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DESIGN OF AN ORANGERY AT THE HISTORIC KRZYŻANOWSKI MANOR IN CUDZYNOWICE: THE CHALLENGE OF COMBINING MODERNITY WITH TRADITION

The manor in Cudzynowice, owned by the Krzyżanowskis since 1821, was a centre of intellectual and patriotic life. Remodelled in the 19th and 20th centuries, it succumbed to war-time damage and post-war neglect. Since 2004, restoration work has been underway to restore its 1926 appearance using modern techniques. In 2024, work began on the design of a new orangery, which would harmoniously combine the historic structure with contemporary architectural elements, in accordance with conservation principles.

This article presents a comprehensive approach to integrating modern construction with historical heritage, considering both technological innovations (including 3D scanning, reinforced concrete) and the faithful reproduction of architectural details. The orangery design, based on respect for authenticity, exemplifies the dialogue between tradition and modernity.

Keywords: Cudzynowice, manor, Krzyżanowski family, restoration, historic architecture, orangery, heritage conservation, building technology, 3D scanning, cultural heritage

1. INTRODUCTION

Integrating contemporary architecture with historic structures is one of the greatest challenges of contemporary conservation, and requires the reconciliation of heritage protection with the functional and aesthetic needs of the 21st century. This problem is particularly evident in the case of manor complexes, where historic substance often requires both revitalisation and adaptive reuse [Yavuz, Yildirim 2020]. This study focuses on the case of the manor house in Cudzynowice, where an attempt has been made to rebuild a no-longer-existing orangery, which had been an important element of the original spatial layout, using technology and materials that meet contemporary standards without compromising the monument's authenticity.

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Studies on similar projects, such as those by Zeynep Yavuz and Mehmet Tayfun Yildirim [2020], point to four main strategies for combining the old with the new: imitation, simulation, a respectful approach, and a contrasting approach. In the case of Cudzynowice, the ‘respectful’ model was chosen. This assumes neutrality of form and materials, which allow the historic layout to remain evident [Liu 2023].

The design was based on interdisciplinary methods, and combined traditional conservation techniques (e.g., manual detail modelling) with advanced technologies such as 3D scanning [Pikulski, Marek 2023]. The results of research on the compatibility of historic materials with modern mineral mortars [Zielińska, Misiewicz 2016] were also used, as these minimise the risk of future masonry degradation.

This study aims to both document a unique case and identify model solutions that, as highlighted by Słuchocka [2017], combine heritage conservation with innovation, and can provide a reference point for future projects in the context of heritage conservation and preservation.

2. HISTORY OF THE CUDZYNOWICE MANOR

The manor in Cudzynowice (present-day Świętokrzyskie Voivodeship, Kazimierz County, Kazimierza Wielka Municipality) is part of the history of the Krzyżanowski family of the Świnka coat of arms, whose activity in the area dates back to the early 19th century. On 29 June 1821, Adam Jan Szymon Krzyżanowski (1785-1847), a Kraków barrister, rector of the Jagiellonian University, dean of the Faculty of Law and editor of the first Polish edition of the Napoleonic Code, purchased the Cudzynowice estate from the Żeleński family for 180,000 Polish złotys. Krzyżanowski, the owner of tenement houses on Kraków’s Szczepańska Street and the villages of Czulice and Kurdwanów, made Cudzynowice a centre of intellectual life, hosting guests such as the Estreicher family [Czuba 2003].

In the mid-19th century, Adam’s son, Józef Ludwik Krzyżanowski, erected a single-storey manor house in Cudzynowice using red brick from the local brickworks. In 1880, the building was extended with a two-storey wing, giving it a T-shaped plan. The building’s architecture combined Classicist simplicity with eclectic elements: the ground-floor section was decorated with a portico with six columns flanking the main entrance, while the outbuilding, topped with a high roof, was of ancillary use [Czuba 2003]. The manor was surrounded by a landscape park from the mid-19th century, and was listed in the register of monuments of the Świętokrzyskie Voivodship on 30 September 1959 under no. A.186.

Włodzimierz Krzyżanowski (1859-1901), son of Józef Ludwik, continued to modernise the estate. In 1926, he did a major renovation of the manor, enriching the facades with decorations made using the plaster-pulling technique, used in window cornices, triangular abutments and pilasters (fig. 1) [Kuliś 2024].



Fig. 1. View of the manor house in Cudzynowice from 1937 [Czuba 2003]

The last owner of the estate was Włodzimierz Leon Krzyżanowski (1897-1940), a graduate of the Faculty of Law at the Jagiellonian University, who was murdered in Kharkiv in 1940. During the Second World War, the manor, managed by Włodzimierz Leon's wife, Stefania, became a centre for the Home Army: it housed a sanitary post, arms stores and a shelter for fugitives, among them Roger Gasnier (a French prisoner of war), Allan Hamet (a British RAF airman) and Jewish families and displaced persons from Warsaw [Czuba 2003].

On 16 January 1945, the German air force bombed the manor and grange, forcing the Krzyżanowski family to leave the estate. Soon taken over by the state, the estate became the property of a State Agricultural Farm and later of the local Agricultural School Complex, which adapted it for use as a boarding school [Damulewicz 2008].

The lack of repairs has led to progressive deterioration: the ceilings collapsed, the brick walls eroded and the park became overgrown. In the 1995/96 school year, the building was closed due to being unfit for use and remained derelict for another decade.

In 2004, the manor was bought by private investors, whose aim was to restore it to its 1926 appearance. The project's key element was the restoration of facade plasters along with the eclectic decoration and bright colour scheme, while using technologies that would permanently bind with the brick pattern. Today, the

manor house, surrounded by a revitalised park, is a testament to the heritage of the Krzyżanowski family and their role in the region's cultural landscape.

3. RENOVATION AND CONSERVATION WORK

The renovation of Cudzynowice manor, carried out in 2022, was a multi-stage process based on advanced technologies and specialised materials to restore the historic substance to its original character. The restoration was preceded by an analysis to determine the best methods by which the natural fabric of the building would be preserved and any interference would not deprive the manor of its original form and architectural detail [Zielińska, Misiewicz 2016]. Surviving iconographic sources, such as historic photographs, proved indispensable (fig. 1). As the author of a study on the contemporary role of design documentation in architecture notes, this type of material 'provides an external context for form, linking the designer's autonomous vision to its spatial shape' and deserves special protection and display as part of cultural heritage [Słuchocka 2017].

The work started with a comprehensive cleaning of the facade from the remains of the cement plaster, using two methods: local mechanical scraping and blast cleaning using an abrasive with a granulation of 50-80 μm , selected based on tests performed on obscured parts of the wall. This treatment allowed the authentic texture of the bricks to be exposed without disturbing their structure. At the same time, the remnants of former electrical services, metal brackets and other extraneous elements that compromised the integrity of the historic walls were removed. This was followed by the removal of loose mortar from the inter-brick joints, filling the cavities with a lime-sand mortar of similar composition to the original. A total of 142 bricks degraded by salt and moisture were also replaced, with full-size replicas matching the colour and texture of the existing pattern.

The next step was to reinforce the masonry structure. Helifix stainless steel rods, 6 mm in diameter, embedded in epoxy resin, were inserted in 23 facade cracks to stabilise the structure and prevent further damage. A 'graft' layer of KEIM spray-on trass-cement mortar was placed onto the base layer to improve the adhesion of subsequent layers. The wall surface was then levelled with 15-mm-thick KEIM Porosan-Ausgleichsputz-NP mortar, followed by two coats of KEIM Porosan-Trass-Sanierputz-NP restoration plaster, which protects against capillary moisture up to a height of 150 cm. The final layer was a KEIM Turado thin-coat render with embedded KEIM Glasfaser-Gittermatte glass mesh to increase the mechanical resistance of the facade.

As research has shown [Szarejko, Górka 2023], the building should not have been subject to a thermal retrofit, as this could have had a negative impact on its architectural form. It was therefore decided instead to carefully reconstruct the walls using modern technologies to strengthen and thermally seal them.

The reconstruction of architectural details such as cornices, abutments and pilasters was based on an analysis of archival photographs and surviving fragments of decoration. The stencil pulling method was used together with the Baunit mortar system: a rough layer (Baunit Stucco Grobzug FG 88) and finishing layer (Baunit Stucco Feinzug FF 89), and for the monolithic elements Baunit Stucco Mono SM86 mortar was used. After priming the surface with KEIM Soldalit-Fixativ, a silica sol-based primer, the facades were painted twice with KEIM Soldalit silicate paint in a shade close to the historic shade, as determined by colour proofs.

Particular attention was given to the conservation of the Pińczów limestone columns supporting the portico. Their surface was cleaned using the pressure-jet method with a fine abrasive (80 μm glass microspheres), which preserved the natural patina. Local cracks were reinforced with 1.5-mm-diameter stainless steel wire 'spiders' embedded in epoxy resin, and the cavities were filled with Remmers RM 003 mineral putty, selected for its mechanical parameters and porosity. Colour integration of the abrasions was also carried out using KEIM Restaurolasur paints, and the final water repellent treatment was done using LOTEXAN N, which forms a vapour-permeable protective coating.

The entire work was completed with photographic and written documentation submitted to the Voivodeship Monument Conservation Office. The process, based

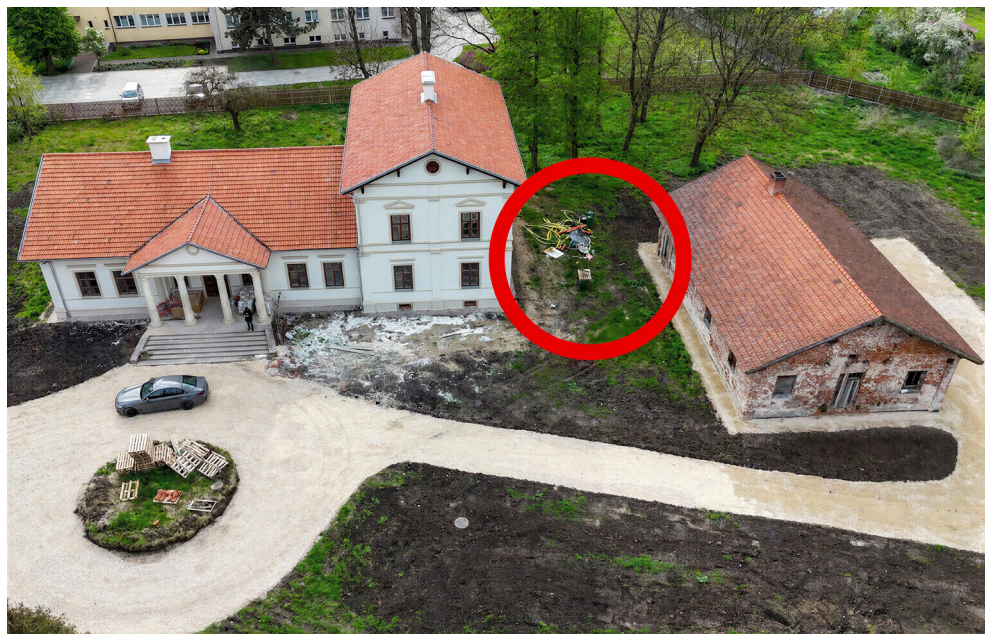


Fig. 2. View of the manor house in Cudzynowice from 1937.

The location of the proposed outbuilding is shown in red

[author: staff of the CUT FoA Chair of Descriptive Geometry and Digital Technologies]

on WTA (Wissenschaftlich-Technische Arbeitsgemeinschaft) guidelines, adhered to the principle of material compatibility, minimising the risk of future damage. The combination of traditional techniques (e.g., manual detail modelling) and modern technologies (trass mortars, silicate paints) exemplified the synergy between heritage conservation and innovative building solutions (fig. 2).

4. GUIDELINES FOR THE DESIGN OF A NEW ORANGERY AT CUDZYNOWICE MANOR HOUSE: CASE STUDY

In 2024, a detailed survey of the main manor house and outbuilding was carried out at the request of the manor complex's owner. This work was carried out by the staff of the Department of Descriptive Geometry and Digital Technologies at the Faculty of Architecture, Cracow University of Technology. The survey was conducted using a 3D scanner, which produced a precise point cloud that served to develop a detailed 2D documentation of the building. This method, according to current research [Pikulski, Marek 2023], is regarded as one of the most accurate and reliable building surveying techniques in use today [Pikulski et al. 2024].

Based on the data obtained, a conceptual proposal for the orangery was developed, which took into consideration both the client's guidelines and the recommendations of the Voivodeship Conservator of Monuments. It was the wish of the manor's owner that the new structure should be a modern building, using contemporary materials, while respecting the historic substance of the manor – its architectural detailing, colours, materials used and the technology used in the earlier renovation.

Based on the point cloud, accurate 3D models of both the manor house and the outbuilding were developed, which enabled a detailed analysis of the proposed orangery's form in the context of the existing buildings [Koszewski et al. 2021]. Architectural details, ground level differences, wall thicknesses and the positioning of window openings, among others, were included. As the surviving archive material only shows a fragment of the original historic orangery (including part of the entrance porch), it was not possible to clearly reconstruct its original appearance (fig. 3). All that is known is that it acted as a link between the manor house and the outbuilding. As a result, the monument conservator agreed to introduce contemporary architectural elements into the new massing.

Designing the orangery as a winter garden, connecting the mansion and the outbuilding and featuring separate, partitioned-off vestibules at both entrances, glazed on each side and equipped with a porch leading into the garden, was a design challenge. It required an in-depth analysis of examples of the harmonious combination of modern architectural forms with historic structures.

Taking the study by Zeynep Yavuz and Mehmet Tayfun Yildirim [2020] as an example, it can be argued that contemporary annexes added to historic buildings serve a utilitarian function and are a conscious design tool that, when properly



Fig. 3. The only historical photo found to show a fragment of the no-longer-existing original orangery that connected the manor house and the outbuilding (highlighted in red) [current owners' archive, photo found during the manor house survey]

executed, enables the old and the new to merge harmoniously. Yavuz and Yildirim analysed selected examples of such architectural interventions in the context of international conservation declarations (including the Athens, Venice and Amsterdam charters) and contemporary design criteria, identifying four main approaches: imitation, simulation, a respectful approach and a contrasting approach. The research shows that 'respectful' and 'contrasting' approaches, which on the one hand preserve the autonomy of the new and, on the other, do not dominate the historical context, are currently dominant.

New annexes can take many forms, from roof or facade additions to spaces that connect several buildings or new circulation elements, and their design should

consider a number of aspects: scale, rhythm, colour, material, relationship with light or the surrounding structure. The authors emphasise that while the regulations mandate respect for historic substance, they leave a great deal of interpretative freedom for designers. It is particularly important to maintain a balance so that the new building complements the composition without disrupting the legibility of the historic layout.

Using the research presented in the article 'A Comparison and Combination of Modern and Historical Architecture' [Liu 2023] as an example, it can be concluded that successfully combining historical and modern architecture requires a deep understanding of both the differences and potentials of the two trends. The authors primarily analysed traditional Chinese timber-framed architecture with a courtyard layout, contrasting it with modern construction based on concrete, steel and functionality. The text shows that although traditional architecture is characterised by its strong cultural roots, a humanistic approach to space and refined aesthetics, it has its technical limitations, including low fire resistance and long construction times. In contrast, modern buildings, although more sustainable, cost-effective and functional, often lack spirituality, local character and harmony with their surroundings.

In the context of the design of the orangery in Cudzynowice, the research findings presented above provided a valuable reference, especially in terms of selecting a design strategy that, on the one hand, allowed the new part to express contemporaneity and, on the other, did not dominate the existing substance. The conclusions concerning integration through material consistency, scale and spatial relationships, and the role of translucency or flexibility as contemporary means of supporting the insertion of the new into the historical context are particularly valuable.

5. DESIGN OF THE ORANGERY IN THE CUDZYNOWICE MANOR COMPLEX: INTEGRATING HISTORY WITH CONTEMPORANEITY

The orangery, a historic link between the manor house and the outbuilding in Cudzynowice, has been designed as a contemporary interpretation of a historic form, based on strict conservation guidelines and analysis of archival sources. The design envisaged a building with a rectangular plan of 750 × 600 cm, with the longer sides parallel to the wall of the outbuilding, which perhaps refers to the original spatial layout (fig. 4). The main part of the orangery, which serves as a winter garden, has been designed with glazing on all sides, with asymmetrical vestibules connecting it to the existing exits of the manor house and the outbuilding. The difference in floor levels between the buildings (the higher level of the mansion) necessitated the introduction of three steps, each 15 cm high, in the connecting passage on the side of the mansion, which allowed for a smooth transition without interfering with the historic walls (fig. 6).

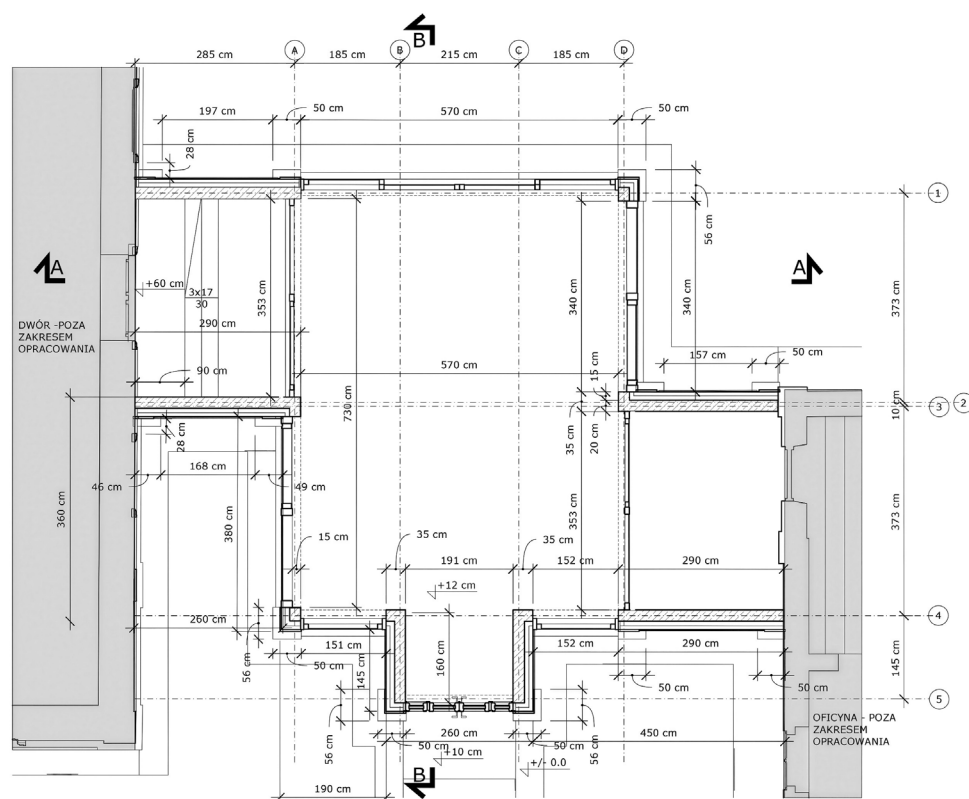


Fig. 4. Plan of the new orangery [by Piotr Pikulski (original research)]

The architecture of the orangery integrates harmoniously with the body of the manor house through stylistic details. It has a flat roof, with a slope of 2% hidden behind a cornice of polystyrene covered with structural plaster that encircles the building, which imitates the form of the historic cornices of the manor house, while masking the system of gutters that drain the flat roof. The central element of the roof is a gable skylight with an aluminium structure, glazed with 10-mm-thick ESG laminated glass, which illuminates the interior and emphasises its glass character. The facades are decorated with flat columns and rustication made of mineral plaster, with colours integrated into the palette of the manor house. Aluminium doors, designed in the style of historic manor house wings, flank the porch on the garden side and are a direct reference to the historic orangery seen in the archival photographs (fig. 3). They were made to order, according to a design developed based on research into methods of restoring historic woodwork [Piątkowska et al. 2023], referring in style to the double doors of the manor house, but introducing an element of modernity in the form of the material used (aluminium) and partial glazing.

Designed with reinforced concrete, the structure of the orangery provides static independence from the existing buildings. The foundation was designed as reinforced concrete strip and pad footing, 1.2 m below grade (below the depth of frost penetration). The load-bearing walls and ceilings were made as monolithic elements, reinforced with Ø12 mm ribbed bars, which guaranteed rigidity while maintaining slender proportions. To avoid transferring loads to the historic walls, 3-cm-wide expansion joints were used, filled with flexible EPDM tape, thus compensating for thermal differences and subsidence. Vertical and horizontal insulation was applied in the form of PVC membrane and bitumen compounds to protect against capillary moisture (fig. 5).

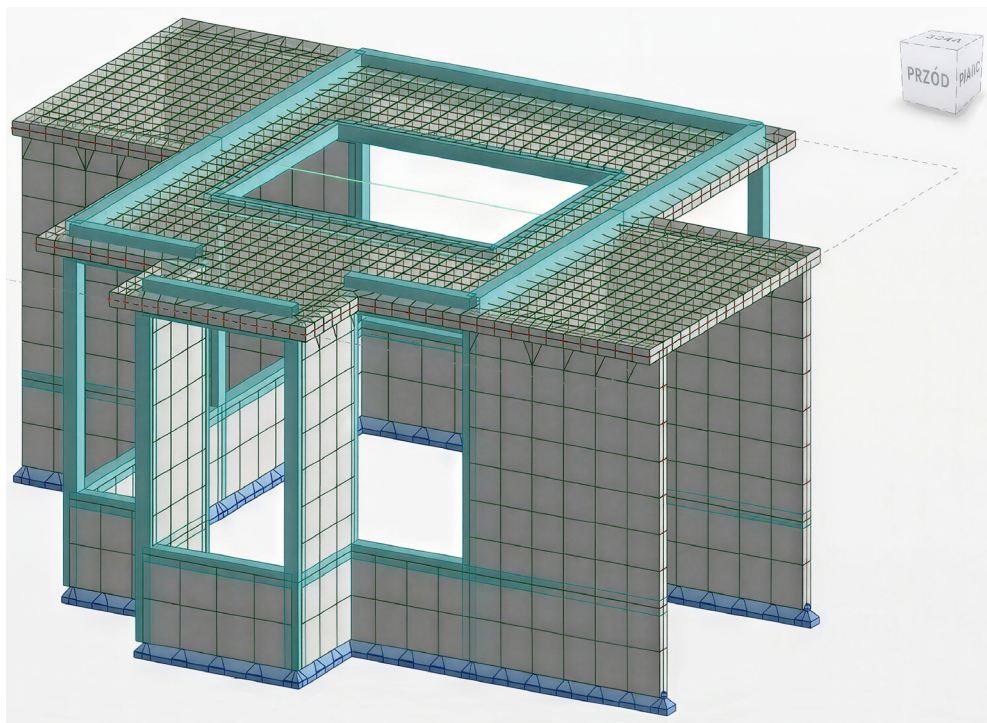


Fig. 5. Illustration for static-strength calculations made with licensed computer programmes, using FEM-type design techniques
[by Dariusz Szemraj M.Eng, Biuro Projektowo-Uslugowe Szemraj-Projekt]

The construction began with excavation works protected by watertight formwork, with concurrent construction of a band drain. After the foundations and reinforced concrete walls (B25 class concrete) had been poured, the installation of the aluminium window frames, including a self-supporting skylight, and the insulation of the walls with 15-cm-thick EPS 100 polystyrene boards began. The external

plasters, applied using a traditional technique with reference to the texture of the manor house facade, and the colours matched to the historic palette through proof tests. All connections to the manor house were designed so that the orangery can be dismantled in the future without disturbing the authentic substance. To this end, the existing glazing over the side door of the manor house was retained (290 cm aperture height) and a 5-cm technological gap was left between the glazing and the ceiling to allow for maintenance (fig. 6).

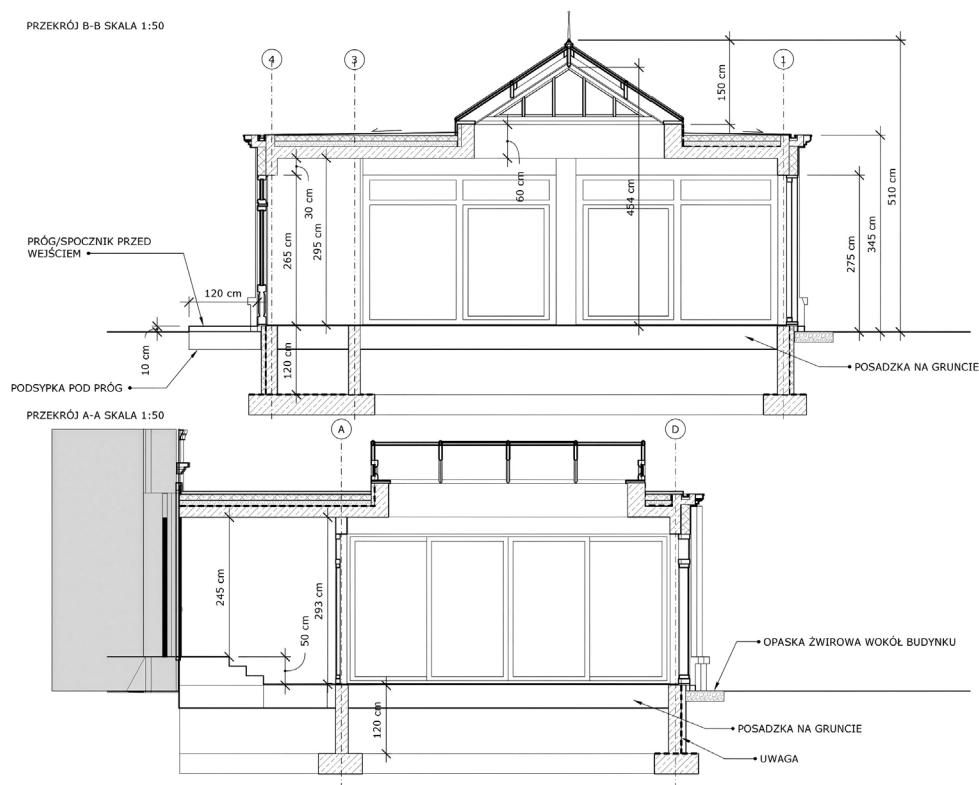


Fig. 6. Cross-section of the new orangery [by Piotr Pikulski (original research)]

The design, approved by the Voivodeship Conservator of Monuments, exemplifies the synergy between heritage conservation and modern architectural innovation. The use of reinforced concrete and aluminium yielded a light, transparent structure that, despite its modern language, respects the historic context through proportion, detail and colour palette (fig. 7). The orangery, as a symbolic bridge between different eras, not only restores the lost spatial layout, but also becomes an education tool that presents the evolution of construction techniques in a dialogue with the past.



Fig. 7. Spatial diagrams depicting the concept of the orangery and its connection to the existing manor house and outbuilding [by Piotr Pikulski (original research)]

6. CONCLUSIONS

The design of the orangery at the historic Krzyżanowski family manor in Cudzynowice exemplifies an informed and sustainable approach to architecture within the context of cultural heritage. The measures implemented, from the comprehensive renovation of the manor house to the advanced 3D building survey and the conceptual proposal for the new building, show that harmoniously combining modern forms with historical substance is achievable, provided that respect for the past is maintained and conservation guidelines are followed. An analysis of theoretical research and specific international cases shows that the currently dominant approaches, respectful and contrasting, facilitate a dialogue between old and new without compromising the integrity of the monument.

The orangery designed for the Cudzynowice estate is an informed response to the need to functionally extend the manor house while respecting its architectural and cultural context. Due to the use of modern technologies, advanced materials and a well-thought-out spatial form, the new building does not compete with the historic fabric, but complements it, aligning it with the idea of an

intergenerational architectural dialogue. This design serves as an example of good practice in contemporary interventions in historic space (balancing innovation with care for heritage) and offers a valuable reference point for future projects in a similar context (fig. 8).



Fig. 8. Visualisation of the proposed orangery [by Piotr Pikulski (original research)]

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PROJEKT ORANŻERII PRZY ZABYTKOWYM DWORZE KRZYŻANOWSKICH W CUDZYNOWICACH – WYZWANIE POŁĄCZENIA NOWOCZESNOŚCI Z TRADYCJĄ

Streszczenie

Dwór w Cudzynowicach, od 1821 r. własność rodziny Krzyżanowskich herbu Świnka, przez ponad dwa stulecia stanowił centrum życia intelektualnego, kulturalnego i patriotycznego. Wzniesiony z czerwonej cegły w połowie XIX w., wielokrotnie przebudowywany (m.in. rozszerzony o piętrową oficynę w 1880 r.), stał się symbolem lokalnej historii i dziedzictwa ziemiańskiego. Podczas II wojny światowej jako schronienie dla Armii Krajowej i uciekinierów uległ poważnym zniszczeniom wskutek niemieckiego bombardowania w styczniu 1945 r. W okresie PRL, przekształcony w internat szkoły rolniczej, popadł w ruinę, tracąc większość detali architektonicznych i historyczny układ przestrzenny.

Od 2004 r., pod opieką prywatnych właścicieli, trwają kompleksowe prace renowacyjne mające przywrócić obiektowi wygląd z 1926 r. – okresu jego największej świetności. Wykorzystano zaawansowane technologie, takie jak skaning 3D do inwentaryzacji, zaprawy mineralne KEIM do rekonstrukcji tynków czy pręty Helifix do wzmacniania konstrukcji. W 2024 r. podjęto decyzję o odtworzeniu historycznej oranżerii, która niegdyś łączyła dwór z oficyną. Projekt, opracowany we współpracy z Wojewódzkim Konserwatorem Zabytków, zakłada harmonijną integrację nowoczesnych materiałów (żelbet, szkło laminowane) z historyczną substancją.

Artykuł szczegółowo analizuje wyzwania technologiczne i konserwatorskie, takie jak dostosowanie współczesnych systemów izolacyjnych do zabytkowych cegieł czy odtworzenie eklektycznych detali metodą „ciągnięcia” szablonowego. Przedstawia także innowacyjne rozwiązania, w tym aluminiowy świetlik dwuspadowy imitujący historyczne formy oraz system dylatacji chroniących przed przenoszeniem naprężeń. Projekt oranżerii stanowi przykład dialogu między tradycją a współczesnością, łącząc funkcjonalność XXI w. z szacunkiem dla materialnego dziedzictwa. Jego realizacja wyznacza nowe standardy w ochronie zabytków, udowadniając, że nowoczesna architektura może stać się narzędziem opowiadania historii, a nie jej konkurentem.

Słowa kluczowe: Cudzynowice, dwór, rodzina Krzyżanowskich, restauracja, architektura zabytkowa, oranżeria, ochrona dziedzictwa, technologia budowlana, skanowanie 3D, dziedzictwo kulturowe