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Suomen Kulta: Alvar Aalto, the Kymijoki industrial projects.

Compared to the major well-known works of Alvar and Aino-Marsio Aalto, the industrial projects are comparatively unexplored. Either side of World War II they completed several factory projects in Finland's Kymijoki region including the renowned Sunila Pulp Mill. This paper construes these works as a relatively unknown collection within an extensive, well-known corpus that warrants further investigation. It shows the industrial projects to be valorised through site planning, regard for topography, use of monumental brick forms, the trialling of tectonic and constructional typologies, and other perceptible architectural ideas that materialize at the same time in the industrial and non-industrial projects. The paper centres on the architecture of several Kymijoki factories and comments on the inter-relationships with well known Aalto works. The consequence of the industrial projects lies in this relationship of continuity with the renowned works, and the flow of ideas between them and the main Aalto projects of the same period. A study of this kind may offer additional insights into both the industrial and non-industrial Aalto works of the 1930s.

The Kymi River flows southward from the lake system that dominates south-eastern Finland, to the port of Kotka 120 kilometres east of Helsinki on the Gulf of Finland. For extractive industries, like the milled timber and pulp factories that have been in the river valley since the 1870s, the Kymi carried raw materials down stream to supply the mills while the harbour at Kotka accommodated shipping for the export of finished products by sea. Alvar Aalto is represented by several factories and worker communities in this region. In Aalto's architectural trajectory from 1930, industrial building commissions developed to become equal to the better known residential, educational and civic buildings. Concomitant with twentieth century Finland's industrial profile, the factory commissions were predominantly timber industry installations of various sorts. Specifically, the Finnish 'gold' to be found in the Kymijoki area is a group of Aalto projects completed just before and after World War II, namely the Sunila Pulp Mill and Housing (1936-8, near Kotka), the Tampella Paper Mill, Housing and Elementary School (1937-8, at Inkeroinen), the Enso-Gutzeit Paper Mill (1951, in Kotka) and the nearby Ahlström Glassworks Warehouse (1948-9, in Karhula). With the possible exception of the Sunila Factory, these industrial projects (including communities) are but minimally present in the literature. Archives, including drawings and photographs are held at the Alvar Aalto Archive in Jyväskylä, and of course, the buildings and sites themselves are archives.

The Kymijoki industrial projects are of considerable architectural interest and they are all the more so, given their historical coincidence with the better known Aalto works progressing through the office at the same time in the hands of some of the same architectural staff; Jarl Jaatinen, Markus Tavio and Paul Bernoulli, for example.¹ The period was a significant one for the development of the Alvar and Aino Marsio-Aalto's architecture as it transitioned from an observant Modernism to a putative regionalist assemblage.² Notably, between 1935 and 1939, the Kymi industrial projects were created alongside the Aalto House in Helsinki, the Savoy Restaurant interior, the Finnish Pavilions at the Paris and New York World Fairs, the Standard Terrace housing in Kauttua and the *Aalto: Architecture and Furniture* exhibition at New York's Museum of Modern Art. If reflection on the 1930s Aalto legacy generates the impression of a split portfolio with those celebrated projects on the one hand, and the somewhat overshadowed industrial projects on the other, there is evidence to the contrary. In rebuttal, the archive drawings and photographs reveal a more integrated compilation. This is backed up by the detailed tracking of drawing issue dates and the staff architect's initialling of drawings for 1935-9 period as mentioned. Tellingly, the way in which public exposure, such as exhibitions and publications, has privileged the famous works, means the body of work for those years has not been uniformly exposed, either in the hands of the architect or in almost all of the subsequent publication and scholarship, except for the relatively recent work of Pekka Korvenmaa.³ This supports the case for a more evenly weighted study of the industrial projects, including the community installations, alongside the familiar works.

Of the three Kymijoki wood product factories, those at Inkeroinen (for Tampella) and in Kotka (for Enso-Gutzeit), are both paper mills manufacturing finished paper products, whereas Sunila is a Sulphate Pulp Mill which produces wood pulp in uniform sized, dry cellulose sheets for use in subsequent processes such as the manufacture of plastics and cardboard. Sunila was a nationally significant project mounted by a consortium of established timber industry companies chaired by Harry Gullichsen, who nominated Aalto for the commission⁴ in the same period he and his wife Maire (who was a director of Artek) engaged him for their Villa Mairea project. The Aalto architectural office, based in the Munkkiniemi house-studio at this time, comprised Alvar and Aino, a secretary, a technician and six architects.⁵ With the notable exception of the Administration Building, the scarcity of floor plans in the Sunila archive attests to the primacy of industrial criteria in the design process. The Aalto office only produced fragments of plans on the edges of elevation drawings. Aulis Kairamo, the works technical manager, laid out the factory processes as a set of sequentially arranged, detached buildings linked with material conveyors. Although, it is now occluded by later additions, this schema was explicit in Aalto's conceptual model. (Fig. 1) The cycle begins at a Debarking Plant from where the material is conveyed to the top of the highest building, the Washing and Screening Plant and then delivered, by gravity, to further processes including the Evaporating and Drying Plants, before the finished pulp boards were conveyed back down to the wharf at sea level for shipping.⁶ Initial engineering advice to flatten the hilly island site was eventually dropped in favour of Aalto's proposal for a series of platforms cut into the granite according to material and gravitational flows.⁷



FIGURE 1 Poutiainen. *Sunila, Model*. 1930s. Alvar Aalto Museum, Jyväskylä.

Noting the materiality of previous works such as the Paimio Sanatorium and the Turun Sanomat building, expressing the Sunila building envelopes in brick was something of a departure for Aalto, who had concealed brick beneath painted plaster in his Turku period. It's possible that white cubic forms may have been considered for Sunila but were deemed too costly in both time and/or money. In fact, a minority of the Sunila buildings are white, as Aalto said, to distinguish storage and transport buildings from red brick manufacturing buildings.⁸ The consideration of alternatives showed the way into the architect's 'red' period. The habitual availability, acceptable cost and historical presence of brick⁹ including its regular use in Finnish industrial buildings including his own 1931 Toppila Mill at Oulu and a similar, but slightly earlier project, Väinö Vähäkallio's 1934-5 red-brick mill at Kaukopää, must have been instrumental in the eventual decision to use brick. Aalto's ability to be flexible and turn apparent setback into design advantage,¹⁰ would also have led him to quickly conceptualise the primary plant buildings as the epic brick prisms seated on the stepped granite platforms that are still present today. (Fig. 2) The combined impression is something Kenneth Frampton called "...tough and rock-like."¹¹ The resultant, separate but proximate, monumental forms imply two urban effects. First, the contiguous spacing between prisms approaches that of a customary city street, and second, the whole composition including the office building, is inclined to revolve around the Power Station and its towering brick flue which, significantly, are the only forms completely enclosed by others in the original composition. Accordingly, they attain spatial centrality and the standing of an urban place. Such an insinuation of city form is ratified in Aalto's referring to this space as a "piazza."¹² Here, in the middle of a large industrial project, his reconstituting the demotic tradition of European urban form is an enduring legacy of his earlier attraction (enhanced by habitual travel to Italy, beginning in the 1920s) to one of the ideals of Nordic Classicism.¹³ The prismatic red brick formulation gradually evolved to become an Aalto trope reappearing in post war projects such as the Säynätsalo Town Centre and the National Pensions Institute in Helsinki. (Fig. 3)



FIGURE 2 *Sunila, Washing Screening and Drying Plant, (1936-8)*. Photograph: Metcalf, A. 2015.



FIGURE 3 *Säynätsalo Town Hall, (1952)*. Photograph: Metcalf, A. 2015.

In spite of external appearances to the contrary, the flat-roofed Sunila plant buildings aren't built with a load bearing brick structure but of reinforced concrete framing faced in brick, which may be considered a quasi curtain-wall. (Fig. 4) It is a surface skin that attains structural integrity through a secondary connection to primary structural framing. In this arrangement, interior concrete framing components are not expressed externally as a tectonic reality. However, their existence is implied through in an exacting rhythm of exterior brick piers, not all of which signifies the presence of a reinforced concrete column, nor do they match the dimensional width of the external wall brick pier that hides concrete columns from external view. Glazing perforates these brick surfaces according to the dictates of interior function. Where a specific function is to be day-lit, as in the centre of the Power Station façade, for example, there is a massive 17 x 8.5 metre window glazed in a 900 x 900 millimetre square grid. Where a more uniform light is required across a large floor area, such as the Drying Hall, the glazing largely conforms to the orthodox 'Daylight Factory' model of alternating glazed panels and structural piers and spandrels that pre-dates Sunila and can be found elsewhere in Finland as well as Germany and the U.S.A. Aalto's particular extension of this tradition in his between-the-wars factories was to characteristically curtail any repetition of the Daylight Factory formula and to use steel reinforced wood glazing frames to neutralise lateral wind loading: a sort of curtain-walling in wood.

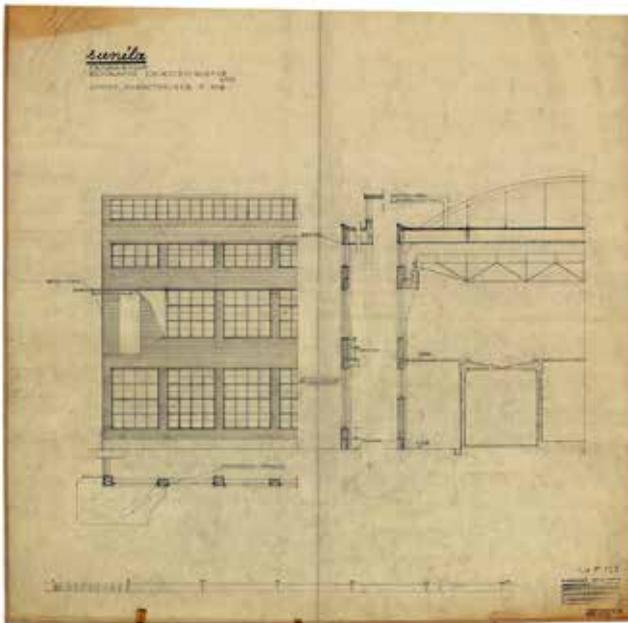


FIGURE 4 Alvar Aalto Arkkitehti. *Sunila, Drying Hall, Elevation and Section*. 1937. Alvar Aalto Archives, Jyväskylä.

There are other specific tectonic applications in Aalto's work at the Sunila factory that are documented and worth mentioning because they reveal an inclination to tectonic experimentation that can be tracked to later works. Firstly, on top of the Drying Hall and the Power Station buildings, a requirement for column-free space is met with rooftop concrete trusses from which a flat roof is suspended. It follows that the trusses' visual presence is not internal as might be expected, but external, experimental and somewhat rhetorical. Secondly, two warehouses of a size indicative of the quantities of chemicals required for cellulose pulp making, are accomplished with a similar investigational intent. These are the Sulphate Warehouse down at the harbour edge and the one for Glauber Salt to the south of the Power Station. The Sulphate Warehouse, a large volume with a partial mezzanine, has a vaulted roof structure of curving laminated timber beams tapered to reflect structural loads. They recall Aalto's 1934 Helsinki Fair Hall competition entry and anticipate the curving roof beams of his post-war churches. In contrast, the now-demolished Glauber Salt Warehouse, represented here by the pencil perspective, emerges without precedent or subsequent development in his work. Its single volume concrete roof in the form of a parabolic arch extends down to earth without the interference of walls. This concrete giant was a tentative glance in a direction not taken again. (Fig. 5)

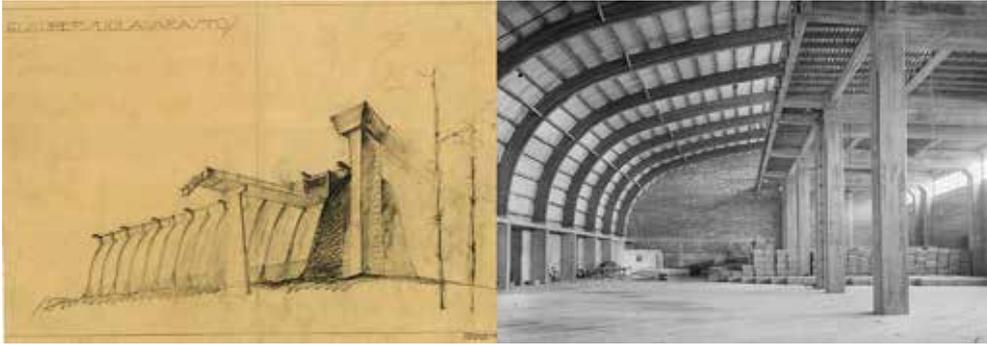


FIGURE 5 LHS: Alvar Aalto Arkkitehti. *Sunila, Glauber Salt Warehouse, Perspective*. n.d. Alvar Aalto Archives, Jyväskylä.
RHS: Photographer Unknown. *Sunila, Sulphate Warehouse*. 1940s. Alvar Aalto Museum, Jyväskylä.

In Sunila's wake the two Kymijoki paper-only mills were built before and after the interregnum of war. The 1938 Tampella Paper Mill near Inkeroinen and the 1951 Enso-Gutzeit Paper Mill in Kotka share functional and architectural characteristics. The Tampella development included a grinder room and pulping plant as well as the main paper production area, whereas the Enso-Gutzeit project in Kotka Harbour is purely a paper-making machine hall serviced by existing grinding and pulping facilities. Thus, the processes used at these two mills is more direct than that producing cellulose pulp at Sunila and Aalto's buildings reflect that reduced complexity. In contrast to Sunila both are on flat sites with long, linear buildings and a ziggurat cross-section configured to admit high levels of natural light into the midst of the main factory space. (Fig. 6) Hinted at in Sunila's Drying Hall, and designed not long after the inventive top-lit reading room of the Viipuri Library, this factory section results from the manipulation of the upper walls of an otherwise prismatic box. In Aalto's work, the stepped roof/wall junction design is formulated at Sunila, progressed at Inkeroinen and further refined at Kotka where the clarity of forms *vis à vis* their functions is manifest.

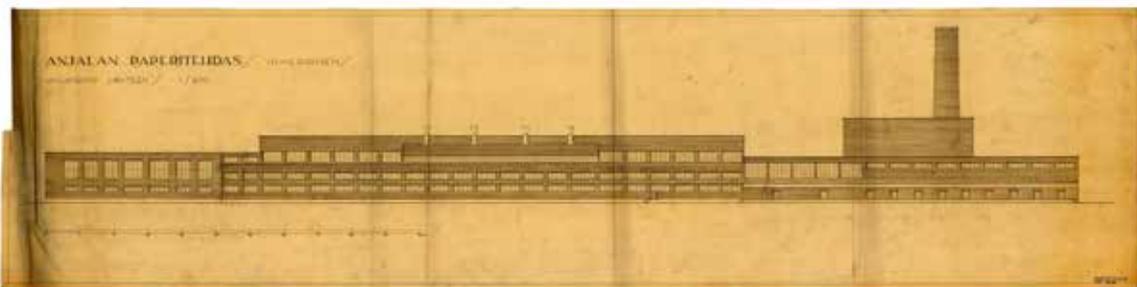


FIGURE 6 Alvar Aalto Arkkitehti. *Tampella Paper Mill, West Elevation*. n.d. Alvar Aalto Archives, Jyväskylä.

In the way that management of interior day-lighting initiates significant architectural content for Aalto, so too does the contiguous arrangements of exhaust flues enable other expressive forms. Seemingly absent from Sunila, the elaboration of exhaust flues first appeared in a mid-1937 Tampella elevation study. On the roof, above a range of freely composed fenestration combinations, an array of rooftop flues materialises. However, in this exploratory elevation, the brick prismatic form is not stepped and the flues look unstructured and tentative. Later, at the Enso-Gutzeit Machine Hall, (Fig. 7) the elements of ziggurat form and expressed exhaust flues coalesced into an identifiable factory type where the stepped building envelope and sculptural flue are contrapuntally related in a fully developed composition where the flues are now all of one type and allocated to a dedicated plinth. It is conceivable that the prototypical aspect of these forms was felt in England, where a related machine aestheticism surfaced in projects like the Pompidou Centre, two decades later.

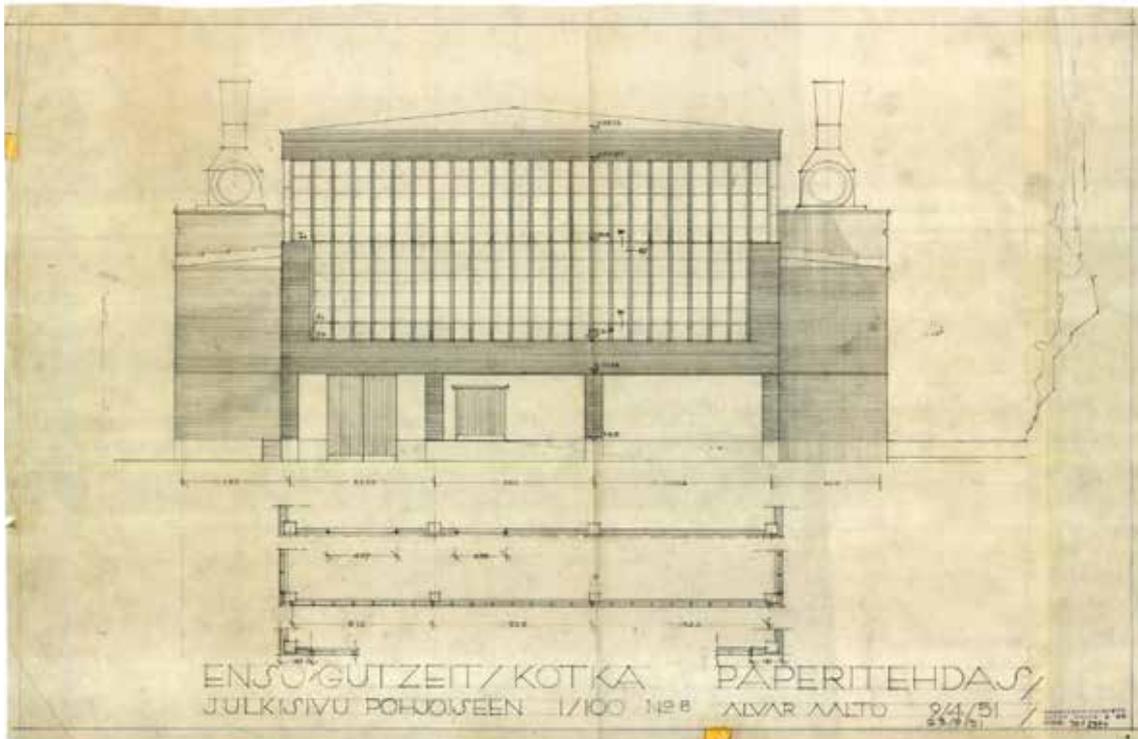


FIGURE 7 Alvar Aalto Arkkitehti. *Enso-Gutzeit Paper Mill, North Elevation*. 1951. Alvar Aalto Archives, Jyväskylä.

In support of this possibility, Aalto's Kotka Paper Mill project appeared in Eduard Neuenchwander's 1954 German/English book *Finnish Architecture and Alvar Aalto*¹⁴ along with the Ahlström Glassworks Warehouse in Karhula of 1948-9. (Fig. 8) The book and the Karhula Warehouse caught Kenneth Frampton's attention, and some forty years later he reproduced illustrations from it in his *Studies in Tectonic Culture* (1995).¹⁵ Combining structural repetition and pitched roof forms, this deceptively simple warehouse building reflects Aalto's concern with flexible standardisation and the Finnish vernacular that coalesced in response to wartime loss and damage, to built infrastructure, especially housing. In 1943, when Aalto held a government position and been elected Chairman of the Association of Architects,¹⁶ rebuilding in response to war-time destruction became an urgent public project. As a result, Finnish architects investigated and developed rationalised construction and standardisation associated with research into vernacular building culture. During the 1930s Aalto's architecture started to incorporate vernacularism, notably in the Paris, New York and Lapua pavilions as well as the Villa Mairea. He had also contributed to the standardisation initiative in the Tapani Standard Apartment Block in Turku and in his contribution to CIAM 1929 "Standardisation" theme.¹⁷ Later, he set out his approach for standardisation with variation, or what he called "Flexibility in Standardisation" in an unpublished manuscript¹⁸ from the early 1940s. The Karhula Warehouse exemplifies this approach with a substratum of identical timber roof trusses supported by repetitive concrete columns, under-girds a superstratum of non-standard roof extensions to create a seemingly bespoke building out of standard elements. This particular form-prescription using vernacular materials, pitched roofs and clerestories, but without flexible standardisation, became widespread in Australia and elsewhere during the 1960s.¹⁹



FIGURE 8 *Ahlström Glassworks Warehouse. (1949).* Photographer: Photograph: Metcalf, A. 2015.

With warehouses proffering architectural hypotheses, (some taken further, others not), red brick factories in urban groups arranged as super-prisms replete with rooftop armatures and day-lighting installations, the industrial projects were a defining prospect of which Alvar Aalto took hold. The concurrent interiors of industrial projects such as the Sunila Administration Building positioned Aino Marsio-Aalto to work on significant interiors in the period between the establishment of Artek and the Villa Mairea commission. The years 1935-9 represent an astonishing five years for them both. In that time they worked not only on industrial projects, but housing, interiors, the pavilions, exhibitions and a school. In sum, fifteen key projects ran in parallel between 1936 and 1939 with that small architectural team. Registering the fact that Alvar and Aino Aalto worked together across all projects, her contributions were chiefly focussed on the design and documentation of interiors. As well as the Savoy Restaurant and the World's Fair Pavilions this emphasis included Sunila projects such as 'Kantola,' the Manager's Residence and the Administration Building interiors, especially the executive areas, in addition to the Inkeroinen Elementary School. (Fig. 9)



FIGURE 9 *Inkeroinen Elementary School, Entry Hall. (1938).* Photographer: Metcalf, A. 2015.

Finally, to provisionally sample the overlap between the two Aalto portfolios, the Villa Mairea and the Inkeroinen Elementary School were both completed in 1939. Together with the slightly earlier Aalto Residence and the contemporaneous Sunila Office Building, and the Kantola residence, they allow a relative view of certain architectural ideas. For example, the Helsinki house, the school and the Villa Mairea, (Fig. 10) share non-rectangular 'T', 'L' and 'C' plan configurations with sun-catching, south-western orientation. In addition to this solar provision, living spaces in the houses, and classrooms in the school, receive the wind protection afforded by the enfolding plan geometry. All three buildings also have covered outdoor spaces at ground level and primary circulatory stairs positioned in the plan's pivoting corner. Additionally, the coterminous Villa Mairea, Inkeroinen School, Kantola Residence and the Sunila Administration Building are all provided with an interior architecture jointly conceived by the Aaltos and largely design-managed and implemented by Aino-Marsio Aalto.²⁰



FIGURE 10 Comparative Plans: Aalto House, Villa Mairea and Inkeroinen Elementary School. Metcalf, A. 2016.

For the Aaltos, the closing year of the 1930s was also a year of American engagement including the May 1st opening of the Finnish Pavilion at the New York World's Fair, and the building of further factory housing at Sunila, Kauttua, Varkaus and Inkeroinen. Then, in November 1939, the Soviet Union invaded Finland precipitating the Winter War. Aalto was soon involved; "... 2nd Lieutenant Aalto was first posted to Kuopio, but then transferred to the Government Information Centre as a propaganda expert."²¹ His new responsibilities and the wartime cessation of major architectural projects meant the office entered a contracted period in sharp contrast to the intensity of the last five years of the 1930s.²²

The task of appraising the relationship between Alvar Aalto's late 1930s Kymijoki industrial works and the kindred works created coevally by the same architectural office persists. In spite of the industrial projects being enormous in scale and their architectural production restricted to the design of exterior enclosures, Alvar Aalto's ingenious but effective strategy was to purposefully engage with constraints, adopt an affirmative approach to representing the massive using everyday materials, and to exteriorise as many elements as possible (trusses and flues for example). It would be erroneous to frame the industrial work as a precluded counterbalance to the renowned interwar architectural work. The coterminous works such as the Sunila Administration Building, 'Kantola' and the Inkeroinen School over which Aalto had greater control, and were documented in greater detail, reveal a palpable sense of continuity with other work of the 1936-9 era such as the Savoy Restaurant, Villa Mairea, the Paris and New York Pavilions. Together, the 1936-9 works cemented the Aalto reputation and portended future developments. They share an architectural gene pool.

Endnotes

- 1 These are three staff architects whose initials appear on Aalto office drawings for both industrial and non-industrial projects in the years 1936-39.
- 2 Juhani Pallasmaa, "Alvar Aalto; *Toward a Synthetic Functionalism*," in *Alvar Aalto: Between Humanism and Materialism*, ed. Peter Reed (New York: Museum of Modern Art, 1998), 20.
- 3 Pekka Korvenmaa, "Modern Architecture Serving Modern Production," in *Alvar Aalto Architect, Volume 7*, ed. Pekka Korvenmaa (Helsinki: Alvar Aalto Foundation/Alvar Aalto Academy), 9.
- 4 Renja Suominen-Kokkonen, *Aino and Alvar Aalto – A Shared Journey; Interpretations of an Everyday Modernism* (Helsinki: Alvar Aalto Foundation/Alvar Aalto Museum, 2007), 32.
- 5 Goran Schildt, *Alvar Aalto; The Decisive Years* (New York: Rizzoli, 1986), 157.
- 6 Sunila Oy, "How Cellulose is Manufactured," in *Alvar Aalto Architect, Volume 7*, ed. Pekka Korvenmaa (Helsinki: Alvar Aalto Foundation/Alvar Aalto Academy), 166.
- 7 Schildt, *Alvar Aalto: The Decisive Years*, 145.
- 8 Schildt, *Alvar Aalto: The Decisive Years*, 266.
- 9 Martin Ahren, ed., *Traditional Building Materials of the Baltic States; Building Preservation and Maintenance in Practice* (Stockholm: National Heritage Board Sweden, 2003), 9.
- 10 Harry Charrington and Vezio, eds., *Alvar Aalto; The Mark of the Hand* (Helsinki: Rakennustieto, 2011), 162.
- 11 Kenneth Frampton, "Alvar Aalto and the Future of the Modern Project," Daniels Public Lecture, Faculty of Architecture, Landscape, and Design (University of Toronto, February 7, 2013).
- 12 Schildt, *Alvar Aalto; The Decisive Years*, 266.
- 13 Goran Schildt, ed., *Sketches: Alvar Aalto* (Cambridge, Mass., and London: The M.I.T. Press, 1979), 11.
- 14 Ed. and Cl. Neuenschwander, *Finnish Architecture and Alvar Aalto* (New York: Praeger, 1954), 88.
- 15 Kenneth Frampton, *Studies in Tectonic Culture; The Poetics of Construction in Nineteenth and Twentieth Century Architecture* (Cambridge Mass. and London: M.I.T. Press, 1995), 358.
- 16 Aalto, Alvar (1898-1976) in *Biografiakeskus, Suomalaisen Kirjallisuuden Seura*, <http://www.kansallisbiografia.fi/english/?id=1404> (10/11/2013)
- 17 Kenneth Frampton, "The Legacy of Alvar Aalto," in *Labour, Work and Architecture; Collected Essays on Architecture and Design* (London: Phaidon, 2002), 235.
- 18 *The Architectural Drawings of Alvar Aalto 1917-1939, Vol.7* (New York and London: Garland Publishing, 1994), 386. (AAA Ref 88/1244)
- 19 Jennifer Taylor, *Australian Architecture Since 1960* (Sydney: The Law Book Company, 1986), 46.
- 20 Renja Suominen-Kokkonen, *Aino and Alvar Aalto - A Shared Journey* (Helsinki: Alvar Aalto Foundation/Alvar Aalto Museum, 2007).
- 21 *Alvar Aalto: What & When* (Helsinki: Rakennustieto, 2013), 38.
- 22 *Alvar Aalto: What & When*, 39