

# The Appearance of Prefabrication as a Subject in Architectural Education at the Budapest Technical University

## Uniting Theory and Practice in Modern Construction Activities in the Decade after 1945

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### Abstract

The building economics demands after World War II required creative and imaginative engineering work from the actors of the construction industry. For the participants of the process, factory prefabrication and on-site installation presented the possibility of applying reinforced concrete structures economically. These structures had already been present in the modern engineering mindset for decades in the interwar period.

From 1949 onwards, centralised state control developed in Hungary, and the new economic policy also expressed a methodological change in education. An essential background of this practice was the training of architects at the Budapest Technical University, in accordance with the new needs of the construction industry. What effect did the development, dictated by the state, have on the evolution of the Hungarian construction industry, and what advances did it highlight compared to the innovations between the two world wars?

The study explores connections and correlations between theoretical knowledge and practical experience at the time and examines the transformation of architectural education through an objective analysis of documents. In addition to the exploratory research of archival materials, we place particular emphasis on the exploration of personally experiential processes by including an accurate picture of contemporary developments through oral history. With the scientifically evaluated data, the study is the first to examine the characteristics of Hungarian engineering education of the period introducing the most innovative designers of the Hungarian construction industry to transfer practical living knowledge at the university level.

### Keywords

prefabrication, architectural education, construction practices

### 1 Introduction

Awakening from the trauma of World War II, a new structure of economic and political power emerged in Hungary, leading to decisive changes in economic, social, and cultural life. After the political turn of 1948/49 and the Communist takeover, the highly centralised state system made it possible to start a systematic development in all areas of life to rebuild the country and restore the economy. The modernisation processes of the previous decades provided a sound basis for this: the transformation primarily relied on the theoretical and scientific background of modern engineering thinking and the practical knowledge of designers and engineers who successfully survived the

horrors of war. The most significant tasks were related to re-establishing infrastructure and engineering constructions, including architecture. University-level training could also be closely connected to the building economics processes and was able to contribute with up-to-date theoretical and practical work.

The changes in economic and cultural policy, which also had a strong influence on the profession of architecture, were almost immediately addressed within the architectural education at the Budapest Technical University. In general, this responsiveness was encouraged by ministerial orders, but significant importance can also be attached

to innovative internal processes. One of the snatched but clear examples of this is how, resulting from a government decision aimed at increasing prefabrication, the teaching of new structures and technologies gained more space in the curriculum of the Faculty of Architecture in the spring and summer of 1951 (Istvánfi, 2015). It provided an opportunity for innovatively developing prefabricated reinforced concrete frame systems, an engineering solution that had been rarely used in the Hungarian construction practice of previous decades.

How can we articulate the significance of these changes and developments in engineering? Based on the available university archival documents and the personal recollections of former students, the effectiveness of the steps of this transition, the methodological changes in education, and the joint development of theory and practice can be reconstructed. The study so far seeks to answer the question of what measures were generated by order of the Ministry of Construction on 26 April 1951 (which, upon the government's decision, called on the dean to develop a curriculum on prefabrication) at the Faculty of Architecture of the Budapest Technical University (Dean's Office, 1951). May we name the faculty members dealing with the topic of pre-production? To what extent and in what way were students able to become acquainted with the latest structures and materials? The study evaluates curriculum developments and contemporary professional debates. In addition, it compares scientific research with contemporary personal recollections, which can provide a more complete picture of a period that has not been fully explored so far. (This is perhaps the latest time to evaluate such research as many of the former students are over 90.) The research on the process of transformation in the only university base of Hungarian construction industry at that time provides an opportunity to compare the developments in East-Central European higher education and the stages of construction in the early post-war decade.

## 2 The concept and types of prefabrication in the 1950s

Decision No. 108/5/1951. of the Council of the National Economy was published in 1951 in Hungary, ordering increased development of prefabrication in structural construction and civil engineering (Dean's Office, 1951). This also influenced the training of architects at the Budapest Technical University: Section VI. 25. stated that "...secondary and higher technical education bodies/technical colleges and technical universities/ should introduce regular teaching of prefabrication issues".

The decision was based on the objectives of the five-year economic plan launched in 1950: it was impossible to realise the planned projects, almost half of which were industrial facilities (Haba, 2019:p.60), by using only traditional structures and technologies, as there was simply not enough time, building materials or workforce available. What was meant by prefabrication at the time? The process was still in the experimental phase in 1951, and there were constant debates within the profession about the method or even the definition of prefabrication. This uncertainty can be best illustrated by the prefabrication conference (Haba, 2019:p.66) held by the Magasépítési Tudományos Egyesület (=Building Construction Scientific Association) in 1951 (Major, 1951). László Lux, the editor-in-chief of the journal and the first director of the IPARTERV state design institute (Schéry, 2001) (established in 1950 by merging two predecessor institutions), summarised the benefits of the new structures and methods in his introductory study *Prefabrication of concrete and reinforced concrete structures* (Lux, 1951). These arguments were the following: prefabrication can significantly shorten construction time; it is not exposed to the weather, so the construction industry can operate all year round; it allows engineers to save on building materials, for example, by replacing wood that is in short supply; it can reduce construction costs, or workers may be redeployed.

The articles also reveal that from the two types of prefabrication (factory and on-site), the experts commenting on the subject aimed to establish factory prefabrication in the long run, but several factors hampered this objective. For example, the underdevelopment of the nationalised construction and machinery industry in post-war Hungary, the unresolved issue of cost-effective transport, the lack of elaboration of a modular system and type design, and the most important plant, the Building Element Factory (Anonymous, 1952a) had only a few years of history. For this reason, it transpired that while many residential buildings were made of prefabricated elements in 1950 in the Soviet Union, which was considered exemplary and to be followed, in Hungary, only railway RC bedding elements were produced in significant quantities with factory prefabrication at that time (Mihailich, 1951).

However, from the second half of the 1940s, significant progress was made in the field of on-site prefabrication, which innovations were mostly due to Gyula Mátrai and his design team (Haba, 2019:p.67). For instance, the use of special structures fundamentally defined the hall buildings of power plants designed in this era (Haba, 2012, Fig. 1).



Fig. 1 Prefabrication at Borsod Power Plant, 1952 Anonymous, 1952b)

The first industrial building entirely constructed with on-site prefabrication was the hall of the Ganz Shipyard, rebuilt in 1947–48 (Pozsgai, 1981). After that, the Mátrai Group perfected its method, i.e. the large-panel organised prefabrication system from project order to project order. This innovative system led to the construction of buildings in the early 1950s with increasingly diverse structures, forms, and aesthetics (Haba, 2019:pp.67–81). The thermal power plant (1949–52) and aluminium smelter plant (1950–53) in Inota, the Gyöngyös Railroad Switch Factory (1950–51) and the thermal power plant in Dunaújváros (1950–53) were built in this period. These constructions, being defining works in the early history of prefabrication in Hungary, also played a significant role in education from the autumn of 1950 onwards, mainly in the form of study trips and production (summer) internships, but also in theoretical education.

This scheme, combined with the joint work of architects, structural engineers, technologists and contractors, made it possible to achieve an internationally recognised engineering performance that took into account both the issue of economy and aesthetics. It is no coincidence that when evaluating the results of the first decade of industrial architecture after World War II, the dominant individual of industrial architecture, Jenő Szendrői (1965), emphasised

the following: "...the most economical solution depends on the advanced state of the industry and local and financial opportunities. Technical development is a question of time, space, climate, and even social advancement. An engineer can only recommend new materials and structures if their economical use is actually enabled by national or even local conditions.". The implementation of this concept could be achieved through conscious development and practice-oriented knowledge transfer right from architectural education to construction. "The real success is the widening of the horizons, to select the best choice from the myriad of variants that actually live only in the imagination of the structural engineer. Choosing the most valuable of the numerous ideas: this subjectivity is the highest level of engineering." – as later formulated by Jenő Szendrői (1965:p.81).

### 3 Education methodology on prefabrication

#### 3.1 Educating the theory of prefabrication at the Budapest Technical University

To some extent, the topic of prefabrication had already appeared in architectural education in the 1948/49 academic year, in parallel with the introduction of the new curriculum. Károly Arvé, Head of Department of Building Constructions, known from the interwar generation of engineers, gave lectures on reinforced concrete slabs and roof structures made with prefabricated elements within the subject of Building Constructions for the 3<sup>rd</sup> graders of the design (A) specification (Dean's Office, 1948). As for the construction (B) specification, he dealt with the issue in even more detail and already, from the 1st grade onwards, prefabrication was given a separate chapter in the curriculum. For example, within *Building Constructions II*, the innovations were presented in the lecture entitled "The current state of construction standards, type design and prefabrication in Hungary and abroad" (Dean's Office, 1948).

In the 1950/51 academic year, the following subjects dealt with similar questions (Table 1).

Table 1 Subjects related to prefabrications in the 1950/51 academic year

Name of subject	Topic related to prefabrication
Residential Building Design	prefabrication for single-family houses
Industrial Building Design	partly or fully prefabricated industrial facilities, type design and standardisation
Construction Machinery and Scaffolding	design of prefabrication plants
Mechanics, Materials and Structures	prefabricated structures
Building Construction	prefabricated structures

Assistant professor Zoltán Egyed collected all this information in his dissertation *On Certain Issues of Prefabrication in University Education* after being asked to compile the schedule for the independent class on prefabrication in the spring of 1951 (Egyed, 1951).

Zoltán Egyed was appointed a part-time lecturer at the Department of Construction Economics and Implementation (later Construction Management) on 1 October 1950, a position he held until his resignation on 15 September 1954 (Dean's Office, 1950s). His own subject, which he gave the title *Prefabrication*, was first introduced in the spring semester of the 1951/52 academic year as a two-hour lecture per week for the 4<sup>th</sup>-grade students of the construction (B) specification. The class could no longer be found in the curriculum of the 1954/55 academic year, which may be related to the resignation of the instructor (Timetables, 1950s; Egyed, 1953). Egyed emigrated after the 1956 Revolution and settled in Austria (Ásós, 2019).

However, this was not the first attempt to teach the topic as a separate class at the Faculty of Architecture. Adapted to the needs of practical life, Kornél Rados, Head of Department of Industrial Building Design (newly founded in 1950), considered it important that architecture students came up with the most innovative solutions during their studies. In the spring semester of the 1950/51 academic year, Rados launched (Timetables, 1950s) an optional class called *Prefabrication in the Building Industry*. However, in the absence of a sufficient number of applicants, he was unable to start the class (Dean's Office, 1951).

The content of Zoltán Egyed's lecture series can be identified from two sources: first from the above-mentioned 1951 article, where he presented the ideal structure of the class, and second from the university textbook published in 1953, which was based on the lectures given at the university (Egyed, 1953). In the new series of lectures, Egyed first clarified the concept of prefabrication, in which areas the procedure could be applied in architecture, and what were its advantages and disadvantages. How had the method developed in Hungary and abroad before 1945, and what changes were associated with studying the Soviet-Union-invented technology? What are the types, structures, and materials of prefabrication? What are the required conditions for factory prefabrication? He then discussed the individual steps of prefabrication: design, organisation, prefabrication, storage, transport, and connection of structures, mechanisation and auxiliary structures, the issue of cost-effectiveness, and the rationalisation of construction.

From the educational perspective, the instructors also tried to ensure that the students met the prefabricated structures not only in theory but also on the construction site and in prefabrication plants.

### 3.2 Educating the practice of prefabrication at the Budapest Technical University

As in practice, where initially mainly the design of industrial facilities gave way to the use of prefabricated building elements and structures in Hungary, in architectural education, the emphasis on the teaching of industrial architecture drew the attention of students and teachers increasingly to the latest solutions. The Department of Industrial Building Design aimed to allow students to also study the operation of the plant types (which were issued as design assignments) in reality. So, from November 1950, factory visits were organised for them, accompanied by consultant teachers. The Head of Department, Kornél Rados, put it this way: "*At the same time, study trips to factories and industrial construction sites with students and separately with the department's staff also enhanced the live connection between education and industry.*" (Rados, 1954).

In 1950–51, the entire 5<sup>th</sup> grade visited, for example, the Building Elements Factory in Budapest, which specialised in factory prefabrication, a smaller group visited the Ganz Transelektro Plant (1947–48), the Roessemann Conveyor Equipment Factory (1949–50) and the Hungarian Ceramic Factory (1949–50) (Faculty of Architecture, 1951). The construction of the Ganz Transelektro Plant is one of the early examples of using the rolling scaffolding process (Haba, 2019:p.41), while the latter two factories combined the rolling scaffolding solution with pioneering on-site prefabrication (Haba, 2019:pp.45–47).

On the one hand, the study of entirely on-site prefabricated industrial buildings was given impetus by the 1951 Government Decision mentioned in the introduction to this paper. On the other hand, it was fostered by the Decision No. 150/7/1951 N.T. of the Council of the National Economy, which made the four-week summer production practice at designated industrial plants compulsory for the 3<sup>rd</sup> grade students in technical higher education (during the summer break before the 3<sup>rd</sup> year) and even gave specific instructions for the implementation of these camps (Dean's Office, 1951). The students of the Faculty of Architecture of the Budapest Technical University were sent to the construction sites of the designated companies in groups of 5–15 people, accompanied by a teaching assistant (instructor). On behalf of the plants, an appointed manager

developed the four-week working schedule in collaboration with the instructors. During the practical training, the students usually observed the work processes in small groups of 2–3 people while making notes, and then the groups also reported to each other about what they had seen.

To complete the production internship, students also had to write a study on one of the topics listed in the thematic plan prepared in advance by the Faculty of Architecture and then give an oral report based on the written work. The list of twenty items was compiled by Zoltán Egyed. Topic 3 (ceiling structures) also dealt with prefabricated slabs and floor beams, while Topic 9 was devoted entirely to the theme of prefabrication: *"Prefabrication issues at the worksite. Methods and means of material handling. Requirements of quality concreting and their fulfilment. Purpose and tools of the compaction of concrete. Materials and structure of the formwork of prefabricated elements. The issue of rebar assembly of prefabricated elements. Means of transport for finished elements. Observations and suggestions for on-site prefabrication."* Thanks to a report, it can be stated that out of the specified twenty topics, the issue of prefabrication was quite popular: Some 14 out of 98 students wrote a study even the title of which included prefabrication (Dean's Office, 1951).

From the reports of the accompanying teaching assistants (Dean's Office, 1951), it can also be seen that most of the construction sites provided an opportunity to learn about the on-site prefabrication process: from site organisation through elements' production to lifting and fixing. However, two of the locations of the 1950/51 academic year's summer internship stood out in terms of prefabrication: the construction of the thermal power plant in Inota (Várpalota) and the construction of the Gyöngyös Railroad Switch Factory (Figs. 2 and 3).

#### 4 Construction works in Inota (1949–1952) and Gyöngyös (1950–1951)

In Inota, György Krizka, assistant professor of the Department of Public Building Design II, assisted the students, and the professional leaders were László Mók and Ödön Vámos, who also provided consultations five hours a week (Dean's Office, 1951). In 1951, the architects of the power plant, Gyula Mátrai and Béla Fekete, talked about the significance of the construction as follows: *"...the construction of power plants with prefabricated reinforced concrete elements was a novelty in the world, and it was justified by serious national economic interests; for example, to shorten the construction time with approximately one year and to completely eliminate the scaffolding timber. The completely novel task, which put the designers of the organised prefabrication system to the test, almost necessarily resulted in a whole series of sub-solutions that promoted development. These solutions made the construction of the Inota Power Plant one of the most significant industrial works of the country's building industry, both technically and economically."* (Mátrai and Fekete, 1951). The construction was not so much innovation in the use of medium-weight prefabricated elements (like ribbed roof element, skylight and window element), but in the design and assembly of heavy-weight frame elements. Thanks to the welded element joint and I-sections, material use was significantly reduced, proving the advantages of prefabrication over the monolithic process.

The construction in Inota was also innovative in terms of lifting in the heavy-weight frame elements. Special lifting machines, so-called two-legged bulls (Mátrai and Fekete, 1951) were designed specifically for this purpose, which managed to lift even the heaviest beams of 58 tons (Weisz, 1952). In July 1951, during the students' summer



**Fig. 2** Manual fabrication of the building of the Inota Power Plant, 1951 (Anonymous, 1951a)



**Fig. 3** Overview of the construction site, Inota Power Plant, 1951 (Anonymous, 1951b)

production internship, the construction of the thermal power plant hall was already in an advanced state, as can be seen from a July 1951 newsreel (Magyar Filmhíradó, 1951), but there was also plenty of opportunity to observe the prefabrication workflows.

The hall building of the Gyöngyös Railroad Switch Factory was also constructed with organised on-site prefabrication as a project of the Mátrai Group, in which the engineers further improved their system, putting special emphasis on aesthetic design (Figs. 4 and 5). The latter objective was most evident in that, for structural reasons, the architects tried to consequently apply the "cassette system" used for the frame and skylight elements throughout all the elements of the hall (Haba, 2019:pp.70–71).

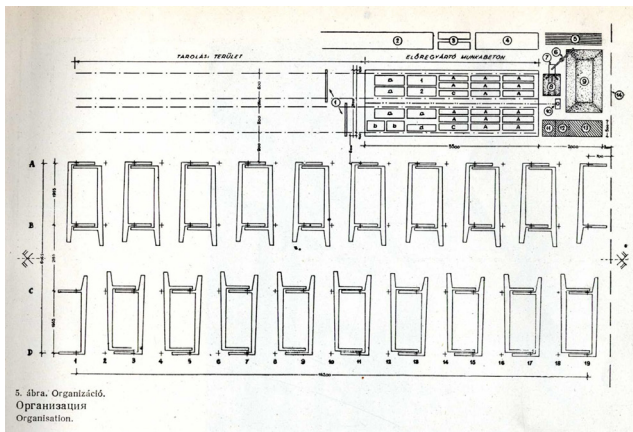


Fig. 4 Organizational plan, Gyöngyös (Mátrai, 1952)

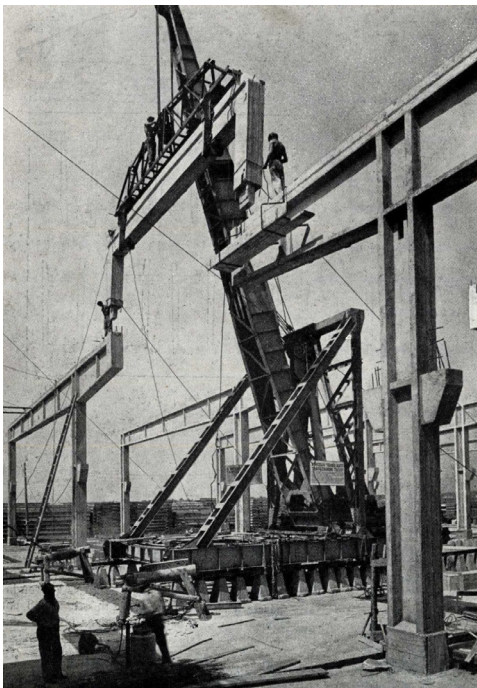


Fig. 5 Building of the Gyöngyös Railroad Switch Factory (Mátrai, 1952)

The three-nave hall consists of 19 frame structures, placed 9–9 meters apart. A frame structure consists of two two-legged frame elements and a monitor element connecting them in the middle. The roof elements provide the axial connection of the 19 frame structures, crane supports, and window elements, the weight of the built-in prefabricated elements ranges from 2 to 33 tons. In July 1951, during the summer internship, students observed the production and lifting of both large and small elements, as the preparation of small elements began in mid-March, and their installation was completed in September. Production of the large elements began in mid-April, and their lifting and installation began on 14 June. The prefabrication department of the construction project employed an average of 150 people (Mátrai, 1952).

István Pogány, assistant professor of the Department of Public Building Design I, accompanied the students on their visit to Gyöngyös; the plant manager was Márton Ónodi. The instructor's report shows that a separate prefabrication and reinforced concrete group has been formed from the students to get acquainted with the different work processes. The first group studied the process of prefabricating reinforced concrete windows, roof elements and frames on the ground, in formwork, in a horizontal position, and then the movement and lifting of the finished elements. At the same time, the second group could, above all, observe the formwork, rebar assembly and lifting of the frame elements (Dean's Office, 1951).

Antal Molnár participated in the practice training as a student. This is how he remembered the period spent in Gyöngyös from the perspective of almost seven decades: "The second internship was a technician practice and mentioning again the relationship between plains and mountains, I tried to find a place where the mountain also played a decisive role. This place was Gyöngyös, where a railroad switch factory was built. It was a huge factory, with a width of approx.  $3 \times 18$  m span [19.55 m + 21.55 m + 19.55 m], 72 m [61.60 m]. It was a crane hall; large elements, fabricated downstairs on the production surface, weighed 36 [33] tons and had to be erected first and put in place with a swing structure. All this happened in 1951, six years after the war. By then, engineers could assemble and set up construction machines with which such a quick construction could be carried out. I was absolutely lucky with this because all that I know now about prefabrication, especially about the prefabrication of industrial and hall buildings, I learnt most of it there, in the five weeks of internship. It was a direct experience; I could almost hold

*the end of the pillar, on which first a shoe was put to make it slide to the foundation opening. Next to the foundation, the pillar was lifted vertically, moved slightly sideways and then lowered; thus, the frame structure of the hall was almost ready."* (Molnár, 2019).

The experience on the construction site may have been truly decisive for him, as in his 1953 diploma thesis Molnár dealt with the design of a power plant, the hall structure of which consisted of 14 prefabricated frame structures (12 in the engine room) placed every 5.2 meters, made of RC supports lightened with cassettes. The support beams were put in place after the columns were erected, the reinforcement was welded together at the appropriate points, and the concreting was finally done. The architect placed a 45-ton running crane with a 20-meter-long span in the engine hall (Figs. 6 and 7).

### 5 Prefabrication and Socialist Realism

In Antal Molnár's 1953 diploma project plan, it can be clearly seen that although the most modern structures were used, decorations compatible with the Socialist Realism's style dictation also appeared on the exterior to some extent (Fig. 8). For example, the prefabricated artificial stone ledge supplemented with stone cantilevers or a semicircular false-window-like motif of the lantern on the east façade.

Previously, similar expectations had not yet been formulated concerning the design of the Inota and Gyöngyös constructions; the façades of the halls were given a design entirely coming from the structure. However, following the conclusion of the 1951 style debate generated by the cultural policy of the time, the question of the applicability of Socialist Realism came to the fore in practising and even in educating industrial architecture (Karácsony and Vukoszávlyev, 2019).

For example, recognising the shortcomings, IPARTERV issued an internal tender in January 1952 to design the façade of a factory hall. By doing so, they also criticised their work carried out in 1951 and tried to provide guidance for the future so that the designers could feel the "architectural demands of an industrial building or an industrial site" (Szendrői, 1952).

Somewhat later, in the 1953/54 academic year, similar goals were formulated at the Department of Industrial Building Design at the Budapest University of Technology: professors wanted to provide more space to design issues in both lectures and design practices but also to give new technologies and cost-effectiveness the same prominence (Rados, 1954). Antal Molnár's diploma project can be considered an early experiment within the education of

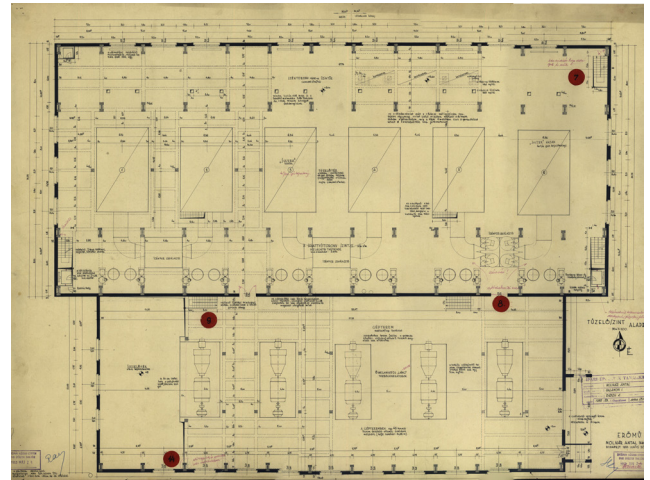


Fig. 6 Diploma project of Antal Molnár, first floor plan, 1953 (Molnár, 1953)

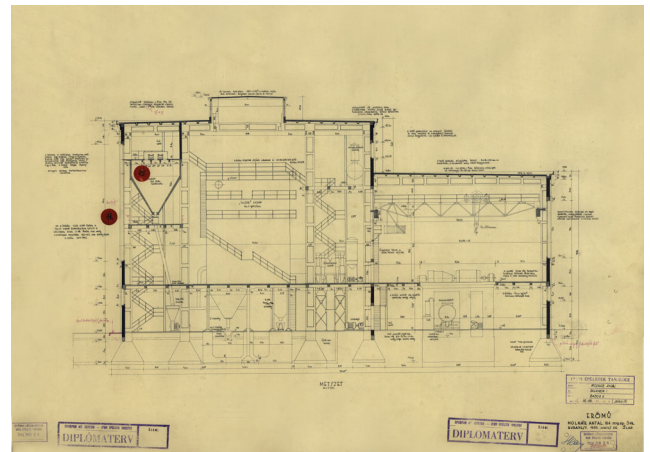


Fig. 7 Diploma project of Antal Molnár, section, 1953 (Molnár, 1953)

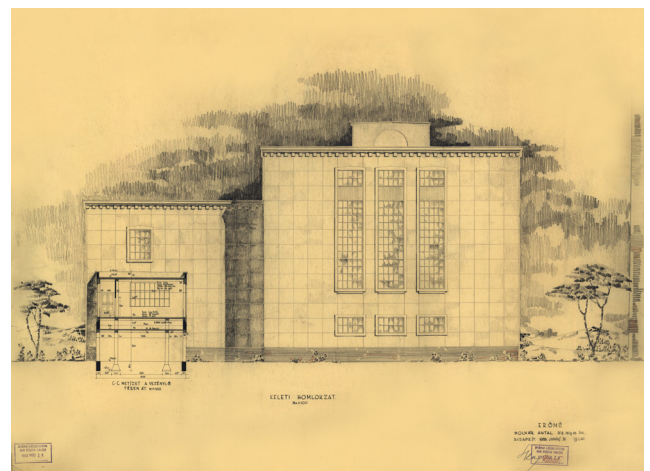


Fig. 8 Diploma project of Antal Molnár, elevation, 1953 (Molnár, 1953)

architects, which combined forms corresponding to the Socialist Realism's style dictation with the building industry developments of the five-year plan.

Molnár's example is also an ideal case to illustrate the intertwining of architectural education and practical life. The experience gained at the summer internship after the 2<sup>nd</sup> year and the knowledge from the class called *Prefabrication*, which was studied in the spring semester of the 4<sup>th</sup> year, undoubtedly influenced his diploma project and later his work.

Jenő Kiss was a student of the Faculty of Architecture at the Budapest Technical University a little later, between 1951 and 1956, but in his recollection, he also emphasised the importance of the method and education of prefabrication. At the same time, he also highlighted the close intertwining of theory and practice: "*Prefabrication was taught very thoroughly. In fact, prefabrication started in Hungary at that time, part of it was factory prefabrication, and the other part was on-site. For example, I was on a production internship at the construction site of the Ganz Tram Factory. In each case, the factory constructions of that time were presented in-depth. Gnädig gave us many such lectures. (...) He taught us as a visiting professor; he did not actually lecture theory but presented the plans he worked on, for example, the salt warehouse in Kazincbarcika, where the structure consisted of three-hinged arch supports. He joined the practical courses several times, always presenting how these structures were designed and the challenges. Theoretical lectures were given at the Department of Reinforced Concrete Structures*" (Karácsony, 2021).

## 6 Summary

At the end of the 1940s and the beginning of the 1950s, the training of architects at the University reacted quite

quickly to the changes affecting the profession. However, it also created opportunities to complete existing education methodology and to establish new practices. Thus, for example, the profile of each department was established in 1950 in line with the emerging system of state design institutes, and the subject of prefabrication was incorporated into the curriculum only a few months after issuing the Government Decision that boosted the new construction method. University documents and personal recollections that reinforce them emphasise rapid processes and the smooth transfer of current knowledge.

Further research is foreseen to clarify the extent of the education on prefabrication as an independent class and whether it gained new impetus in the early 1960s when technology began to play a vital role in mass housing construction. Hungarian research can contribute to studying university educational and industrial processes in East-Central Europe and mapping similar economic and technical developments of the postwar industrial era.

We can state that the intensified education of prefabrication appeared in architect training at the Budapest Technical University almost in parallel to practice. The students met the innovative solutions in theory in the framework of each lecture, and the summer production practices and factory visits helped them observe the work processes of on-site and factory prefabrication in reality. Later they could even use the acquired knowledge in their design tasks, creating continuity in the development of modern engineering science.

## References

- Anonymous (1951a) "Building of the Inota Power Plant" [photo] 153551, Fortepan, Hungary.
- Anonymous (1951b) "Building of the Inota Power Plant" [photo] 153539, Fortepan, Hungary.
- Anonymous (1952a) "Az Épületgyár" (Building Element Factory), Szabad Nép, 10(218), p. 1. (in Hungarian)
- Anonymous (1952b) "Prefabrication at Borsod Power Plant" [photo] 153521, Fortepan, Hungary.
- Ásós, J. (2019) "Interview with József Ásós", [digital tape and typed manuscript] Interviewed by Rita Karácsony, Corporation of the interview, Jan. 29.
- Dean's Office (1948) "Építész Osztály, Tervező tagozat", [documents] (Class of Architects, Specialization in designing architecture), pp. 44, 99., The legacy of Gábor Petrőczy, 2002/835/28, Magyar Építészeti Múzeum és Dokumentációs Központ, MÉM MDK, Budapest, Hungary. (in Hungarian)
- Dean's Office (1951) "Documents of the Dean's Office", [documents] 105/b 1951/77, 98, BME OMIKK (Budapest University of Technology and Economics, National Technical Information Centre And Library) Archives, Budapest, Hungary.
- Dean's Office (1950s) "Zoltán Egyed", [documents] BMO documents, BME OMIKK (Budapest University of Technology and Economics, National Technical Information Centre And Library) Archives, Budapest, Hungary.
- Egyed, Z. (1951) "Az építési előregyártás egyes kérdéseiről az egyetemi oktatásban" (On Certain Issues of Prefabrication in University Education), *Építés-Építészet*, 3(7–8), pp. 434–437. (in Hungarian)
- Egyed, Z. (1953) "Előregyártás" (Prefabrication), Tankönyvkiadó, Budapest, Hungary. (in Hungarian)
- Faculty of Architecture (1951) "Minutes of the meeting of the Faculty of Architecture, annex to the meeting of 13 April 1951, report", [documents] 105/a, BME OMIKK Archives, Budapest, Hungary.



- Haba, P. (2012) "Expression of energy: The architecture of power stations in Hungary between 1945 and 1970 part I", *Periodica Polytechnica Architecture*, 43(1), pp. 17–32.  
<https://doi.org/10.3311/PPar.7157>
- Haba, P. (2019) "Magyar ipari építészet 1945–1970" (Hungarian Industrial Architecture 1945–1970), TERC Kft. ISBN 978-615-5445-63-7 (in Hungarian)
- Istvánfi, G. (2015) "Adatok a magyar építészképzés műegyetemi történetéhez 1945–1990. Rendszerváltozástól rendszerváltozásig" (Additions on History of Hungarian Architecture Education 1945–1990. From system change to system change), *Építés – Építészettudomány*, 43(1–2), pp. 1–54. (in Hungarian)  
<https://doi.org/10.1556/eptud.43.2015.1-2.1>
- Karácsony, R., Vukoszávlyev, Z. (2019) "Teaching Modernism: A Study on Architectural Education in Hungary (1945–60)", In: Melenhorst, M., Pottgiesser, U., Jaschke, F., Ostwestfalen-Lippe, H. (eds.) *100 Years Bauhaus. What Interest Do We Take In Modern Movement Today?*, Lemgo, pp. 331–343. ISBN: 9783000625800 3000625801  
<https://doi.org/10.25644/ehew-9179>
- Karácsony, R. (2021) "Title of the Interview", [digital tape and typed manuscript] Interview by Jenő Kiss, Corporation of the interview, Jan. 28., Febr. 04.
- Lux, L. (1951) "A beton- és vasbeton-szerkezetek előregyártása" (Prefabrication of Concrete and Reinforced Concrete Structures), *Építés–Építészet*, 3(7–8), pp. 349–358. (in Hungarian)
- Magyar Filmhíradó (1951) "Az Inotai hőerőmű építése" (Building of the Inota Power Plant), Hungary: MHDF. (Identification code: mfh-51-27-03) [online] Available at: <https://filmhivadokonline.hu/watch.php?id=10865>
- Major, M. (ed.) (1951) "Építés–Építészet, 3(7–8)", *Magyar Építőmunkások Országos Szövetsége, Magasépítési Tudományos Egyesület*, Budapest, Hungary. (in Hungarian)
- Mátrai, G., Fekete, B. (1951) "Az Inotai Erőmű építészeti jelentősége", (The architectural significance of the Inota Power Plant), *Építés–Építészet*, 3(7–8), pp. 380–384. (in Hungarian)
- Mátrai, G. (1952) "A Gyöngyösi Váltó- és Kitérőgyár építkezésének ismertetése" (Description on building of the Gyöngyös Railroad Switch Factory), *Magyar Építőipar*, 2(3), pp. 126–138. (in Hungarian)
- Mihailich, G. (1951) "Korszerű építési eljárások és szerkezetek" (Modern Construction Methods and Structures), *Az MTA Műszaki Tudományok Osztályának Közleményei*, 1(1), p. 751. (in Hungarian)
- Molnár, A. (1953) "Diploma project of Molnár Antal", [drawings], Archive material identifier, Budapest University of Technology and Economics, Department of Industrial and Agricultural Building Design, Budapest, Hungary.
- Molnár, A. (2019) "Interview with Antal Molnár", [digital tape and typed manuscript] Interviewed by Rita Karácsony, Corporation of the interview, Jan. 16.
- Pozsgai, L. (1981) "Dr. Mók László élete és munkássága" (The Life and Work of Doctor László Mók), *Magyar Építőipar*, 30(7), p. 399. (in Hungarian)
- Rados, K. (1954) "Hogyan neveljük az ipari építészet jövőendő szakembereit?" (How to educate future professionals in industrial architecture?), *Ipari Építészeti Szemle*, 4(9), pp. 59–60.
- Schéry, G. (eds.) (2001) "A magyar tervezőirodák története" (History of Hungarian Design Institutes), *Építésügyi Tájékoztatási Központ Kft.* ISBN 9789635127757 (in Hungarian)
- Szendrői, J. (1952) "Üzemi csarnok homlokzatpályázata" (Design competition on the façade of a factory hall), *Ipari Építészeti Szemle*, 2(6), pp. 48–51. (in Hungarian)
- Szendrői, J. (1965) "Ipari építészetünk" (Industrial Architecture of us), *Műszaki Könyvkiadó*, Budapest, Hungary, 1965. (in Hungarian)
- Timetables (1950s) [documents] BME OMIKK (Budapest University of Technology and Economics, National Technical Information Centre And Library) Archives, Budapest, Hungary.
- Weisz, G. (1952) "Iparterv 1951. évben tervezett előregyártott vasbetonvázas csarnokrendszerei" (Prefabricated reinforced concrete hall systems designed by IPARTERV in 1951), *Ipari Építészeti Szemle*, 2(6), p. 62. (in Hungarian)