zur architektonischen Entwicklung des Areals zu betreuen und seitens der Bauforschung und Architekturgeschichte zu begleiten.

Die Teilnehmer des «Petersburger Dialogs» 2008 auf der Laderampe des Kraftwerks (Photo: Petersburger Dialog).

Die entstandenen entwerferischen Vorschläge sollten für unterschiedliche Bebauungsdichten und Nutzungen Varianten für einen behutsamen Umgang mit dem erhaltenen Baubestand des Mendelsohnschen Masterplans entwickeln, darunter vor allem für den «dynamischen» Baukörper des Kraftwerks sowie die in Anlehnung an die Hutfabrik in Luckenwalde errichteten Oberlichtwerkhallen und einen vierstöckigen Querflügel mit Produktionsräumen, jeweils aus frühem Stahlbeton. Aus diesem Grund wurde mit Aussicht auf eine praktische Ausführung besondere Aufmerksamkeit den Fragen der Sanierung bzw. Ertüchtigung des Stahlbetons gewidmet.

Leider stießen die fortwährenden Bestrebungen des Eigentümers des Mendelsohn-Areals und deutscher Kollegen nicht auf die erwünschte Resonanz seitens der Stadt und der Denkmalbehörden. Nach dem Besitzerwechsel im Jahr 2014 wurde das Areal, wie in Großstädten Russland weiterhin üblich, zum begehrten Objekt kommerzieller Immobilienentwicklung. Ungeachtet einer vielstimmigen Kritik in St. Petersburg und in Deutschland wurde durch Baltijskaja Kommercija / City-Stroj eine dichte Bebauung des Geländes mit drei neunstöckigen Wohnhochhäusern vorbereitet und aufgeführt.

Die noch erhaltenen und gut erkennbaren architektonischen Zeugnisse Erich Mendelsohns, seines einzigen realisierten Großbauprojekts für die Sowjetunion, wurden dabei endgültig abgewertet und auf das Niveau post-sowjetischen kommerziellen Wohnungsbaues einnivelliert.[2]

Nach Anfrage von docomomo international waren die Ergebnisse der Arbeiten am Mendelsohn-Areal in St. Petersburg bei der 10th international docomomo-technology conference in Breslau / Wroclaw 2009 präsentiert und später in Form eines englischsprachigen Aufsatzes zusammengefasst worden. Da die geplante docomomo-Publikation bislang nicht erschienen ist, blieb der Aufsatz ungedruckt und wird hier, ergänzt durch einige Aktualisierungen, erstmals in vollem Umfang veröffentlicht. - Sergej Fedorov

Endnoten

1 Runder Tisch «Textilfabrik Rote Fahne. Probleme des Erhaltens und Perspektiven der Nutzung», 17. März 2017, von VOOPIK St. Petersburg mit Teilnahme des GIOP und docomomo Deutschland (Alex Dill) http://www. interfax-russia.ru/NorthWest/report.asp?id=815325.

2 Das Flaggschiff der Avantgarde geht unter», Novaya Gazeta, 21. März 2017, http://novayagazeta.spb.ru/ articles/10890/; «Man hat Mendelsohn verdorben», Rossiyskaya Gazeta, 22. März 2017, https://rg.ru/2017/03/22/ reg-szfo/v-peterburge-potrebovali-snesti-novostroj- vozle-pamiatnika-arihitektury.html.

Titel des nachfolgenden Aufsatzes

Sergej Fedorov, Matthias Pfeifer,
Erich Mendelsohn's Red Banner Factory in Leningrad, 1926–1932
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Architektonische Entwicklung des Areals «Rote Fahne», Projektvariante. Perspektive entlang der Korpusnaja Ulica, Kraftwerk (re.) mit Neubauten (Museum, Hotel). Machbarkeitsstudie des Büros David Chipperfield Architects, Berlin (2009). © David Chipperfield Architects.

Realisierte Bebauung des Areals «Rote Fahne» mit drei neunstöckigen Wohnhäusern, auch im Innenbereich (Photo: Sergej Gorbatenko, Juni 2017).

Erich Mendelsohn’s Red Banner Factory in Leningrad, 1926–1932

Building Research, Structural Rehabilitation, Architectural Development. Proposals 2007–2014

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KIT Fakultät für Architektur · docomomo international
Der aktuelle Umgang mit den Bauten der Moderne

Erich Mendelsohn's Red Banner Factory in Leningrad, 1926–1932

Building Research, Structural Rehabilitation, Architectural Development. Proposals 2007–2014

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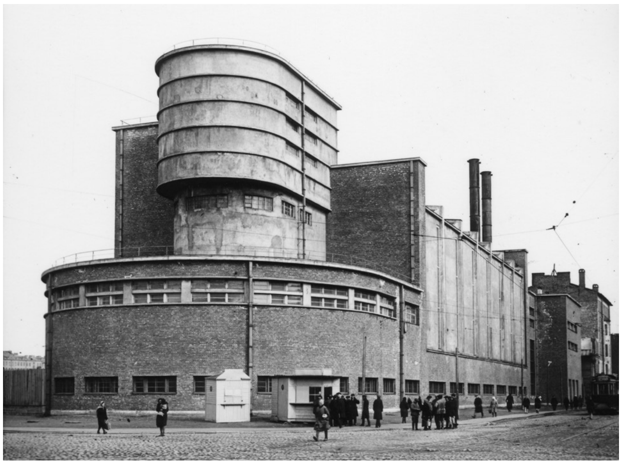
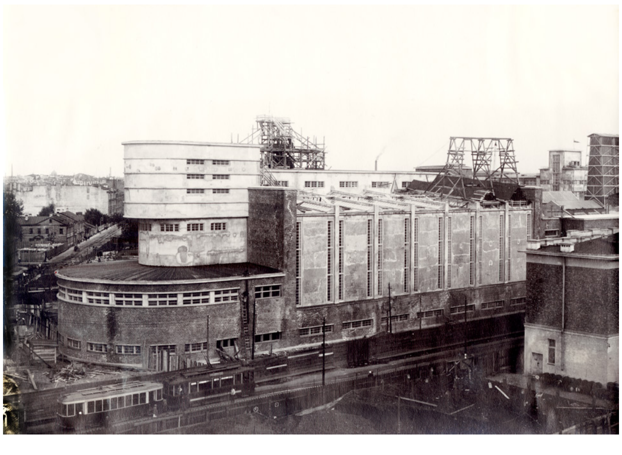
In 2006, the well-known Modern Movement site of the former Red Banner Textile Factory in Petersburg, the former Leningrad (built in 1926–1928 and 1931–1932 on the basis of Erich Mendelsohn's revised design) became the property of a new private owner. In the intervening years work was carried out to assess the technical state of the existing buildings, and several plans for the architectural development of the area began to be developed. The initiative launched by a private individual to preserve and develop the large-scale industrial complex from the period of constructivism (figs. 1–3) remains unique in Russia's modern architectural and construction history and for this reason has attracted the broadest attention.[1]





The present paper compiles for the first time the results achieved during the period 2007–2009 in the work of the assessment as well as the architectural and structural development of the Red Banner complex. The authors hope that this initiative will be successful and will be happy if this paper is instrumental in drawing broad attention to the project's implementation.

The specifics of the Factory design and Mendelsohn's authorship

The Friedrich Wilhelm Kersten textile Factory that was located on the western edge of the Petrogradskaya district since 1872 (the contemporary address is 53 Pionerskaya Street), which was nationalized in 1922 following the October Revolution, was renamed the Red Banner (Krasnoe Znamya) Factory and incorporated into the newly established Leningrad Textile Trust.[2] The Factory acquired a further plot of land in 1925, doubling its area. The management of the Textile Trust invited the architect Erich Mendelsohn to undertake the architectural development of the new area.

A. A. Pini, a board member of the Leningrad Textile Trust, apparently played a particular role in the choice of Mendelsohn as project designer. As extant archive materials indicate, Pini (together with two other board members) travelled to Berlin in September 1925 and visited Mendelsohn's office in order to conclude an agreement; he subsequently helped to organize three working visits by Mendelsohn and his colleagues to Leningrad (October 1925, and March and July–August 1926) and also provi-

Figs. 1 and 2: Erich Mendelsohn. The Red Banner Factory power station. 1926–1928
– General view from Grebetskaya (now Pionerskaya) Street after completion. Photo after 1928/1929
– General view from the roof of the old part of the Factory during completion. Photo 1928/1929

(next page)
Fig. 3: «Red Banner»: the new stocking and knitting Factory in Leningrad, 1926–1928. Main factory buildings as depicted in the magazine SSSR na stroyke, 1930

ded the greatest possible assistance in carrying out the architect's design plans.

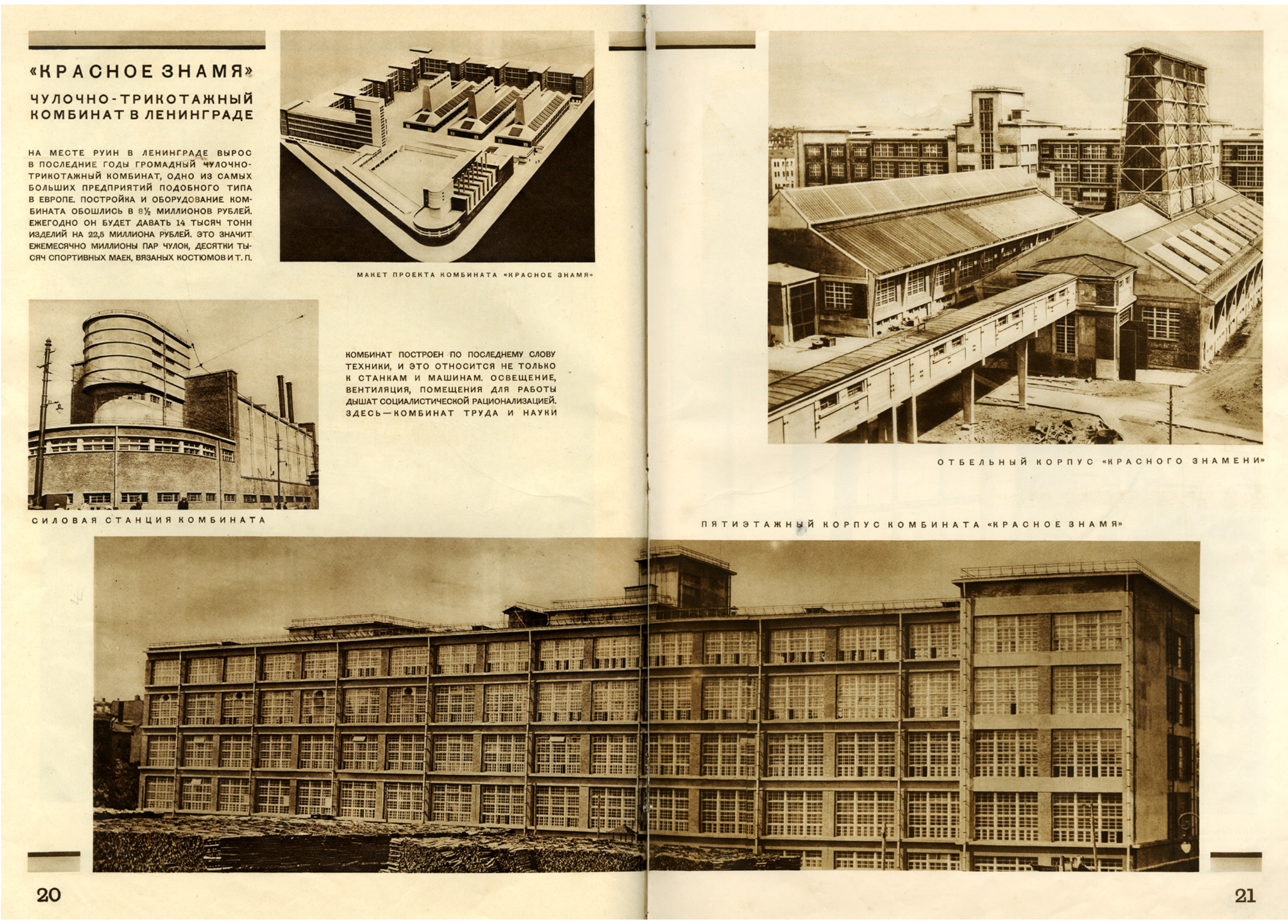
Mendelsohn drew up the project to develop the new area of the Red Banner Textile Factory in his Berlin office between September 1925 and March 1926 and sent it to Leningrad for implementation on the site. Owing to the high architectural quality of the design and a number of publications, most particularly of photographs of its model,[3] the project soon became one of the recognized symbols of modern European architecture and the progressive initiatives of early Soviet architecture (fig. 3).

The fate of the Red Banner Factory's new industrial buildings constructed in Leningrad from 1926 to 1932 themselves proved to be much more complicated. Surveys conducted in recent years of the structures on site and an analysis of known and recently rediscovered archive sources have provided answers to a number of unresolved questions regarding the history of the building's architecture.[4] This first and foremost relates to the question of the relationship between Erich Mendelsohn's original design and the building that exists today.

Mendelsohn's original design – which has as yet not been found in the Russian archives – was transmitted to the specially created Office for the Construction of New Buildings at the Leningrad Textile Trust for adaptation to local conditions. The Office entrusted its practical implementation to the PromStroy industrial construction corporation, the city's largest and most experienced construction organization at that time. The detailed design planning and construction of the Factory's buildings were carried out by the architects S. O. Ovsyannikov and I. A. Pretro, who had actively worked in Petersburg before the Revolution, as well as the engineers E. A. Tretjakov, B. D. Vasilev and others. Drawings of the two approved design variations, relating to June and December 1926, have been preserved in the corresponding Petersburg archives.[5]

They indicate, inter alia, that, while having considerably simplified Mendelsohn's original master plan, the Leningrad architects and engineers also preserved and to a large extent developed their underlying construction principles. As a result, all of the Red Banner Factory buildings erected from 1926 to 1932 – the power station, the five-storey main production building connected by a walkway to the three-storey sales section building, and the two dyeing workshops within the production yard – were erected with the use of various types of cast-in-situ reinforced-concrete structures, which were largely based on German experience in industrial construction in the 1920s.

Nevertheless, owing to the constant (often justified) changes made to the design during the construction process, Mendelsohn halted his supervision of the project and in October 1927 ended his last contact with the client.[6] The architect's letters from Leningrad indicate the ever increasing disappointment that he felt during the project implementation and are an interesting testimony to the design's high evaluation by the author himself as well as Mendelsohn's perfectionism in drafting.[7]



«КРАСНОЕ ЗНАМЯ»

ЧУЛОЧНО-ТРИКОТАЖНЫЙ КОМБИНАТ В ЛЕНИНГРАДЕ

НА МЕСТЕ РУИН В ЛЕНИНГРАДЕ ВЫРОС В ПОСЛЕДНИЕ ГОДЫ ГРОМАДНЫЙ ЧУЛОЧНО-ТРИКОТАЖНЫЙ КОМБИНАТ, ОДНО ИЗ САМЫХ БОЛЬШИХ ПРЕДПРИЯТИЙ ПОДОБНОГО ТИПА В ЕВРОПЕ. ПОСТРОЙКА И ОБОРУДОВАНИЕ КОМБИНАТА ОБОШЛИСЬ В 8½ МИЛЛИОНОВ РУБЛЕЙ. ЕЖЕГОДНО ОН БУДЕТ ДАВАТЬ 14 ТЫСЯЧ ТОНН ИЗДЕЛИЙ НА 22,5 МИЛЛИОНА РУБЛЕЙ. ЭТО ЗНАЧИТ ЕЖЕМЕСЯЧНО МИЛЛИОНЫ ПАР ЧУЛОК, ДЕСЯТКИ ТЫСЯЧ СПОРТИВНЫХ МАЕК, ВЯЗАНЫХ КОСТЮМОВ И Т. П.

МАКЕТ ПРОЕКТА КОМБИНАТА «КРАСНОЕ ЗНАМЯ»

КОМБИНАТ ПОСТРОЕН ПО ПОСЛЕДНЕМУ СЛОВУ ТЕХНИКИ, И ЭТО ОТНОСИТСЯ НЕ ТОЛЬКО К СТАНКАМ И МАШИНАМ. ОСВЕЩЕНИЕ, ВЕНТИЛЯЦИЯ, ПОМЕЩЕНИЯ ДЛЯ РАБОТЫ ДЫШАТ СОЦИАЛИСТИЧЕСКОЙ РАЦИОНАЛИЗАЦИЕЙ. ЗДЕСЬ—КОМБИНАТ ТРУДА И НАУКИ

СИЛОВАЯ СТАНЦИЯ КОМБИНАТА

ОТБЕЛЬНЫЙ КОРПУС «КРАСНОГО ЗНАМЕНИ»

ПЯТИЭТАЖНЫЙ КОРПУС КОМБИНАТА «КРАСНОЕ ЗНАМЯ»

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In general, the remaining industrial buildings from 1926–1932 at the Red Banner Factory site in present-day Petersburg should be viewed as Erich Mendelsohn's unfinished project. The only complex component erected on the basis of his design is the power station building (1926–1928, figs.1 and 2), the well-known architectural monument that is often mistakenly identified with the complex as a whole.[8] As the most interesting part of the entire architectural composition of the new industrial complex, the station was recognized for many years as a model of contemporary European architecture in Leningrad architectural practice in the period of constructivism.[9]

The basic principle of Erich Mendelsohn's original design – the overall integrity of the new industrial ensemble of the second half of the 1920s, in which the brilliantly conceived general spacial planning solution was inseparable from the solutions regarding individual spaces – was completely lost during the construction process. The four-storey main production building and the two adjoining dyeing and bleaching sections (1926–1932, fig. 3), which were constructed without Mendelsohn's participation within the framework of the structures constituting his original design turned out to be detached from the power station. Nevertheless, these production buildings clearly rank among the interesting examples of the new industrial architecture of Leningrad constructivism. In 2009, they were included on the list of the city's protected architectural monuments.

As early as 1929, the power station building was proposed for the first competition of the city's best constructed buildings and received the highest award. In the materials accompanying that proposal we encounter a comment which serves as a sort clue explaining the building's architectural and structural specificity:[10]

> "In evaluating the results achieved on site it is necessary to take into account the fact that both the design and the cost estimate were drawn up prior to the issuance of the special guidelines by government bodies on measures for reducing construction costs. Thus, at that time, it was impossible to employ the rational methods that we now have at our disposal, and the role of personal initiative was all the more significant in the construction."

Indeed, by the time the competition was held, during the implementation of the first five-year plan for the country's development (1928–1932), the programme approach to the widespread use of reinforced-concrete pursued other objectives – the all-round industrialization of construction processes within the framework of the strict economy of building materials. Accordingly, Mendelsohn's power station building constructed in the years 1926–1928 remains one of the most interesting examples of the potential of early Soviet structural engineering that was still free of the rigid regulation to be imposed under the coming industrialization in carrying out complicated modern architectural projects.

Owing to the complicated political circumstances in Russia and Germany at the beginning or the 1930s, Mendelsohn' original design materials were lost. The working blueprints and model of the Factory, which were sent to Leningrad in duplicate, were not preserved in local archives or museums. However, the Petersburg archives referred to earlier have preserved the blueprints of the alternative designs drawn up, which constitute important documentary material illustrating in detail the specific characteristics of the buildings that were constructed and are preserved today on site.

It is interesting to note that at all stages of construction work, judging from the oral information provided by Factory workers, the Leningrad design engineers continued on the whole to follow Mendelsohn's master plan in developing the Factory complex up to the final large-scale expansion at the beginning of the 1950s.

A reinforced-concrete framework as a structural basis of the power station building

Apart from the generally recognized architectural merits of the Red Banner Factory as an industrial ensemble, an example of architectural expressionism, the fact that the construction of the power station constituted a kind of experimental laboratory for utilizing the potential of reinforced-concrete in the early period of Soviet construction practice is still little known. Inspections conducted in recent years have shown that not only the power station building but also all of the Factory's original edifices (1926–1932) represent interesting examples of the various types of early monolithic reinforced-concrete structures (figs. 4–14).

Reinforced concrete was the basic means for carrying out Mendelsohn's innovative architectural design, which relates to one of the most successful implementations of his architectural conception of "the dynamic and the functional". In accordance with the original design, the power station building (approximately 102 m in overall length, 45 m in width, and 24 m in height) consists of three functionally different units with independent structural designs: the filtration unit; the boiler and fuel-tank section and the turbine unit. All three units are situated on the same axis along present-day Pionerskaya Street (figs. 2, 6). The main rectangular structure of the boiler and fuel tank sec-

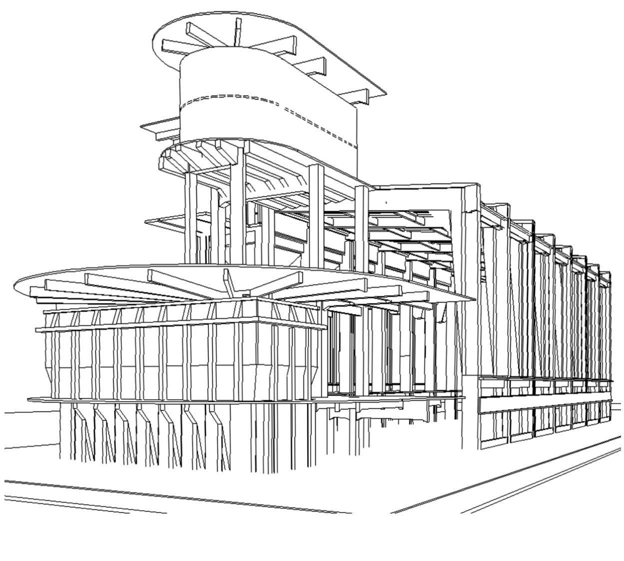
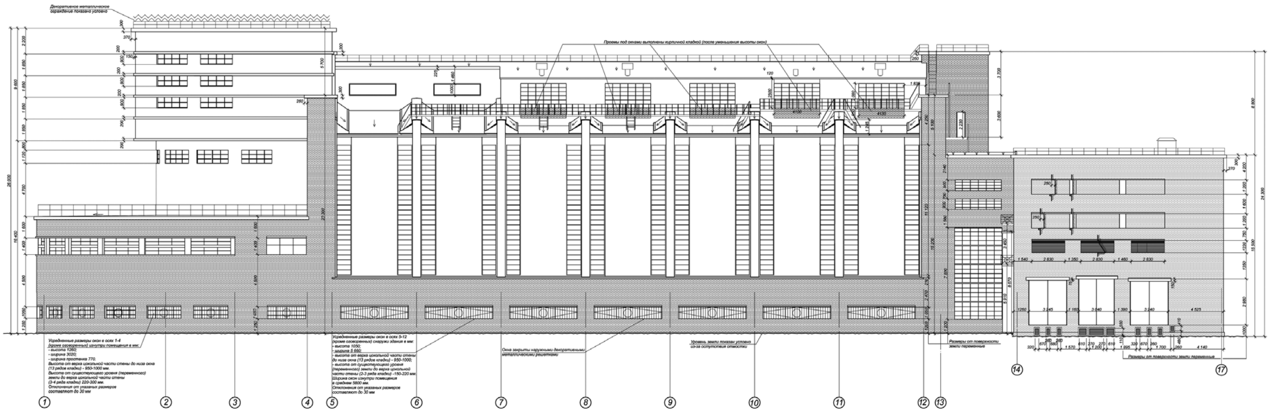
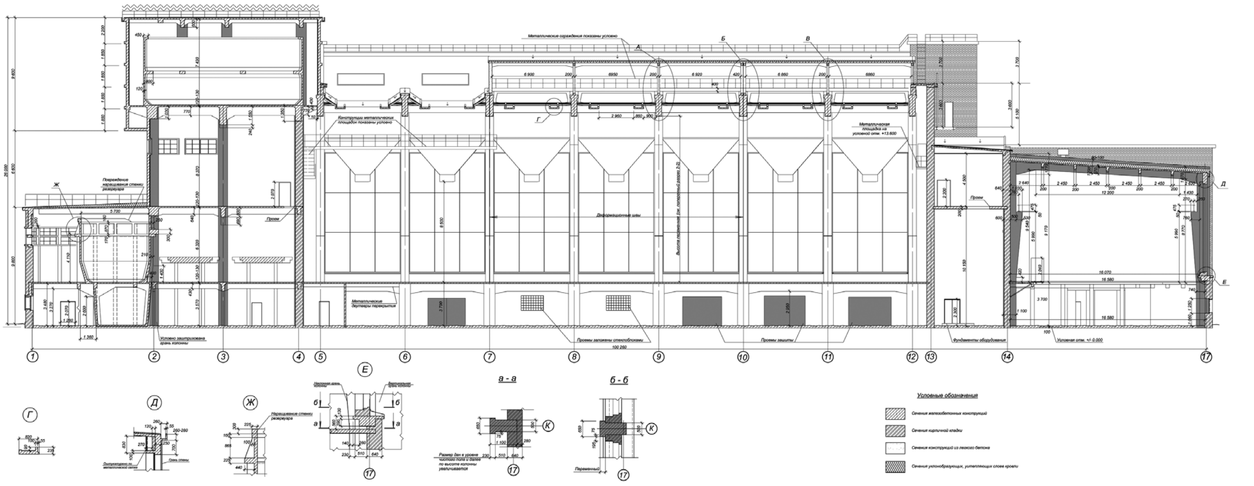
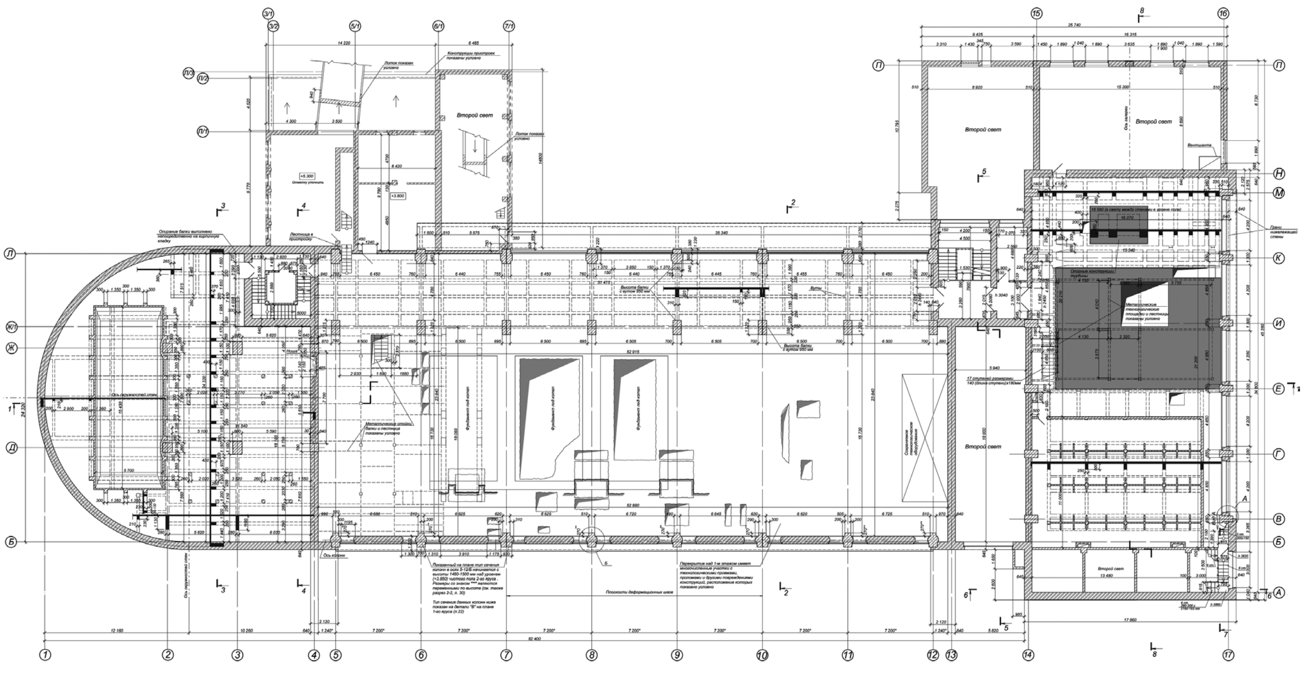


Fig. 4: The reinforced-concrete framework of the power station building. CAD simulation (StroyNauka, Minsk)







Figs. 5–7: Façade on Pionerskaya Street, longitudinal cross-section, and plan at level + 3,80 m of the power station. Measurements 2008 (StroyNauka, Minsk)

tion with lateral and overhead lighting connects with the semi-circular filtration unit by means of the first staircase. Behind it is the rectangular abutting structure, which includes the turbine unit, the distribution chamber, staircases Nos. 2 and 3, and utility rooms (figs. 5–7, on the right).

All parts of the building's framework (fig. 6), including the roof, fuel tanks, water-storage tank and sedimentation basins, were constructed of reinforced-concrete. Frame and semi-frame structures with flat and semi-circular covering on the beams served as the building's structural base. The building has no standardized elements, and all the dimensions were based on Mendelsohn's architectural design. Parts of the framework supplement the load-bearing outer walls, which were made of clinker bricks.

The frame structures of all parts of the building rest on a 1 m thick monolithic slab reinforced by ribs of that height and placed at a depth of 2.3 m.

The load-bearing structure for the three-part cylindrical volume of the filtration unit and also the building's corner section (26.4 m in height and 12.4 m in diameter at the base) is an incomplete framework. It consists of three frame types: one under the wall at the edge of the boiler section, a central frame and an end frame (figs. 5–7). The frames are multi-tiered with rigid cross-beams at the level of the overlapping ceiling panels (3.8 m, 10.25 m and 18.75 m). The cross-sections of the frame posts are rectangular and narrowing towards the top along the tiers in accordance with the reduced weight load. The radial beams of the ceiling panels for the lower semi-circular part of the corner structure converge at the level of 10.25 m on the cross-beam, which is in the form of a Vierendeel girder. On the opposite side, they rest on load-bearing brick walls (fig. 7). The self-sustaining reinforced-concrete walls of the upper tier of the cylindrical structure are 180 mm thick, and the internal insulation consists of boards, felt stripping and plaster on lathing.

The main rectangular part of the building housing the boiler and fuel-tank section, which, according to the design, consists of seven 7.2 m wide blocks (= 7 boilers), adjoins the filtration section (figs. 9–11). L-shaped semi-frames with support hinges and sliding supports at the height of 18.2 m serve as the load-bearing structures for the boiler section. The reinfor-ced-concrete support bolsters of the boiler section frames rest on widening rubble stone foundations. The height of the frames is 18.38 m, and their span length is 18 m; the height of the cross-beam (it has the same thickness as the overlapping ceiling panels) is 1.9 m; the cross-beam has a slight T-shape, the gradient of the cross-beam and the covering is 1:10. Concrete binders run between the frame posts at the height of 0.0 m, 5.25 m and 17.18 m. Imposts, which together with columns form narrow vertical windows that become skylights, were placed between the binders at the height of 5.25 m and 16.38 m. They were intended to provide light for the open space between the boilers (fig. 11).

The boiler section's ceiling consists of concrete beams which join the cross-beams of the frames and narrow flanking frames. The openings formed by them (3.10 x 3.86 m) were left for the possible repair of the boilers from above or in case of an explosion and initially were covered with specially designed light wooden panels. For architectural reasons, a ceiling panel was placed at the lower part of the cross-beam in order to improve the visual perception of the structure.

The fuel-tank section occupies a narrow part of the power station's hall on the courtyard side (figs. 9 and 10). High frames at a distance of 6 m between the column axes and the two cross-beams at a height of 3.8 m (with a cantilever arm at the courtyard side) and 17 m form the load-bearing structure for this part of the building. The upper 1 m high cross-beam is also the foundation for the binders of the silo tanks. The general height of the tank walkway is 23.16 m. The largest cross-section of the walkway columns is 1.35 m x 0.7 m. There is a continuous two-layer frame glass cover in the tank section between thin reinforced-concrete imposts, which provides a good view of the boiler furnaces, the automatic weighing machine and other mechanical equipment.

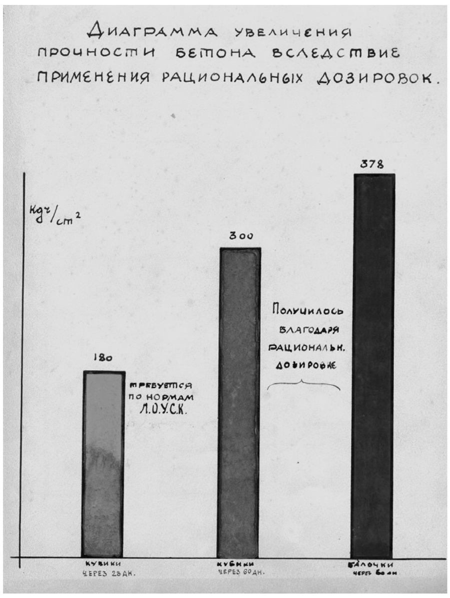


Fig. 8 (a, b): Diagrams illustrating the strength of the concrete and the amount of cement used in the concrete, 1928–1929

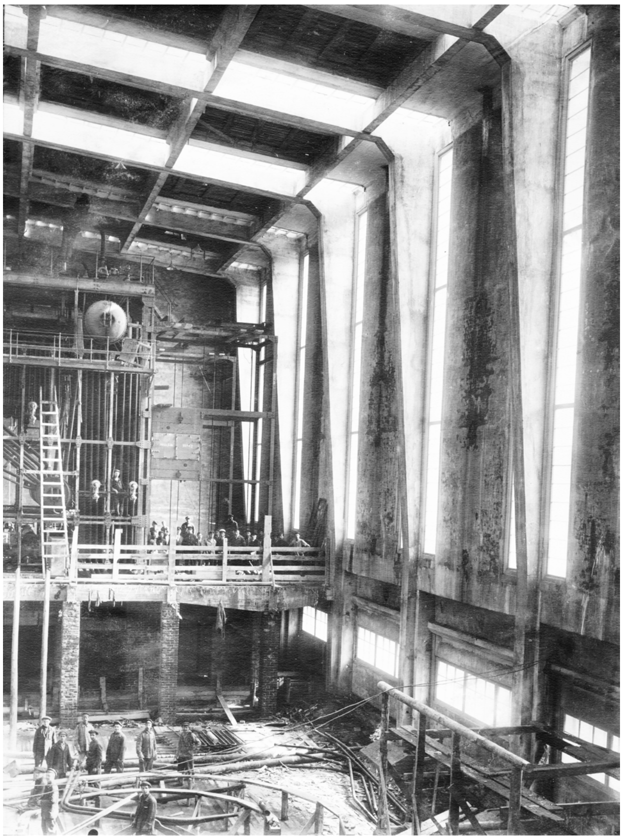


Fig. 9: General view of the power station's boiler hall after completion. Photo 1928/1929

Fig. 10: General view of the power station. Current state, 2009

The turbine unit, built perpendicular to present-day Pionerskaya Street, is situated at the back end of the boiler section, behind the narrow rectangular room housing the pumping station (fig. 5, on the right). In Mendelsohn's original design, this unit was assigned an important architectural role – it flanked the area of the main pedestrian and vehicle entrances to the Factory, which remained unrealised (fig. 1). The boiler and the fuel tank sections are divided along the length by two expansion joints into three parts, 2 + 3 + 2 respectively. In addition, all three parts of the station's buildings are separated by contraction joints. The insulation of the reinforced-concrete ceilings and walls – at the height of 10.25 m in the filtration section and 17 m in the fuel tank section – was provided through light slag-based concrete that is 20 cm thick in the ceiling panels and 10 cm thick in the walls.

The above-mentioned contemporary report on the results of the construction of the power station building in 1929 identified the structure's characteristics as follows and the complications that arose in working with moulded reinforced-concrete during the building process:[11]

(1) the absence of standard repeated structures;
(2) the complicated structural layout of the three-part semi-circular building (the filtration unit): the circular covering panels on radial beams, a Vierendeel girder et al.;
(3) the complex frame and semi-frame roof structures of the large halls;
(4) the complexity (irregularity) of the distribution system (in the turbine unit);
(5) the massive size of individual reinforced-concrete components: the turbine foundations, the cross-beams of the semi-frames in the boiler section et al.;
(6) the presence in the building's structure of various reinforced-concrete objects, often resting on independent foundations: tanks, water-storage tanks, sedimentation basins et al.

The specific characteristics of construction in concrete

The work of erecting the Factory buildings began at the end of 1926 with the demolition of the six-storey residential building situated on part of the the power station building site and the preparation of the foundation pit and was conducted continuously during the years 1927 and 1928. At the same time, work also started on constructing the reinforced-concrete foundations. All the work was carried out without seasonal interruption; during the winter work proceeded in temporary closed heated premises. The basic work of building the load-bearing exterior reinforced-concrete structures was conducted in 1927. After they were completed, the construction of the interior structure components began and was finished at the end of 1928 (according to other information, at the beginning of 1929) in the already glazed and heated building. The engineer S. M. Fish was the chief construction supervisor for the power station until the middle of 1928. Subsequently, the building of the power station was carried out as a separate, independent project, which was supervised by the engineers S. Ya. Vygodsky and A. P. Berezkin.[12]

The high quality of the reinforced-concrete work, which was highlighted in all the appraisals of the completed construction work, according to the specialists who drew them up, was in equal measure linked to the painstaking organizational work and the well thought out proportions of the concrete components. All the structures comprising the power station were built with concrete 2/II. A reinforced-concrete production plant with two Storrer-system concrete mixers supplied with cold and hot water was set up at the work site. During the winter, all components of the concrete (sand, gravel and water) as well as the bricks for the wall enclosure were warmed up.

In determining the concrete mixtures, basic attention was focused on the optimal correlation of the various proportions of sand and gravel as well as water content. Since the gravel was brought to the construction site in small quantities and was of different types (e. g. the sand content in gravel varied from 5 % to 25 %; and in the subsoil from Lakhta from 30% to 60 %), the composition of the filler materials used constantly varied in order to ensure complete utilization. In actual fact, experiments were conducted on the work site in the granulometric analysis and selection of the concrete mix. They were carried out in a small laboratory outfitted with the necessary equipment. The purpose of the experiments was to produce the strongest possible concrete using the least amount of filler materials.

On the basis of the work carried out by the German specialists Otto Graf, Adolf Kleinlogel, Heller and others, the construction managers for the Red Banner power station increased the proportion of sand to 5 cm. In casting the concrete, an ongoing analysis was conducted of the porosity of the filler materials, which reached the standard level of 35 % – 40 % for sand and 45 % for gravel. All the combinations of filler materials used in the experiments were recorded in a special journal and were tested for strength in comparison with control specimens. The documents that have been preserved indicate that these tests were part of the basic production cycles of the reinforced-concrete and were carried out from the beginning of June until the end of October 1927. The average strength range achieved was 159–202 kg/cm² (in 49 to 52 days). The documents refer to ranges of 307 kg/cm² as good results (for the columns in the fuel tank and filtration sections).

A second question considered by the laboratory related to the percentage ratio of water to cement in the concrete mix. The presence in the power station design of segments for large fixtures and also, as is referred to in the documents, “the experience gained in constructing the VolkhovStroy electrical power station” (the first station built under the electrification programme of the USSR national economy during the years 1919–1926 at a distance of 122 km to the east of Leningrad) made it necessary to use very plastic types of concrete, They included mixes with a 13 % water content (of the volume of dry mix according to the Zaliger classification). This standard was implemented with the help of a special 150 litre tank (the Storrer system). The batching principles described, according to the construction supervisors, led to a significant increase in strength in terms of existing technical standards and the efficient use of cement (fig. 8).

While focusing on the strength characteristics of the concrete, no less attention was given to its “geometric contours”, that is, the architectural quality of the façade finish. This was achieved by completing the fixture installation and woodwork (production of the formwork and laying out of the flooring) and careful supervision of concrete placement. As the documents referred to indicate, the plaster finish on concrete surfaces and part of the façades (11,000 m² in all) that was provided for in both Mendelsohn’s original design and the revised design drawn up by the Institute (the PromStroy design) for the purposes of “efficiency and economy” was eventually replaced by a 1:3 cement mortar finish.[13]

In less than three years of work, 4000 m³ of concrete were laid, more than 659 tons of steel fittings were installed and approximately 1 million bricks were laid. Each day 200–300 persons worked on the construction site. The total cost of building the power station (materials, work, water-supply system and sewage system) amounted to 1,110,128 roubles. In terms of the power station’s 59,657 m³ area, 1 m³ cost 18.58 roubles. With account taken of the preparatory and overhead expenses, 1 m³ cost 23.03 roubles.

Upon the completion of the construction work two years after it began, no defects or cracks were detected in the building’s concrete frame, As pointed out in the records of

Fig. 11: General view of the power station from the courtyard, 2009

Fig. 12: Roofing of the power station, 2009

Figs. 13 and 14: General view of the bleaching and dyeing (on the right) workshops (1926–1928). Interior view of the former dyeing workshop. Photo 2009

Figs. 15 and 16: View of the main production building (1926–1932). Interior view of the main production building. Photo 2009

the meetings held to discuss the quality of the structure in 1929 after it was finished, “in spite of all the innovations and advances in the field of reinforced-concrete, its quality and actual strength can be judged no earlier than 10 years following completion of the work”.

Current state of the building’s concrete structure

During the years from 1930 through the 1990s, the Leningrad Red Banner Textile Factory, right up to the phasing out of production in the years 2000–2003, remained one of the country’s largest industrial enterprises in its field.[14] As part of the ongoing work to expand and develop textile production, the Factory’s buildings were periodically subjected to detailed engineering inspections (for example, by the GPI-3 institute in 1972–1973 and 1982–1984), which confirmed the structural reliability of the power station and other Factory buildings (figs. 18–21).

In 2007–2008, within the framework of devising a plan for the further architectural development of the Factory in connection with the transfer of most of the site to a new owner, the StroyNauka Engineering Office (Minsk, Belorus) conducted the most recent detailed inspection and a new statistical evaluation of the state of the power station’s reinforced-concrete structure (figs. 3, 5–7, and 9).[15] In general, this inspection also found no serious defects or deformation of the reinforced-concrete elements indicating any fundamental errors in planning or design. All the elements of the concrete framework had retained their operating capability and maintainability.
In the building generally consisting of three units, one placed on a shallow concrete-slab foundation in rather complicated subsoil, no irregular sedimentary deformation of the foundation or the load-bearing structures has been detected, The first corner unit, whose structural design is the most complicated, has not shown any indications of overstress in the load-bearing frame and beam structures. The greatest movement in the L-shaped frames in the basic boiler unit is up to 50 mm. According to the results of the strength tests conducted, the structural concrete used in the building corresponds to the class C15–B20 (principally C15), under the strength classification system used in Russia.

Nevertheless, the building’s structures and details do show significant local defects and damage, the presence of which can be explained by the following reasons:

1. The novelty of the original design or, generally speaking, the complex nature of maintaining most of the programme monuments (and their structures) of Modern Movement architecture;

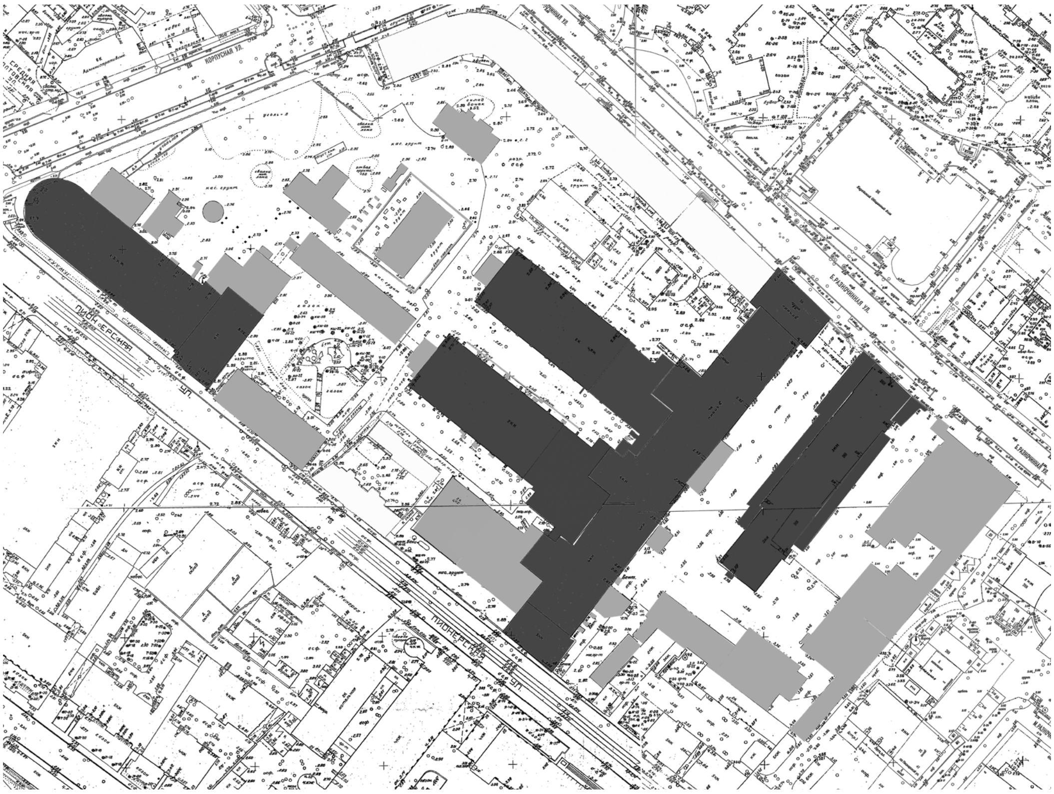
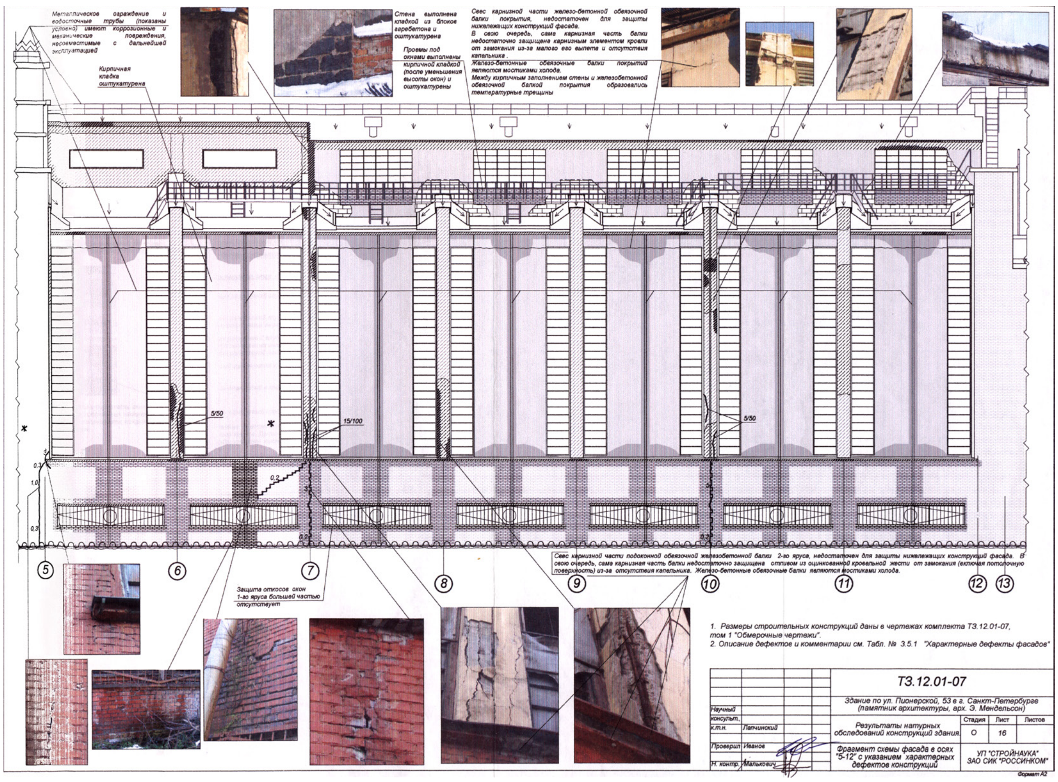


Fig. 17: Industrial buildings from 1926–1932, in the Factory's contemporary structure, based on the 2008 cadastral survey (the Office of Kramm & Strigl)

Fig. 18: Results of the power station building inspection: façade of the boiler section on Pionerskaya Street, 2008 (StroyNauka, Minsk)



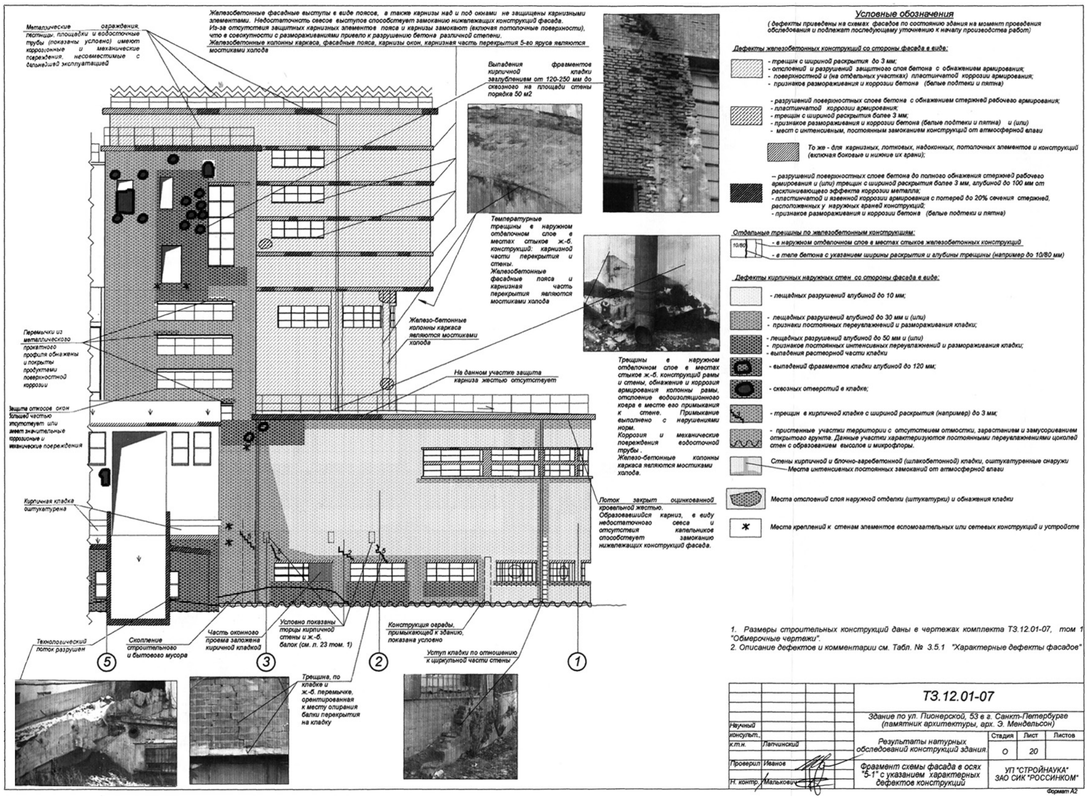
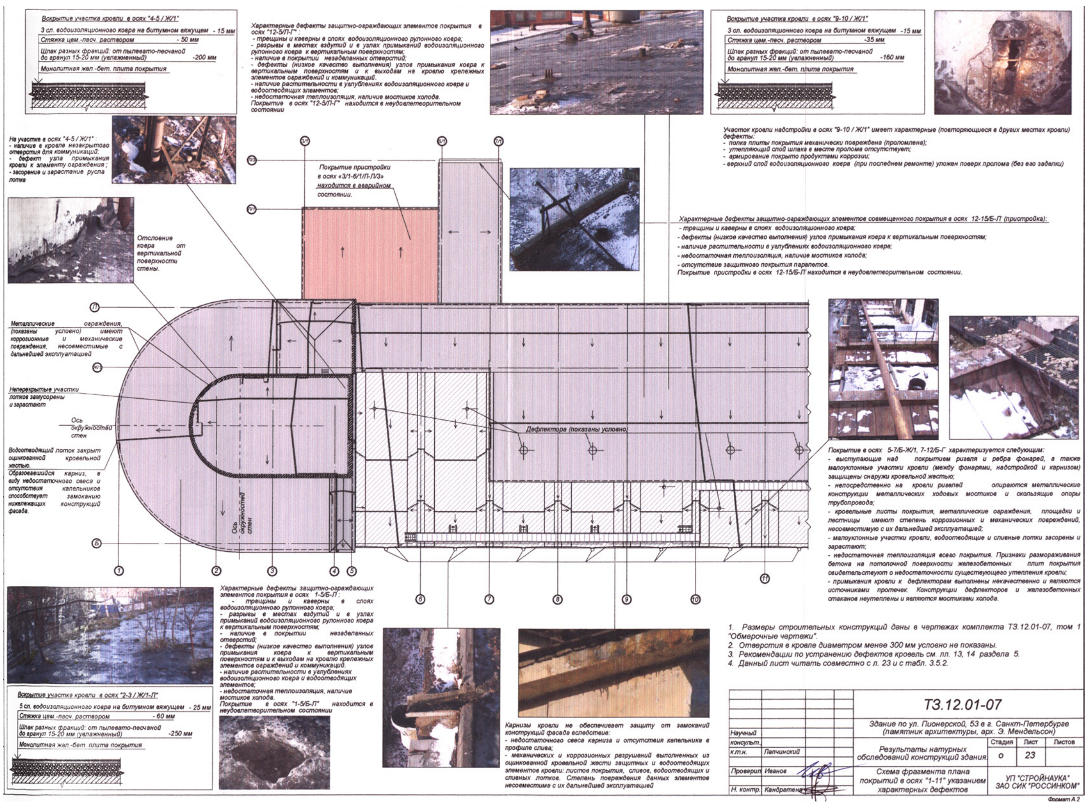


Fig. 19: Results of the power station building inspection: façade of the filtration station facing the courtyard, 2008 (StroyNauka, Minsk)

Fig. 20: Results of the power station building inspection: condition of the flat roof, 2008 (StroyNauka, Minsk)



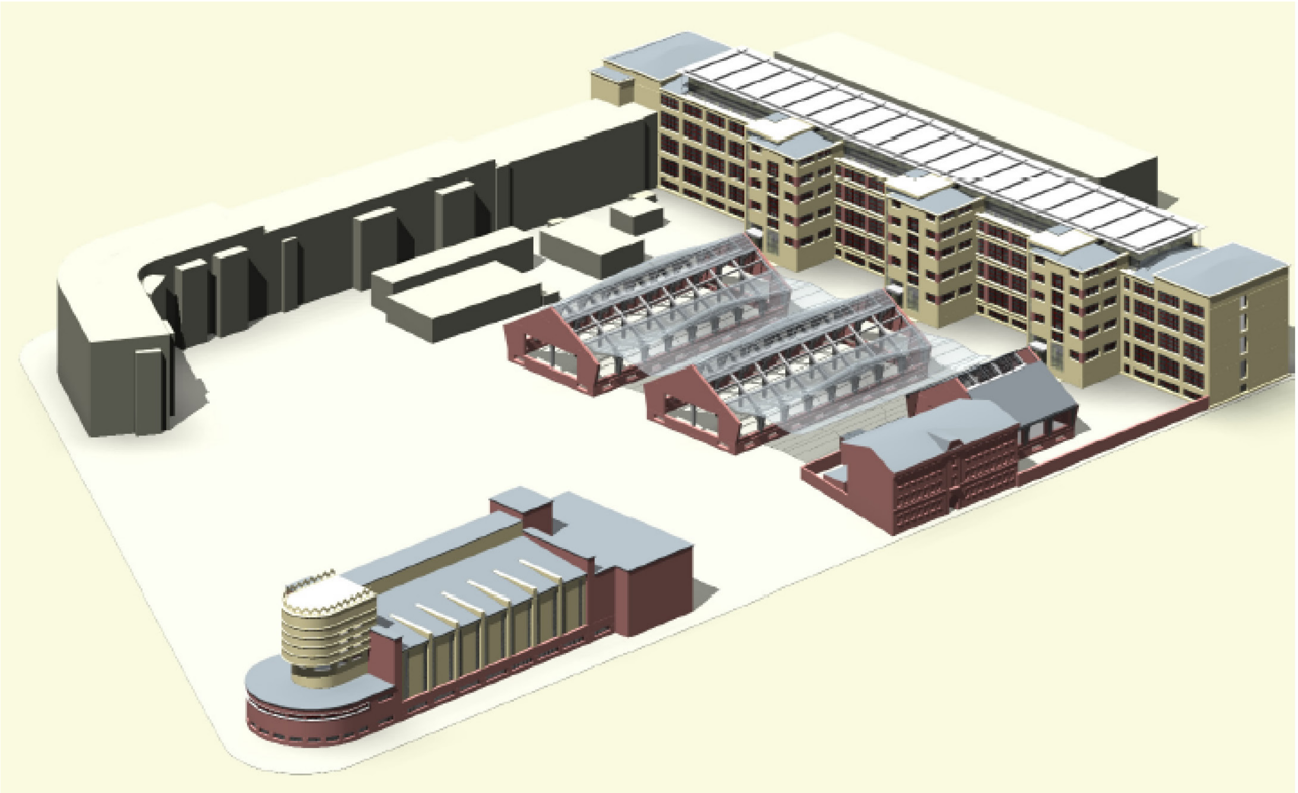


Fig. 21: Reinforced concrete buildings of 1926–1932: a basis for developing the Factory site. CAD simulation, 2008 (the Office of Kramm & Strigl; Darmstadt)

2. Insufficient experience as well as an apparent tendency towards experimentation in designing and constructing the reinforced-concrete structures and also the attempts to conserve construction materials with regard to the design;
3. Negligence in operating an architecturally and functionally complex building during the Soviet period.

Thus, the design's novelty led to decades-long technical hitches in maintaining the flat roof on all parts of the building. The maintenance of the roof in turn was complicated by a primitive drainage system consisting of external water tanks and pipes, which was used in pre-revolutionary Russian construction practice and carried over into Soviet practice (fig. 12). The unregulated collection of moisture and snow caused warping of the impervious layer in places, an accumulation of debris in the water tanks, and, as a result, the penetration of moisture into wall structures. By the middle of the 1930s, the light wooden cladding and the glass covers on the lamps in the large boiler hall were replaced by pre-cast reinforced-concrete plates on the metal beams. A new superstructure was built (1934–1936?) on the roof frames over the boiler hall, which altered the load on the frame cross-beams (fig. 9).

The heat insulation of the exterior wall surfaces and parts of the overall framework – the very heavy and ineffective heat-insulation materials, particularly the packed and dampened boiler ash and sand – proved to be short-lived. Over the years, extensive areas with low thermo-technical characteristics formed in exterior structures.

Common defects in components of the early reinforced concrete – the corrosion and collapse of metal fittings – in the power station building were aggravated by the minimal thickness of the protective concrete layer. As a result of the wedging action produced by corrosion, the thawing effect of the periodically moistened areas of concrete and local mechanical effects due to the adaptation of spaces for new purposes, cracks formed in the protective layer, leading even to the splitting off of separate sections of the concrete cover. This being the case, the extent of the carbonization of the exterior layer of the concrete structures in most cases does not exceed that of the protective concrete layers over the metal fittings.

Another factor in the intensive development of the corrosive processes affecting the reinforcement in the power station building turned out to be linked to experiments relating to the composition of the concrete mix (focusing on large amounts of sand filler), which specifically caused the insufficiently solid structure of the concrete. The use of gravel as filler produced porosity in the concrete, which in turn lowered the resistance of the material to the penetration of aggressive chemical agents – water vapours, oxygen and gases.

Much of the damage was caused by the subsequent unskilled operation of the building. In addition to the roof damage, this also led, for example, to the widening of the gaps in the courtyard side glass cover with the deterioration of the concrete imposts during the delivery of bulky technological equipment through the boiler hall in the 1960s.

Further architectural development of the site

The work of evaluating the buildings of the Red Banner Factory begun in recent years (see above) first of all provides for the preparation of materials for formulating plans for the complex's architectural development.The archival research and on-site inspection indicate that, in addition to its generally recognized architectural merits, the power station and other Factory buildings rank among the special monuments of the construction history of the second half of the 1920s. The fully preserved frame structures of the Factory buildings demonstrate the potential for adapting early reinforced-concrete to new form-creating concepts of Modern Movement architecture (fig. 21).

Both the architectural as well as the structural aspects of the buildings are the object of preservation in ongoing work. It should lead to the creation of architectural plans that relate both to modern architectural criteria as well as the requirements of the city.

Until now two European architectural offices have been invited to devise plans for developing the Factory's grounds. In contrast to the practice followed by Russia in the past decade of inviting foreign architects without regard for the compatibility of their creative principles with the local architectural tradition, the basis for selecting the design planners was experience in renovating historic buildings in a specific urban planning context as well as interest in working with monuments of Modern Movement architecture in order to preserve their distinctive architectural features and maintain those features through the new buildings surrounding them.

The offices of Kramm & Strigl, Architects and Designers, in Darmstadt and David Chipperfield Architects in Berlin/ DCA submitted their proposals during the first phase of work. The area for development, including historically protected buildings and separate contemporary buildings, covers approximately 49,000 square metres. The plan is to be implemented in several stages. The planners considered three alternatives for utilizing the area in order to increase the number of possible choices.

Both plans provide that all the completed components of Mendelsohn's overall design should be preserved as monuments exemplifying modern industrial construction and, accordingly, should be restored as such. In terms of further architectural development, both designers have proposed mixed-use development combining culture and commerce, such as spaces for cultural events, including a museum, a conference hotel, an office complex and apartments. Each proposal contains two design alternatives.

The plan put forward by the Office of Kramm & Strigl is based on a clear division between old and new and would develop new structures only in those parts of the site where they would not have a negative impact on the state of the buildings that are under preservation and are of historical value or on the future spacial layout of the site in general. The interior area would arranged with Streets and sidewalks laid out at right angles as in an urban district. A public esplanade on the long northern side of the power station would provide a visual outlet to the monument (fig. 7). From there, the site would open up through a new interior axis parallel to Pionerskaya Street, which would cut through the renovated main production building and lead to the revitalized old Street, where the industrial site originally ended.

Both the new buildings and the former Factory buildings converted for new use – hotels, apartments, the renovated industry halls (fair site, gallery) as well as the main industrial building (offices/ media house) – would appear as separate structural units. Their arrangement to a certain extent follows Mendelsohn's original plan and opens up the site to Pionerskaya Street (the entrance to the hotel) and restores the structural size of the ventilation shafts over the two halls (exhibition rooms) as the new middle façade of the site. A more detailed explanation of the design's specific characteristics is provided below:

The Factory's electricity generating plant or power station is regarded as the first part of construction work and of the conceptual design for the architectural development of the site (I). It is proposed that the power station building should be completely restored and that its importance as the basic compositional element (by analogy with Mendelsohn's original design) should be preserved within the framework of the new planning decision for the future site.

The rooms of the building's semicircular northern section (the former filtration station) are to be separated from the concrete storage tanks, which would be preserved, and would initially remain free. In the northern part of the building, the reinforced concrete, which was subjected to chemical corrosion, must be completely renovated.

The floor covering in the main hall of the power station, its boiler and fuel-tank section (at a level of +3.5 m),is at present partially destroyed. The extant photo-documentation of the power station's main boiler hall carried out soon after construction shows that there was initially no reinforced-concrete covering in the hall. It is proposed that the hall should be restored to this state. The resulting gallery would correspond well with the cultural functions planned for the hall, such as the staging of theatrical and musical performances, the holding of conferences and fashion shows and so forth (fig. 22–24).

The wall in the northern part of the hall, which is an important spacial element, can be used subsequently as the load-bearing base for exhibiting large-scale artistic objects.

None of the building's internal technical equipment is suitable for contemporary requirements of public facilities. Its replacement constitutes a separate problem, which has a significant impact on the possibilities for the building's architectural development.

The annex to the building's southern side (the turbine section) together with the electrical apparatuses and equipment should be kept in their current state. The two interior levels of the annex functionally represent a single space that could be used, for example, as a restaurant. Alternatively, a small cinema or concert hall could be set up here.

A full-scale link to the new interior area of the site could

Figs. 22–24: Proposals for the architectural development of the Red Banner Factory. Alternatives submitted by the Office of Kramm & Strigl

Fig. 22: View of the office centre – renovated main production building

(opposite)
Fig. 23: View of the new interior axis of the site with the power station in the foreground
Fig. 24: General site plan

be established in restoring the façade facing the courtyard. Opening up the façade would also make the "joint" use of the courtyard space in the summer possible. All the surfaces of the power station's façades, the window frames and the windows must be restored. It is assumed that the general construction and restoration work at this stage of the site's development and at all subsequent stages would be carried out in the closest collaboration with the monument preservation authorities.

The Factory's main production building is to be fully renovated and outfitted with the appropriate equipment for an office or media centre (the second stage of work). Mendelsohn's original design for the southern part of the main production building (originally L-shaped) put forward a solution involving a four-spanned reinforced-concrete frame, which was repeated on all four floors and at the basement level. When the design was revised by the Leningrad architects and implemented (a 175m wing facing Malaya Raznochinnaya Street, which no longer exists), the number of frame spans was reduced to three. The building was erected in two phases: from 1926 to 1928 (the basic part) and from 1931 to 1932 (the part on Pionerskaya Street). The distinct and unified forms of the nearly cubical staircases in the original design were also modified. The profile of the staircases in the completed building is irregular in plan view and on the façades, which considerably distorts the clarity of Mendelsohn's conception. Furthermore, according to the blueprints for the final design (June 1926) as well as photographs, the central staircase is higher and has the form of a real tower.

The present technical state of the main building varies on each floor from relatively good (the upper floors) to bad (the ground floor) and the very bad (the basement). The building's façade, which has a two-part linear slit (a complete lower one and a pilaster section in front of concrete columns) is relatively well preserved. None of the building's engineering systems or equipment is in working condition.

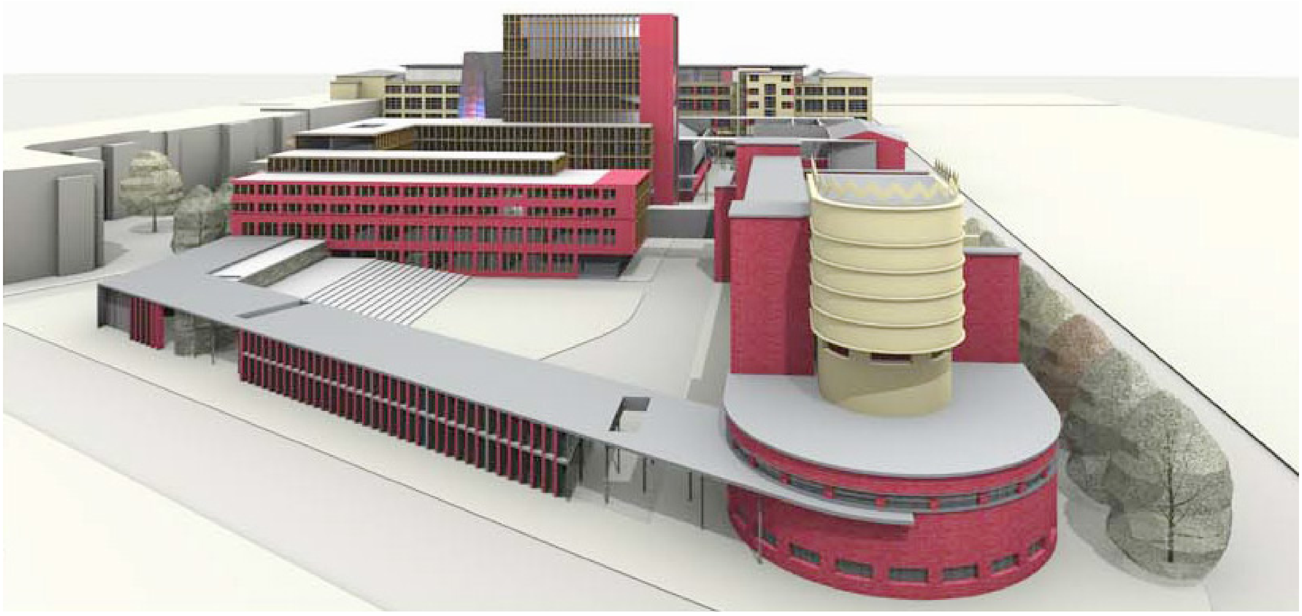
In the opinion of the authors of the design, a multilevel production building with considerable depth (approximately 20.0 m) would best meet the requirements for modern office facilities, for example, office studios, a business centre or media centre. A business centre on the Red Banner site could be created by separating the former main building of the Factory from the dye sections, redesigning the staircases in the basement and on the ground floor and first floor, and constructing new elevator shafts.

The separate space thus achieved (1) would be connected with the parallel adjacent former sales department building (2), which was built at the beginning of the 1930s and connected to the main building by means of a suspended passageway that clearly resembles the passageway of the Bauhaus building in Dessau. If these two buildings (1+2) were linked by additional glazed passageways, the business centre could function as an independent part of the site.

The façade of the Factory's main production building (fig. 15, 16) with its two-part structure and linear slit is fairly well preserved. The goal of the façade renovation work should be to preserve its present appearance and restore the occasionally separate filigree detail according to the architectural specificities of the time. The interior courtyard space of the office centre (1+2) would make it possible to preserve all the characteristic attributes of the industrial architecture of Leningrad constructivism. Its somewhat dull appearance could be embellished through a reflecting pool (or alternatively, a green space) and the additional modern glazed passageways.

The dyeing and bleaching sections: in his original design for the three identical interior sections of the Factory (two dyeing sections and one bleaching section), Mendelsohn proposed an innovative technological and highly interesting architectural solution for the buildings. It further developed the principles that he had already employed in the planning of industrial buildings, above all the Hat Factory in Luckenwalde (1921–1923).

The extended rectangular-plan chamber sections in the original design were topped off with ventilation shafts (natural drawing ventilation ducts) that are approximately 10 m high. The building of such a superstructure led to serious static complications. It required the construction in the chamber of a central reinforced-concrete post with a V-shaped end. In the buildings constructed by the Leningrad design engineers (two sections within the area,

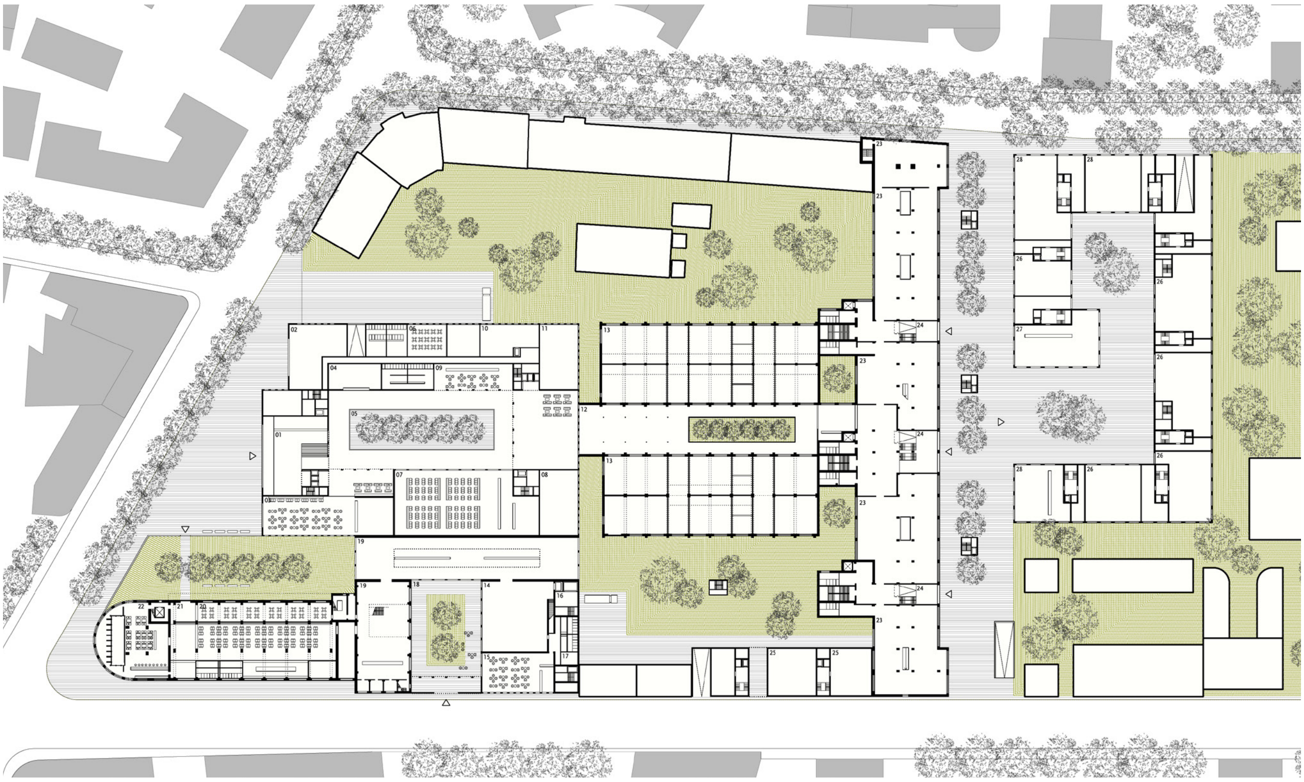


1926–1928; and the dyeing section along Pionerskaya Street, at the beginning of the 1950s), reinforced-concrete frames with central V-shaped ends were used. An end in the form of a ventilation shaft appeared only over one dyeing section, the central one. The reinforced-concrete base of the ventilation shafts in Mendelsohn's design had been replaced by light metal latticework structures (fig. 3), which were dismantled in the 1970s.

The proposed development plan would preserve the three former dyeing and bleaching sections and join them by means of a light-weight cover. This could be called the third part of the site development work (III). There would be a new multi-span space when the canopy is in place at the site. It could be used as a museum, exhibition or multipurpose building for various large-scale activities, fairs or special events.

The frame structures from 1926–1928 that have been preserved would create a special atmosphere in the new interiors, calling to mind the history of the Factory. Freed from unnecessary structural elements, the building's basement in the inner-courtyard space would be expanded and utilized as a single-level semi-underground garage (more details below).

As an alternative for developing the former dyeing sections of the Factory, they would be given new architectural features, which could be compared to the "ventilation shafts" (fig. 32). They would not be based on a restora-



Figs. 25–31: Proposals for the architectural development of the Red Banner Factory. David Chipperfield Architects, Berlin 2008/2009
© David Chipperfield Architects

Figs. 25–27: Variant B

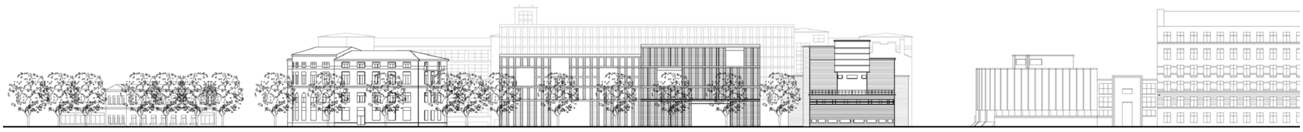
(above)
Fig. 25: Façade to Pionerskaya Ulica (top)
Fig. 26: Masterplan of entrance level

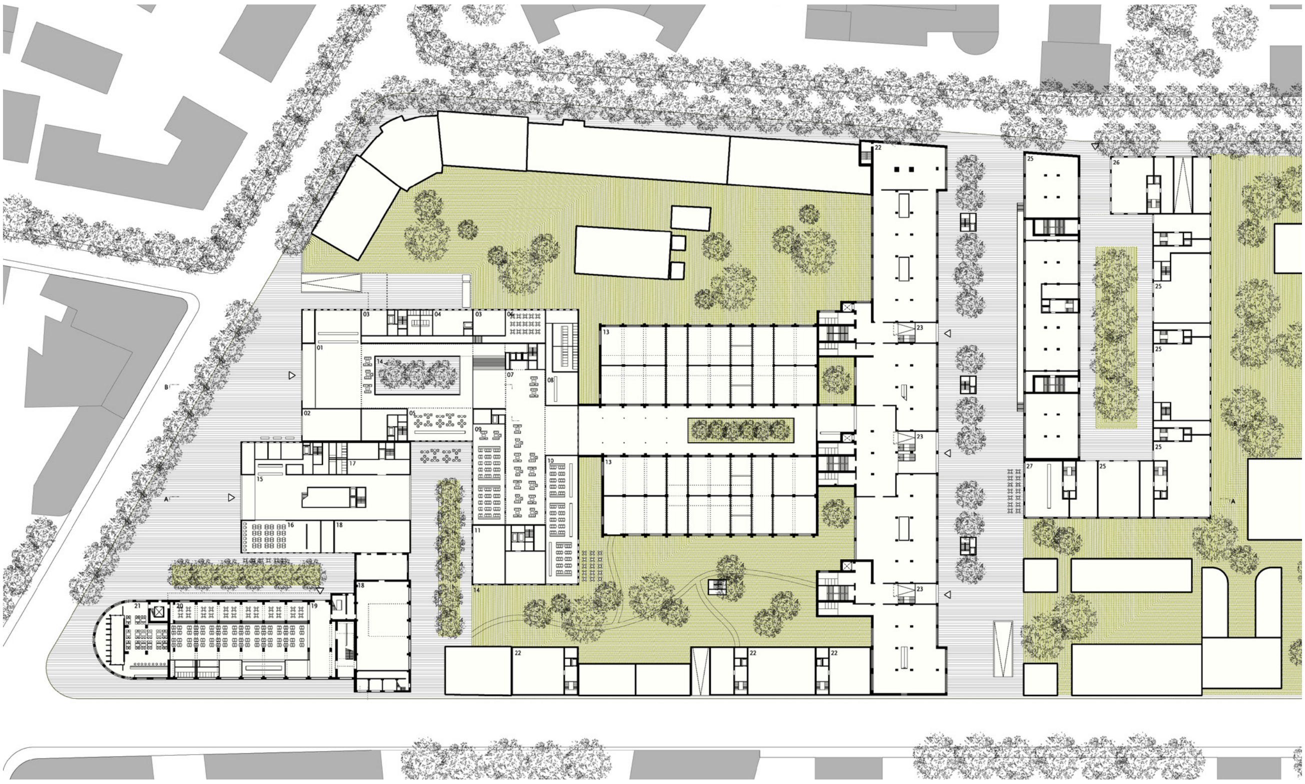
(below)
Fig. 27: Model depicting new and old volumes

Figs. 28–31: Variant A

(opposite)
Fig. 29: Façade to Korpusnaya Ulica (top)
Fig. 30: Masterplan of entrance level
Fig. 31: View depicting new and old volumes (down)

(below)
Fig. 28: Model depicting new and old volumes



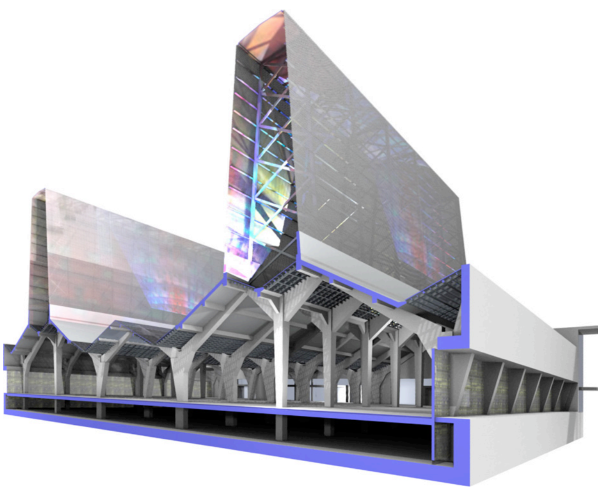


tion of Mendelsohn's design or a reconstruction of the latticework metal shaft over the central section installed towards 1928. A light-diffusing glass or textile cover at the level of the roof would provide the indirect lighting in the chambers that is important for the purposes of a museum. Under this alternative, the authors, at the request of the client, also considered the possibility of adding a conventional architectural constructivist "quotation", which would be reminiscent in modern stylized form of Mendelsohn's design and would be used as a luminous panel installation that would function primarily during hours of darkness. The new Red Banner area would at the same time acquire an individual distinctive feature drawing the attention of visitors and residents and reminding them of the district's past.

New construction: the Congress Hotel – the fourth part of the site-development work (IV). – The appearance of a hotel would bring diversity to the functional building-up of the site and considerably enliven its day-to-day life (shops, restaurants, cafes, bistros and the like). The construction of a 4-star hotel like the Congress Hotel would be appropriate for this part of the city. Under the proposed plan, the large hall of the power station would also be part of the hotel's public area. Connecting the hotel to the restored building of the former power station (I) by means of a covered walkway would greatly expand and enhance the possibilities for using the hotel as a venue for various types of activities. Space in the underground garage would be set aside for parking hotel automobiles.

The Boardinghouse: A temporary-residence facility for travelers who, owing to their activities, require a small apartment in Petersburg for five to six months of the year constitutes the fifth part of the construction work (V). Such apartments combine individual lodgings with services and are an integral part of the range of modern accommodations found in most large European cities, but which are not as yet available in Petersburg. The advantage of situating such a building on our site would be that the function of providing services to the residents would be carried out by the hotel, which is located nearby. Parking spaces would be set aside in the underground garage connected to a separate new multilevel garage.

Fig. 32: New alternative use of the former dyeing and bleaching workshops: exhibition space with underground garage (the office of Kramm & Strigl)



The plans submitted by David Chipperfield Architects (fig. 25–31) is designed to complement the partially completed fragments of Mendelsohn's general plan with new buildings and and integrate them into a new large-scale planning structure for the site. The original buildings on the Factory grounds from the end of the 1920s and the new buildings would stand in equality next to each other. They would together form new interconnected architectural spaces that would complement one another functionally.

The further development of Mendelsohn's general plan was not viewed as the task of assigning a new purpose to the site or because of the nature of the structures existing there today. The proposed integration of the disparate elements of the original general plan into a well-ordered planning scheme indicates that they once constituted parts of a single well-thought-out system. Erich Mendelsohn's power station itself remains a "fragment" and a symbol of the entire area.

Integrating the original fragments into a modern planning structure would enable a new multifunctional utilization of the site with spaces for museum and cultural activities, a hotel with a conference centre, as well as an office centre and apartments. The site's "flagship", the restored power station building, is to be used as a space for various events or as part of the new museum, in spite of the limited possibilities of upgrading the construction physics of the building.

The proposed compact urban construction on the Mendelsohn site offers many alternatives with regard to the overall industrial planning from 1926 to 1932. A new building complex would be developed parallel to the free-standing power station. Its covered inner axis would open up the area from a public esplanade in front of the new façade of the building complex on Korpusnaya Street through the new and old inner spaces to the reopened old intersecting road of the industrial site. Taken as a whole, the proposal can be viewed to a certain extent as a continuation of the overall work carried out by David Chipperfield Architects, above all on Berlin's Museum Island, and the new axial arrangement of the buildings on the site could certainly be considered a type of "industrial-archeological promenade". A more detailed description of the project's characteristics (alternative II with the new museum building) is provided below:

Treatment of the existing buildings – under the proposed plan all the buildings erected according to Mendelsohn's Factory layout design would be preserved as part of a notable example of the new industrial architecture of the Soviet period. This includes not only the power station, which already ranks as a federal monument, but also the two chamber workshops (for dyeing and bleaching) and the main Factory building, which were recognized as regional monuments in 2009. These buildings would be repaired and restored and would be given a new function. All the architectural parameters and characteristics of the buildings would be preserved and restored without diminishing the site's economic value.

Further utilization of the site – the grounds of the former Red Banner Factory are located on the boundary of Petrogradskaya district, a busy and well-frequented pre-revolutionary district. Peter and Paul Fortress and

Fig. 33: Conversion of the former dye-works halls into a modern multifunctional exhibition or atrium space (David Chipperfield Architects, Berlin) – © David Chipperfield Architects

Petrovsky Stadium are within walking distance. The city centre with the State Hermitage Museum, Nevsky Prospekt and the Admiralty are only two or three stops away on the metro (underground). The nearest metro station, Chkalovskaya, is a five-minute walk from the Factory site. The site's attractive location lends itself to highly compact and multifunctional utilization as a new urban area.

The power station – a museum and space for special events: the power station, with its large hall that is several storeys high, its specific spacial structure and the ambiance of an industrial building of its period is perfectly suited for holding theatrical, concert, dance and other performances, fashion shows, receptions and large-scale exhibitions. These alternative uses would not be affected by the limited possibilities for modernizing the building's heating-system.

The addition of a new museum building with a rather classic contemporary appearance – white, rectangular rooms equipped with the latest technology – to the power station would be an attractive combination of the possibilities for further developing the entire site as a centre of contemporary art.

A (four-star) hotel with a conference centre in the former Factory workshops (the dyeing and bleaching sections), a commercial and office centre in the former multi-storey production section and building with top-quality accommodation in the immediate vicinity would promote development in this regard. The proposed combination of functions would, on the one hand, continue the specific use of the adjacent older buildings and would, on the other hand, complement them through the new cultural and touristic components. The plan would thus promote the revitalization of the site and its integration into the urban fabric.

The chamber workshops as a conference centre – in addition to the power station's expressive form and impressive interior space, the interiors of the two former chamber workshops (fig. 13, 14) also bear witness to the specific character of Mendelsohn's original plan. Their reinforced-concrete frame structure, reminiscent of the Luckenwalde Hat Factory near Berlin, is a unique testament to the high architectonic criteria typifying the industrial architecture of the 1920s and to Russian-German cultural exchanges in those years.

Their further use as the conference centre of the planned hotel could give new life to these buildings. The covered space between the workshops would be part of hotel's axial foyer. It would link the hotel with the office centre in the former main production building. There would also be entrances leading from the new foyer to the conference centre chambers (the former workshops). It would thereby meet the needs of the hotel as well as those of the conference centre, being part of the interior passageway through the redevelopment area (fig. 24).

The new structures and their use: the new hotel and the new museum under this concept would be built as separate structures. Each would be independently linked to the architectural monument through the power station building. The museum would be located behind the power station along Pionerskaya Street and connected to it by means of a single-storey exhibition hall situated well within the site. These three structures would form a small courtyard secluded from the Street by means of a wall. The yard would serve as both a museum courtyard and a space for evening performances.

From Korpusnaya Street, the hotel would give the impression of an almost monolithic structure. To the right of the hotel, there would be an open space receding into the site, emphasizing the visual effect of the power station as a monument of industrial architecture.

The hotel's compact structure, which would include four wings, would be a direct continuation of the planning structure for the two workshops under Mendelsohn's general plan. The hotel buildings – the former workshops – the former production building and the power station-museum would here form a second, clearly-defined development area.

Inner areas and access to them: the new area adjacent to Korpusnaya Street would play a central role in the functioning of the complex. It would create a space for viewing the architectural monument of the power station, make it possible for vehicles to drive up to the hotel and serve as a unique urban foyer for visits to the museum and attending evening events in the area. From here it would be possible to walk through the interior of the grounds by means of a passageway through architecturally different foyers, past the two chambers of the former workshops, through the office centre and ending at the interior vehicle thoroughfare. This private thoroughfare would restore the Street that originally passed through the site (Malaya Raznochinnaya Street) and once flanked the Factory's outer boundary. There would be entrances from the thoroughfare to the office centre and the residential part of the complex in the former main production building.

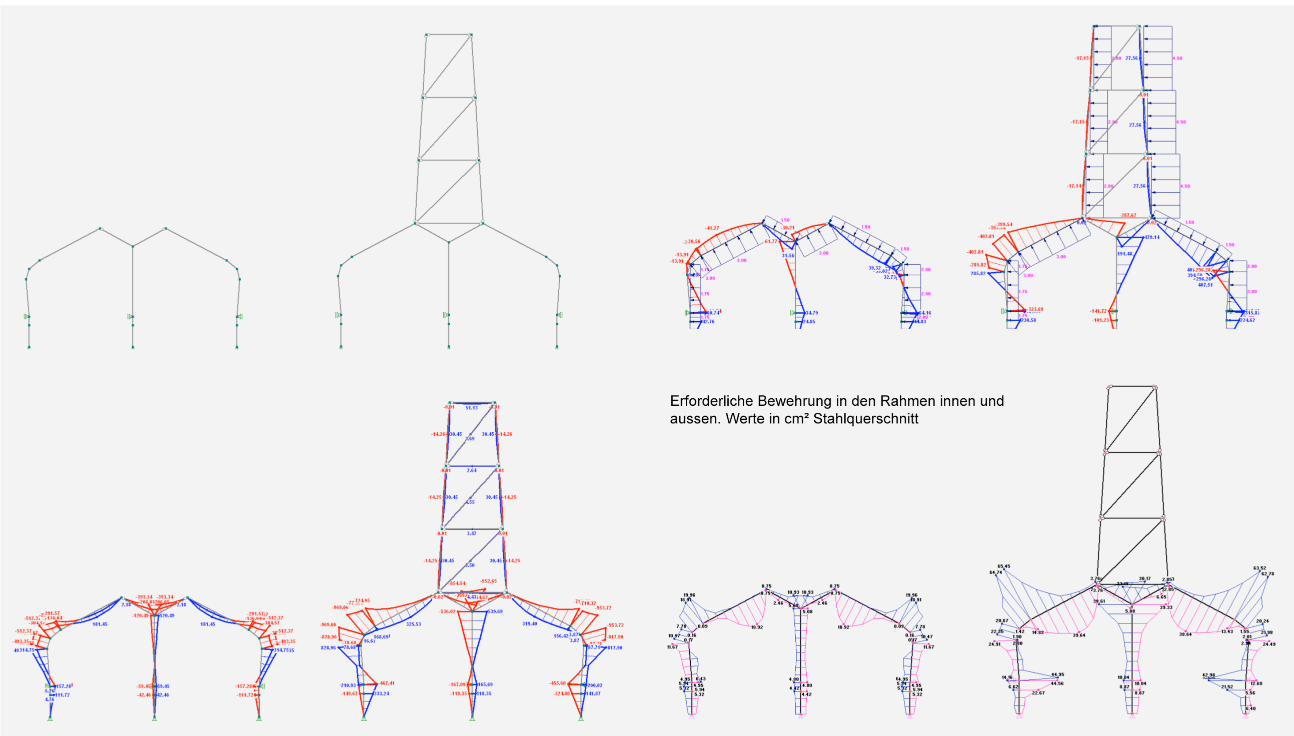
Access to the new museum and the power station would be provided from Pionerskaya Street through the small museum courtyard. In this almost idyllic little courtyard, which would serve as both a foyer and an exhibition area, the power station building and the museum would engage in an interesting dialogue.

Transportation concept, parking spaces: underground garages would set aside spaces essentially for the entire site in order to avoid congesting the site's architecturally attractive ground-level surface. Each of the proposed alternatives would provide at least one space for two hotel rooms and at least one space for one and a half apartments in the residential area. It would also be possible to enable visitors to the museum and power station commercial centre to use the underground garage of the office and commercial centre in the evening.

The Factory's main production building as an office and business centre: the four-storey former production building with its spacious rooms that are divided only by support pillars is very well suited for an office and business centre. Depending on how the floors are subdivided, small and mid-size businesses such as architects, designers, fashion designers, film studios and small studios for dance, exercising and yoga as well as small-scale manufacturing could be set up here. The use of entire floors and company branch or a large planning office is indeed also conceivable.

If the building was developed as part of the former Factory grounds consisting solely of the interior area, the work yard at the time, it is planned that the future development

Fig. 34: Comparative estimates of the frame structures of the original bleaching and dyeing workshops of 1928 (the Office of Professor Pfeifer and Partners, 2008)



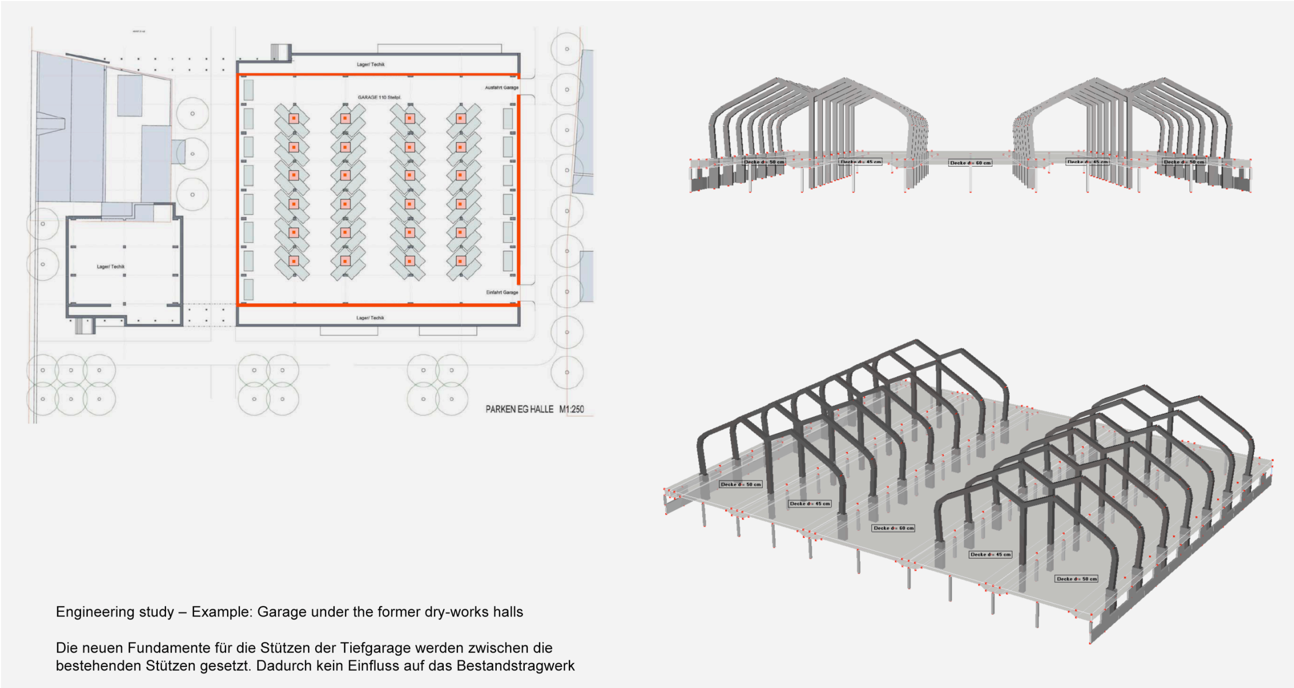


Fig. 35: The possibility of expanding the original frame structure of the dyeing workshop through an underground garage (the Office of Professor Pfeifer and Partners, 2008)

would be shifted to the new private thoroughfare and that the office and commercial centre would be given a representative address in the city.

Structural development of the Red Banner Factory: Conservation and renovation of the historical concrete structures

The success of further work to preserve the Red Banner Factory complex will obviously in practice depend on the preparation and carrying out of the renovation work on the reinforced-concrete structures and their inclusion in new architectural solutions. Therefore, proposals were put forward with the client's approval to preserve and strengthen the existing elements of the reinforced-concrete frames of individual buildings as part of the initial plans for developing the area (the office of Kramm & Strigl Architects) I. They were implemented by the Engineering Office for Support Structures of Professor Pfeifer and Partners, Darmstadt.

In terms of the architectural solutions put forward, with the use of existing archival materials and the initial results of research conducted, the possible approaches to a statistical analysis were analyzed and the possible alternative ways of also preserving structural elements of the buildings under restoration were proposed.

A statistical analysis of the power station's framework was not considered at this stage owing to its relatively good state of preservation and the considerable degree of solidity ensuring the possibility of adaptation for most public purposes. In developing the final project documentation on restoring the complex, it is necessary to conduct a further study of the load-bearing elements of the reinforced-concrete framework and the roofing of the building in order to determine their real support capacity, the degree of preservation of the concrete and the possibility of further utilization.

In carrying out the detailed planning, it is necessary to find a solution that properly meets the contemporary needs of structural physics: the building's roofing must be reconstructed on the basis of verified structural solutions in accordance with the requirements of thermophysics for attic and roof structures taking into account the possibility of energy conservation and regeneration. The entire engineering infrastructure must be brought into compliance with current norms and standards and completely renovated.

The frame structures of the dyeing sections: the reinforced-concrete structures of the two dyeing sections, which constitute a rare and rather well-preserved example of early monolithic frame structures (fig. 33, 35), were analyzed as an initial exercise. Similar frame structures were widely used in German practice during the 1920s and the 1930s, particularly in the buildings already cited as the basic prototype for the Red Banner Factory – the Luckenwalde Hat Factory (Erich Mendelsohn, 1921–1923). Detailed working blueprints from the middle of 1926 found in the Central State Archive for Scientific and Technical Documentation in Petersburg were used for the purpose of analysis. They confirm the fact that only the central dyeing section was designed with a ventilation shaft in 1926–1928. Blueprints preserved in the archive correspond to the other, northern or interior, bleaching section, for which no ventilation shaft was planned (fig. 33). Verification calculations that were conducted indicated that the reinforcement frame depicted in the blueprints – apparently incorporated in the existing frame structures – make up only one third of the overall area of the reinforcement frame required for determining the stress

Fig. 36: The possibility of preserving and adding a storey to the former main production building. Façade (the Offices of Kramm & Strigl and Professor Pfeifer and Partners, 2008)

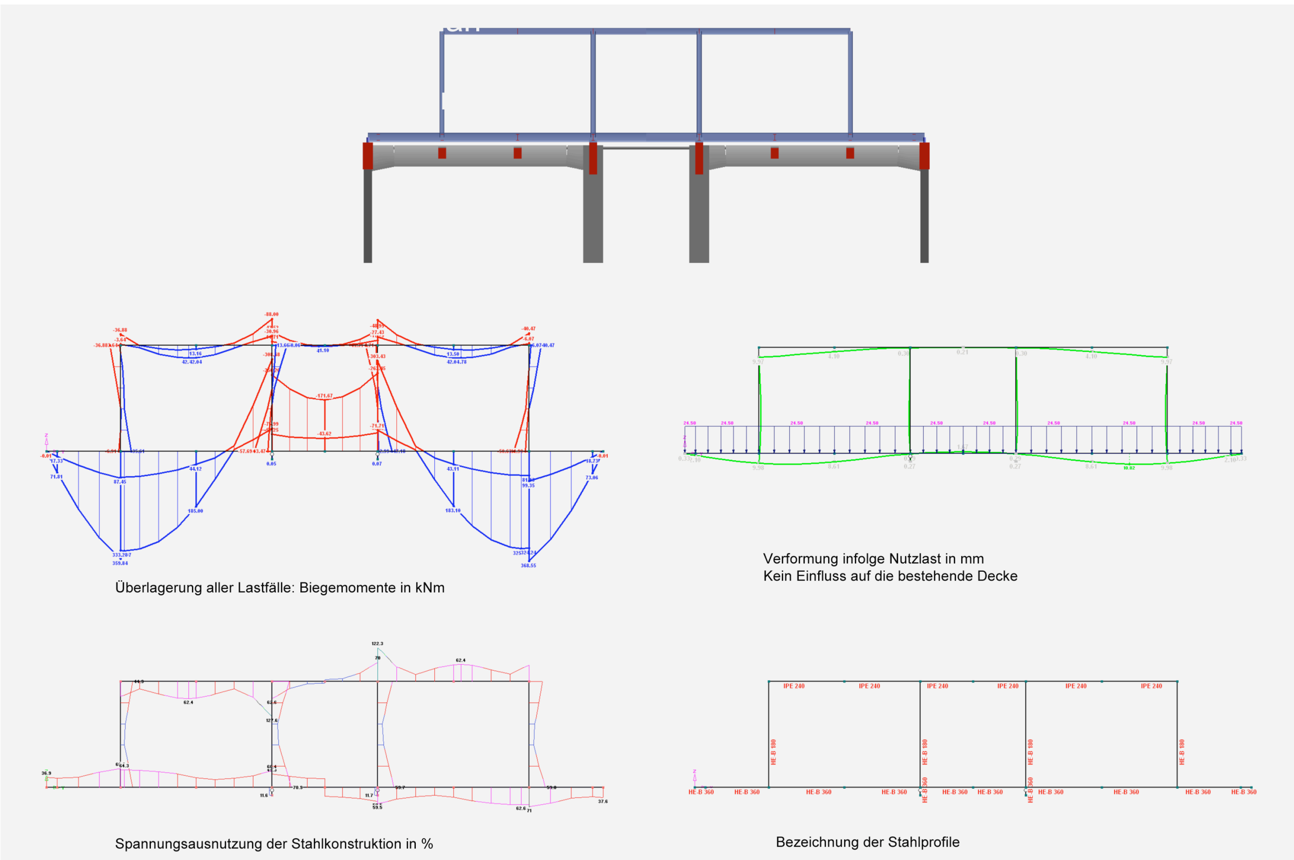
resulting from wind pressure when there is a ventilation shaft over a building.

Research into the contemporary state of the sections indicates that the shaft was subsequently dismantled (presumably in the 1970s) and that the aperture for it running along the section's entire main axis was covered with a continuous gable glass roof. All the glass panels for overhead lighting provided for in Mendelsohn's design turned out to be closed. Windows that were in the walls were also most likely replaced with glass block in the 1970s. The load-bearing reinforced-concrete frames that have been preserved are fully in line with the 1926 design documentation in the Central State Archive. This documentation includes the complete reinforcement frame arches, contains specific information on the design calculations and is generally remarkable for the exceptionally high quality of detail analysis.

One of the alternative designs for the site's architectural development proposes adding to the two former dyeing sections architecturally distinctive features which could be called "ventilation shafts" (fig. 32). For this reason, it was considered important to verify the load-bearing capacity of the existing frame structures with regard to stress resulting from the addition of a superstructure, especially under the influence of horizontal wind pressure.

The dimensions indicated on contemporary measurement diagrams served as the basis for calculating the weight of the structures. German norms from the 1920s, close to the period when the dyeing sections were constructed,

Fig. 37: Assessment of the additional weight load of a new penthouse on the framework structure (the Office of Professor Pfeifer and Partners, 2008)



were used to determine the level of stress from snow and wind. Light-weight steel structures with glass sheeting were selected provisionally as new architectural elements – metal-rod superstructures over the former dyeing sections. If the superstructures are built with light-weight membrane sheeting for lighting, this approach is also fully feasible. The amount of the wind pressure would be identical in both cases (fig. 34).

In developing the final design documentation and carrying out the work of renovating the chamber sections, it will be necessary to conduct further studies of the load-bearing structures in situ and adhere to the following concomitant restoration requirements:

– determine the real load-bearing capacity and stability of the existing frame structures and of each separate section since they were constructed on the basis of different designs in structural and static terms (without a shaft over the frames and with a frame);
– ascertain the specific geometry and dimensions of the frame structures, the type of concrete used and its integrity, as well as the location and type of the reinforcement frames; the location of the frames can be determined only by making sample cuts in specific areas of the concrete structures to uncover the frames;
– these cuts also make it possible to determine the extent of the solarization of the concrete, which in turn makes it possible to define measures to protect the frame structure from corrosion;
– the thickness of the concrete layer covering the frame structure and the compatibility of the reinforced-concrete structures with current Russian fire regulations must be specific areas for study;
– the glass-block windows and other structural parts installed later must be removed.

The covering of the new underground garage and strengthening the frame structures: the proposed architectural conception (C) would make use of the basement storey of the dyeing sections, which would be expanded by lowering the inner-courtyard level between the sections to create a single-storey underground garage. The dimensions of the slab spans for covering the garage are 12 + 12 + 16 + 12 + 12 metres. For planning reasons, the central part would not have internal supports. A covering slab up to one metre in thickness would be put in place between the existing frame stanchions in the basement. The slab would contain a load-bearing element, which would place the load on individual new supports. The thickness of the covering depending on the span would vary accordingly from 45 cm to 60 cm. The weight of the slab would be 3 kN/m² (300 kg/m²) since landscaped spaces would be laid out on the part of the slab between the buildings. Light-weight covering, for example, with hollow, spherical elements made of artificial material would be used in order to reduce the sole weight of the slab structure.

The structures of the new semi-underground garage would be separate from the preserved load-bearing frame structures of the dyeing sections, primarily with regard to vertical load transfer. The supports for the new structure would be distributed in the basement between the existing frame stanchions on the same axis. In this way, it would be possible to achieve independent load transfer from the new structure to the ground through new foundations, and

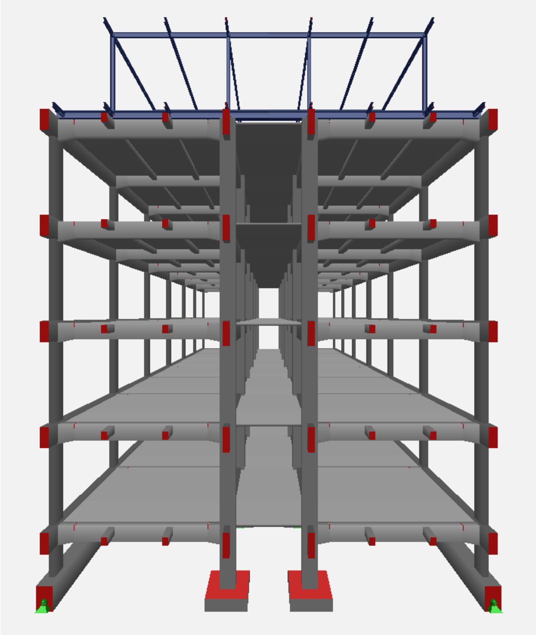


Fig. 38: Assessment of a new penthouse on the framework structure on a main fabric building (the Office of Professor Pfeifer and Partners, 2008)

it would also be possible to construct the simplest possible foundations, regardless of the existing structures. If new vertical architectural features were built over the sections, it would be necessary to take into account the change of the load on the existing old foundations.

This design solution may at the same time make it possible to achieve a horizontal strengthening of the structure without further increasing the vertical load on the existing historical structures. After the new covering slab structure for the garage is built, it would form an additional horizontal link for the former dyeing section frames. At the present time, the horizontal components of the frames' expansion force are transferred to the slab placed on the ground. The supports terminate much lower than the level of the slab. According to a preliminary assessment, the existing foundations and frames will not require additional strengthening once the garage covering slab is in place.

Framework of the main production building: all the architectural plans proposed at the present time provide for new utilization of the former main production building as an office building (business or media centre). Apart from certain insignificant planning changes in staircases in the lower floors and the addition of elevator shafts, the load-bearing frame structure of this 4½ storey production building with a monolithic reinforced-concrete framework and the interesting solution of the two-part ribbon façade would remain unchanged under all the plans under consideration.

The multilevel framework used in the Factory's main production building, unlike the reinforced-concrete structures of the other Red Banner buildings, is one of the widely used models of early reinforced-concrete (from approximately 1910 through the 1930s). There are many examples of this approach to the preservation, reinforcement and new utilization of similar buildings with such frameworks.

The further utilization of the reinforced-concrete framework of the main Factory building under the proposed plan would at first glance be complicated by the proposed addition of a fifth-storey superstructure – a penthouse set back from the façade. The load-bearing capacity of the upper floor roofing (70 kg/m²) cited in the inspection survey referred to does not permit an additional load on the building under the regulations in force. Nevertheless, even in this case it is feasible to propose a design solution on the basis of a light steel frame that would not exert additional load pressure on the upper floor roofing and would rest only on the framework's outer stanchions (fig. 37). The latter, according to the report's evaluations and on-site observations, could withstand the additional load. The concrete covering itself could in this case remain unreinforced and bear only its own weight in the future.

The archive documentation relating to this building (1926–1932), unfortunately, has still not be found. In their analysis and calculations regarding the building's reinforced-concrete frame, the designers made use of inventory blueprints and the results of a study provided by the client,[16] which gives a very negative assessment of the building's condition. If these assessments are confirmed by the exacting inspections that must be carried out in the project's further implementation, measures would have to be taken to reinforce the building's load-bearing structures.

In such cases, it is necessary to determine on site the real load-bearing capacity of individual parts of the various structures under load stress. If one of the project's alternatives is implemented further, on-site tests should be compared with the results of calculations carried out, and a calculation method appropriate to the specific situation should be selected or worked out on this basis. This approach would make it possible to achieve significant savings in conducting the reconstruction and other work.

It should be borne in mind in this regard that the load-bearing capacity of "historical" buildings is actually much greater than that indicated in findings based on contemporary norms of computer calculations. The reason for this is that the procedure for conducting calculations is based on some model which cannot convey or quantify all the hidden reserves of the load-bearing capacity of the material used in "historical buildings" or their type of structure. For example, the arch effect, which cannot be calculated, comes into being in the course of time in buildings with massive (stone or concrete) cladding or covering.

Thus, in developing working project documentation, it is necessary to comply with the following restoration requirements, which are in principle traditional:

– inspect the framework support structures, including the roofing, and the limits of their further use;
– assess and reinforce the roofing in individual areas in accordance with existing actual temporary load stress for the office buildings;
– the buildings' entire engineering infrastructure must be in accordance with contemporary norms and standards (complete renovation);
– in conducting detailed planning, it is necessary to find a solution that meets the current requirements of structural physics.

A provisional summary

The work carried out in inspection and the preparation of planning documentation for developing the Mendelsohn site in St. Petersburg remains a rare example of close co-operation between the Russian private client, colleagues from Petersburg's monument preservation authorities and German specialists. Project coordination and the practical work of developing the project is still being conducted from Germany.[17] The German side expresses the hope that the first successful steps taken in this large-scale undertaking will be continued and that the Mendelsohn site in Petersburg will set an example in terms of dealing with the extensive legacy of Modern Movement architecture there.

The work already conducted and the unexpectedly widespread interest In participating in the design planning on the part of many architectural design offices clearly demonstrate that the task of appropriately adapting the architectural heritage of the 20th century to contemporary architectural and technological standards is increasingly becoming a challenge for current architectural practice.

At the same time, this work shows that integrating the Modern Movement legacy that is to be preserved into a changed urban architectural framework requires forward-looking plans regarding design, restoration and reinforcement of support structures. The preservation and renovation proposals in those plans should at the same time be in accordance with requirements concerning sustainability, profitability and energy efficiency, which in general open up a future-oriented perspective for the architectural heritage.

The planned incorporation of the Modern Movement legacy into the historic cultural landscape of European cities and city centres that contemporary architects are striving to bring about is in this regard invariably accompanied by judicious concepts and real integration. Obviously, each planner has his own interpretation of these concepts, which is not always understood by the public or professional colleagues. The problem of evaluating the experience that is constantly being amassed and arriving at generally recognized criteria relating to the development of projects for revitalizing Modern Movement architectural sites remains unsolved.

It should be noted that the current yearning for the successful integration of the Modern Movement architectural heritage into specific urban contexts is to a certain extent changing the customary role of the attendant architectural research work. The latter is ever more clearly being employed as the direct basis for forward-looking design and restoration plans and is at least intuitively or scientifically accepted by planners.

Notes

1 Fedorov, S. Die Textilfabrik “Rote Fahne”: Ein nicht abgeschlossenes Projekt Erich Mendelsohns in Russland, in: Festschrift für Rainer Graefe. Forschen, Lehren und Erhalten (Editor Juliane Mayer). Innsbruck 2009, pp. 251–267; id. Erich Mendelsohn’s Red Banner Factory in Leningrad 1926–1928; Laboratory for Early Concrete Works in the Soviet Union, in: Proceedings of the Third Congress on Construction History, Cottbus 2009, Berlin 2009, pp. 561–570; id. Erich Mendelsohns Fabrik Rote Fahne in Leningrad. Baugeschichte – Bauforschung – architektonische Weiterentwicklung, in: Koldewey-Gesellschaft. Bericht über die 45. Tagung für Ausgrabungswissenschaft und Bauforschung vom 30. April bis 4. Mai in Regensburg, Mai 2008, Stuttgart 2010, pp. 305–318; id. Gespräch über die Zukunft der „Roten Fahne“. In: Das architektonische Erbe der Avantgarde. ICOMOS Hefte des deutschen Nationalkomitees, XLVIII, Berlin 2010, pp. 30–35.

2 Until its closing shortly after 2000, the “Red Banner” had become one of the three largest hosiery and knitting factories in the Soviet Union/Russia with 8,000 to 14,000 workers. (see in particular Suknovalov A. E., Fomenkov I. N., Fabrika Krasnoje Znamja, Leningrad 1968).

3 The first publication depicting the project model could be considered: [No author] Welt-Spiegel, 1926 (a weekly supplement to the newspaper Berliner Tageblatt), No. 32, 8 August 1926, p. 3. The project is depicted in the fullest form in the book: Mendelsohn, E. Das Gesamtschaffen des Architekten, Skizzen, Entwürfe, Bauten, Berlin 1930, pp. 118–126 (facsimile publication: Braunschweig/Wiesbaden 1988; English translation: Erich Mendelsohn. Complete Works of the Architect. Sketches, Designs, Buildings. New York/London 1992 – pagination identical). In view of the loss of the original project design, the materials in Mendelsohn’s book remain the author’s most complete documentation of the project, which was reproduced in subsequent editions (see for example: Zevi. B. 1999: Erich Mendelsohn. The Complete Works. Basel/Boston/Berlin, pp. 118–120, 437).

4 See in particular the publications referred to in note 1.

5 This primarily relates to the materials already referred to of the two Petersburg archives: the Central State Archive for Scientific and Technical Documentation of St. Petersburg, which has preserved the basic project documentation on construction in the city during the Soviet/post-revolutionary period, and the Central State Archive of St. Petersburg. The search for the relevant materials relating to the planning of the Red Banner Factory site in other depositories is continuing at the present time.

6 The last archival documentation confirming Mendelsohn’s written contacts with the client relating to the design planning of the factory thoroughfare is contained in Central State Archive of St Petersburg fund 1916, list 3, doc. 229 (Correspondence with the architect E. Mendelsohn on expanding and equipping the Red Banner Factory, 1926–927), sheets 1–7. The documents attesting to the official severance of relations between Mendelsohn and the client have not been found in the archive.

7 The Getty Center for the History of Art and Humanities, Los Angeles, Special Collection: Erich Mendelsohn’s letters, including: 1926, No. 10, 1 August 1926. The author thanks Prof. Jean-Louis Cohen, Paris/New York, for his assistance in acquiring materials from the Getty Research Institute.

8 See, for example, Makagonova, Mariya L., The Red Banner Factory in Leningrad – the Work of E. Mendelsohn. In the second DOCOMOMO Conference Proceedings, Dessau, September 1992, pp. 224–226.

9 See, for example, Makagonova, M. L., Erich Mendel’son v Leningrade: fabrika “Krasnoe Znamya”, in Nevski Arkhiv, Istoriko-kraevedchesky sbornik, ed. II, Moscow–St. Petersburg 1995, pp. 270–284 (in Russian); A. De Magistris, Il construttivismo leningradese e la Krasnoe Znamja, 1925 et seq., in: Casabella, 651/2, December 1997-January 1998, pp. 40–47; Kirikov, B. M., Stieglitz, M. S., Architektura Leningradskogo avangarda. Putevoditel. St. Petersburg 2008, pp. 225–231 (in Russian).

10 See “Explanatory note on the construction of the Red Banner Factory power station”, Central State Archive for Scientific and Technical Documentation fund 192-3-1, pp. 1–27 and 1–3 (typewritten text in Russian, the probable author of the note is the engineer S. Ya. Vygodsky).

11 See note 10, “Explanatory note on the construction of the Red Banner Factory power station”, pp. 7–8.

12 See note 10, “Explanatory note on the construction of the Red Banner Factory power station”, pp. 12–13.

13 See note 10, “Explanatory note on the construction of the Red Banner Factory power station”, p. 20.

14 See note 2.

15 Lapshinsky, A. K. (research supervisor), Results of the survey of the building’s structures at 53 Pioneer Street in Saint Petersburg, volumes 1 and 2, Stroy-Nauka, Minsk, 2008 (manuscript in two volumes in Russian, which were kindly provided for this work by the factory owner, Mr. Igor I. Burdinsky).

16 The Red Banner Factory. Report on the technical survey. Department of Architecture, Petersburg University of Architecture and Civil Engineering, Prof. S. F. Grishin (project manager). St. Petersburg 2007, manuscript.

17 On the instructions of the factory owner, Igor I. Burdinsky, the co-author of this publication S. Fedorov (KIT Karlsruhe) has been functioning as co-ordinator for the architectural part of the project for the development of the former Red Banner Factory site since 2007.

Illustration sources

Fig. 1: State Archive of Cinematic, Phonographic and Photographic Documents in St. Petersburg, gr. 32860
Fig. 2: Central State Archive for Scientific and Technical Documentation, St. Petersburg, fund 192-3-1-9797
Fig. 3: The magazine SSSR na stroyke, Moscow, 1930, № 5–6, pp. 20–21 (copy of the Russian National Library, St. Petersburg)
Figs. 4–7: StroyNauka, Minsk, 2008
Fig. 8 (a, b): Central State Archive for Scientific and Technical Documentation, fund 192-3-1-9797
Fig. 9: Central State Archive for Scientific and Technical Documentation, fund 192-3-1-9797
Figs. 10–13: Photo-documentation, Sergej Fedorov, 2008-2009
Fig. 14: Photo-documentation, Rüdiger Kramm, 2007
Figs. 15 and 16: Photo-documentation, Sergej Fedorov, 2008–2009
Figs. 17 and 21: Kramm & Strigl, Architects and Planners, Darmstadt
Figs. 18–20: StroyNauka, Minsk, 2008
Figs. 22–24: Kramm & Strigl, Architects and Planners, Darmstadt
Fig. 25–31: David Chipperfield Architects, Berlin
Fig. 32: Kramm & Strigl, Architects and Planners, Darmstadt
Fig. 33: David Chipperfield Architects, Berlin
Fig. 34–35: Office for Structural Engineering, Professor Pfeifer and Partners, Darmstadt
Fig. 36: Kramm & Strigl, Architects and Planners, Darmstadt
Fig. 37–38: Office for Structural Engineering, Professor Pfeifer and Partners, Darmstadt

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- Bergheimer Bad in Heidelberg (Bj. 1903)
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