The Finnish Wooden House Transformed: American prefabrication, war-time housing and Alvar Aalto

PEKKA KORVENMAA

This article deals with the industrialisation of wooden one-family housing in Finland and the American impulses that were vital to this process [1]. It starts with a short introduction on the development of wooden architecture in both countries, but the main focus is on the years 1935–1945. The aim is to show the outline of events and the central themes of research which is still in progress. An attempt is made to relate this discussion of architectural and technological history to the transatlantic exchange of innovation, with the wooden one-family house serving as the case material.

Wood and Architecture in the Periphery

The traditional building culture both in northern USA and Fennoscandia relied overwhelmingly on the abundant forests that provided the material for houses as well as for domestic utensils [2]. In both cultures stylistic concepts such as Neo-Classicism, first developed in other materials, and were translated into a vocabulary based on the possibilities of wood. This happened with a time-lag, and mostly without academically trained architects. Techniques were simple enough to be mastered by untrained labour. Further common factors also included the low level of urbanisation, an emphasis on small building units, and the location of settlements in close proximity to the building materials. In this way both areas, although far apart, showed similarities in their pre-industrial wooden architecture. Parallel developments, dominated by a variety of technical and formal solutions adapted to one major material, were crucial to the interaction between US and Finnish construction techniques.

One important difference between building practices in the two countries was the fact that in the USA, the frame house was well established even from the beginning of the colonial settlements, whereas the log cabin was mostly reserved for the frontier. In Finland, by contrast, solid horizontal timber construction dominated all wooden building up to the Second World War. A decisive factor was the difference in climate. Frame walls did not give protection from the Nordic winter before the advent of modern insulation technology (Fig. 1).

Introduction of American innovations in Finland: the first stage

By the end of the nineteenth century the American way of erecting wooden houses had undergone a transformation that had led to the dominance of the several versions of the pre-sawn frame, of which the well-documented balloon frame was the most popular [3]. Mechanisation, industrialisation and finally mass-production, combined

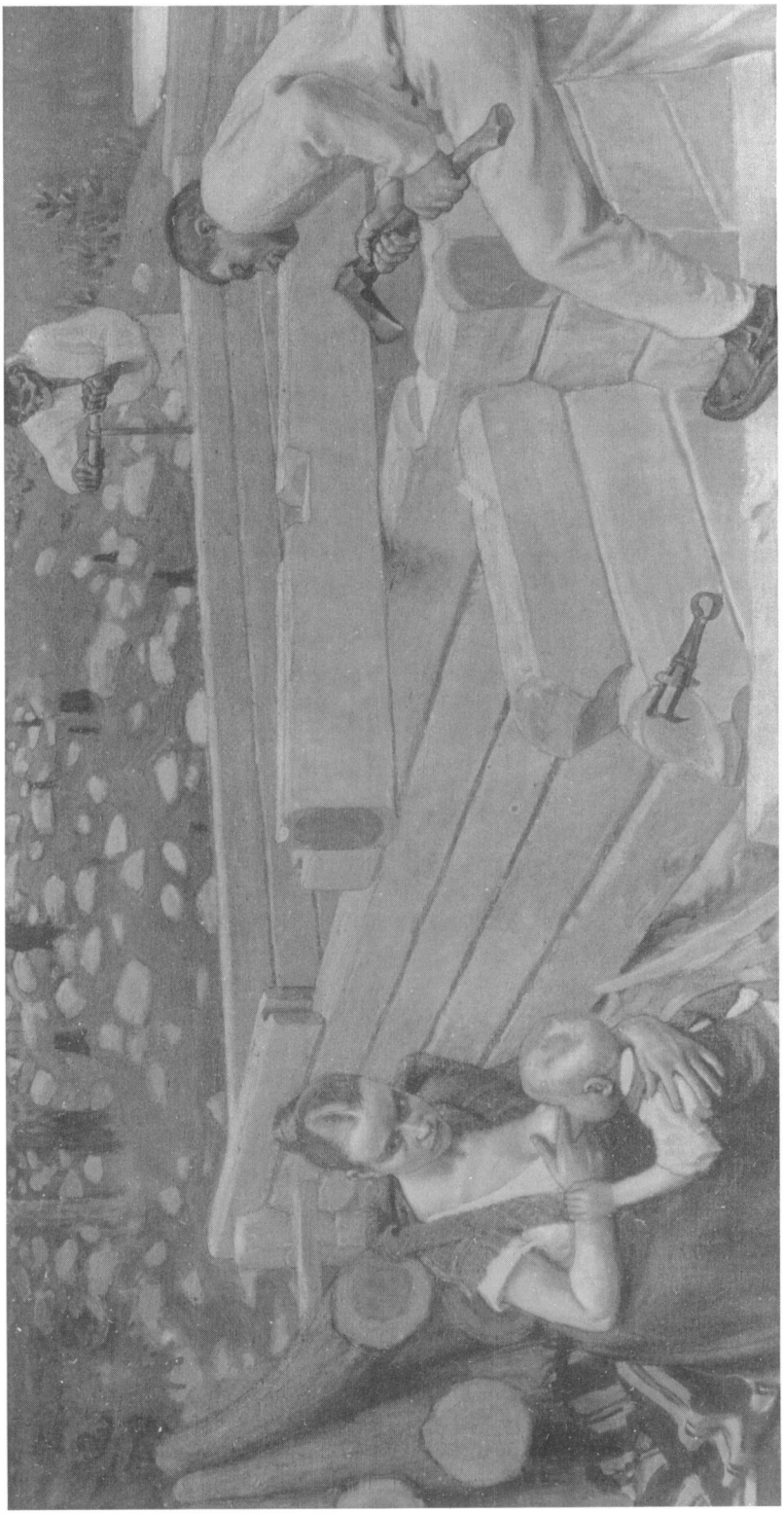

FIG. 1. Erecting a log cabin, a painting by Akseli Gallen-Kallela of 1903 (Gallen-Kallela Archives, Espoo).

with a rapidly growing distribution system of railways and water routes had thoroughly entered the domain of building wooden one-family homes [4]. Increasingly the production of houses was taken inside factories, and mass-produced building parts rationalised and shortened the time of on-site assembly, which required a minimal work force without specific construction skills [5].

FIG. 2. The Vallila working-class housing district, Helsinki, in the early twentieth century. Solid log walls were used even in an urban context (Helsinki City Museum Picture Archives).

Finnish wooden construction by the end of the 19th century still followed the Iron Age tradition of solid timber. The low level of industralisation that actually began in the latter half of the century did not affect this tradition except by offering secondary parts such as windows, nails and new roofing materials like sheet metal. The process of construction was not rationalised and was to a great degree based on the use of a couple of tools such as the axe and rules of thumb. The slow growth of the settlement pattern did not require serial production and the erection of houses was an individual, labour-intensive task (Fig. 2).

An economic boom and accelerated urbanisation, combined with the problem of working-class housing, led in the early years of this century to a discussion among builders concerning new, more rational and industrially conceived building methods. In this connection, the USA, the paragon of industrialisation and effectiveness, was seen as a source for emulation. Master builders travelled in the USA and propagated the frame house in the trade press. At the same time the production of building parts such as doors, windows and furnishings was moving more and more from the carpenter's shop to the steam-powered factories. Their heterogeneous range of products was one of the reasons for attempts towards standardisation in the building trade. Again US practices were regarded as applicable [6]. Some experiments were made in

using the wooden frame, but at this stage it did not become popular. One reason was its poor climatic performance: others were the relatively low price of timber and labour. At any rate, by the outbreak of the First World War, Finnish wooden construction was, to a growing degree, the object of efforts in industrialisation, rationalisation and standardisation. Models were explicitly sought from the USA, which was invested with a tremendously positive value as a source of innovations and modernism for several levels of Finnish culture, not least in the formal appearance of architecture in general [7].

What made the geographically remote US examples so usable in the very different Finnish context? In terms of cultural influences and especially in the technological field, Germany had always been the prime source of learning for Finland, maintaining this role up to the 1940s. The American influence lay in the uses of wood, contrasting with European modes of building production derived from other materials.

Between the wars: problems of housing and the rise of prefabrication in the US

The economic problems of the 1930s and the New Deal climate directed growing public concern towards the organising of mass housing in the US [8]. One of the alternatives considered was to look towards the European, especially German, efforts of the 1920s with their *Siedlungen* realised through multi-story brick and concrete blocks as, for instance, at Frankfurt. This interest paralleled the advent of the International Style and the influence of German expatriots in the East Coast architectural schools. Another way was to develop the local and well-established tradition of one-family houses. It was precisely around this approach that several trends merged towards the end of the 1930s.

Albert Farwell Bemis, an industrialist who also had a holding company involved in housing, Bemis Industries Inc., and was the author of the influential book *The Evolving House* [9], awarded in his will funds for a research centre in housing. Named the Bemis Foundation, it began its activities at the Massachusetts Institute of Technology in 1938 with John Ely Burchard as the first director [10]. The Foundation was for some years perhaps the most important centre for research in the rationalisation of the design and production of housing in the US, and served as a focal point for several leading professionals interested in these problems. Besides modernisation in production the emphasis of the Foundation seems to have been on architectural modernism. It seemed that here at last was a chance to explore the long-awaited, modern mass-production technology of building so desperately sought after by the pioneers of modern design, but not to be found in the Old World [11].

By the 1930s, the US prefabrication industry had grown into large-scale mass-production, following the general pattern of other leading industries in terms of rationalisation, standardisation and distribution [12]. The marketing mechanism sought analogies with the automobile industry and the factory-built home was seriously regarded as the solution for inexpensive housing [13]. This article deals only with prefabrication in wood, leaving aside a multitude of similar approaches in materials such as gypsum, steel, copper and concrete [14]. The discussion is limited to permanent buildings conceived and produced as industrial products, transported for rapid assembly at the building site without the need of additional parts or materials. The term 'prefabrication' covers here both panel construction and the so-called pre-cut building systems that had their greatest popularity before the period in focus here.

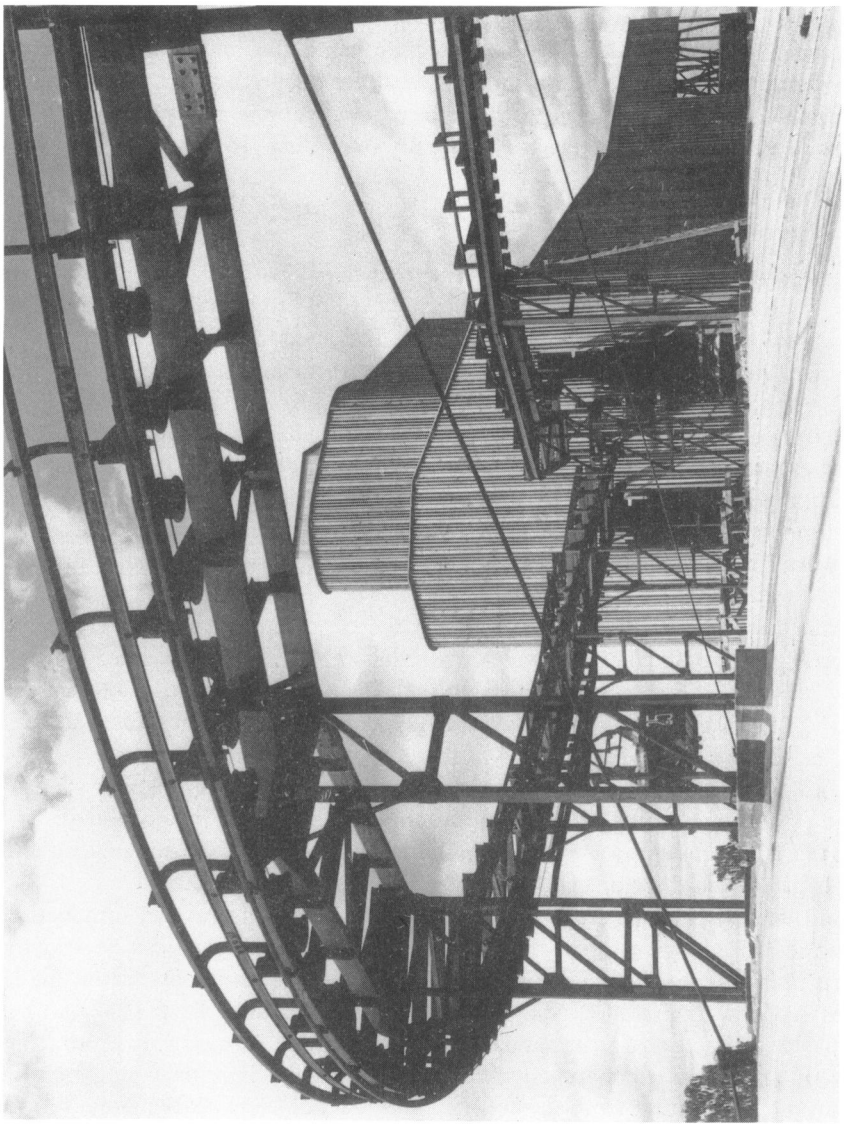

FIG. 3. The sawmill of the Ahlström Company in Warkaus (1945), designed by Alvar Aalto and used in the production system for AA-system houses (Museum of Finnish Architecture Picture Archives, Helsinki).

Prefabrication and the need for housing, not to mention marketing directed towards middle class customers, emerged as a combination that attracted the concern of both research institutions, such as the Bemis Foundation, and government authorities. Several technical solutions were tested in the US Forest Products Laboratory [15] before they entered the production line. The problems of housing were also seen as a major architectural problem among young architects working, for example, in state-sponsored projects like the ones run by the US Farm Security Administration in the West. At the end of the 1930s there was thus a serious attempt to solve the problems of low-income and lower middle-class housing by using the industrially produced wooden one-family house as the basic unit. It is also evident that at this opportune moment private industry, government offices, research institutes and gifted architects with Modernist aspirations found the task mutually rewarding [16].

The Finnish Scene

In Finland, wooden building continued in the traditional pattern in the 1920s and 1930s. The problems of housing in the larger cities were mostly solved by multi-storey urban blocks or by individual settlement using the solid log walls. We have to remember that the country was still predominantly rural and suburbanisation was minimal. The development of wooden structures focused to a great degree on small-scale industrial communities in the countryside. Finnish industrialisation was based on the use of forests and the leading enterprises were known for a variety of products, e.g. lumber and paper, stemming from this resource. The forest industry was also in a leading position technologically and had the best international contacts. In order to keep their work force at the production sites far away from cities they had to provide housing.

One of the largest forest-based companies in the country, A. Ahlström Oy, hired the architect Alvar Aalto in 1937 to develop an industrialised, pre-fabricated housing system in wood for building company housing at their numerous industrial sites and to offer it on the general market. In this way, the A. Ahlström Oy Warkaus house factory was not so dependent on the fluctuations of the economy because the company's own demand would consume the major part of the supply (Fig. 3). Before this first stage of the so-called AA-system, Aalto, the leading modernist architect in Finland, had already worked for the Ahlström company, designing both multi-storey company housing and the private house of the director and his wife [17].

Aalto had always shown great interest in American culture and production methods. In the 1930s he also found the informal but functional American one-family home an increasingly suitable starting point for softening the continental avant-garde ideologies of modern architecture. The prefabricated house system from 1937 was his first attempt to combine rational but flexibly standardised design and production methods, wood and serial production for the use of a family living in a single house [18]. This meant a departure from the continental model of large blocks and a return to traditional Finnish patterns of settlements. Technically, the frame construction had become a well-performing solution in the 1930s through the development of insulation materials, even those based on wood and produced by the very same companies that also started to build house factories in the late 1930s and early 1940s. In Finland prefabricated wooden houses were a part of a production system, where a single company had access to resources, design, production, marketing and distribution. And in the case of houses, a part of the production could even be incorporated into the

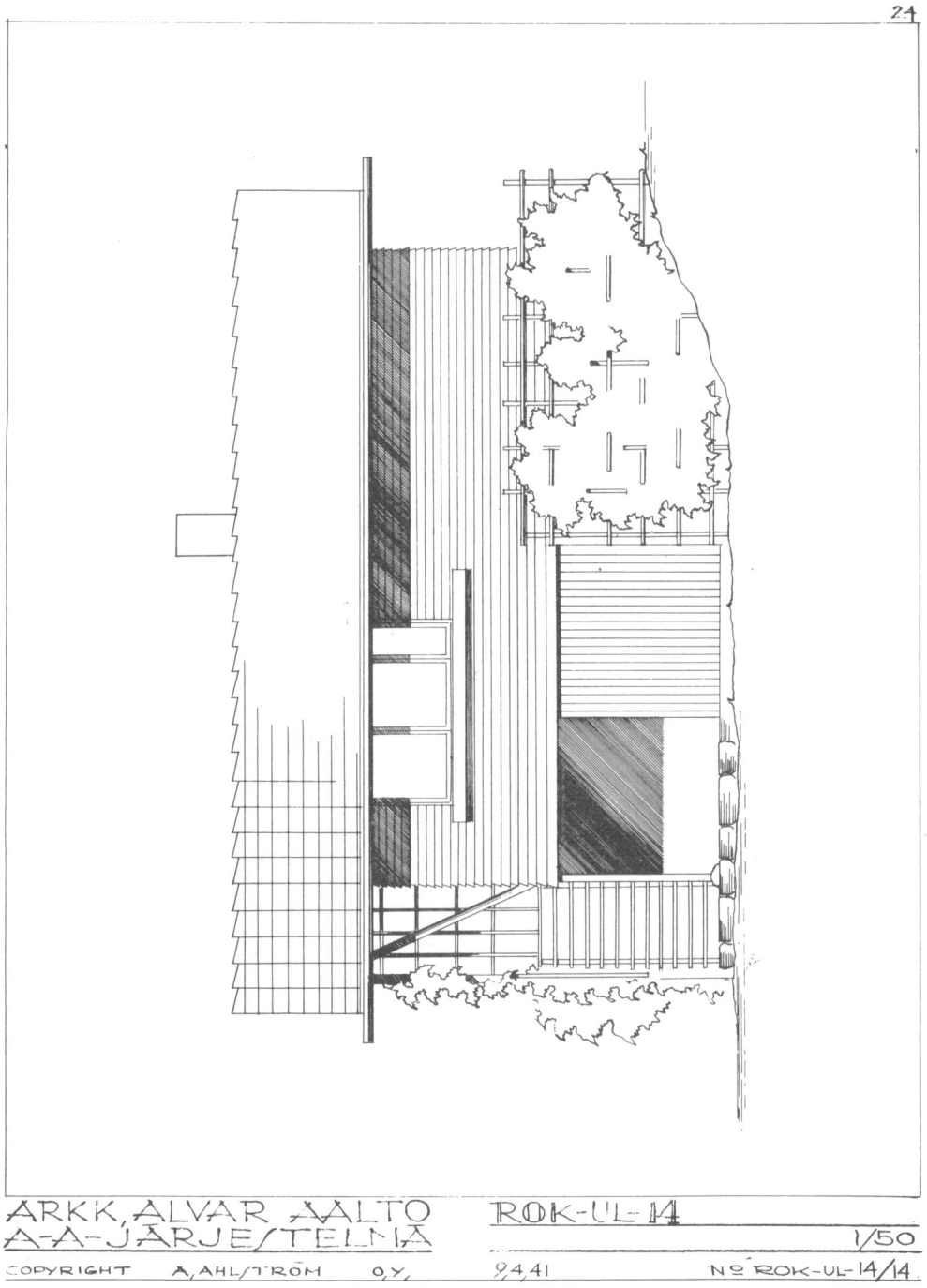

FIG. 4. A drawing from the Alvar Aalto office archives of an AA-system prefabricated house, 1941 (Museum of Finnish Architecture Picture Archives, Helsinki).

FIG. 5. Erecting an AA-system house (Museum of Finnish Architecture Picture Archives, Helsinki).

needs of the company's own housing requirements. Thus, what Alfred Chandler has called "vertical integration" was clearly visible, especially in the case of Finnish companies that based their activity on the forests [19]. They only had to add one more product, houses, to their well-developed system.

So prefabricated housing in Finland did not develop into an independent activity, but was conceived within an already existing pattern, defined by the needs of the country's dominant and only export industry. This gave prefabrication generally a solid start, free from financial hazards. The results were often of high standard especially if, as at the Ahlström company, the company executives were inclined towards the modernisation of industry and society, with modern architecture seen as a vital ingredient.

Aalto at the Bemis Foundation: the individual as the carrier of innovations

Aalto, who had visited the US several times in the late 1930s [20], gave a lecture at the Massachusetts Institute of Technology in April 1940 on *Housing Problems in Finland and the Reconstruction Program* [21]. This topic had become urgent after the Winter

War with the Soviet Union in 1939–40, and because of the moving of half a million people from the ceded territories to within the new borders. During his visit Aalto even tried to organise funds for a US-financed, model town in Finland for war refugees. This experimental project, *An American Town in Finland*, would have been realised through rationalised, standardised and prefabricated building methods via an organisation called *For Finland Incorporated* and the ambitious plan indicated that the town would serve as a laboratory on housing for the whole world. After the visit, it was agreed that Aalto would start in September 1940 as a Research Professor at the MIT School of Architecture, working in co-operation with the Bemis Foundation. Aalto taught at MIT during the autumn term, but the political situation, especially the growing tension between Finland and the Soviet Union, drew him back to Finland sooner than expected. As a result of his visits and teaching, Finnish wooden architecture, Aalto's own experiences in prefabrication and standardisation, and the imminent need for reconstruction were related to the US context in a way that proved to have far-reaching consequences for the Finnish practice of construction, even if the pedagogical and financial efforts in the US never filled expectations.

It was largely the director of the Bemis Foundation, the modernist John Burchard, who organised Aalto's appointment at MIT. He recognised that it was Aalto's expertise in the questions of reconstruction, where shelter had to be created in a short time for large groups of people, that made him potentially useful in terms of the foundation's role in low-cost housing research. As explained in a press release by MIT from August 7, 1940 " . . . the Institute will be enhanced by new knowledge and methods developed through research on reconstruction in Finland under Mr. Aalto's supervision". The same source defined Finland as ". . . the perfect laboratory for a study in the techniques of reconstruction and housing". In his 'Working Program for Architectural Research at MIT' of September 1940 Aalto stated as one of his chief topics the 'Examining of the Flexibility of Standardisation'. This would happen via the wooden one-family house. In setting out his programme he had already experienced the difficulties met by the Finnish government in erecting sufficient housing after the Winter War, and the camp-like results of building monotonous rows of identical one-family houses. It was in Aalto's interest to learn about US methods of prefabrication, especially in terms of standardisation and industrialisation, and about research at the Bemis Foundation. Clearly, the interests of MIT, the Bemis Foundation, and Aalto corresponded to a great degree. Practical work was to centre on problems Aalto already knew from his experience with the Ahlström Company and the state reconstruction authorities. It is also evident that the work done at MIT was planned to be immediately put into practice in Finland through a US-sponsored, experimental housing programme resulting in a model town.

Aalto and his students produced a portfolio of plans for different kinds of one-family, wooden, flexibly expandable shelters [22]. This material, derived from both the Finnish experience of crisis housing and US knowledge of prefabrication, was even introduced to the Disaster Department of the US Red Cross to provide it with a 'first aid' housing scheme. After seeing Aalto's plans, Albert Evans from the US Red Cross made a statement, which is worth quoting because it illuminates the basic differences in the attitudes between reform-minded, modernist architects and the US industry concerning the prefabricated, one-family home:

> It is quite clear that the project is motivated from a desire to meet the needs of families rather than as an outlet of some given type of structure or

material. Most of the work in our country in pre-fabricated homes and structures has been motivated by the desire to find an increased market for some type of product. This, I think, explains why we have made so little progress in the field of mass production. [23]

The Second World War, Housing and Finland

In his native country, Aalto immediately put his US experiences into practice. In 1941 he redesigned entirely the AA-system, by developing further the level of rationalisation and standardisation (Figs. 4–6). In articles in the trade press he propagated the necessity for labour-saving work methods and standardisation through the industrially produced house [24]. His double expertise, based on both the Finnish and US scenes, was also appreciated on the Continent where problems of reconstruction were to emerge in the wake of the Second World War.

Soon after Finland again entered the war in 1941 the Finnish Association of Architects set up an office for reconstruction and, what was to be more important for the future, an office for standardisation. Aalto was the driving force behind these efforts and especially in the standardisation work he used his recently gathered US knowledge. A brochure describing the problems of reconstruction, that could be overcome through standardisation, mentions the American publication *Sweet's Catalog File* as an example of how to distribute information on building in a rational and uniform way [25].

Aalto was in a position to find use for his ideas both in the domain of private industry and in the service of the state. For the Ahlström Company the prefabricated wooden house was an ideal answer to company housing during the shortage of building materials during and after the war: the forest was always present to be exploited. For the Finnish government the wooden house was in a similar way the best solution for fast reconstruction and for new settlements. In the whole phenomenon of industrial house production, the war was a decisive factor. The enterprises in industrial house production had consolidated themselves in a joint sales organisation already in 1940 [26]. Now the war gave them an almost unlimited market, in which advertising was not necessary and funding came from public sources. Even exports soared, when the German *Wehrmacht* needed temporary housing for its war machine.

The years 1941–45 were the second stage in the transfer of American innovations in the industrialisation of Finnish wooden house production. The war provided a broad testing ground for the ideas that came to Finland almost wholly through the person of Aalto. It was a rare, and to some degree accidental combination that a single person happened to become expert in US developments in housing immediately before this kind of information was urgently needed in Finland, and was even in a leading position in the organisations carrying out reconstruction activity.

If the war gave impetus to the Finnish housing industry the same was true to a much grander scale in American prefabrication and the rationalisation of building production in general. After the US had entered the war, all housing activity in the country was placed under the supervision of the National Housing Agency (NHA) in 1942. In America the need for housing was not caused by destruction or occupation but by the work force of the war industry that had to be settled in strategically vital locations. Now the experience of the prefabrication industry came into use on an unforeseen scale. Pressures of time and cost rationalised the whole process of production in a way that normal market demand would probably never have done.

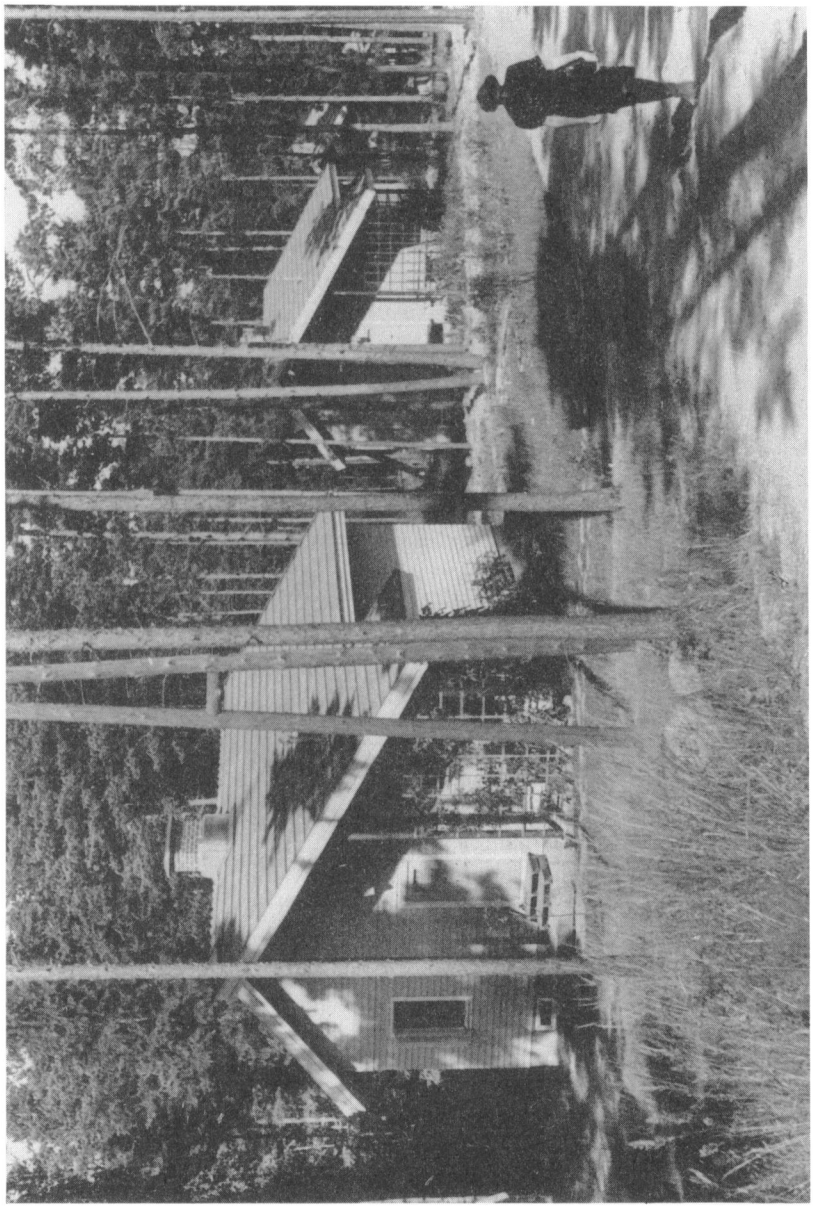

FIG. 6. AA system houses in Kauttua, one of the Ahlström Company's production sites, a photograph of the mid-1940s (Museum of Finnish Architecture Picture Archives, Helsinki).

Whole towns had to be built in a few months, and often the first structure erected was a house factory [27].

After the War

The American prefabrication industry experienced a post-war boom, when the wartime effort was converted into the needs of new one-family housing, stimulated by the return of veterans and by rapid suburbanisation based on the automobile [28]. But the war also signified the eclipse of the factory-made house as a final solution to housing problems. During the war, power tools had entered the construction site and the building of a house returned again from the factory to the site. There the houses could be erected in an economical way, with minimal labour, following methods tested in wartime housing. This solution came to dominate the building of one-family homes, and is still the most typical one used today.

When the war was over and construction in Finland resumed its peace-time character, the wooden one-family frame house, often prefabricated, came to characterise a major part of new settlements [29]. The years immediately after the war opened the way for the third wave of US influence. This time it covered a broad range of cultural and economic activities characteristic of the general Americanisation of post-war Europe. In terms of building, the ideas channelled by Aalto were amplified through the study trips that several Finnish architects made to the US [30]. Information was now more easily obtained, and the prefabrication industry published reports on American production methods [31].

The Pattern of Interaction

Wooden architecture in America and Finland had developed in such a way that ideas from America could be incorporated into the Finnish practice of construction. This did not occur in the first attempt in the early years of the twentieth century, because the receiving nation was not ready for the transfer of innovations in building technology. But the situation was different around 1940. Possibly these two countries would have communicated even without the active part played by an individual, the architect Alvar Aalto. But his role was decisive in that he personally connected their two building cultures at a time when his experiences were needed in the service of both private industry and the state. In terms of technology and construction, it is perhaps unusual that the innovations were transmitted through an architect and not a civil engineer.

The course of development in both countries demonstrates the role of the war as the utmost rationaliser of industry, where mass production is realised without the normal restrictions of competing market forces and finance. The case of the wooden, prefabricated one-family house shows how the broad variables of geography, natural resources, industry, war and transatlantic interaction worked in the transformation of this artefact in Finland through impulses from the USA. In a way, a circle was closed through Aalto as a mediator. The log cabins that Finnish and Swedish immigrants brought to the USA some 300 years before the events discussed above had been a major ingredient in the development of the American tradition of building in wood.

Correspondence: Pekka Korvenmaa, Department of History of Art, University of Helsinki, Fabianinkatu 33, 00170 Helsinki, Finland.

References

[1] This article is partly based on the paper *American prefabrication and the transformation of the Finnish wooden house*, given at the Society of Architectural Historians Annual Meeting, Boston 1990.

[2] On wood in American context see Brooke Hindle (ed.), *America's Wooden Age* (New York, 1975); on log construction Terry G. Jordan, *American Log Buildings: An Old World Heritage* (Chapel Hill, 1985).

[3] On frame constructions see Paul E. Sprague, 'Chicago Balloon Frame: The Evolution During the 19th Century of George W. Snow's System for Erecting Light Frame Buildings from Dimension Lumber and Machine-made Nails', in: H. Ward Jandl (ed.), *The Technology of Historic American Buildings: Studies of the Materials, Craft Processes, and the Mechanization of Building Construction* (Washington, DC, 1983); National Lumber Manufacturers Association, *Frame Construction Details* (Chicago, 1920).

[4] On the development of production systems see David A. Hounshell, *From the American System to Mass-Production 1800–1932* (Baltimore, 1984).

[5] On the later development of these trends see Charles George Ramsey & Harold Reeve Sleeper, *Architectural Graphic Standards for Architects, Engineers, Decorators and Draftsmen* (New York, 1932 and several subsequent editions); also Tom F. Peters, 'An American Culture of Construction', *Perspecta 25. Yale Architectural Journal* (1989), pp. 162–77.

[6] For example, articles 'Amerikalaista rakennustapaa', *Rakennustaito*, 7, 1906, pp. 95–6; Gustaf Strengell, 'Konstruktiodetaljeja lankkurakennukseen', *Rakennustaito*, 20, 1908, p. 241; A. V. Malmi, 'Havaintoja Amerikan-matkaltani', *Rakennustaito*, 18, 1913, pp. 168–9.

[7] This development of wooden architecture has yet to be written about. A general picture can be obtained from the professional journals *Tekniska Föreningens i Finland Förhandlingar, Teknikern, Arkitekten, Rakentaja, Rakennustaito* (Helsinki). The general pattern of American influence in Finland is outlined in the book by Keijo Virtanen, *Atlantin yhteys: Tutkimus amerikkalaisesta kulttuurista, sen suhteesta ja välittymisestä Eurooppaan vuosina 1776–1917. Summary: The Atlantic Connection: An Investigation of American Culture, Its Relation to, and Impact on Europe 1776–1917.* Historiallisia tutkimuksia 144 (Helsinki, 1988).

[8] See for example Catherine Bauer, *Modern Housing* (Boston, 1934) and The Editors of 'Fortune', *Housing America* (New York, 1932).

[9] Albert Farwell Bemis, *The Evolving House I–III* (3 vols. Cambridge MA, 1936); see especially vol. 3, *Rational Design.*

[10] The following information on the Bemis Foundation, Burchard and Alvar Aalto's activities at the Foundation is from the collections of Massachusetts Institute of Technology, Institute Archives and Special Collections (hereafter abbreviated MIT archives). On the Bemis Foundation see Albert Farwell Bemis Foundation, 1938–1954. Records, 1926–1954. Manuscript Collection—MC 66. The author is grateful for the permission to use and publish material from the MIT Archives and wishes to extend his thanks to Reference Archivist, Kathy Marquis.

[11] On European architects and industry in the 1920s and 1930s see Mary McLeod,

'Architecture or Revolution: Taylorism, Technocracy and Social Change', *Art Journal*, Summer 1983, Vol. 43 (2), pp. 132–47; on the relationship with the US see Thomas P. Hughes, *American Genesis: A Century of Invention and Technological Enthusiasm* (USA, 1989), especially chapters 6 and 7; *Gropius, Machine Design, and Mass Production*, in: *Wissenschaftskolleg*. Institute for Advanced Study, Berlin (Jahrbuch 1984), pp. 171–80; Richard J. Neutra, *Wie Baut Amerika?* (Stuttgart, 1927); *Amerika: Die Stilbildung des Neuen Bauens in den Vereinigten Staaten* (Wien, 1930); for a broader survey see Charles S. Maier, 'Between Taylorism and Technocracy: European ideologies and the vision of industrial productivity in the 1920s', *The Journal of Contemporary History*, Vol. 5, No. 2 (1970), pp. 27–62; on the European vision of wooden construction see Konrad Wachsmann, *Holzhausbau: Technik und Gestaltung* (Berlin, 1930).

[12] As exemplified by the Gunnison Housing Corporation; see Hounshell, *From American . . .*, pp. 310–17.

[13] On American prefabrication, history and the situation in the 30s, see Alfred Bruce and Harold Sandbank, *A History of Prefabrication* (John B. Pierce Foundation, New York, 1944); Burham Kelly, *The Prefabrication of Houses: A Study by the Albert Farwell Bemis Foundation of the Prefabrication Industry in the United States* (Chicago, 1951).

[14] On prefabrication in general, see the works by Gilbert Herbert, of which especially the latter is valuable in terms of the matters dealt with in this article. Gilbert Herbert, *Pioneers of Prefabrication: The British Contribution in the Nineteenth Century* (Baltimore, 1978); *The Dream of the Factory-Made House: Walter Gropius and Konrad Wachsmann* (Cambridge, MA, 1984).

[15] Forest Products Laboratory was a unit of the research organisation of the Forest Service, US Department of Agriculture, started in 1910. It was the first and for several years only institution in the world conducting general research on wood and its utilisation.

[16] The author is grateful to the following architects who, in interviews during the years 1988–90 significantly enriched the picture the author had drawn from written sources on housing and prefabrication, as well as on the architectural climate between the years 1935–45 in general: Holmes Perkins (Philadelphia, PA), Vernon De Mars (Berkeley, CA) and Carl Koch (Cambridge, MA). All of them were active either in government housing programmes or in the prefabrication efforts.

[17] On Aalto in the 1930s see Göran Schildt, *Alvar Aalto: The Decisive Years* (Helsinki, 1986), Paul David Pearson, *Alvar Aalto and the International Style* (NY, 1978); on Aalto and Ahlström company housing before the AA system Pekka Korvenmaa, 'Arkitekten i industrialistens tjänst: Alvar Aaltos planer för Kauttua industrisamhälle 1938', Summary: The architect and the industrialist: Alvar Aalto's plans for Kauttua, 1938. *Konsthistorisk tidskrift-Art Review, published by the Society of Art History, Stockholm*, Årgång LVII 1988, Häfte 3–4 (Göteborg, 1988), pp. 168–72.

[18] The drawings archive of the Ahlström Company Warkaus Sawmill House Factory is in copy form in the Alvar Aalto architecture office archives, Helsinki. The following information on the AA-system and the A-houses is from this source.

[19] Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, 1977); the concept is used in the field of the history of

technology by Thomas P. Hughes in 'The Order of the Technological World', *History of Technology*, Vol. 5, 1980, pp. 1–17.

[20] On Aalto in the US see Pearson, *Alvar Aalto*, pp. 188–95, and Schildt, *Alvar Aalto*, pp. 165–80.

[21] Aalto's plans are revealed in the booklet by him, *Post-War Reconstruction: Rehousing Research in Finland* (New York, private printing, 1940). The information on Aalto, his relationship to MIT, and his efforts to raise funds for Finland's reconstruction is from MIT Archives, Dean of Humanities/Burchard Collection AC 20, box no. I, folders no. 1–2. His lecture of April 25 has survived as a press release, and the article by Alvar Aalto, 'Post-War Reconstruction', *Magazine of Art*, June 1940, pp. 362–82 is based on this lecture.

[22] This material is partly published in Alvar Aalto, 'Byggande Röda Korset', *Arkitekten* 6, 1941, pp. 92–4.

[23] MIT Archives, Burchard collection, Office memorandum from the American Red Cross National Headquarters, Washington DC, Sept. 17 1940.

[24] See Alvar Aalto, 'Europas återuppbyggnad aktualiserar det centralaste problemet för vår tids byggnadskonst', *Arkitekten* 5, 1941, pp. 75–80.

[25] Suomen Arkkitehtiliitto, *Rakennustaide ja standardi* (Helsinki, 1942); see also Alvar Aalto, 'Finlands Arkitektförbunds standardiseringsarbete', and Aarne Ervi, 'Standardiseringen på byggnadsområdet', *Arkitekten* 5–6, 1943, pp. 41–6.

[26] The organisation was called Puutalo Oy; see *25 vuotta suomalaista puutaloteollisuutta* (Helsinki, 1965).

[27] On this effort see Van Rensselaer Sill, *American Miracle: The Story of War Construction Around the World* (New York, 1947), and The Museum of Modern Art, *Wartime Housing* (New York, 1942).

[28] From the rich post-war material on prefabrication see for example A. L. Carr, *A Practical Guide to Prefabricated Houses* (New York, 1947), and Raymond K. Graff, Rudolph A. Matern & Henry Lionel Williams, *The Prefabricated House: A Practical Guide for the Prospective Buyer* (New York, 1947).

[29] On reconstruction and the 1940s in general see Erkki Helamaa, *40—luku: Korsujen ja jälleenrakentamisen vuosikymmen*, Summary: 1940—decade of the dugout and the reconstruction of dwellings (Museum of Finnish Architecture, Helsinki, 1983).

[30] Also an exhibition on American architecture was arranged in Helsinki in winter 1945; see Alvar Aalto, 'Den amerikanska byggnadskonstens andliga bakgrund', *Arkitekten* 1–2, 1945, p. 2.

[31] For example Kauko Kuoppamäki, *Amerikan taloteollisuuden kehityksen suunta*, Puutalo Oy, Teknillisiä tiedonantoja (Helsinki, 1946).