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RESEARCH ARTICLE

Expression of energy

The architecture of power stations in Hungary between 1945 and 1970 part I.

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Abstract

The study in two parts discusses the architectural characteristics of power stations built in Hungary from 1945 to 1970, reviewing the period's social, architectural and technological background, as well as those factors that exerted an influence on power station architecture in these 25 years. The study points out that despite the dominance of technological systems in the case of this building type, Hungarian architects were able to create autonomous designs by their various interpretations of monumentality as a unique aesthetic quality.

The first part of the study focuses on the processes that took place in the Rákosi era (1948-1956). It mainly explores the interplay between the structural and formal characteristics resulting from on-site concrete precasting, the technological demands imposed by the electricity industry and the stylistic expectations of socialist realist ideology, and shows how this led to a kind of classicizing monumentality that also manifested in the area of engineering.

Keywords

power stations · industrial architecture · architectural theory · on-site precasting · structural aesthetics

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Introduction

The design of heat power stations undoubtedly presented one the most complex professional challenges among the gigantic wave of construction projects that characterised the post-World War II industrialisation in Hungary. In virtually all their details, the highly complicated and monumental technological equipment of power stations were organically linked to the building within which they were housed, resulting in great spanned structures reaching into the sky, and continuously changing configurations that required the special competence of both the architects and the constructors.

When studying the history of power stations, an autonomous area distinct from all the other fields of industrial architecture emerges, primarily telling the story of the interaction between the rigorous technological requirements of electricity production and fundamental architectural principles, while being multiply tied to the general tendencies of structural design and form that defined Hungarian industrial architecture. Moreover, in the late 1940s and during the 1950s, power station design served as a catalyst for various processes and was the number one 'innovator' in this regard. Thus, power stations came to be a kind of emblem of the main professional ambitions in the industrial architecture of the period. This is seen particularly where architecture as an art form would be capable of creating autonomous works even when placed at the service of the industrial technologies that took precedence over it.

In power station design, this objective found its expression mainly in the various interpretations of monumentality, an architectural quality crucial to these highly impressive buildings of immense dimensions. These forms of manifestation were more than likely, closely connected to similar 20th-century trends in power station architecture and the ideologies pertaining to communist cultural policy in the early 1950s. It stood as a formidable architectural challenge, since with the advancement of technological progress, power stations were increasingly transformed into mere machines, thus diminishing the role of the architect.

The history of Hungarian power station architecture between 1945 and 1970 can be divided into three periods in regard to structure, technology and aesthetics, of which the second could be seen as a transitory stage. In the developments of the 1970s, mineral oil, natural gas and nuclear energy were given preference over the previously almost exclusive use of coal, which ushered in a new era in power station architecture in virtually all aspects. Although reflecting an internal process to a significant extent, these periods were not isolated in a general architectural sense: the numerous power stations built in the period surveyed show that the changes that occurred in the intellectual foundations and social-political background of Hungarian architecture, on the whole exerted an influence on industrial architecture, which followed its own path in many respects.

In order for this complex system of interrelations to be explored in depth, the international and domestic historical background of the power station as an industrial building complex will first be discussed. This will be primarily in the context of the interrelation of monumentality and modernism, and then the characteristics and changes pertaining to the relationship between technological and architectural design will be reviewed. Considering that contemporaneous literature almost exclusively discusses power stations from the point of view of their achievements in terms of technology and structural design, these gigantic facilities can only be assigned their worthily deserved place in the history of Hungarian architecture by way of a – hitherto missing – complex analysis.

1. Power stations and monumentality: architectural history background

In his book titled *History of Civil Engineering*, published in 1949, Hans Straub calls attention to a particular aesthetic duality inherent in modern industrial buildings. He suggests that these buildings "unintentionally" create the impression of monumentality through their gigantic dimensions, unusual structures and the "expressive power of statically obvious forms". He explains, "exceptionality is, in itself, an element of monumentality in as much as it leaves a lasting impression in the mind of the spectator. »To be reminded« is, in fact, the very meaning of monumentum." [41, p. 234] At the same time, he points out that numerous modern industrial buildings also convey a kind of "intentional monumentality". Here, the architect's intent is to endow industrial buildings with qualities such as historical representation, "pretentious symmetry" or the attributes of the machine-worshipping constructivist-futurist art, which they originally do not possess at all in their pure functionality and structural logic [41, p. 234]. In other words, the designer is no longer content with his building being remembered by the spectator through its inherent qualities but wants to *remember* and *remind* others of something concrete with the work itself, which is the true purpose of monumentality.

Straub claims that this attitude is in stark conflict with the "technical style", which is based on the synthesis of artistic ingenuity and a particular aesthetic quality inherent in the expediency of engineering constructions, i.e., with the approach, in the development of which, architectural historiography has attributed a pioneering role for a long time. The author discusses this phenomenon at length, being aware of a cultural divide between the two kinds of monumentality. He confirms that even though it was cultivated by belligerent avant-gardists, and industrial architecture was not bound by long-lasting conventions, an important role was often given in the industrial architecture of the first half of the 20th century to the ambition that linked the revolution of modern architectural space, function and structure with the modernised idiom of classicism (seen as a shared, humane and unifying mentality full of pathos). The objective here was to formulate a monumental expression for the social ideals and the technological 'progress' characteristic of the 'machine age'. In addition to the representational purposes of commissioners, this phenomenon was frequently linked to political ideologies – especially from the 1930s, when monumentality increasingly assumed political connotations – similarly to other areas of architecture.[1]

Of course, industrial architecture provided fertile ground for the construction of various – both positive and negative – symbols of the machine age, and thus also for attempts aimed at making modernism conform to society's need for monumentality. At the same time, it is also easy to see why there are so many power stations among the examples of "intentional monumentality". Since power stations were typically characterised by simple masses reaching up into dizzy heights, they lent themselves as vehicles of majestic representation. However, their highly complex and gigantic technological equipment turned them into machine-buildings rather than the conventional industrial halls and thus manifested the 'energy' of industrial civilisation through their mere appearance; for many decades, bizarre 'Greek machine temples' combining classicizing – and even gothicizing – trends with *sachlich* forms, and brick 'machine cathedrals' were erected one after the other. This direction was given especial impetus in the 1920s, when the global appearance of high-voltage networks triggered an immense growth in the dimensions of urban power stations [20, p. 17–18]. Even at this time, there were many architects who thought that the innovative structures and the masses following the dynamic contours of the machines were fascinating as they were. Nevertheless, it seems that this trend intensified in industrial architecture – and thus in power station architecture too – as a result of the utilitarianism brought about by the economic crisis and the breakthrough of the International

1 General questions of the relationship between modern architecture and monumentality – including issues of industrial architecture – are discussed in: [30] [9]. Some aspects of this subject are studied especially in the context of industrial architecture in: [6].

Style, and persisted during the large-scale reconstructions after World War II.[2]

This particular duality of "intentional" and "unintentional" monumentalism can also be seen in the early stages of Hungarian modern industrial architecture. In the society of the 1920s, which was tuned against progress, the pre-modern tendencies that had begun prior to World War I basically only had the opportunity to realise their ambitions pertaining to structural innovation and functional rationality in the area of industrial architecture [8, p. 245], often combined them with a kind of classicizing monumentality. (Important examples published in: [32].) In Hungary, like elsewhere, the most impressive examples for this were provided by the electricity industry developments. During the expansion of the Kelenföld power station in 1927-1934, Virgil Bierbauer (Borbíró), an architect fully committed to modern architecture, strove simultaneously to keep and reinterpret the classicizing pre-modern style of the already existing parts of the facility (Kálmán Reichl, 1913-1926) upon the request of the developer [34][1]. Although it can be felt that Bierbauer was – strangely – at ease with the architectural approach of Reichl. Similar principles are attested to by the turbine room of the Diósgyőr Metallurgical Plants (Hungarian Wayss and Freytag, late 1920s) and two large transformer houses in Budapest (Kálmán Váczy Hübschl; Virgil Bierbauer; both: 1929) [32, pp. 57, 66, 68].

The classicizing trend was left behind by the power station constructions linked to the World War II military industrial developments, obviously for reasons of economy, and because in the 1930s the *Neue Sachlichkeit* and related approaches had also become widely accepted in Hungary.[3] The "unintentional" monumentality through purely modern forms, undisguised concrete structures and vast glass walls already prevailed in the Ajka power station (Béla Enyedi, 1940-1943; [47, pp. 100, 116–118]) and the new wing of the power station of the Csepel Iron and Metal Works. These buildings were direct predecessors of the first power stations built after the war and marked a radical change not only in terms of their formal but also technological disposition.

As previously mentioned, the duality of modernist structural innovation and classicizing gained ground again in power station architecture in the early 1950s, although with an entirely different social, design engineering and building industry background. However, it was only a short-lived intermezzo, as a few years later, Hungary joined the Western trends again and the new tools of expressing monumentality – tendencies highlighting the inherent aesthetics of the machine and structure came to the fore.

2. Technology and architecture

Virtually all the power stations built in Hungary from the early 1940s to the mid-1960s had a "side-by-side" plan, with the exception of only a few smaller facilities. This meant that the machinery used for the individual stages of the technological process – the coal bunkers, the feedwater system, the boilers and precipitators, the turbines, generators and condensers, as well as the transformers supplying the transmission lines – were housed in halls repeated side by side.

The aforementioned Ajka and Csepel power stations were the first large-scale Hungarian examples of the new technological system linked to the side-by-side power station type, which replaced the previously generally used – e.g. Kelenföld Plant –T-plan (long turbine house with boiler houses projecting out of it at right angles).[4]

In this period the technological and architectural disposition of power stations were bound by a large number of factors, which often significantly changed from one development to the next. In addition to the geographical parameters of the site, factors such as the quality of the fuel, the performance of the available machines, the expected capacity of the power station and the permanent requirement of construction cost optimisation, all played a decisive role in the architects' choice of which technological variant and architectural structure to use. These factors primarily affected the structure, layout and size of the boilers, as well as the auxiliary equipment systems and indirectly, the spatial layout of the boiler houses as well. All these obviously exerted an influence on the design of the other parts of the power station – the turbine house, the hall for the feedwater system and the bunkers – while considerations of cost-effectiveness linked to the overall construction of the building were also taken into account during the arrangement of the equipment [18, pp. 13-75]. Architects were faced with the task of combining technological and architectural considerations in order to achieve a disposition and spatial proportions that were feasible for a cost-effective structural system under the conditions of the Hungarian building industry. This task posed a considerable challenge since the four main technological units (the boiler house, the bunkers, the hall for the feedwater system, and the turbine house) necessitated wings with often significantly different heights and widths; the structural and aesthetic reconciliation of these frequently led to professional confrontation in Hungary, like elsewhere. (This issue is discussed in more detail in: [19][13].) This architectural problem was further complicated when the switching equipment used to transmit electricity had to be housed in a separate building joined to the turbine house.

2 This is mentioned primarily in relation to Great Britain but also as a general phenomenon in: [31, pp. 208–209]. In relation to the United States of America: [48] these two works also point out the different trends in the power station architecture of the two countries.

3 For a history of Hungarian power station architecture between the two world wars and during World War II, see: [20, pp. 18–20].

4 The technological changes pertaining to Hungarian power stations and the most important facilities are described in: [21, pp. 240-257]. The author also discusses technological variants not included in this study, e.g. the system with a double row of boiler houses, used in the Bánhida power station, built in 1928, which was a kind of antecedent of the side-by-side plan. Besides the Ajka and Csepel power stations, a side-by-side system can be found in the Mátravidéki power station in Lovászi, the construction of which was halted by the war and only completed in the late 1940s. On the development of the side-by-side plan, see: [31, p. 209].

In addition, the greatest changes in heat power station technology in the 20th century were brought about by the continuous increase in the performance – and thus size – of boilers and the consequent decrease in their numbers. This trend gave rise to the side-by-side plan, which was used worldwide in the 1940s – also in Hungary – and formed the background to the great technological change that mainly started in Western Europe and the United States in the 1950s, and by around the 1960s became more global, thus reaching the Eastern Bloc countries[5] [12]. The increase in the size of boilers combined with their accelerated obsolescence resulted in increasing difficulty in finding profitable solutions for the architectural structures enclosing the equipment. Architects no longer strove to optimise the sizes and costs relating to the cubic capacity and the load-bearing structures, but instead, to radically reduce them and to open up the buildings. This was encouraged by the fact that the newly developed machines required closed spaces to an ever-decreasing extent. In the meantime, replacing the side-by-side technological arrangement, new systems with the lines of machines projecting from the central boiler were spreading worldwide[6] [12][31, pp. 208-209][18, pp. 197-198]. This dual tendency also made itself felt in Hungary and from the late 1950s gradually transformed the architectural character of power stations [19]. It will be discussed later how in Hungary this technological change coincided with the significant development that took place in industrial architecture in the areas of structural design and formal trends.

3. From Inota to Tiszapalkonya: new concrete aesthetics and socialist realism (1949-1956)

The development of the electricity industry and the professional organisations of power station construction

In the 25 years after World War II, considering the conditions of the country, an exceptionally high number of power stations were built in Hungary: nine high-capacity heat power stations of national importance were constructed in this period, of which several were extended during the 1970s. Four of these facilities were built during the Rákosi dictatorship, between 1949 and 1956, and the fifth development began at the end of the Rákosi era (in 1955). In addition, numerous smaller, low-capacity power stations satisfying local electricity and heat needs – typically those of one or more industrial plants and the population of the given area – were constructed.

Although the industrial development programmes of the Rákosi and Kádár eras underwent major modifications and crises, the stepping up of electricity production was kept as a priority objective, with the exception of a few brief periods [38, pp. 534–544]. After the nationalisation of the entire domestic electricity industry between 1946 and 1949, it became possible to draw up a development concept in line with central command. The dramatic increase in energy demand resulting from the industrial restoration, implemented in the framework of the three-year economic plan of 1947-1949 and the large-scale project aimed at the electrification of villages (lasting up until 1963), necessitated the fast reconstruction and the extension of the already existing power stations [46, p. 33, pp. 37-41]. The especially energy-intensive development of the aluminium industry required the construction of the new, high-capacity power stations: the planning of the facility in Inota began in 1949. Party ideological explanations served the purpose of lending greater impetus to the construction works; one of such tenets was ‘Soviet power + electrification = communism’, which was even quoted in the 1970s in connection with the development of the energy industry.

When the sovietisation of engineering and architectural professions was carried out in 1948-49, government organisations were established with the aim of coordinating and planning the future projects of energy industry development. The Power Station Design Office (Erőmű Tervező Iroda (later Power Station and Network Design Company /Erőmű és Hálózattervező Vállalat/, ERŐTERV) was primarily put in charge of technological planning, while the implementation work was done by the Power Station Development Company (Erőmű Beruházási Vállalat, ERBE) [23, p. 9]. From 1950, architectural design was carried out by one of the teams of the Industrial Building Design Company (Ipari Épülettervező Vállalat, IPARTERV), consisting of architects congregated around Gyula Mátrai, who took on the lion’s share in introducing on-site concrete precasting to Hungary, although the architects of ERŐTERV were regularly part of the process.

A succession of new energy industry development projects were launched within the framework of the large-scale industrial development programmes during the first five-year plan (1950-1954), which embodied the objectives of the Rákosi regime. The development projects of the Dunaújváros, Kazincbarcika and Tiszapalkonya power stations started in 1950, 1951 and 1952, respectively. The industrial development concept, which was completely unrealistic given the country’s potential, created a severe crisis by 1953, necessitating a radical

5 This process developed hand in hand with that of the “block power stations”, in which – at variance with previous practice – only one boiler was used for each turbogenerator. The first block power station in Hungary was built in Oroszlány in 1959-1960.

6 For information on this trend in relation to the power station architecture of the GDR, and thus indirectly the Eastern Block, see: [15]. On the characteristic features of the earliest power stations built with open-air boilers, see: [48].

correction of economic policy. The heavy industry developments were significantly reduced by the reform measures introduced by Imre Nagy's government (1953-1955), which formed after sidelining Mátyás Rákosi. In this period, no new high-capacity power station constructions were begun; moreover, the building of the power stations in Kazincbarcika and Tiszapalkonya were stopped [38, p. 247–249][28, p. 33, p. 38]. As the political scene changed and the Rákosi circle gained strength, the new government that rose to power in the spring of 1955 strove to restore the pre-1953 conditions. Although on a much smaller scale, the heavy and energy industry developments were nevertheless assigned priority once again: the large-scale projects that had been halted were restarted and completed, and work was started on the construction of new power stations; it was these that ushered in the next period of power station architecture [38, pp. 273–292].

The beginnings of on-site precasting in power station architecture – new aesthetics in concrete

The first large-scale power station built for the aluminium works at Inota (design: from 1949; construction: 1950-1952/53) provided a great opportunity for the renowned structural designer, Gyula Mátrai, and his colleagues Johanna Wolff[7], Béla Fekete and Károly Pászti. (Figures 1-3.) They were able to introduce new design methods and a new interpretation of the relationship between function and architectural structure, based on the knowledge they had gained from their professional practice, with the aim of rationalising the vast-scale future construction projects.[8] Being the first large-scale project of this kind, the implementation and arrangement of the power station at Inota showed imperfections characteristic of early experiments; however, it unambiguously represented a significant development not only in the history of power station architecture, but also in that of Hungarian industrial architecture as a whole.

The Inota facility was the first building where the new structural systems based on on-site concrete precasting were tested on a large scale. This building technology method was entirely new in Hungary at the time; however, after its introduction around 1947-1948, it became widely used within a short period. This was largely due to its facilitating of a material-efficient, fast and easy construction process amidst the conditions of a building industry burdened by a severe lack of resources and funds in the hasty industrialisation implemented by the Rákosi regime. Subsequently, the new method received major international recognition, too [45, pp. 192-224].

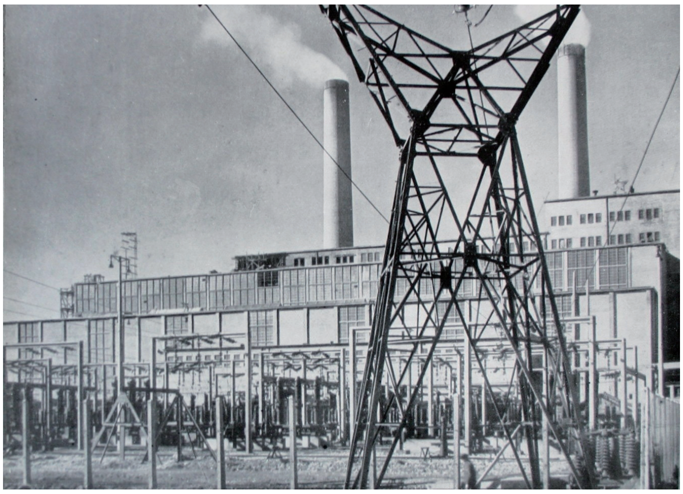

Fig. 1. Inota power station. Designers: Gyula Mátrai, Johanna Wolff, Béla Fekete, Károly Pászti. 1949-1953. (Szendrői, J. et al. eds.: *Magyar építészet 1945–55*, Budapest, 1955.)

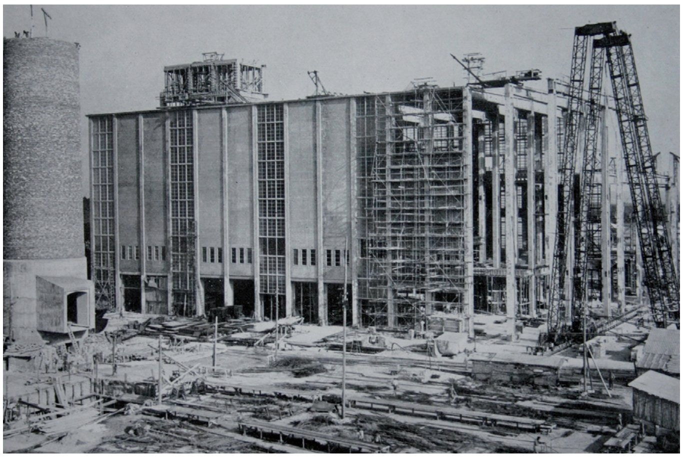

Fig. 2. Inota power station. (Szendrői, J. et al. eds.: *Magyar építészet 1945–55*, Budapest, 1955.)

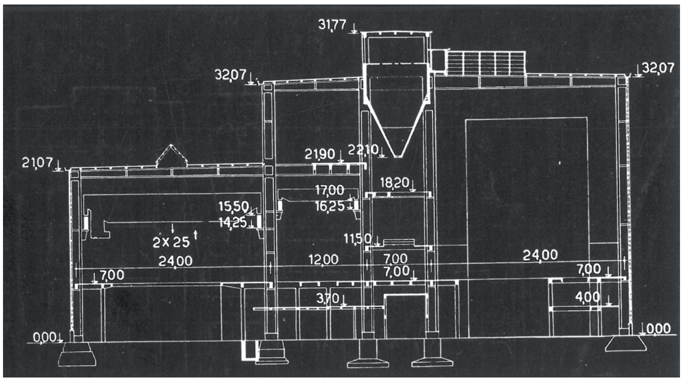

Fig. 3. Inota power station. Cross section. (Szendrői, J.: *Ipari építészetünk*, Budapest, 1965. 214.)

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7 Two spellings are found in literature for the name of the architect: Wolf and Wolff.

8 The planning of the Inota development project began at the Hungarian National Factory Building Company (Magyar Gyárépítési Nemzeti Vállalat), in cooperation with the Elektroprojekt technological office in Prague. International co-operation was necessitated by certain deficiencies in the Hungarian electricity industry and by the short time available for the planning process. Mátrai and his colleagues did the design work as employees of the Hungarian National Factory Building Company, but at the time of the actual construction, from the beginning of 1951, most of them – including Mátrai – were already working at IPARTERV. For more on this, see: [2, pp. 17-22] [23, pp. 9-10] [28, pp. 10-14] and "Az IPARTERV Tervosztályának kimutatása az erőművek tervezéséről" [Documentation of the Planning Department of IPARTERV on the design of power stations], Box 22 of National Archives of Hungary (Magyar Nemzeti Levéltár) XXIX-D-10-a.

The concrete frames used for the structure of the Inota power station were assembled together from precast pillars and beams of dimensions that surpassed the results of previous experiments – even regarded as outstanding by international comparison. Yet, this was only the beginning. As will be discussed later, major developments were introduced during the planning of the power stations built in the following years. These included the structural systems utilizing on-site precasting, as well as the design, detail forming and joining of the members, with solutions generally being more material-efficient, while resulting in lower weights and aesthetically more favourable solutions as compared with the Inota facility [35][26]. This structural innovation had an impact on all areas of industrial architecture, with designers striving to apply the innovations in as many development projects as possible.

By the first half of the 1950s, the Mátrai group and other colleagues of IPARTERV had produced a whole range of structural systems for on-site precasting that they had developed. They took a refined approach to form and demonstrated a designer attitude aimed at exploiting the new opportunities of detail forming, promoting the emergence of a kind of new aesthetics in concrete in the area of on-site precasting in Hungary. This new aesthetic resulted from the far more elaborated, slender and articulated structural forms that could be produced with on-site precasting rather than with the monolithic method; moreover, a consistent coordination of modules could be achieved, thus facilitating a total structural and aesthetic unity in the buildings.[9] This new technology also enabled designers to use both standardised and unique sets of elements (or combine them), depending on the given project. Thanks mainly to Gyula Mátrai and the reputed civil engineer, László Mokk's up-to-date knowledge, Hungarian on-site precasting benefited greatly from the Western European developments relating to this technology in the 1930s and 1940s; this included the work of such notable experts in the field as Eugéne Freyssinet, Gustave Magnel and Pier Luigi Nervi, as well as from the modernist engineering philosophy in which the standardisation and prefabrication of concrete structures was seen as yielding a radical improvement in the aesthetic standards of the built environment.[10]

Mátrai and his colleagues had achieved significant results in the area of on-site precasting in 1949-1950, although the design of the Inota power station led them to unexplored territory in several respects. Because of the difficulties they were faced with during dealing with practical problems, the new concrete aesthetics only had a chance to be partially developed. This was pointed out in a summary article Mátrai Gyula wrote in 1955, in which he stressed that during the design of the Inota facility – despite all their efforts – a one-sided professional practice dominated by a technological attitude, to the detriment of architectural and structural considerations, prevailed [26]. He also mentioned that this practice commonly led to discrepancies in form and proportion between the various parts of the building, which left designers with the necessity of choosing poor structural solutions. Mátrai did not provide examples of this phenomenon, but he might have referred to the Ajka power station, whose technical plans specified spatial forms of significantly varying clear heights and proportions within the same part of the building, resulting, despite some high quality architectural solutions, in a rhapsodic ensemble of masses with different heights and widths.

The designers of the Inota power station were well aware that holding the individual parts of the building together into a compact mass had not only aesthetic but also structural and economic benefits (fewer types of elements, fewer component parts and less jointing, etc.). Nevertheless, their efforts in this direction were not fully considered, resulting in a slightly discordant, unevenly stepped mass form with monolithic annexes further breaking up the unity of the design.[11] It must be added here, that in spite of this, the Inota power station had a far more balanced form and structural order than the Ajka facility. The walls of the power station in the original concept were to be assembled from prefabricated panels, but they were eventually produced from monolith reinforced concrete and brickwork because of the unpreparedness of the building industry [35].

Despite the many reductions and compromises, the design can boast of numerous outstanding details. The fine glass wall structures assembled from prefabricated concrete grids – extending to the entire expanse of the facade in the case of the hall for the feedwater system – and the slender pillars clearly visible on the exterior surfaces, provide one of the most grandiose Hungarian examples of the visible skeleton frame construction (Joedicke) so highly praised in modern architecture. The same solution can be found in the initial plans made for the power station of the Kazincbarcika chemical plant, which were radically altered at a later stage. (Design published in: [16, p. 34, p. 39].) (Figure 4) In these drawings the glass walls fully filling the space between the pillars of the loadbearing structure are unambiguously assigned the main role: the building has far more clear and balanced masses than the Inota power station, and is thus reminiscent of an airy greenhouse suffused with light. The contrast created by the 'immaterial' quality of

9 Mátrai's ideas about structural aesthetics are discussed in: [25, p. 129].

10 The comprehensive knowledge of László Mokk is illustrated by the numerous international examples he includes in his book on on-site precasting: [29].

11 It must be noted that the mistakes of implementation and planning can be partly put down to some problems in the co-operation between Energoproject and the Hungarian architects.

the glass walls and the profusely articulated, expressive massing define the character of the boiler house design produced by Gyula Rimanóczy for an industrial plant in Debrecen. (Design published in: [22, p. 29].) The marked technicism of the design is an outstanding solution as the mass composition exactly follows the asymmetrical forms of the machines, thus lending the smallish building a sense of heroism. While in the expressive force of the Inota and Kazincbarcika designs derived from the 'innate' forms of the prefabricated structures, a kind of "intentional monumentality" can be perceived, albeit not in a classicising fashion but rather through the translation of the machines' forms into architectural forms.

These compositional principles – which influenced all areas of industrial architecture in the first years after the war – could not be persistently applied over the long term, since at the turn of 1950 and 1951, some articles published on industrial architecture called for the radical rethinking of previous design practices on economic and ideological grounds. On one hand, these articles were indeed motivated by the severe lack of resources and funds, but on the other they were conceived in the spirit of cultural and policy attacks launched from summer 1949 to promote the 'intellectual sovietisation' of the architectural profession. The stigmatisation of modernism and labelling it as a bourgeois-intellectual, cosmopolitan, expensive style incomprehensible to the general public and in conflict with the new social order was a prelude to the dictatorial introduction of socialist realism in 1951. However, this process proved to be fraught with more problems in industrial architecture compared with other areas of the profession: many architects – in many cases justifiably – regarded industrial architecture as a 'protected area' due to its dependence on technology, where the classical principles of modernism could persist [11]. Nevertheless, the first issue of the periodical of IPARTERV, titled *Ipari Építészeti Szemle*, took a critical approach to the high costs and cosmopolitanism of the "formalist" mass composition of industrial buildings, with its emphasis on technological systems and the often overwhelming glass wall cult. The article stressed that the spirit of "socialist industrialisation" required technological units designed in compact masses, apertures of minimal sizes and non-constructivist facades articulated on a human scale [43][5].

It is hardly a coincidence that it was around this time that the plans made for the Kazincbarcika power station were altered: the expansive glass walls of the turbine house were replaced by a brick facade articulated with a row of narrow windows. (Designs published in: [16, pp. 34-35, p. 39].) (Figure 5) It is

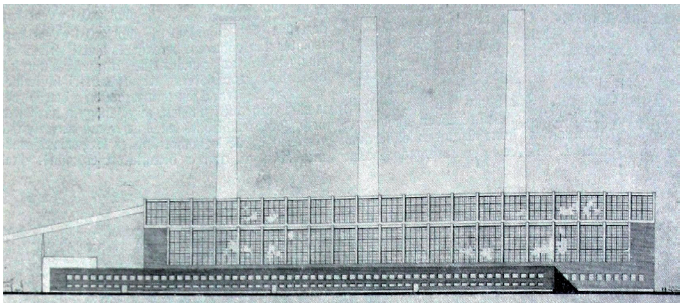

Fig. 4. Kazincbarcika power station. First design version. 1950-1951 [16, p. 34].

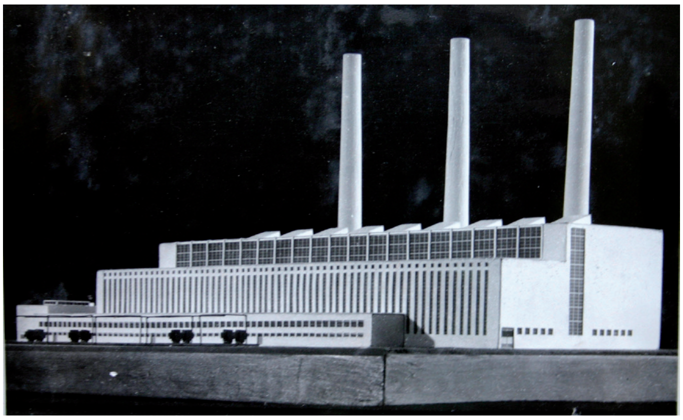

Fig. 5. Kazincbarcika power station. Second design version – model. 1950-1951. (By kind permission of Foundation for Modern Industrial Architecure – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

important to note here, that although the change was explained by the technological redundancy of the glass walls, opinions in power station architecture in this period were strongly divided worldwide – therefore presumably in Hungary too – about the amount of daylight necessary in the interiors of power stations.[12] At the same time, the unifying tendency in power station architecture in regard to massing and ground plan layout – previously mentioned in connection with the Inota facility – happened to satisfy the new expectations of the period.

Equally important regarding the application of officially promoted principles and the development of the new concrete aesthetics is the power station that was established on the premises of the gigantic metallurgical plant in Dunaújváros, the new 'socialist city' (planning from autumn 1950, construction in 1951-1953 [17, p. 26-51]). (Figures 6-9) The designers of this development – Mátrai, Pászti and Fekete, as well as Attila Csaba and László Vasek – were now given far greater freedom to realise their ambitions. This was possible since the technological designers accepted that the massing did not

12 It seems that this debate was at least as much influenced at the time by local architectural conventions, aesthetic preferences, and the given building industrial and economic opportunities as by the technological and functional requirements. This is analysed e.g. in: [7, pp. 248-249]. In this regard, Hungarian power station architecture was also inconsistent: huge glass walls appeared in the second half of the 1950s.

Fig. 6. Dunaújváros power station. Designers: Gyula Mátrai, Károly Pászti, Béla Fekete, Attila Csaba, László Vasek. 1950-1953. (Szabó, J. ed.: *Nagyipari létesítmények 1945-1970*, Budapest, 1975, p. 93.)

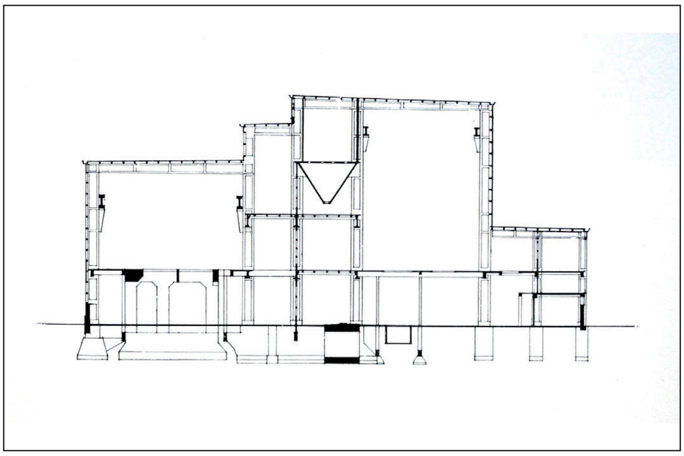

Fig. 8. Dunaújváros power station. Cross section. 1950-1953. (Szendrői, J. et al. eds.: *Magyar építészet 1945–55*, Budapest, 1955.)

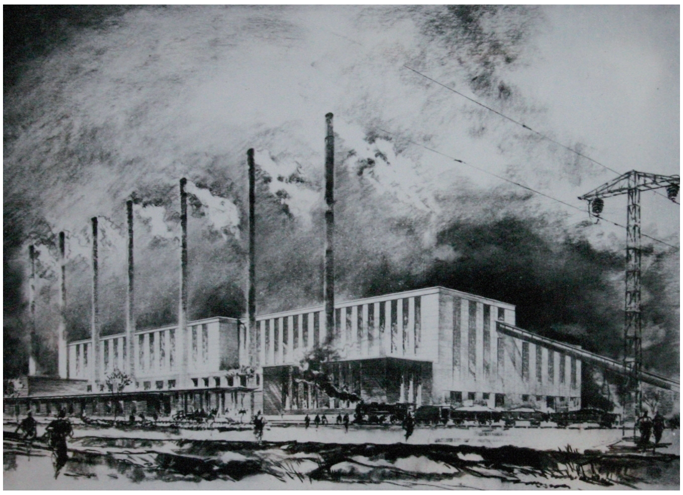

Fig. 7. Dunaújváros power station. Rendering. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

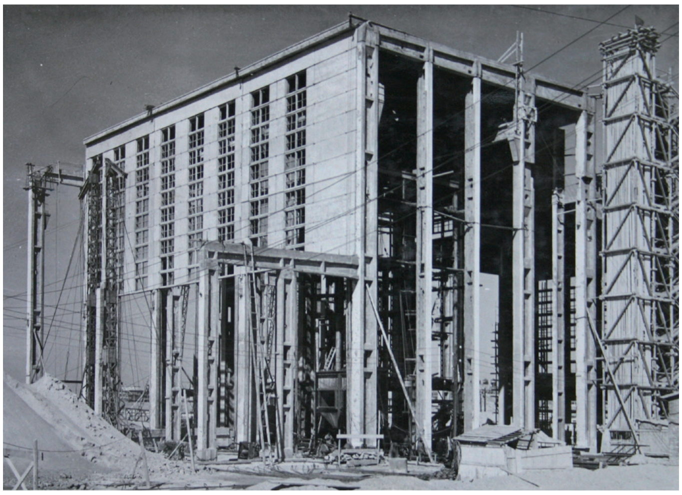

Fig. 9. Dunaújváros power station. Structure. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

only depend on the space required by the equipment housed in the facility. Additioanlly, the builders were more experienced in on-site precasting, thus being able to far better exploit the opportunities this technology provided. The heights of parallel wings were less at variance with each other here than in the Inota power station, and the bunker hall was successfully designed into one unit with the boiler house; however, the hall for the feedwater system still represented a transition, although far less conspicuously [26][35]. For reasons of cost-effectiveness, the facades were opened up by a row of narrow and tall windows instead of glass walls, providing a model for power stations to follow in subsequent years. The dense web of the prefabricated panel construction runs through the facades as a kind of geometrical pattern, creating a visual unity between the individual parts of the building. However, this aesthetic order is somewhat disrupted by the alternation of too many panel versions (which architects predominantly explained with the problems of technological design and the lack of experience regarding panel constructions) and the numerous errors in implementation [26, p. 391]. Nevertheless, being at the centre of the symbolic Dunaújváros project of the Rákosi era, the power station stood as a spectacular demonstration of the potential inherent in on-site precasting and in an industrial architecture free of formalism – contemporaneous periodicals praised at length this fascinating embodiment of the principles of ‘socialist building’.

The problem with socialist realism: Kazincbarcika and Tiszapalkonya

All that constituted an intention or a hopeful start in the Inota and Dunaújváros power stations came to fruition in the next two facilities in Kazincbarcika and Tiszapalkonya. These not only represented the next stage in the inner development of power station architecture, but also became the buffer zone between socialist realism (which had by then been made the obligatory style by official dictates) and the new concrete aesthetics of industrial architecture. It should come as no surprise that despite the fact that socialist realism could be

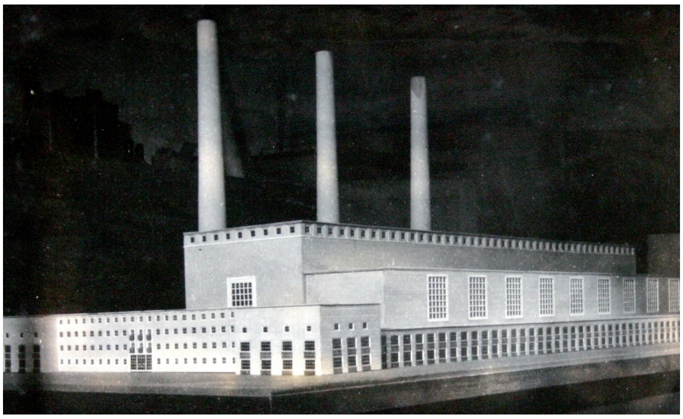

Fig. 10. Kazincbarcika power station. Third design version – model. 1951. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

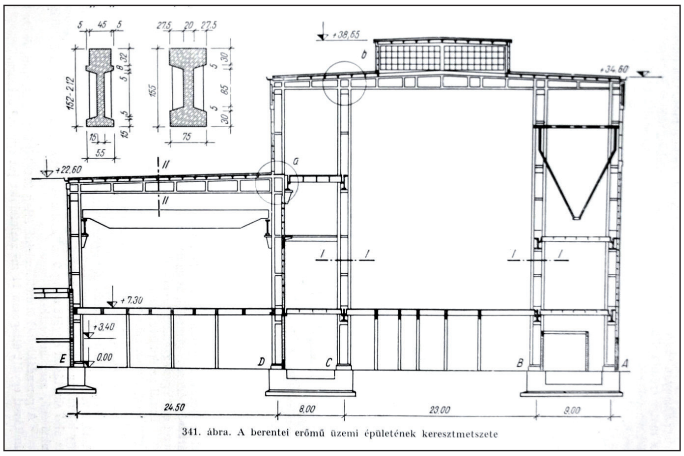

Fig. 12. Kazincbarcika power station. Cross section [29, p. 273.].

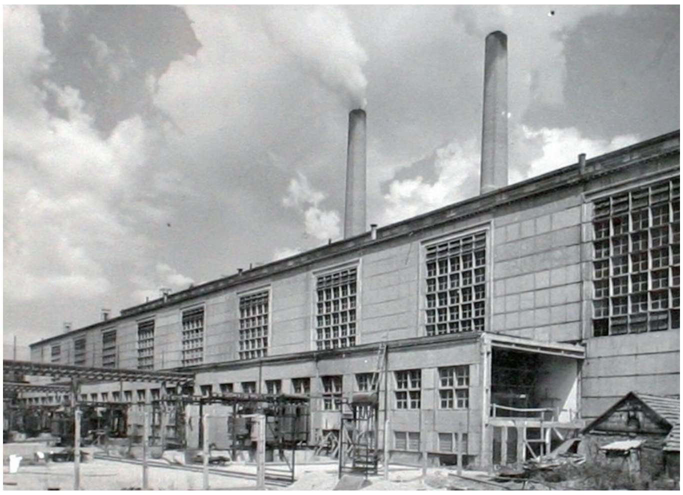

Fig. 11. Kazincbarcika power station. Designers: Gyula Mátrai, Károly Pászti, Béla Fekete, László Vasek, Bertalan Árkay. 1951-1955. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

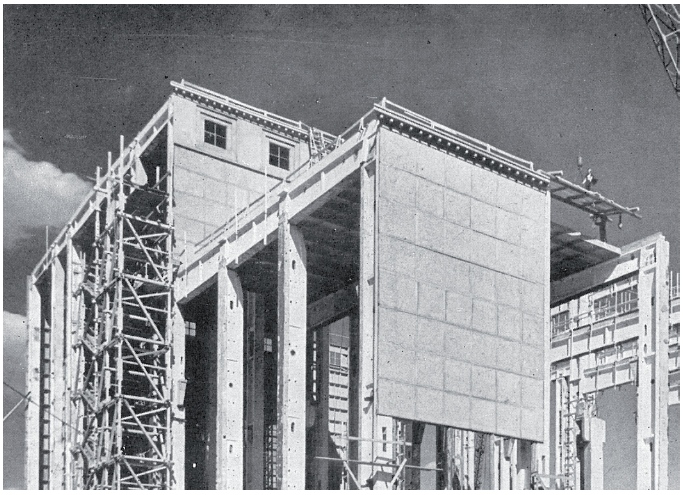

Fig. 13. Kazincbarcika power station. Structure. (Szendrői, J. et al. eds.: *Magyar építészet 1945–55*, Budapest, 1955.)

imposed on industrial architecture far less due to the technological restrictions, certain spectacular projects – among them the power stations – had to satisfy official expectations to some extent, most likely because of the symbolic role attributed to them in the narrative of 'building socialism'.

During the second and final reworking of the drawings made for the Kazincbarcika power station in autumn 1951, the design team led by Mátrai (Pászti, Fekete and Vasek) was joined by a prominent figure of modern Hungarian architecture, Bertalan Árkay; it is likely that he designed most of the implemented facade compositions.[13] (Figures 10-14) This time the architects worked together in far closer cooperation with

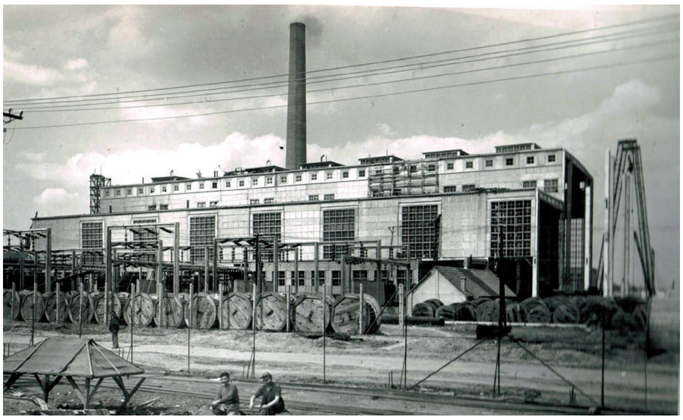

Fig. 14. Kazincbarcika power station. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

13 The names of Bertalan Árkay and Árpád Szentpály can be read on the power station's façade drawings dated September-October 1951. Letter file of National Archives of Hungary (Magyar Nemzeti Levéltár) XXIX-D-10-b 2540. Preliminary work linked to the power station development project had likely begun in 1950 [28, p. 33], but according to archive data the project design and the draft plans were only approved in spring 1951. (Az IPARTERV Tervosztályának kimutatása az erőművek tervezéséről [Documentation of the Planning Department of IPARTERV on the design of power stations], Box 22 of National Archives of Hungary (Magyar Nemzeti Levéltár) XXIX-D-10-a. The construction started in 1952, was suspended in 1953, and then restarted and completed in 1954-1955.

the technological specialists than in previous projects, agreeing on a functional arrangement and mass composition that almost completely eliminated the formal diffusion that was previously dictated by the technological systems. Since the hall for the feedwater system, the boiler house and the bunker hall were placed in a three-nave rectangular hall, the main building of the power station – disregarding the low switching house in front of the turbine house – formally consists of two parts (the large, three-nave hall and the lower and narrower turbine house connected to it). This solution facilitated a radical simplification of prefabricated structures and an increased formal maturity, which were beneficial in terms of both economy and aesthetics: it allowed for the concrete frames of the power station's loadbearing structure to be assembled from only five pillars and two massive beams. A complete formal and structural unity was also achieved in the panel system of the facades, which could thus serve as the basis for the overall aesthetic system of the power station design [26] [29, pp. 272-275]. The square fields outlined by the ribs of the panels were used as a kind of module in the articulation system of the facades. Forming a network, they cover the closed surfaces and run through the concrete grid of the windows, the roof lights and even the glass walls between the turbine house and the hall for the feedwater system. The clear structural logic of the building's loadbearing structure, its mass composition made up of compact forms, and its simple but refined details found a common denominator in this taut geometrical order, as if uniting in an almost poetic harmony the work of the engineer focusing on structural-technological expedience and that of the architect striving for the overall artistic effect of the design.

Numerous details of the facades of the Kazincbarcika power station do not follow this principle of logical forming; however, the windows are surrounded by moulded window frames, the walls are closed with dentilled cornices, and the ventilation openings of the higher part of the building are designed as windows with stepped outer reveals reminiscent of antiquity. These applicative and classicizing details, finely harmonised with the panel system, were already conceived in the spirit of the Hungarian ideology created around socialist realism, and at the same time they foreshadowed the grave dilemma that this stylistic dictate brought about in industrial architecture.

Around this time, the debate in industrial architecture primarily focused on how the slogan 'socialist content–national form' – itself a contradiction – could be reconciled with the specifics of industrial architecture and on-site precast concrete construction [11, pp. 338-348]. While 'socialist content' propagated the monumental synthesis reflecting the grandness of expediency and the socialist world order, by 'national form' they referred to design principles drawing inspiration from – but not copying – local progressive traditions and within that primarily from Neo-classicist architecture linked to the Reform Era, which was seen as having brought about 'national revival' by a large part of society [39] [40]. It was not impossible to apply the requirements of expediency and monumentality together in industrial buildings, given the nature of the design task. However, ideologists were less than satisfied with the notions of "unintentional" and 'necessary' monumentality: their expectation was monumentality in the classical sense, intentionally achieved though symmetry, contrasts, accentuated axes and rhythms. This meant a barely reconcilable paradox in regard to modern functional and technological requirements, similarly to the expectation of regarding Neo-classicism as a formal and intellectual basis in architecture. At the same time, as shown by the examples in Chapter I, connecting innovative structures and the classicizing tradition was not entirely unknown to modern Hungarian industrial architecture. Although these buildings were not regarded as appropriate reference projects for structural design based on on-site precasting, they nevertheless might have influenced the thinking of architects.

In light of this, it is obvious that in the design of the Kazincbarcika power station, certain elements, such as the coherent, symmetrical masses, as well as the quiet rhythm of the windows and the grid of the panel construction reminiscent of a classical ashlar wall, were by their nature suitable for satisfying the requirements of expediency and monumentality. This 'classical purity' was perhaps not ceremonial enough, and did not sufficiently remind people of the progressive traditions; hence, direct allusions were needed. Thus, architects turned to some general elements of historic architecture (window frames, cornices, etc.) to enhance the inherent monumentality of the facility's construction, although only to such an extent that the structural and formal consistency of the design would not be ultimately disrupted. They applied the same solution on the facade of the switching house, situated before the facade of the turbine house, and the facade of the office and welfare building, located in front of the eastern facade of the power station. In the latter case, however, the previous modern mass composition needed to be altered: in order to achieve a classicizing representation, emphatic corner avant-corps were added to the building, while the centrally placed main entrance was accentuated by being more richly articulated (Figure 15).

The Kazincbarcika power station would have been a suitable illustration for the article written by Jenő Szendrői, the chief engineer of IPARTERV, which had the partial aim of justifying the validity of purely structural aesthetics at the time when socialist realism was imposed on architects [44]. Szendrői claimed that the methods of 'socialist building' (prefabrication, modular coordination) could be best implemented through architectural solutions resembling the characteristics of 'classicizing styles'. In his view, the mass and facade compositions characteristic of Neo-classicism follow from the internal logic of prefabricated structures. He concluded, "the classical character of socialist architecture is also confirmed by the production method and the structural solution …" [44. p. 572].

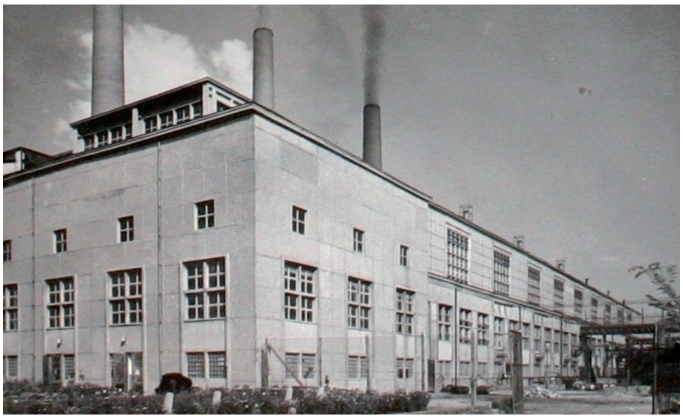

Fig. 15. Kazincbarcika power station. Office and welfare building. Designers: Gyula Mátrai, Károly Pászti, Béla Fekete, László Vasek, Bertalan Árkay. 1951-1955. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

Fig. 17. Tiszapalkonya power station. Structure. Designers: Gyula Mátrai, Károly Pászti, László Vasek, László Bereczky. 1952-1957. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

The design of the Kazincbarcika power station is reminiscent of several other designs that were submitted to an architectural competition announced in 1952. The aim of the competition was to find socialist realist methods of composition reconcilable with the restraints of industrial buildings through the design of the facade for a metallurgical hall assembled from prefabricated panels. The competition was declared a failure by the jury, since they had expected architects to use a more ceremonial style with more broken-up and richly articulated surfaces [42].

This criticism might have played a part in the fact that the classicizing modulation of prefabricated constructions was far more distinctly and impressively carried out in the power station erected for the Tiszapalkonya chemical plant (design from spring 1952, construction until 1957, with several breaks) than in the facility in Kazincbarcika, partly because the architects of the Tiszapalkonya power station – Mátrai, Pászti, Vasek and László Bereczky – were able to exploit the benefits of the new developments in on-site precasting (Figures 16-20).

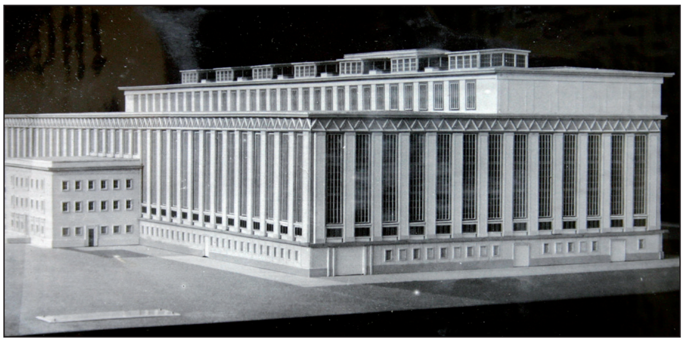

Fig. 16. Tiszapalkonya power station. Model. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

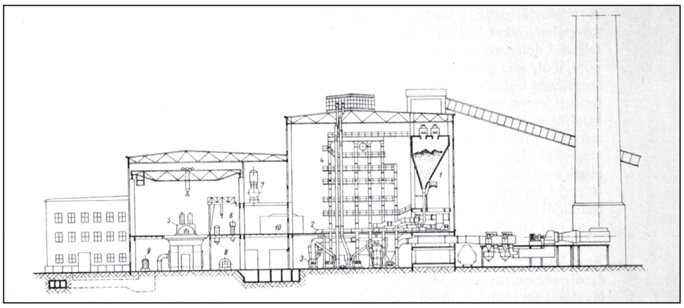

Fig. 18. Tiszapalkonya power station. Cross section: structure and technological system [18].

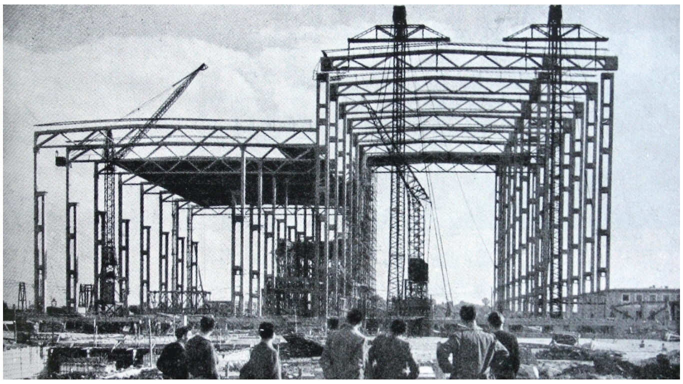

Fig. 19. Tiszapalkonya power station. Structure.
(Szabó, J. ed.: *Nagyipari létesítmények* 1945-1970, Budapest, 1975, p. 93.)

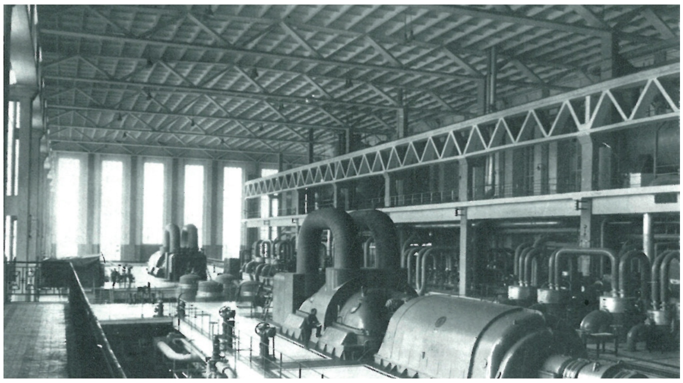

Fig. 20. Tiszapalkonya power station. Turbine house, interior.
(Szabó, J. ed.: *Nagyipari létesítmények* 1945-1970, Budapest, 1975, p. 208.)

The power station in Tiszapalkonya is primarily characterised by a majestic and compact mass reminiscent of monuments, and it seems that the technological systems formed less of an obstacle than in previous projects. The hall for the feedwater system and the turbine house shared the same space, and the opportunity arose to unite the bunker hall with the turbine house. The designers finally arrived at two two-nave halls of appropriate proportions both technologically and architecturally. Therefore, similarly to the Kazincbarcika building, the one in Tiszapalkonya only consists of two blocks, although their heights and widths are less at variance in the latter, thus the mass composition became even more closed and coherent.

The buildings character is just as strongly determined by a significantly changed structural system. In order to enhance material-efficiency, the architects started to use open web structural elements, Vierendeel pillars, trusses and lattice girders. (Detailed descriptions of the structure in: [35, p. 24-26][4][29, p. 278-281].) Yet again, this introduced a 'refreshing change' in aesthetics in the architecture of power stations: it lent a great degree of gracefulness to the whole building but especially to the interior spaces, elevating the hall of the turbine house into one of the most spectacular industrial interiors. The simultaneous optimization of the cubic capacity required by the technological equipment and the structural system brought a kind of culmination regarding ambitions aimed at economy – considered throughout the planning of the three high capacity power stations built after 1949 – and thus was highly praised by the contemporaneous press.

Another change was the introduction of a new panel system in which the previously horizontally positioned rectangular elements were placed upright. This new construction was far less determined by the building's loadbearing structure than the Dunaújváros and Kazincbarcika panel constructions (since they were joined not to the pillars of the frames but the edges of the slabs). Thus, it enabled a freer forming of the panels and a loosening up of the facade surfaces through a division allowing for a more diverse chiaroscuro. The architects exploited this opportunity and developed a multifarious range of panels with which they were able to achieve a kind of geometrically stylized classicizing design and facade structure in such a way that the on-site precasting process was not made unnecessarily uneconomical and it continued to meet the prevailing technological and functional requirements. The facades stand on tall and accentuated plinths and are closed with an element reminiscent of classical entablatures. The remaining surfaces are dominated by rows of panels functioning as pilaster-like articulating elements alternating with the concrete grid of the windows placed in between them.

The panel constructions also had a technological function: the U-cross-sectioned panels in between the windows provided an air duct for the ventilation equipment, being an extremely economical and space-efficient solution [35, pp. 24-26] [29, pp. 100-101]. Thanks to this solution the panels functioned as vertical articulation elements jutting out from the facade as quasi pilasters. This particular detail encapsulated an entire architectural way of thinking: the aspiration aimed at harmonizing – and even integrating – technological methods with structures made with on-site precasting finally met with the artistic ambition of synthesizing the new concrete aesthetics with a classicizing design.

The described detail also shows that the panel construction was used not so much to conceal but much rather 'spiritualize' the industrial function and the character of the buildings' structure: the scale and form of the masses, as well as the sizes of the windows and the ventilation openings in the plinths clearly demonstrated the 'factoryness' and the prefabricated nature of the building. Despite the designer's intention to synthesize, the classicizing modulation of the construction was bound to result in paradoxical solutions, which – for this reason – provided lessons to be learnt. For example, the zigzagging frieze running on the entablature, virtually turned the pattern created by the bracing struts of the lattice girders spanning the halls into a classicizing decorative element, thus making a classicizing allusion to interior structural forms. The aim of the designers might have been to achieve a kind of aesthetic interplay between the facades' composition and the interior structural design, although it remains a question whether such ambitions could be more than mere futility in the given architectural situation. In any case, with its extremely finely differentiated details, the power station inadvertently focused attention on the philosophical dimensions of the period's architectural issues, which, regardless of the contradictions, created such an autonomous architectural world that it does not come across in any of its elements as opportunistically catering to socialist realist ideology.

In the following lines written in 1954, Máté Major, the period's leading theorist, suggests that the building did, after all, satisfy the expected ideological objective linked to it. Major stressed that the architects "expressed the classical unity of the main building" through the division of the facades and the arrangement of the masses and that the aesthetic considerations imbue every structural detail "not at the cost of bringing compromises dictated by technology… and economy but rather in a way that more advanced architectural forms would represent more developed technological and economic standards." [24, p. 13] In his article Major also discusses the strong expressivity of the interiors and the loadbearing structure: "joining the interiors of the turbine hall and the hall for the feedwater system, as well as the unified solution of the internal architecture of the thus resulting vast interior space, are an artistic expression of the astounding energy… generated here." [24, p. 13] Major most likely saw the building's "classical unity", in which expedient structures and spatial forms themselves also became multi-layered and monumental means of architectural expression, synonymous with the notion of 'socialist content'.

Less than two years later, the architectural concept of the power station at Tiszapalkonya no longer received overall praise: the political changes that had taken place in the Soviet Union and Hungary during this time and the simultaneous easing of ideology encouraged architects to break with socialist realism and return to modernist principles. In 1956, Péter Benkő wrote that the Tiszapalkonya power station had a well-designed and harmonious structure, but at the same time "regarding the details of the building, the architects were unable to free themselves from… the architectural principles that prevailed at the time of planning… which led to contradictions." [4, p. 243] Opinions about the architecture after 1951 diverged significantly at this time. For example, in an essay published in 1956, in which Máté Major undertook the task of giving an unbiased, objective evaluation of the years of socialist realism, the author also had the most important power stations in mind when elaborating that in a smaller part of the industrial facilities built around this time "an ambition to achieve a richer forming [meaning: conforming to the ideology of socialist realism] and the restrictions linked to the type of project, interacted in a way that a more fortunate and deeper fusion came into being than in other architectural tasks", while, in general, factory buildings inherently either resist ideological pressure or – on the other extreme – the templates of socialist realism are manifest in them conspicuously inorganically. To borrow the words of Major, standing as an example of this productive "interaction", the power station at Tiszapalkonya draws attention to Hungarian architects' aspirations to develop feasible strategies while retaining their professional integrity.

Low-capacity power stations, auxiliary plant buildings

The architecture of smaller power stations catering to local demands during the Rákosi era followed a different path of development in a certain sense, despite the similar technological and formal issues. These buildings, less bound by considerations of economy, opened up greater opportunity to exploit the variability of technological systems, and through that, to use aesthetically more advantageous and diverse massing. Instead of the strictly side-by-side plan form of the technological units in high-capacity power stations, in the case of low-capacity facilities, the possibility arose for a T- or L-shaped disposition. For this reason on-site precasting was not worth using in these buildings, which, therefore, were predominantly constructed with a monolithic technique.

The power station built for the Csepel paper factory stands out with its exceptionally refined detail-forming. Its architects – József Wappler, Pál Mayer and Ervin Kemper – applied solutions in some parts of the facade composition similar to those seen in the Tiszapalkonya power station, although the walls in the Csepel construction were built from brick and the entablatures and window frames follow the Neo-classicist models more closely. (Description of the structure: [37].) (Figures 21-22) A similar style is shown by the design made for the far larger power station at Marosújvár (Ocna Mureş) and that of the Újpest facility (former: Endre Resatkó, 1953; latter: Jenő Halászy and György Rácz, 1953) [24, pp. 18-19, pp. 14-15]. The facade composition of these buildings is the same in the Debrecen ball-bearing factory's boiler house (István Füzér, István Hermány and co, c. 1952-1953 [10]), although here the entablatures and sections were replaced by bands of plastered wall, being only a faint allusion to Neo-classicism. (Figure 23) The mass composition built on contrasts, the sombre grandeur of the vast closed wall surfaces, as well as the tranquil rhythm of the row of windows and the simple moulding elements carved in limestone and marble, lend monumentality to the power station of the Technical University of Heavy Industry in Miskolc (József Schall, 1953) [24, pp. 16-17] [33] (Figure 24). This effect is further intensified by the heroism inherent in the building's connection with the landscape: the power station stands on a platform towering above the valley. A power station drawing by Jenő Juhász [24, pp. 20-21] has a similar although slightly more decorative design. It impressed Máté Major, in whose view the style of this work "seemed to be a feasible direction through which the exteriors of industrial buildings could finally

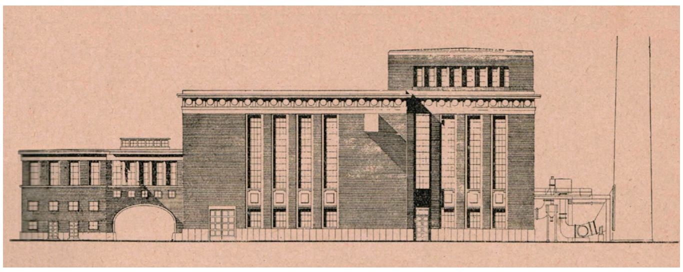

Fig. 21. Power station, Csepel paper factory. Facade plan. Designers: József Wappler, Pál Mayer and Ervin Kemper. 1953-1960 [37, p. 49].

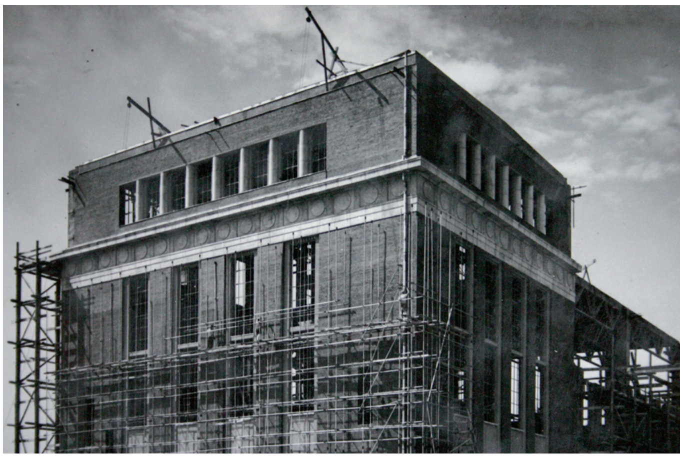

Fig. 22. Power station, Csepel paper factory. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

Fig. 23. KBoiler house, Debrecen ball-bearing factory. Designers: István Füzér, István Hermány and co. 1952-1953. (By kind permission of Foundation for Modern Industrial Architecture – IPARTERV Photo Archive / A (Modern) (Ipari) Építészetért Alapítvány – IPARTERV Fotóarchívum)

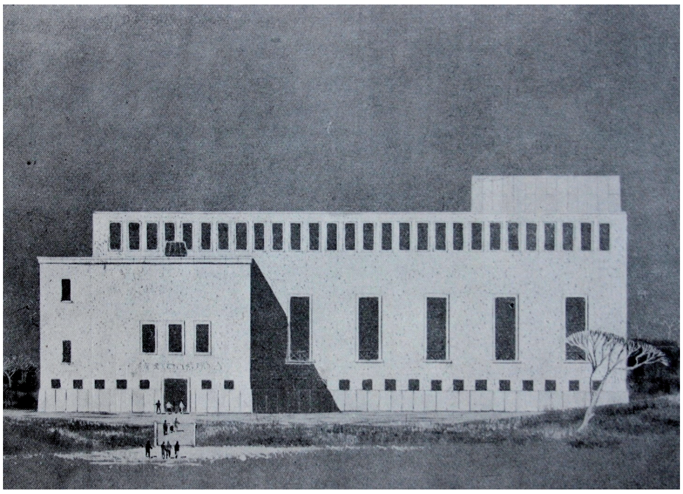

Fig. 24. Power station, Technical University of Heavy Industry in Miskolc. Facade plan. Designer: József Schall 1953. [24, p. 17].

be lifted out from their previously soulless »sachlich«-ness and a harmonious expression for the gravity and optimism of productive work could be finally found." [24, p. 10]

Although technical parameters greatly determined the design of the *auxiliary plant* buildings linked to power stations, such as facilities for fuel supply and water management, cooling towers, etc., they were important elements in the overall appearance of power station complexes; as much as was possible, their designers strove to harmonise these buildings with the character of the main building. The composition of the main buildings was, however, typically defined by the switching houses; due to the technology involved, there was a wide range of possible opportunities for its location. A frequent solution was to connect the turbine hall and the freestanding switching house with the *control room*, where the equipment controlling the machines of the power station was installed; examples of this include the power stations of Dunaújváros, Tiszapalkonya and Csepel. Other locations for the control room were inside the main building, or in a separate building outside it. However, in the Kazincbarcika power station, for example, the control room connected the switching house and the office building. These rooms were typically of higher quality in terms of their interior architecture: in the case of all the power stations discussed in this paper, the control rooms had delicate glass ceilings, hidden lighting, subdued and articulated walls, all in an elegant, classicizing style.

Overall, it can be clearly seen that the main objective in the architecture of power stations around 1949-1950 was to emphasise the economy of the new concrete technology, 'reflecting the spirit of socialism', and even to aestheticize it. From 1951, however, architectural forming – beyond the need to adapt them to technological changes – was defined by aspirations to 'reconcile' the conflict between classicizing monumentality (as "intentional monumentality") and the aesthetics inherent in structures produced by on-site precasting. This distinguishes the power stations of the Rákosi era from the prewar classicizing modernist industrial architecture mentioned in Chapter I in connection with the power stations at Kelenföld and Diósgyőr. Of course, in some respects there are bound to be aesthetic overlaps between the power stations of the two periods due to the similar nature of the architectural tasks and the formal ambitions involved.[14] At a more general level, it can be stated that the power stations of the Rákosi era actually stand as peculiar – and rather late – examples of the classicizing tendency of "intentional monumentality", which was manifested in 20th-century industrial architecture. The power stations at Kazincbarcika and Tiszapalkonya are on a par with those prominent buildings whose designers successfully created an architectural idiom that did not clash with the art policy of the time, yet self-confidently avoided muscovite schemas and 'recipes' invented by Hungarian ideologists. At the same time, it must be

14 Such formal interplay can be seen especially in the case of small power stations, since they have a monolithic structure and brickwork facades like the facilities built before World War I. See especially the formal similarities between the Debrecen ball bearing factory's boiler house and boiler house III of the Kelenföld facility; and the power station of the Csepel paper factory and the parts of Kelenföld power station designed by Reichl.

noted that the Mátrai group and the architects that worked with them, did not revisit the classicizing modernism of Scandinavia or the traditional materials and structures used in Hungarian rural classicism; instead, being exceptional in this regard in Hungary, they sought the new path for architecture through concrete technology.

However, this trend only lasted a mere four to five years. The mid-1950s was a period of major changes: the ideology of socialist realism collapsed, opening the way for the revival of Hungarian modernist traditions; moreover, radically new structural systems produced with on-site precasting came into being. It became unambiguously clear that the system based on the combination of precast frames and panels had reached its limits with the Tiszapalkonya power station, beyond which no further development was possible either in terms of economics or structure. Inspired by this realisation, the design team of IPARTERV began the development of a radically new system around 1955-1956, in tandem with the planning of the power station at Pécsújhely, which ensured a further reduction in the number of element types and the actual number of elements [36][35, pp. 27-28]. This new system was a milestone in regard to engineering and economy, and it also led power station architecture down a new path, bringing about fundamental changes in the unique concrete aesthetics that emerged in the late 1940s. This innovation gave architects the opportunity to finally create 'something entirely different' from socialist realism, in the spirit of the 'winds of change', which then they were eager to present in a spectacular way.

Monumentality continued to be an important issue, although designers no longer focused on the classicizing modulation of prefabricated constructions but rather – perhaps since they had no other choice – attributed growing importance over the following years to the articulation of forms resulting from the integration of structures and machines, used as a means of artistic expression. This might be likened to the technicist architectural approach that Rayner Banham referred to as "exposed power" [3, pp. 234-264].

(The next part of the study analysing the developments after 1956 will be published in the next issue.)

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