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TECHNOLOGY IN ARCHITECTURE. 3 EXAMPLES

TECHNOLOGIA W ARCHITEKTURZE. 3 PRZYKŁADY

Abstract

Architecture is a practical field of knowledge that serves to organize human life and work, but it also has a broadly understood interdisciplinary character. In Polish terminology, architecture refers to the process of designing and constructing buildings, thus inherently involves technique. For this study, examples are drawn from public utility buildings constructed simultaneously in three countries, which are perceived to vary in their levels of civilizational advancement:

- The headquarters of Press Glass in Konopiska near Częstochowa, designed by Konior Studio,
- The Science Museum in Amsterdam, known as Nemo, designed by Renzo Piano Workshop,
- The Louis Vuitton Foundation Art Museum in Paris, designed by Frank Gehry.

Keywords: contemporary architecture, architectural engineering, public utility architecture

Streszczenie

Architektura jest dziedziną wiedzy praktyczną, służy organizacji życia i pracy człowieka, ale także jest także dziedziną o charakterze szeroko pojętej interdyscyplinarności. W nazewnictwie polskim architektura, oznaczając proces projektowania i wznoszenia budynków, ma tym samym technikę niejako wpisaną w nazwę. Dla wypowiedzi przykładami stały się obiekty użyteczności publicznej, zrealizowane w jednym czasie, w trzech krajach, które w powszechnym odczuciu różnią się stopniem rozwoju zaawansowania cywilizacyjnego:

- Budynek siedziby zarządu Firmy Press Glass w Konopiskach pod Częstochową, projektu Konior Studio,
- Muzeum Nauki w Amsterdamie zwany Nemo, pracownia Renzo Piano Workshop,
- Budynek Muzeum sztuki Fundacji Louis Vitton w Paryżu, projekt Franka Gehry.

Słowa kluczowe: architektura współczesna, technika w architekturze, architektura użyteczności publicznej

1. INTRODUCTION

The motto and the subject of the annual meeting in Cracow entitled Defining Architectural Space is "Architecture and Technology." The organizers decided against a precise definition leaving a great deal of freedom to the authors of the planned presentations. Architecture is a practical field, and it serves the organization of human life and work, but it is also a field of

broadly understood interdisciplinarity. In Polish nomenclature, architecture meaning a process of designing and erecting buildings, has technology practically inscribed in its name.[1]

As examples, I used public utility buildings completed at the same time in three different countries, that differ in the degree of the development of civilizational advancement:

- The headquarters of the Press Glass Company in Konopiska near Częstochowa, designed by Konior Studio, is an office building located in an unusual location and with a form that is equally unusual for an office building. The author of the design is Tomasz Konior and his KONIOR STUDIO. A generally accessible technology was used in the construction. Here it can be seen in a calm and elegant form.
- The Museum of Science in Amsterdam, known as Nemo, delights us not so much with its uncommon shape, but with the sheer quantity and quality of its infrastructure which had to be completed in order for the Nemo to be created and function. The facility was created by the Renzo Piano Workshop.
- The Louis Vuitton Foundation Art Museum in Paris, was designed by Frank Gehry, who in the Parisian structure similar to the one in Bilbao, amazes with his show of the unity of technology and architecture. The building, which is bereft of the function of the practical impact on its surroundings, has excellently maintained one of the basic goals, which is also important for the profession: showing the joy of creating a unique place that is also people-friendly.

2. EXAMPLES

2.1. HEAD OFFICES OF PRESS GLASS IN KONOPISKA NEAR CZĘSTOCHOWA, ARCHITECT TOMASZ KONIOR, KONIOR STUDIO

The structure is an expression of the meeting between the investor who has a precise action plan and the architect possessing a creative imagination. The meeting resulted in the creation of a building that amazes with its unique form for the function of an office building and a location that is unusual for the main office of a prosperous company. That is the short presentation of the main offices of Press Glass in Konopiska near Częstochowa 2020. The building was designed by Tomasz Konior, KONIOR STUDIO.

The Press Glass office building was created on the edge of the Polish Jurassic Highland, on the border between suburban buildings and the natural environment. The location is quite unusual for office buildings. In the past, these were unused agricultural fields and groves, that the investor transformed into a broad golf course and situated the building there. Along with its new function, the terrain changed its image. In the past, overgrown with numerous types of trees, dotted with waterways and small water reservoirs, it now supplements the architecture of the newly created building. The idea of the investor was to create the company headquarters on a green plateau, with architecture that would express the company's dynamic character while ensuring the employee's contact with nature.

The new arrangements are based on the idea of cohesiveness of nature and technical culture. The character of the image of the structure was brought about by colors observed

[1] In English schools, a commonly used name is "architectural design", thus differentiating the design process.

in nature as well as soft and natural shapes which entrenched their form into the green, hilly landscape. The discussion of the team resulted in a plan in the form of a triangle. Each subsequent story of the building differs in size of the outline, which decreases as we move towards the top. This procedure causes a reduction in scale and increases the impression of fluidity at the intersection of architecture and landscape.

The focal point of the arrangements is an open, internal courtyard made in the image of an exotic garden, which, contrasting with the landscape of the golf courses, creates an extraordinary place. The concrete which is generally a construction material here also creates the finishing layer of the building. The elevation of the technology building and the columns of the main entrance zone were created out of exposed concrete with an imprinted formwork or coarse texture obtained via the *graining* method.

The use of prestressed concrete, a technique that is sparsely used for small buildings, allowed for the use of non-standard spans. The ready-made, large construction modules, and building components delivered to the construction site, which were used for the elevation, roof, and the edges of terraces and balustrades, account for the character of the building exterior.

Glass in the Press Glass building is an important, however not a dominant material. Put together with the massive materiality of concrete, it influences the feeling of modernity and lightness of the building. The flat glass surfaces, as well as the bulky, rounded glass in the corners of the external elevation and the courtyard, are one of the most important elements which constitute the character of the transparent "architecture without borders." Refined details of assembly out of polished, stainless steel create an elegance of solution, while the use of reflexive glass blurs the boundaries between interior and exterior. The size of the building seems to be indefinable.

Wood is the material that supplements the character of the building. It is used on the cladding of the installation shafts, external walls, and fragments of the floors. Wood creates a specific softness, difficult to achieve, but one that is especially important when it comes to official and representative places. Wood is also a material used in the finishing of the terraces, railings of the balustrades, doors, and furniture.

The roofs of the buildings are filled with photovoltaic cells and play the role of green terraces. They are covered with plants that are easy to maintain: sedums and vines. Natural greenness used in large spaces becomes a building material that is present here on equal terms with traditional building materials.[2]

2.2. MUSEUM OF SCIENCE IN AMSTERDAM, THE BUILDING KNOWN AS NEMO, ARCHITECT RENZO PIANO 2020

The construction of NEMO was quite a challenge for Renzo Piano, as the building was to be created at the top of a road tunnel, while the curvature of the tunnel served as the foundation. That is why, the water surrounding the area became an inspiration for the form of the structure, which seems to emerge out of the water.[3]

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[2] Personal archives of NJ, and: N. Juzwa, J. Świerzawski, *Myśli – marzenia – miejsca. Architektura polska w innowacyjnej współczesności*, Narodowy Instytut Architektury i Urbanistyki, Warszawa, 2021

[3] *How was NEMO built?* [in:] NEMO Science Museum, https://www.nemosciencemuseum.nl/en/explore/wist-je-dat/how-was-nemo-built/ (access: 30.05.2024).

Renzo Piano in his notes, written while designing NEMO, wrote: *Amsterdam is a one-dimensional city*, while a square overlooking the city is a highlight of so many of the world's urban centers. Amsterdam does not have it. As a result, the architect created his own square: in the shape of a terrace, on the top floor of the museum building. NEMO is a recognizable building, its copper-green shape soaring 22 meters above the water level, makes it seem as if it was emerging out of the water. The interior of the museum was shaped with emphasis placed on science and technology. The creators were focused on exhibitions and "immersing yourself in the wonders of science."[4] The staircase is designed for optimum orientation, the walls are neutral grey. Renzo Piano referred to this concept as a "noble factory", as if he was searching for a contrast to the rather "playful" character of the elevation.

The museum building is located on top of a tunnel, which serves as its foundation. The wooden poles above the southern entrance support NEMO. Its construction in 1997 extended the tunnel by 90 meters. In the place where the tunnel descends, the building extends upwards.

Characteristics of the tunnel:

- the tunnel is an important city artery, every day it is used by 50 thousand cars and every minute three buses drive through it,
- 160 wooden poles support the tunnel on the bottom of the river so that it does not float on the water,
- the tunnel is lit by approx. 600 thousand LED lamps and 150 thousand electric lines run through it, supplying electricity to the northern part of the city and the region.[5]

NEMO is located in the center of the city. Near the railway station, where the tunnel descends towards the harbor, a walkway emerges leading to the museum. The ramp also creates a panoramic view of the historical center of Amsterdam. A sort of gradual transition was created from the scale of the historic city center to the openness of the seaport.

The interior of the building, economical in its shape, emphasizes the exhibits instead of the interior. The orientation is created by natural light. The roof of the building houses exhibits which take advantage of the sun, rain, and wind… The cladding of the building is made of oxidized copper selected due to its lifespan, lightness, and durability. However, symbolically it expresses the brand and technology.

It may seem that NEMO is a structure with a view of the city center, however, it is also an important addition to the beauty of the panoramic view of the city and an excellent example of complex urban structures.

2.3. LA FONDATION LOUIS VUITTON, ARCH. FRANK GEHRY, PARIS, 2014

The Louis Vuitton Foundation Center[6] is located in the natural landscape of the Jardin d'Aclimatation Park in the western part of Paris. This 19th-century park was designed in

[4] *The building* [in] NEMO Science Museum, https://www.nemosciencemuseum.nl/en/about-nemo/organization/nemosciencemuseum/building/# (access: 30.05.2024).

[5] *Ibidem*.

[6] The description used comes from a doctoral dissertation by Filip Zamiatnin, done under my supervision (NJ): F. Zamiatnin, *Nurt ekspresjonistyczny w architekturze współczesnych budynków użyteczności publicznej*, PhD thesis, Lodz University of Technology, Łódź 2024.

the shape of an English garden, while its grand opening was attended by Napoleon III. In 2014, the new building of the Louis Vuitton Foundation Center was opened.

The chairman of the LVMH conglomerate, which owns the Louis Vuitton brand – Bernard Arnault, pointed out that the goal of the investors was to create an exceptional space for art and culture, which thanks to the emotions and dedication of Frank Gehry would become an architectural icon of the 21st century. The architect wanted to create a building that would be relevant to modern times – fluid and changing, depending on the time and season. The distinctive form of the building results from the arrangement of glass panels in the form of sails which together have a surface area of 135,000 m2. The transparency and lightness of 19th-century glass pavilions are what inspired Frank Gehry to create the elevation.

The idea was transformed into a contemporary design language, and one could say that the form has become just a memory of the historical pavilions. The glass panels were installed thanks to a steel and wood substructure to the reinforced concrete walls of the building, while at every stage of the construction process, the horizons of shaping buildings were somewhat broadened, moving away completely from the conventionality of both designing and building. For the development of the design, Frank Gehry created numerous working models out of wood, plastic, and aluminum, at the same time playing with lines and shapes to bestow a sensation of mobility onto his future building. The final model of the design was then scanned and digitalized in order to develop a digital model.

The method of Frank Gehry's design based on creating models that are then scanned and digitalized has become the calling card of the architect. The selection of elevation materials was obvious to the designer, the glass layer covered the reinforced concrete core of the structure, which houses utility rooms, giving the structure both volume and liveliness.

It is worth underlining that the American architect, who is famous for his lack of respect for the context, was able to create an expressive form which despite everything, does not necessarily have to be seen as a distinct contrast to its surroundings. The curvilinear glass panels inscribe themselves into the dynamic of the natural landscape of the 19th-century park, while the enormous building seems to emerge out of the green surroundings as if it were alive. In addition, it beautifully expresses the joy of creation.

3. SUMMARY

In general, it may be said that the participation of technology in architecture is the function of the importance of the constructed building and the social and civilizational development of the place. Of course, it all also depends on the imagination and architectural concept created by the designer.[7]

Architecture is closely connected with technology. As a practical discipline, it always boasted an interdisciplinary character. Today it is hard to imagine that the first texts about

[7] This text recalls the beauty of the architecture of the New Louvre Building in Abu Dhabi, at the gates of the Eastern world and old Europe, designed by Jean Nouvel. Looking at the beauty of the structure of the grand dome, it is difficult to distinguish between the beauty of the technology used in its construction and the beauty of architecture, both fields join in perfect unison.

architecture and buildings for architecture were created by engineers,[8] experts in building machines and structures for the military.

A military constructor who served both Julius Caesar and Octavian was Marcus Vitruvius, and he was also the author of the work *De Architectura*. The treatise was created between the years 20–10 BC, and its author is also the man behind the famous rules and regulations, still current today, concerning the construction of buildings and city planning. He was the creator of the so-called Vitruvian Man, today known from the later version created by Leonardo da Vinci. The aforementioned valuable work created in the first century prior to our era, while it was kept with great piety, eventually became lost. The treatise *De architectura libri decem* was found in 1415 in the library of the St. Gallen Monastery in Switzerland, and then was commonly disseminated after 1486 when it was printed and translated to various languages.

In 1648, the École Nationale Superiere de Beaux-Arts (School of Fine Arts) was created in Paris, funded by Cardinal Mazzini and established by Charles le Brun as the Royal Academy of Painting, functioning under the auspices of the government with a goal of educating in architecture, painting, sculpture, precious metal engraving, and on behalf of government structures. Still, the basis of the education was small private workshops.

Difficult exams meant that the school was considered to be the best in the world. It functioned thanks to small, independent workshops where all was taught under the watchful gaze of a renowned master. There were also architectural workshops.

The school achieved renown thanks to annual exhibitions in the *Salon* and competitions in which the main prize was the *Prix de Rome* – a 3-year stay in the *Villa Medici* in Rome.

King Napoleon III made the Beaux Arts an independent school in 1864. After 1897, women were also admitted into the school. In 1922, the Prize was awarded to a woman, Renée Gailhoustet, born in Oran Algeria. She dealt with residential buildings. She designed numerous houses and urban complexes in Paris and the surrounding area and she was the precursor of greenness in public space and residential complexes.[9]

In the 19th century, many Americans studied in the Parisian Beaux Arts and after returning home they were the creators of prestigious buildings in New York and Chicago. The school is still functioning today, however, architecture was moved from the school after the student riots of 1968.

The Roman Prizes in the École de Beaux Arts have been awarded regularly since 1720.

In the 20th century, the Prize is still presented as a prestigious distinction, with an additional category introduced for musicians alongside the existing one for architects. The recipients of it were, among others, Hector Berlioz, Charles Gounod, Georges Bizet, and Claude Debussy.[10]

As can be seen, since the beginning of its very existence, the field of architecture has always functioned in and around the sphere of influence of technology or the fine arts, and even music, which may come as a surprise. However, it has always remained a distinctly autonomous field with a practical but also interdisciplinary and multifunctional character, with clearly determined goals, possibilities, and boundaries.

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[8] In writing the present-day name of the profession I assume that the reader understands that it is about the comparison of activities.

[9] M.C. Florian, *French Architect Renée Gailhoustet Receives the 2022 Royal Academy Architecture Prize* [in:] ArchDaily, 1.06.2022, https://www.archdaily.com/982903/french-architect-renee-gailhoustet-receives-the-2022-royal-academy-architecture-prize (access: 18.06.2024).

[10] *Prix de Rome* [in:] The Encylopaedia Britannica, https://www.britannica.com/art/Prix-de-Rome #REF.4522 (access: 17.06.2024).

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[4] *Prix de Rome* [in:] The Encylopaedia Britannica, https://www.britannica.com/art/Prix-de-Rome#REF.4522 (access: 17.06.2024).

[5] *The building* [in]: NEMO Science Museum, https://www.nemosciencemuseum.nl/en/about-nemo/organization/nemosciencemuseum/building/# (access: 30.05.2024).

[6] Zamiatnin F., *Nurt ekspresjonistyczny w architekturze współczesnych budynków użyteczności publicznej*, PhD thesis, Lodz University of Technology, Łódź 2024.

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Professor, worked in the Faculty of Architecture of the Silesian University of Technology and at the Institute of Architecture and Urban Planning of the Lodz University of Technology until 2021. Scholarship in France (1981–1982), worked in the architecture office of Professor Gunther Henn in Munich, Germany (1977–1979) and in INWESTPROJEKT in Katowice (1965–1976). Working as an academic teacher she did not lose touch with the profession of a designer. Her work includes numerous designing works, competitions, 32 supervisions of doctoral theses, and 6 books. The book *Polish Architecture in Contemporary Innovation: Thoughts, Dreams and Places.*, published in 2021, was awarded the Vitruvius Prize 2022 by the Architecture and Urban Planning Committee of the Polish Academy of Sciences and the Minister of Development and Technology Award for the best publication. The book was published in English in 2024 by Routledge. At present, she cooperates with the National Institute of Architecture and Urban Planning in Warsaw.

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