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EXEMPLARY RESULTS OF CLOSE COOPERATION BETWEEN ARCHITECTS AND STRUCTURAL ENGINEERS

PRZYKŁADOWE REZULTATY ŚCISŁEJ WSPÓŁPRACY POMIĘDZY ARCHITEKTAMI I KONSTRUKTORAMI

Abstract

The paper gives some information about three awarded structures in Thuringen – Germany. The selected structures are:

- New Theater in Erfurt with interesting structure of winding stairs, roof-shell and transparent façade,
- Toscana Terme in Bad Sulza near Weimar, with organic, curved roof-shell in woodstructure,
- Auerwold Palace in Auerstadt near Weimar built as an organic structure with willow switches growing in the ground.

Keywords: architecture, structure, vegetal structures

Streszczenie

W artykule przedstawiono trzy nagrodzone obiekty zlokalizowane w Turynii – Niemcy, ich autorów i konstrukcje. Tymi wybranymi obiektami są:

- Nowy Teatr w Erfurcie, z interesującą konstrukcją schodów wachlarzowych, dachu i transparentnej ściany,
- Toscana Terme w Bad Sulza koło Weimaru z organiczną, wygiętą, drewnianą konstrukcją dachową,
- Auerwold Palace w Auerstadt, również niedaleko Weimaru, którego organiczna konstrukcja została wykonana z witek wierzbowych rosnących w ziemi.

Słowa kluczowe: architektura, konstrukcje, konstrukcje roślinne

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1. Introduction

The significant problem with the structure studies for students of architecture is their reluctance to analyze structural and construction issues. Hence their poor knowledge of these disciplines so closely related to architecture. The obvious conclusion is: more time for lectures and seminars in the curriculum for better understanding of structure – and construction – related problems. More teamwork practice of architects and structural engineers should be demanded. Creation + building function + structure + construction details = complete part of architectural statement. How positive can be the results of such close cooperation, we can see in the paper presenting three exemplary creative works.

2. Neues Theater (New Theatre)

Erfurt, Turingen, Germany
Year of construction: 2003

Structure: LEONHARD, Andrä and Partners, Erfurt
Architecture: Architekturbüro Prof. Jörg Friedrich PFP, Hamburg
Landschaftsplanung und Freiraumgestaltung: WES und Partner Hamburg [3]



Fig. 1, 2. New Theatre in Erfurt, Germany. Transparent façade with roof-shell of the spectators hall. Photo O. Büttner (left) [6]

Ryc. 1, 2. Nowy teatr w Erfurcie, transparentna fasada z przekryciem muszlowym nad widownią. Fot. O. Büttner [6]



Fig. 3, 4. New Theatre in Erfurt. Spiral stairs. Photo O. Büttner [6]

Ryc. 3, 4. Nowy teatr w Erfurcie. Spiralne schody. Fot. O. Büttner [6]

The first interesting facility is Neues Theater (The New Theatre) in Erfurt, the capital city of Free State Thuringen – Germany, built in 2004. It boasts of its remarkable structure. The building is set up on a rectangular plan. Its front façade reflects in the outside pool. The main feature of the interior is a spiral staircase and a large black funnel which is, actually, a part of the hall where the spectators sit.

When you look from the outside through the glazed façade your sight catches:

1. The spiral staircase made in reinforced concrete swinging in two circles from the ground level up to the third level.
2. The second specific feature which is the spectators' room for 800 persons. The concept is based on a bowl-like structure, constructed also in reinforced concrete (Fig. 1, 2). The structural engineer was Dr Ing. Alfred Büttner with the international office Leonhard and Partners in Erfurt. The project was awarded with the construction-engineer prize by the Free State Thuringen in 2004 (Großer Thüringer Ingenieurpreis 2004) [4, 5].

3. Toscana Therme

Bad Sulza, Turingen, Germany
Year of construction: 2000

Structure: Prof. Trabert&Partner, Geisa
Architecture: Ollertz&Ollertz Fulda [8]



Fig. 5, 6. Toscana Therme Bad Sulza. Bird's eye view. Photo O. Büttner

Ryc. 5, 6. Termy Toscana Bad Sulza. Widok z lotu ptaka. Fot. O. Büttner



Fig. 7. Toscana Therme Bad Sulza, Germany.
Shell structure in wood-grating.
Photo O. Büttner

Ryc. 7. Termy Toscana, Bad Sulza, Niemcy.
Siatka konstrukcyjna łupiny. Fot. O. Büttner

Fig. 8. Toscana Therme Bad Sulza, Germany.
Shell structure in wood-grating

Ryc. 8. Termy Toscana, Bad Sulza. Niemcy.
Siatka konstrukcyjna łupiny



Fig. 9, 10. Toscana Therme Bad Sulza, Germany. Interior – curved roof-shell with the grating-structure. Photo S. Kuc

Ryc. 9, 10. Termy Toscana Bad Sulza Niemcy. Wnętrze – zakrzywiona łupina z widoczną siatką konstrukcyjną. Fot. S. Kuc

Toscana Therme in Bad Sulza near Weimar, Thuringen – Germany is a recreational facility with indoor and outdoor swimming pools. Sun studios, sauna and a restaurant are also part of the functional programme. Prof. Trabert was responsible for a very interesting organic shell-like structure constructed as a wood grating. The shell seen from outside resembles a light membrane structure spanning between the points of foundation. Prof. Trabert [8], as the structural engineer, was awarded with the first prize for structural achievements by the Free State Thuringen in 2000 (Thüringer Ingenieurpreis 2000) [5] (Fig. 5–8).

4. The Auerwold Palace

Auerstedt, Thuringer, Germany
Year of construction: 1998

Structure: Marcel Kalberer
Snafte Strukturen [7]



Fig. 11. Auerwold Palace. View from outside with living structure in spring time.
Photo O. Büttner

Ryc. 11. Pałac Auerwold. Widok z zewnątrz wiosną. Fot. O. Büttner



Fig. 12. Auerwold Palace. Inside view in autumn. Photo S. Kuc

Ryc. 12. Pałac Auerwold. Widok wnętrza jesienią. Fot. S. Kuc

The Auerwold Palace [1, 2], in a small town Auerstedt near the old historic City of Naumburg, Thuringen – Germany, is the third example. It was built in 1998 with 300 volunteers from all over the world. The way it was "planted" expresses the potential energies that can be mobilized in a community-oriented natural building process [7]. The structural engineer – Marcel Kalberer was assisted by constructors and artists of the building group Sanfte Strukturen. He guided many different volunteers through the construction of the palace. The firm has in the last years developed an old construction concept calling it back to life. The structural system is more than three thousand years old and was invented by Sumerians living in the region of the Euphrat river. Here is, in short, the construction principle. The old Sumerians used reed switches as supporting elements. Now their successors substituted them with wood. But in our European regions we have only willow switches. In both cases the material was tied up to a stable bundle element – similar to the lictor's bundle of the old Romans. Their installation was very simple. They need to be put in a ground hole and fixed with earth and water – that's everything (Fig. 1–3).

We obtain a natural structure and a contribution to the ecological building in present time. While the construction was a social event, the Palace itself would soon be used as a center for community festivities. The full-moon events, for example, have already become legendary and have drawn more than 80 000 visitors from near and far regions. Every event has its own character due to the changing cultural activities and light installations.

Since than Sanfte Strukturen have constructed a total of over 50 willow-projects.

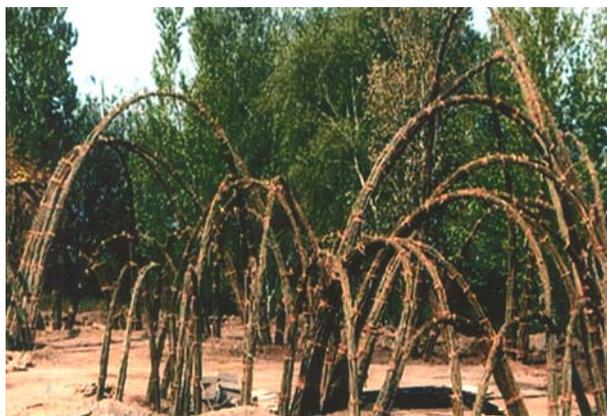


Fig. 13. Mounting the structure for an open-air stage near Wrocław.
Photo O. Büttner

Ryc. 13. Montowanie konstrukcji dla potrzeb sceny na wolnym powietrzu koło Wrocławia. Fot. O. Büttner

The living architecture in the interactive social process of construction is later growing in its ever changing forms. The concept has been realized in some European regions (Germany – Berlin, Koeln, Rostock IGA 2003; Belgium – Antwerpen; the Netherlands-Hagen; Sweden-Malmoe; also near Wrocław in Poland). The relevant structures found their application in kindergartens, parks, exhibitions, music halls and other facilities.

5. Conclusion

It is the fact that the professional training has been, somehow, reduced in, recent years. Therefore the architects have problems in the teamworking with civil-engineers. What can we do?

1. It is necessary to teach the students better the principles of construction with new qualitative content. This is the duty of all instructors in universities. We must encourage their independent comprehension of structural problems.
2. Architects and engineers should use the logic thinking in their common work even more than so far. The presented examples are good results of their close cooperation and a proof of this necessity.

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