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A TECHNIQUE FOR CREATING ARCHITECTURE?

TECHNIKA TWORZENIA ARCHITEKTURY?

Abstract

Is Architecture pure Art, devoid of technical aspects, or a discipline of technical sciences? Can the innovativeness of the technical solutions applied be the main determinant of Architecture? In the architecture of the 1950s–1970s, we can find beautiful, sometimes spectacular geometrical forms – the hyperboloid of the Brasília Cathedral, the spherical covering of the Sydney Opera House, hyperbolic paraboloids, the tensegrity structure of the covering of the Katowice Arena, the so-called Spodek. The construction of these forms was made possible by the use of innovative technical solutions. So, was Architecture defined by technology?

Keywords: architecture, geometrical form, designing, Spodek

Streszczenie

Czy Architektura jest czystą, pozbawioną aspektów technicznych Sztuką, czy też dyscypliną nauk technicznych? Czy nowatorstwo zastosowanych rozwiązań technicznych może być główną determinantą Architektury? W architekturze lat 50.– 70. XX w. odnajdujemy przepiękne, nieraz spektakularne formy geometryczne – hiperboloidę Katedry w Brasílii, sferyczne przekrycia Opery w Sydney, paraboloidy hiperboliczne, strukturę tensegrity przekrycia katowickiej hali widowiskowo-sportowej, tzw. Spodka. Budowa tych form możliwa była poprzez zastosowanie nowatorskich rozwiązań technicznych. Czy zatem poprzez technikę zdefiniowana została Architektura?

Słowa kluczowe: architektura, forma geometryczna, projektowanie, Spodek

1. INTRODUCTION

Is there Architecture without technology? Is Architecture a pure Art devoid of technical aspects? We talk about: the technique of building construction, technical aspects of design and engineering, technique in architecture. We wonder: is Architecture an Art or a discipline of technical sciences? And at the same time, we marvel at the art of building, at the technical aspects of erecting architectural structures, and describe the changing forms and functions of Architecture as a process that changes over time, occurring simultaneously with technical progress. Can the novelty of the solutions applied be the main determinant of Architecture? Can we shape Architecture through Technology?

In the architecture of the 1950s–1970s, we can find beautiful objects, often spectacular in terms of the construction of their geometric form – the hyperboloid of Oscar

Niemeyer's Brasília Cathedral, the spherical skylights of John Utzon's Sydney Opera House, the hyperbolic paraboloid of Felix Candela's objects,[1] the tensegrity structure of the skylight of Katowice's Spodek arena. The construction of these forms was made possible through the use of innovative technical solutions. So is Architecture defined by technology?

We describe the architecture of the turn of the 20th and 21st centuries with terms:

- Non-Standard Architecture,
- Architecture of the Fold,
- Digital Architecture,
- Blob Architecture,
- Hyperarchitecture – a structured system, programmable and adaptable environment.

The technical, digital aspect of object creation is the determinant of the concepts and definitions used.

In this connection, in general, holistically, can we speak of a Technique for creating Architecture?

2. ARCHITECTURE WITHOUT ARCHITECTS?

In 1964, the Museum of Modern Art in New York organised two exhibitions that were highly significant in form and content: "Architecture without Architects"[2] and "Twentieth century engineering."[3]

Presenting human dwellings from caves through huts, clay-built huts of Africa and the Middle East, to wooden huts of Europe and Asia, the exhibition "Architecture without Architects" consisted of numerous photographs, diagrams and models that depicted various forms of vernacular architecture. The exhibition included earthen huts from Yemen, traditional villages from Mali with their characteristic towers of dried brick, floating houses on Lake Titicaca in Peru and Bolivia. Each of the structures on display exemplified adaptive building techniques that responded to specific climatic, social and material conditions.[4]

The exhibition "Twentieth century engineering" consisted of sections focusing on different aspects of engineering. Projects from areas such as construction, transport, energy, urban infrastructure and space technology were on display. The exhibition included both photographs, models and technical drawings that illustrated the complexity and diversity of engineering projects. Keneth Snelson's tensegrity mast prototype, Eero Saarinen's Jefferson National Expansion Memorial, geodesic domes by R. Buckminster Fuller, Pier Luigi Nervi's Turin Exhibition Hall, Felix Candela's Chapel of Our Lady of Couernavac, and the great telescopes, water towers, cooling towers, bold forms of double-curved concrete shells

[1] M. Sroka-Bizoń, *Will modernity become a tradition?* [in:] T. Kozłowski (ed.), *Defining the architectural space. Tradition and Modernity in Architecture*, vol. 5, Oficyna Wydawnicza ATUT – Wrocławskie Wydawnictwo Oświatowe, Wrocław 2019, pp. 83–92.

[2] B. Rudofsky, *Architecture without architects. An introduction to non-pedigreed architecture*, The Museum of Modern Art, New York 1964, https://assets.moma.org/documents/moma_catalogue_3459_300062280.pdf (access: 1.06.2024).

[3] A. Drexler, *Introduction* [in:] *Twentieth century engineering*, The Museum of Modern Art, New York 1964, https://assets.moma.org/documents/moma_catalogue_2568_300190129.pdf (access: 1.06.2024).

[4] P. Trzeciak, *Pochwała różnorodności. Architektura po roku* 1960 [in:] I. Kunińska (ed.), Sztuka świata, vol. 10, Arkady, Warszawa 1996, p. 279.

spanning hangars, stadiums and station platforms, huge dams and suspension bridges – were all representative of rational design thought.

The curators of both exhibitions Bernard Rudofsky and Arthur Drexler put forward a bold thesis – creating Architecture without architects is possible!

3. TECHNIQUE FOR CREATING ARCHITECTURAL ICONS

8 May 1971 saw the ceremonial opening of the Provincial Sports and Entertainment Hall in Katowice, now known as "Spodek."[5] An object was opened, which in contemporary descriptions is described as: an icon of Katowice, a classic of Silesian architecture,[6] a spectacular object deserving the name of a Polish architectural icon.[7] In the context of considering the relationship between Architecture and Technology, an extremely interesting case illustrating an example of the special relationship between these two disciplines is the creative process accompanying the creation of this building. Based on the research carried out, it is possible to identify the turning points and breakthroughs of this process:

- the organisation by the Association of Polish Architects of a closed competition for the design of a sports and entertainment hall in Katowice located in the area of the Wełnowiec Ditch (in the Koszutka district), in close proximity to the Culture and Leisure Park;[8]
- adopting the classical model of the Roman theatre, the Colosseum building, as the starting point in the design concept of architects Maciej Gintowt and Maciej Krasiński, members of the design team working under the direction of arch. Jerzy Hryniewiecki;[9]
- Wacław Zalewski, a member of the same team, proposed the concept of building the spatial structure of the hall as an inverted cone; shaped in this way, the object was similar to the classical Greek theatre, with the difference that the natural terrain used by the Greeks to situate amphitheatrical buildings was replaced by a man-made structure;[10]

[5] The colloquial name of the hall 'Spodek' began to function among the inhabitants of Katowice in 1973. I. Kozina, *Spodek rozciągany i ściskany*, "Architektura-Murator" 2012, no. 2, p. 18.

[6] T. Borówka, *Spodek. Ikona Katowic, klasyk śląskiej architektury w stolicy GZM*, [in:] Ślązag, 5.10.2022, https://www.slazag.pl/spodek-ikona-katowic-klasyk-slaskiej-architektury-w-stolicy-gzm (access: 2.06.2024).

[7] A. Cymer, *Spodek, proj. Maciej Gintowt i Maciej Krasiński, BSiPTBP* [in:] Culture.pl, 24.10.2016, https://culture.pl/pl/artykul/spodek-proj-bsiptbp (access: 2.06.2024).

[8] In 1959, the Provincial Committee for Physical Culture in Katowice approached the local branch of SARP to organise a competition for the design of a sports and entertainment hall at Feliks Dzierżyński Street (now Chorzowska Street) leading to the Culture and Leisure Park. The competition was a closed one. Four teams with experience in designing sports facilities were invited to participate: 1. the team of Julian Brzuchowski (Silesian Stadium in Chorzów), 2. the team of Jerzy Gottfried, 3. the team of Kazimierz Sołtykowski and 4. the team of Jerzy Hryniewiecki (10th Anniversary Stadium in Warsaw). I. Kozina, *Spodek…*, *op. cit.*, p. 18.

[9] This stage in the creation of the design concept is described by I. Kozina: "As Wacław Zalewski recalls today, the architects designing Spodek, Maciej Gintowt and Maciej Krasiński, who belonged to Hryniewiecki's Warsaw team, originally had different ideas, taking the Roman Colosseum as their starting point." *Ibidem*.

[10] In an interview with the Architektura-Murator journalist Maja Mozga-Górecka, Wacław Zalewski described this stage in the creation of the design concept for the hall as follows: "Two Macieks,

- selection of the winners of the competition;[11]
- decision to build the building[12] and change its location; the hall was located near the roundabout, which is the intersection of two downtown arteries: W. Korfantego Avenue (formerly Armii Czerwonej Street) and W. Roździeńskiego Street; the consequence of the change of location was the necessity to adapt the structure of the building to its foundation in an area subject to a much more intensive impact of mining.[13]

Each of the highlighted turning points and breakthrough moments influenced the developing design concept of the work. Andrzej Żórawski, who together with Aleksander Włodarz designed the hall's structure after Wacław Zalewski left Poland in 1962, described the design process as an evolutionary one, emphasising that it was only the fourth concept for the structure of the building that was realised[14] The end result of the creative process created by the design team was an architectural object nowadays referred to as an icon of Katowice – "Hala Widowiskowo – Sportowa Spodek". Its central, distinctive part is the conical main hall.[15]

The inverted, driven into the ground rotating cone, cut with a plane not parallel to the horizontal plane of foundation, from the vision of W. Zalewski, "sat" on a prestressed foundation ring, which was based on 40 pillars – wishbones (Ill. 1). The pillars were articulated

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Krasiński and Gintowt, worked on the project. They had no idea how to go about it. They came to me, perhaps because I had a thought unspoilt by knowledge of the problem. I proposed an inverted cone with the lower part in the ground, so that the weight of the whole building would act on the ground in the smallest possible area. For buildings in mining areas, it is not the subsidence itself that is dangerous, but the differences in subsidence between points close to each other. I also wanted the shape of the structure to show what is happening inside. So that you could see the auditorium in this shape." M. Mozga-Górecka, *Wacław Zalewski – intuicja inżyniera* [in:] "Architektura-Murator" 30.12.2016, https://architektura.muratorplus.pl/krytyka/waclaw-zalewski-intuicja-inzyniera-aa-peyF-cmSs-QFfi.html (access: 14.06.2024).

[11] The Competition Jury consisted of: arch. Czesław Kotala (chairman of the court), arch. Julian Duchnowicz, Jerzy Ziętek (vice-chairman of the Regional National Council in Katowice), Tadeusz Kuchar, Roman Stachoń, arch. Juliusz Dumnicki, arch. Tadeusz Łobos, arch. Włodzimierz Prochaska, arch. Eugeniusz Wierzbicki, arch. Jędrzej Badner. By the decision of the Competition Jury, the work of Jerzy Hryniewiecki's team was selected from among 4 design concepts. In the jury's opinion, this work best fulfilled the conditions of universality, at the same time providing the most favourable solutions in terms of architecture. *Hala Sportowa w Katowicach. Materiały z konkursu*, "Architektura" 1960, no. 7, pp. 265–268.

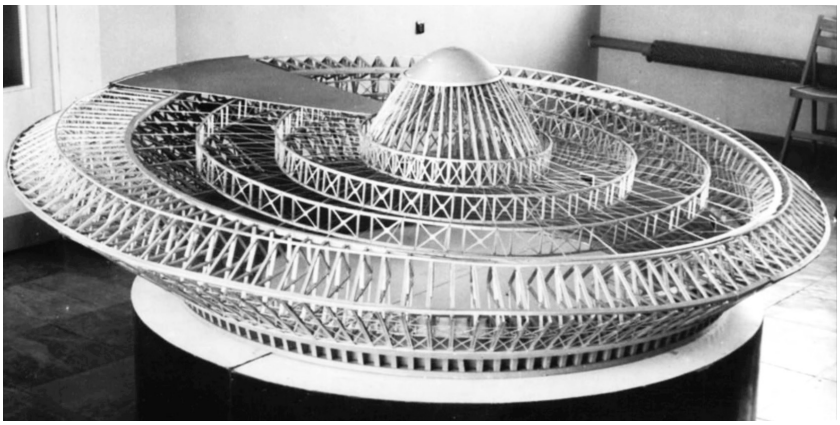
[12] The decision to build Spodek was finally taken by Jerzy Ziętek, who had been president of the Presidium of the Voivodship National Council in Katowice since 1964. It was then that it was decided to change the location of the building slightly, moving it closer to the newly erected city centre, to the vicinity of the roundabout. I. Kozina, *Spodek…*, *op. cit.*, p. 18.

[13] In a retrospective interview conducted more than 50 years after the facility's conception, W. Zalewski characterised the ground conditions of the new location picturesquely: "Spodek was built in the middle of the city and on post-mining land. The ground underneath it is cut by tunnels, resulting in frequent uneven subsidence, which still damages buildings in Silesia today. The Silesian land was therefore precarious, in the sense of foundations, not in the sense of patriotism." M. Mozga-Górecka, *op. cit.*

[14] A. Żórawski, *Ewolucja projektu konstrukcyjnego Hali Widowiskowo – Sportowej w Katowicach*, "Inżynieria i Budownictwo" 1969, no. 10, pp. 381–386.

[15] M. Gintowt and M. Krasinski, in the authors' reflections presented in 1965 in the journal "Architektura", point to the main hall as the central part of the facility: "The central element of the facility is the main hall. Its body is the conical bowl of the auditorium, the slant of which results from utilitarian reasons […]." M. Gintowt, M. Krasiński, *Hala widowiskowo-sportowa w Katowicach*, "Architektura" 1972, no. 8–9, p. 317.

on the foundation feet so that the horizontal plane of the foundation ring is not deformed. The side structure of the cone was formed by 120 lattice steel ribs, which are at the same time forming the cone. The covering of this steel "basket", the elliptical cross-section of the revolving cone, is "braided" from 120 rope-and-bar trusses connected by an inner ring, above which "floats" the dome – a lantern that illuminates the interior.[16] The spatial structure of the building's construction can be admired on archive photographs documenting the stages of the hall's construction. One of the photographs serves as an illustration for this article (Ill. 2).



Ill. 1. Spatial model of the "Spodek Arena" in Katowice developed for the architectural competition, source: the archive of "Spodek Arena".

Ill. 2. Spatial structure of the "Spodek Arena" in Katowice – construction phase of the facility, the archive of "Spodek Arena".

[16] *Ibidem*, p. 308; R. Szydłowski, B. Łabuzek, *Kondycja dachu katowickiego Spodka w świetle aktualnych pomiarów sił w dźwigarach linowo-prętowych*, "Przegląd Budowlany" 2022, no. 5–6, p. 89.

An excellent supplement to the study of the relationship between Architecture and Technology, in the context of the analysed creative process related to the creation of the Katowice Spodek, is the documentary film by Zenon Filar entitled. "Assembly of the roof structure of the main hall of the Provincial Sports and Entertainment Hall in Katowice."[17] The technical aspects of creating an architectural object, which are an ongoing search for answers to the questions: how to design it, how to solve it, how to build it, can be found in the film presenting the momentum of the already realised roof support structure and the realisation stage connected with the assembly of the paraboloidal dome crowning the roof. Admiring the erected structure of the hall's roof, it is difficult not to agree with the assessment of this part of the building formulated by the architects M. Gintowt and M. Krasiński, that this roof is a very successful engineering construction by its complete simplicity and purposefulness.[18] Perhaps it would only be appropriate to extend this architectural assessment of the structural element with a few adjectives describing the structure of the building as innovative, spectacular and simply beautiful. Complementing the characterisation of the hall's construction in this way, one might ask the question – is the beauty of the Spodek's construction and the associated beauty of the building due solely to the engineering pursuit of practicality and efficiency of its designers, as described by Henry van de Velde? And who managed to achieve this beauty?

4. SUMMARY

Creating Architecture is a creative process. A process that requires the talent of the creator, but to fully realise it requires technical knowledge – Technology that enables the creator to formulate answers to basic, technical questions – how do I make it, how do I design it, how do I solve it, how do I build it?

> According to Mies van der Rohe, Technique conceals the whole world (…) it provides the necessary means and makes it possible to create expressive forms (…) Where technique achieves true perfection, Architecture arises (…) Architecture is dependent on its times. It shows what they really are, it makes their form visible. This is why Technique and Architecture are so closely linked.[19]

The spectacular architectural buildings of the 1950s–1970s cited in the introduction are often characterised as innovative structures that are, in a way, illustrations of the technical possibilities of their time. To travesty the words of the master – it was Technique that made it possible to create these expressive forms.

Can we therefore look for technical methods of creating Architecture? In this connection, in general, holistically, can we speak of a Technique for creating Architecture?

The analysis of the design process of the "Spodek Entertainment and Sports Hall," which is the subject of the considerations presented in this article, allows us to confirm the conviction that Architecture is created in a creative imaginative process. The first stage of this process is the search for: an idea, a concept, a brilliant thought, a flash of creative genius. A separate issue is to identify the participants – creators of this process, which is most often carried out in teams.

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[17] Z. Filar, *Montaż konstrukcji dachowej hali głównej Wojewódzkiej Hali Widowiskowo-Sportowej w Katowicach*, Filmoteka Śląska, https://filmotekaslaska.com/budowa-spodka#r-desciption (access: 17.06.2024).

[18] M. Gintowt, M. Krasiński, *op. cit.*, p. 318.

[19] P. Trzeciak, *op. cit.*, p. 297.

The curators of the exhibitions "Architecture without Architects" and "Twentieth century engineering" presented in 1964 at the Museum of Modern Art in New York, Bernard Rudofsky and Arthur Drexler, put forward a bold thesis – creating Architecture without Architects is possible. The creation of beautiful buildings need not be the domain of architects. A painful conundrum that can be attempted to mitigate by claiming that the beauty achieved by the engineer is due to the fact that he or she is not conscious of the pursuit of beauty. The engineer, a non-architect, designs practically and efficiently obtaining the beauty of the building unconsciously, as it were, as an added value. Is this the case in every case? What research method can be used to determine which participant in the design process is the conscious creator of the beauty of a building?

In numerous publications, descriptions of the "Spodek Performance and Sports Hall," it is customary to present two architects as the primary creators of the building: Maciej Gintowt and Maciej Krasiński.[20] In the case of this object, the presentation of authorship with the privileged role of architects as the default demiurges of the object's beauty seems incomplete and biased. The constructors Wacław Zalewski, Andrzej Żórawski and Aleksander Włodarz played a not insignificant leading role in designing the spatial form of the hall. In the design process they solved not only structural technical problems.

Ill. 3. "Spodek Arena" in Katowice in the contemporary city silhouette, source: "Architektura-Murator" 2022, no. 3, p. 23.

The original concept of a sports and entertainment hall modelled on the Roman Colosseum, by architects M. Gintowt and M. Krasiński, was transformed under the influence of W. Zalewski's concept into a conical mass whose interior resembles a Greek amphitheatre. And it was this spatial form that was developed further in the design. It was the inverted cone that delighted the jury of the competition[21] in 1960 and has accompanied the citizens of Katowice as an icon of their city for more than 50 years (Ill. 3). The designer W. Zalewski was the originator of the object's spatial form, and it is worth remembering this.

[20] A. Cymer, *Spodek…*, *op. cit.*

[21] I. Kozina, *Spodek…*, *op. cit.*, p. 18.

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[13] Trzeciak P., *Pochwała różnorodności. Architektura po roku 1960* [in:] Kunińska I. (ed.), *Sztuka świata*, vol. 10, Arkady, Warszawa 1996, pp. 279–297.

[14] *Twentieth century engineering*, The Museum of Modern Art, New York 1964, https://assets.moma.org/documents/moma_catalogue_2568_300190129.pdf (access: 1.06.2024).

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