international working party for
documentation and conservation
of buildings, sites and neighbourhoods of the
modern movement

Technology of Sensations
Технология сенсаций

preservation technology
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The Alvar Aalto
VYBORG LIBRARY

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e: ola.wedebrunn@karch.dk

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The editors wish to dedicate this book to the memory of

CATHERINE COOKE (1942-2004)

Catherine Cooke supported and inspired the work of
Modern Movement Technology, and was undoubtedly
the best expert of Russian Modernism.

Kyle
Technology
"Talking about New
Sensations" quote L.R.
thanks for good
cooperation
Ola

Alvar Aalto Vyborg Library - Technology of Sensations
Technology Workshop and Seminar on Case Study

Proceedings of the Seventh International DOCOMOMO Technology
Seminar, Vyborg 18-19th of September 2003

Editors:
Ola Wedebrunn
Maija Kairamo
Tapani Mustonen
Tatyana Svetelnikova

English translation:
Gareth Griffith
Russian translation:
Annikki Kieliverkko

Graphic Design:
Gilbert Hansen

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Linde Tryk, Aarhus

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PREFACE

The Central Library of Vyborg is housed in a building designed by the world-famous Finnish architect Alvar Aalto. From 1994 the building has been undergoing reconstruction as a complex scientific renovation project, planned by an international group of architects, with the goal of creating a modern, functioning cultural centre in the border region of Russia.

The 7th International DOCOMOMO Technology Seminar took place on 18-19th September 2003 in Vyborg, and was dedicated to the Vyborg Library of Alvar Aalto – "Vyborg Library. Constructions of Sensations". The timing of this seminar was very good, since the renovation works are an on-going process in the library.

All the lecturers had an excellent knowledge of their topics, which they shared in a manner understandable even to non-specialists. The audience received a wide and up-to-date presentation by these experts of the various problems facing them.

The presentations remarkably illustrated how contemporary architecture and the entire society should relate to such treasures of architectural heritage through examples of other modernist buildings that have been renovated. They also brought up the unique features of the lighting, colouring and acoustics of the Vyborg Library. It was also wonderful that the seminar took place in the library itself, where each participant could experience the process of the restoration works, and visually demonstrate the research, ideas and suggestions made during the presentations.

The library is situated in the border region of Russia and Finland and represents a huge concentration of information on culture, art and international architecture. But still, in order to understand each other, personal contacts are indispensable. This seminar helped us to understand each other better by looking at the library as one of the world's architectural treasures, through understanding the culture, technology, practice and ideas of Alvar Aalto, through feeling its light, colour and sounds.

I am delighted that this interesting book will contribute to an international exchange of experiences and practices in renovating modernist buildings and especially one of the treasures of this architecture – the Vyborg Library of Alvar Aalto.

The material in this book, I believe, will also be very interesting for Russian architects and restorers, and they will help us find the right approaches and solutions for the continued restoration of the Vyborg Library of Alvar Aalto and apply the gathered information for practical purposes.

Director of the Library Svetilnikova T.V.

ДОКОМОМО Семинар

Центральная городская библиотека г. Выборга располагается в здании, построенном по проекту всемирно известного финского архитектора Алвара Аалто. С 1994 года в здании ведутся реставрационные работы в форме международного сотрудничества в рамках проекта комплексной научной реставрации библиотеки и создания на ее базе современного действующего культурного центра приграничного региона.

7-й семинар ДОКОМОМО, состоявшийся 18-19 сентября в Выборге, Россия, был посвящен Выборгской библиотеке Алвара Аалто – «Vyborg Library construction for sensations» и был организован более чем своевременно, учитывая ход реставрационных работ в здании.

Всех докладчиков отличало прекрасное знание материала и умение донести свои знания даже до неспециалистов. Спектр тем и номенклатура авторов были представлены достаточно широко и вместе с тем актуально.

Доклады замечательно проиллюстрировали, как должны современные архитекторы и общество в целом относиться к архитектурному наследию на примерах изучения реставрации других зданий архитектуры модерна и уникальных исследованиях освещения, цвета и акустических особенностей библиотеки А.Аалто в Выборге. Замечательно, что этот семинар состоялся в самом здании библиотеки, где каждый участник непосредственно смог познакомиться с ходом реставрационных работ, наглядными примерами проиллюстрировать свои исследования, ход мыслей и предложений.

Библиотека находится на приграничной территории и в ней накоплен огромный объем информации о культуре, искусстве, архитектуре всего мира, но чтобы лучше понимать друг друга, личные контакты просто необходимы.

Данный семинар помог нам лучше понять друг друга через понимание отношения к библиотеке как одному из мировых архитектурных шедевр, через восприятие культуры, технологии, навыков, идей архитектора Алвара Аалто, через ощущение его света, цвета и звука.

Я очень рада, что эта интересная книга внесет значительный вклад в международный обмен опытом и навыками при осуществлении реставрации зданий архитектуры модерна и в частности шедевра этой архитектуры – библиотеки Алвара Аалто в Выборге.

Собранные в ней материалы, я думаю, будут очень интересны и российским архитекторам, реставраторам, помогут им найти правильные подходы и решения при дальнейшей реставрации здания библиотеки А. Аалто в Выборге и применить весь собранный и обобщенный опыт на деле.

Директор библиотеки Светильникова Т.В.

THE TECHNOLOGY OF SENSATIONS

Ola Wedebrunn

«On met en oevre de la pierre, du bois, du ciment; on en fait des maisons, des palais; c'est de la construction. L'ingéniosité travaille.
Mais, tout à coup, vous me prenez au coeur, vous mais faites du bien, je suix heureux, je dis: c'est beau. Voilá l'architecture. L'art est ici.... Avec des matériaux inertes, sur une programme plus ou moins utilitaire que vous débordez, vous avez établi des rappports qui m'ont ému. C'est l'architecture. »

Le Corbusier, Vers une Architecture, 1923[1]

Technology is often understood as material and construction that could be tested and proved with references to general principles. Thus building science might be understood as volume and matter arranged in objective scientific relations.

This technology seminar of the DOCOMOMO Technology Committee, however, does not focus on general principles of science. It concerns technology experienced in the case study, and its aim is to target the case study and technology of architecture as the sensations evoked in the interrogation between people and building. The technology within this seminar is, therefore, rather characterised as the technology of sensations, as that what makes building and people; from the programme, construction and building to the use and changes that the case study inevitable undergo.

This might touch the complexity of technology as well as the intuitive, sometimes inexplicable but obvious interaction of building and people.

By addressing material and perception as the sensations of technology, the aim of the seminar is to characterize the building science of the case study where it could be grasped empirically and individually and at the same time be comprehended as a path of the general progress of theory.

Through the case study we also hope to unfold and comprehend aspects and relations of architecture and technology that would be different from a traditional way of tracing material and perception. The idea of *The Case Study Seminar* is to provide a possibility to investigate what might be narrow, specific and heterogenic but still the individual case will mirror and enrich other cases simply because it emphasises and develops the importance of a sensibility for diversity.

Alvar Aalto Library, Vyborg

Architectural heritage is a resource of culture. Its qualities are often so fragile and complex that the investigation of the condition of a building ought to be compared to the assessment of the environment and the condition and diagnosis of organic growth.

This case takes place in, and circulates around the Alvar Aalto Library in Vyborg. Like a film or a written biography characterizing a personage, the aim of the case study is to characterise the building and the qualities and properties involved. The architectural practice and theories of Alvar Aalto are, of course, a source for understanding the library, but so is the building itself, as well as its visitors and the attraction and changes it generates from its daily function and cultural heritage it represents.

The library is considered cultural heritage and is a listed building. Like most buildings, it is listed because of its architectural value; aesthetic, technical and social. But cultural heritage is often of a diversified nature, thus some buildings are listed simply because they are old, and some buildings might even be listed rather because of the history they represent. When it comes to Vyborg Library there could be little doubt that the aspects that make it cultural heritage are diversified and complex and involve the building as well as its history, the people of Vyborg and its daily use and circumstances.

The assessment of the building and the ongoing restoration certainly involve the sensibility to understand history as well as to provide a visionary view for the future. Thus it makes little sense to insulate the understanding of the case study to the building itself, but rather to broaden the scope of experience.

We have therefore broadened the scope of the first seminar on the case study of modern movement technology, paralleling Vyborg Library with two other case studies; the Narkomfin building in Russia and the Zonnestraal sanatorium in the Netherlands.

While the case of the Narkomfin building serves to enlighten and focus on the difficult situation for modern movement architecture in Russia, the case of the Zonnestraal sanatorium is an example of the inherent knowledge that could be drawn upon through the investigation and experiences made by a careful and sensitive restoration.

People and Building

The scope of Vyborg Library certainly concerns more than the building itself. It is about a multicultural town with Swedish, Finnish, Russian and German influences, and a contemporary Russian city of 80,000 inhabitants.[2] Language and reading are, of course, very important for the citizens of Vyborg. This makes Vyborg Library one of the most important buildings of the city, with an average of 800 visitors every day of the year.
Just like the changing contrasts of the seasons, trade and visitors colour the market and the streets of the city, so the circumstances for architecture change, balancing the possibilities

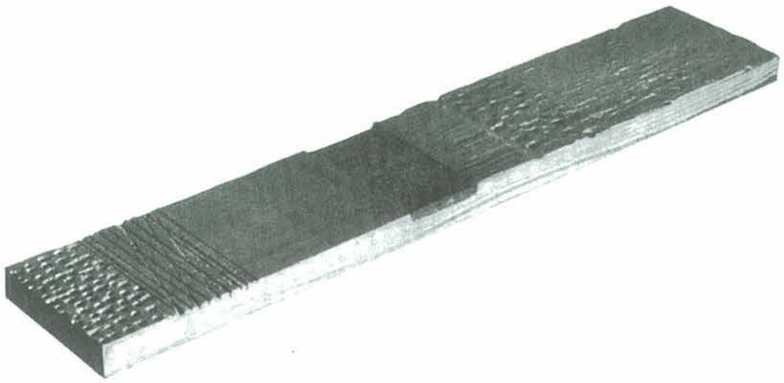


foto: clasen / dessau

abb. 44 vera mayer-waldeck (bauhaus, 1. semester 1927)
fakturstudie. holz mit verschiedenen werkzeugen bearbeitet.

(diese aufgabe ist ähnlich gelöst wie bei abb. 41.)

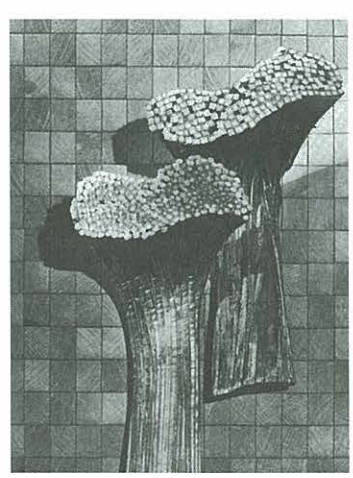
61

and quality of impressions and experiences that are provided by the physical circumstances and the administration of the inherited value that makes Vyborg and its modern library.

Contrast

While the very early buildings of Alvar Aalto might be considered to grow out of a free interpretation of a classical tradition, the Vyborg Library is considered a modern building of an original experience and an increasing liberation from unreflective mimesis. The architecture of Alvar Aalto displays a wide scale of sensitivity for qualities of matter, space and composition.

While the change from the free interpretation of classical tradition to a modern architecture circulate around the Stockholm Exhibition in the summer of 1930, with the Swedish architect Erik Gunnar Asplund as mentor,[3] a second wave of influential grain might be considered to have grown out of the influence from the Hungarian Bauhaus architect Lazlo Moholy-Nagy. Aalto had met Nagy at the CIAM meeting in Frankfurt in 1929, and in the summer of 1931 Nagy visited Aalto in Finland.[4] When returning to Bauhaus, Nagy sent Aalto his book *Von Material zu Architektur* about the education of material experienced through a method of learning as an original sensibility for the contrast of material qualities and perception.[5]



This book might very well be an important inspiration for Aalto's move to an original, experienced and modern architecture. In a series of material compositions, the direct meeting between wood and Aalto becomes models in form and material of the properties of wood itself. Wooden fibres chopped and glued together as sticks and cellulose becomes original compositions and an almost second nature. This nature is the origin of the technology that Aalto developed for his famous bent wood

chairs, first designed for the auditorium of the Vyborg Library.[6]

In an even larger scale, wooden lattice multiplied in the mechanic repetition of the ceiling makes a continuing wave and an almost organic energy of quanta that sways over the curved furniture to shape light, space and the acoustic sensations of the room.

Touching the senses

There could be no doubt that Aalto's architecture touches all the senses. His delicate treatment of glass does not only sustain the beauty of the flowers but the taste of fruits and food and the smell of flowers that glasses, vases and bowls contain.

Aalto follows the sensibility of different matter and technology in all scales.

– As the branch that constitutes the door handle of Aalto's sauna in Muuratsalo, grasped by the hand as the limb of the tree and close relative of nature to our very own naked body.

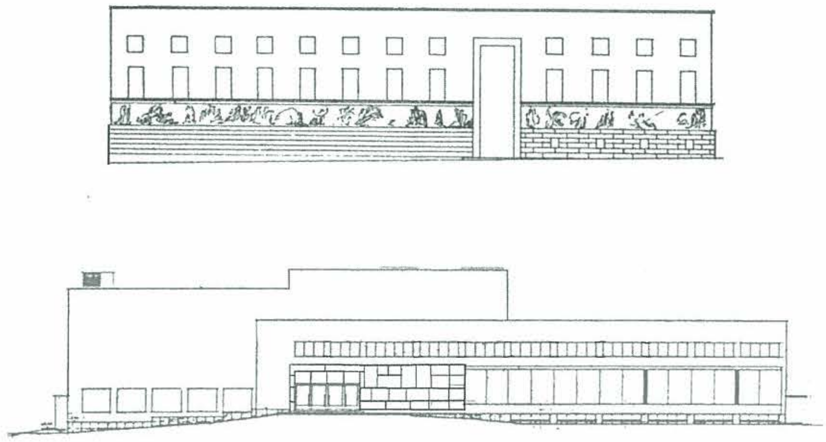
– From the study of brick samples in the walls of his own summer house in Muuratsalo to the contrast and overheated deformed secondary quality bricks laid in the Flemish bond at the Baker House dormitory at MIT in Cambridge, Massachusetts.

Touching the heart

The Vyborg Library touches the senses. There is no doubt that the architecture of the library has many qualities, contributing to the progress of general principles and theories of public functions, as well as creating the frame for private experiences. It is a structure of great character that continuously influences and gives meaning to modern Vyborg.

The library of Vyborg touches the heart with its inherent care, with its ability to generate a living interior and an animated technology of sound and vision; from reflected colours and materials, and from the fact and fiction on the shelf to the virtual reality of its present Internet café.

Maybe the best potential for Alvar Aalto's Vyborg Library is to remain an ongoing Case Study, a vital example of the Technology of Sensations, the Modern Movement displayed as the stimulating contrast and complementary by the changing activity of readers, borrowers, staff and welcomed guests.



Two different elevations of Alvar Aalto's designs for the Vyborg Library, illustrate the change from the free interpretation of classical architecture in 1927 to the experience of modern architecture in 1933.

The free interpretation of classical architecture, as well-known through the work of the Swedish architect Erik Gunnar Asplund, became a major inspiration for a whole generation of architects searching for a new objectivity. Responsive to tradition as well as to experiences of a new reality, functionalism moved from the necessity to answer elementary facts towards a sensibility for architecture as a synthesis of experienced matter and construction.

Notes

1. *"You employ stone, wood and concrete, and with these materials you build houses and palaces. That is construction. Ingenuity is at work. But suddenly you touch my heart, you do me good, I am happy and I say: "This is beautiful."*
...By the use of raw materials and starting from conditions more or less utilitarian, you have established certain relationships which have aroused my emotions. This is Architecture." Le Corbusier, *Towards a New Architecture [Vers une Architecture,* 1923]; translated by Frederick Etchells, Architectural Press, London, 1927.

2. Vyborg was founded by the Swede Torgils Knutsson in 1293. Later, as a maritime trading city, it became Finland's second largest city, until it, along with most of Karelia, was ceded to the Soviet Union after the Second World War. Four languages were spoken in Vyborg before the Second World War; Swedish, Finnish, Russian, and German. An introduction to the history of Vyborg can be read in: Petri Neuvonen, Tuula Pöyhiä and Tapani Mustonen, *Viipuri Opas kaupunkiin. Vyborg, Town Guide*, Rakennustieto Oy, Helsinki, 1999, pp. 8-50.

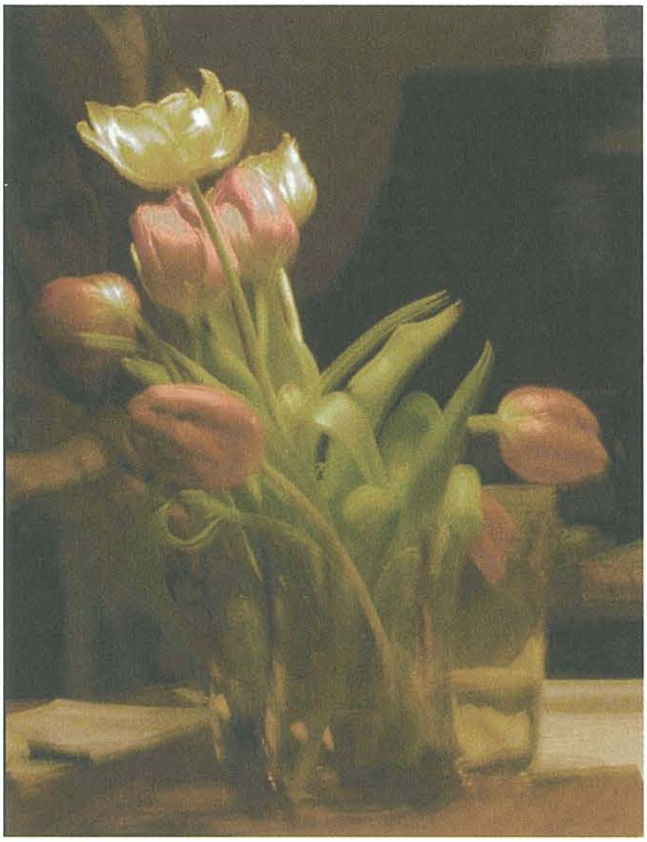
3. The Swedish architect Erik Gunnar Asplund was in charge of the 1930 Stockholm Exhibition, and Sven Markelius was among the group of architects that planned the exhibition with him. Markelius was an important friend of Aalto's. For more on Aalto, Markelius and Asplund see: Göran Schildt, "Aalto, Bauhaus and the Creative Experiment", in Kirmo Mikkola (ed.), *Alvar Aalto vs. The Modern Movement*, Rakennuskirja Oy, Jyväskylä, 1981.

4. Laszlo Moholy Nagy and Alvar Aalto met for the first time at the second CIAM meeting in Frankfurt in 1929. See ibid, p. 25. Moholy-Nagy and Ellen Frank visited Aalto in Finland and in Stockholm, where they stayed with Swedish architect Sven Markelius; ibid, p. 26. In a letter from himself and Frank, Nagy included a copy of his book *Von Material zu Architektur*, and in a draught for a letter Aino Aalto writes to Frank thanking them for Nagy's book. The letter and sketch are to be found in the Alvar Aalto Archives in Helsinki.

5. Laszlo Moholy-Nagy, *Von Material zu Architektur*, Bauhausbuch Nr. 14, Albert Langen Verlag, Berlin, 1929.

6. Aalto's wooden models from the 1930s are described by Schildt, in op. cit., pp. 28-30.

Ola Wedebrunn (b. 1958)
is an architect (MAA). His PhD thesis (made at the Royal Danish Academy of Fine Arts, 2003) was titled *Character and Language of Materials.* He is presently teaching and continuing research at the Royal Danish Academy of Fine Arts in Copenhagen, as well as curating exhibitions on architecture and art. He has published several books and articles about Modern Movement architecture, materials and technology (including joint-editor of the books *DOCOMOMO Scandinavia – Vision and Reality* and *Eastern Cemetery* about the architecture of Sigurd Lewerentz). Ola Wedebrunn is a member of the DOCOMOMO International Executive Committee and holds the chair of DOCOMOMO Specialist Committee on Technology.



Технология сенсации

Ола Ведебрунн (Ola Wedebrunn)

«Ты берешь камень, дерево и бетон, и их них строишь дома и дворцы. Это называется строительством. Изобретательность выражается в работе.
А вдруг ты трогаешь мое сердце, мне приятно, я счастлив и говорю: «Это красиво».»
... Используя сырье и отправляясь с точек более или менее утилитарных, ты создал определенные отношения, которые вызывают во мне чувства. Это Архитектура.
Ле Корбюзье: «К новой архитектуре» (Vers une Architecture, 1923)

На Седьмом технологическом семинаре Комитета Технологии ДОКОМОМО рассматривалось, каким образом технология воспринимается через сенсации данного «case study».
На семинаре сделана попытка раскрыть и понять аспекты и отношения между архитектурой и технологии, отличающиеся от традиционной трактовки материи и восприятия. Возможно, что объект исследования в данном случае является узким, специальным и гетерогенным, но, несмотря на это, каждый отдельный случай

отражает и обогащает другие случаи уже тем, что он подчеркивает и развивает значение чувствительности к разнообразию.
Исследование здания библиотеки и ведущихся в настоящее время реставрационных работ требует понимания истории и одновременно приносит пользу в современных условиях, обеспечивая перспективный взгляд на будущее.

Люди и здание

Всё, что связано с Выборгской библиотекой, касается гораздо более широкого круга вещей, чем само здание библиотеки. Речь идет о многонациональном городе, подвергавшемся шведскому, финскому и немецкому влияниям, а в настоящее время это российский город с 80.000 жителей. Жители Выборга очень ценят свой язык и много читают. Вследствие этого библиотека является одним из самых важных зданий города, которое в среднем посещает 800 человек в день. Времена года, торговля и посетители меняют облик города и его рыночной площади. Также условия архитектуры меняются и балансируют наши возможности воспринимать то, из чего состоится унаследованная ценность Выборга и его современной библиотеки.

Контраст

Алвар Аалто в своих архитектурных решениях проявляет большое разнообразие чувствительности к свойствам вещества, пространства и композиции, с влиянием от шведского архитектора Эрика Гуннара Асплунда на Стокгольмской выставке в 1930 г. В его работах также чувствуется влияние архитектора Баухауса, Ласло Мохой-Надя, который посетил Аалто в Финляндии и подарил ему свою книгу «От материала к архитектуре».

Как трогают сердце

Библиотека г. Выборга трогает сердце посетителя своей заботой о нем. В ней создан живой интерьер и подвижное пространство звуков и видов с помощью отражений цветов и материалов, от разнообразных книг на книжных полках до виртуальной действительности современного интернет-кафе.
Возможно, что самый главный потенциал библиотеки Алвара Аалто заключается в том, что она остается постоянным объектом изучения, живым примером Технологии Сенсации, движения модерна, который демонстрирует свои возбуждающие контрасты и где читатели, абонементы, персонал и желанные посетители находятся в постоянном движении.

'ZONNESTRAAL': RESTORATION OF A TRANSITORY ARCHITECTURE

Concept, planning and realisation in the context of its authenticity

Wessel de Jonge

The main building of the Zonnestraal Sanatorium after restoration in late 2003. The variety of room sizes and parapet heights reveal Duiker's "functionalist" approach.

Ever since its completion in 1928, Jan Duiker's Zonnestraal Sanatorium in Hilversum has probably been the most canonical and internationally celebrated example of Modern Movement architecture in The Netherlands. But after its change in function in around 1960 a consequent series of adaptations and refurbishments caused the disfigurement of Duiker's masterpiece, which has doubtlessly been the most controversial issue in architectural heritage in the country. After two decades of extensive preparatory research, and with the prospect of an eventual UNESCO World Heritage nomination, the restoration of the first building finally started in autumn 2000. The careful dismantling of the main building proved to be an unprecedented source of knowledge and hands-on experience regarding early modern building technology and its preservation. With the first stage of the restoration completed, albeit partly, in 2003, the great value of Duiker's work is now again available to the expert community as well as the general public.

The Zonnestraal Sanatorium is arguably one of the most clear-cut demonstrations of the vanguard philosophy of the Modern Movement in architecture. Its design was a seemingly temporary structure that challenged eternity, in a reinterpretation of some of the grand ideas of the Enlightenment. Conceived between 1925 and 1927 by Jan Duiker (1890-1935), Bernard Bijvoet (1889-1979) and structural engineer Jan Gerko Wiebenga (1880-1974), the Sanatorium is strongly rooted in the cultural, social and technological developments of the Industrial Revolution.
During that dynamic period in history, the building tradition underwent unprecedented changes. Industrialisation and the consequent process of urbanisation triggered a demand for new and particular building types. The functional programmes for buildings became increasingly diverse and specific and, as a result, more short-lived. New materials and construction technologies allowed engineers and architects to fulfil these needs to an ever-growing extent.
In the 1910s and 1920s, architects acknowledged a direct link between the design and technical lifespan of a building and the user requirements over time.
As the time span for use changed as well, time and transitoriness ultimately became important issues in architectural theory. Consequently, this led either to a transitory or adaptable architecture. The consequent translation of these ideas into practice produced the specific architecture of the Modern Movement, of which Zonnestraal is a stunning example.

Transitoriness

Jan Duiker was a main spokesman of the Modern Movement in The Netherlands. "Why is it", he complained in 'De 8 en Opbouw' in 1933, "that one refuses to view the form as the materialisation of the functions, demanded from the organism? (...) This form (...) that is nothing more than an answer that comes up to the requirements most directly: the most economic solution."[1] Duiker clearly considered architecture as a matter of reason rather than style, attributing great value to the connection between form, function, material, economy and time.

Jan Duiker in his automobile, which he identified as one of his inspirations for industrial assemblage products.

According to some of his writings, he promoted the idea that whenever a building's purpose had to change, the form would loose its right to exist and the building must be either adapted or demolished altogether. Clearly, he regarded buildings as utilities with a limited lifespan and occasionally even as 'throw-aways'.
With Zonnestraal he produced the first and arguably most direct response to a short-lived functional programme in his professional life. Based on a solid belief in science and progress, the sanatorium was established in the conviction that tuberculosis would be exterminated within thirty to fifty years.[2] Here, the architect managed to subtly balance user requirements and technical lifespan with the limited budget of the client, creating simultaneously a structure of breathtaking beauty and great fragility.
Hence, we are faced with the conservation of a structure that was intended to be transitory. It is clear that the restoration of his buildings poses great challenges in both

conceptual and material terms because, in such cases, the idea of transitoriness must be understood as part of the original design intention.

Spiritual economy

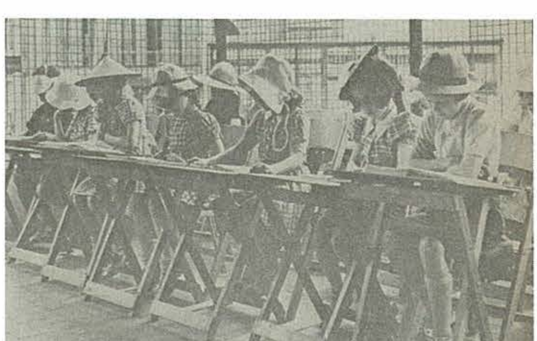
It is quite striking to see how the engineers were ahead of the architects as far as the employment of modern building technology was concerned. Some of them designed structures which anticipated Le Corbusier's theoretical writings years before these were widely published. Wiebenga designed a remarkably modern Technical School in Groningen as early as 1922 with a full concrete structural frame, light infills, and steel framed window casements arranged in horizontal bands.[3] It was still five years before Le Corbusier canonised the free plan with his 'five points for a new architecture',[4] providing a theoretical basis for the architectural avant-garde, and just four years before Duiker invited him to help him work on the sanatorium project.[5]

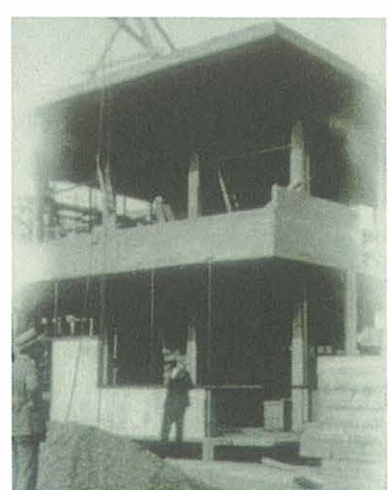
With 'Zonnestraal', they followed a rigorous distinction between load-bearing structures and infills, in order to allow for maximum flexibility, and used light and transparent materials in the facade to ensure the unhampered access of daylight and fresh air into the building. Related to the idea of varied lifespans was the introduction of prefabrication for building components, since it allowed the easy replacement of deteriorated or malfunctioning parts, as well as later adaptation in response to functional change.

Directly linked to the principle of the open plan are a series of technological inventions, such as the radiation ceiling panels for Duiker's Open Air School in Amsterdam (1927-28) and his patented hot-air system for the Gooiland Hotel in Hilversum (1934).

Duiker designed his buildings as light as possible, using minimum amounts of material. This is demonstrated, for instance, by the extremely slender concrete frame of Zonnestraal, with the beams haunched at their bearings and tapering cantilevers to follow the moment diagram as closely as possible. The necessarily complicated carpentry for the formwork was not uneconomic in a period with cheap labour and relatively expensive materials.

His aim for optimal construction is referred to as "spiritual economy", which, as Duiker wrote in 1932, "leads to the ultimate construction, depending on the applied material, and develops towards the immaterial, the spiritual". He introduced this notion so as to distinguish this conceptual principle from financial economy.[6]

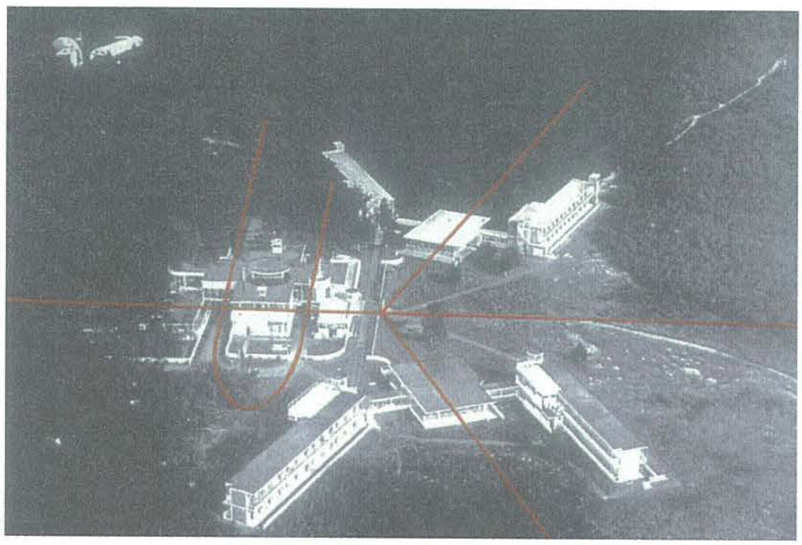




left: Directly linked to the open plan were technological inventions such as the radiation ceiling panels for Duiker's Open Air School in Amsterdam (1927-28).

right: Test construction of the plastered parapets of the Zonnestraal Main Building in 1927. The rigorous distinction between load-bearing structures and infills allowed the use of light materials in the facade.

Still, in many of his projects optimalisation was a bare necessity, due to his clients' shortage of funds. He again needed all his "engineer's-art" to make the actual construction of Zonnestraal possible, albeit in two stages, as the financial position of the client only allowed for a second pavilion for patients to be completed in 1931, three years after the main building and the first pavilion had been opened.



The Zonnestraal Sanatorium, on the perimeter of a pine forest overlooking the moors near Hilversum, shortly after the completion of the second pavilion in 1931. The layout shows the interaction between an East-West axis through the passages to the outside world, and a North-South axis that ran from the main staircase through the large hall on the first floor to the open field.

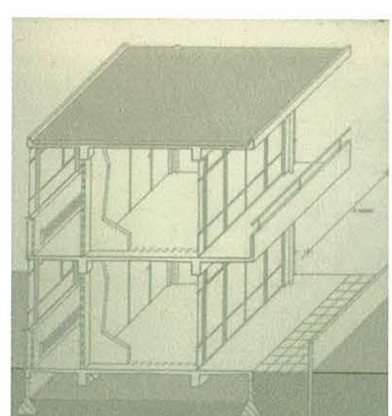
Zonnestraal

The sanatorium was part of a larger aftercare colony for tubercular patients, which was founded in 1919 by the Diamond Workers Union of Amsterdam following British examples. Duiker's master plan involved a main building with two patient pavilions, to be extended later with two more pavilions, arranged along a North-South axis. The pavilion wings are set at 45° to each other, allowing unhampered views out and plenty of daylight in.

Since money was extremely short, a cheap construction method was required. Observing also hygiene requirements, eventually a reinforced concrete frame was chosen. The buildings are entirely structured on a 3m module, based on the Dutch 1918 Concrete Regulations, which allowed the formwork of floors with a span of 3m to be removed in a weeks' time rather than the four week curing period that had to be respected for larger spans. This was a crucial condition in view of the strict six months construction schedule for Zonnestraal.[7]

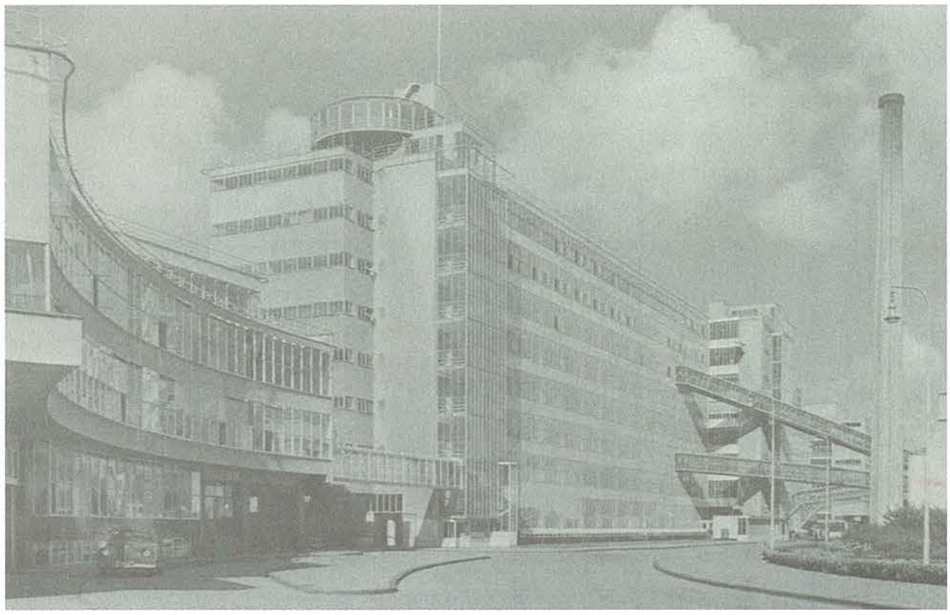
The pavilions clearly illustrate how Duiker and his associates assimilated the concrete frame with the architectural lay out, which is tailored around the required functions. The wings feature parallel girders set off at 3m, creating a zone for individual 3x3x3-metre patient rooms. The 1.5m cantilevers of the floor slabs provide terraces on the sunward side and a corridor to the north, that connects the rooms and links the stairs at both ends.

Thus, the building is almost like a functional pro-



The pavilions clearly illustrate how the architects assimilated the concrete frame with the architectural lay out, tailored to the required functions.

Brinkman and Van der Vlugt's Van Nelle Factory (1926-31) represents the idea of rational planning to its fullest.



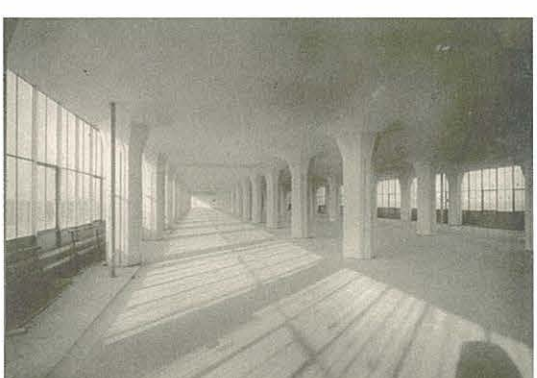
gramme enclosed by a steel, glass and plaster envelope. Although less obvious due to the complexity of the programme, the layout of the main building is based on the same principles. The building seems to evoke a striking demonstration of Adolf Behne's original definition of 'functionalism' of 1923, as opposed to 'rationalism'.[8] According to Behne, functional planning departs from the brief and involves the careful design of individual spaces for each particular function, with specific dimensions and performance characteristics, organically producing a tailor-made suit. One may conclude that, consequently, the building may not be easily adaptable to functional change and is likely to have a short functional life expectancy, as opposed to such striking examples of 'rationalism' as the Van Nelle Factories in Rotterdam, where the a-specific, neutral space could be relatively easily adapted to a new use as a centre for design studios.[9]

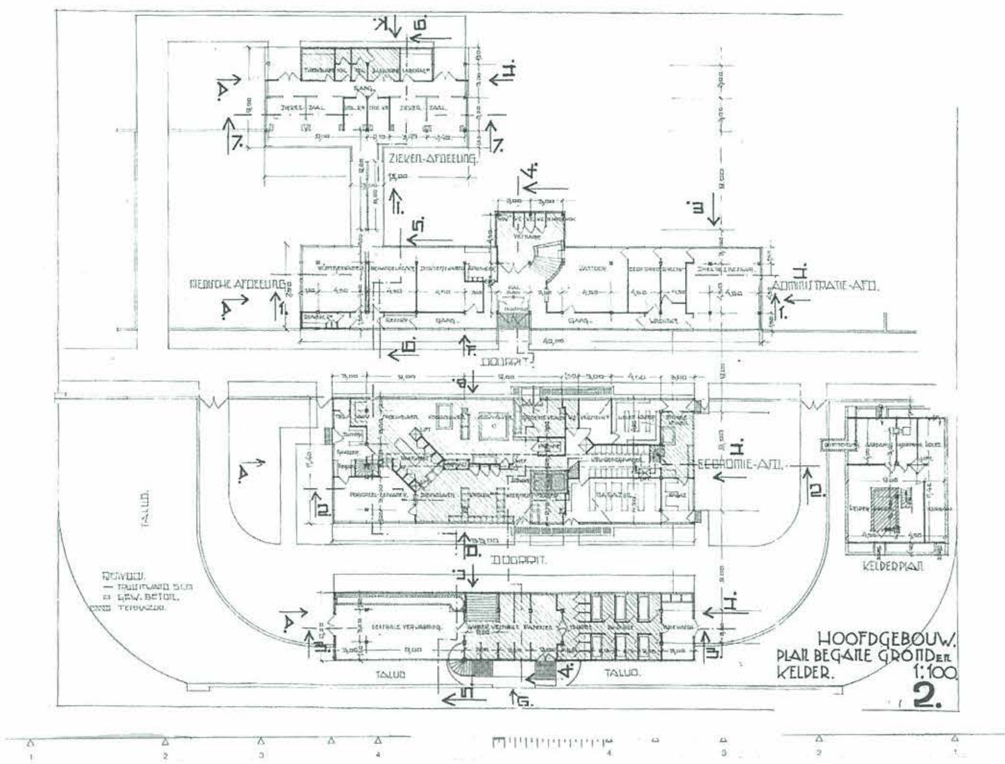
In Zonnestraal's main building each room has particular dimensions, and even the height of the parapet varies according to the use of the space concerned. Moreover, the building features several programmatic clusters, such as the medical/administrative department, the kitchens and the boiler/bath house, which are accommodated in separate wings on the ground floor. By detaching these wings from each other by passages for cars, the functional status quo was fixed. Such an obstruction of any future adaptation may be best understood in its relation to the building's limited lifespan.

On the other hand, the particular layout of the building suggested an interesting inter-

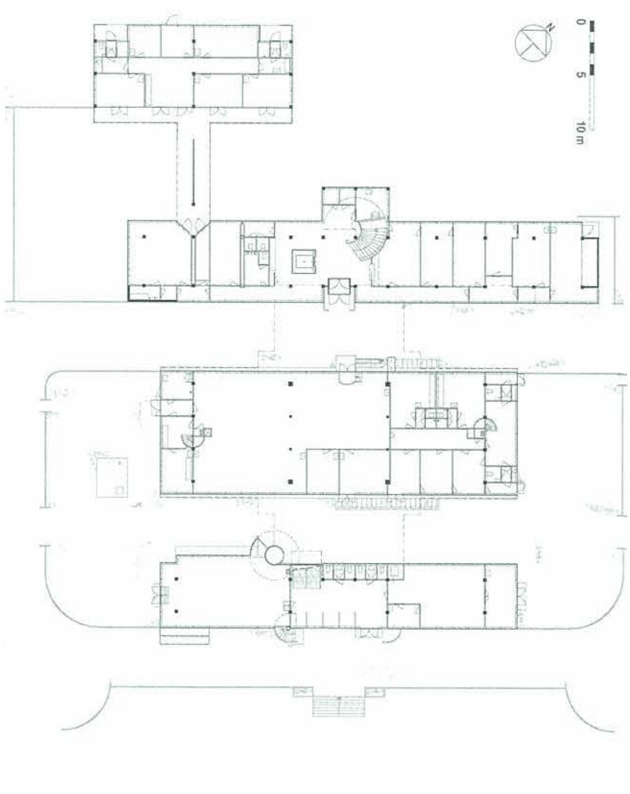
left: A work floor in the Van Nelle coffee factory showing the rationally planned, open and flexible floor plan. Mushroom columns and smooth ceilings ensured proper daylighting.

right: The rational plan of the Van Nelle buildings allowed for the relatively easy accommodation of new functions. An architects' office at the Van Nelle Design Factory.





The original plan of the Main Building showing the functional clusters and passages. Bottom: boiler/bath house; Middle: kitchen wing; Top: administrative/ medical department.



Plan of the Main Building redesigned for the new function. Most of the original plan appeared compatible to the new functions. The large physiotherapy room in the centre was once the main kitchen.

action between an east-west axis through the passages, which connected the sanatorium complex with the outside world, and a north-south axis that organized the day-to-day use of the premises by the patients during the harsh years they spent to be cured of their life-threatening disease, and that ran from the main staircase through the large hall on the first floor to the open field and the pavilions. One of the beauties of Duiker's architecture is this symbolic expression of the main building as a crossing at different levels of these inner and outer worlds.

Industrial technologies

The extensive preparatory research projects carried out since 1983 showed that Zonnestraal was a test ground for new and experimental building technologies.[10] Though aimed at industrial mass production and the dry assemblage of prefabricated building parts, most solutions actually adopted in the main building still involve hand-made prototypes, with all the related problems and failures. Remarkably, Duiker had the opportunity to improve some of the technologies applied in the main building and first pavilion of 1928, when completing the second pavilion three years later.

Fascinatingly, also in the materialisation of the sanatorium buildings Duiker demonstrated a profound understanding of how to balance the technical lifespan with the requirements and scarce resources of the client. By using cheaper non-galvanised steel windows he limited the technical lifespan of the buildings, though they would surely last for the expected functional lifespan of thirty years. Moreover, as part of their labour therapy, it was planned that the patients would regularly paint the steelwork, avoiding excessive maintenance costs.

The main building of 1928 involved a prototypical curtain wall consisting of individual window units made of 25mm steel profiles. These casings were produced in a workshop and mounted on site against vertical steel posts (IPE 8) that ran between the floors. To save material, the second and further window units came with just one jamb and were fixed against the previous casing to create a stable unity, actually producing one large window frame over the full 33m of the building's length. The lack of any tolerance in the joint between the casings of course gave rise to problems in controlling the measurements. Also, the 25 mm deep window profiles were so shallow, that the 1.50 m wide top hung casements were too unstable to avoid early glass breakage. Even during construction, additional mullions had to be placed in the casements in order to subdivide them to become more flexible.

The salvaged facade, uncovered in 1997 after demolition of a post-war extension, gave evidence of all original details and hardware.

When the other pavilion was finalised in 1931, these shortcomings were countered by choosing a stronger 37 mm profile series, introducing side hung casements of a much smaller size, and by designing independent steel framed window casings that were placed between the IPE 8 posts with sufficient tolerance, largely according to contemporary curtain wall systems.

Another example of improvement was the construction of the parapet. Steel mesh was fixed between the steel posts under the windows. After the lower half of the mesh was

covered by several layers of cement plaster on both sides, the upper half was folded inward to create an inner skin by plastering the interior surface. A similar technique was used for the partitions.[11] As a matter of fact, this had nothing to do with dry assemblage but a lot to do with the desire to create an abstract, pristine surface.
The parapets of the 1931 Dresselhuys Pavilion, on the other hand, involve prefabricated spandrel panels made of clay wire mesh and 6 mm steel reinforcement bars, again plastered with several layers on both sides, to a total thickness of 50 mm. By welding the ends of the rebars against the IPE 8 posts, the panels were fixed vertically. After the joints were filled with bitumen, the spandrels were finally painted. These spandrel panels are the first prefab 'concrete' building parts known to be used in The Netherlands.
The curtain wall and spandrel construction, as well as some other features, make the sanatorium complex a unique witness to the rapid developments in building technology in the second half of the 1920s, before the economic crisis and the Second World War brought them to a halt, until they re-emerged during the building boom of the post-war reconstruction.

Obsolete

The war also caused a brief upswing in tuberculosis in Europe, triggering the discovery of antibiotics shortly afterwards. As predicted by Duiker and his clients in the 1920s, most sanatoria became obsolete by the mid-1950s and Zonnestraal was no exception. The sanatorium was transformed into a general hospital in 1957, just before it reached the end of its life expectancy. As a result, numerous extensions were added, and wooden barracks were scattered all over the hospital estate, compromising the serene clarity of the original layout.

The corridor in the administrative department showing the condition of the Main Building just prior to the restoration.

The first pavilion was completely refurbished in 1955-58, enclosing the open balconies and changing the characteristic staircases of the building. Today it stands unrecognisable.
The main building was first extended several times towards the north. Around 1976, serving as a general lobby for the hospital, the detached wings of the ground floor had to be connected and the northern passage was closed off. The main entrance was moved to the eastern tip of the middle wing, where originally the kosher kitchen had been located. Moreover, the rest of the building was completely refurbished. The interior arrangements were radically altered, almost all the partition walls were removed, the slender steel-framed window casings were replaced by wide aluminium ones with double glazing and the colour scheme was changed.
The second pavilion was largely left as it was. Since the early 1980s, the pavilion stands obsolete, a victim of the elements and local hooligan gangs. The windows are broken and the concrete is fully being exposed to the weather. The damage caused by corroding rebar is enormous and parts of the roofs have recently collapsed.
After amalgamating with another hospital in Hilversum in the early 1990s, the premises were largely vacated, awaiting a new use. The big question was, how to find one.

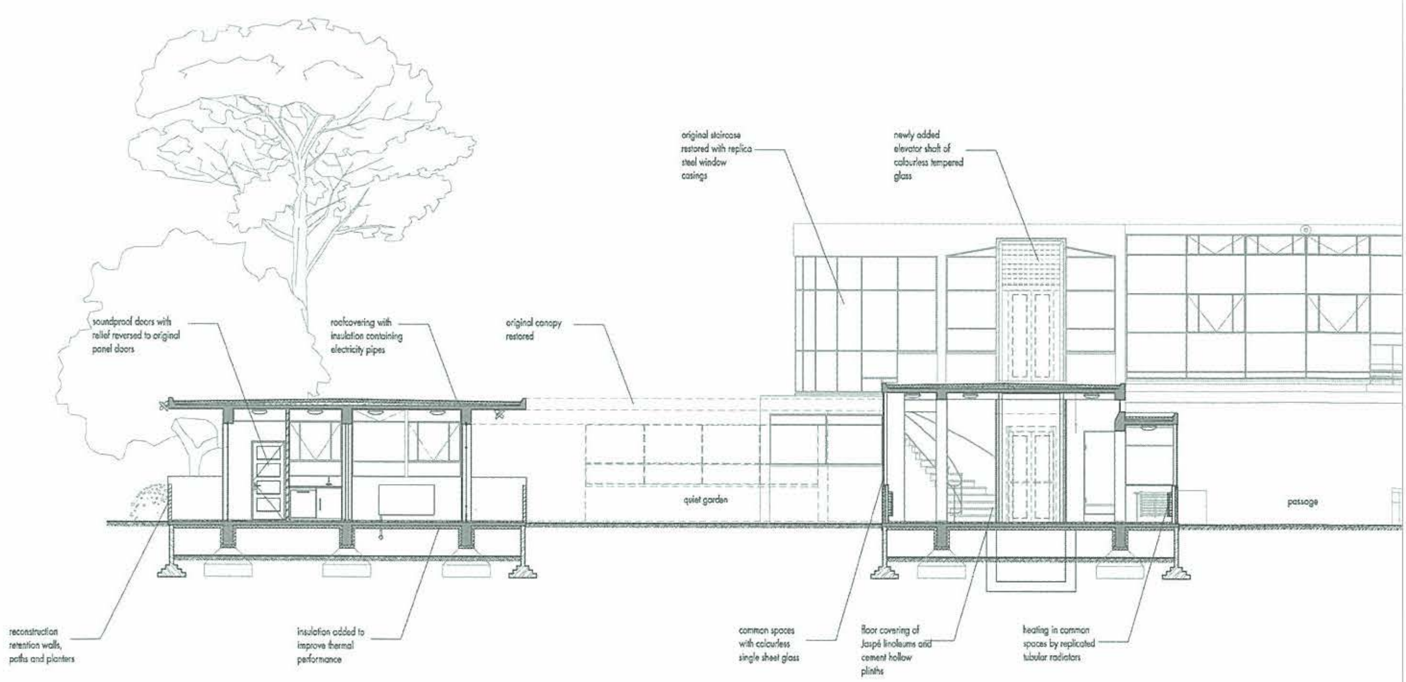
Function follows form...

In our way of working, the structural analysis of the buildings themselves has become prominent. This requires sufficient time in advance to study the layout, the structural frame, the building technology and materials, as well as the role attributed by the architects to the building installations, and how all these elements interrelate. The aim of such extensive research is to obtain a comprehensive understanding of the buildings' rationale before actually touching it.

The most complicated issue to assess is how the architects themselves saw the performance of their buildings in terms of building physics in relation to the systems for heating and cooling they devised. As a matter of fact, these installations were of great interest to many of these architects, who preferred to call themselves building engineers rather than designers, as proper knowledge of heating and cooling systems was decisive in designing light, open plan or even semi-open-air buildings for our climate. Unfortunately, little research has been performed regarding the historic development of such systems and we have to rely largely on period magazines and an occasional handbook.

Given this importance, we have tried to restore as much as possible the most essential elements of the installations, such as the tubular heating radiators in the most public areas of the building, such as the corridors and the main hall upstairs.

Another challenge has been that these buildings were designed at a time when the energy performance of buildings was quite differently considered than we are used to since the energy crisis of the 1970s. This is even more the case since Zonnestraal has been designed with a user in mind who advocated keeping all windows open at all times, also in winter. Despite efforts to improve the performance of the buildings in energy terms, it has been obvious right from the start that present requirements can



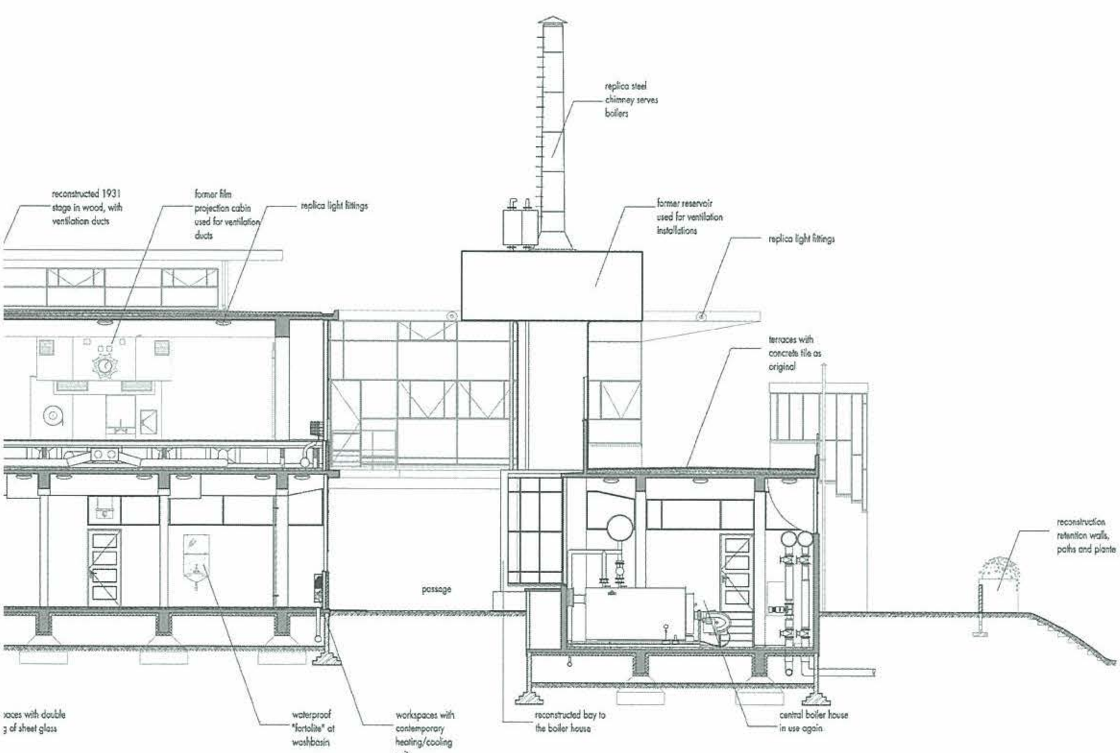
never be met without totally destroying the essence of Zonnestraal.[12] As a result, the comfort level inside the building will hardly fair in accordance with present standards. Rather than trying to change this against all odds, we proposed to look for a new and appropriate use that could comply with these facts. Matching form and function reminds one of Duiker's efforts when designing the buildings 75 years ago. But Louis Sullivan's credo "form follows function", which was adopted by the Modern Movement as a guideline, has now been reversed.

Project

Since 1995, a new set up as a healthcare centre has been developed in a master plan for the restoration and extension of the original ensemble by Hubert-Jan Henket architects and our office, in cooperation with the landscape architect Alle Hosper. The centre will involve a variety of independent, polyclinic-type health services and additional conference facilities in the main building. Both pavilions will eventually serve as accommodation for patients. To finance these costly operations, the municipality of Hilversum allowed an apartment complex to be built elsewhere on the forested premises.

In order to capture Zonnestraalís spirit of modernity, the original state of the ensemble as it was completed in 1931 has been taken as a reference regarding the interior layout, functional clustering and elevations, as well as architectural and technical solutions. The varying condition of the three original buildings may suggest in due course a different restoration approach for each of them.

The oldest pavilion has been put to a new use as a 'health care hotel',[13] after it had been basically renovated earlier on. From September 2000 to December 2002, the original workshops of 1928 were restored and extended by our office and now serve as an obesities clinic. The main building was restored from September 2000 to July 2003 and



Section of the restored building showing passages and various solutions for the facades and installations. Far right: boiler house; right: physiotherapy room; left: main hall with elevator; far left: former hospital wing.

By concentrating the steel members into a U-shaped frame in the centre of the elevator shaft, a crystalline volume with glass corners resulted, and which leaves the contours of the building almost untouched.

so far accommodates a sports injuries' rehabilitation clinic and a conference centre in the main hall upstairs. The client's choice not to have one tenant for the building, but rather several individually operating users elegantly, matches the specificity of the original layout with the two passages for cars, and allowed the northern passage to remain open again.

The original interior layout was precisely known from the preparatory research project and appeared largely compatible with the new functions required, which were then carefully inserted into the tailor-made suit that Duiker had left us. The close interrelation between the exact, 'functionalist' layout of the various rooms and the facades guided us to select a proper use for each space. Only when a new function could not be accommodated by the old structure was it proposed to deviate from Duiker's plan. Fortunately, the prominent extremities of the various wings originally served mostly as secondary entrances, cloakrooms and sanitary facilities that were also functional in the new set up, so that little had to change. More difficult was to find a new use for the obsolete kitchens in the core of the building, until a physiotherapy hall for the rehabilitation clinic appeared to fit in nicely without being very visible from the surroundings.

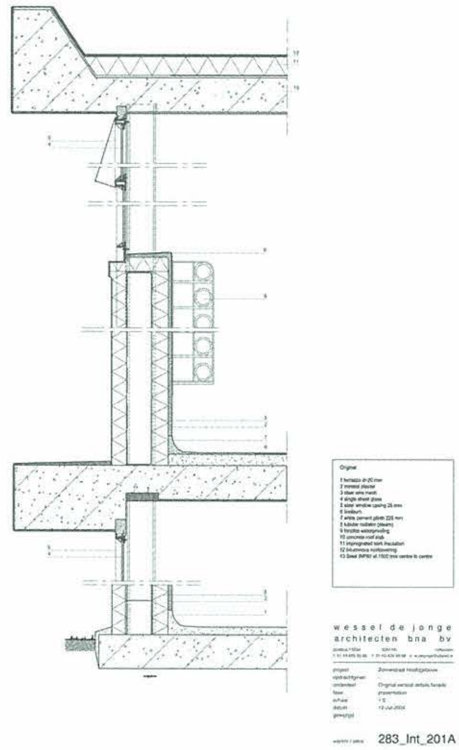
Similar decisions were made to fit in an elevator to comply with present regulations regarding wheelchair access. By concentrating the steel members into a U-shaped frame in the centre of the shaft, a crystalline volume with glass corners resulted, which leaves the contours of the building almost untouched.

The boiler house again serves as a heating plant for ñ eventually ñ the entire complex of buildings. As the original radiators were fuelled by steam and their replicas by hot water, additional floor heating was added in the single-glazed main hall. Together with sun-reflective curtains, solar gain is largely compensated by switching the floor heating to cold water during the summer. The reconstructed podium doubles as a ventilation shaft, allowing cold air into the central part of the hall for additional cooling. In doing so, a climatising system according to present standards could be inserted to ensure a pleasant indoor climate throughout the year without compromising the fragile transparency of the original building.

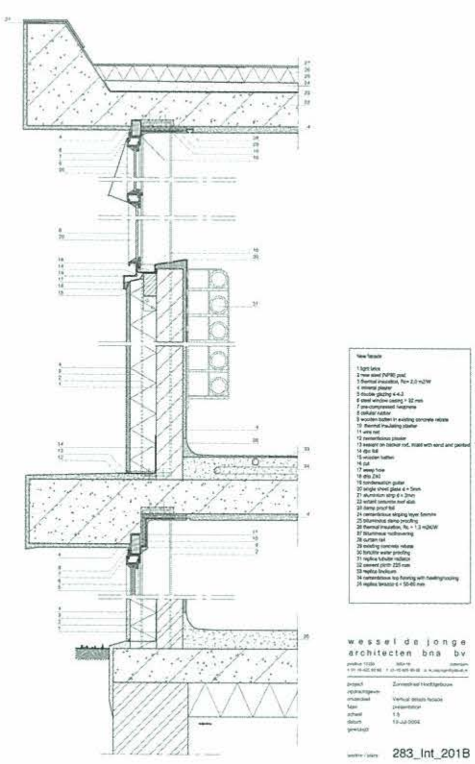
Material aspects

When planning the restoration, Duikerís search for new and specific technical solutions and materials for Zonnestraal has meant attaching great value to the few remains thereof in the main building.

The works largely involved the reconstruction of the original facades, partitions and finishes, and there has been little conservation or restoration of authentic materials, except for the concrete structural frame, a few partitions and the salvaged parts of one facade. As the essential meaning of this building lies within the conceptual starting points of the original designers, and the restoration project has been aimed at revitalising the perception thereof, to my mind one could successfully argue that it still concerns a real restoration. Yet, we realised that the material aspect was vital for the suc-

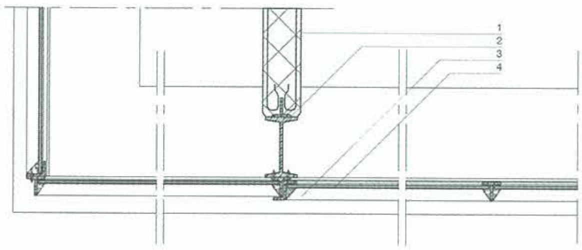


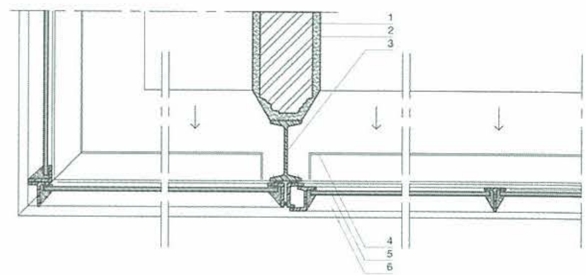
Section through the facade, as built in 1928. Window casings of 25mm and plastered mesh parapets are fixed to steel NP 8 posts. 1:20



Section through the facade, as restored in 2003. 32/37mm replacement windows are fixed against similar NP 8 posts.
The parapets are now of insulated light brick, which allowed for a seamless and pristine finish as the original. 1:20

Comparison of the original and replacement horizontal details. 1:10





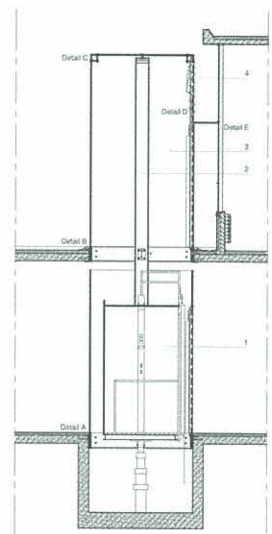
Original

1 partition plastered wire mesh
2 steel INP80 at 1500 mm centre to centre
3 steel window casing 25 mm
4 single sheet glass

New facade

1 light brick
2 mineral plaster
3 new steel INP80
4 condensation gutter
5 single sheet glass 5 mm
6 new steel window casing 32 mm
7 joint 3 mm with sealant

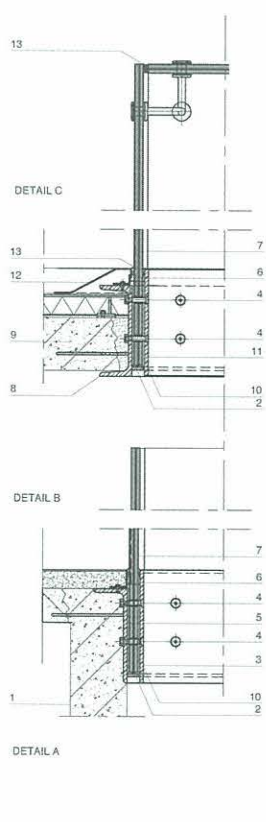
Section through the new elevator shaft. The central steel portal supports the tempered glass construction and accommodates all elevator technology at the same time.

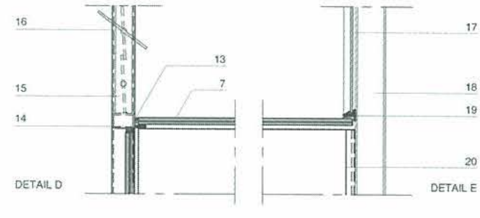


Section Elevator shaft

1 Elevator in stainless steel and tempered glass
2 Steelframe for elevator shaft, combined with all elevator mechanics and wiring
3 Elevator shaft in tempered glass
4 Automatically operated ventilation shutters in tempered glass

Details of the elevator shaft. A, B and C vertical sections, D and E details of the connecting bridge to the original facade (right). 1:20





Elevator shaft

1 concrete elevator pit
2 steel strip 30x8 mm
3 steel bracing strip 300x10 mm
4 sunken-head M12-60 into welded bolt
5 steel L 90x250x10 mm
6 stainless steel 45x45x3 mm cold folded
7 Optiwhite laminated glass 12.10.4
8 UNP240
9 extant concrete floor
10 rubber sealant (black) 220x5 mm
11 steel bracing strip 280x10
12 stainless steel flashing
13 sealant (black)
14 steel strip 30x6 mm
15 fixed glass shutter
16 automatic glass shutter
17 single sheet glass
18 INP80
19 replica steel window casing
20 stainless steel U-profile

cessful revitalisation of Duikerís architectural concept, and to make comprehensible the full cultural context of Zonnestraal.

Some lost parts have been carefully reconstructed at a high cost, such as the steel window casements, the sheet glass and finishes like the linoleum and the terrazzo floorings in particular areas. Components such as the window hardware may have been industrially produced in the 1920s, but have since been taken out of production and had to be hand-crafted for the restoration.

In a way, the ëfunctionalistí principles in which the sanatorium buildings originated have caused us to attach greater value to the truthfulness of the very materials than has been the case in some other recent restoration cases of modern buildings.[14] Also, it has required more artisanship than anticipated.

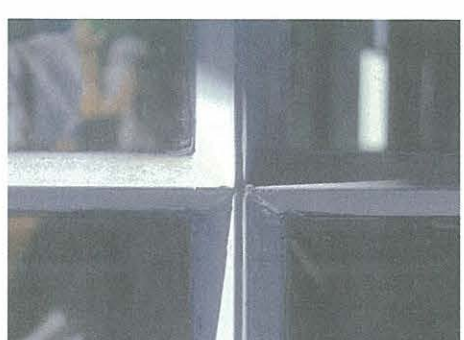
Curtain wall

The faithful reconstruction of the exterior was made possible due to the discovery of an original section of the facade in the summer of 1997, after an extension to the building was demolished. Apart from a section that could be reconstructed from this salvage material, the facades have been built up from new, steel-framed window casements. As the shallow 25 mm profiles of the original casements could not hold double glazing and the initial stability problems had to be avoided, the new units have been made of slightly heavier 37 mm profiles, similar to the ëimproved versioní of 40 mm that Duiker himself used in the 1931 pavilion.

Due to the greater depth, the sharp putty framing of the original glazing could even be made in the shallow double-glazing units that were specially designed for the restoration.

To remake and guarantee a facade without any tolerance in dimensions, as was originally the case, is something not even an experienced restoration team is willing to accept today. We redesigned the facade as a series of individual casements fixed against the vertical posts with a minimally acceptable tolerance of 3 mm in the joint between them. By filling the joint with a flexible sealant and pushing it back with a finger nail, the joints slightly show and indicate which sections of the facade are actually new.

Thanks to extensive colour research carried out by Evert-Jan Nusselder and Mariël Polman of the National Heritage Department RDMZ, the original colour scheme could be fully retraced. Zonnestraal appeared to be a rare example in The Netherlands of a Modern Movement building that had actually been really white, even with a dash of blue in the mineral paints to add more brilliance to the plastered surfaces. The heavenly blue shade of the casings, with a remarkable touch of violet, makes the steel frames dissolve against the sky.



left: A detail of the original 25mm steel window casings of the Main Building, showing the shared jamb between two casings.

right: A detail of the 32/37mm replacement windows, showing the [-shaped jambs of both independent casings with a 3mm joint.

The only remaining original facade of the Zonnestraal building shows extremely slender details with 25mm window profiles that cannot hold double glazing. It was therefore retained in its material authenticity but relocated to a corridor where single glazing was acceptable.

Glass

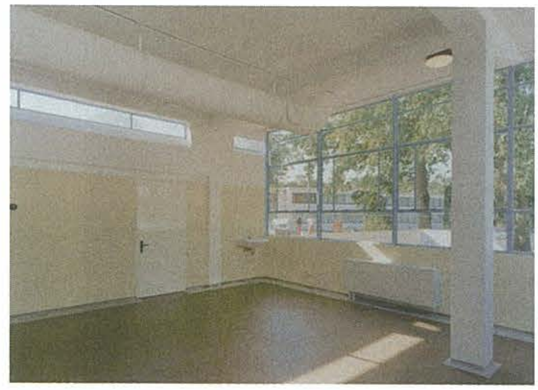
Being nothing more than a concrete frame with a transparent membrane enclosing it, this building required serious efforts to find types of glass that would allow us to perceive the original building as closely as possible. Zonnestraal predates the invention of float glass,[15] which was developed by Pilkington in the 1950s and became readily available only in the late 1960s. Sheet glass as used in Zonnestraal was slightly warped, producing vertical distortions, which was essential to the vision and reflection qualities of the state-of-the-art curtain wall of 1928.

Moreover, the colourless glass of the 1920s, made of low-iron sand, which has since been used up in Western Europe, could only be found at a reasonable cost in the new member states of the EU. Colourless sheet glass was eventually imported from Lithuania.[16] Single glass has again been used in spaces that did not require careful climatisation, such as corridors and staircases, as well as spacious rooms such as the main hall upstairs that would allow people to move away from the glazing sufficiently not to be affected by cold draughts. As the cross shape of the hall easily allows one to look through four layers of glazing, the issue of glass colour has been particularly important here.

For the workspaces, single glazing was not acceptable and a sophisticated solution for double glazing was designed to meet the required conditions. As double and single glazing would be applied right next to each other, it was particularly important to reduce any differences in appearance. Therefore, we wanted the Lithuanian glass for the outside pane. To avoid any colouring of the double glass unit, as compared to the single glass

left: An original interior of the doctor's room. The classic oak furniture, linen curtains and woollen carpets present a contrast with the brilliant exterior image of the building.

right: The same doctor's room after restoration. All finishes have been re-made, but the heating/cooling units in workspaces are contemporary.



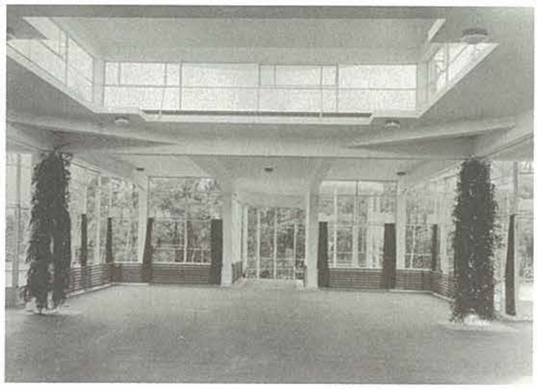
next to it, we had Starphire float glass imported from the US for the inside pane, which is of even more neutral colour. Very recent developments in UV-proof adhesive technology allowed the warped Lithuanian glass to be joined with the float glass pane in a Belgian factory, using a neutral grey U-PVC spacer that was specially produced in Italy. On close inspection, the expert eye may find the multiple reflections of the double glazing units slightly diverging from those of the single panes, but viewed casually from a certain distance the slightly blurred reflections from the sheet glass surface are predominant.
The 11 mm thick double glazing units could be accommodated by the new window units. The increased depth of 37 mm of the steel profiles allowed for similar putty framing as found in the original single-glazed section of the facade.

Cement plinths

The contrast between the interior and the exterior of Zonnestraal in terms of finishes and colour has been a huge surprise. After earlier restorations of modern interiors in The Netherlands, most notably the Sonneveld House of 1932,[17] it has again been striking to see that the originally selected colour schemes and finishes are quite different and much richer than those we tend to consider as 'modern' today.
The interior finishes bare witness to the functional character of the building as well. Beneath the whitewashed ceilings and upper parts of the walls, the lower parts were finished with a warm yellow mineral paint covering a section of strong cement plaster. The waterproof 'fortolite' sections in the cloakrooms, toilets, kitchens and behind washbasins were made in a similar shade, though slightly textured and more brilliant. From the draft specifications we learned that Duiker wanted the floors covered with a sound-absorbing material, for which he initially proposed asphalt roof covering.[18] Eventually he relied on linoleum, which was much more expensive. In order to economise, Duiker decided to use the flooring only in the central field of each space where people would actually walk. The remaining areas along the walls and around columns were finished with white cement plaster, which was set up against the wall to create a hollow plinth. Again, such handcraft was not uneconomic in a time of inexpensive labour, and hence the disproportionate cost of restoring the plinths confronted us with a paradox when restoring the building.
Another way for Duiker to cut expenses was to avoid waste by using either the full 2 m wide or half width linoleum sheets. As the corridors measure 1.50 m centre to centre, a handsí width on either side of the linoleum aisle was left for the white cement plinths, exactly as seen on period photographs.

Linoleum

With the architectsí original order for JaspÈ linoleum we got hold of the product specifications, amounts, colours and related codes, but no information as to which rooms each colour was planned for. Given Duikerís initial idea of having roof covering on the corridor floors and stairs, we believed the very dark brown to be used there. Similarly, the middle brown colour may have replaced the oak parquet for the main hall that had to be economised on. Finally, the dark green may have been used for the staff rooms. This assumption was calculated in terms of surfaces, to find out that the amounts ordered for each colour nicely matched our hypothesis.
Jaspé is a wood patterned design, easily produced by having the upper calender rotating



The main hall upstairs in the original situation. Note the woollen curtains, the cement plinths around the columns and the tubular radiators.

The main hall after restoration. The 1931 stage has been remade to accommodate ventilation ducts. The floor has two shades of reproduced Jaspé linoleum and the tubular radiators have been reconstructed.

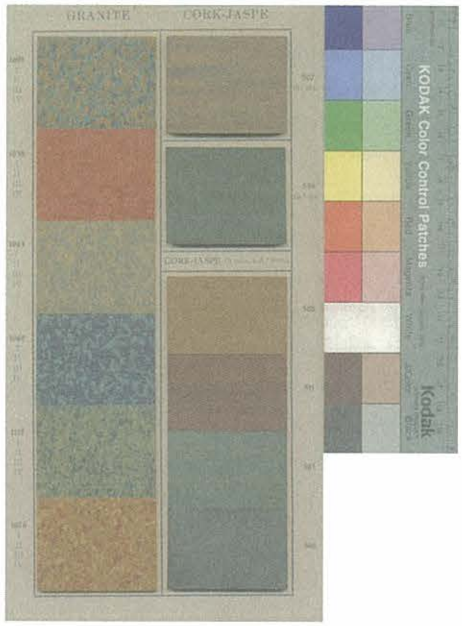
at a slightly higher speed in order to stretch the contrasting colour particles, and therefore relatively cheap. The producer, Forbo Krommenie, still held the 1928 sample books but, much to their regret, was unable to reproduce the pattern themselves due to the lack of the proper calender. Eventually, rival manufacturer Armstrong DLW appeared to be still equipped to reproduce Jaspé linoleum. Only because Forbo was still prepared to offer the 1928 sample book as a reference, could the process of reproduction could finally start, and we are still extremely grateful to them. Unfortunately, the green ordered by Duiker was out of production and the alternative colour he selected was lacking from the old samples. As we remained unsure of the exact green colour, we decided instead to rely on just the two brown colours that we were sure of, and applied these in all the rooms. The two brown shades were redesigned on the basis of a digital scan of a salvage piece of Jaspé. After extensive tests and samples, the DLW laboratories managed to remake both colours convincingly.[19]

Together with the yellow walls, the natural linen curtains and the woollen carpets, the light and dark brown linoleums created quite a contrast with the bright blue window frames and the brilliant white facades. Though functional and unadorned, the interiors of 1928 were probably less an expression of progress. Still, the choice for Thonet bent wood furniture can be explained from the fact that these were already mass-produced and therefore ëmoderní, while the steel tubular furniture that we associate with modern interiors was still hand made for the elite.

Conclusion

The restoration of this building has provided us with several new insights, and has helped us to revise and improve some of the conclusions drawn from our research predating the restoration process.

When speaking about an architecture that pursued industrial building methods and the assembly of machine-produced components, one could argue that the very materials are indeed not essential. For the authenticity of Modern Movement architecture, the spatial qualities, appearance, form and details are evidently more significant, though the core of modernity in architecture remains the idea, the conceptual starting points of the original architect. This may lead us to the conclusion that the absolute value of materials and constructions as applied in modern structures must not be overestimated. In view of the underlying philosophy and the limited functional lifespan of many



The original 1928 sample book of Forbo Krommenie. Right, third from the bottom, the dark brown 511; fourth from the bottom the middle brown 508. The green 505 was no longer available in 1928.

Armstrong DLW staff worked with the architects to expertly redesign both colours. Tests were also compared to samples of other finishes, such as the cement plinths and wall paints to create a convincing colour scheme.

The linoleums were redesigned on the basis of a digital scan of a salvage piece of Jaspé linoleum (left), varying the basic tones that constitute the design (right).

modern buildings, most building materials applied in modern structures are also short-lived. As the authenticity of materials is, therefore, often difficult to maintain, a convenient excuse to ignore the material aspects of these modern prototypes becomes available. However, the restoration of Zonnestraal taught us that such an excuse can easily be false.

It is self-evident that our earlier conclusion, that the assessment of the historic value of Modern Movement buildings must be based on more than just their appearance, was strongly confirmed. Understanding the original design approach appeared critical to the conservation process. Precisely in the case of Duikerís works, it made us comprehend that the exposed constructions themselves are vital to the original concept. His technological innovations are directly linked to the free plan and the rationalisation of construction. Even if some of them failed, we must be aware that the experiments of modern engineers and architects represent a historic significance of their own. Respecting the material aspects of their architecture helps us to understand what may appear to us as the anachronisms of the era.

The contrast between the interior and the exterior finishes and colours appeared striking, most notably because those originally selected for the interiors do not easily comply with our image of the Modern Movement. To our mind, respecting this difference has contributed greatly to the quality of the present restoration, and to the narrative of Duikerís original architecture in the social and cultural context of its time.

This is vital for making historic continuity understandable as well for the public at large. Apart from its great architectural value, the unique history of Zonnestraal has made it an unprecedented symbol of our social democracy, attracting almost 2000 visitors on the first day the restored building was open to the public.

Wessel de Jonge

Wessel de Jonge (b. 1957) graduated in architecture at Delft University of Technology, The Netherlands, in 1985, and combines an academic and a professional career. He has been the restoration architect for several noted Modern Movement buildings in the Netherlands, including the seminal 1923 Technical Schools in Groningen (1999) and Duiker's 1928-31 Zonnestraal Sanatorium in Hilversum (2002), the latter in co-operation with Henket Architects.

Wessel de Jonge has also been the supervisor for the revitalisation of the 1928-31 Van Nelle factories in Rotterdam (1999-2004).

Wessel de Jonge is the co-founder of DOCOMOMO and held the position of International Secretary and Editor of the DOCOMOMO International Journal from 1990 to 2002. He is presently a member of their international Advisory Board and International Specialist Committee on Technology. He has widely lectured and published internationally on the challenge of preserving the recent architectural heritage.

The interior of the Zonnestraal building illustrates the hand-made character of the interior finishes that contrasts with the architect's ambitions regarding industrial building methods.

The rear of the Main Building after restoration. The clear-glass elevator shaft is one of the very few changes to the building that is visible from outside.

The Northern passage after restoration. To the right, the salvaged 25mm single-glazed facade. Left and top: the 32/37mm replacement facade, with double glazing on the ground floor, and single sheet glazing on the first floor.

Notes

1. J. Duiker, 'De nieuwe Fordfabriek te Amsterdam', *De 8 en Opbouw*, 1933, pp. 113-118.

2. During the preparatory meetings for the planning of the sanatorium, the Board of Zonnestraal indicated a life expectancy of 30 years. The minutes of these meetings are today held in the International Institute for Social History (IISG) in Amsterdam.

3. These features were adopted by Wiebenga to respond to the limited construction time that was allowed, while the programme for the schools was still unclear, thus creating maximum adaptability. See Jap Sam (ed.), 2000.

4. Le Corbusier and Pierre Jeanneret, untitled, in *L'architecture vivante*, Autumn/Winter 1927, pp. 13-27.

5. Wiebenga left to work in the United States soon after the schools were finished in 1923. After his return in 1926, he published a series of articles that reflected his fascination with a variety of professional issues, ranging from rational planning and construction to functional building and material properties. His involvement in the planning of Zonnestraal and several other key modern buildings in The Netherlands reached far beyond the average professional involvement of a structural engineer. He advised Duiker on many issues, among others the finishes to be applied in Zonnestraal, and revised the specifications, which is unusual in the Netherlands' building tradition. See Henket, and Jonge, 1990.

6. J. Duiker, 'Dr. Berlage en de "Nieuwe Zakelijkheid"', *de 8 en Opbouw*, 5 (1932), pp. 43-51.

7. See See Henket, and Jonge, 1990, pp. 36-37.

8. Adolf Behne's 'Der Moderne Zweckbau' (Munich 1926) had already been written in 1923, but was only published three years later, when publications by Gropius, Mendelsohn and others had already sparked a wide debate. See Behne, 1996.

9. See W. de Jonge, 'The Technology of Change. The Van Nelle Factories in Transition', in Henket and Heynen, 2000, p. 46.

10. The research by H.A.J. Henket and W. de Jonge resulted in a report that has later been summarized and extended with an English summary: see, Henket and Jonge, 1990. Since than, the building history of the individual buildings has been reported in greater detail by our office in various unpublished volumes. The IPE 8 is a type of steel section that dates to the pre-war period, coded in centimetres rather than millimetres. Today, we have INP 80, which is similar in size (8cm wide) but different in form, most notably because the flanges have a continuous thickness, while the flanges of an IPE taper.

11. A construction following American examples advocated by Wiebenga shortly after his return to Europe: See J.G. Wiebenga, 'Amerikaansche bouwmethoden een economisch succes' in 'Gewapend Beton' 1926, pp. 32-35; see also Henket and Jonge, 1990 and Molema and Bak (eds.), 1987.

12. See Henket and Jonge, 1990, pp. 53-54, 81-82, 85-86, 99.

13. Rather than occupying hospital beds, after a brief period in intensive care, patients are accommodated in a health care hotel to further recover, and at much lower cost. Located mostly amid nature, patients enjoy their stay much better and tend to be cured faster. Such a benefit is also economically advantageous for the health insurance companies, who are thus interested to invest in projects such as Zonnestraal Health Care Resort.

14. Particularly the restoration of the Van Nelle factories in Rotterdam; see: 'The Technology of Change. The Van Nelle Factories in Transition' in Henket and Heynen, 2002, pp. 44-59.

15. This is an absolutely smooth contemporary glass, produced by floating molten glass on to liquid metal. See Jonge and Wedebrunn (eds.) 2000, and Wiggington, 1996.

16. For the Van Nelle factories, sheet glass in smaller sizes was found in the Czech Republic. Similar glass is artificially reproduced as 'Bauhaus Glass' by Schott, Germany, though at higher cost. For more about glass technology and types, see Jonge and Wedebrunn (eds.) 2000, and Wiggington, 1996.

17. See Adriaansz (et al.), 2001.

18. It was Wiebenga who corrected Duikerís draft regarding this point, claiming that the bitumen would stain the white cement plinths. The draft specifications with annotations by Wiebenga are in the archives of the International Institute for Social Studies in Amsterdam.

19. An extensive report on the reproduction of Jaspé linoleums for Zonnestraal will be published in a forthcoming edition of the DOCOMOMO International Journal.

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Зоннестраал: Реставрация мимолетней архитектуры

Концепция, проектирование и выполнение в контексте своей достоверности

Вессел де Йонге (Wessel de Jonge)

Санаторий «Зоннестраал», построенный в 1928 г. в городе Гильверсум, является наверное самым классическим и знаменитым образцом архитектуры Модерна в Голладии на международном уровне . Но, поскольку в 1960-е годы здание стало использоваться по другому назначению и, следовательно, имели место адаптация и реновация, шедевр Дуйкера потерпел некоторые убытки. Поэтому он несомненно является самой спорной темой архитектурного наследия страны...

После двух десятилетий предварительных исследований и благодаря возможному включению здания санатория в число памятников мировой архитектуры ЮНЕСКО, реставрация была начата осенью 2000 года. Осторожный демонтаж главного здания дал реставраторам ценную информацию и конкретный опыт строительной технологии модерна на его ранней стадии развитии, а также опыт сохранения реставрируемого здания. Теперь, после завершения первой стадии реставрации в 2003 г., бесценная работа Дуйкера опять открыта для специалистов и других посетителей.

THE NARKOMFIN HOUSE AND THE MODERN MOVEMENT IN MOSCOW

Anke Zalivako

Since the collapse of the Soviet Union in 1991 the face of the city of Moscow has changed a lot. A large number of administrative and apartment buildings have been erected. Quite a number of prestigious projects have been realized, such as the 4-storey underground shopping-centre "Manezh Square" next to the Kremlin. The construction boom continues. One of the main town planning aims is the regeneration and preservation of Moscow's historical centre. In the Middle Ages the centre had about 680 churches. This silhouette of towers should return with the so-called "Moscow style", which has appeared since the mid-1990s, and which pretends to be the contemporary national Russian Architecture. Accordingly, many churches have been reconstructed. Some of the most spectacular events were the reopening of the Christ the Saviour Church in 1997 for the city's 850th jubilee, and the reconstructions of the entrance building to the Red square, the Iverskije Vorota, and the Church Kazan Mother of God. All of them had been destroyed in the 1930s. The City is trying, on the one hand, to reconnect to the situation that existed before the revolution and, on the other hand, to omit the Soviet period.

It's necessary to understand Moscow's present town planning policy when looking at the situation of the remains of avant-garde architecture in Moscow and especially the avant-garde monuments. The majority of them had been erected on former clerical sites, which were expropriated from the church after the revolution. Today the Russian Orthodox Church has re-obtained most of its former properties. The current situation shows that reconstruction works in Moscow are concentrated on the preservation of old and clerical monuments, whereas a lot of Constructivist buildings are still in a very poor condition, although quite a number of them have since 1987 carried the official status of a historical monument.

About 70 buildings from the Constructivist period of Russian architecture from the 1920s and 1930s are located within the so-called garden ring of the City of Moscow. 37 of them are under protection as cultural heritage. Under the Russian Federal Law for the Preservation of Historical and Cultural Monuments (26.06.2002), the status of a historical monument means that it is of national, federal or local importance. This status, however, can change. Today in Moscow there is only one monument left from this period that carries the status "of federal importance": the railway-workers club on Komsomolskaya square, designed by Alexy V. Shchusev in 1928-29. This building, with its decorated facade, is not typical of Russian Constructivist architecture at all, yet matches the city's architectural aims and has therefore managed to retain its status. All other monuments are of so called "local importance", which means that the City of Moscow is in charge of them. This low level status means that the City of Moscow can do anything with a building, in accordance with the Moscow Law for the Preservation of Historical and Cultural Monuments (14th July 2000).

Today the condition Moscow's Constructivist monuments can be divided into four different groups:

The first group consists of buildings that are still in use, mostly in their original function, such as the State Ministries built between 1927 and 1929 for the Soviet government after it moved back from St. Petersburg. These include, for example, the so-called Narkomsem building, the Ministry of Agriculture, built in 1929-1933 and designed by architect Alexy V. Shchusev. Further representatives of this group are the Gostorg Headquarters for the State trading organization, from 1927, designed by architects

The Kauchuk Workers' Club, 2002.

The Narkomsem Ministry of Agriculture, 2002.

"Mostorg" Department Store, 2003.

Boris Velikovskij and Mikhail Barshch as well as Le Corbusier's "Centrosojus" ministry for the light industry (officially "Narkomlegprom") from 1929-1936, and some of the workers clubs. For example, the famous "Zuev" workers club, with its glazed corner stair, built in 1927-1929 by architect Ilya Golosov is still in use: its 75th anniversary was celebrated in 2002.

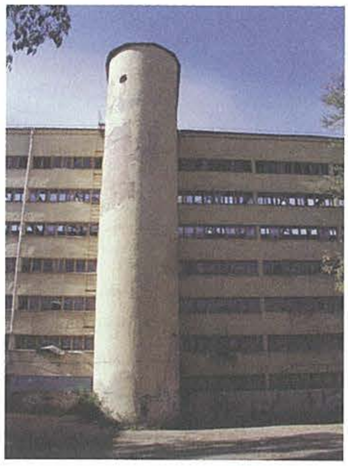
The second group is formed by buildings that have been left with an investor, as proscribed in the Moscow Law for Preservation. The investor is responsible for all reconstruction works coming under the regulations. Unfortunately, such a restoration normally ends up with what is called "Euroremont", a very cheap coverup refurbishment, which should look like European standard but in fact is of very low quality (as to Catherine Cooke).

A quite impressive example of this second group is seen today in Melnikov's Kauchuk Workers Club, built in 1927-1929, where the wooden-framed windows have been changed into mirror-glazed metal ones. The reconstruction of the famous Mostorg department store, built in 1929 by the Vesnin brothers on Krasnaia Presnia is an example of this group, too. There the investor and new user of the house became the Benetton company. Like many other Constructivist buildings, the original windows had already been changed in the 1960s to aluminium ones. In a restoration in 2002 the building's ventilation system was integrated into the facade. The building lost its transparency due to the corporate identity of Benetton: the front and rear windows have been closed with gypsum board. Also, two emergency stairs have been added, which has increased the volume of the building by quite a lot.

The only representative of the third group is the Melnikov house on Krivoarbatskij lane, which can be considered as the one and only attempt in the 1990s to undertake a civilized restoration based on scientific and historical documentation.[1] The way in which the building has been reconstructed can be compared to Europe's first attempts to deal with Modern Movement architecture, such as, for example, the restoration of the Weissenhof-Siedlung in 1981-1987, when a lot of original materials were lost and the appearance of the buildings changed quite a lot.[2]

The last group of Constructivist buildings in Moscow are buildings that are more or less abandoned; such as some of the workers' clubs or the 1920's communal houses. One example is Ivan Nikolaev's communal housing complex for trainees and apprentices of the Textile Institute, from 1929, famous for its extreme size.[3] Also well known is the Narkomfin House, which was listed in 2002 as one of the 100 most endangered sites in the world by the World Monuments Fund.

All over the world the Narkomfin House is recognized as the finest built example of the Constructivist rationalist architecture. It was built in 1928-30 by Mosei Ginzburg and Ignaty Milinis as a semi-collectivized housing complex for the employees of the Soviet Financial Ministry (Narodnyj komitet financov-"Narkomfin"). It was one of seven communal houses in Moscow representing the new socialist housing ideas of that time, when it was ideologically intended to dissolve the family and realize collective living; for example by minimizing individual space and kitchens and maximizing collective space. It was labelled as a "transitional" type, which means that it still has small kitchens, but had a canteen as well in the adjacent communal block. The house was part of a master plan that should have consisted of two residential blocks, a kindergarten, a laundry and a hostel. The plan was not fully realized, because by the end of the 1920s the Constructivist architects were being more and more criticized. The defamation had



Communal housing complex for trainees and apprentices of the Textile Institute, 2003.

its origins in the discussion of the Communal Housing projects in the late 1920s, when this approach to organizing socialist life proved unworkable and was discontinued. The Communists accused the architects for their failure as well as for their waste of expensive and scarce materials in the Soviet economy, such as glass and metal. With the growing political tension, the Constructivist architects were accused of "cooperation with the fashions of capitalist architecture" under the label "Corbusianism".
In fact the Narkomfin House is the prototype for Le Corbusier's later built Unité d'habitation in Nantes, Marseille and Berlin. A story is still told of how the young Le Corbusier asked Ginzburg for copies of the layouts of the duplex unit-apartments, which he took back to Paris, where he developed his idea of the "vertical" city. In the Narkomfin House there are two different types of duplex-apartments and different types of apartments at both ends of the building. This layout, with open space and galleries, was obviously too modern for its inhabitants at that time. The first thing people did after moving in was to make the house fit themselves by eliminating these special details.
Since that time, this building and Constructivist architecture generally was never appreciated in Moscow. It is still defamed for several reasons. First of all, it's a late consequence of the first repression under Stalin in 1932. Today Constructivist architecture is still considered to be "ideologically imposed architecture, which has nothing to do with national Russian roots", because of its spartan character. For the Narkomfin House this has meant that since 1928 it has not once been refurbished. This was more or less accepted during the Soviet period, with the excuse of economical difficulties; but nothing has happened within the last twelve years, either, when any ordinary residential block in Moscow underwent a minimum refurbishment.

The Railway Worker`s Club on Komzomolskaya Square, 2001.

However, the house still represents the new housing ideas and the new construction technologies of its time. Actually, the prejudice of "being worse than Europe's Modern Movement" is another reason for the bad reputation of Constructivist architecture in Moscow, but, in fact, the Narkomfin House is the best example for demonstrating that the Constructivist buildings, or at least the ones built as pilot-projects between 1927 and 1929, were made from the same materials and with the same technology as any other Modern Movement building of the same period in Europe.
This happened, because the house had a special promoter: the client was the Minister of Finance, at that time Nikolai A. Miljutin (1889–1942), who was personally

"Gostorg" Headquarter for the State Trading Organization, 2003.

The Melnikov House after the restoration in 1999.

interested in architecture, but due to the revolution became commissar. The architects were lucky with this client, who did everything to help them realize their project in difficult times, with the lack of building materials. The architects succeeded in building it on complete analogy with the Bauhaus buildings in Dessau, especially the workers' housing estate in Dessau-Törten. The Narkomfin House project was the first attempt in Moscow to prefabricate materials on site, just as Gropius had done since 1925 in Dessau–Törten. Furnace-clinker concrete blocks were used for the ceilings and the external walls were built *in situ*. The Narkomfin House is the only building from the 1920s in Moscow which has ceilings made of furnace clinker concrete blocks similar to Modern Movement buildings around Europe.

Other evidence for the tight connection between this house and the ideas of the Bauhaus is the fact that the Bauhaus-teacher Hinnerk Scheper, who worked in Moscow's "maljarstroi"-team between 1928 and 1931, did the colour-layout for the Narkomfin House.

The detail design of the flat roof is quiet similar to the roof-detailing of Ernst May´s housing-estates in Frankfurt-Praunheim from 1927-29. The roof terrace is finished with prefabricated concrete tiles, lying on gravel. Wood-cement and furnace clinker concrete were used, as was common in Europe, too. Despite this, the same insulation material was used as in Europe, where it was called "Heraklith". In the Soviet Union this material was named "Fibrolit".

The wooden sliding windows of the Narkomfin House can be compared to the wooden sliding windows that Le Corbusier and Pierre Jeanneret invented for their house at 14 and 15 Rathenaustrasse in the Weissenhof Exhibition from 1927. Le Corbusier used a prototype for an insulating glass unit, whereas Ginzburg put his window in two single layers, as was the normal practice in Russia. The single units of both windows are quite similar. These are just a few examples to show that there is no big difference between the Narkomfin House and any other Modern Movement building in Europe.

With the times of *perestroika*, numerous attempts have been made to find an investor for the Narkomfin House, especially by the son and the grandson of one of the architects, Vladimir and Alexy Ginzburg, who are both architects. Since then, there have been several attempts, mostly initiated by foreigners, to rescue this house within the last decades, but none of them has been successful. Nevertheless, one has to take into account that with regard to the difficult approach to Constructivist architecture in Moscow in general, it can be considered a big success that this house had not been demolished due to its condition, especially since the latest construction boom.

The current situation is that the building has recently acquired a new neighbour, a typical "Moscow-style" office-block, which was partly financed by the City of Moscow.

A high voltage cable for the new building was dug into the ground and a new street was constructed in June 2003 on the site of the Narkomfin House complex. This street, only four metres from the house itself, changed the whole situation on site and superseded all existing restoration projects. Recently, new plans have appeared. The plan by the Moscow government is to turn the Narkomfin complex into a high level hotel, which will include changes in the layout and the construction of additional floors: this is a very "creative" approach to preserving the building.

Something will undoubtedly happen to this building in the immediate future, because since the summer of 2003 the Narkomfin House has been visible from the garden ring, and in its current condition this is not considered acceptable in today's Moscow.

Unfortunately, only a few people in Moscow are aware of the value of Constructivist buildings such as the Narkomfin House.
This case shows that the avant-garde buildings in Moscow remain in their traditionally dissident position and are currently under immense economic pressure. With the speed of changes happening in present-day Moscow, they will be lost very quickly.
My personal hope is that as many buildings as possible will survive until the situation becomes more civilized with a following new generation. Otherwise, the active change of Moscow into Las Vegas will carry on, and more authentic witnesses of Russia's history will be lost soon and forever.

Notes

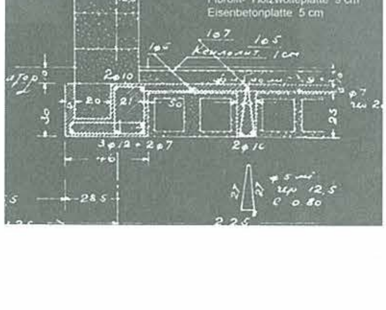
1. For details about this restoration see Vladimir Rezvin, "The Restoration of Melnikov's House", in: *Do.co.mo.mo Conference proceedings: First International Docomomo Conference*, Sept. 12-15th, 1990. Eindhoven 1991.

2. This is the reason for the current "restoration of the 1987 restoration" of Le Corbusier's and Pierre Jeanneret's house in the Weissenhof, financed by the German Wüstenrot Foundation.

3. Most of the examples are listed in Dennis Sharp and Catherine Cooke (Eds.), *The Modern Movement in Architecture. Selections from the DOCOMOMO Registers*, 010 Publishers, Rotterdam, 2000. See "Russia East", the Communal house for textile institute students or the Narkomfin House.

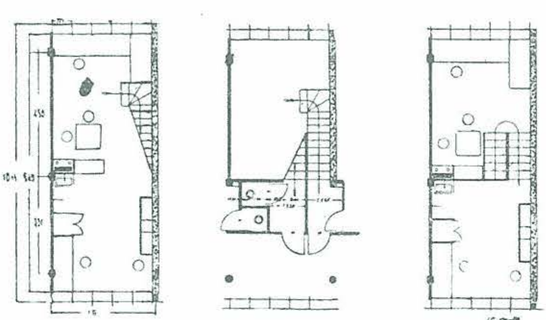
Anke Zalivako

Anke Zalivako is an architect and director of the Schinkel Center for Architecture, Preservation of Monuments and City Studies at the Technical University of Berlin. She has practised as an architect in Hamburg and Moscow. "While working in Moscow I was shocked by the bad condition of the Russian Constructivist buildings. I decided to quit practising as an architect and to find the reasons for the obvious remaining bad attitude towards the Constructivist architecture in post-Soviet Moscow. The result was a PhD thesis at the Technical University of Berlin, 2003, comparing the preservation of 1920s buildings in the Federal Republic of Germany and the Russian Federation." Anke Zalivako has given various lectures and been involved in conferences and exhibitions on this subject in connection with the Moscow Architectural Institute and the Shussev Architectural Museum in Moscow.

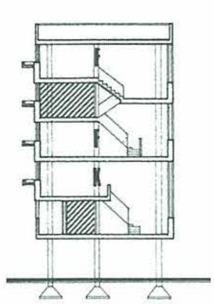


Narkomfin-site: Furnace concrete clinker blocks on the site of the Narkomfin House, Ginzburg, 1931.

The Narkomfin House, rear facade, 2003.

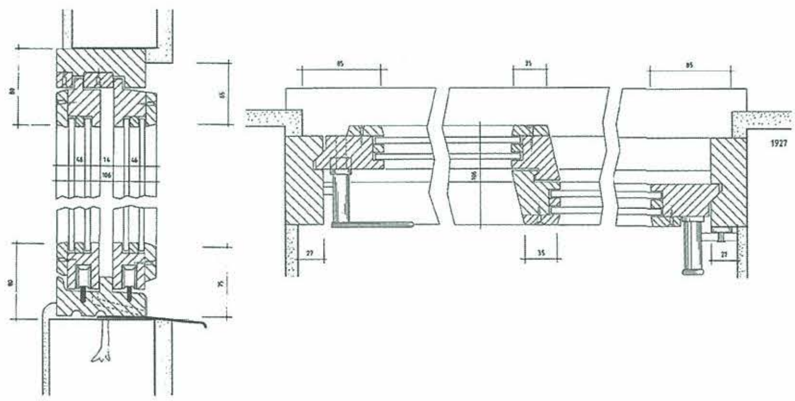


Типовая ячейка «Ф»
Wohnungstyp "F"



The Narkomfin House, southside, 2003.

The Narkomfin House,
sliding windows, 2003.



Дом Наркомфина в Москве. Case study.

Анке Заливако (Anke Zalivako)

Дом Наркомфина, жилой комплекс типа дома-коммуны для работников Министерства финансов Советского Союза, был построен в 1928-30 гг. архитекторами Моисеем Гинсзбургом и Игнатием Милинисом. Использованные при строительстве новые строительные технологии явились отражением новой для своего времени, социалистической идеи организации жилья. Благодаря своим новаторским идеям и уникальным пространственным качествам дом Наркофина признан во всем мире лучшим экземпляром архитектуры конструктивизма и заслуживает того, чтобы находится под защитой ЮНЕСКО. К сожалению, в данный момент дом находится в бедственном состоянии.
Судьба здания Наркомфина показывает всю трагедию архитектуры конструктивизма в Москве, где данное направление никогда не ценилось и не принимается до сих пор по ряду причин. Наряду с финансовыми трудностями, причина печального состояния дома заключается в том, что сейчас оказывается предпочтение реставрации церквей. Московские постройки в стиле авангардизма остаются до сих пор в своем традиционно-отвергнутом положении.
Case study дома Наркомфина является попыткой проиллюстрировать весь комплекс проблем, связанных с реставрацией подобных зданий в центре Москвы в условиях постсоветского периода.

THE ALVAR AALTO LIBRARY IN VYBORG

Maija Kairamo and Tapani Mustonen

The Municipal Library of the City of Vyborg (Viipuri) was built in 1933-35 after a long period of design, during which Alvar Aalto developed the project from a classical competition entry of 1927 to a matured modernist masterpiece that included many technical novelties.[1] The city was annexed to the Soviet Union after World War Two. Amazingly, in the middle of a heavily bombed city, the Library itself was not badly damaged. However, after the war it remained abandoned and was left open to the elements for ten years. It was during this period that the building lost its original interior and outside surfaces, fittings and furniture. During the years 1955-1961 the library was rebuilt by the Soviet authorities and today still serves as the Central Municipal library of the City of Vyborg. Aalto himself criticised the rebuilding: "The building exists but has lost its architecture."

The present restoration program[2] was started in 1991 as a joint initiative by the Finnish Ministry of Environment, Alvar Aalto Architects and the Russian authorities. The goal of the restoration is to regain the architectural values of the building, whilst meeting the present-day needs of function and safety. Some practical alterations from the Soviet repair period will remain as historical layers.

The original drawings, specifications and photographs from the 1930s are available in the archives of the Alvar Aalto Foundation and provide good background information for the restoration. The restoration needs a creative interpretation of the original design material and a profound knowledge of both the present condition of the existing building and its past. One advantage is that the planning team for the restoration is mainly composed of architects who once worked in Aalto's office.

The architecture of the library was the result of the innovative use of modern technologies and materials. Aalto researched human behaviour and the needs of the reader and created architectural forms to satisfy these needs. Particularly famous are his drawings of the acoustic ceiling of the lecture hall and of the "little man" reading a book under the top-lighting. Also, the heating and ventilation systems tried to create as natural conditions as possible.

The roofs – the fifth facade of the building

The roofs of the library were from the beginning an important part of the architecture. The published collection of pictures of the library in the 1930s always includes an aerial

left: Lecture hall wing roof, removing Soviet layers, 1999.
middle: Inspecting the new Lecture Hall wing, roof 2000.
right: Copper covers for the ventilation pipes, Lecture Hall roof, 2000.

view of the building. Aalto himself described the technical solution of the roof for lighting and heating as follows: "The roof is used for those functions, which the sun has in the open nature".[3] Already in Aalto's competition entry the main library room was covered by a huge glass roof. The idea of the roof lighting was refined during the design period. The roofs of the Lending and Reading Hall were the first ones where Aalto used a large number of skylights as the main source of natural lighting for the interior. This later became one of the characteristic details of his architecture. The Lending Hall is lit by 30 skylights, the Reading Hall by 27 and the main entrance by one skylight. The original skylights were simple constructions, with single 1,6 cm rough cast glass disks held in place by their own weight over slightly conical concrete drums.

Special care was needed to repair the roofs during the period 1999-2004. All the roofs of the building are flat. The original construction of the large roofs was an aerated concrete slab, with a damp-proof insulation layer and concrete screed; the small roofs had an Insulite soft-board layer. The rainwater was led away along inner pipes and drains installed close to the eaves, and the outlets of the ventilation channels were carefully designed eaves details. The roof of the Lecture Hall Wing functioned originally as a terrace with steel railings. During the 1955-1961 renovation, the concrete screed and insulation were removed and replaced by a new synthetic insulation and bitumen layers, and the parapet of the Lecture Hall wing was heightened by two brick courses. The glass disks of the skylights were replaced with plastic domes in 1955-1961. Additional domes were added in the 1990s.

The first roof repair to be undertaken during the present restoration was that of the Lecture Hall Wing, in 1999. The deteriorated bitumen and insulation layers above the original bearing concrete slab were removed. The original inner rainwater pipes were cleaned and new stainless steel drains were installed.

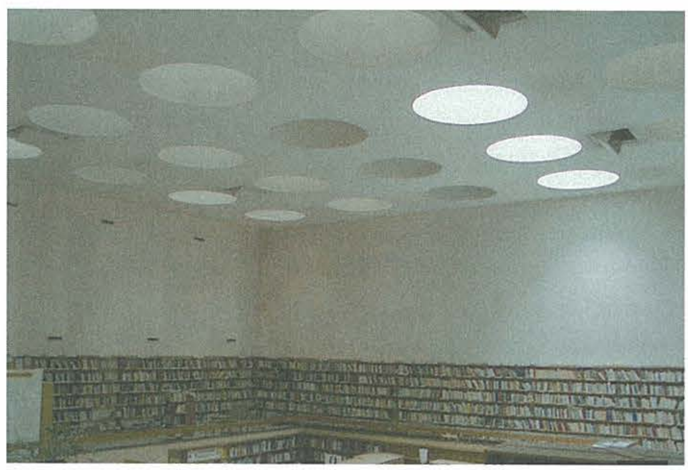
The slope of the original roof slab was improved, to which was then added the waterproof layers and 5cm expanded plastic insulation, on top of which was cast a frost-proof concrete screed.

The original height of the parapet was restored and the eaves covered with copper sheeting. The steel railing will be installed at a later date after the completion of the urgent and more important restoration works. The repair of the roof of the entrance of the Children's Library was carried out in 2000, the roof of the Lending Hall was begun in July 2001 and the roof of the main entrance, the terrace of the Lending Hall and the roof of the Reading Hall in April 2003.

The restoration of the roofs of the Lending and Reading Hall aimed to reconstruct the original form of the skylights. However, modern laminated glass was used instead of the

Reading Hall Roof, removal of the old bitumen layers, 2003.

Lending Hall roof, skylights renewed with new glasses 2002.



New light I: The first three skylights assembled, view from the Lending Hall 2002.

original rough cast glass, and an additional pane of laminated glass was installed in the skylight drums to improve energy efficiency. To adjust the height of the skylights, plywood ground rings were added on top of the concrete drums. The last skylight glasses were installed in April 2004.

The staircase of the Lending Hall terrace is part of the roof landscape of the building. It originally consisted of prefabricated reinforced concrete elements installed as cantilevered beams into the brick wall during its completion. The concrete had deteriorated, the reinforcement bars rusted and the bearing capacity gone. In the restoration in 2001, the carbonated concrete was removed, the reinforcement bars sandblasted and corrosion protected, a few new reinforcement rods were added and new concrete was cast. One step of the stairs could be totally preserved and a few others were partly saved with only some conservation needed. The completely rusted original steel hand rail of the staircase was replaced by a new one following the original model.

Steel construction, doors and windows

Aalto divided the library complex into a heavy brick-walled shelter for books and a lighter club and office room wing with bearing steel columns. The doors and windows were made of steel or wood. The original steel frames of doors and windows and some fragments of metal doors still remain and represent the originality of the building: they will be carefully conserved.

The great glass wall is one of the main architectural features of the building. It symbolises the metamorphosis from Aalto's original classicist competition entry of 1927 to one of the most beautiful examples of the Functionalist period. The glass wall was repaired in 1994-1996 as a manifestation of the start of the restoration project. The original steel frame was conserved, as well as the original brass hinges. The steel windows, the corroded iron fittings and rotten wooden lists from the Soviet period were replaced. The screw joints of the frames had partly been replaced by welding already in 1955-1961, and this latter method was again used to join the frames. All the metal parts were rust protected and painted and new wooden parts oiled.

top: Ruined concrete steps before the work. Railing connections on the left.
middle: Carbonated concrete has been removed from the iron bars.
below: Terrace and the stairs in October 2003.

The original entrance doors to the Periodicals Room are remaining, but the handles in brass and wood have disappeared. The doors were repaired in 2000-2002. They were rusty, deteriorated and out of use. However, as they were originals, they were conserved in an as authentic state as possible. Only the lower parts of the frame had to be renewed, and two original hinges were preserved and conserved.
The doors were conserved, the locks modernised to meet the local standards, and the handles were reconstructed according to the original drawings, old photographs and a comparison with similar handles used in the Paimio Sanatorium. This work was carried out excellently by an old metal workshop in St. Petersburg.
The entrance doors of the Children's Library have original frames but the doors were from the 1955-1962 renovation: they have now been reconstructed using the Periodicals Room door as a model.

During the Soviet rebuilding of 1955-1961 the height of the Lecture Hall window was reduced by about 20cm. The height of the bearing concrete beam was increased by three brick courses and the vertical members of the original steel frame were cut.
Also, the corner was plastered. Furthermore, as mentioned earlier, the parapet was heightened and thus the proportions of the northern elevation were completely changed.

During the restoration in 2000-2003 the Lecture Hall window was conserved and restored. The bearing concrete beam under the window was returned to the original dimensions and the corner detail was reconstructed. It was necessary to renew the lowest rusted parts of the original steel frame. The height of the frame was increased by 20cm, being now 317cm. The window's single laminated glass is 315cm high.
The ventilation grilles will be reconstructed according to the original photographs using the technical solutions developed by Aalto's office. When the original height of the eaves was returned during the roof repairs of 1999, the north elevation regained its elegant proportions.

left: The great glass wall under restoration, 1994.
middle: Painting the joints of the restored structure, 1994.
right: The great glass wall from the street, 1995.

The undulating ceiling of the Lecture Hall

The undulating wooden ceiling of the Lecture Hall is one of the most interesting architectural elements of the building. Sigfried Giedion considered Aalto's ceiling of great historical importance: "The irrational curves of the ceiling glide through space like the serpentine lines of a Miro painting.... Here, therefore, the scientific reasoning and artistic imagination have merged to free architecture from that rigidity which is today an ever-present menace."[4] The original ceiling was probably built on site by carpenters who were specialised in constructing boats. The original ceiling was destroyed after the war and rebuilt in 1955-61 on the basis of old photographs and profile fragments in the walls, but in the details it differs much from the original and must be replaced.

A 10m^2 prototype of the undulating ceiling was installed to commemorate the Aalto centenary year in 1998. The prototype is a research object to investigate the problems concerning the whole ceiling. The prototype, with its flush joints, has not withstood the varying humidity and temperature of the inner climate of the library but is nevertheless a valuable test for the final design. In autumn 2000 the original working models of the ceiling were found in the cellar of Aalto's own house at Riihitie 20, Helsinki. The original had tongue-and-grooved joints and the intention is to reconstruct the ceiling following these models.

left: Periodicals Room: original exterior door frame and the brass hinge at the workshop in St. Petersburg 2001.
right: Architect Leif Englund studying the original frame at the workshop 2001.

Notes

1. *Acanthus* 1990 (Museum of Finnish Architecture) includes the articles "Viipuri Library – The 1927 Competition Entry" by Simo Paavilainen, and "Viipuri Library from Paper to Final Building" by Kristiina Nivari, which describe the development of the project.

2. Maija Kairamo, "The Restoration of Viipuri Library", *Docomomo Journal,* September 2003, pp. 92-99. The article gives a more profound description of the present restoration project, than is given here.

3. Alvar Aalto, "Rakennusteknillinen selostus", in Juha Lankinen (Ed.), *Viipurin kaupungin kirjasto 13.10.1935,* Viipuri, 1935, pp. 27-31.

4. Sigfried Giedion, *Space, Time and Architecture.* Cambridge, Mass., Harvard University Press, 1962 (fourth edition), pp. 579-582.

Maija Kairamo

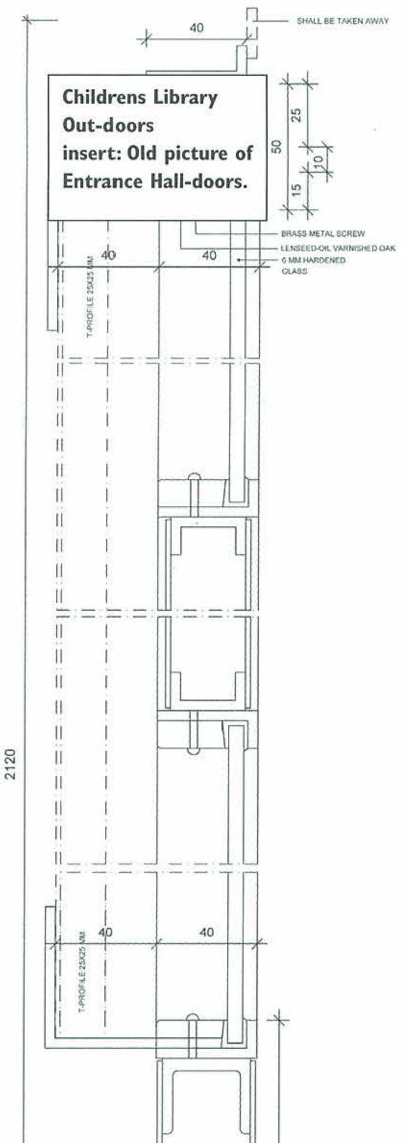
Maija Kairamo is an architect (SAFA), and a member of ICOMOS and the DOCOMOMO Advisory Board. She worked as a conservation architect at the National Board of Antiquities from 1963 to 1998. Maija Kairamo is member of the Board as well as Secretary General of the Finnish Committee for the Restoration of Viipuri Library. She has lectured in several universities in Finland and abroad, and has published articles in several Finnish and international publications.

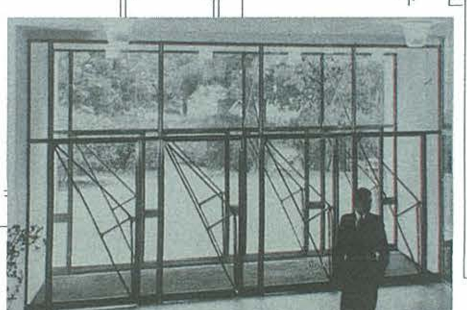
Tapani Mustonen

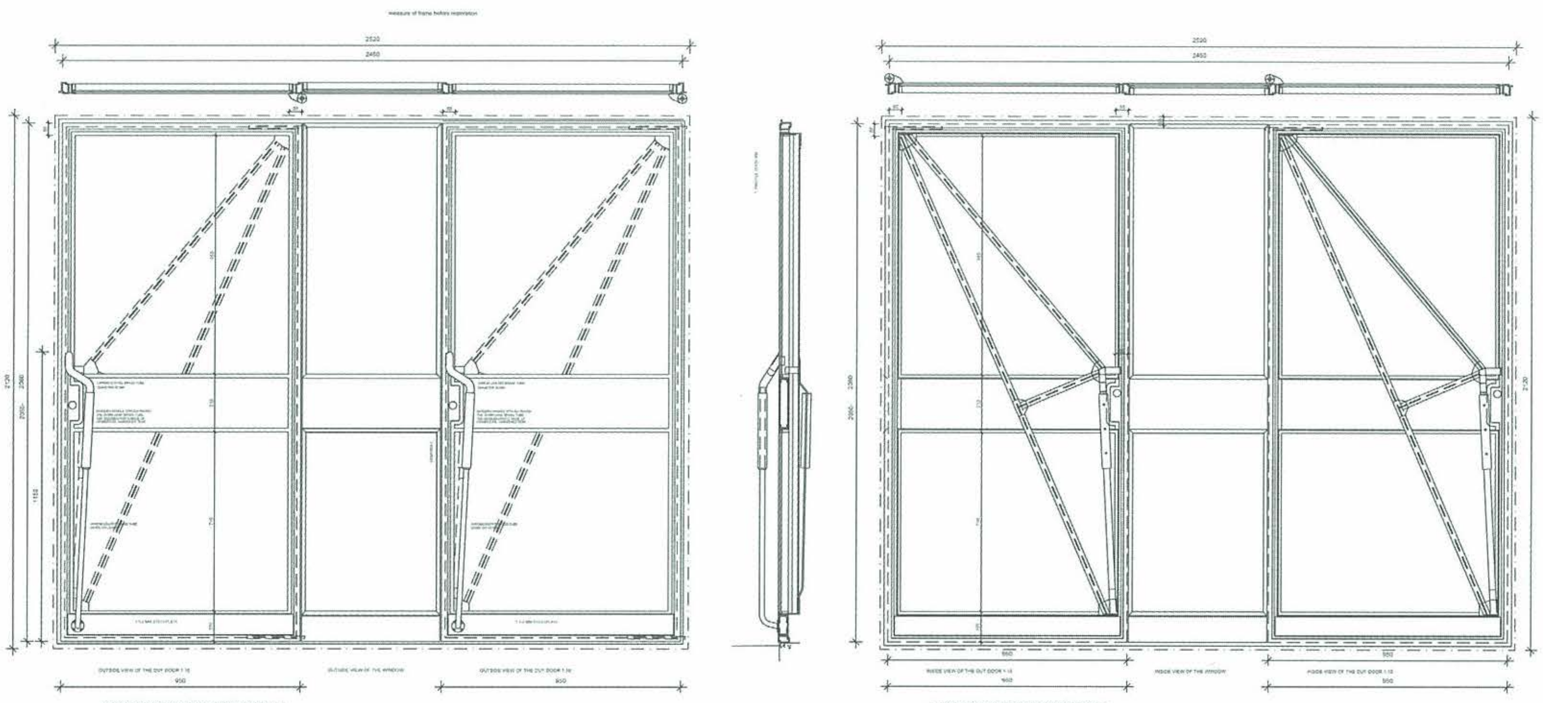
Tapani Mustonen (SAFA) is a practising architect. He has worked for Alvar Aalto Architects Ltd and has been advisor to the Alvar Aalto Foundation. He has run his own architect's office in Helsinki since 1991, and has recently completed the design for a new Central Fire Station for the city of Porvoo.
Among Tapani Mustonen's restoration works are several buildings by Alvar Aalto, such as the House of Culture (Helsinki), Villa Tammekann (Tartto, Estonia), the Aaltos' own house at Riihitie 20 (Helsinki), and Tehtaanmäki School (Anjalankoski). The restoration of Villa Tammekann was awarded the Europa Nostra Award in 2002 and the restoration of School Tehtaanmäki the Architectural Committee of South East Finland Award in 2003.
Tapani Mustonen is a member of The Finnish Restoration Committee of Viipuri Library.

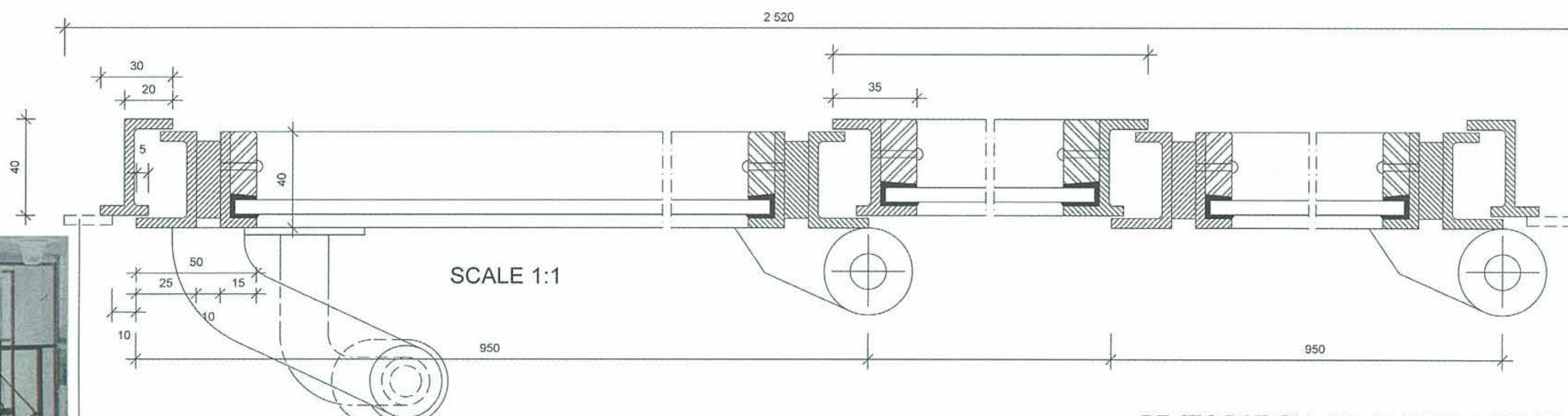
left: Studying the Lecture Hall window, 2002.
right: Lecture Hall, window in the original dimensions, 2003.

Childrens Library Out-doors
insert: Old picture of Entrance Hall-doors.









RESTORATION OF VIIPURI LIBRARY

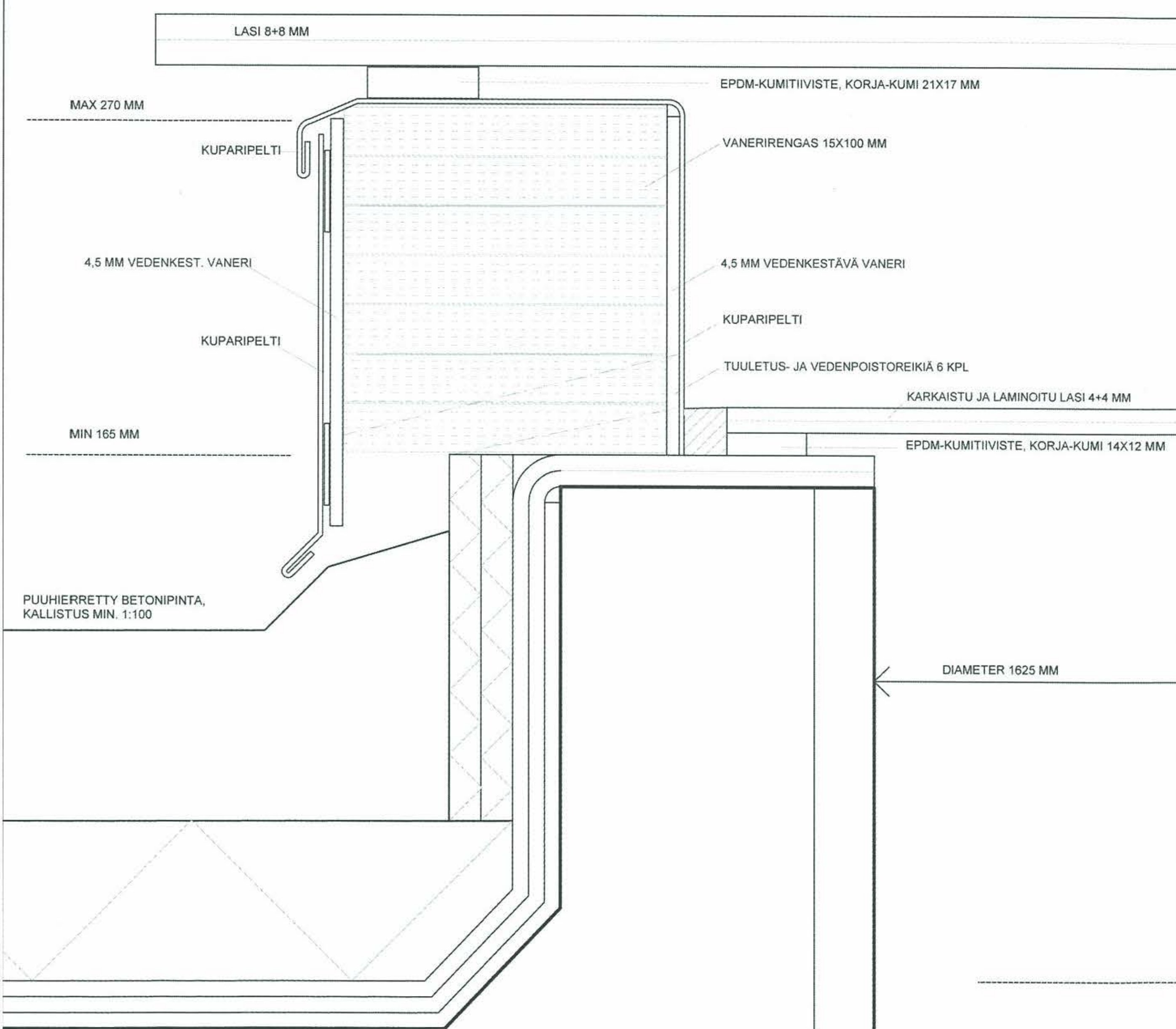
Prospect Suvorova 4 Vyborg Russia	
Helsinki 31.3.2001 26.9.2001	CHILDRENS LIBRARY OUT-DOORS 1:10 DETAILS 1:1
The Finnish Committee Architects/LE email vyborg@alvaraalto.fi	Architecture

THE FINNISH COMMITTEE FOR THE RESTORATION OF VIIPURI LIBRARY

Detail of the new Skylight, 1:1

TÄSSÄ 4 ÄÄRITAPAUSTA KUN KATTOIKKUNOIDEN
BETONIRENKAIDEN KORKEUS JA ULKOHALKAISIJA
EI AINA OLE SAMA. TOTEUTUS TULEE LÖYTYMÄÄN
TÄSTÄ VÄLISTÄ, AINAKIN NIIN ETTÄ PITKITTÄISRIVIEN
LOPULLISET KORKEUDET OVAT SAMAT. SAMOIN
KATTOIKKUNOIDEN ULKOVAIPAN KUTEN KUPARI-
KAULUKSEN TULISI OLLA RIVEITTÄIN VAKIO.

MUITA VAKIOITA TULLEE OLEMAAN:
VANERISTA TEHTY TUKIRENGAS ELI KATTOIKKUNAN YLÄREUNA
SISÄLASI = 1520 MM
ULKOLASI = 1880 MM HALKAISIJALTAAN



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LEIKKAUS 1:1
MATALIN KAULUS
SUURIN HALKAISIJA

RESTORATION OF VIIPURI LIBRARY

adress: Prospect Suvorova 4 Vyborg Russia	drawing type / number
place and date: Helsinki 1.4.-01 12.10.2001	name of the drawing / scale
name of the designer: The Finnish Committee Architects/LE, TM	LAINAUSSALIN KATTOIKKUNA 1:1
email vyborg@alvaraalto.fi	architecture / construction / other: Architecture

THE FINNISH COMMITTEE FOR THE RESTORATION OF VIIPURI LIBRARY
Tiilimäki 20 00330 HELSINKI Finland phone +358 9 480123 fax +358 9 485119

left: Lecture Hall corner during the work, 2003.
right: Lecture Hall Bay Window in November 2003, Alvar Aalto's Library exhibition inside.

Библиотека Алвара Аалто в Выборге

Майя Кайрамо и Тапани Мустонен (Maija Kairamo, Tapani Mustonen)

Городская библиотека г. Выборга была построена в 1933-35 гг. После второй мировой войны город оказался на территории Советского Союза, а сама библиотека довольно хорошо сохранилась во время войны. В течение следующих десяти лет она пустовала и за это время её оригинальный интерьер и наружная отделка, оборудование и мебель были утрачены. Во время Советской власти, с 1955 по 1961 г. библиотека была перестроена ею, и до сих пор здание используется в качестве городской библиотеки г.Выборга.

Нынешняя программа реставрации была начата в 1991 году по совместной инициативе министерства окружающей среды Финляндии, российских официальных властей и архитекторов, бывших коллег Алвара Аалто. Целью реставрации было восстановление неповторимой архитектуры здания, вместе с тем, чтобы оно отвечало современным требованиям по функциональным качествам и безопасности. Общая стоимость реставрации составила примерно 6,8 миллионов евро.

Оригинальные чертежи, проектные задания и фотографии 30-х годов явились хорошей информационной базой для реставрации. Была создана проектная группа под названием Комитет реставрации библиотеки г.Выборга, в которую были включены главным образом архитекторы, которые когда-то работали в проектном бюро Алвара Аалто.

Кровля библиотеки является весьма важным элементом архитектуры здания. Кровли читального и абонементного залов были первыми, в которых Аалто использовал большое количество иллюминаторов в качестве источника естественного освещения интерьера. Во время реставрации кровли в 1999-2004 гг. было необходимо соблюдать максимальную осторожность. Все кровли здания являются плоскими. Крыша лекционного зала была оригинально построена в виде террасы с металлическими перилами. Лестница, ведущая на террасу абонементного зала, являясь частью крыши здания и была восстановлена в 2001 году. Фонд "Давайте сохраним наше наследство" Роберта Вильсона на основе Мирового фонда памятников архитектуры (World Monument Fund®) выделил 240 тыс. долларов на проведение работ по реставрации кровли.

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Аалто разделил весь комплекс библиотеки на две части: на книгохранилище с тяжелыми кирпичными стенами и на офисный флигель более легкой металлической конструкции. Двери и окна были стальными или деревянными. Оригинальные стальные рамы дверей и окон будут аккуратно сохранены. Большая стеклянная стена была отремонтирована в 1994-1996 гг. Сохранились первоначальный стальной каркас стены и латунные петли. Стальные оконные рамы, поржавевшую железную фурнитуру и сгнившие деревянные плинтуса советской эпохи заменили на новые. Во время реставрации в 2000-2003 гг. окно лекционного зала сохранили и восстановили.

Одной из самых интересных архитектурных деталей здания является волнообразный потолок лекционного зала. Первоначальный потолок был разрушен во время войны и переделан в 1955-61 гг. на основе старых фотографий и фрагментов профиля на стенах, но всё-таки в некоторых деталях он достаточно сильно отличается от оригинала. Реконструкцию потолка лекционного зала предполагается произвести к 70-летию библиотеки в октябре 2005 г.

Для получения дополнительной информации см. www.alvaraalto.fi

Alvar Aalto Library exhibition in the library, November 2003.

THE 1950S RENOVATION OF VIIPURI LIBRARY

Viipuri Library, 1954. Photo: courtesy of "What's the Time in Vyborg?" and the Regional Archives of the State Museum "Vyborg Castle".

Kirsti Reskalenko

This paper is based mainly on an interview with architect Aleksandr Shver, the chief designer of the 1950s renovation, and local newspaper articles from the 1960s. The interview has been published in its entirety in Ptah 2002: 2.
The material for this article was gathered in conjunction with "What's the Time in Vyborg?", a project initiated and produced by artist Liisa Roberts.

The planning of the library renovation started in 1950. Architect Petr Rozenblum drew one version with the building as it was earlier and another version decorated with neo-classical motifs. In January 1954, Leningrad's architectural committee decided to renovate the library, following the original design. Also that year, a statute was issued by the Soviet government called "A Change of Course in Architecture" ("Ob izmenenii napravlennosti v arhitekture"), which rejected the classical, decorative motifs of the Stalinist era. It was a propitious moment to renovate Aalto's library.

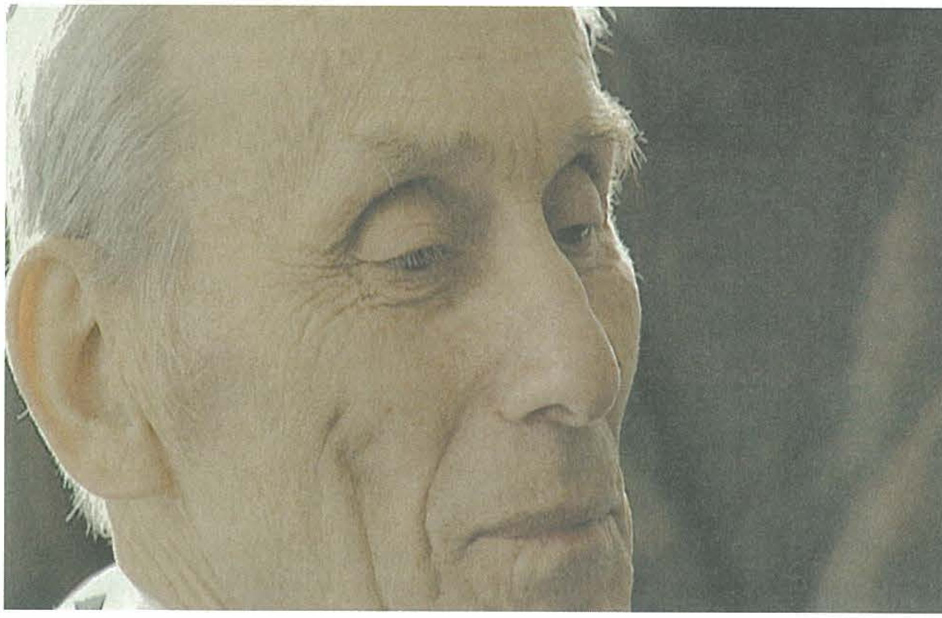
Demolition work began at the end of 1955. Construction began before the design work was completed because the Soviet Ministry of Culture threatened to re-allocate the money budgeted for the library's renovation unless work was begun in 1955. At the start of 1956, the contractor had only construction drawings, as the mechanical engineering drawings were incomplete. In particular, Aalto's heating system proved to be a design headache.

Reconstruction proceeded at a leisurely pace, even though the target of finishing the renovation was entered each year in the contracting firm's production plan. When Rozenblum died in 1957, his work was taken over by a young architect, Aleksandr Shver. In March 2002, Shver reflected on the problems of renovation work in the 1950s as follows:

"It is difficult to understand those times now. Everything has changed since. The library now enjoys world-wide renown, but in the 1950s it was nothing more than a wretched district library. Accordingly, it was repaired by a regular building contractor, who had also built Vyborg shipyards. The contractor was not accustomed to detailing of a high standard.

The original form of the acoustic ceiling is still visible today. The line separating the painted and unpainted wall surfaces is proof of that. The roof was rebuilt accordingly. It must be admitted that the situation was a difficult one. We had no drawings, not even decent photographs, only ones that were reproduced from a periodical. We constructed the acoustic ceiling from spruce battens. They were obtained from an instrument factory. They differ in colour and shape from the boards Aalto used. We wanted to contact Aalto, but were forbidden to do so.

You must consider that the country was very poor. Everything was in short supply. Take, for example, the auditorium light fittings: those made by Aalto were missing. Anyway they could not be used on ceilings according to our fire regulations. Instead, I designed lamps that stood on the floor. I found ready-made lampshades and designed the fittings to suit.
In Aalto's day, the floors were covered. We could only get tiles, which were available in certain colours and amounts. We did not know what kind of flooring or doors had been installed in the building earlier. The skylights were also problematic. We wanted them to be reproduced just as



Architect A.M. Shver, Alvar Aalto Library, Vyborg, April 24, 2002.

Aalto had designed them. Nobody made glass that was thick enough. They proposed that we use searchlight glass that was supplied to the army. It would have been very expensive. Then they started to produce cupola skylights from plastic. We had to agree to them. One of the light fittings belonging to the reading room had survived, and we used it to produce new fittings. They are fully in accordance with Aalto's design.

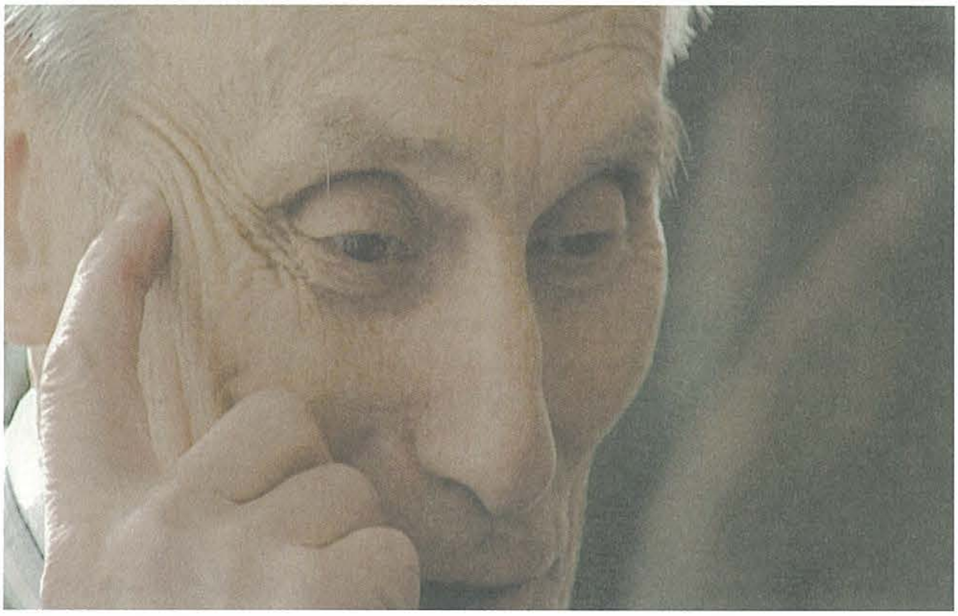
The roof presented the biggest problem. We covered it with standard roofing felt. Roofing felt is a difficult material and requires care on the part of installers. The construction work was done by a regular contracting firm, which did not have the skills for the job. The roof was laid to inadequate falls and it leaked. We were unable to definitively repair it, and simply made spot repairs on three occasions."

The situation on the site seems to have been chaotic. According to one timetable, the repairs should have been completed by October 1959. Three weeks before the completion date, local newspaper *Vyborgski Communist* published an article about the uncompleted jobs under the headline: "Builders Ignore Deadlines", stating:

"During the past week, electrical cables were installed, metal parts of ceiling lanterns were welded, and the glazing of them begun. Carpenters were working on bases for shelving, painters were priming surfaces.

There are no doors yet installed. Reading Room light fittings were produced at the Elektroinstrument factory. They have been at the library for over two weeks, but the developer has had no time to test them.

Glazing work is unfinished due to the shortage of glass. Impact resistant glass for the ceiling lanterns has not yet arrived. Neither Comrade Grinstein, manager of Building Department 5, nor anyone else knows when the glass will be delivered. Comrade Bekmurshin, the engineer who is responsible for Building Firm 14, doesn't know when they will start to install doors. Test results for the heating system are not encouraging. The heating pipes do not work. The



heating boilers which worked well initially have started to be unpredictable. Incoming air blowers from the boilers have been causing us worry, and Comrade Belov, the subcontractor's manager, doesn't know the answer. He claims that "We invited a cooling expert from Leningrad initially, then ordered the equipment from Factory 4, which produces mechanical engineering equipment. The factory is designing it. It's anyone's guess when it will be delivered". The client, designers and contractor have repeatedly discussed the mechanical ventilation system. However, installation has still not started.

The standard of some work is dubious. The double-glazed frames are fixed instead of being removable, as the design requires. To clean the windows, the glazing must be removed! There is no site timetable. The easier jobs are done first, and the hard ones put off for the unforeseeable future."

The renovation was completed in 1961, and the "Palace of Books" opened it doors to the town inhabitants. In spite of the optimistic headings of the local newspapers, they soon had to give space also to critical articles. The head of the library, together with two other persons, published an article in autumn 1962 called "The Library asks for help". The reality described in the article was horrific:

"The first months showed how low the quality of works has been and what mistakes the projects may include.
At wintertime the indoor temperature on the first floor level did not rise over 10–12°C, though the radiators were very hot. The library officials could not work. Many of them became ill.

But the real difficulties occurred when it began to rain. The roof of the library leaked. It was no wonder! The roof is not covered with hard impermeable material. It is covered with sand! There are concrete slabs on the sand. At summertime flowers grow on the roof. How can this kind of covering protect from humidity?
That is why the whole ceiling of the library is spoiled. Plaster falls down, there are streams of water on the walls and electric cables get spoiled.

That's not all. Because of the wrong covering on the roof lanterns, water drops down into the reading and lending halls. On rainy days the water gets in through windows and glass doors. The main electricity distribution box is a fire hazard because the contractor has not isolated it from ground water.
The frames of windows and external doors are of poor quality. They have big gaps in places where there should be certain profiles and insulation. In many rooms it is impossible to work in the wintertime because of a constant draught."

The authors of the article tell that many different committees had visited the library and many protocols were written pointing out the need for the fast correction of the mistakes. But nothing happened. "The fantastic building was becoming damaged..." they wrote.
The photographs taken by Alan Irvine in May 1962 tell another story: the state of the renovated building seems to be quite good. The local newspaper also published many photographs showing the renovated library and wrote "The interior of this unique building impresses with its laconic forms, rich light and air". The town inhabitants in Vyborg were happy to own a modern public library. And I suppose that many Soviet architects also visited it during the years of the iron curtain.

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Kirsti Reskalenko
Dr. Tech., works as a town-planner architect in the city of Joensuu, a regional centre of eastern Finland. She translated the restoration documents for the Committee for the Restoration of Viipuri Library.

THE CENTRAL LIBRARY OF THE CITY OF VYBORG

Album compiled by I. Alginan and P. Paraeva
texts painted by P. Shkuryakov
facts and figures compiled January 1, 1962
photographer unknown

Translation of the Russian texts
p.60: The Main Checkout Area: Book Exhibitions and Free Access Stacks of the Collection

The Reading Room.

p. 61: The Main Checkout Area: Free Access Stacks

The Main Checkout Area and the Reading Room have solid walls, which keep out the noise from the street. They are lit through spherical drums, that channel calm, even, shadow-free light.

p.62: Entrance to the Main Checkout Area and the New Arrivals Exhibition.

The New Arrivals Exhibition

p.63: The New Arrival Exhibition is refreshed every 15 days. In 1961, the readers checked out 29.862 books from the Exhibition.

Entrance to the Children's Department.

p.64: 2.588 readers are registered with the Children's Department. 12.700 books are available for unrestricted checkout.

The Main Checkout Area: the Checkout Desk

p.65: The Fairytale Room.

The staircase to the Second Floor.

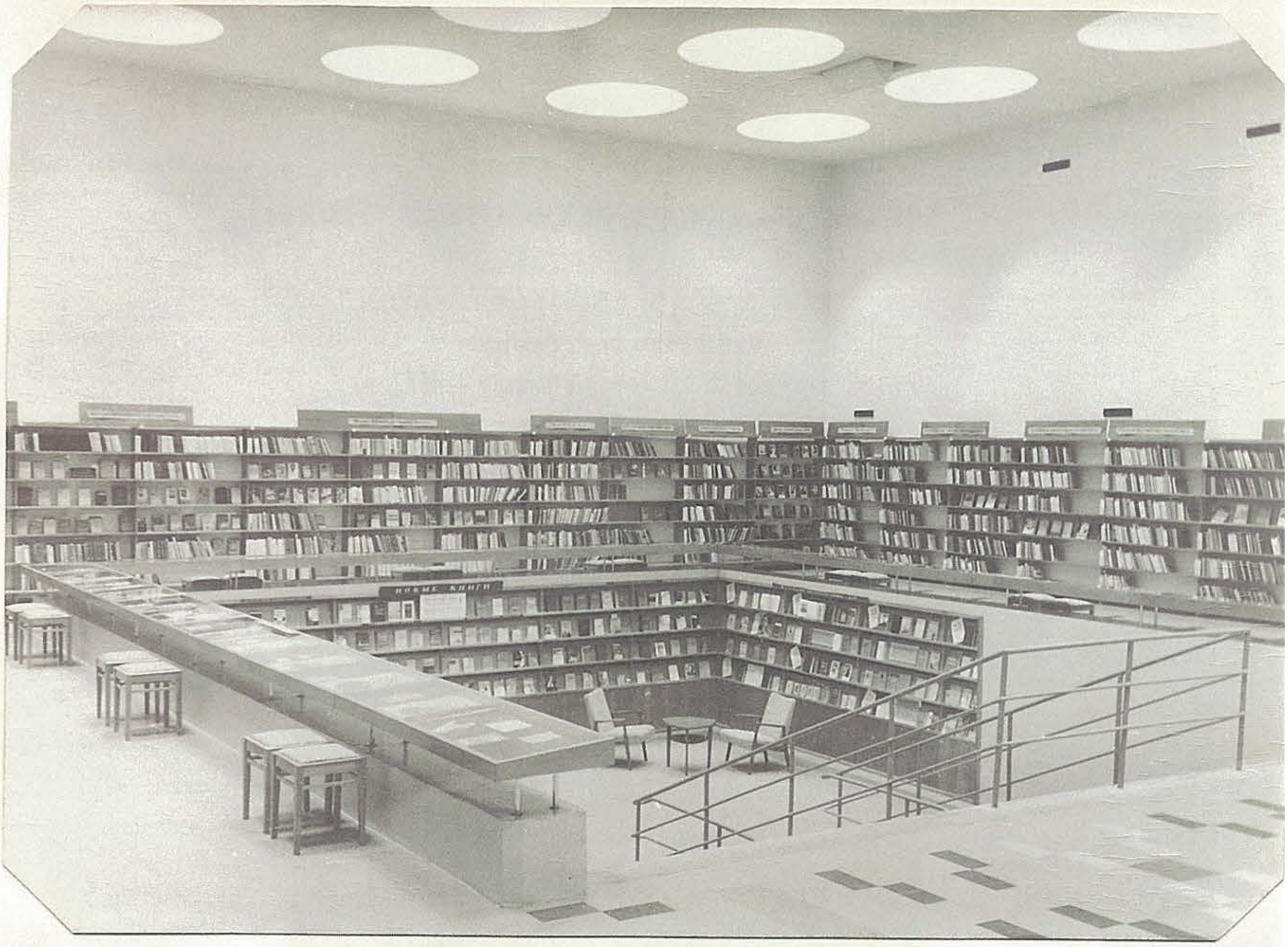
p.66: In 1962, the Library is organizing three-year courses to train the specialists with secondary education. 35 people will be enrolled in the course.
Every year, the Library hosts 18 to 20 interns from among the second- and fourth-year students of the Leningrad Institute of Library Science.
The Library conducts volunteer-based courses for community librarians. 22 people are enrolled in these courses.

Employees and activists of the Library have developed a methodological guide, *How to Read and to Select a Book*.
Bibliographical guides were compiled: *What should a Builder Read, In Assistance to a Machine-Builder, What to Read.* Employees of the Library are developing a general guide to the Library. Additional albums are being developed: *How to Use a Systematic Catalogue, How to Use an Alphabet Catalogue*.

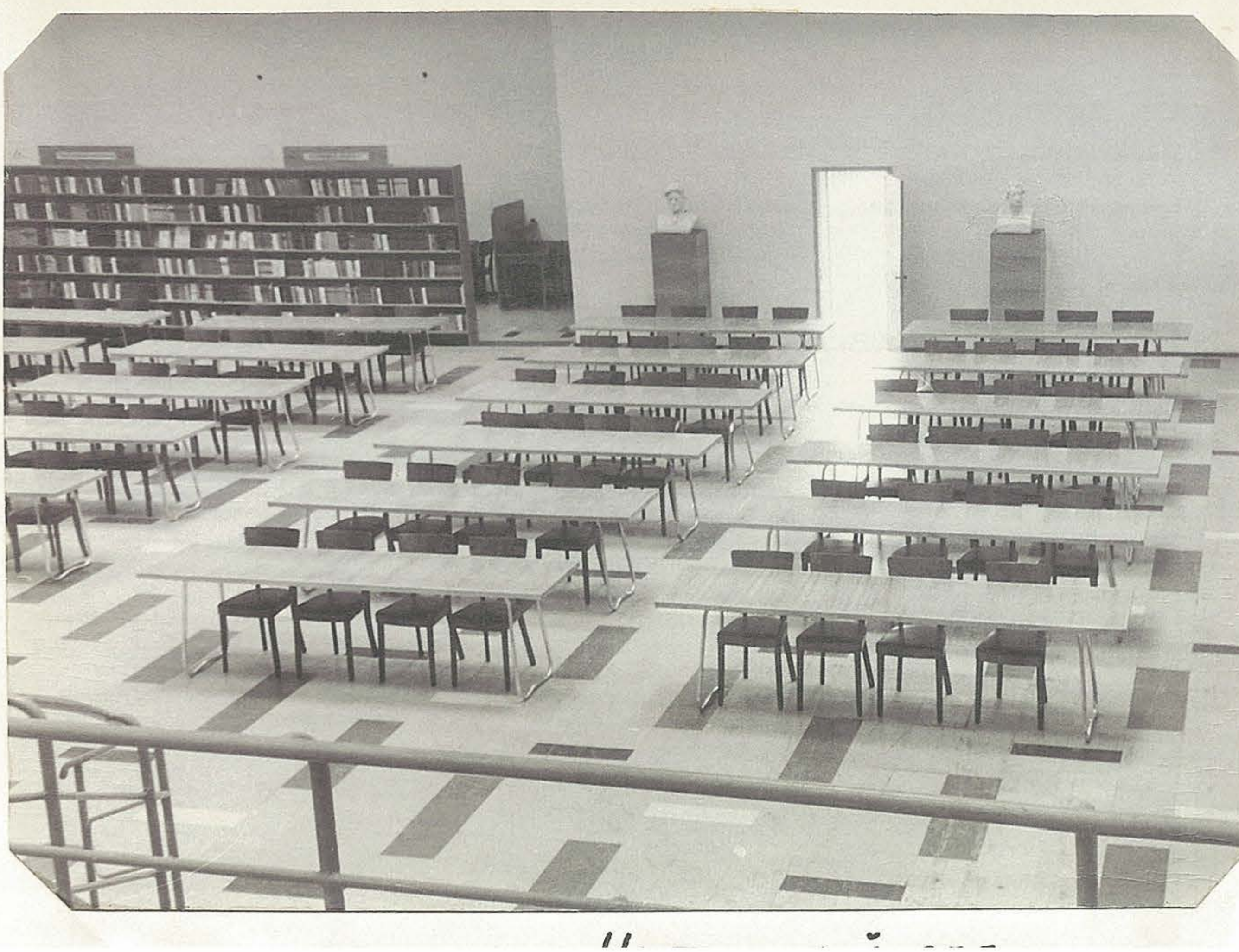
p. 67: Stairway entrance to the Foreign Books Department, the Methodological Office, the Travelling Book Collection and Service Areas.

Entrance to the Lecture Hall.

The pictures have been published in the article "April 24, 2002, Alvar Aalto Library, Vyborg Russia", by Kirsti Reskalenko and Liisa Roberts in *Untitled (Experience of Place)*, Ed. Gregor Neuerer, 2003. Courtesy of Koenig Books, London, pp.59-90.

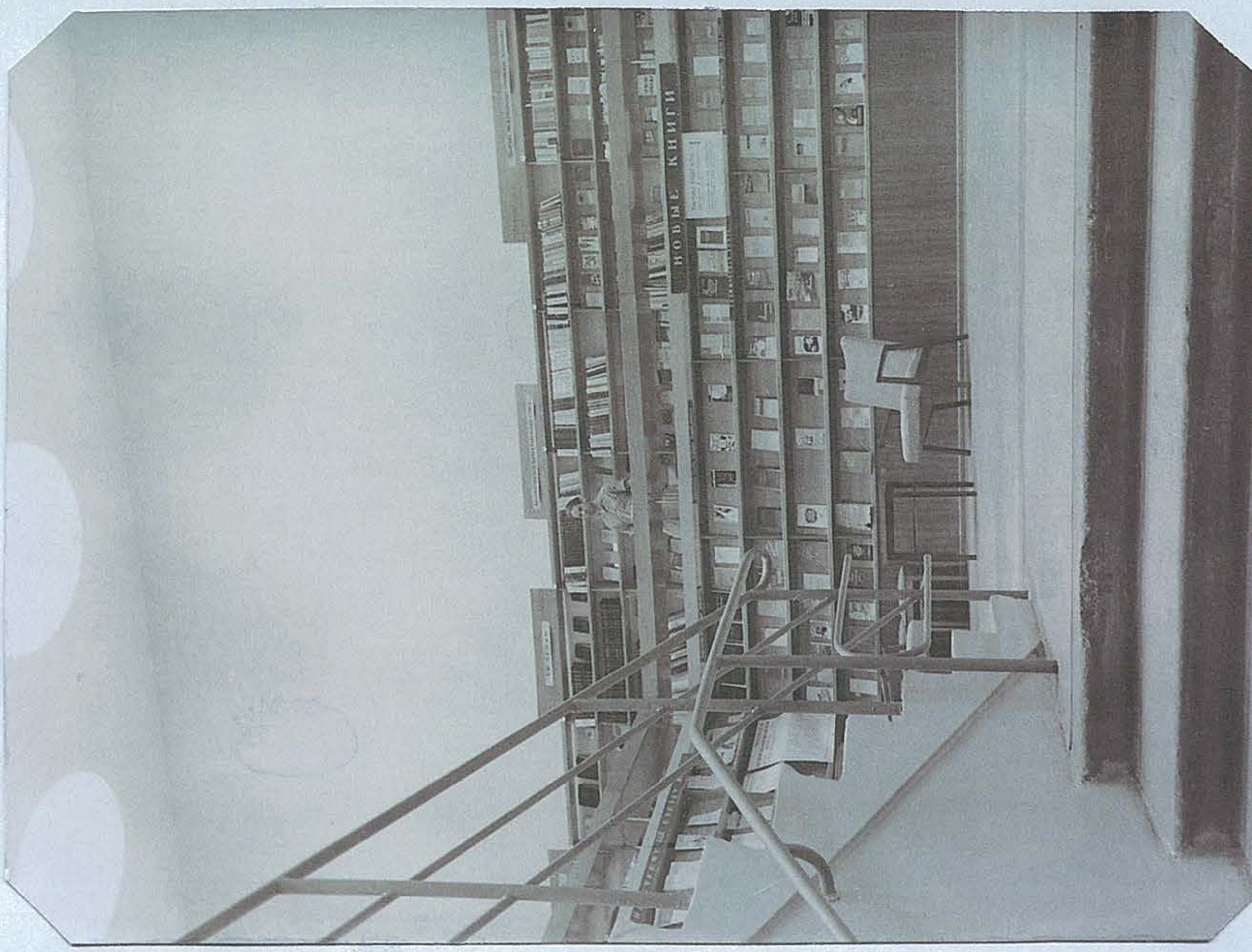


Абонемент. Книжные выставки и стеллажи открытого доступа к фонду.



Абонемент. Стеллажи открытого доступа.

Абонемент и читальный зал имеют глухие стены, препятствующие проникновению в них уличного шума, а освещаются через сферические люки, дающие спокойный равномерный бестеневой свет.



Вход на абонемент и выставку

Выставка новых книг обновляется через каждые 15 дней.

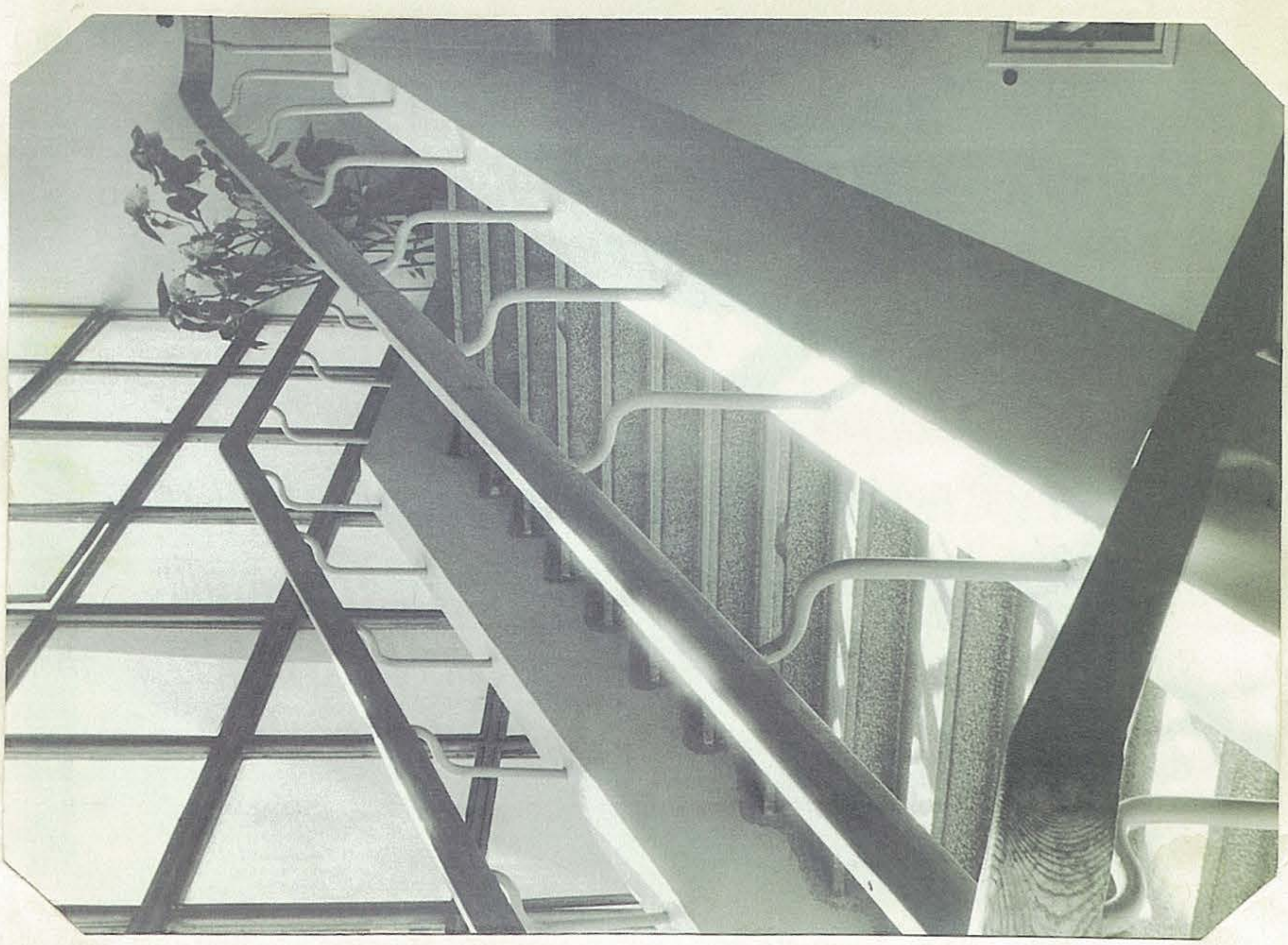
В 1961 году с выставки выдано 29862 книги по заявкам читателей.

Вход в детское отделение

На абонементе детского отделения 2588 читателей. Для свободного выбора представлено 12.700 книг.

Абонемент. Кафедра

Комната сказок



Лестница ведущая на второй этаж.

В 1962 году в библиотеке организуются 3-х годичные курсы по подготовке специалистов со средним библиотечным образованием. На курсах будет обучаться 35 человек. Ежегодно в библиотеке проходят практику 18-20 студентов 2 и 4 курсов Ленинградского библиотечного института.
Библиотека ведет систематическую методическую работу с 59 библиотеками города. При библиотеке работают на общественных началах курсы библиотекарей-общественников, на них обучается 22 человека.

Работниками и активистами библиотеки разработано методическое пособие: „Как читать и выбирать книгу". Составлены библиографические указатели: „Что читать строителю", „В помощь машиностроителю", „Что читать". Работники библиотеки работают над созданием путеводителя по библиотеке. Разрабатывают альбомы: „Как пользоваться систематическим каталогом", „Как пользоваться алфавитным каталогом".

Вход в иностранный отдел, методический кабинет, передвижной фонд и служебные помещения.

Вход в [illegible]

Восстановление Выборгской библиотеки в 50-е годы – Резюме

Кирсти Рескаленко (Kirsti Reskalenko)

В статье публикуются отрывочные сведения о проблемах восстановления библиотеки в 50-е годы. Статья написана по материалам интервью с архитектором Александром Швером, который являлся автором проекта реновации интерьеров библиотеки и ответственным за осуществление авторского надзора, а также по материалам статей в местных газетах 1960-х годов. Интервью опубликовано целиком в журнале Птах 2002:2. Материалы собраны по проекту художника Liisa Roberts *What´s the time in Vyborg*?

Проектировочные работы были начаты в 1950 году. Ленинградский Комитет по строительству принял в 1954 году решение о том, что библиотека будет восстановлена в её первоначальном виде. Это было неслучайным: в том же году вышло постановление «Об изменении направленности в архитектуре». Архитектор Петр Розенблум разработал вариант реконструкции с неоклассическими деталями.

В 1955 году рабочие приступили к разборке завалов полуразрушенного здания. Работа по восстановлению шла медленно: из года в год оно входило в планы подрядчика. Архитектор Розенблум скончался в 1957 году. Его работу продолжил молодой Александр Швер. Он рассказывал об условиях строительства: «Нельзя забывать, что страна была очень бедной. Не хватало строительных материалов». Проектировщикам не разрешали писать автору здания и советоваться с ним. В подрядной организации не было квалифицированных рабочих.

Местная пресса следила за реконструкцией библиотеки и писала о его её недостатках. На разработку и монтаж системы отопления и вентиляции библиотеки ушло много времени. Остекление окон затягивалось из-за отсутствия стекла в стране. Были жалобы также на непоследовательное ведение работ и на длительные паузы.

Библиотека, «Дворец книг», была открыта в марте 1961 года. К сожалению заведующему библиотеки, председателю библиотечного совета и заведующему хозяйством пришлось писать уже осенью следующего года о низком качестве строительных работ: в помещениях второго этажа температура не поднималась выше 10 – 12 градусов, крыша библиотеки протекала, главный распределительный щит электроэнергии находился под угрозой перегорания и так далее. Многие комиссии посещали здание, но нечего не менялось. Прекрасное здание продолжало разрушаться... Фотографии, в том числе снятые Аланом Ирвинем в мае 1962 года, свидетельствуют, однако, о другом: здание находилось хотя бы внешне в хорошем состоянии.

Несмотря на все недочёты реконструкции, у жителей Выборга появилась уникальная возможность посетить современную библиотеку, которая «радовала лаконичностью форм, обилием света и воздуха». Библиотека была единственной в своём роде в стране Советов. Она стала также местом паломничества советских архитекторов в годы железного занавеса.

A FEW MOMENTS OF “WHAT’S THE TIME IN VYBORG?”

COLLATED BY LIISA ROBERTS

**Auditorium,
Alvar Aalto Library,
Vyborg,
October 2001.**

In March 2001, the creative writing workshop "What's the Time in Vyborg?" initiated by Liisa Roberts, began meeting in the auditorium of the Alvar Aalto Library. The workshop was intended for teenagers in Vyborg to develop a script for a film about the city.
It was run by Roberts in collaboration with Olga Maslova and Edgaras Platelis.
One of the participants, Olga Fedotova then 15 years old, wrote "The Story of Turning into a Thing" in response to the task of describing: what the city thinks. The material from the creative writing workshop was further developed into a script, local television news clips, a series of performative events including a city excursion, and most recently a film by the work group formed in the writing workshops including: Olga Fedotova, Dina Grigorieva, Yana Klichuk, Lyuba Mukhorova and Anna Yaskina.

История Превращения в Вещь

Федотова Ольга (Olga Fedotova)

У городов нет будущего, нет прошлого, нет настоящего. Ничего нет. Да и самих городов нет. Есть только человек в желтом пальто, старая скамейка, черепица на порыжевшей крыше и кусок пыльного неба. Все это неразрывно связано с тем, что раньше было городом. Глыбы мертвого металла вверх, пыль живого камня вниз. В каждой прозрачной луже отражается давно упавшая звезда. Где-то в зыбком воздухе тугой стрелой отскочили от стены звуки ушедших в небытие голосов.

Желтое пальто распахнулось и явило собой красную подкладку. Его обладатель сел на старую скамейку. "Что со мной? - думал человек в желтом пальто. - Я жив или мертв? Если жив, то почему не могу поднять глаза и увидеть кусок закопченного неба, а если мертв, то почему не могу упасть с пыльной высоты, сливаясь с землей? Земля ...". Его мысли прервал неизвестно откуда вспорхнувший голубь. Сильные крылья разрезали воздух и неслись к стене дома. Еще движение ... стена поглотила птицу. Мимо человека в желтом пальто пролетела дама, вернее даже не дама, ее почти не было видно из-за огромного красного шарфа. Где-то за углом топали ботинки. Желтое пальто или человек в нем видел огромные пуговицы, а за ними маленьких людей. Видел даму, похожую на микроволновку, можно было бы даже сказать, что это микроволновка в шляпе. Человек в желтом пальто подумал: "Что здесь делают эти грузчики-часы, шахматный мальчик и девушка в парике-капусте? Почему эти люди так похожи на предметы? Зачем они идут туда - сюда с пластмассовыми лицами, хлопая стеклянными глазами?" Ему вдруг показалось, что старая черепица, скамейка, окна, двери - все вторило ему. А проходящим предметам эти голоса казались просто мятежным ветром, отчаянными порывами бегущим по городу. "Станьте людьми, - кричали стены, - стойте! Вы - часть города, город жив, а вы мертвы. Так не бывает, стойте!". По городу все так же шел шахматный мальчик, летел красный шарф, похожий на даму. "Что это со мной? - задумался человек в желтом пальто. - Город - это город, я - это я. Нет связи." И на самом деле теперь уже ничего не держало этого человека, старую скамейку и черепицу на порыжевшей крыше. Только в пестрой толпе иногда мелькало желтое пальто.

THE STORY OF TURNING INTO A THING

Olga Fedotova

The cities have no past, no future, and no present. They don't have anything. Cities themselves don't exist. There is only a man in a yellow coat, an old bench, old roof-tiles on a faded roof, and the quadrangle of dusty sky. All of this is an integral part of what had been the city. The hunks of dead metal–up; the dust of live stone–down. Reflections of long-fallen stars in each transparent puddle. Through the hazy air, sounds of voices that passed into oblivion bounce from the walls like well-aimed arrows. The yellow coat opened and revealed itself as a red lining. Its owner sat down on the old bench. "What is going on with me?" the man in the yellow coat was thinking. "Am I dead or alive? If alive, why can't I lift my eyes and see a piece of the soot-covered sky? If dead, why can't I fall down from the dusty heights, becoming one with the earth? The earth ..." A pigeon, suddenly in flight, interrupted his thoughts. Strong wings were piercing the air and hurling towards the wall. One more movement, and the bird was swallowed up by the wall. A lady in a red scarf flew by the man in the yellow coat. Rather, it was not even a lady; she could not be seen behind the enormous red scarf. Boots were thumping somewhere around the corner. The yellow coat or the man in it saw huge buttons, and behind them–tiny people. He saw a lady who resembled a microwave; one could say that it was a microwave in a hat. The man in the yellow coat thought, "What are these movers-clocks, the chess-boy and the girl-in-the-cabbage-wig doing here? Why do they so resemble things? Why are they walking around with plastic faces, blinking glass eyes?" It suddenly seemed to him that the old roof-tiles, the bench, and windows, and doors, all were imitating him. The things passing by thought that these voices were just the unruly rebellious wind running through the city in desperate gusts. "Turn into people," shouted the walls. "Wait! You are a part of the city. The city is alive, and you are dead. Wait, it cannot be like this!" The chess-boy was still strolling in the city. The red scarf resembling a lady was still flying. "What is going on with me?" thought the man in the yellow coat. "The city is the city, and I am I; I am myself. There is no connection." In fact, nothing was holding this man, the old bench and the roof-tiles on the faded roof in place any more. Only in the crowd, there flashed from time to time a yellow coat.

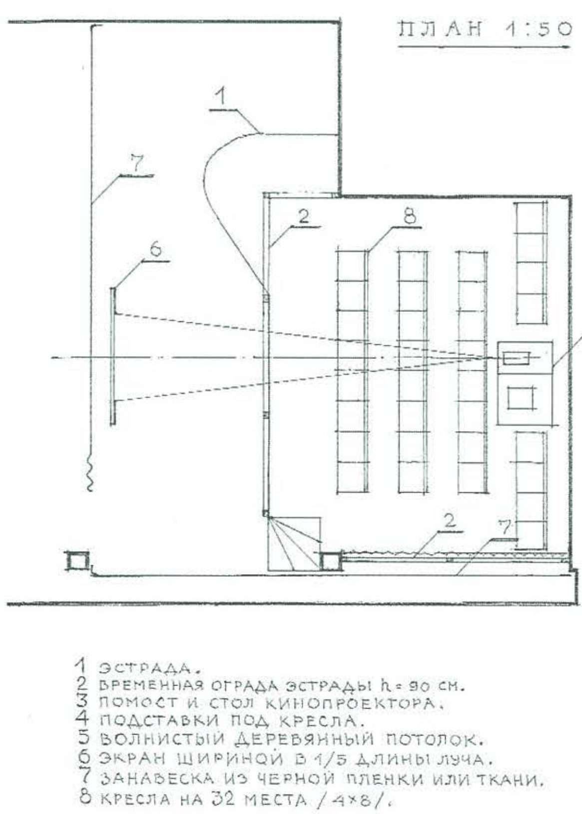
(Translation Denis Maslov)

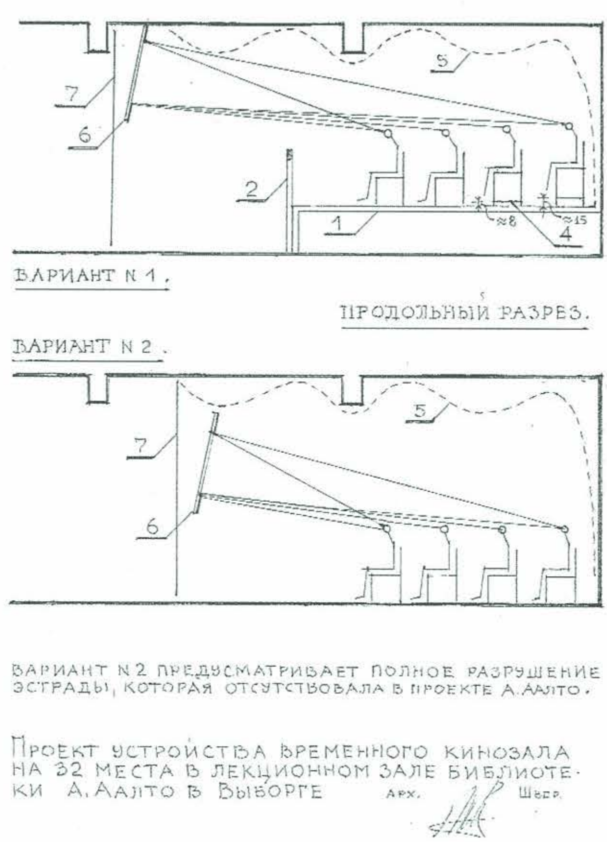
www.auditorium.vbg.ru

above: Early morning view from the auditorium to the entrance hall, Alvar Aalto Library, Vyborg, October 2001.

right: Speaker's area, auditorium, Viipuri library, Viipuri, 1935.

The Soviet period renovation of the Alvar Aalto Library included an unrealized plan to remove the windows of the auditorium and to change the space into a cinema. As a part of the work for "What's the Time in Vyborg?", architect Aleksandr Mihailovich Shver was commissioned to create a design for an occasional cinema respecting Aalto's original auditorium design, in which the film produced by "What's the Time in Vyborg?" could be screened. To facilitate the realization of the project, architect Kirsti Reskalenko created "A Project for Research and Collaboration: Architect Aleksandr Shver and the Viipuri Library", the goal of which was to uncover the history of the 1st restoration period of the library from 1957 to 1961. The project was initiated in April 2002 with a walking tour of the Alvar Aalto Library led by Shver for the benefit of the Finnish Committee for the Restoration of Viipuri Library. Since then, there have been several publications based on the material from the tour. The stage (a platform for a film projector installed in the Soviet period) was removed from the auditorium by the Restoration Committee and "What's the Time in Vyborg?", as specified in Variant 2 of Shver's design, for the occasion of the 7th International DOCOMOMO Technology Seminar in September 2003. A set of Aalto's Jakkara stools was donated by ARTEK for the cinema in February 2004, on the occasion of the presentation of "What's the Time in Vyborg'?" at the 3rd berlin biennale of contemporary art.





1. stage.
2. temporary railing for the stage H=90cm.
3. dais and table for film projector.
4. stands underneath stalls.
5. wooden undulating ceiling.
6. width of screen 1/5 of projection distance.
7. black polytheline or fabric curtain.
8. stalls to seat 32 (4 x8).

In variant no. 2 the stage, which was absent from A. Aalto's project, is completely dismantled.

Project plan for an occasional cinema seating 32 in the Lecture Hall (auditorium) of the A. Aalto Library in Vyborg
arch. Shver

Polyvinyl tiling installed in the first renovation period in the entrance hall, Alvar Aalto Library Vyborg, October 2001. Stills from the film (pp. 56-58, 70-74) "What's the Time in Vyborg?" (2001-04), directed by Liisa Roberts, Cinematography Aleksandr Burov.

In November 2004 the film "What's the Time in Vyborg?" will be aired on the Finnish Television channel YLE 1, and in 2005 it will be screened at the Alvar Aalto Library, Vyborg, as well as in St. Petersburg and in Berlin. The film collates images produced in various phases of the "What's the Time in Vyborg?": it includes film footage created during the creative writing workshop, which visualized the city through the lens of the teenagers' writings, video material generated in the framework of an improvisation workshop, television footage, as well as film segments of the city excursions conducted by the teenagers with Vyborg's former Finnish inhabitants. The film was premiered during the 2004 Whitney Biennial at the Aalto-designed Kaufmann Conference Rooms at the Institute for International Education in New York, where a presentation of the restoration of the Library had been held in 2002.

Aleksandr Burov is a Cinematographer based in St. Petersburg, Russia. Since 1985 he has worked on major projects with the filmmaker Aleksandr Sokurov. His most recent film with A. Sokurov, *Father and Son*, opened in theatres throughout Europe and the USA in summer 2004.

In 2001 **Olga Fedotova** was a student in grade 10 at School no.10, Vyborg, Russia. In September 2004 she will enter the Department of Direction of Theatrical Events, State University of Culture and Art, St. Petersburg. (see p.136-137)

In 2001 **Dina Grigorieva** was a student in grade 10 at School no.36, Vyborg, Russia. Currently she is in her third year in the Department of Philosophy of St. Petersburg State University, St. Petersburg.

In 2001 **Yana Klichuk** was a student in grade 8 at the Gymnasium, Vyborg, Russia. In September, 2004 she will enter the Smolnie Institute of Arts and Sciences of St. Petersburg State University, St. Petersburg.

Olga Maslova is a psychologist living in St. Petersburg, Russia and Lausanne, Switzerland. She co-founded the first private psychological practice "Dialogues" in post-Soviet St. Petersburg.

In 2001, **Lyuba Mukhorova** was a student in grade 9 at School no. 10, Vyborg, Russia. Currently she is in her second year in the Department of Art History at St. Petersburg State University, St. Petersburg.

Edgaras Platelis gradutated from Vilnius University in 1998 with a B.A. in English philology and in 2000 with an M.A. in World Literature. He is a translator and writer of short stories. He is currently working for the "Metropolio Vertimai" translation bureau in Vilnius, Lithuania.

Architect **Kirsti Reskalenko's** doctoral thesis "Historical Continuity and Preservation of Architectural Heritage in Russia 1978-2000" was a study of the system of architectural preservation in the Soviet Union and Russia, in particular, evaluating its results in Pskov, Russia. She translated the planning documents of the restoration of Viipuri Library into Russian. She is currently working as a town-planning architect in Joensuu, Finland. (see p.69-75)

Liisa Roberts is an artist based in Helsinki, Finland and St. Petersburg, Russia. Her work has been exhibited widely since 1993 in exhibitions such as *Documenta X* (1997) and *D'Apertutto* at the 48th Venice Biennale (1999). She initiated "What's the Time in Vyborg?" in 2000. In September 2004 she will begin work on a new film linked to New York City's Highline, an abandoned elevated rail duct built in the 1930s.

Architect **Aleksandr Mihailovich Shver** lives and works in Vyborg, Russia. He is the chief architect at the Lencitizen Project and was the chief designer of the restoration and reconstruction of the Central Library of the City of Vyborg, named in honor of N. K. Krupskoi (the Alvar Aalto Library) in 1957-1961. (see p.54-58)

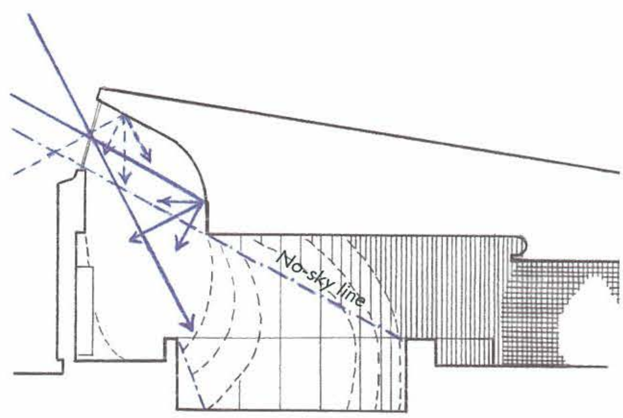
In 2001, **Anna Yaskina** was a student in grade 11 at School no.6, Vyborg, Russia. She is currently taking a year off from her studies in the Department of Philology of the Vyborg branch of the University named in honor of A. E. Herzen. Her son Matvey will be two years old in December 2004.

Yana Klichuk reciting her poetry on the stage, auditorium, Alvar Aalto Library, Vyborg, June 20, 2003.

AN ANALYSIS OF THE DAYLIGHTING PRINCIPLES IN TWO LIBRARIES DESIGNED BY ALVAR AALTO

When a daylight opening functions as 'daylighting luminarie'

Merete Madsen



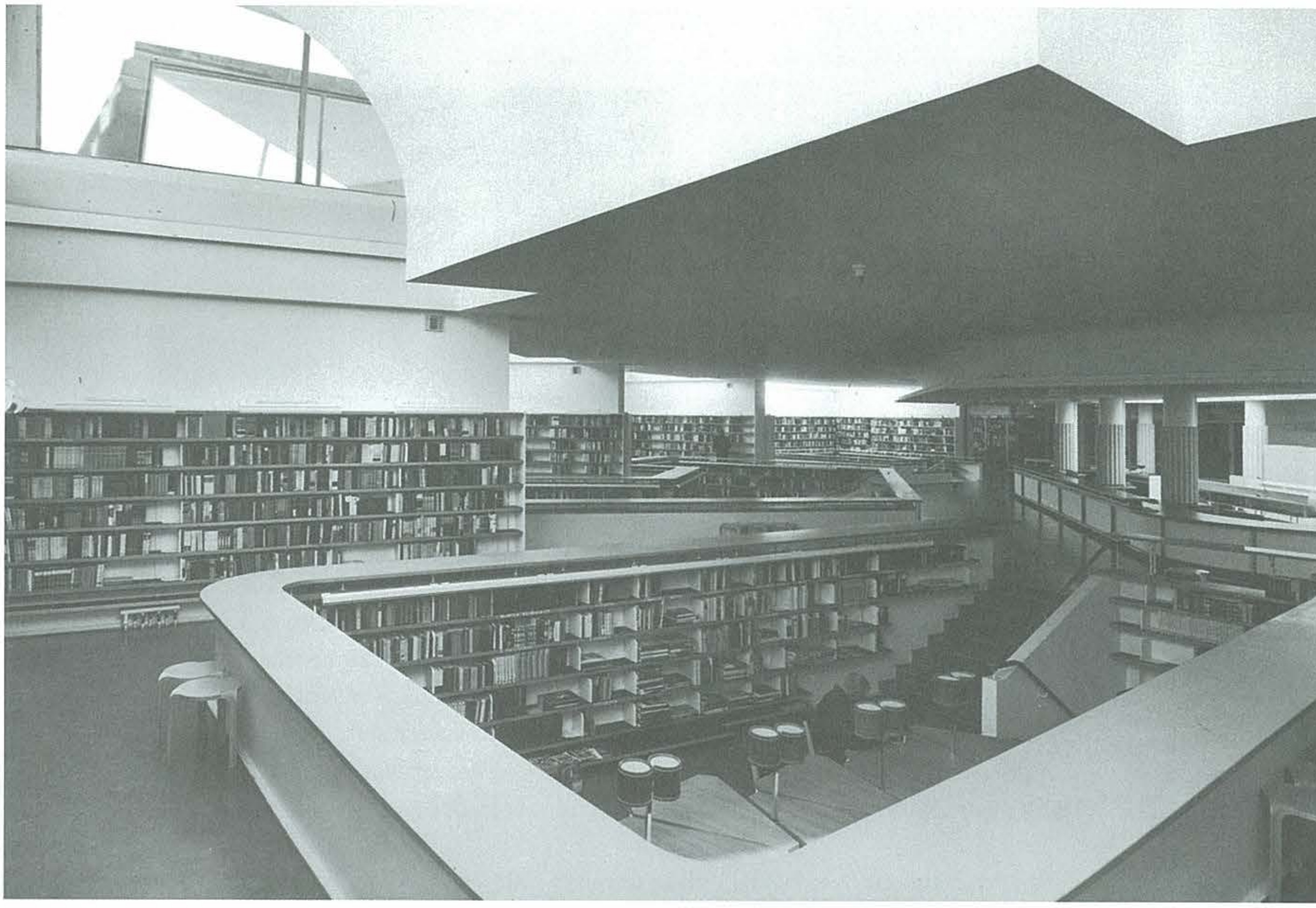
In the Rovaniemi Municipal Library, designed by Alvar Aalto, the natural daylighting in the lending room is very precisely controlled; principally by a row of north-facing, periscope-like 'skylight scoops'. The library lending room's daylighting composition can be seen as a complex refinement of the fundamental illumination principles that Aalto developed thirty years earlier in his first library design in Viipuri.

The majority of the daylight openings function as a kind of 'daylighting luminarie' because the apertures' form and everything situated in relation to the apertures influence how daylight enters the space. The skylight scoops in the lending room provide a distinct example of this. The way the skylight scoops' asymmetrically curved vaults shield, transform and reflect the daylight entering the space is reminiscent of the way a lampshade shields its light source, reflecting the illumination outwards into a space.

Rovaniemi Municipal Library (1962-68), lending room. The 'skylight scoops' shield direct skylighting (with a low inclination angle, causing glare) from entering the space. Simultaneously, the skylight scoops' asymmetrically curved vaults reflect the daylight indirectly downwards into the reading niches and on to the bookshelves under the openings.

In the Rovaniemi Library there is a row of reading niches along the north wall, which are illuminated by the skylight scoops that follow the wall's fan-shaped form. These apertures are a hybrid between a clerestory window and a skylight: 'skylight scoops'. The purpose of these skylight scoops is to shield the segment of the skylighting with a low inclination angle, which could cause glare. At the same time, the scoops reflect the daylight downward into the reading niches and on to the bookshelves.

One cannot be certain if Aalto intentionally designed these skylight scoops in Rovaniemi as a kind of daylighting luminarie, since, with age, Aalto gradually ceased providing explanations for his architecture. He was seventy years old when Rovaniemi Library was completed, and he didn't publicly explain his intentions for the library's ligh-

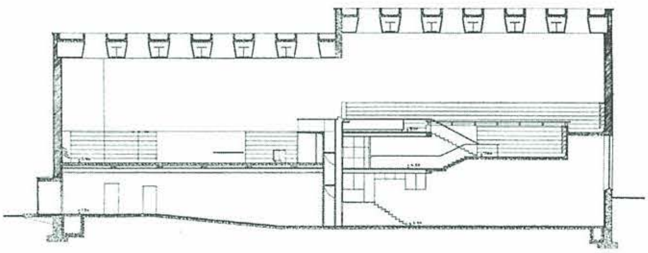


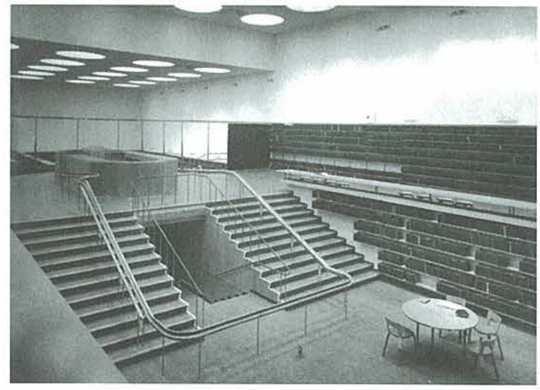
Rovaniemi Municipal Library (1962-68), lending room.

ting conditions. Rovaniemi Library's skylight scoops are therefore left to speak for themselves. Nevertheless, they do have a past.
In 1928, Aalto was a young, idealistic architect of thirty years of age who'd just been exposed to the new international architecture – Modernism. During the summer of 1928, Aalto embarked upon a European study tour to meet some of the day's leading architects and artists, and to study their works. It was in connection with these travels that Aalto visited Poul Henningsen in Copenhagen.

Poul Henningsen endeavoured to create modern lighting. He wanted to create lighting fixtures that wouldn't cause glare and would transform the light from a light bulb into a suitable and effective form of illumination. With the design of his 3-shade PH-lamp in 1926, Henningsen had successfully established the foundation for his system of artificial lighting fixtures, fulfilling his mission statement to create hygienic, economical and aesthetic lighting.

It was important for Henningsen to explain his lighting fixtures in a manner understandable to consumers. However, at the same time, he also elaborated upon his theories of illumination in several articles; in, amongst other journals, *Kritisk Revy* [Critical Review]. Aalto presumably had knowledge of Henningsen's articles. In any case, Aalto was one of the first foreign architects to use Henningsen's PH-lamps in his own projects. In fact, Aalto ceased designing his own lighting fixtures for several years, opting instead to use fixtures designed by Henningsen. Many of the lighting fixtures that Aalto designed later in life were inspired by Henningsen's fixture designs; and perhaps Henningsen's theories of illumination also influenced how Aalto worked with daylighting as well.





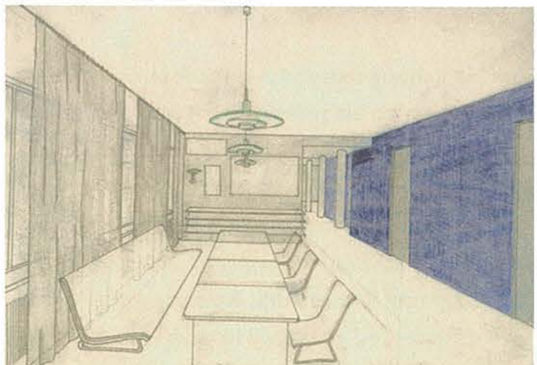
Viipuri Municipal Library (1927-35), lending room. The conical skylights prevent direct sunlight from entering the space. Concurrently, the inner sides of the skylights reflect the daylight so it is diffused and evenly distributed in the space.

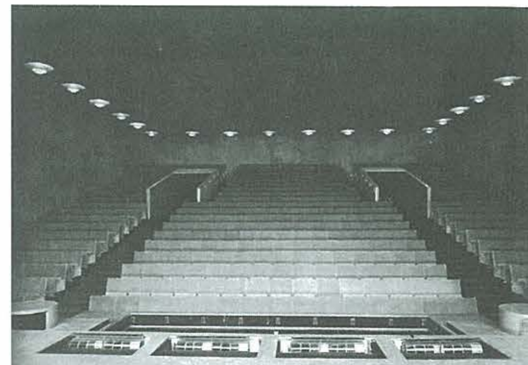
In 1928, Aalto drafted his second proposal for the Viipuri Municipal Library. He'd won the competition the year before with a proposal influenced by Nordic Classicism. In his competition scheme, the library's lending room was designed as a high-ceilinged space covered by a large glass roof. When Aalto revised this scheme in 1928, he maintained the floor plan's resolution whilst removing all the stylistic trappings of Nordic Classicism. The design was now inspired by the new international style and by Le Corbusier's architecture. Amongst other immediately visible influences on Aalto's Viipuri Library was the lending room's illumination via horizontal ribbon windows.

When Aalto drafted Viipuri Library's final design in 1933, he returned to his original idea regarding skylighting in the lending room. However, instead of a large glass roof he designed a system of conical skylights. The intention was to prevent direct sunlight from entering the library's interior, using the skylights' conical form to reflect the daylight and to disperse it in "millions of directions", as Aalto himself expressed it.

During this period, Aalto actively participated in the architectural debate, where he often used examples from his own work to explain his viewpoints. One of his main arguments was "the human factor". He believed that functionalism focused too greatly upon the economical and technical aspects of architecture. "Real functional architecture must be functional mainly from the human point of view", proclaimed Aalto in his article titled "The Humanizing of Architecture" (The Technological Review, November 1940). In this article, Aalto used the example of Viipuri Library's conical skylights and daylighting conditions to explain what he meant by the difference between "technically

Aalto was one of the first architects outside Denmark to use PH-lamps in his own design projects.
left: Turun Sanomat newspaper building (1928-29), conference room.
right: Auditorium in Turku's Municipal Theatre (1927-28).



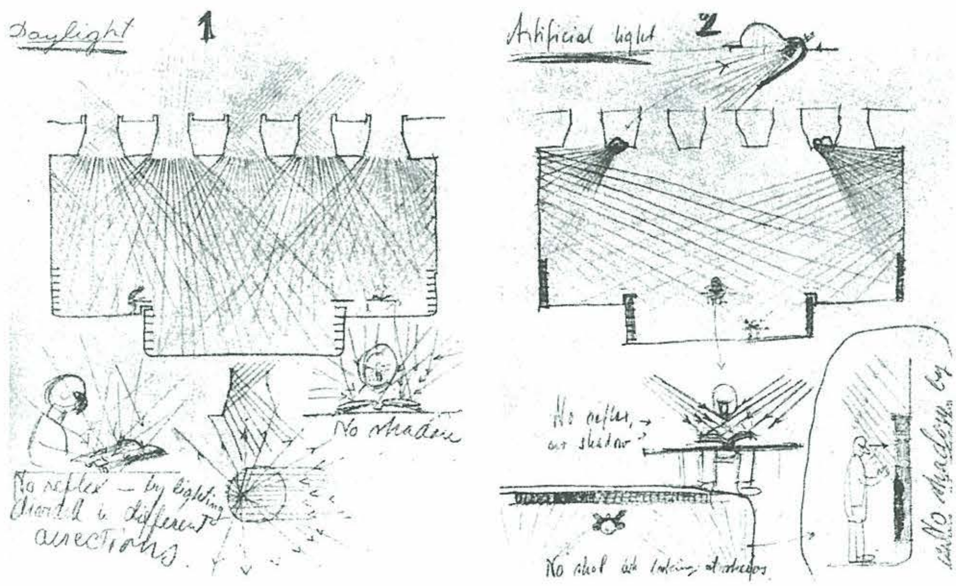


rational" and "humanly rational". Aalto explained that the conical skylights are technically rational because of the monopiece glass system they employed, in which a singular piece of glass covers the apertures (reducing the probability of leakage). At the same time, the conical skylights can be regarded as humanly rational because they provide illumination appropriate for reading. Aalto believed that the light should be evenly distributed and diffused to create the optimal lighting conditions for the library's most essential function: the reader and the book. The reader should be able to sit freely and read without reflections and shadows occurring on the book's pages. In Viipuri Library, this principle is applicable to both the artificial and the natural lighting for the entire space.

From then on, Aalto employed the conical skylights throughout the entirety of his architectural opus. Concurrently he developed other types of skylight constructions, which he variegated and refined from project to project. Amongst other things, this development lead to the design of the reflective skylight scoops in Rovaniemi Library's lending room.

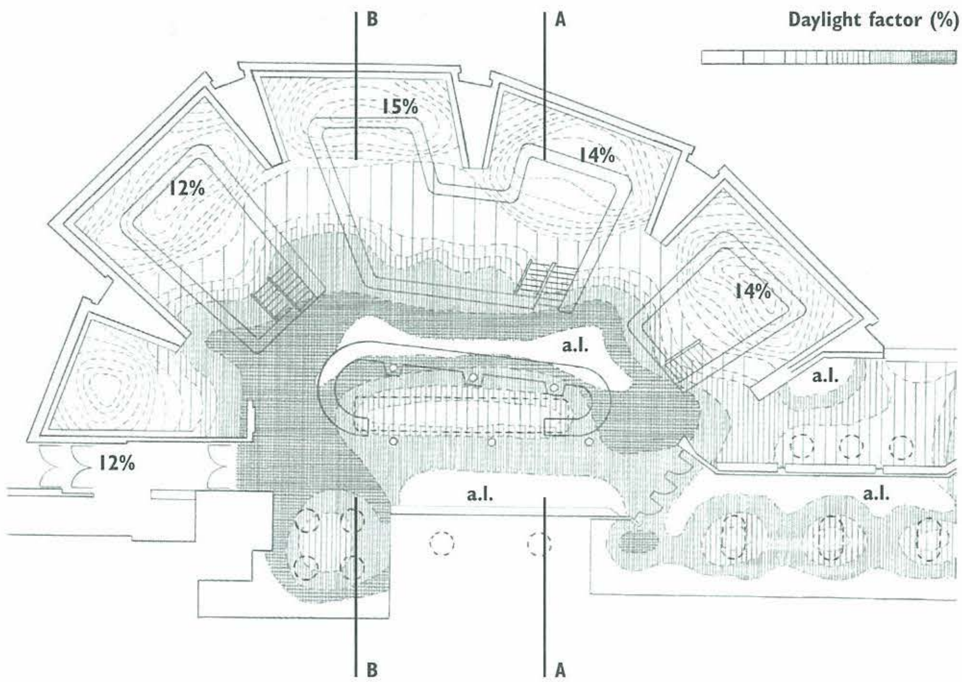
In contrast to the luminance level in Viipuri Library's lending room, the luminance level in Rovaniemi Library's lending room isn't uniform. On the contrary, it's so varied that the daylighting creates the phenomenon of 'space(s) within space(s)', which are experienced as independently defined zones of light, or 'light-zones'. The no-sky lines that are generated by the skylight scoops define these light-zones. At the same time, these light-zones are intensified because the direct skylighting is supplemented by the daylighting that is indirectly reflected downwards on to the vertical surfaces defining the light-zones. In this case, the vertical surfaces are the bookshelves in the fan-shaped north wall and the columns behind the control desk.

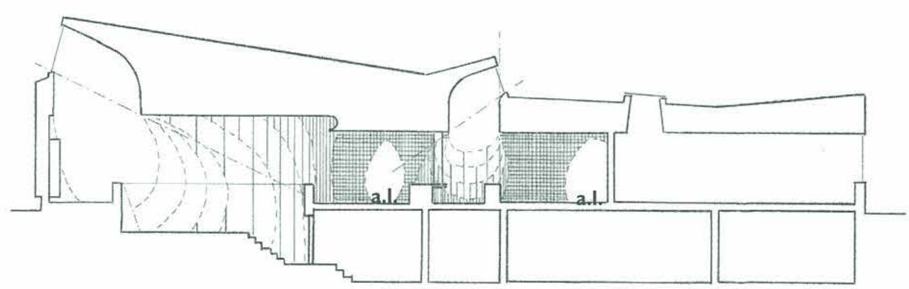
The light-zones defining the north-facing reading niches have the added refinement of connecting the sunken reading niches with the library's upper level. In other words, the composition of light-zones is able to both divide the space as well as to connect different spaces.



Aalto's illumination principle illustrations for the natural daylighting (left) and artificial lighting (right) in Viipuri Library's lending room.
The illumination is evenly distributed and diffused so the reader isn't disturbed by reflections or shadows occurring on the book's pages or the bookshelves. On the sketches, Aalto has written the keywords: "No shadow" and "No reflection".

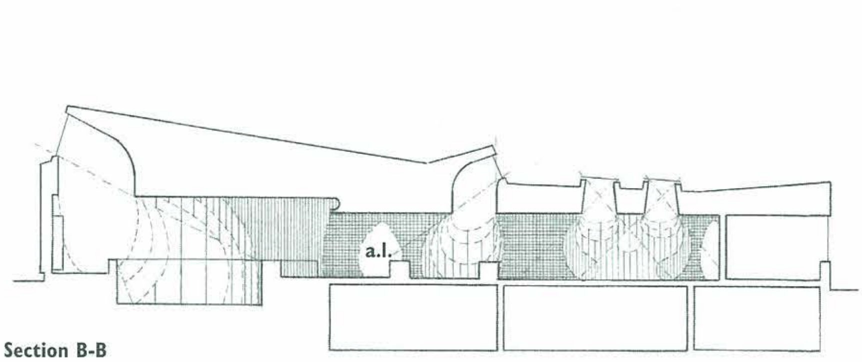
Plan for Rovaniemi Library's lending room, rendered with 'isolux' contours illustrating the day-lighting levels.





Section A-A

al.= artificial 'light-zones',
i.e. light-zones created by artificial light

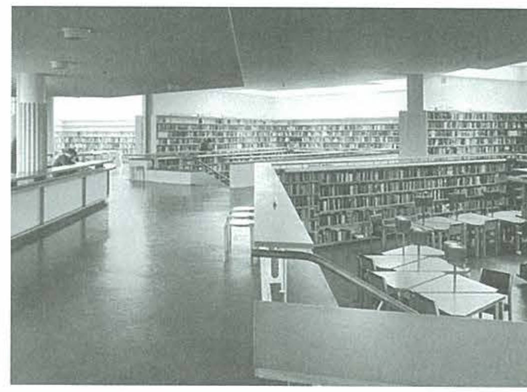


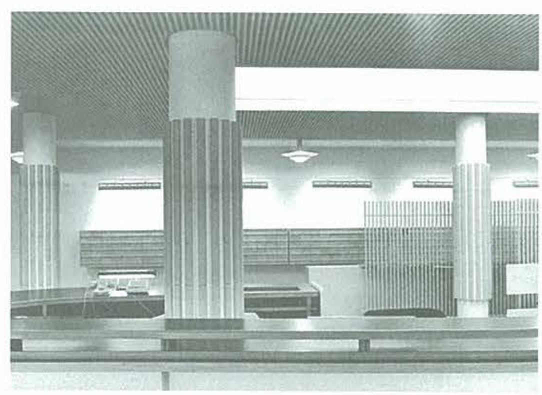
Section B-B

Section through Rovaniemi Library's lending room, showing the no-sky lines and the spatial distribution of the skylighting sketched as 'influx of light' contours.

In the reading niches, the daylighting is augmented by the bookshelves' artificial lighting and by a row of fixed desk lamps in the sunken reading niches, which creates warm 'light caves'. The combination of the cool daylighting light-zones, enveloping zones of warmer artificial light are rich in character – especially in Rovaniemi, where the periods of twilight are long and varied.

The light-zones are limited and defined by intervening areas of shadow, which create spatial interludes in the overall daylighting composition. More specifically, the areas of shadow act as border zones between the light-zones, as 'a space within a space'. In relation to the shadowed area, the skylight scoops act as 'eyebrows', preventing a direct view of the segment of the sky that could cause glare. In front of the control desk in Rovaniemi Library, Aalto created an artificial light-zone, where the meeting between the patron and the librarian is embodied in a meeting between a daylighting light-zone and an artificial light-zone. The lending room's pliant daylighting composition makes particular demands on the artificial lighting, which is either situated within the daylighting light-zones or inside the intervening areas of shadow. Artificial light isn't positioned in the interval between light and shadow, where it would eliminate the daylighting composition and the experience of the light-zone(s).





The composition of light-zones in Rovaniemi Library's lending room is wholly other from that of Viipuri Library's lending room, where the daylight entering through the numerous conical skylights creates one cohesive light-zone, comprising the entirety of the lending room. However, despite the luminance levels and the distribution of the illumination being completely distinct in the two libraries, the lighting conditions aren't so different when seen from Aalto's "humanly rational" point of view. As in Viipuri Library, one can sit freely and read in Rovaniemi Library (in the niches' light-zones) without disturbing reflections and shadows occurring on the book's pages. The difference between these libraries is that the 'human function' – the reader and the book – isn't applicable in the entirety of Rovaniemi Library's lending room. In Rovaniemi, one reads in the light-zones and moves in-between them.

In Rovaniemi Library's lending room, the daylighting creates the phenomenon of 'space within a space', which is experienced as zones of light. These 'light-zones' define the lending room and function as a sequence in which one finds a book (the illuminated bookshelves), browses through the book on various levels (the reading niches' light-zones), and then borrows the book (the control desk's light-zone).

Consequently, the lighting conditions in Rovaniemi Library's lending room can be seen as a complex refinement of Aalto's basic principle of creating humanly rational lighting conditions: a principle which he developed in connection with Viipuri Library. Even though the form of illumination is completely different in these two libraries, it is first and foremost the perception of the library's function that is varied. The function is transformed from that of merely reading a book (as a principle for the entire space) into an almost ritualistic sequence in which one finds a book (the illuminated bookshelves), browses through the book on the various levels (the reading niches' light-zones), and then borrows the book (the control desk's light-zone).

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Merete Madsen

Merete Madsen PhD. is an architect (MAA) and currently Assistant Professor at the Royal Academy of Fine Arts, School of Architecture in Copenhagen
Her Ph.D. thesis, titled "Light-zones [*Lysrum*] as a concept and tool", was an exploration into the spatial and form-giving qualities of daylight: more specifically, establishing a foundation for discussing *lysrum* as an architectural concept, as well as illustrating how *lysrum* can be detailed, concretised and used as a tool in connection with the analysis of daylight in spaces with multiple daylight openings.

Когда отверстия в потолке функционируют как «светильники дневного света»

Мереmе Мадсен (Merete Madsen)

В главном абонементном зале библиотеки Алвара Аалто в Выборге свет распространяется достаточно равномерно. В свое время Аалто считал, что равномерно поступающее и распространяющееся освещение дает идеальные условия самой главной задачи библиотеки: читателя и его книги.
Тридцать лет спустя Аалто проектировал городскую библиотеку в г. Рованиеми. Там распространение дневного света далеко не равномерное. Наоборот, освещение настолько разнообразное, что дневной свет там создает феномен «пространства внутри пространства», которое ощущается отдельными зонами света, или ´светозонами´.
Несмотря на совершенно разные уровни освещения и распределения света в этих двух библиотеках, условия освещения в этих двух библиотеках не так сильно отличаются друг от друга, если их рассматривать с точки зрения «гуманного рационализма» Алвара Аалто. Различия можно найти прежде всего в понимании функции библиотеки. Если в библиотеке раньше просто читали книги, что было главное назначение всего пространства, то теперь речь идет почти о ритуальной последовательности, во время которой читатель находит книгу (освещенные книжные полки), пролистывает ее более или менее тщательно (читальные уголки, определенные освещением), а потом берёт книгу на дом (зона освещения, определяющая территорию стола выдачи книг). Другими словами, разные условия освещения в данных двух библиотеках являются скорее результатом разного понимания функции библиотеки, чем разного подхода к концепции света и освещения.

THE STRUCTURE AND SYSTEM OF ALVAR AALTO'S ROUND SKYLIGHT

Markku Norvasuo[1]

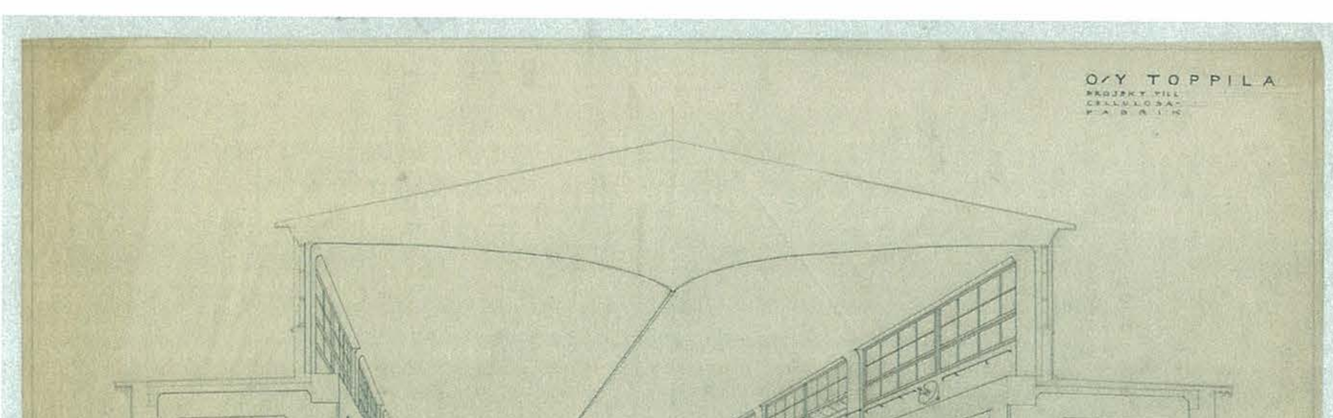
System, structure and architectural motif

The round skylight was the earliest of Alvar Aalto's famous skylight constructions. It was only late in the 1940s that other well-known motifs began to emerge: the combination of a clerestory window and a vault-like form (the "light scoop") and the "crystal-like" lanterns. The grand auditorium of the Helsinki University of Technology and the central hall of the National Pensions Institute in Helsinki are examples of these latter types. For the round skylight, the library of Viipuri (Vyborg) is important because of the complete "ceiling system"[2] used there. The skylight now had a clear lens-shaped glass top and an open conical light well.

The quality of illumination was an obvious motivation for the development of the round skylight, but its systemic nature was also evident.[3] The roof of Viipuri Library incorporated three different infrastructural systems: the bearing structure, the heating and the lighting. Lighting in turn consisted of daylight and electric lighting. After Viipuri, the direct association of electric light with the light well reveals further systemic aspects that are of particular interest.

We can trace the technical development of the round skylight along two intertwining lines, the *system* and the *structure*. The careful handling of practical issues indicates the importance of technical matters. But when Aalto invented his round skylight he also created an *architectural motif* – a tool of architectural variation and expression. Architectural form and technology, however, are often separated from each other.

Fig. 1. Toppila pulp mill, Oulo, 1930. (AAM no. 70/74).



Explanations regarding architecture do not always reveal the influence of technology, which may be hidden yet is sometimes decisive. Therefore, it is important to consider all three issues from the technological viewpoint.

Lighting as a system

Towards the end of the 1920s Aalto was certainly aware of the idea of illuminating ceiling surfaces with electric light. An example can be found in an illustration of the Toppila pulp plant (Oulu, 1930, fig. 1), which has both clerestory windows and electric light fittings directed towards the ceiling surfaces of a production shed. In the Viipuri Library Aalto used wall surfaces for the distribution of electric light and the round skylights for the distribution of daylight. Accordingly, the ceiling was not the only light-distributing surface. But Aalto had already considered light fittings attached directly to the skylight structure. In the entrance hall of the Paimio Tuberculosis Sanatorium (1929) there were electric light fittings beside each skylight in the ceiling – an idea that later appeared in the staircase hall of the Institute of Pedagogy in Jyväskylä (1951). Furthermore, above an operating table there was an individual skylight with six light bulbs inside and a hook for an operating lamp a highly utilitarian setting (fig. 2). Diffusing glass was used in both the light well and the semicircular window wall of the operating theatre to provide sufficient daylight. Electric light was combined directly with a light well in the designs for the Finnish pavilion at the Paris World's Fair of 1937 (fig. 3). The fittings were part of the superstructure of the skylight together with metallic sunscreens. The latter were added because of the more southern latitude of Paris in comparison with Viipuri. (If the light well had been di-mensioned according to the highest elevation of the sun it would have been much deeper than in Viipuri.) In fact there were two lamps, one illuminating the light well below and another directed upwards, apparently towards the foliage of surrounding trees. Perhaps the metallic sunshade was also meant to be illuminated. This kind of *outside* placing emerged again more than a decade later in the MIT dormitory and Rautatalo building projects.

The idea of combining electric light with daylight was probably not Aalto's own. It was far too apparent to remain without general attention. White-coloured daylight was one of the ideals of the era, and even "artificial daylight" fittings were proposed.[4] They had a diffusing glass to disguise the electric lamps behind the type of glass that Aalto applied in Paimio. One year after the Paris World's Fair the magazine *Byggmästaren* presented the design of the Malmö Museum by Carl Axel Stoltz. In the article there was a section of a gallery where electric reflectors were placed *inside* rooflight constructions.[5] Since the 1950s Aalto regularly placed his light fittings inside the light wells. This idea appeared already in the designs for the House of Culture in Helsinki (1952-58).

Structural improvements

One structural source for the round skylight is interestingly present in the Turun Sanomat newspaper office building (1928). The three skylights of the printing hall terminated the famous two rows of sculptural columns. Around the inner corner there was another long rooflight area, like a side bay of the central column area. It was made of "glass concrete", a structure of glass squares between concrete ribs.

Glass concrete was translucent, load-bearing and fire-resistant, and, therefore, typically used in deep multi-storey buildings, such as industrial lofts and department stores. Daylight from the top level could pass through the lower floor levels (the idea was similar to that of Labrouste's cast-iron floors). Also in the Turun Sanomat building there was a mezzanine level below the long rooflight made of the same material. Glass concrete was also used to illuminate spaces below pavements. In the Turun Sanomat building both types of rooflights opened onto the courtyard level outside (fig. 4).

At that time, hollow glass bricks had not yet been introduced. Glass concrete was in practice a single-layer glazing; so, too, was the cast glass of the round skylight. Obviously poor thermal resistance was not a problem inside a building or for cold structures. However, unlike many glass concrete structures of the time, the round skylight was always used for building envelopes. Inevitably, this solution created problems in the form of condensation and draughts. It may even have led to the closing of light wells to stop water from dripping. The experience probably led to the improvement of glazing around the year 1950. The Finnish Engineers' Association Building in Helsinki (1948-1953) was perhaps the first case, or at least among the first one where the new structure was applied (fig. 5). The number of glass panes was now three. The upper gap between them was ventilated and the lower gap was lined with a rubber seal. Condensed water was led away. In this particular design, the inner diameter of the light well was about 900 mm and the height approximately 650 mm.[7]

The same structure was used in several designs over the following years. A curious thing presents itself here. The above design was intended for the kitchen space of the Engineers' Association Building. Other similar cases include the educational kitchen of the Institute of Pedagogy, the restaurant kitchen of the National Pensions Institute and early designs for the House of Culture. Now the skylight type, previously prone to condensation problems, was boldly used in the most difficult environments. In the illustrative drawings for the kitchen of the Paimio Sanatorium one can see large steam hoods above the kettles. Aalto was certainly aware of the problem and trusted the improved design. Introducing the Rautatalo building (1951-55) in the Finnish architectural magazine *Arkkitehti*, Aalto presented his illumination system also as a *snow-melting device* (fig. 6). He mentioned that the external light fittings had already been used in the MIT Dormitory building (1947-49), but did not mention the Paris pavilion. Regarding the Rautatalo building, he wrote: "[T]ilted [sky]light openings easily become covered by snow. Therefore the warmth radiating from the building, together with the warmth produced by the light fittings, make the snow slide off the roof openings."[8]

The air moisture condensates on cold glass surfaces. Their low temperature is caused by a thermal flux from the inner to the outer surface of glass panes. But this thermal leak also tends to melt snow. When the insulation was improved, both the melting of snow and condensation were reduced.[9] There were thus literally "two sides" of the thermal insulation question.

Variations of an architectural motif

The 1950s in general marked a period of strong development in Aalto's rooflights and clerestory solutions. Common to these new forms is the relatively upright position of the glazing. It is also interesting to note that the large lanterns of the National Pensions Institute had luminaires *between* the outer and inner glazings. Apart from the questions of architectural meaning and characteristics of illumination, it is possible to consider whether these solutions had something to do with the "snow problem". Certainly it was not the most important reason for Aalto's search for new glazing forms. It could, rather, be described as a precondition to be considered.

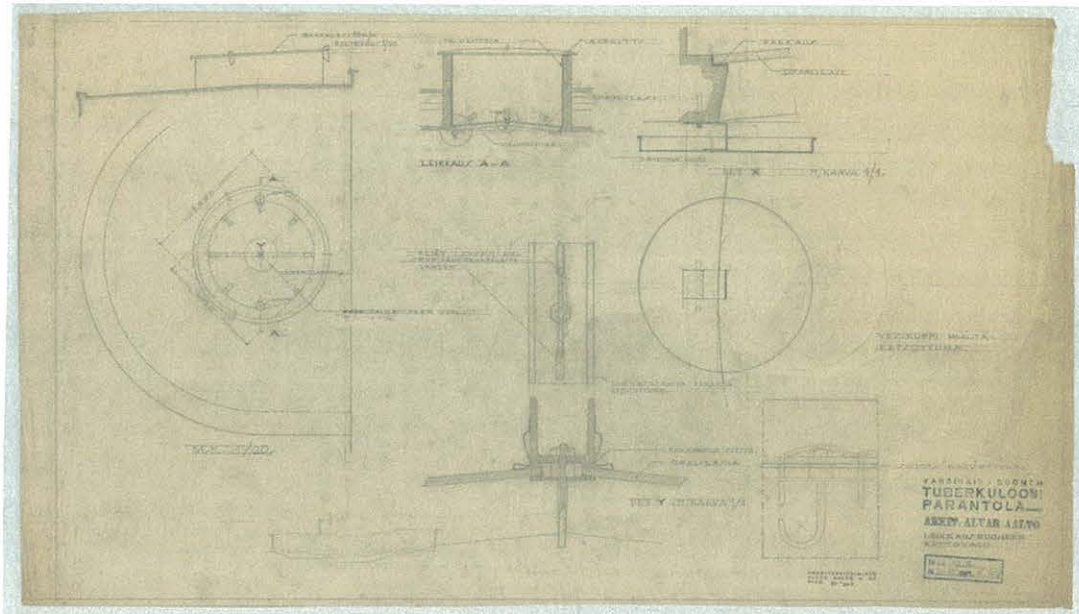


Fig. 2. The operating theatre of the Paimio Tuberculosis Sanatorium, section of the round skylight. (AAM no. 50/267, detail)

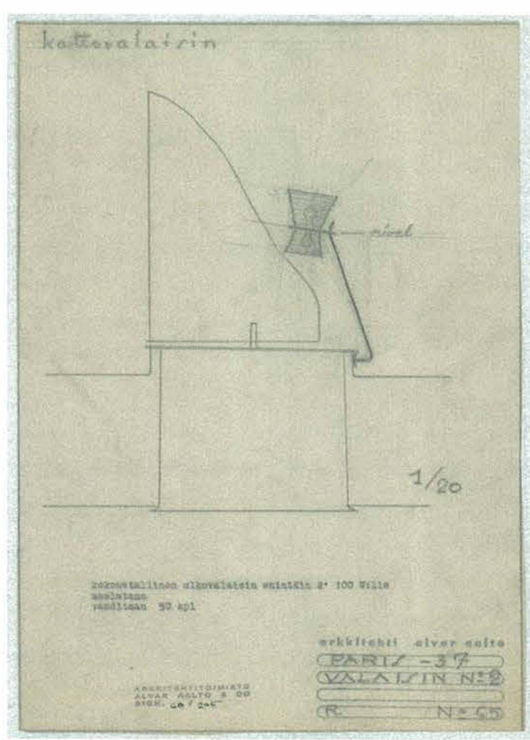


Fig. 3. The skylight construction for the Paris World Exhibition, 1937. (AAM no. 68/205)

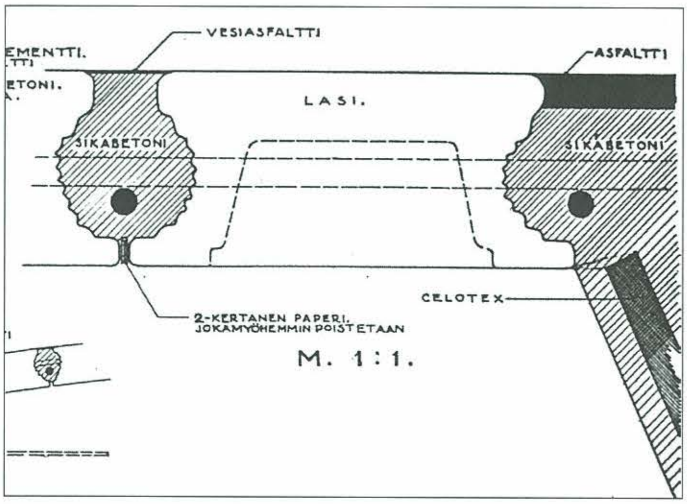
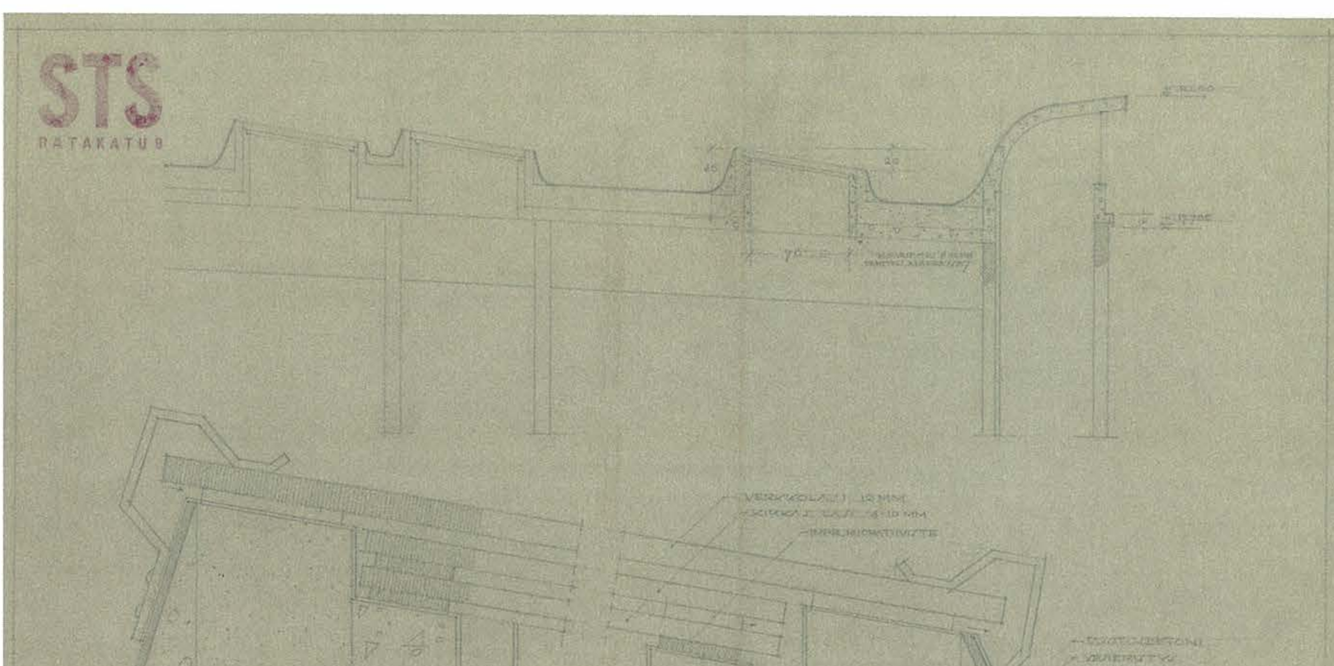


Fig. 4. Glass concrete construction from the "Standard furniture" drawing series, 1930. (AAM no. 96/40, detail)

Fig. 5. The improved construction of the round skylight, dated May 30th, 1950. (AAM no. 60/335)



In one Finnish source of the period, the recommended minimum slope of a glazed roof was 40 degrees, in order to keep it free from snow.[10] This is quite much compared to the slightly tilted tops of the round skylights. In 1948 Aalto designed skylight glazing based on an octagonal pyramid for the American Embassy garage in Helsinki, two years before the improved design for the Finnish Engineers' Association Building (fig. 7). Therefore, uncertainty remains whether the experiences of melting snow were already known. The former project remained unbuilt.

Given the limitations of horizontal glazing, the round skylight was perhaps the most versatile of Aalto's window motifs. It was used for both distinctive, even monumental buildings (such as the Viipuri Library), and everyday spaces. Perhaps the industrial sources and the rationalistic idea of the *lighting device* were reflected in the small-scale uses of the round skylight. These spaces were often small, like the bathroom and the storage room of Aalto's own house in Helsinki, the workers' sauna at the Sunila pulp mill, as well as the stair halls of the attached employee houses for the EKA company, and the basement-level entrance of the Inkeroinen village school. These completed works all date from the years 1935-1939.

Did Aalto intend his round skylight to be a *standard type*? There is a series of drawings for "standard furniture" where glass concrete and several types of light fittings, some of them Aalto's own designs, were included but not the round skylight.[11] In any case, what happened during the 1940s was that the round skylight *was* becoming a "standard", also in an architectural sense. Already in 1938, architects Elma and Erik Lagerroos used this idea in their competition entry for the enlargement of the University of Helsinki Library. In the competition for the Rautatalo building (1951), all invited competitors (Arne Ervi, Viljo Rewell and Markus Tavio) seem to have proposed the use of round skylights.[12] From this point of view, it is possible to suggest that both internal and external light fittings were partly a reaction to such a situation, even if the idea of variation and additive elements were present from the very beginning of the round skylight. Aalto also used the conical type, even in industrial buildings, such as the Typpi Oy plants in Oulu.[13]

The small and intimate, yet dignified, library of the National Pensions Institute in Helsinki (1952) resembles the Viipuri Library in many ways. Perhaps it was also the last occurrence of the round skylight atrium in the original sense. As in Viipuri, electric lights illuminate the bookshelves around the room. Quite exceptionally, there are no electric lights inside or above the skylights. From now on, other skylight motifs became more important in Aalto's library spaces and public buildings.

Notes

1. Markku Norvasuo M.Arch, M.Sc (Tech). The article relates to my doctoral dissertation, currently in preparation, on the use of daylight in Alvar Aalto's architecture. The author wishes to thank the Finnish Cultural Foundation for financial support.

2. Aalto 1955, p. 129.

3. Aalto 1935, p. 152. In 1940 Aalto repeated the argument in a more general form: see Aalto 1997 (1940), p. 105.

4. Summerer 1929, p. 20 (fig. 15). The luminous ceilings of 19th century public buildings were predecessors of such an idea. Since they were designed for gaslight, the glass also isolated the flames from the room space. See Schivelbusch 1988, pp. 4647.

5. Stoltz 1938, p. 15.

6. When visiting the Anjala paper mill, where there is a rare case of rectangular skylights by Aalto, I was informed that the skylights had been closed because of the problem of dripping water.

7. AAM no. 60/336. The MIT Dormitory building (1947) is approximately from the same period.

8. Aalto 1955, p. 129.

9. According to architect Tapani Mustonen, the snow is not a problem in the Viipuri Library, in spite of the improved rooflight structure, because the wind helps in keeping the roof level free from snow.

10. Keinänen 1949, vol. 2, p. 114.

11. Anon. 1994 vol. 4, p. 85-122. They are dated 1929-32, before the final designs of the Viipuri Library.

12. Anon. 1938; illustrations of Anon. 1952.

13. AAM no. 70/1393.

Fig. 6. The round skylights of the Rautatalo, Helsinki. (*Arkkitehti*, **no. 9/1955, p. 133)**

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Markku Norvasuo

Markku Norvasuo (b. 1958), M.Arch, M.Sc (Tech) is a senior research scientist at the Technical Research Centre of Finland (VTT).

He has acted as daylighting consultant in several architectural projects in Finland.

His article relates to a doctoral dissertation currently in preparation on windows and the use of daylight in Alvar Aalto's architecture. Markku Norvasuo can be contacted at: markku.norvasuo@vtt.fi

Комната с небесным потолком
тема освещения с помощью иллюминаторов в архитектуре Алвара Аалто с 1927 по 1960 г.

Маркку Норвасуо (Markku Norvasuo)

В данной работе целью является изучение изменений в использовании окон в работах Алвара Аалто. В этом контексте основная проблема – это проблема света. Свет связан с проблемами конструкции и архитектурных форм. Главные вопросы следующие: 1) где берут свое начало архитектурные мотивы и идеи, касающиеся окон и 2) каким образом Аалто сам использовал концепцию света и понимал проблемы, связанные с ней? Все это особенно интересно, поскольку Аалто занимает спорное место в модернизме, причем стиль его индивидуален. Данное исследование имеет эмпирическую ориентацию, но не в смысле технологии освещения. Технология и «наука о свете» рассматриваются в их историческом и архитектурном контекстах. Эмпирический материал состоит из эскизов, чертежей, письменных документов и зданий, начиная с периода раннего функционализма и заканчивая «зрелым» периодом Алвара Аалто. На такой основе представляется возможным найти общие черты в различных проектах и типах зданий и, желательно, проследить развитие темы света.

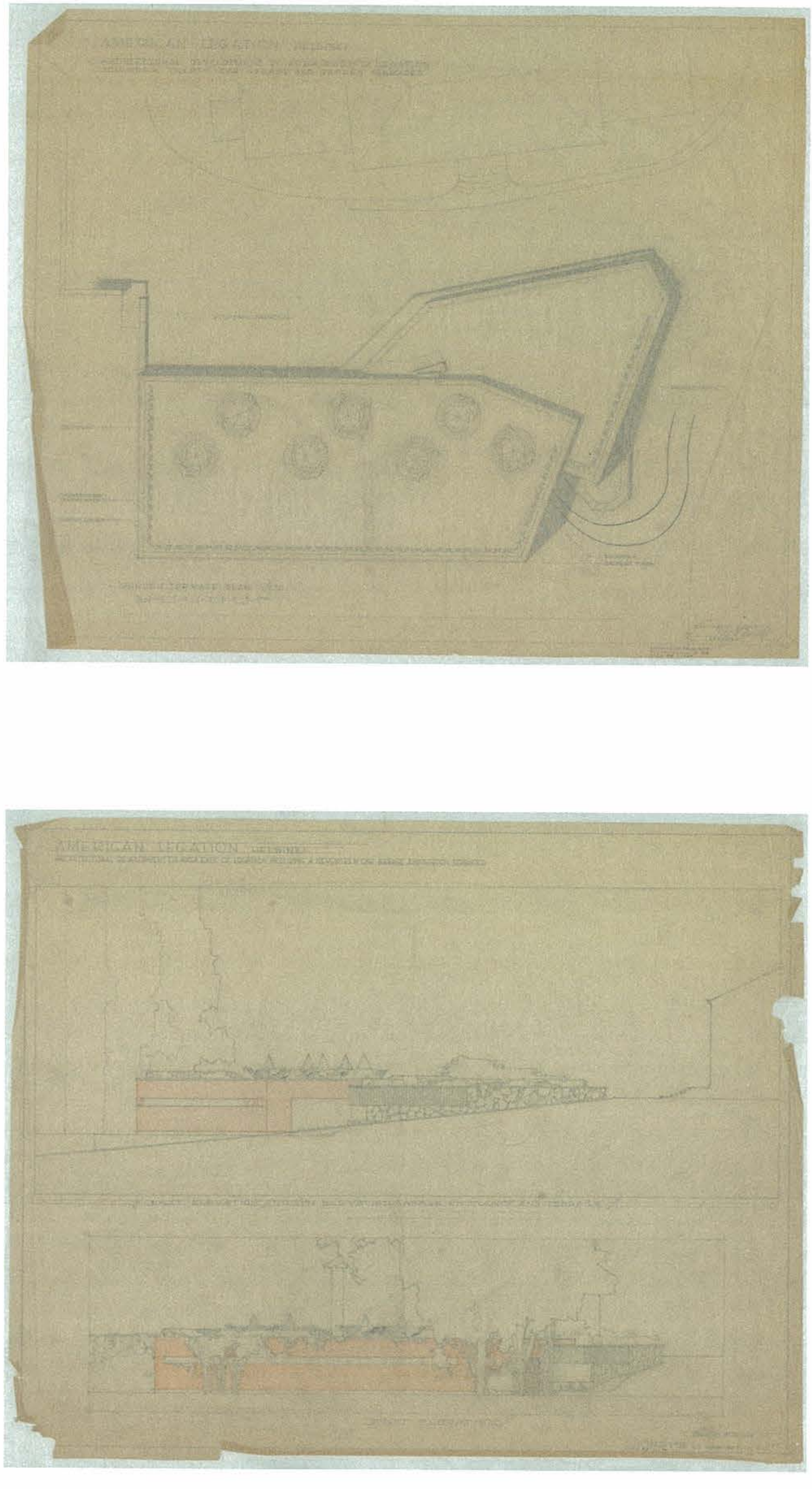


Fig. 7. The project for the American Embassy garage, Helsinki, 1948: the skylight construction. (AAM no.89/140, 89/146).

AALTO AND NATURAL LIGHT CONSTRUCTIONS

TINA SARAWGI

1. Introduction

Light is the most basic element of visual perception. Our perception of an object depends on the amount of light reflected from the surface of the object back to our eyes. A prior understanding of lighting in an environment is paramount to designing aesthetically pleasing, psychologically comforting, functionally appropriate and energy-efficient interior spaces. The successful use of daylight in a building requires that the associated forms and devices be conceived as an integral part of the architectural design during the design process.

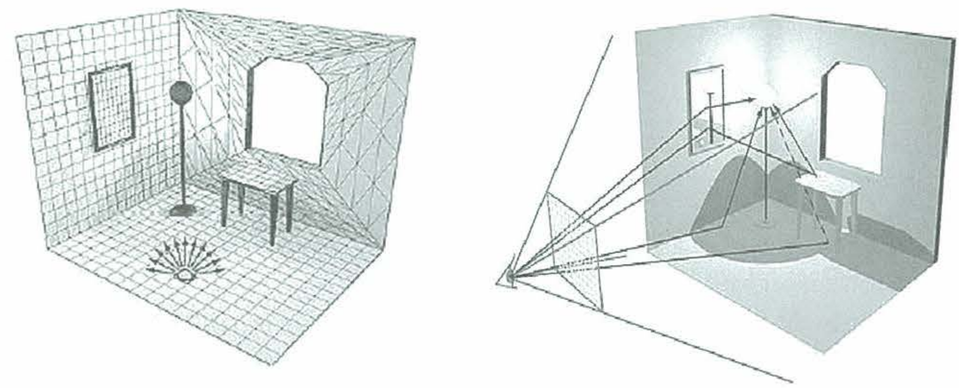
Methods	Limitations
Numerical methods (Hand Calculations and Nomographs)	Hard to predict the qualitative aspects of lighting.
Physical Model	Daylighting model studies require testing under real sky or an artificial sky simulator. Physical models are also time-consuming to construct. The observation of the interior of any model is difficult and extremely limited in flexibility and scope.
Computer-graphics based rendering	Although computer modeling can extend the possibilities of physical scale models because of their flexibility, walk-through animation capability, and the ability to change color (Greenberg, 1974), the traditional *ray-tracing* and *Z-buffer* techniques for computer graphics based visualization are not physics based and hence not photometrically accurate. They are also view dependent.

Table 1: Limitations of popular daylight simulation and assessment methods.

The difficulty of predicting the performance of the dynamic phenomenon of daylight has been widely reported in the literature over the decades (Lam, 1986; Novitski, 1990). The numerical method, scale physical models, and computer-graphics based rendering have been the most popular tools of simulation for daylight design. However, each has certain important limitations (see Table 1), so none of these methods provides a robust model for daylight decision-making during the conceptual and design development stages for a built environment.

The recent advances in computer-aided design and rendering in the past few years compel another look at simulating daylight effects (Ubbelohde, 1998). For example, radiosity based simulation methods take the physics of light and photometric sciences into account in rendering the lighting effects that would be created by natural and artificial sources. So far the need to conduct daylighting analysis in a design project to seek insight into the design process has been overlooked.

This paper discusses a project undertaken to critically assess a commercially available software program that incorporates a combination of radiosity and raytracing techniques (see Figures 1a and 1b) in comparison to other methods in selected buildings of Alvar Aalto. It focuses on testing the accuracy of these techniques for daylight simulation and visualization and its ability to allow quick iterative daylight explorations, which are essential to any design decision-making process.



Figures 1a and 1b: Radiosity calculates the light intensity for discrete points in the environment by dividing the model surfaces into a mesh of smaller surfaces (left). Raytracing works by tracing rays backward from each pixel on the screen into the 3D model to derive the light intensity (right) (Source: Lightscape White Paper, 2001).

2. Methodology

Two prominent types of skylights recur in the buildings of Alvar Aalto – pyramidal and conical (Paranandi, 1991). The Academic Bookstore in Helsinki features his pyramidal sky lit space while the Rautatalo Building, also in Helsinki, exhibits the conical sky lit space (Figures 2a and 2b). These spaces were selected to develop the resources for the project because they demonstrate an exclusive use of these skylights (Figures 3a and 3b). The two spaces are also complex enough to allow a comprehensive testing of the daylight simulation software program. Simple boxes or cubes with a limited number of rectangular apertures are often used for software development (Ubbelohde, 1998). The ability to model complexities of real buildings is essential for the daylighting simulation software program to be useful in the design process.

The research was conducted in three major phases with the intent to gauge the effectiveness of each method towards daylight visualization and assessment in the central atrium space of each of the buildings, as outlined below. Qualitative and quantitative data were recorded for each phase. The quantitative data, as the name suggests, was collected as numeric values of daylight factor (percentage of internal and external illuminance) at discrete points in the spaces. The qualitative data depicted the visual distribution of daylight within the spaces.

i) Documentation of Daylight in the Actual Spaces

Both buildings were visited twice to collect the quantitative and qualitative data to avoid errors that could have arisen if data was limited to one sampling period. The quantitative data was collected with the help of a Li-COR light meter, while the qualitative data was collected as several images and panoramic movies of the spaces.

ii) Daylight Simulation of the Physical Scale Models

The physical scale models of the two buildings were built to the scale of 1:25 to accommodate the photocells and the camera for quantitative and qualitative measurements respectively. Since both the spaces were almost symmetrical only one half of the atrium space was built. A reflecting mirror was used to reflect the other half. The models were tested for daylight in a mirrored uniform sky simulator.

iii) Daylight Simulation of the Computer Models

The computer models of the two buildings were built in Form.Z, a modeling software program. It was then imported into Lightscape for daylighting simulation. Rendered images and panoramic movies of the spaces were derived from the computer model as qualitative data. The quantitative daylight data was obtained from the models at the points equivalent to the actual space and the physical model.

It may be noted that the physical and computer models were prepared for this project by doing minimal settings, just as a design student would do to test a design process model of comparable complexity. This strategy was adopted to test the performance and application of the daylight simulation methods in a time-bound design studio setting, where a student can afford to spend only a limited amount of time on daylighting design and then move onto the next important design process issue in hand.

3. Observations and Results

The observations and results from the three phases of the project are presented in separate quantitative and qualitative sections below.

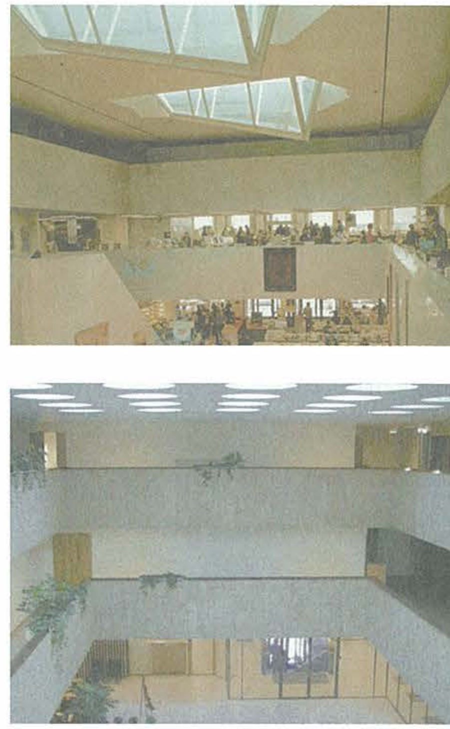
i) Quantitative

The quantitative results were represented as illumination graphs showing the comparison between the daylight factor levels in the physical model, computer model and the actual space. The quantitative data generation was intuitive in the physical model. However, it was relatively difficult to obtain from the computer model. This is because the user interface of Lightscape does not have a provision to directly obtain the external illuminance for an interior daylight simulation model.

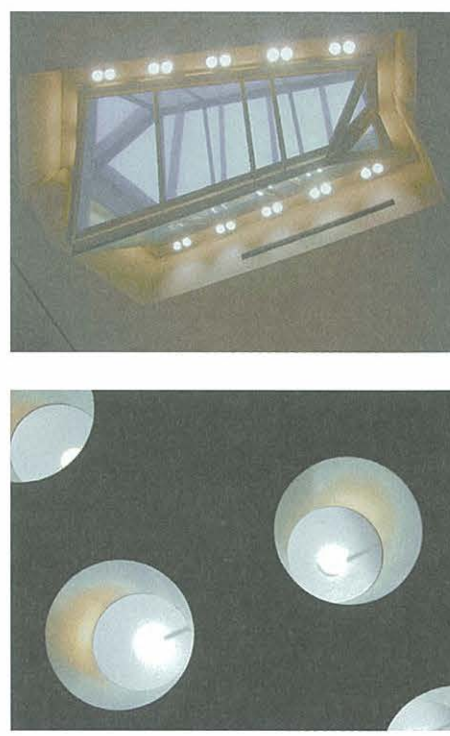
The quantitative measurements from the computer model were very close to the actual space (see Figures 4b and 4c). In comparison, the measurements from the physical model were distorted at the center (see Figure 5c), due to the error generated by the mirror that was used to reflect the other half of the atrium space. Building the whole physical model is the best way to work around this limitation, which can become tedious at a large scale.

ii) Qualitative

The qualitative measurements of the physical model were very close to the actual space, unlike the computer model. Lightscape generated daylight simulation can be misleading if one does not have a pre-conceived idea of the light distribution in the space. In this study, the physical model and the actual space images helped achieve the appropriate lighting levels in Lightscape. Using the software program alone is prone to producing erroneous results. Also the settings of the computer screen brightness can have significant impact on one's perception of the lighting levels in an environment. However, the false color



Figures 2a and 2b:
The Academic Bookstore (top) and the Rautatalo Building (below), Helsinki.



Figures 3a and 3b:
The two types of skylight in the buildings – pyramidal (top) and conical (below).

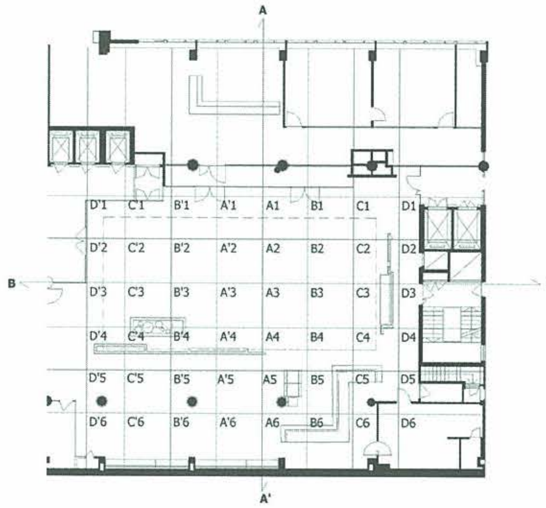


Figure 4a: Plan of the Rautatalo Building, showing the section lines for the illumination grid.

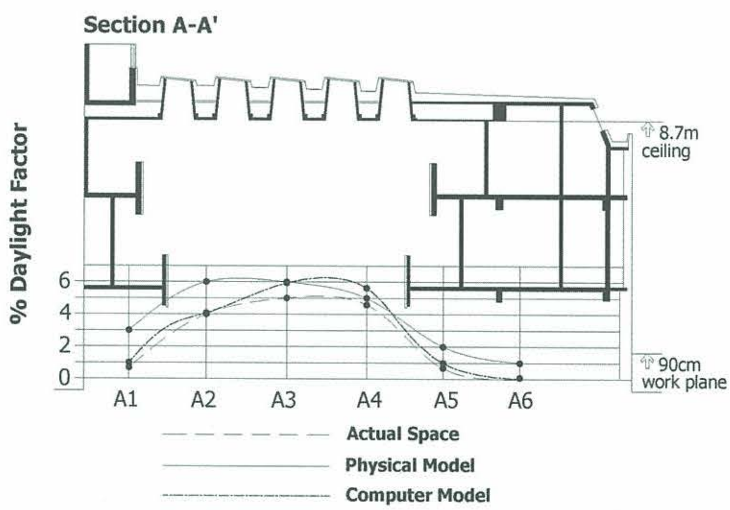


Figure 4b: Daylight factor illuminances for the Rautatalo Building on April 9th 2003 at 10:00 am along Section A-A'.

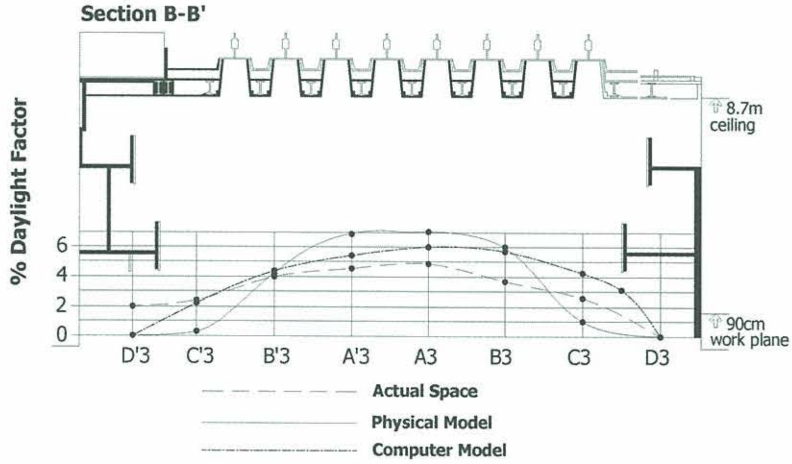


Figure 4c: Daylight factor illuminances for Rautatalo Building on April 9th 2003 at 10:00 am along Section B-B'.

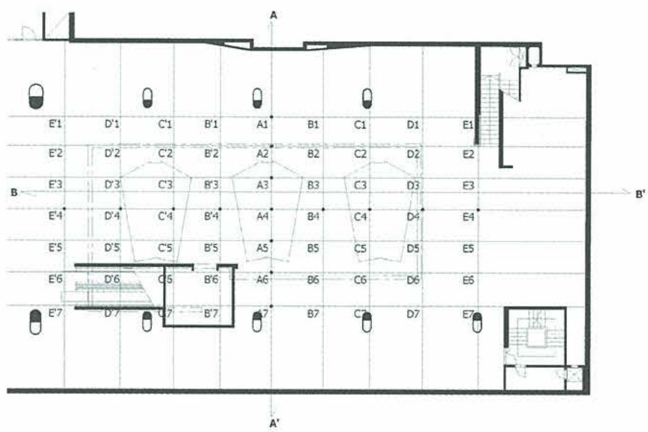


Figure 5a: Plan of the Academic Bookstore, showing the section lines for the illumination grid.

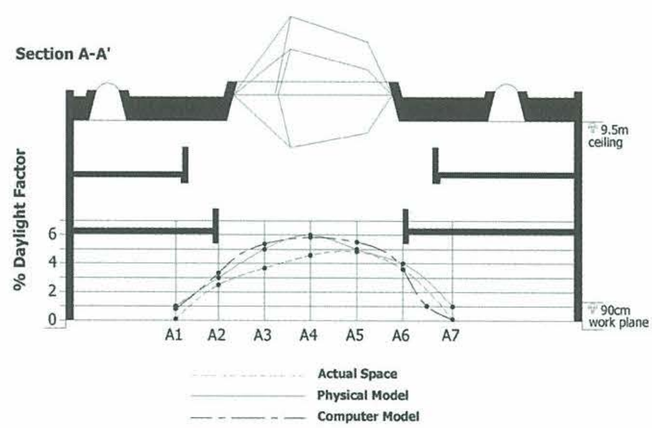


Figure 5b: Daylight factor illuminances for the Academic Bookstore on April 13th, 2003 at 3:00 pm along section A-A'.

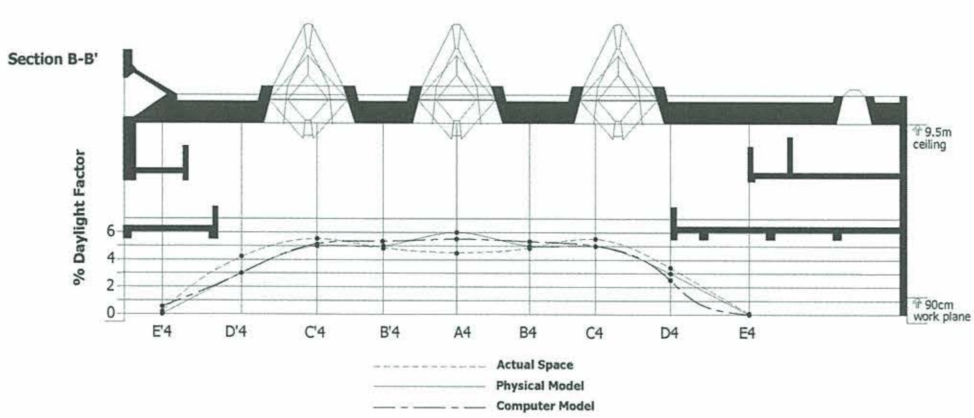


Figure 5c: Daylight factor illuminances for the Academic Bookstore on April 13th, 2003 at 3:00 pm along section B-B'.

renderings are a noteworthy feature in Lightscape. They help to take note of minute light changes in the spaces otherwise indiscernible by the human eye.
The qualitative data obtained from the aforementioned three phases of the project was compiled in the form of a table as shown below in Table 2. In addition to this, panoramic movies of the existing space and the computer models were compared for a three-dimensional analysis (Figures 6a, 6b, 7a and 7b).

4. Conclusions and Future Work

It was noted that using the computer media without prior preparation is tedious and challenging, unlike physical model simulations. The transition from the modeling to the lighting simulation program was time-consuming and tedious. Lightscape demanded major time-consuming modeling changes before it could make any accurate daylight predictions. Even if the modeling was done accurately, the Lightscape simulation was prone to artifacts at the edges. Hence, the digital media is not mature enough to produce accurate qualitative physical lighting results without adjustments based on the physical media or actual space. It is easier to derive a convincing image than make the model work like a built space.
In conclusion, a combination of both the physical model and the digital model is more useful and effective in the design process where one can extend the possibilities of the other. This is because the physical models are helpful in validating and directing the use of computer graphics since they are more intuitive and closer to real life scenario. On the other hand, incorporating physics-based CGI rendering method (the radiosity feature in Lightscape) in the design process not only helps to more accurately visualize daylight but also enables one to try alternate material and light settings, with unlimited flexibility of viewing the space through minimal time investment.
The research findings from this project will be implemented during the design process in the upper level design studio class in our school (University of North Carolina at Greensboro). The students will build 3-D digital models of their buildings and based on the research findings learn more advance tasks, such as lighting simulation to visualize their lighting designs scientifically and accurately rather than illustrating desired lighting effects without a sound photometric basis.

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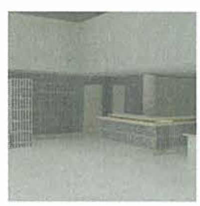
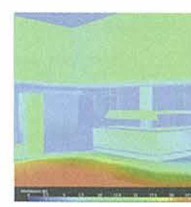
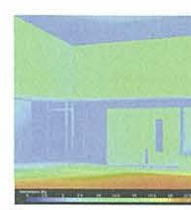
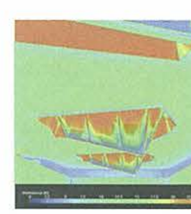
Tina Sarawgi

Tina Sarawgi is an assistant professor at the Department of Interior Architecture at the University of North Carolina at Greensboro, USA. She holds a graduate degree in architecture with computer-aided design specialization from Miami University at Ohio, USA, and a professional degree in architecture from School of Planning and Architecture in New Delhi, India.

Tina Sarawgi's research interests are computer-aided lighting simulation, and Virtual Reality design theory and applications in architecture.

Table 2: Comparative daylight simulation data of the two atrium spaces.

BUILDING PROJECT	ACTUAL SPACE	PHYSICAL MODEL	COMPUTER MODEL	FALSE COLOR RENDERING
RAUTATALO BUILDING SKYLIGHT TYPE: CONICAL				
				
ACADEMIC BOOKSTORE SKYLIGHT TYPE:				
				

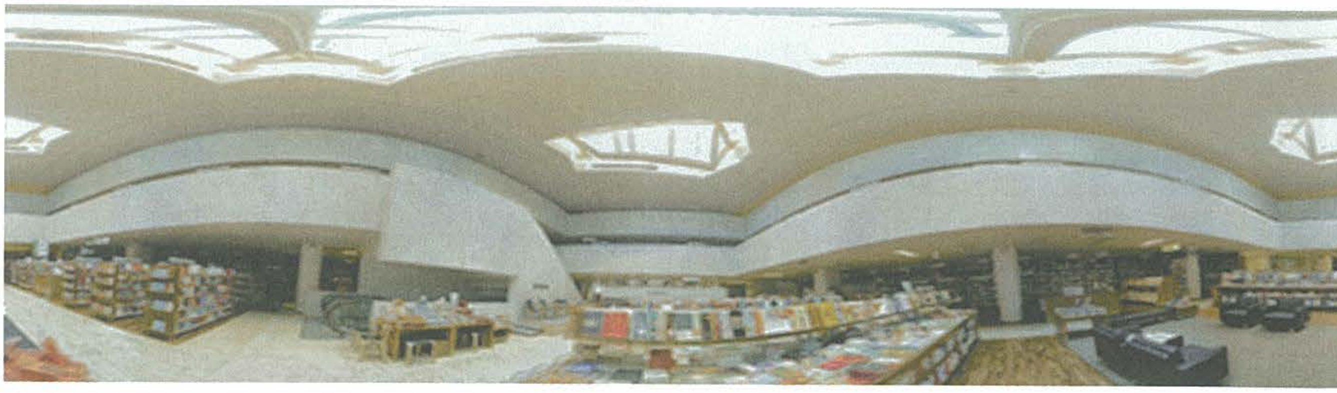


Figure 6a: Panoramic view of the Actual space - Academic Bookstore at 10am on April 13th 2003.

Figure 6b: Panoramic view of Computer Model - Academic Bookstore at 10am on April 13th 2003.

Figure 7a: Panoramic view of the Actual space - Rautatalo Building at 10am on April 9th 2003.

Figure 7b: Panoramic view of Computer Model – Rautatalo Building at 10am on April 9th 2003.

Аалто и конструкция естественного света

Тина Саравги (Tina Sarawgi)

Свет – это самая главная часть визуального восприятия. Наше восприятие объекта зависит от того, сколько света от поверхности объекта отражается в наши глаза. Правильное понимание освещения является условием для проектирования в эстетическом смысле приятного, психологически успокаивающего, функционально удобного и энергетически эффективного интерьера. Удачное использование дневного света в здании требует того, чтобы формы и устройства интерьера рассматривались как неотъемлемая часть архитектуры уже во время проектирования.

В литературе многие десятилетия обсуждалась проблема о том, как сложно предсказать действие такого динамического феномена, как дневной свет (Lam, 1986; Новицкий, 1990). Популярные методы симулирования дневного света в проектировании, такие как цифровой метод, использование макетов и компьютерных графических изображений не дают достаточно информации для понимания дневного освещения, поскольку что у каждого из них имеются свои ограничения. Достижения последних лет в компьютерном проектировании и в воспроизведении изображения заставляют снова думать о том, как можно симулировать дневной свет (Ubbelohde, 1998). До сих пор на потребность анализа поведения дневного света для процесса проектирования не обращалось достаточно внимания. В разработке программного обеспечения часто используются простые ящики или кубики с некоторым количеством прямоугольных отверстий (Ubbelohde, 1998). Возможность моделирования всей сложности настоящих сооружений необходима для эффективного использования дневного света в проектировании.

Поэтому данный проект занимает критическую позицию по отношении к коммерческим компьютерным программам, которые содержат комбинацию технологии на основе отслеживания лучей по сравнению с другими методами для достаточно сложного проекта. Данный проект сосредоточен на тестировании программы симуляции и визуализации дневного света и также способности программы исследовать дневной свет быстрой итерации, что является существенным для принятия любых решении по проектированию. Полученные результаты обсуждаются и даются рекомендации для дальнейшей работы.

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THERMAL COMFORT IN THE VIIPURI LIBRARY

Emmanuelle Gallo

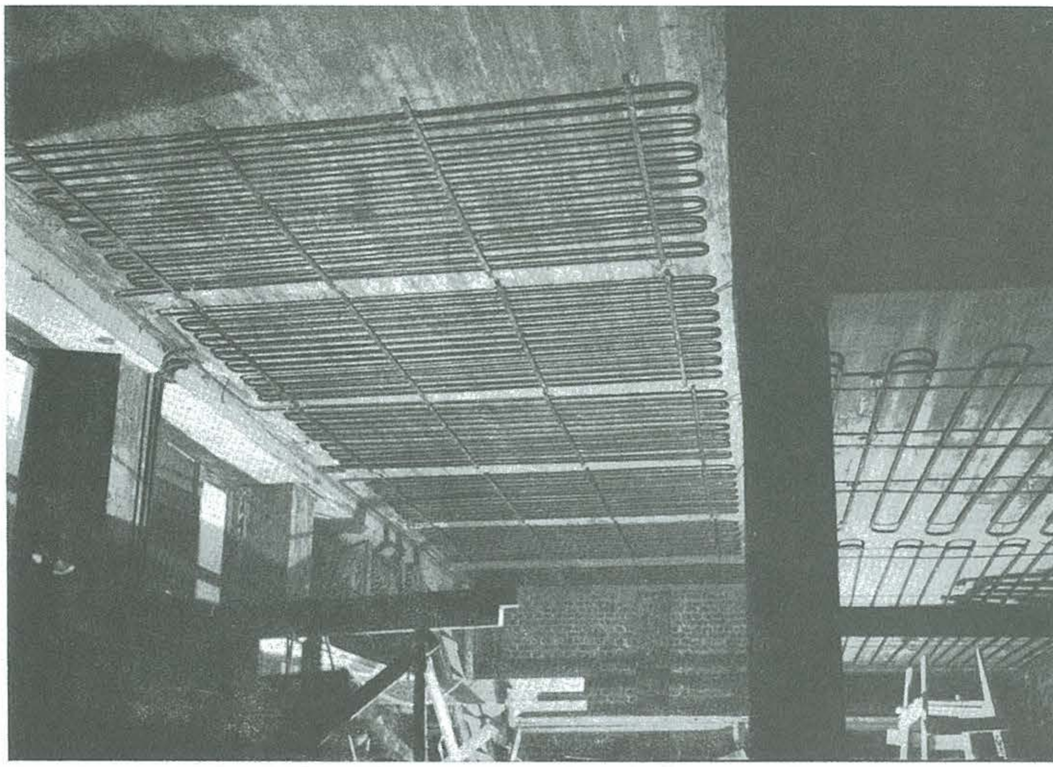
Before visiting Vyborg for the Docomomo Technology Group seminar, I had never considered writing about a building and architect I had never worked on previously. However, the visit to the library and Gerard Willemense's presentation on the drainage and ventilation problems, together with his own proposals to improve the situation, inspired me to write this short overview of the building's thermal comfort.

What we know of the original state

The architect Alfred Roth, a close friend of Alvar Aalto, included the Viipuri Library in his book *The New Architecture* in 1939. He provided many technical details: "The following rooms are heated by ceiling panels: loan department, reading and periodical room, newspaper room, children's library and entrance hall. The other rooms, including the lecture room, are heated by ordinary radiators." [i.e. ideal standard, "Classic" radiators].[1] According to Roth, the engineer C. Rosenqvist was in charge of the heating and ventilation systems, working for the firm Ekono, which used this building as an advertisement for its products. Radiant heating from above was indeed appropriate for the building's function, since the walls are taken up by bookshelves and cannot be fitted with radiators.[2] At the time of the building's construction, radiant heating was recommended by thermal engineers for places where people partake in physical activities, including libraries, even if in the 1930s, when such heating systems were still infrequent, this advice was theoretical rather than empirically tested.[3] In the basement plans for the building one can see a heating chamber with three boilers and another room with three pumps, as well as a large storage for coal and a chimney in the corner of the reading room terrace. The unusual thickness of the external walls (75cm) permitted insulation (without more details) and the passage of ventilation conduits (glazed stoneware pipes) and rainwater downpipes. The plans show two kinds of ventilation duct: round ones for fresh air coming from the ventilation plant located in the cellar, and larger rectangular ones for the air flowing out to the roof. The openings of the latter conduits are visible in the photographs of the lending hall and reading and periodical room at the upper lever of the external walls. A freehand sketch, reproduced in the Getty Foundation Report, illustrates the circulation of the fresh air from the vent at the upper level of the walls to other levels.[4] Outlet vents just above the shelves are evident in photographs. These spaces have been slightly over pressured. We do not know if the air was lightly heated in the basement before circulation, although radiant heating was sufficient to maintain comfort with fresh air.[5] According to the presentation of Rosenqvist, the lecture hall and book storage were minimally heated.[6]

The destruction and first renovation

No particular information exists about the destruction of the heating and ventilating systems during the war and the following period of disuse.[7] As the foundations are intact and the inner and outer brick walls were only slightly damaged, it is possible to imagine that this system is still present: 40% of the concrete roof was destroyed and it



Panel-heating putkisto asennettuna nuortenosaston lukusalin katossa foto th nyblin

Viipurin Kaupungin uusi kirjastotalo on varustettu säteilylämmityslaitteilla, joiden suunnittelun ja valvonnan on suorittanut

EKONO

VOIMA- JA POLTTOAINETALOUDELLINEN YHDISTYS

Helsinki, Unioninkatu 15

53

Advertisement in the pamphlet "Viipurin Kaupungin Kirjasto", 1935.

is possible that the pipes inside were damaged. The transcription of a discussion between architect Aleksandr Mihailovitvch Shver, Library Director Tatiana Vladimirovna Svetelnikova and the Finnish Committee for the Restoration of the Viipuri Library in April 2002 sheds some light on the condition of the heating system: "I don't see much of a problem regarding heating. Of course, all the plaster was taken down and all pipes in the ceiling were partly repaired. Anyway, they where installed where Aalto had them, according to the pattern of his pipes. Plaster was taken down."[8] During this meeting, Shver pointed out that the heating room was still functioning (in its original state?) in the 1960s. A part of the pipes was renewed during the Soviet period. Shver also wrote: "It was more difficult with ventilation, because it was so complicated to fine-tune. The system of ventilation here is so difficult for our engineers to understand, and there were no blueprints, so all of this was done intuitively."[9] In the reading room, we can still notice the air vents at the upper and lower levels, even if this system is actually out of order.

District heating

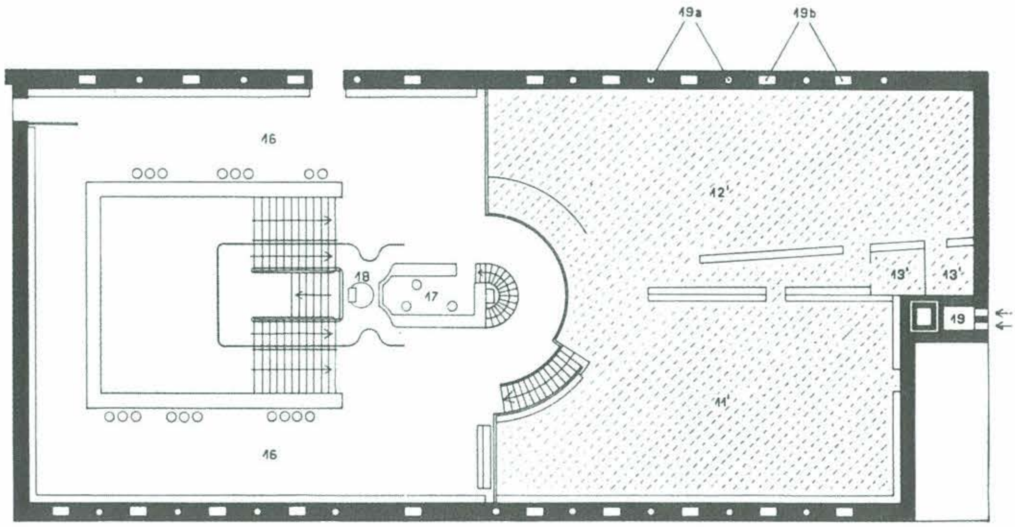
In the same discussion, Shver says that "the heating room was closed only relatively recently" – which, in fact, is incorrect.[10] Today the building is connected to the town heating network. District heating, which appeared in North America at the end of the nineteenth century, was introduced in Russia in the 1920s, and greatly developed in Communist countries after the Second World War.[11] This system is often economical and ecological, but creates a total dependence. Space is saved inside the building and, in the case of Aalto's library, the coal storage was planned to become an additional book stack, but in practice it was too damp. The current inefficiency of the heating in the reading room may be caused by an inadequate quantity of hours of heating production or a shortcoming of power delivered by the notoriously unpredictable Vyborg district heating system.[12]

Recent studies and restoration

The Getty Report traces the different restorations, and the renovation of the heating and hot water system during 1999-2000.[13] All existing radiators are Soviet, and a part of them was renewed in the 1990s. Preliminary studies were made in the 1990s by Ekono, the original heating and ventilation designer company.[14] In the Getty Report there are also references to heating pipes in the ceiling, an observation consistent with Alfred Roth's book. Drawings of the ventilation pipe-covers above the hall exist, as do photographs of radiators in other places, such as corridors and upper level offices.

Heating and the construction of sensations

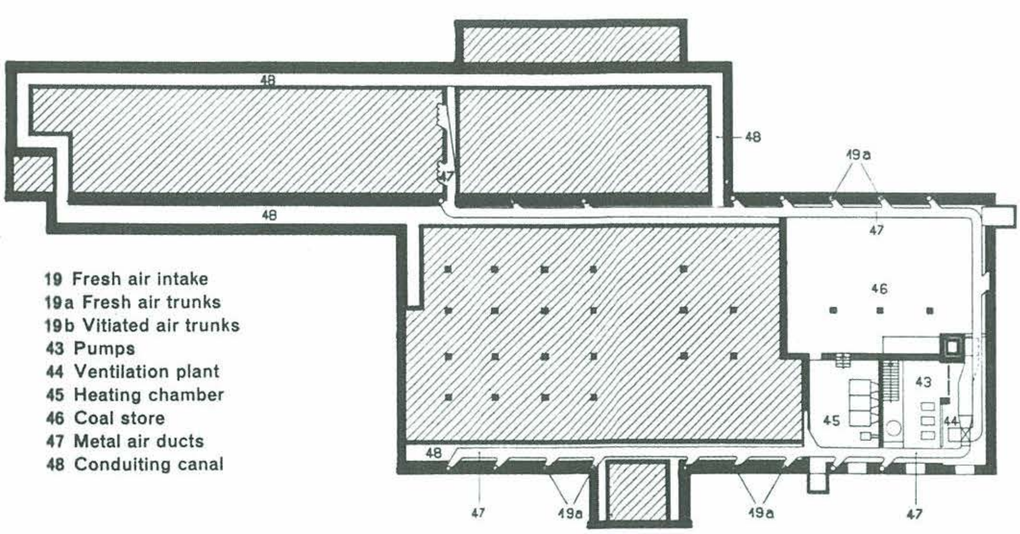
Aalto's idea that natural light and heat should come from above the seats of the readers is seductive, and even sensual, just like the sun on our skin. The heating in the ceiling was certainly supposed to keep the breathing space inside the double slab roof in a salubrious condition and prevent condensation on the skylights, a kind of "active" insulation of the roof. Radiant heating is an obvious reference to the Roman hypocaust systems with their warm floors and ventilated walls. Hypocausts were well known in the nineteenth century due to archaeological excavations and publications.[15] Aalto may have learned about these systems during his frequent trips to southern Italy (e.g. Capri), and through the main heating literature often referring to the Roman period. We may thus



11 Reading room
12 Periodical room
13 Rooms for private study

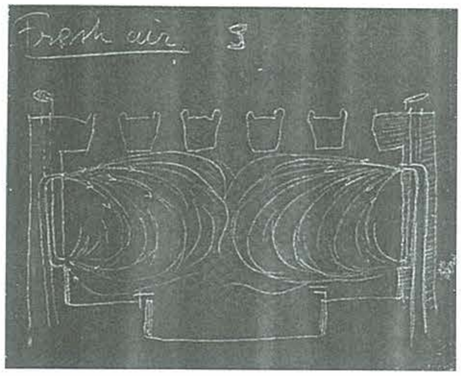
16 Loan section
17 Control
18 Waste paper basket

19 Fresh air intake
19a Fresh air trunks
19b Vitiated air trunks



19 Fresh air intake
19a Fresh air trunks
19b Vitiated air trunks
43 Pumps
44 Ventilation plant
45 Heating chamber
46 Coal store
47 Metal air ducts
48 Conduiting canal

Alvar Aalto Library, Vyborg
above: Cellar plan
below: Soussol plan



interpret the Viipuri Library as a modern and successful reinterpretation of the heating technology of antiquity. Aalto's sensualist design not only featured the radiance of light but also the radiance of heat from the same source: the ceiling. The library users were thus bathed in light and warmth.

Notes

1. Alfred Roth, *The New Architecture, 1930-1940,* Engelarch, Zurich, 1939 [book published in French, German and English].
2. From the nineteenth century, libraries were often heated by hot air, which is not as comfortable as radiant heating with fresh air.
3. André Missenard, "Convection et rayonnement", *Architecture d'Aujourd'hui*, mai 1935, p. 36. This particular issue of the journal was dedicated to heating and ventilation. The polytechnician Missenard won the famous German Rietschel Prize in 1938 for this works on ambiance temperature.
4. *Project Preparation Work for the Conservation of the Alvar Aalto Library in Vyborg, The Getty Grant Program Report,* The Finnish Committee for the Restoration of Viipuri Library, 2001, p. 50.
5. With still air, the ambient temperature is proportional to the sum of the air temperature and the average of the radiant temperatures.
6. C. Rosenqvist, "Viipurin Kaupungin Kirjasto", post-implementation pamphlet, 1935.
7. We have to keep in mind that the building was not used as a library for ten years after the war, just as a "storage" for the suffering city.
8. Kirsti Reskalenko and Liisa Roberts, Edited by Gregor Neuerer, *Untitled (Experience of Place).* Verlag der Buchhandlung Walter König, Köln, 2003.
9. They may have understood the old system, but have other reasons to neglect it.
10. *Untitled (Experience of Place)*, p. 80.
11. Sven Werner, *Fjärrvärmens utveckling och utbredning*, Värmeverksföreningen, Stockholm, 1989, p. 79.
12. The Finnish Committee for the Restoration of the Viipuri Library has for at least ten years proposed for safety reasons using a heat exchanger for the library, but it seems to be difficult for the local authorities to accept.
13. The Getty Program Report, p. 4.
14. Information given by Tapani Mustonen.
15. Gustav Fusch, *Über Hypocausten-Heizungen und Mitteralterliche Heizungsanlagen*, 1910, p. 117.

Emmanuelle Gallo

Emmanuelle Gallo is an architect, an art & culture philosopher and a historian of contemporary architecture. After a period of architectural practise, she taught history of architecture, construction design, and the history of construction in several institutions, such as l'Institut d'art de l'Université de Paris 1. She is currently completing a dissertation on the history of heating in lodgings in France. She has published papers on the history of architecture, the history of heating, and a book on the history of a 19th-Century palace in Normandy, France, in connection with an exhibition. Emmanuelle Gallo is one of the founder members of DOCOMOMO France, a member of the DOCOMOMO ISC/Technology since 2002 and webmaster of DOCOMOMO International.

Тепловой комфорт в Выборгской библиотеке

Эммануелле Галло (Emmanuelle Gallo)

В своем коротком докладе я постаралась собрать информацию об отоплении и тепловом комфорте Выборгской библиотеки со ссылкой на исторический контекст и с пониманием того значения, которое имеет выбор метода отопления для комплексного восприятия здания.
Первоначально излучатели тепла находились в потолке больших помещений, также как радиаторы в других помещениях. В необычайно толстых стенах читального зала (75 см) были проложены вентиляционные и дождевые трубопроводы.
После войны и произошедших разрушений, восстановление системы отопления и вентиляции производилось без наличия оригинального проекта. Потом здание подключили к городской тепловой сети, благодаря чему подвальное помещение, в котором складировался уголь, было освобождено. А во время проведенной с 1999 по 2000 гг. реставрации отопление и система горячей воды были отремонтированы.

Идея отопления излучателями тепла берет свое начала в Римской эпохе и такое решение не применялось широко в 30-е годы. Чувственное проектирование Аалто сказалось не только в распространении света в помещении через иллюминаторы, но также и в том, что тепло распространялось из того же источника, потолка. Таким образом, посетители библиотеки купались как в свете, так и в тепле.

ARCHITECTURAL PAINT RESEARCH IN THE VYBORG LIBRARY: PRELIMINARY EXAMINATIONS

Mariël Polman

In September 2003, ahead of the Seventh International DOCOMOMO Technology Seminar, I undertook research of the paint used in the Vyborg Library. In fact, this first research was only a start, because the time available was limited to three days. Paint scrapes and samples of the paint layers were taken at more than 40 different locations in the building. I took these back with me to the Netherlands, where 36 samples were examined in the laboratory. Though further examinations are necessary, the initial start made it obvious that it would be worthwhile to continue with such research.

I was very happy to be invited to carry out paint research in the beautiful and fascinating Viipuri Library designed by Alvar Aalto. What would be the original colour scheme of this modern building with plastered facades and steel windows? Would there be traces left of the authentic paint layers of the interior? What sort of finishing touches would there be?
Though it is only a small part of the conservation work, the authentic colour scheme is nevertheless important. In May 2000, the Docomomo International Specialist Committee on Technology organised the 5th seminar on the Modern Colour Technology to emphasise the issue.

"Paint can be seen as a simple and direct expression of its time, taste, value and mood. The painted schemes of the twentieth century reflect ideas which have evolved during that century, and play a fundamental role in the expression of the original architectural design."[1]

In order to discover the original colour scheme of a building, the main principle is to examine the paint layers in the building itself. The building is the only place where the absolute answers exist and can be found. It is important and significant to make a thorough technical paint investigation of a building in order to establish relevant authentic data characteristics. It is not only the original colour that is important, but also the authentic pigments and binding agents, as well as the texture and the application. In addition to the on-site investigation, sources such as historical photographs, correspondence and literature are significant too, as this case-study will show.
Although the building looked dilapidated, this did not necessarily affect the results. Problematic were, in fact, the renovated parts, where the original plaster and paint layers had been removed, and where the doors had been replaced. The paint research began by scraping paint layers at several places. Scraping the paint layers involves using a sharp knife (e.g. a scalpel) such that the paint layers are scratched off one by one in small surfaces, resulting in a chronological overview of the paint layers that were applied in the past. The colours of the paint layers were matched with colour charts and then photographed. This, however, was insufficient to recognise the real colour, due to the fact that the paint layers had faded, discoloured and decayed (photo 1).

Photo 1, stratigraphy: LV1 ground floor, corridor, wall along auditorium.

7. yellowish
6. pink, like wall, window side
5. light pink
4. warm pink (pink-orange, looks like 6)
3. white, thin groundlayer
2. green-grey
*
1. light yellowish
0. grey stucco

Samples of all the paint layers, including the base, were taken at each selected location. In the laboratory of The Netherlands Institute for Cultural Heritage,[2] the paint samples were moulded into cubes of synthetic resin, and polished at right-angles to the paint. These so-called cross-sections were then examined under a microscope. The cross-sections were studied by magnifications of between 200 and 400 times. The pigments in the paint layers were analysed by scanning electron microscopy (SEM), with an energy dispersive X-ray analysis. The microscopical results were combined with the stratigraphic results (photo 2).
The aim of the research was to discover Aalto's original colour scheme of 1935, but it is obvious that (especially) the interior walls have been painted more often, about six to eight times. The Vyborg Library has undergone a varied history. It was the municipal library of Finnish Viipuri from 1935 until the Winter War of 1939-40. During the first Soviet period, 1940-41, as well as during the following short Finnish period, 1941-44, it continued to serve as a library. However, after the war it stood empty and abandoned for ten years, which caused much damage to the building. The local administration had already planned repairs and a refurbishment in 1950, but it was not until the middle of the decade that renovation got under way. The library was reopened for municipal use in 1961.[3]
Though the exterior was replastered, under the new plaster a fragment at the passage from the reading room to the terrace on the east facade was found (photo 3).

Photo 2, cross section: Sample LV 1. Interior, ground floor, corridor (room 418), wall along auditorium.

The original scheme on the stucco wall of the corridor has a white colour
Paint layer 1: light brown transparent chalk layer
Paint layer 2: white chalk layer
The first overpaint has a light blue colour
Paint layer 3: light blue layer containing zinc white, chalk, synthetic ultramarine blue and yellow iron oxide
Paint layer 4: light blue top layer containing zinc white, chalk and synthetic ultramarine blue
The overpaints:
The second overpaint has a very light blue colour.
Paint layer 5: light brown transparent chalk layer
Paint layer 6: very light blue top layer containing lithopone, same barium sulphate and some synthetic ultramarine blue
The third overpaint has a yellowish tone.
Paint layer 7: yellowish layer with zinc white, same barium sulphate, same chalk and same synthetic ultramarine blue
Paint layer 8: yellowish top layer containing zinc white, same barium sulphate, same chalk and same synthetic ultramarine blue
The fourth overpaint has a light pink colour.
Paint layer 9: light pink layer with zinc white, chalk, same synthetic ultramarine blue and some organic red dyestuff
Paint layer 10: light pink top layer with zinc white, chalk, same synthetic ultramarine blue and some organic red dyestuff
The fifth overpaint has a white colour.
Paint layer 11: white top layer with zinc white, same chalk and same barium sulphate
The sixth overpaint has a yellow colour.
Paint layer 12: yellow layer containing titanium dioxide, chalk, zinc white, some barium sulphate
Paint layer 13: yellow top layer with titanium dioxide, chalk, zinc white, some barium sulphate

The result of the analysis was a yellowish top layer, consisting of chalk, brown-yellow ochre and organic black pigment. Optically, this was an off-white paint. In 1935, Aalto mentioned that the elevations are in a natural-coloured lime.[4]
Also the photographs from the 1930s show that the facades are light, which confirms the results. Aalto also mentioned that "in a few important facade surfaces, blue streaked-quartz steatite [soapstone] has been used".
Nevertheless, the stone cladding by the entrance was replaced for the present black stone cladding.

Fig.3. Original plaster: the passage from the Reading Room to the terrace on the east facade.

The windows had finishing coats in different colours. The black and white photographs show both light and dark window frames. However, this does not automatically mean that the real colours were dark and light. Blue, for example, can appear very light in black and white photographs, and red can look dark. The large window of the west elevation (window of the book-storage, upper section, no. 323) had a black top layer. The photograph from the 1930s shows that the window was very dark, thus confirming the laboratory results.

Although brown-red paint layers were found on the steel window frames on the ground floor, on the steel window of the west elevation of the entrance room of the children's library, and by the book storage on the south elevation, these layers do not seem original. The photographs from the 1930s show that the window frames are light, so this might be another indication that the paints are not original. Additional research is needed. For me, it is rather special that Aalto used different colours for the exterior window frames, in contrast to the Modern Movement buildings I am familiar with in The Netherlands, where all exterior steel window frames normally have the same colour.

In the interior, what especially catches the eye is the loss of the original wood finishes. Also the transparency between the spaces is gradually lost, probably due to the intensive use of the rooms. It was possible, nevertheless, to carry out paint research. Though Aalto tried to separate the parts of the building with a different character,[5] this does not seem to have influenced the finishing layers. On the walls of the corridor on the main floor, the central staircase (including the balustrade), the corridor on the office floor, the circular wall of the main reading room and the children's library (including the columns), a finish comprising two white lime layers was analysed. In fact, because there was a light blue paint layer on top of the lime-paint layers, we thought that the light blue was the first choice finishing colour. But when we read Aalto's description of the building's construction, we had to reconsider our ideas. He wrote:
"The movable furniture in based chiefly on the same principles as the fixed ones and is accordingly mainly wood. In addition, textiles play an important role in the furnishings: as curtains, door and wall coverings, even as a separating element between different room spaces."

The building's internal and external colour scheme is based on the use of natural materials, and only in exceptional cases has the original character of the materials been altered by colouring the surface. Wherever possible, the natural lime-painted surface remains dominant. In walls painted with oil-based paints, the same white has been used and only the metal parts were allowed a few shades other than black. The real colour scheme consists, therefore, of materials. Elevations are natural-coloured lime. However, in a few important facade surfaces, blue streaked-quartz steatite [soapstone] has been used.

For the final result, the colours and tones were naturally affected by such important elements as external and internal vegetation, flowers, fabric, a few sparse decorations and naturally, above all else, books and people.[6] In fact, only the sample of the column in the children's library (room 329), taken ca. 50cm above the floor level, which used to be covered by wood, shows a recognisable separation on top of the first lime layers.

The cross-section of this area shows two lime layers on the stucco layer. Both lime layers show blackish spots. It is possible that mould has infected these layers. On the surface of the second lime layer a black layer is evident. We can draw the conclusion that the second lime layer was white and that this lime layer was the original colour of the column. The other paint samples applied on a stucco layer show also two white lime layers. Here we see that there are no cracks on the surface of the second lime layer and that there is not even any dirt on top of it: we only see a light brown transparent binding-agent layer. The paint layer over the second lime layer shows no modern pigments, such as titanium dioxide. Thus it is not clear where the original colour starts or ends. Because of the black layer, where it is clear that the original colour scheme is white and contains lime, one can further conclude that the white lime layers in the other paint samples could also be white (photo 4). Here we have an example that shows that the study of cross-sections has its limitations.

The steel windows of the children's library and the window in the corridor of the main floor were painted white: zinc white and barium sulphate. The first layers are heavily deteriorated, which indicates that they were exposed for a long time. The steel columns in the auditorium used to be white: zinc white.

The preliminary examinations seem to confirm that Aalto had the interior painted white. But the whites come from different kind of paint: lime white on the walls, zinc white on the columns and zinc white and barium sulphate on the window frames. These are the details that will refine the knowledge of the building and the implementation of the conservation.
Within these white surfaces, Aalto made exceptions, such as the central staircase with green terrazzo steps and fascia. He mentioned that "only in metal parts were a few shades besides black possible". What are these shades?
The next step will be to return to the building and to investigate the paint layers with the newly acquired knowledge. The results of the paint research need to be completed with regard to the other finishes, such as the wood finishes and the floor coverings. We will not be able to find all the answers, but all results will contribute to a thoughtful approach, in order to understand the architecture and to restore the building.

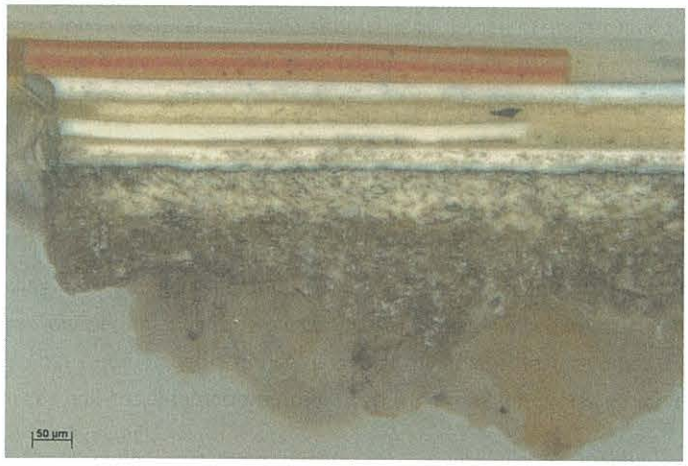


Photo 4, column: Sample LV 24. Interior, ground floor, Children's Library (room 329) column, ca. 50 cm above floor level, used to be covered by wood.

The first scheme on the stucco layer of the column has a brownish colour.
Paint layer 1: brown transparent chalk layer
Paint layer 2: brown transparent chalk layer

The first overpaint has a. greyish colour
Paint layer 3: thin greyish layer containing zinc white and chalk
Paint layer 4: thin greyish top layer containing zinc white and chalk

The second overpaint has a grey colour.
Paint layer 5: white chalk layer
Paint layer 6: white chalk layer
Paint layer 7: white chalk layer
Paint layer 8: grey transparent top layer containing zinc white

The third overpaint has a white colour.
Paint layer 9: white layer containing zinc white
Paint layer 10: white top layer containing zinc white

The fourth overpaint has a white colour.
Paint layer 11: light brown chalk layer
Paint layer 12: light brown chalk layer, the surface of the light brown chalk layer has a brown transparent appearance due to impregnation of the protein binding medium.
Paint layer 13: greyish layer with zinc white and chalk
Paint layer 14: white top layer containing zinc white and a little synthetic ultramarine blue

The fifth overpaint has a red colour.
Paint layer 15: red layer with zinc white, same barium sulphate and red ochre
Paint layer 16: bright red top layer with zinc white, same barium sulphate and red ochre

The sixth overpaint has a red colour.
Paint layer 17: red layer with zinc white, chalk and red iron oxide
Paint layer 18: light red layer with zinc white and same barium sulphate
Paint layer 19: red top layer with zinc white, same lead chromate and an organic red pigment

Notes

1. Ulrika Hubinette: "Polychrome or Monochrome?" in *Modern Colour Technology*. Docomomo Preservation Technology Dossier 5, July 2002, p. 45.
2. Matthijs de Keijzer, Luc Megens and Mariël Polman: *Microscopic and micro-chemical paint analyses of the Alvar Aalto Library in Vyborg, Russia*. Netherlands Institute for Cultural Heritage. May 2004.
3. Petri Neuvonen, Tuula Pöyhiä and Tapani Mustonen: *Viipuri Vyborg. Townguide / Opas kaupunkiin*, Rakennustieto Oy, Helsinki, 1999, pp.123-126.
4. "Alvar Aalto, Viipurin kaupungin kirjasto, 1935", in: *Kaupunginkirjasto 1927, 1933-35, Municipal Library, Viipuri*, Alvar Aalto Museo, Jyväskylä, 1997.
5. Ibid.
6. Ibid.

Mariël Polman

Mariël Polman has trained as an architect, an architectural paint researcher and a house painter. She specializes in architectural paint- and colour-research, and has been an advisor on the research, reconstruction and conservation of painted surfaces with the Netherlands Department for Conservation (RDMZ) in Zeist since 1997. Since 1995 Mariël Polman has been in private practice as an architectural paint- and colour-researcher, giving specialised advice on the redecoration of historic buildings, in particular buildings from the Modern Movement. She lectures regularly, and is also presently completing her PhD. "Colours of the Modern Movement". Mariël Polman has been member of the Docomomo International Specialist Committee on Technology since 1998 and has been a committee member of Docomomo-Netherlands since 2000.

Архитектурное исследование цветов первоначальной покраски библиотеки Алвара Аалто в Выборге
Предварительная экспертиза

Мариел Полман (Mariël Polman)

В сентябре 2003, накануне седьмого Семинара технологии, Мариел Полман положила начало архитектурному исследованию цветов красок, которыми была покрашена библиотека г. Выборга. Целью исследования было поставлено обнаружение оригинальной палитры, созданной Алваром Аалто в 1935 году для окраски стен помещений и стен самого здания. Время проведения исследования было ограничено тремя днями. Было сделано более сорока соскрёбов краски здания в разных местах, и экземпляры краски нанесенных слоев были собраны. Потом в Голландии лаборатория Голландского Института Культурного Наследия изучила экземпляры с тем, чтобы определить разные слои и оригинальный пигмент. Источниками для сравнения служили также исторические фотографии и литература. Предварительная экспертиза дала следующие результаты: оштукатуренные фасады были окрашены белым цветом, отделочные слои наружных стальных окон были разных цветов, например, черными. С внутренней стороны окна были белыми. Перегородки коридоров на первом этаже, центральная лестница (вместе с балюстрадой), коридор этажа, где расположены кабинеты, круглая стена главного читального зала и детской библиотеки (вместе с колоннами) были побелены известью согласно созданной Аалто спецификации на строительство здания.

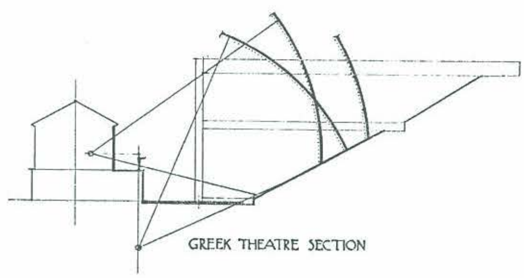
На следующем этапе работы нужно будет вернуться к библиотеке и изучить нанесенные слои краски, учитывая полученную информацию. Результаты экспертизы краски нужно будет дополнить экспертизой других поверхностей, например, деревянной отделки и покрытий пола.

Все невозможно восстановить, но все полученные нами результаты дают возможность к продуманному подходу и к пониманию архитектуры здания в целях его реставрации.

ACOUSTIC RESEARCH OF THE UNDULATING WOODEN CEILING OF THE VYBORG LIBRARY BY ALVAR AALTO

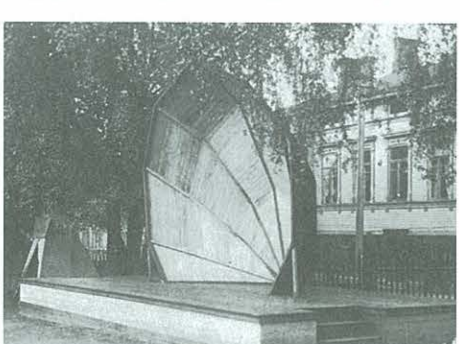
Bo Mortensen

Much has been written about the undulating ceiling of the lecture hall in the Vyborg Library. Alvar Aalto himself claimed the ceiling to be "ninety-nine percent acoustically perfect", and the sketches showing the acoustical considerations behind the ceiling design are often reproduced in books and articles.
But how did the ceiling actually function? Did the wave form really have the acoustical advantages Aalto claimed for it, or could the ceiling just as well have been horizontal?
To answer these questions, comprehensive acoustical investigations have been carried out, including acoustical measurements, in a 1:20 scale model, together with calculations in a 3D computer model of the lecture hall.



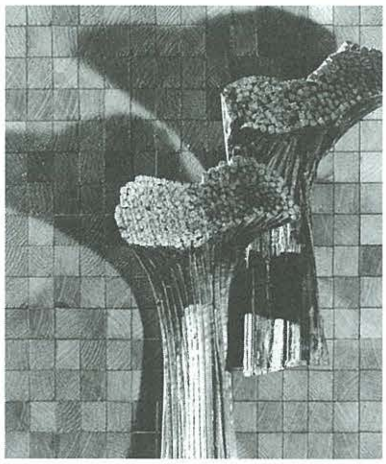
Aalto and the acoustics

In the twenties and the thirties the science of acoustics had just been established, and for architects such as Aalto working with acoustical matters meant basing their design on a mixture of their own intuition for the form and material and statements from the new generation of acoustical engineers presenting a new and still uncertain science.
In connection with the second Finnish Trade Fair in Tampere in 1922, the 24-year-old Aalto made a series of pavilions. One of them was a small bandstand that seemed to have challenged Aalto with regards to considerations about reflecting sound and shaping the surroundings in accordance with the acoustical demands.
Later, for the City of Turku 700th anniversary exhibition of 1929, Aalto and Erik Bryggman designed a larger choir platform, clearly with a family resemblance to Greek



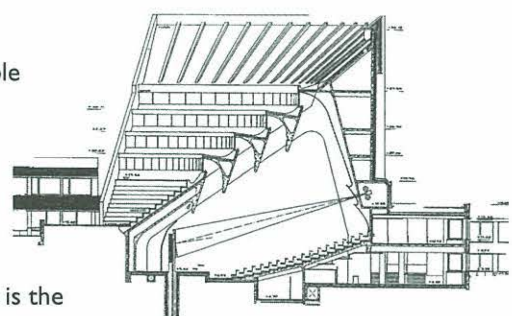
left: Musicpavillion at the Finnsih Trade Fair in Tampere, 1922.

right: Bryggman's choirplatform for Turku's 700th Anniversiry Exhibition.



Alvar Aalto,
wood experiments
and X-leg furniture.

or Roman amphitheatres, with a reflecting wall behind the choir and the reflecting area (orchestra) in front of the choir. Both the large reflector behind the singers and the area in front of them would reflect the sound towards the audience.
The forward-bending or stooping sound reflector from the bandstand in Turku is repeated in a very large number of later works by Aalto. In fact this acoustical shape is also recognized in his wood experiments from the same period, and further in his work with furniture; for example the X-leg from 1954. In the main auditorium at the Helsinki University of Technology (1964-66) the acoustical reflector
behind the speaker had to struggle against a room shape which in acoustical terms is very difficult.
The room is clearly designed from the outside–in, and the room seems impossible to use without loudspeakers.
However, the exterior again relates to the ancient Greek amphitheatres and the acoustical proportions described by Vitruvius.
In the lecture hall of Viipuri Library there is the same forward-bending reflector shape behind the speaker's position.



right: Helsinki
University of
Technology,
interior and section.

left: Church centre in
Wolsburg, 1960.

Here Aalto made the reflector continue in a shape that connects the floor, wall and famous undulating ceiling.

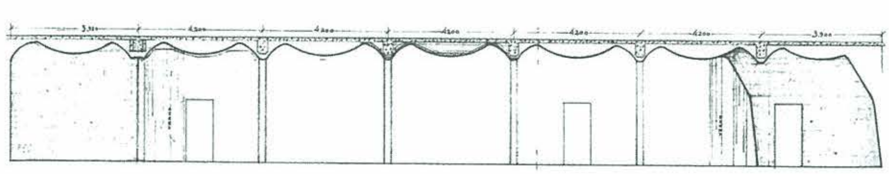
Aalto claimed that the lecture hall was 99 percent acoustically perfect. But what does that actually mean? It means that a speaking voice can reach all parts of the room and that intelligibility is good. This requires a satisfactory reverberation time, and that the hearing level (the sound pressure level) is sufficient in every position of the room and from every possible speaking position in the room.

In analyses of the shifts in Nordic architecture from neo-classicism to pure functionalism and again to an organic Nordic modernism, it has been claimed that the organic free form of the ceiling points the way to a new future, even though it was still based on scientific acoustic research. If the acoustical considerations of the hall should have been a starting point for something so important, I felt it was a subject warranting further study.

Aalto had in his competition entry for the Tehtaanpuisto Church in Helsinki (1930) worked with acoustical considerations in the design of the ceiling.

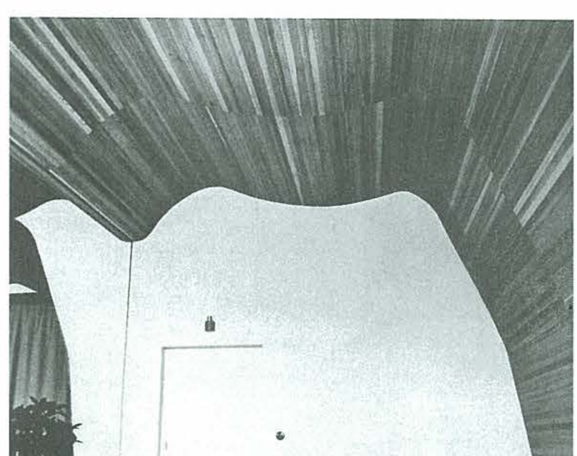
What one would normally aim for is a sound distribution that is as even as possible throughout the entire church. Studying concave surfaces, we see, as Athanasius Kircher already did in the 16th century, that these focus the sound and give an unequal sound distribution. But if we are working with a small radius of curvature with a large room height, we would actually get a sound diffusing ceiling-element.

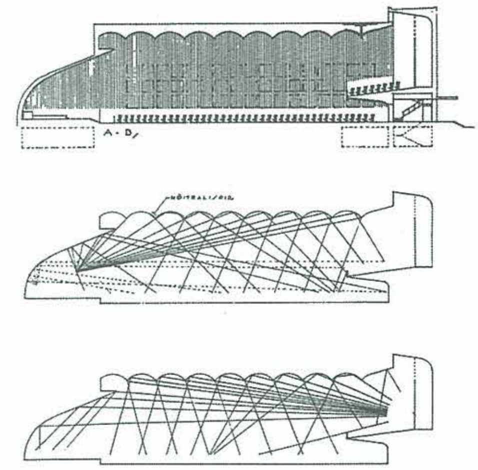
However, if such concave or circular ceiling elements are placed close to the speaker there will be huge acoustical problems; not only because of an unequal sound distribution but also mainly because it is very annoying and confusing to be near the focal point. It creates an amplified signal from a speaker's voice or from your own. In continuation of the considerations of the shape of the ceiling in the Tehtaanpuisto Chuch competition entry, Aalto seems to have made perhaps the most considered acoustical treatment of the hall of the Viipuri Library by "convexing" the concave ceiling.

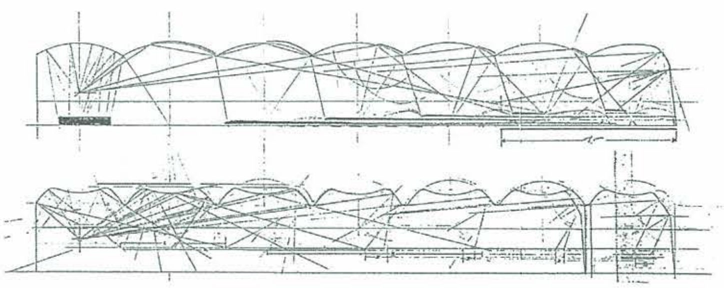


below, left: Mount Angel Abbey Library, 1970.

left and below: Section and ceiling of the Lecture Hall, Vyborg.







left: Alvar Aalto, sketches on the accoustics of the Lecture Hall.

right: Tehtanpuisto Church, Helsinki, competition entry, 1930.

Acoustic models

Architects and engineers studying acoustical matters have earlier used different types of scale models, including models using light or water. The water models were usually section models filled with water. By touching the surface of the water with a little nail one could study the distribution and reflection of the undulation, somewhat similar to how a sound wave in the real room would behave.

In acoustical light models light is used as a sound source, and the reflections of light and sound can be illustrated or followed in the room. A light model was actually used in connection with the project for Aalto's Vuoksenniska Church (1955-1958).

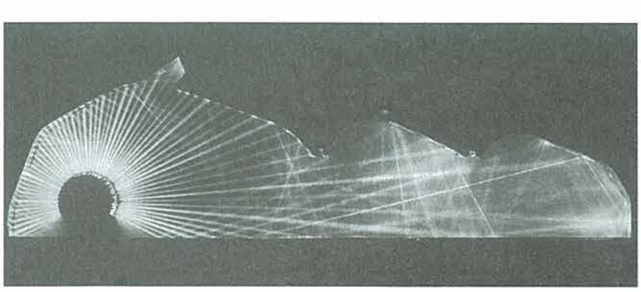
Water models are still used as visual demonstrations of the sound behaviour in rooms in my teaching at the School of Architecture in Copenhagen. By dripping water into an Aalto vase one can show how acoustical focal points will occur in an organic room shape similar to an Aalto vase.

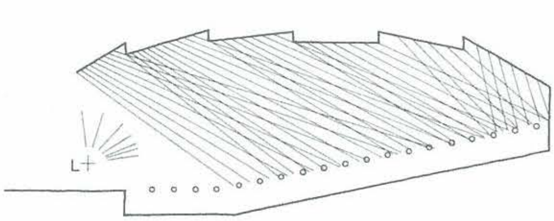
Complimenting it is a demonstration of how Jørn Utzon may have considered the sound reflections for concave and convex surfaces in his Bagsværd Church in Copenhagen (1973-76) by using acoustical drawings.

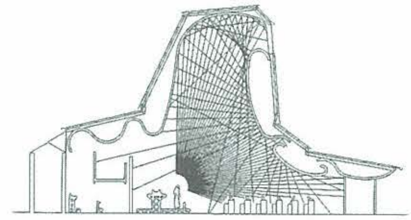
The lecture hall in the Vyborg Library with its undulating ceiling is one of the most often mentioned and illustrated examples of architecture with clearly acoustical motives, but as far as I know there has never been any detailed acoustical examination of the room carried out. Today it is no longer possible to carry out measurements in the lecture hall simply because the ceiling no longer, or only partly, exists. Besides, the hall is not furnished and is in an overall poor condition.

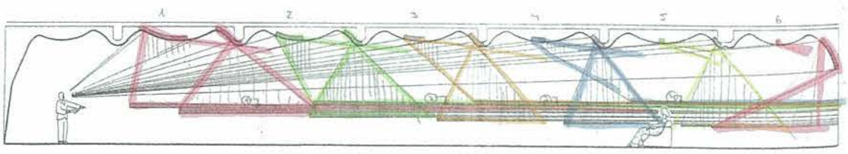
left: Light model for church in Vuoksenniska by Alvar Aalto.

right: Aalto vases.









To examine Aalto's statements about the acoustics of the lecture hall, comprehensive acoustical investigations, including acoustical measurements in a 1:20 scale model and calculations in a 3-dimensional computer model of the lecture hall, have been carried out. The same investigations have also been made for a similar room with a horizontal ceiling, and the results have been compared.
The well-known plan for the library shows us that the lecture hall has a characteristic oblong plan: that means a long average distance from the speaker to the listener. The lecture hall was originally furnished with upholstered chairs in the first rows and wooden chairs in the rest of the hall. In the last five rows of the hall Aalto's three legged stools were used. In that way, the furniture encouraged people to sit in the first rows, where one would assume the acoustic conditions to be the best.
Normally the acoustical design of a lecture hall includes efforts to get as much reflected sound energy to the back of the hall, because the direct sound is weaker there than in the front rows. With the undulating ceiling the sound reflections from the ceiling will be more diffused or scattered than with a horizontal or plane ceiling. The first wide and convex part of the ceiling between the beams reflects sound to a large part of the hall, primarily towards the back of the room, while the "beam-part" of the wave reflects sound down to the listeners below the current beam. As a more sound-spreading surface, one could call it a more 'democratic' or 'social' ceiling, suitable for discussions.
At the same time, with the undulating ceiling there are large parts of the ceiling surface that are placed in acoustical shadow, and therefore can't reflect sound. At first this makes it difficult to quantify the acoustical efficiency of the ceiling.

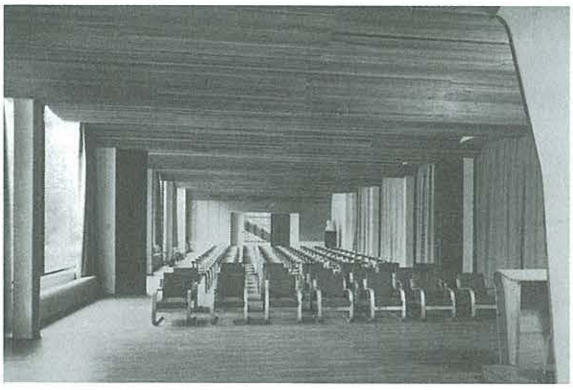
above, left: Normal acoustical design of a lecture hall.

above, right: Jørn Utzon, Bagsværd Church, Denmark

below: Sound reflections from the undulating ceiling.

left: Lecture Hall, furnished.

right: Lecture Hall today.



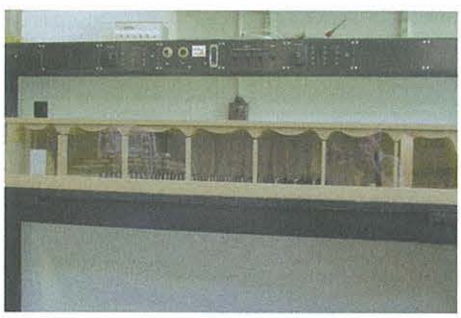
The scale model

The current acoustical investigations with the scale model and with the computer model have been made both with an undulating and a horizontal ceiling.

To make acoustical measurements in a scale model one has to consider a few things about physics and sound. The speed of sound in air (c) is still in a scale model about 340 m/sec. But when the physical dimensions are changed into a 1:20 scale model, the dimensions of the sound, that is, the wavelength (λ), also have to be changed to suit the model. When the wavelengths are reduced twenty times, the frequencies (f) must be increased twenty times as well (due to $c = f \cdot \lambda$).

As a sound source we use an electric flash that is put into the model and placed at the normal speaker position. The microphone is placed in different receiver positions.

The reverberation time in the model is calibrated with textile surfaces so it fits the expected reverberation time in the real hall. As seen below, the curtains in front of the wall opposite the glass facade and the people (and chairs) in the hall are the most important sound absorbing surfaces.



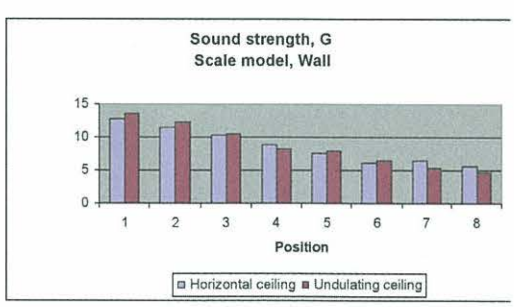
left: The scale model in the laborartory.

right: Electronic flash and microphone in the scale model.

Reverberation time	With curtains	Without curtains
Empty chairs	0,9 sec.	1,9 sec.
With 100 people	0,7-0,8 sec.	1,2 sec.

The measured and calculated acoustical parameters are:

Sound Pressure Level, SPL or G:	The strength or volume of the sound
Speech Intelligibility, STI:	The quality of the speech transmission

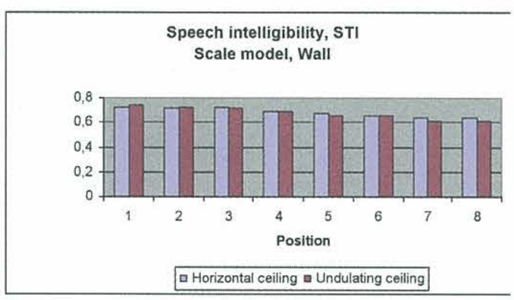


The scale model measurements show us that the undulating ceiling will cause almost the same sound strength as with a horizontal ceiling. However, the undulating ceiling causes slightly higher levels near the speaker and slightly lower levels at the back rows.

The Speech Intelligibility is measured in terms of the STI-value (Speech-Transmission-Index) and evaluated from the scale below:

Subjective scale	STI value
Bad	0,00-0,30
Poor	0,30-0,45
Fair	0,45-0,60
Good	0,60-0,75
Excellent	0,75-1,00

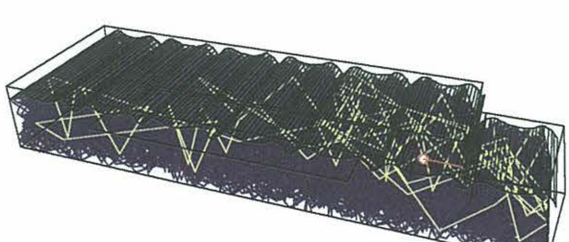
Good Speech Intelligibility depends on a satisfactory low reverberation time and a satisfactory high hearing level (sound source level). But a low reverberation time means high acoustical absorption, and therefore lower levels of the speech sound. Looking at the results, we obtain almost the same fine values (STI > 0,6 at all seats) indicating a good speech intelligibility with both ceilings.



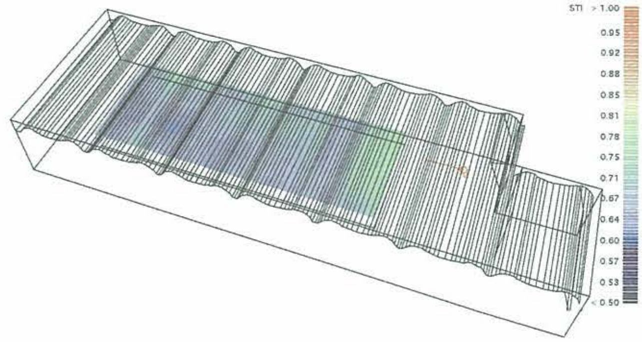
The computer model

In the room acoustical computer program ODEON, two 3-dimensional models of the lecture hall were built: one with a horizontal ceiling and one with the undulating ceiling. The surfaces in the computer model are given material characteristics such as sound absorption coefficients. The program is based on ray-tracing, and from a sound source about 10,000 sound rays are emitted. The history of every single ray is saved in the computer. The computer picks up information about when, from which directions and with what strength the sound reflections arrive to the different receiver positions. After the ray-tracing it is then possible to calculate very many acoustical parameters, for instance the sound strength and the speech intelligibility.

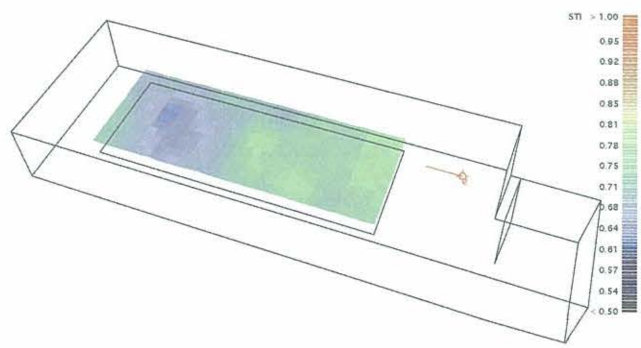
As seen on the colour-mapping of the listeners' positions in the lecture hall above, there is a better and more uniform coverage with the horizontal ceiling than with the



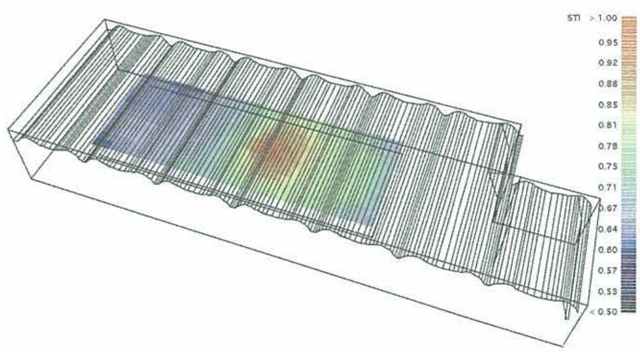
**Computer model.
Ray-tracing in progress.**



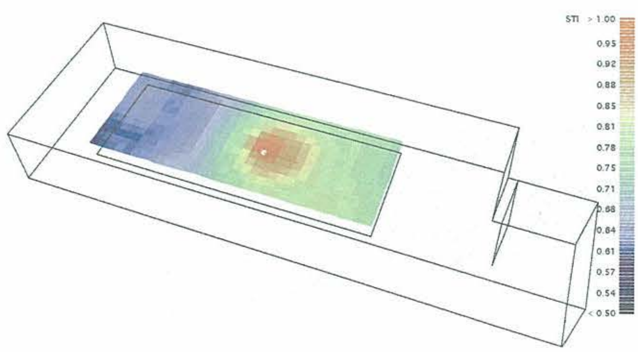
**Undulating ceiling.
Normal speaker
position.
Speech inteligibility
(STI= 0,65-0,74).**



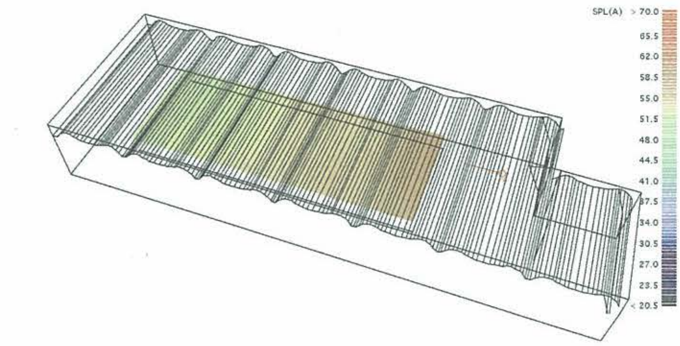
**Horizontal ceiling.
Normal speaker
position.
Speech inteligibility
(STI= 0,66-0,76).**



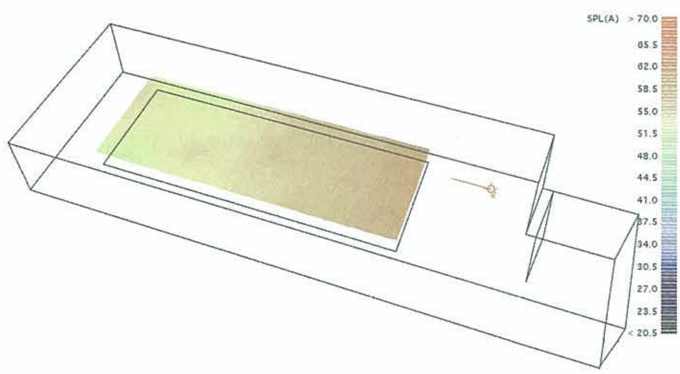
**Undulating ceiling.
Audience speaker
position.
Speech inteligibility
(STI= › 0,63).**



**Horizontal ceiling.
Audience speaker
position.
Speech inteligibility
(STI= › 0,63).**



Udulating ceiling. Normal speaker position. Sound strength SPL 52-58 db (A).



Horizontal ceiling. Normal speaker position. Sound strength SPL 53-59 db (A).

undulating ceiling. Nevertheless, the measured values largely cover the same interval in both cases.

One of Aalto's intensions was to design a ceiling that would give better conditions for discussions and feed back from the audience, and therefore calculations with a speaker position among the audience in the middle of the room was also carried out.

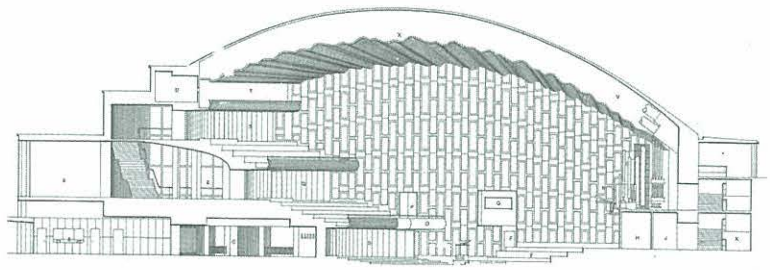
The colour mapping of these calculations tells us that also in this situation we get almost the same values for the speech intelligibility for the two ceiling designs. However there is a tendency towards lower values with the undulating ceiling for positions far away from the speaker. The same tendency is seen when it comes to the calculations of the sound levels (see below), with somewhat lower values in the back of the hall with the undulating ceiling, than with the horizontal ceiling. Also, with the speaker among the audience (results not shown) the undulating ceiling gives somewhat lower values for positions at a distance from the speaker than does the simple horizontal ceiling.

Conclusions from the measurements and calculations

The conclusion from the scale model measurements and the computer model calculations is that the acoustical conditions in the lecture hall would have been almost the same if the ceiling had been horizontal instead of undulating. A horizontal ceiling would even have given somewhat better and more uniform acoustical conditions.

The inspiration from the undulating ceiling

Fortunately Aalto did not have the acoustical knowledge that we have today. The undulating ceiling could be seen as a logical way to hide the concrete beams above, but it



The Danish Radio Concert Hall by Vilhelm Lauritzen, 1939-45.

turned out to be an icon for acoustical ceilings and an inspiration for architects working with acoustical issues in lecture halls or auditoriums. The acoustical quality of the shape was formulated and expressed by Aalto himself, and it was almost never challenged. Both the organic wooden material and the organic form and texture have been attractive elements for architects ever since, and a large number of halls have a clear inspiration from the lecture hall in Viipuri Library.
The main acoustical quality of undulating forms is that we obtain from them diffuse sound reflections that often are desirable. Also recent acoustical research has dealt with the diffusion properties of undulated forms.
In the Danish Radio Concert Hall by Vilh. Lauritzen (1939-45) the wooden ceiling also has a characteristic wave-form. Here was an attempt to avoid the focusing problem of the concave ceiling shape. It was also Lauritzen who gave the ceiling of the Copenhagen Airport (1939) an undulating form, although here the surface material is cellotex, which is a sound absorbing material, and therefore the geometric shape of the ceiling has less influence on the acoustics.

Copenhagen Airport Kastrup by Vilhelm Lauritzen, 1939.

There have been many discussions among architects about from where Aalto found the inspiration for his work. And especially there have been considerations about the inspiration for the undulating ceiling in Vyborg. We know that Aalto found great inspiration through his friendship with the Swedish architect Sven Markelius. Their travels together and lectures given by Markelius had a significant influence on Aalto's work at the time. In a lecture given by Markelius for his architect colleges in Turku, Finland, he actually used acoustics as an example of the new rational relationship between function and form:

"The more precise the objective starting points can be – as an example I here think of the practical and theoretical experiences quite recently obtained within the field of room acoustics – the more absurd it seems that for instance a concert hall is designed from the main idea of

decoration. The congeniality between form and content has for all times been the characteristic of great architecture."

In the same spirit, Aalto used the room acoustical knowledge and arguments of the time as inspiration for his ceiling in the lecture hall in the Vyborg Library, although the Nordic "soft hat" of the lecture hall could just as well have been another source of inspiration.

Alvar Aalto together with Viola and Sven Markelius and an unidentified man with a soft hat.

Bo Mortensen

Bo Mortensen (b. 1960) is Associate Professor in acoustics at The School of Architecture at The Royal Danish Academy of Fine Arts, Copenhagen.
He graduated as a Master of Science in Engineering from the Technical University of Denmark in 1986. Before that he studied architecture at the School of Architecture in Aarhus, Denmark.
Bo Mortensen has written several articles on his research on acoustical aspects in architecture for various books and architectural journals (e.g. *Docomomo dossier, The Finnish Architectural Review*) as well as theatre magazines, acoustical conference proceedings, etc.
Bo Mortensen is managing director of Bo Mortensen Akustik and Gade & Mortensen Akustik I/S. As a consulting engineer and specialist in building and room acoustics, he has most recently worked on the new Royal Drama Theatre in Copenhagen and the new concert hall in Uppsala, Sweden.

Акустическое исследование волнообразного потолка в библиотеке Алвара Аалто

Бо Мортенсен (Bo Mortensen)

О волнообразном потолке лекционного зала библиотеки Алвара Аалто писали много. Аалто сам утверждал, что потолок является «на девяносто девять процентов совершенным в акустическом смысле» и эскизы, иллюстирующие акустические детали планировки потолка, часто воспроизводятся.
А как же он функционировал на самом деле?
Были проведены исчерпывающие исследования, во время которых были проведены акустические измерения на макете лекционного зала в масштабе 1:20 и также расчеты на компьютерной модели 3D.
Результаты исследований показывают, что несмотря на то, что Аалто исходил из верных акустических предпосылок во время проектирования помещений и их деталей, а исходным пунктом у него зачастую служили именно отражение и распространение звука, акустические свойства волнообразного потолка лекционного зала все равно не являются лучшими, чем свойства плоского потолка.
Однако, остается фактом, что библиотека является архитектурным шедевром, а волнообразный потолок стал символом взаимодействия формы, материи и акустической функции, который до сих пор служит источником вдохновения для архитекторов, проектирующих лекционные залы и аудитории.

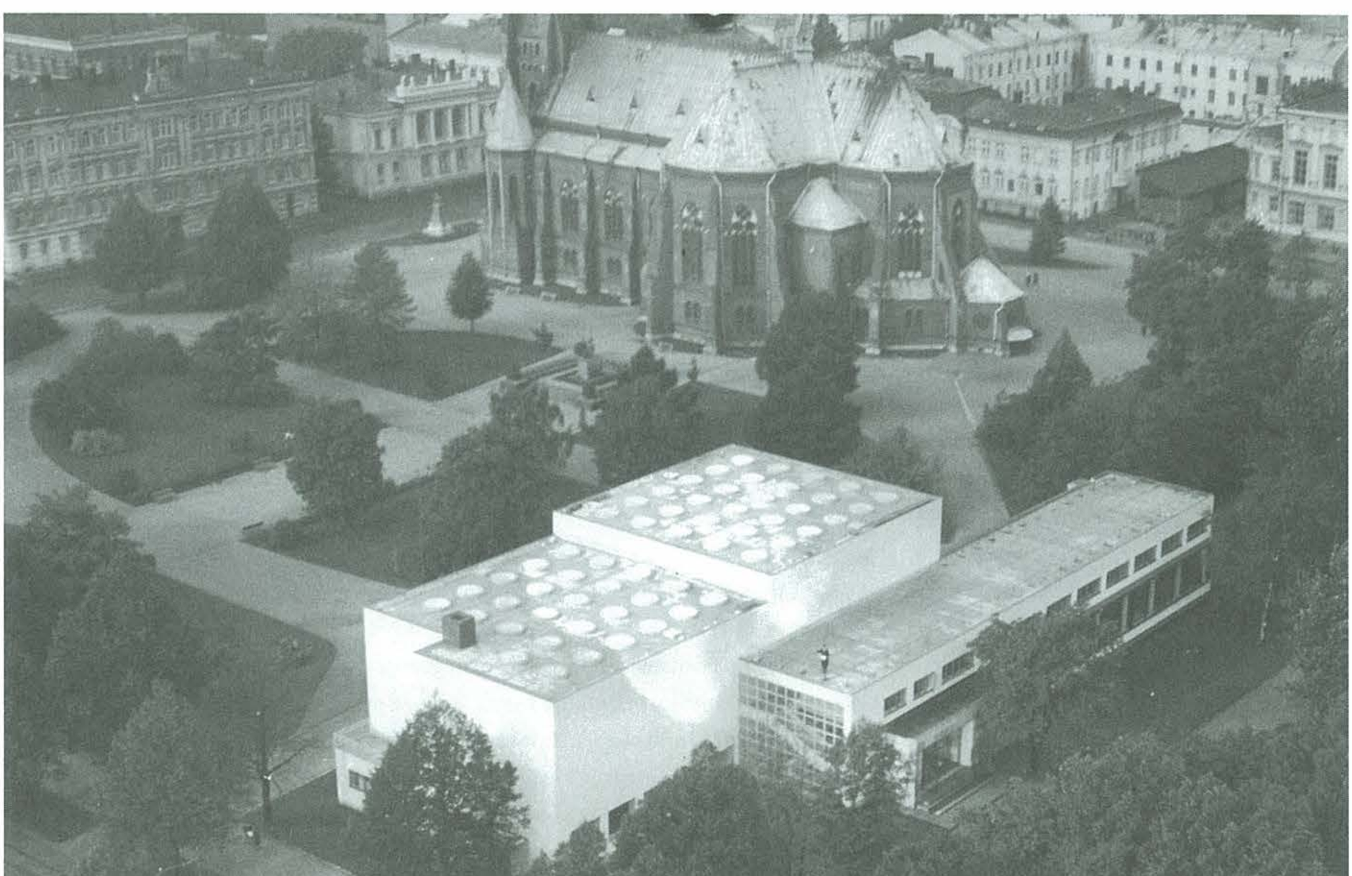
DESCRIPTION OF THE BUILDING'S CONSTRUCTION

Alvar Aalto

The library's plan form and whole design result directly from the site change in the master plan. On the basis of the competition projects I completed the final design drawings according to the earlier location, but when the long discussion on the library's position was finally decided as it is at present, I noticed that the new site gave much greater possibilities for planning and freed the design from the constraint of external formality, which in the earlier case was considerable.

The positive features of the site led to a completely new design for the library: only the main principles of the earlier building's internal organism remained to dominate.

Of the present location's positive aspects I would like to mention: two parks of completely different character and, as the third factor, the junction with the street allowed the grouping and placing of the building's different main parts without any internal or external conflicts. The site offered possibilities for the arrangement of entrances at many varying levels and enabled solutions, that in normal conditions could not be attained. In the building an attempt was made to separate the parts of different character from



each other. The project has two main parts: the library itself with its various departments and secondly the socially active part of the library activity, the clubrooms. If we examine these two main groups more closely, we realize that, extremely unlike each other, they are factors, that each require a very different architectural and technical treatment. All the library departments in a mutual interdependant relationship form the building's massive central part. They comprise solely of the storage of books in its diverse forms and are simultaneously at the place where the books and public come together. Consequently these central parts have been given a conserving and externally closed character. As a point of convergence of the public and books, the other main architectural element consists of optically hygienic and lighting-psychological solutions as well as heating and ventilation systems.

The socially active part of the building, that required for social education and literature propaganda: the clubrooms (lecture hall) and several smaller spaces and offices – are according to their character externally open and light in construction. If in the former part the requirements of the human eye were the starting point, then here the human ear performs as naturally the same part. The lecture hall and clubrooms have thus received their architectural handling on the basis of the general acoustic design.

The medium combining the above psychological division is created by the internal circulation network, which in a way is the building's third basic element, in an architectural sense. The main entrance is at the junction of several park routes adjoining the street, the entrance to the periodical room is directly from the street, the entrance to the children's library, from the playground, is from the south, one floor lower than the main hall. The main entrance is bipartite, it is directed both towards the library and clubrooms. Its size is determined by the use.

In the centre of the main section of the library is the supervision point and below it is the centre for the officials. From all departments the staff have immediate access to this heart of the library. This arrangement, as with all the library department's interconnections, is governed by the flexible use of the personnel.

The core of the library, the lending department and group of reading room, are so combined together, that in reality the main part of the library forms a single large hall, in which the necessary internal division has been achieved by utilizing different floor levels. Likewise it was intended to facilitate and improve supervision by exploiting the different levels, so that the supervision points are partly higher than the circulation level for the public.

The library section was built mainly without internal partition walls, as a parallelogram form, with exceptionally strong, external brick walls. Inside the windowless, 75 cm thick walls run the ventilation ducts. The roof consists of only a single span (17,6 m). It is reinforced concrete with special beam forms, which result from the roof-lighting system used. In the roof there are 57 circular openings, diameter 1,80 m. and conical in shape which form the roof-lighting system. The main principle of this top lighting is as follows: the depth of the cone is so great, that a random 52^0 sunbeam cannot pierce it freely, thus throughout the year sunlight is indirect. Two functions with a different architectural character have been attempted to solve simultaneously, the protection of books from excessive sunlight and creating an optically hygienic overall lighting, so that reading in spite of the interrelated position between person and book in the reading room, would always be free from shadow and glare. The theoretical basis of this lighting system needs a more extensive description than is possible here and it also has building structural and economic starting points.

The same ceiling also acts as a heating source with the so-called panel-heating-system. As the ceiling is divided into lighting parts and solid parts, in the areas remaining between these has been placed a dense network of radiant heating pipes, thus the ceiling of the library hall has been completely used for these functions, which in the open air are served by the sun.

In artificial lighting the same aim has been sought after by placing strong light emitters into ceiling recesses and by using the walls as reflective surfaces for the indirect light. As the bookshelves mainly line the walls, this lighting system has simuntaneously provided their lighting, which irrespective of the interrelated position of the shelf and person, is free from shadow and glare.

The clubroom and office wing has a steel frame structure. Here in the acoustic construction wood has been mainly used. The lecture hall's ceiling forms undulating lamellas (approx. 58 m^2), which are intended to distribute sound, especially spoken sound, so that most of the hall's surface area would be acoustically of equal value. According to the nature of the activities in the hall, I have assumed that, for example, general discussions should be as important as individual performances. For this reason, the acoustic construction, contrary to concert halls for example, has been attempted to solve so that the position of the sound source is arbitrary, e.g. every point in the hall (at a fixed normal altitude) should be favourable both as a sound emitter and receiver. I conceive acoustic questions mainly as physiological and psychological questions, where purely mechanical solutions are not entirely justifiable.

The floors, excluding small exceptions, are massive concrete slabs. Nowhere in the building was floor filling used. Floor finish materials are throughout fixed directly to the structural concrete slab. Sound insulation consists of the combination of heavy concrete floor slabs and soft fibre boards — insulite.

The roofs, without filling as in the former, are insulated with a fabric which has a lead membrane between two bitumen layers. Fascias, roof outlets for the internal rainwater drainage system and various elevation flashings are of copper.

The windows are mainly steel framed, covered internally with teak. A small part is of oak. In the light openings of the library section, coarse glass is combined with the thinner glass inside. Circular (180 cm) coarse glass sheets relying on their own weight are lowered directly on to the concrete conical roof lights.

In the building's interior wood finishes have been used extensively for both walls and ceilings.

A determining factor here has been wood's excellent surface characteristics and for example, in libraries the essential principle that for interiors real original materials should be used, in which wear does not cause similar problems, as for exemple in the use of coloured surfaces and synthetic products. The selection of different wood species has in a way derived from the greater or lesser extent of wear the different parts are subjected to. Karelian red pine has been used mainly in the clubrooms, sycamore in the entrance hall, oak, birch in the children's library and in furniture, teak, and in the actual library part a combination of red beech and Karelian pine, the former throughout in places inclined to heavy wear.

The central heating has been divided into two different systems according to the dual character of the building. In the library part is the "panel-heating" system, which means the production of radiant heat to warm up the concrete and plaster surfaces in the ceiling via a dense network of pipes. Generally this system is used in other parts of the building. The aim in using a ceiling heating system was to achieve an overall solution, where no conflicts arise between the bookshelves and the heating elements and where dust circulation, a circulating air, a factor damaging books and people, is eliminated.

The building has a mechanical ventilation centre, from which fresh air is distributed via special ducts into the building's different parts. The distributing branches of these ducts are glazed fire clay or cast iron. The ventilation system can, by adding some extra parts, be changed into a complete acclimatizing apparatus.
The movable furniture is based chiefly on the same principles as the fixed and is accor-

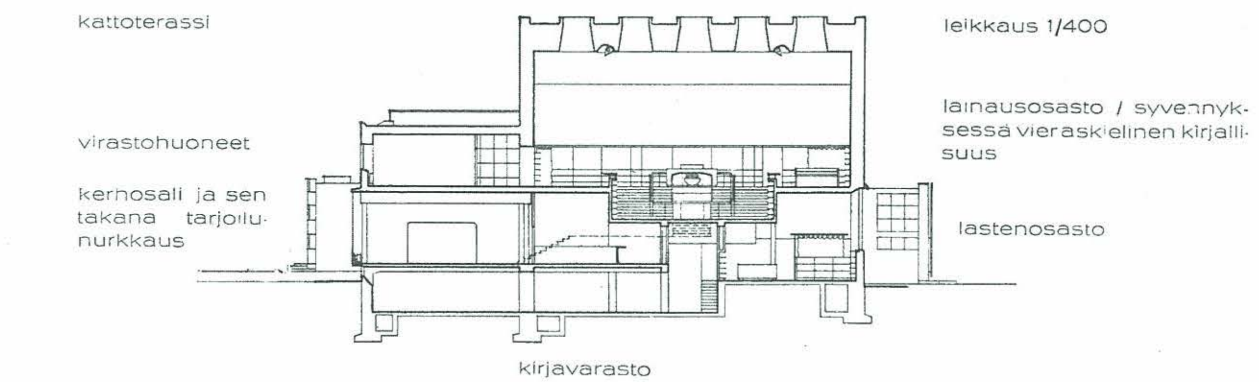
dingly mainly wood. In addition textiles play an important role in the furnishings: as curtains, door and wall coverings, even as a separating element between different room spaces.

The building's internal and external colour scheme is based on the use of natural materials, where only in exceptional cases the materials' original character has been altered by colouring the surface. Wherever possible the natural lime painted surface remains dominant. The same white has been used on walls painted with oil paint and only in metal parts was there allowed a few shades besides black. The real colour scale consists therefore of materials.

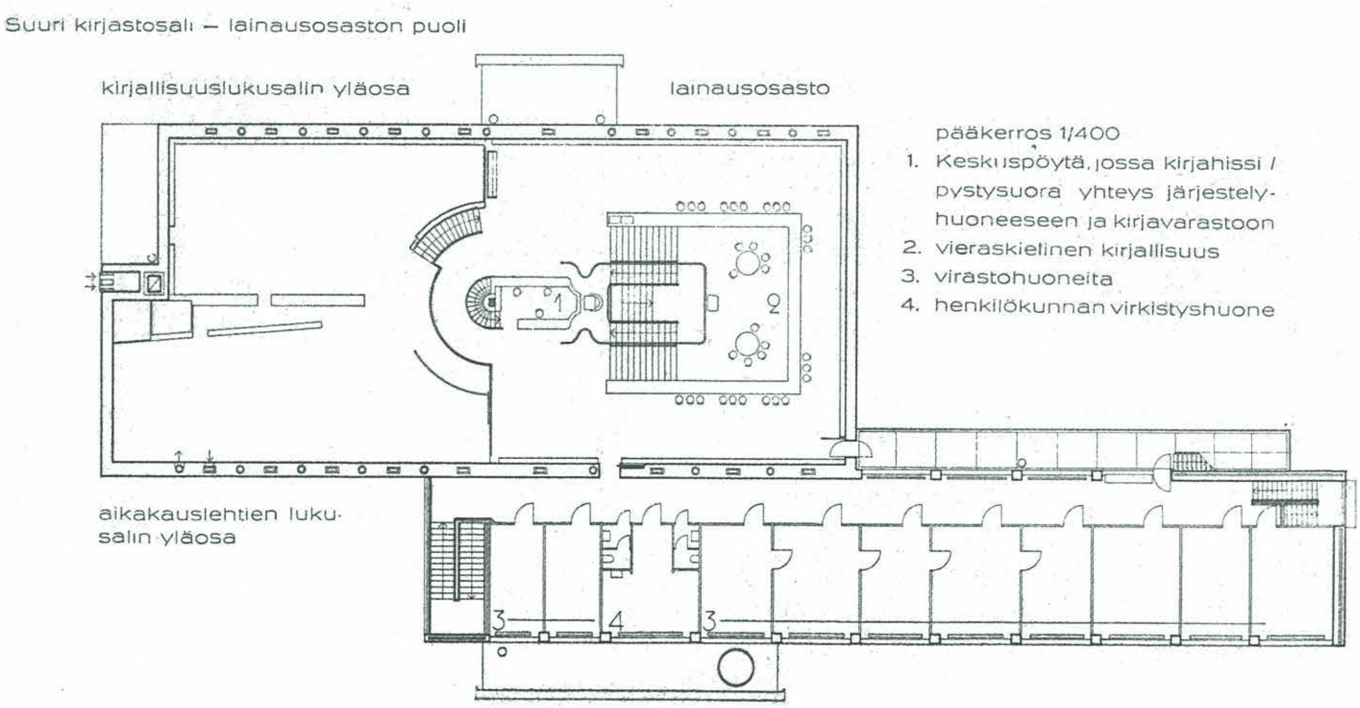
Elevations are finished in natural coloured lime. However, in a few important façade surfaces, blue streaked-quartz steatite has been used.

For the final result, its colour and tone were naturally affected by such important elements as external and internal vegetation, flowers, tissues, a few sparse decorations and naturally above all else – books and – people.

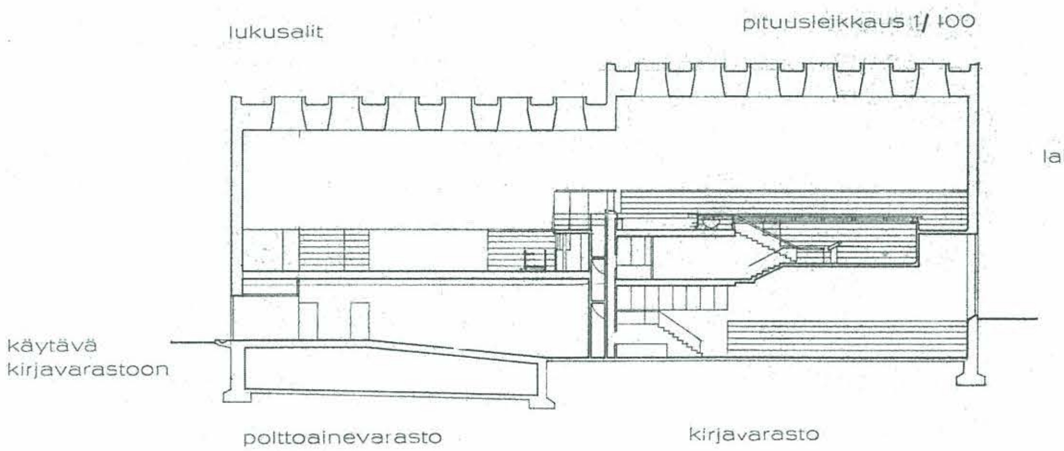
published in: Viipuri 1930-35,
Alvar Aalto – Museo Jyväskylä, Satu Mattila (ed.), 1979.
English translation by Jonathan and Leena Moorhouse.



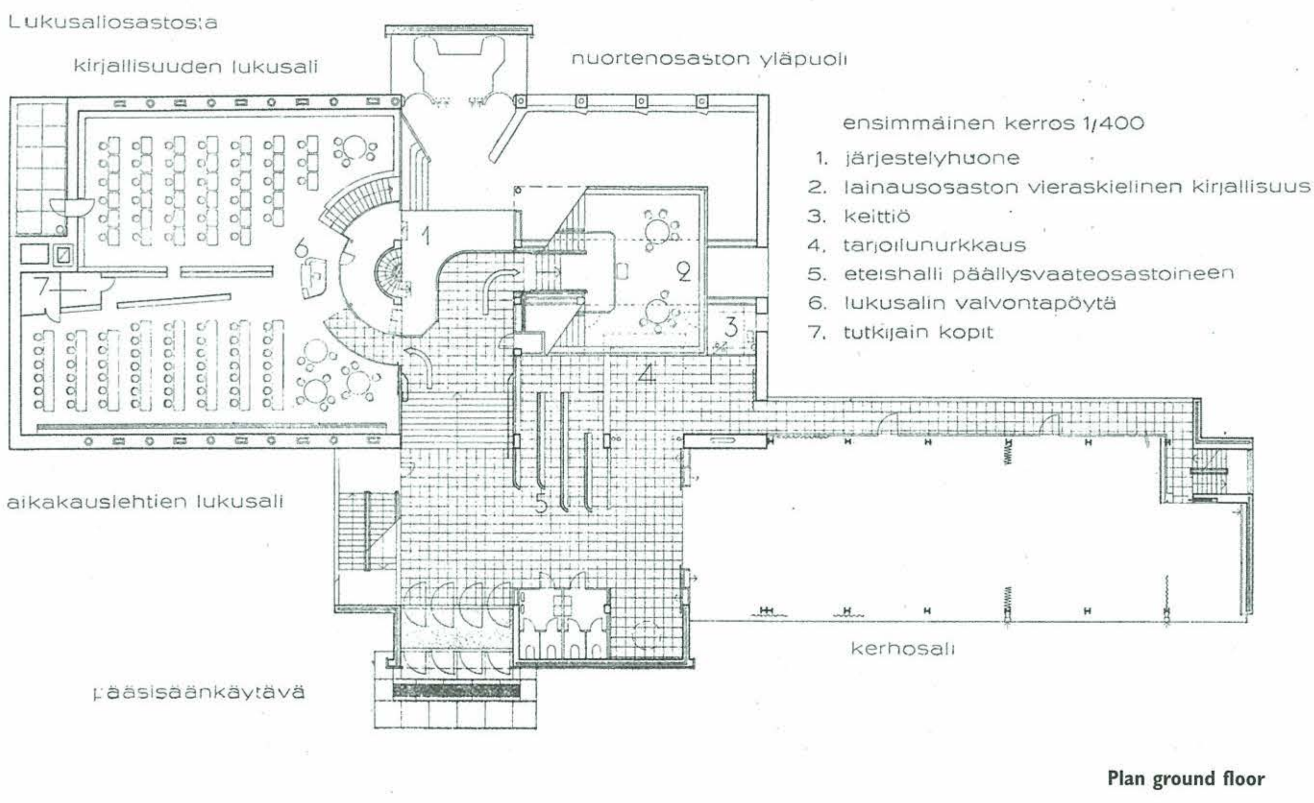
Cross section



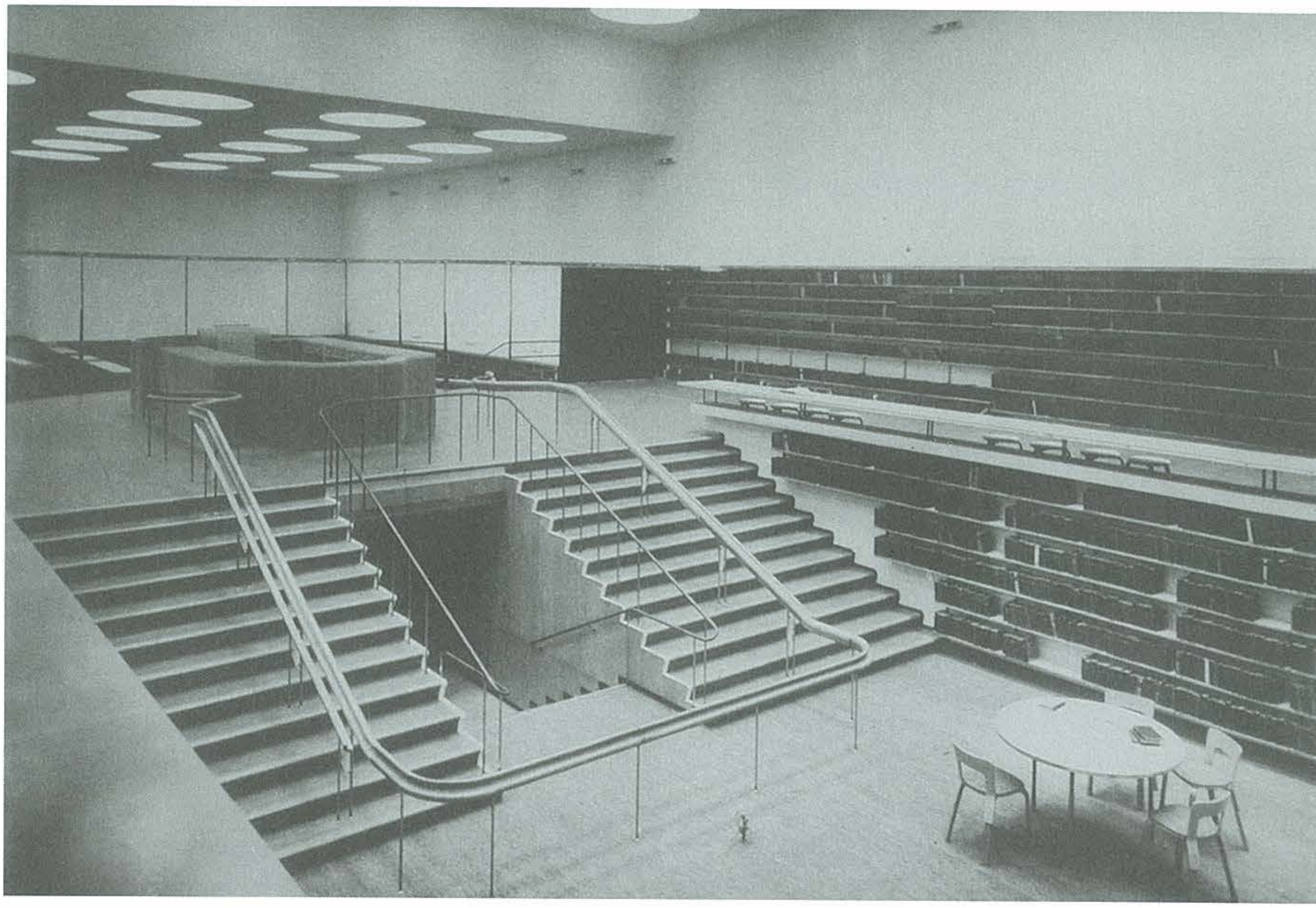
Plan first floor

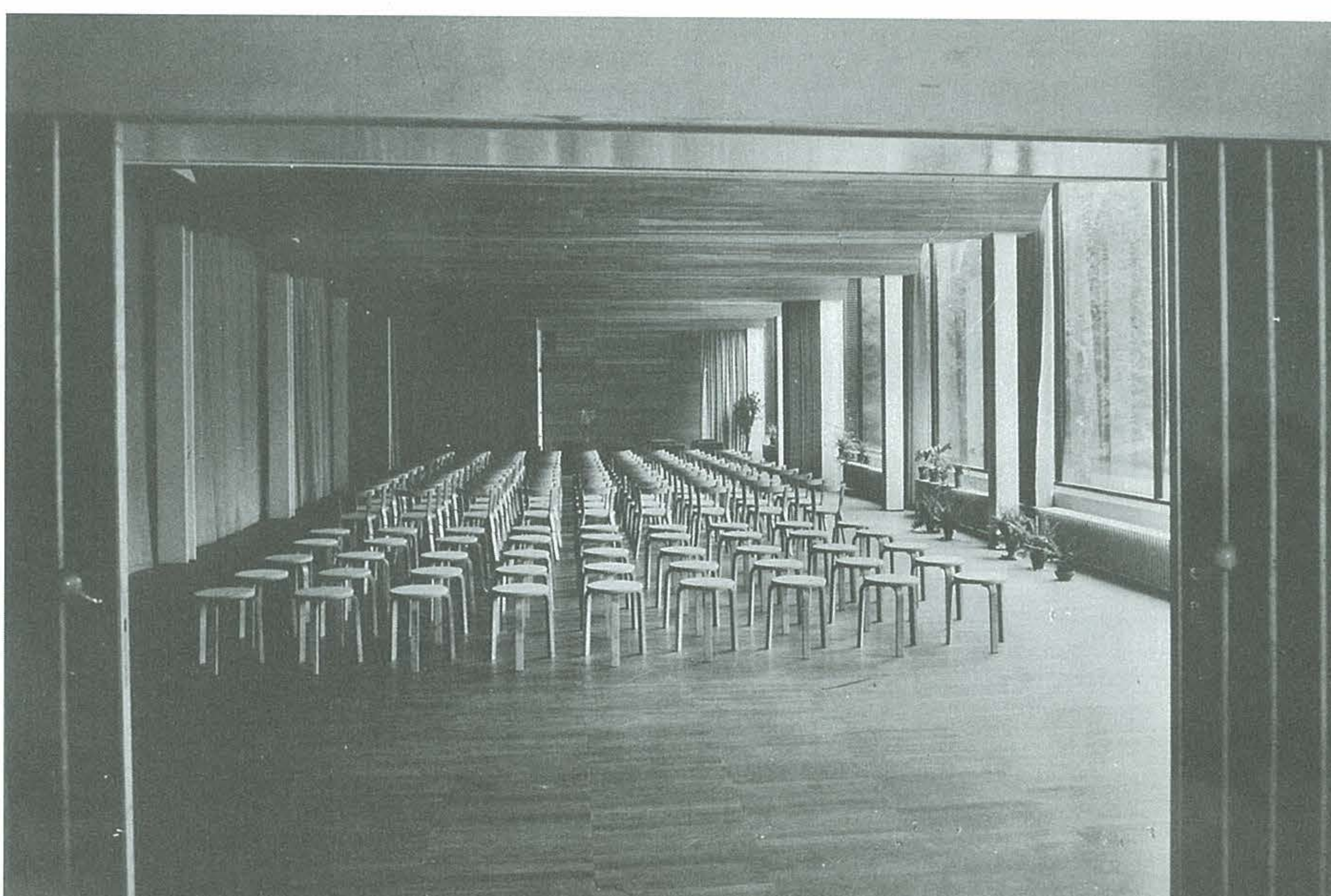


Longitudinal section



Plan ground floor





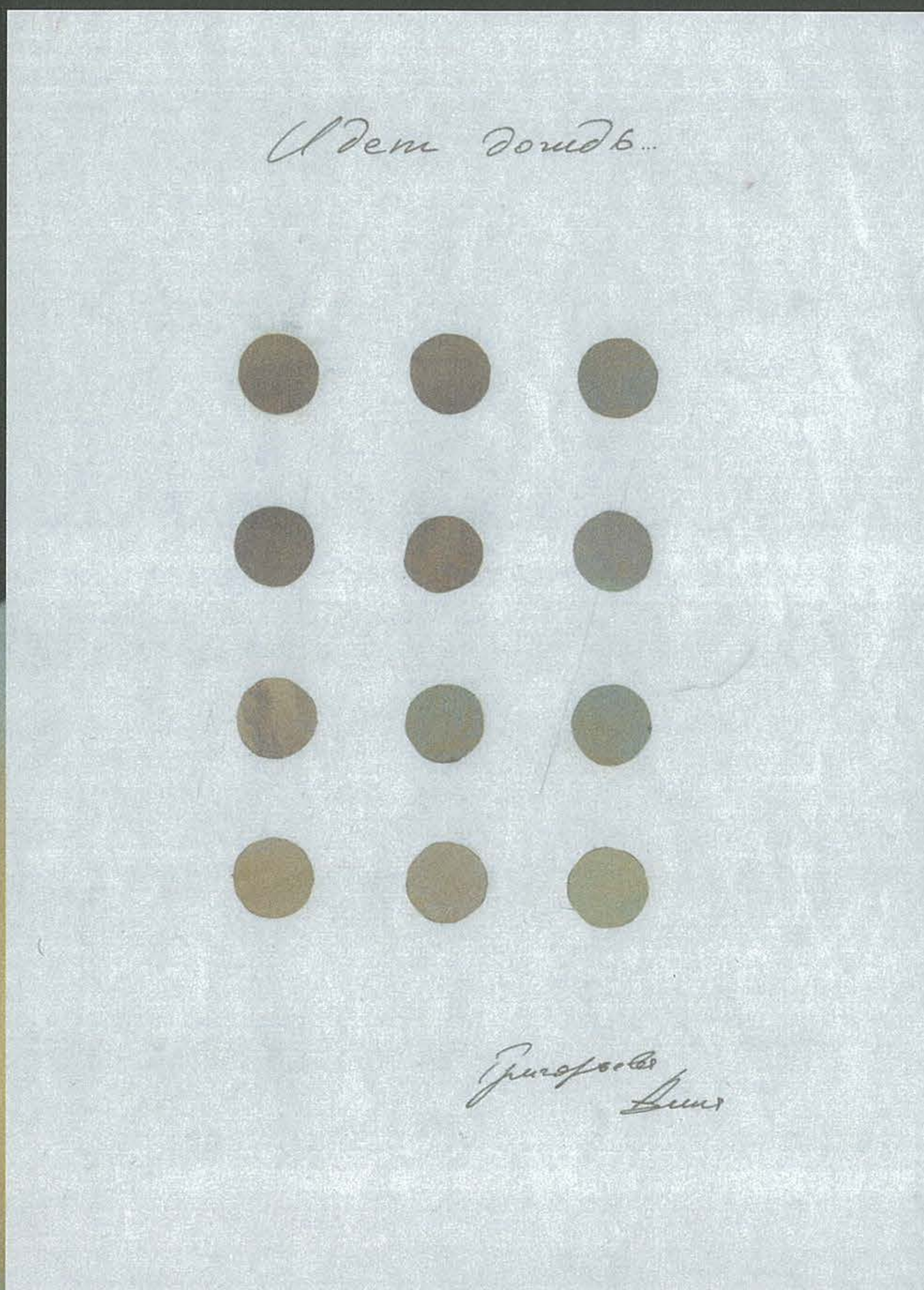
1935


1941

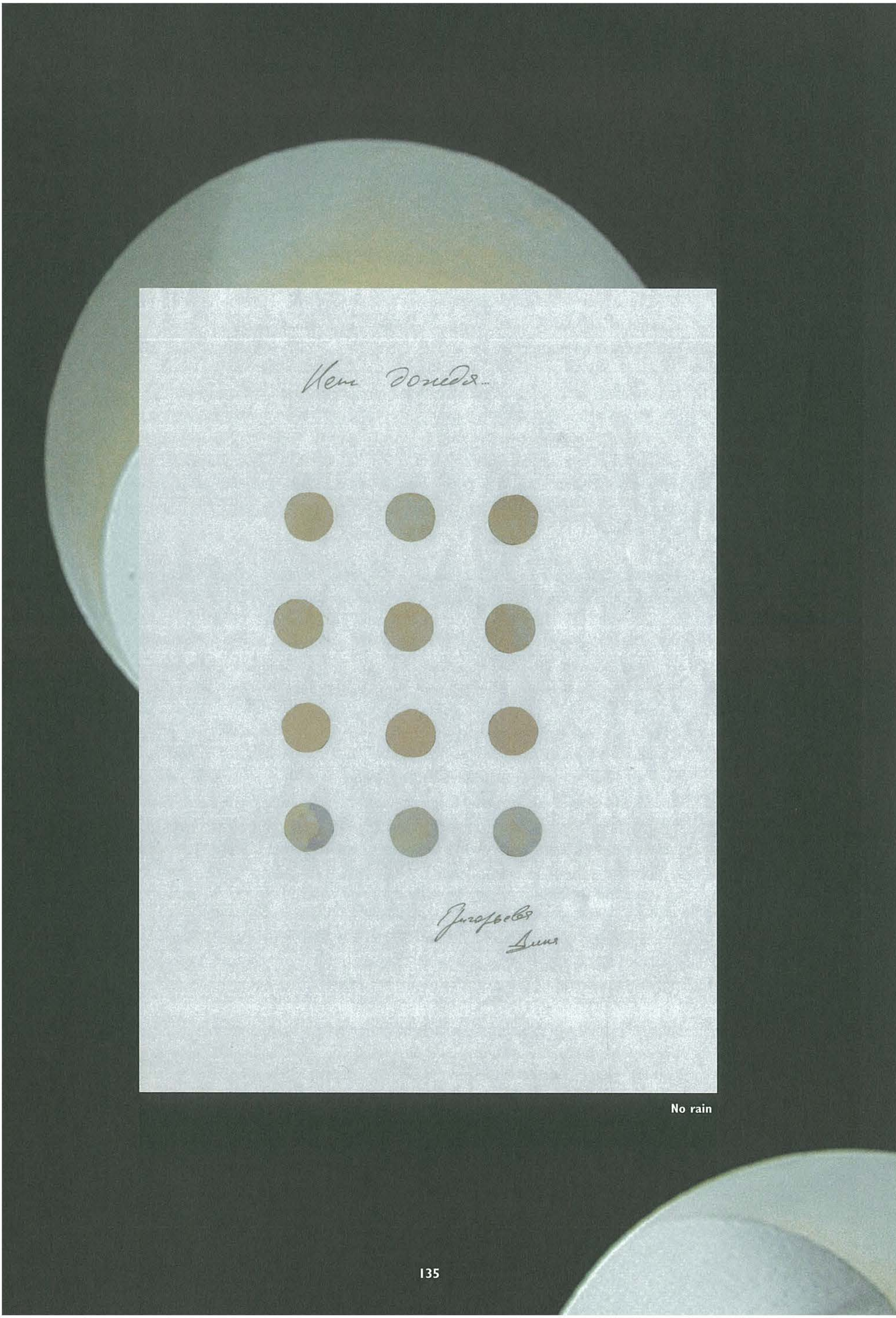
THE LIBRARY FROM INSIDE AND OUTSIDE

courtesy "What the Time in Vyborg?"

DINA GRIGORIEVA



It's raining



No rain

EPILOGUE

Maija Kairamo

Vyborg is one of the most interesting cities on the shores of the Baltic Sea. The present dilapidated state of the buildings and streets may depress the visitor, but a closer look reveals the rich historical heritage, from the Middle Ages to the 20th century. Vyborg is a hidden jewel among historical cities of Europe – fashionable restoration waves have not disturbed its authenticity.

Nevertheless, the restoration of the Aalto Library in Vyborg, one of the treasures of the city, has during the last thirteen years been an object of international architectural interest. Through the Docomomo network, the call to join the international workshop organised by the International Specialist Committee of Technology in September 2003 brought participants from many corners of the world to Vyborg. The papers and discussions of the workshop gave a two-day long fruitful forum for debating "the technology of sensations".

The goal to regain the original architectural value of the building, yet at the same time accepting the necessary technical demands of the contemporary and active use, is common to many restoration projects. Modern buildings were planned to express the function they served. Louis Sullivan's slogan "form follows function" was often repeated by architects when they introduced new architecture. Now these forms will be serving new functions, which is both a philosophical and technical problem with inner contradictions.

The Aalto Library in Vyborg was, unlike many other modernist buildings, built to endure, and is still serving as the central municipal library of the city. But there are more readers and more books, the new technology of data processing, computers, internet connections, modern security standards, modern working methods, which all need space and installations. The problems of the Aalto Library can be compared with those of Duiker's Zonnestraal Sanatorium, which was designed to be transitory, yet will be preserved for the future and serve as a modern rehabilitation centre, and those of Ginzburg and Milinis's Narkomfin House, which is not valued by contemporary Russian society and is in need of a new function. Narkomfin House was inspired by ideas of revolutionary collective urban life, but which gets no appreciation in contemporary Moscow, where people dream and strive for pre-revolutionary bourgeois luxury.

Modern architecture propagated the advantages of industrial production, which meant new economical, hygienic materials, standardisation and effectiveness. This created the basis for modern aesthetics. Industrial production in itself is, however, based on continuous technological development and commercial competition. In fact, this turns the buildings into products with a short life-span; maintenance, repair and now – several decades later – building conservation faces a lack of relevant materials. Fittings, floor coverings, pigments and binding-agents of paints, and most other technical innovations of the heroic years of Modernism have long been out of production.

The restoration of the Periodicals Reading Room of the Aalto Library is currently in progress. The original specifications give detailed information about the materials used, although no proofs of the original surfaces are preserved. Two folders of samples of Nokia's rubber carpets from 1930s are preserved in the Aalto Foundation and these will be used as models for a reproduction of the original red-marbled rubber carpet, which is needed to recreate the original architectural atmosphere. As in Zonnestraal, the once industrially-produced materials will now be produced virtually by hand.

Providing natural light for the readers was one of Aalto's main concerns in the Library. The walls of the Lecture hall, Periodicals Reading Room, Children's Library and office stairs are penetrated by large steel-framed windows, which span over the whole exterior wall, as in accordance with Corbusier's 'Five Points'. These spaces have a direct contact to the surrounding park. However, in the main core of the library, in the Reading and Lending Hall, the reader is protected from all disturbances and can concentrate on the world of books. The reader is embraced by the massive brick walls of the space, which is lit by a mysterious light without shadows through numerous skylights. In Aalto's later creations, such as the Rovaniemi Library (1961-68), the lighting system became more sophisticated. In the Vyborg Library the natural light could again enter the core after the completion of the installation of the restored (and now double-glazed) skylights in May 2004. The way in which Aalto used light in Vyborg Library was unconventional, fresh and youthful and gave an ageless grace to this, his first completed, library.

The undulating wooden ceiling of the Lecture Hall was one of Aalto's inventions. He convinced the contemporary audience that acoustics was the main factor behind the form of the ceiling. The research of Bo Mortensen seems to challenge Aalto's argument, but he concludes that fortunately Aalto did not have the acoustical knowledge we have today. The human being is a complex entity of senses, self-will and feelings. It can be questioned whether a horizontal concrete ceiling would free the willpower of a human being in the same way as a wooden ceiling. The restoration of the Lecture Hall and the reconstruction of the undulating wooden ceiling will give this space back its "architecture for sensations". The ceiling, with its soft waves formed in natural wood, will inspire people to speak and listen, it will strengthen aesthetic well-being and the power of the psyche and senses.

The restoration process of the Library has already inspired the younger generation of the city to look through the Lecture Hall window, to ask "what's the time in Vyborg?", and to seek out the beauty of their home town. The origin of the town lies in the distant past, and there is much to do to reveal the rich time-space of the city. The restoration of the Library will illuminate in an instant how to proceed from the present time to a future time in Vyborg.

ЭПИЛОГ

Майя Кайрамо (Maija Kairamo)

Выборг является одним из самых интересных городов Балтийского побережья. Современное упадочное состояние зданий и улиц может казаться посетителю угнетающим, но при более внимательном изучении его обнаруживается богатое историческое наследие со времён средневековья до XX века. Выборг – это скрытая жемчужина среди исторических городов Европы, поскольку современная реставрация не повредила его оригинальности.

Однако реставрация библиотеки Алвара Аалто, одного из шедевров города, в течение последних тринадцати лет привлекла интерес мировых архитектурных кругов. Многие специалисты со всего мира откликнулись на приглашение Международного Технологического комитета через сеть ДОКОМОМО принять участие в международном workshop в Выборге в сентябре 2003 г. В течение двух дней плодотворной работы были заслушаны доклады и проведены беседы по вопросам «технологии сенсации».

Здание библиотеки Алвара Аалто было, в отличие от многих других зданий в стиле модернизма, построено специально для использования в качестве библиотеки, и в нём располагается центральная библиотека города и по сей день. Только в современное время её посещает большее количество читателей и в ней должно поместиться большее количество книг, а также необходимо использование новых компьютерных технологий, Интернета; здание библиотеки должно отвечать современным стандартам по безопасности и методам работы, и всё это все требует места и соответствующего оборудования.
На архитектуру модернизма распространились преимущества промышленного производства, что привело к созданию более дешевой и чистой продукции, к стандартизации и эффективности. Несмотря на это, многие из технических инноваций героической эпохи модернизма уже давно вышли из производства.

В настоящее время реставрируется журнальный зал библиотеки. Оригинальные архитектурные задания дают детальную информацию об используемых материалов и покрытий даже в тех случаях, когда от них не осталось ни следа. В Фонде Алвара Аалто сохранились две папки с образцами резиновых ковров Нокиа от 30-х годов, и они будут использованы для репродукции подлинного, резинового ковра с рисунком в виде красного мрамора, который необходим для воссоздания оригинальной архитектурной атмосферы. Как случилось в Зоннестраале, материалы, которые когда-то являлись промышленной продукцией, теперь должны быть изготовлены почти вручную.

Главной своей задачей Аалто считал обеспечение дневного света читателям библиотеки. Большие окна со стальными рамами пронизывают стены, они тянутся вдоль всей наружной стены согласно принципу «пяти углов» Ле Корбюзье. Это пространство имеет непосредственную связь с окружающим парком. Но в главной части здания, в читальном и абонементском залах, читатели находятся в объятиях массивных кирпичных стен, а пространство освещается мистическим бестеневым светом от большого количества

иллюминаторов.
В Выборгской библиотеке свет снова проник в здание в мае 2004 г. после того, как были реставрированы и заново вмонтированы иллюминаторы, имеющие теперь двойное застекление. Аалто использовал дневной свет в Выборге в необычной, свежей и новаторской манере, придающей его первой библиотеке изящество, ценность которого не утрачивается со временем.

Волнообразный потолок лекционного зала был одним из изобретений Аалто. Он утверждал в то время, что главным фактором в форме потолка была акустика. Бо Мортенсон в своем исследовании доказывает обратное, а в заключении он приходит к выводу, что, к счастью, Аалто не владел теми сведениями об акустике, которые мы имеем сегодня. Человеческое существо является совокупностью ощущений, воли и чувств. Остается под сомнением, мог ли плоский бетонный потолок освободить силу воли в такой же степени, как деревянный потолок. Реставрация лекционного зала и реконструкция волнообразного деревянного потолка восстанавливает «архитектуру сенсации» данного пространства.

Реставрация библиотеки вдохновляет молодое поколение города, они смотрят через окно лекционного зала и спрашивают: «*Какое сейчас время в Выборге?*» и ищут красоту своего родного города. Истоки города лежат в далеком прошлом, и для обнаружения его богатого временного пространства нужно проделать еще много работы. Реставрация библиотеки дает возможность увидеть то, как можно пройти путь от прошлого до будущего в Выборге.
в Выборге.

List of Participants

Borsholt, Jens architect, The National Danish Board of Cultural Heritage, Copenhagen, Denmark
Cremnitzer, Jean-Bernard architect, teacher at l'Ecole d'Architecture de Normandie, Paris, France
d'Orgiex, Emilie architect, DOCOMOMO International, Paris, France
De Jonge, Wessel architect, Rotterdam, The Netherlands
Englund, Leif architect, Helsinki, Finland
Fedotova, Olga student, Vyborg, Russia
Gallo, Emmanuelle architect, DOCOMOMO ISC/T, Paris, France
Grigorieva, Dina student, Vyborg, Russia
Heikenheimo, Marianna architect, Helsinki, Finland
Kairamo, Maija architect, Helsinki, Finland
Klichuk, Yana student, Vyborg, Russia
Kuipers, Marieke architect, Maastricht, The Netherlands
Madsen, Merete architect, The Royal Danish Academy of Fine Arts, School of Architecture, Copenhagen, Denmark
Morgen, Mogens architect, The National Danish Board of Cultural Heritage, Copenhagen, Denmark
Mortensen, Bo engineer, The Royal Danish Academy of Fine Arts, School of Architecture, Copenhagen, Denmark
Mukhorova, Lyuba student, Vyborg, Russia
Mustonen, Tapani architect, Helsinki, Finland
Norvatsuro, Markku architect, Helsinki, Finland
O'Reilly, Gary architect, New South Wales, Architectural Projects Pty Ltd, Architects, New South Wales 2010, Australia
Polman, Mariel architect, Department for Conservation ZEIST, The Netherlands
Pöppönen, Hannu journalist, Helsingin Sanomat, kulttuuritoimitus, Helsinki, Finland
Roberts, Liisa artist, Finland/ USA
Sarawgi, Tina architect, Department of Interior Architecture, The University of North Carolina, Greensboro, USA
Shver, Aleksandr Michailovitj architect, Vyborg, Russia
Stenberg, Fanny architect, Copenhagen, Denmark
Svetelnikova, Tatyana librarian, Vyborg, Russia
Szmuk, Nitza architect, Tel-Aviv, Israel
Wedebrunn, Ola architect, The Royal Danish Academy of Fine Arts, School of Architecture, Copenhagen, Denmark
Willemse, Gerard engineer, POLMAN colour & architecture, Soest, The Netherlands
Yaskina, Anya student, Vyborg, Russia
Zalivako, Anke architect, Berlin, Germany/ Moscow, Russia

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For information concerning membership, contact:
Docomomo International Secretariat
IFA-Cité de l'architecture et du patrimoine
Palais de la Porte Dorée
293, avenue Daumesnil
F-75012 Paris
P 33 (0) 1 58 51 52 65
F 33 (0) 1 58 51 52 20
E .... docomomo@citechaillot.org
W........ docomomo.com

Bank account
Docomomo International
CCF Paris Odéon
IBAN: FR 76 30056 00070
00705517590 36
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The legendary Vyborg/ Viipuri Library, designed by Alvar Aalto (1927-1935), is situated in the beautiful city of Vyborg, Russia, on the coast of the Gulf of Finland, between Helsinki and St Petersburg. In September 2003 the **Docomomo** International Specialist Committee on Technology (ISC/T) arranged the 7th International Seminar and Workshop of Technology in the Aalto Library. The title of the seminar was The Case Study and the Technology of Sensations. The aim of the seminar was to experience the technology of the Modern Movement in a workshop held in the chosen case study. The papers presented in this book are the results of research and examinations at the location integrated as theoretical, practical and methodological issues considered in relation to restoration. During the seminar, and again in the present publication, various aspects of the building construction as well as lighting, acoustics and the sensations of hands-on experience have been examined.

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