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OD CRYSTAL PALACE DO GLASS HALL – NOWE MOŻLIWOŚCI ZNANYCH MATERIAŁÓW

FROM CRYSTAL PALACE TO GLASS HALL – NEW POSSIBILITIES OF WELL-KNOWN MATERIALS

Streszczenie

Projektowanie wielkoskalowych centrów i pawilonów targowych ma swoją własną specyfikę – „technologie" powiązań funkcjonalnych i uwarunkowania konstrukcyjne, związane ze znacznymi rozpiętościami stosowanych przekryć. Po latach, jakie minęły od pierwszych własnych doświadczeń projektowych w tej dziedzinie[1], jest odpowiedni moment na refleksje nt. historii i perspektyw tej architektury. Ciekawym i pouczającym przedmiotem takiej analizy jest niewątpliwie Centrum Kongresowe w Lipsku, będące swoistą kontynuacją światowych tradycji targowych i historycznych przestrzeni handlowych tego miasta. Po 17 latach od rozpoczęcia użytkowania nowych hal targowych Lipska można dziś podjąć próbę oceny ich funkcjonowania i nowatorstwo zastosowanych rozwiązań konstrukcyjno-materiałowych. Porównanie tych budowli z architekturą innych pawilonów projektowanych na historyczne i współczesne wystawy światowe, wskazuje przewagę prostoty, konstrukcji i uniwersalności form, nad wybujałymi ambicjami twórców architektury „jednej wystawy".

Słowa kluczowe: centra targowe, projektowanie, Glass Hall Lipsk

Abstract

Designing large-scale shopping centres and exhibition pavilions is governed by its specificity: the "technology" of functional connections and structural determinants related to considerable spans of coverings. After years that have passed since the author's first design experience in this field[1], it is now a good time to reflect on the history and prospects of this architecture. An interesting and instructive subject of such an analysis is undoubtedly the Leipzig Trade Fair, being a continuation of the world fairs' tradition and the city's historical commercial space. After 17 years since the opening of new exhibition halls in Leipzig, one can now attempt to assess their functionality and innovation of construction and material solutions. a comparison of these structures with the architecture of other pavilions designed for historical and contemporary exhibitions worldwide demonstrates the advantage of simplicity, construction and versatility of forms over the exuberant ambitions of the "one exhibition" architecture's creators.

Keywords: exhibition centres, designing, Leipzig Glass Hall

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[1] The author participated in a national architectural competition for the design of a new centre of Poznan International Fair in Poznan–Strzeszyn in 1978.

1. Origins of the fair

Fair and marketplace is a form of the transaction of purchase and sale of goods known for millennia. Initially it was a simple barter i.e., non-cash exchange of goods for goods or goods for services; later base and precious metals became a means of payment. In time, after a stamp or ruler image had been stamped on a piece of metal, money became the universal means of payment[2].

In Greek architecture a type of free-standing, elongated column hall *(stoa)* was shaped. Not only was it a place of trade, but it also served administrative and leisure purposes and as a shelter against adverse weather conditions. These buildings usually bordered with the agora and were also built in palestras and gymnasiums. The famous Athenian stoa[3] was built by Cimon around the year 450 BC and decorated with colourful paintings of Polygnotus, Micon and Panaenus.

Commercial function was usually served by marketplaces, forums[4], roofed shopping galleries bringing together a variety of shops and shopping arcades[5]. The Milanese gallery[6] is the oldest and most elegant shopping centre of the city. Its construction, designed by Giuseppe Mengoni, started in 1865. Laid out in the shape of a cross, with 196 and 105.5 m long arms and a large glass dome in the middle, it connects two Milanese squares.

The first written mention of trade fairs in Poland can be found in a document from 1065. The next document is a medieval record of 1278. In 1496 the right of free fair in the city was established. With time, however, this trade encased charges (taxes) in cities, e.g., for the king. For some time the fair tax was not collected from the clergy and nobility; later rural fairs were forbidden to return to the taxation of trade by the venal and noble craftsmen and exempted those peasants "who sell and buy their own things or the things they need" [1] from fees.

2. Permanent fairs and exhibitions areas

Regardless of the method of payment for the goods, there was always the need for the functioning of well-known places where the presentation of the goods offered for sale could take place, "equipped" with additional spaces (premises) to celebrate among other things successful transactions. Trade fairs are usually established with a long tradition, as well as bound by more or less formal trade rules.

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[2] The creators of the coins were probably Phoenicians, also known as Sidonians in the Old Testament, known for their active trading (about 3000 BC). The oldest find of an ancient "coin" (7th century BC) is a lump of electrum (an alloy of gold and silver) bearing the stamp of a goldsmith of Ephesus. Paper money appeared in China and then in Europe in the seventeenth century. Currently popular means of payment is electronic money stored in a computer memory bank accounts.

[3] S*toa poikile* was the location from which Zeno of Citium taught and hence his philosophical school of Stoicism took its name; source: wikipedia.

[4] The oldest forum in Rome was the *Forum Boarium* (beef market – 6th century BC), next to which functioned *Forum Holitorium* (vegetable market). Today, the term forum is sometimes used in the names of shopping malls – e.g. Forum Shopping Centre in Gliwice, CH Forum Koszalin, etc.

[5] An arcade is a shopping centre with retail stores, with a total area usually up to 2000 m^2.

[6] Milan will host the 2015 World EXPO. Also the name "gallery" is currently popular in regards to modern department stores with spaces rented by agents.

Spaces and various commercial facilities of all sizes operate successfully today as they are simply essential for the proper functioning of society in different cultural formations. Local, national or international trade requires more solid grounds and facilities in which it is possible to present the offers of individual producers, to individual visitors as well as resellers and wholesale customers. In addition to typical trade events, fairs and exhibitions may also present technical or cultural achievements of individual countries or producers such as World Fairs[7] (known as EXPO today), motor shows (e.g., Poznan Motor Show, Geneva Motor Show) or electronics fairs (International Photographic Trade Fair in Cologne).

3. World exhibitions

World exhibitions, a place of self-presentation and specific rivalry between states and nations, were organized since 1751 (London) in the capitals and major cities in Europe, Asia, Australia, USA and Canada[8]. The exhibition in 1851 took place in London's Hyde Park and especially for that purpose, Joseph Paxton designed the steel-and-glass pavilion – called the Crystal Palace. After the show the palace was moved to current Upper Norwood, where it burnt down in 1936.

The organization of trade fairs and exhibitions and gathering many participants and exhibitors, requires preparation of exhibition spaces and additional spaces such as the auxiliary space connected with their service and the space needed for handling crowds of visitors to the fair. Having already established position and tradition, fairgrounds, should be equipped with such permanent capacity buildings (pavilions) which would provide exhibitors with diverse needs. Simultaneously, fair objects and their complexes should enable the organization of different events at the same time. This, then, raises the need to build enclosed structures with adequate functional flexibility and to take into account the above requirements of a management plan with commuting, parking, etc. In the case of very complex and extensive exhibition fairgrounds, it is also necessary to supplement the exhibition infrastructure with additional elements for the service and "distribution" of the public such as travellators, minibuses, aerial cable cars, etc.

4. Crystal palaces

Since the invention of the light bulb took place only in the mid-nineteenth century, exhibition spaces had to be illuminated primarily with natural light i.e., day light. Therefore, exhibition pavilions resembled conservatories and palm houses of botanical gardens at the time. They were undoubtedly inspired by such projects as Joseph Paxton's Large Greenhouse (1836–1841) in Chatsworth and Decimus Burton and Richard Turner's Palm House at the Royal Botanical Garden at Kew/Surrey (1844–1848), Francois Jean Delannoy's Galerie Vivienne in Paris (1823–1826) and Charles Rohault de Fleury's pavilion of Jardin des Plantes in Paris (1833–1836).

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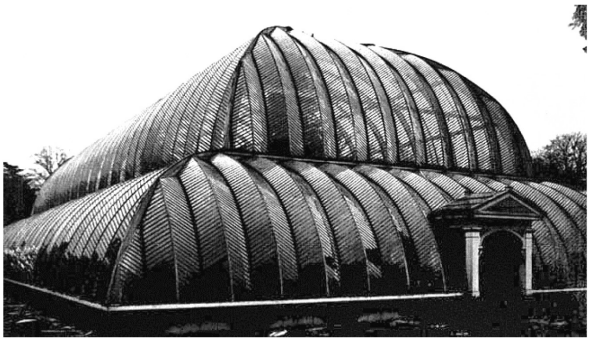
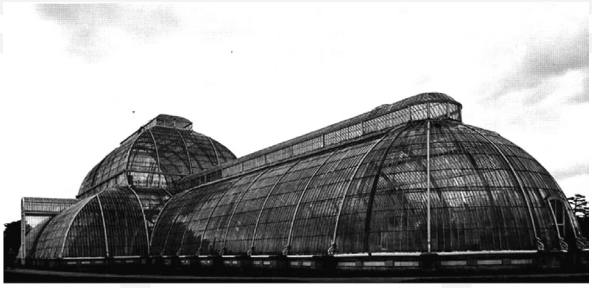
[7] The term "World Exhibition" refers to cyclic expositions presenting cultural, scientific and technical heritage of nations and peoples of the world. International Exhibitions Bureau was founded in 1928.

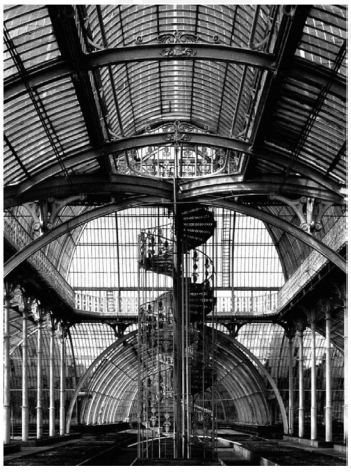
[8] *The Great Exhibition* organized in London in 1851 is considered to be the first truly international exhibition.



Ill. 1. Joseph Paxton, The Large Greenhouse at Chatsworth/ Derbyshire, England, 1836-1841 (source: http:// icancauseaconstellation.tumblr.com/page/35)



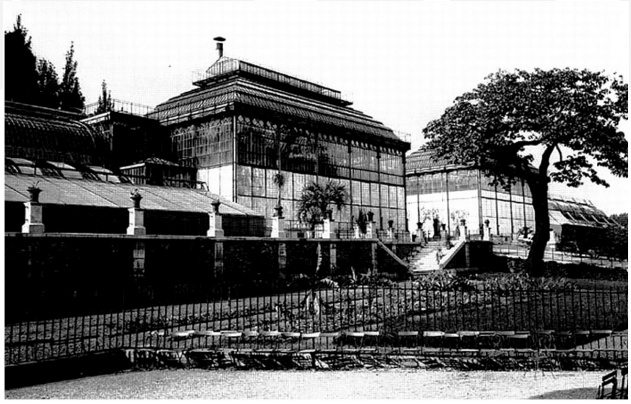
Ill. 2. Decimus Burton and Richard Turner – the Palm House in the Royal Botanical Gardens in Kew/Surrey, England, 1844–1948 (source: http://rubens.anu.edu.au/htdocs/ laserdisk/0231/23117.JPG)



Ill. 3. Decimus Burton and Richard Turner – the Palm House in the Royal Botanical Gardens in Kew/ Surrey, England – the interior, constructed between 1844 and 1948 (source: http://www.all-art.org/ Architecture/22-11.htm)

Ill. 4. Galerie Vivienne in Paris, 1823–1826, designed by Francois Jean Delannoy (source: http://commons.wikimedia.org/wiki/File:P1040471_Paris_II_galerie_Vivienne_rwk.JPG)

Ill. 5. Paris, Les Halles – the interior; designed by V. Baltard and F. Callet (1853–1870) (source: http://rubens.anu.edu.au/htdocs/laserdisk/0231/23127.JPG)



Ill. 6. Paris, Conservatories in the "Jardin des Plantes" – designed by Charles Rohault de Fleury (1833-1836) (source: http://www.all-art.org/Architecture/22-11.htm)

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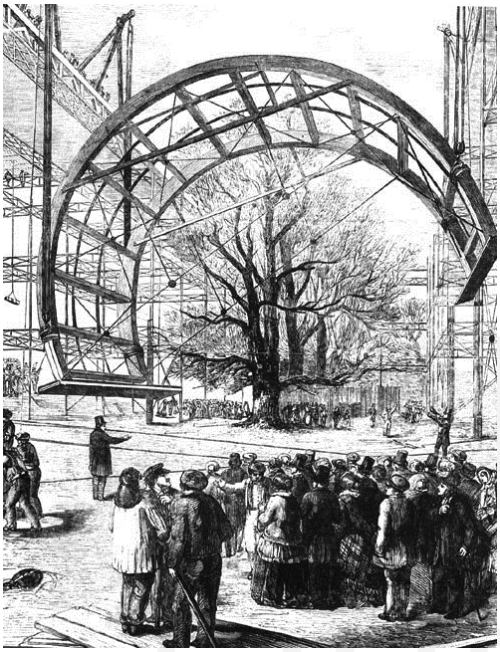

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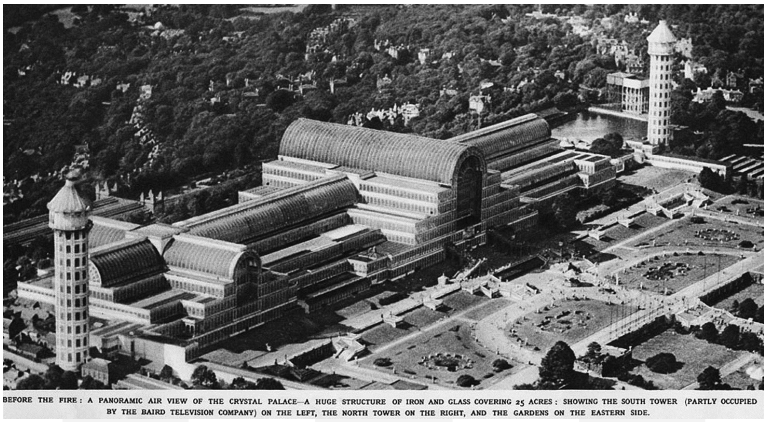
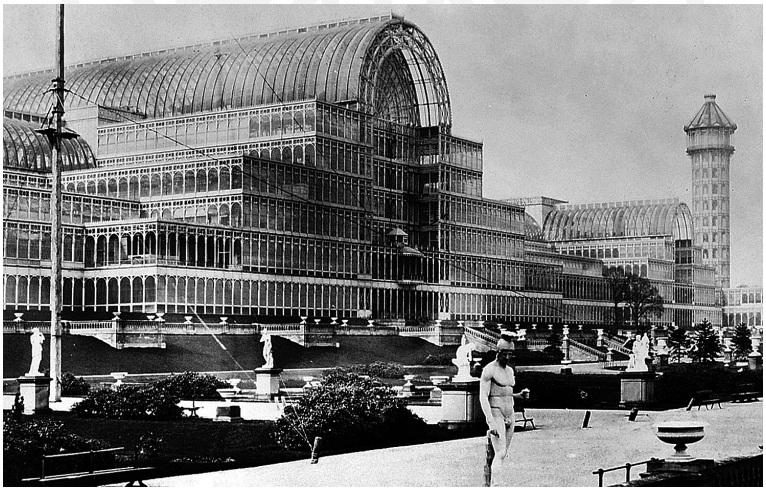
Ill. 7, 8, 9, 10. The Crystal Palace in London – designed by Joseph Paxton (1851) – the building and constructional-architectural details (source: http://www.crystalpalacemuseum.org.uk)



Ill. 11. London, aerial view of the Crystal Palace and the gardens, 1936 (source: http://www.ideal-homes.org.uk/bromley/assets/galleries/crystal-palace/aerial-view)



Ill. 12. The Crystal Palace in London before 1936 – view from the gardens (source: http://classconnection.s3.amazonaws.com/650/flashcards/701650/jpg/paxton21323456777900.jpg)

The experiences of these realizations were later used by Joseph Paxton in the project of the Crystal Palace. This 549 m long and 43 m high structure, sadly not preserved today, was built of steel and glass prefab mutually juxtaposed, which consisted of a glass and steel set of deep beam structures and provided the spatial rigidity of the whole arrangement.

Brilliant simplicity and elegance of the skeletal structure became the model for many other exhibition and trade buildings. The examples include: the Galleria Vittorio Emanuele II in Milan (1867–1878), the Grand Palais in Paris by Charles Girault (1900), New York Crystal

Palace (1852), The Palacio de Cristal in Buen Retiro Park in Madrid (1887), Alexandra Palace (the People's Palace – 1862) in London, the Palace of Industry in Toronto (1858), indoor agriculture Picton Fair in Ontario (1890–1894), exhibition halls in Paris (1936), Botanical Garden in Buffalo, NY (designed in 1868, constructed between 1897 and 1899), buildings of the industrial trade fair in Munich (1853–1854), the market hall in Berlin (1865–1868), The Infomart in Dallas (1985), Glass Hall in Leipzig (1992–1996)...

5. Glas hall: functional, spatial and constructional innovation

The Leipzig Trade Fair is recognized as the oldest fair in the world[9], moreover, 30 fair houses were built in the city until 1917[10]. In 1920, the fair took place at a new location – near the Monument to the Battle of the Nations, in the south-eastern part of the city. As a result of the war most of the halls and rooms of the fair had been destroyed; however, the fairs in Leipzig gradually regained their former rank, transforming themselves into the Leipzig Messe GmbH (Ltd.) in 1990.

In 1996, a new fairground on the north-eastern outskirts of the town was opened at the former Leipzig-Mockau airport. The exhibition grounds now belong to some of the most modern exhibition complexes in the world.

The international Fair and Congress Centre in Leipzig is characterized by spatial and functional clarity and harmony between construction (steel, glass) and nature. The winning project, designed by Gerkan, Marg and Partner Studio, presented compact structural concept of the whole – so that the exhibition halls, restaurants, the Congress Centre and the administration building could be reached without going outside. The Congress Centre was calculated on 2600 seats – in seven conference rooms and fourteen smaller rooms where host all kinds of events can be held.

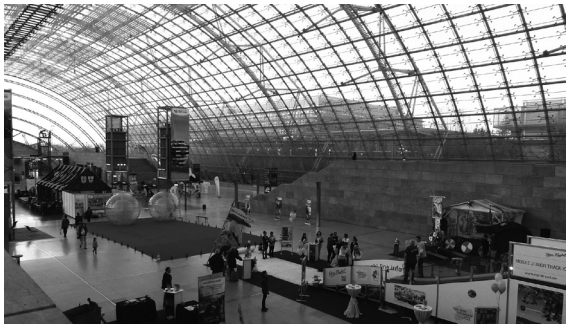
The complex of trade fair halls is connected with the centrally located main entrance hall of an arcuate structure, 80 m wide, 234 m long and 30 m high at the apex. Glass and steel have been already known and used for 150 years, but the form of arcuate steel-and-glass roof covering of the central Leipzig hall is characterized by an unexpected freshness and boldness of architectural vision. The basic construction of the hall is formed by arched beams (of lattice structure) to which a cylindrical mesh of a steel-glass curtain "wall" is attached. The glazing is double glazed (2×10 mm) and the contacts are filled with silicone. The fixing of glass elements compensate for any possible movements[11] (and related internal stresses) in two directions: see [2, 3].

Designers have used experimental hall solutions to ensure its proper microclimate, adjustable air supply and exhaust together with water cooling using special sprinklers. Also the hall floor, equipped with underfloor heating supporting wall convector heating system, possesses much heat accumulation. In addition, massive objects embedded in the hall are heated or cooled

[9] Leipzig received city rights around 1165, confirmed in 1497 by Emperor Maximilian I, who also organized Imperial Fairs (Reichsmessen) in the city centre. After the model fair in the city centre (1895 – Mustermesse),

[10] Including Mädler-Passage, Petershof, Handelshof, Specks Hof, Drei Könige.

[11] These movements under the influence of temperature differences can be over 250 mm long (i.e., 125 mm on each end!).



Ill. 13. Leipzig, the Glass Hall – the interior of the main hall (photo by the author)

Ill. 14. Leipzig, Glass Hall – the access to the main hall (photo by the author, 2012)

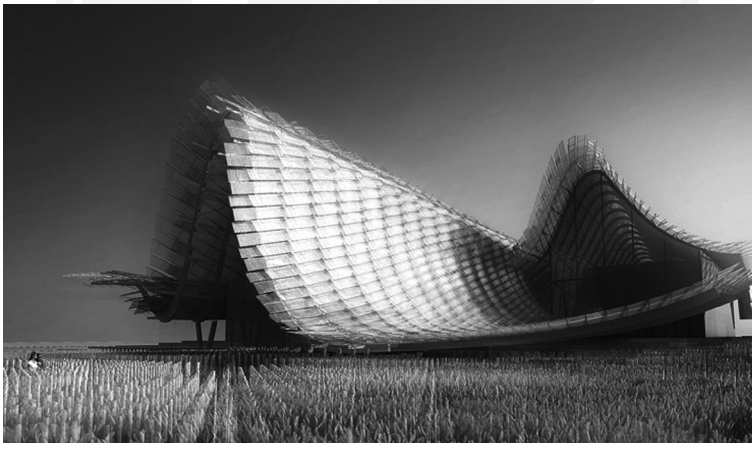
Ill. 15. Leipzig, the Glass Hall – a fragment of the construction of the gable end (photo by the author)

with air at a controlled temperature. The hall is obviously equipped with additional sources of artificial light. Maintenance of the hall is performed by using the water carried in each carrier girder with specially constructed mechanical devices and by movable bridges.

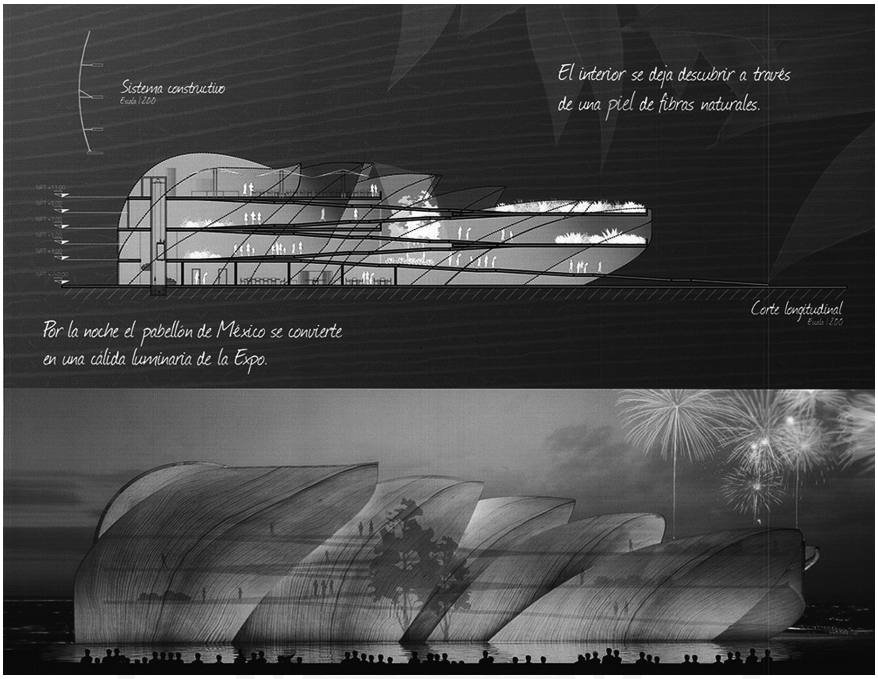
6. Conclusions

Designing large-scale shopping centres and exhibition pavilions has its own specificity: the "technology" of functional connections and structural determinants related to considerable spans of covering. After years that have passed since the author's first design experience in this field, it is a good time to reflect on the history and prospects of this architecture. An extremely interesting and instructive subject of such an analysis is undoubtedly The Leipzig Trade Fair. After 17 years from the beginning of its use, one can now assess its functioning and innovation of applied constructional and material solutions. It is also instructive to compare these buildings, especially the main hall, with the program and individualization in form and design, with the architecture of many pavilions designed for world expositions in the past decades.

This architecture is commonly dominated by the tendency to emphasize national identities of exhibitors in structures and forms of representative exhibition pavilions. As a result, we are dealing with a riot of forms, colours and materials that symbolize different countries and continents. The unsatisfied ambitions of individual designers, who want to enter in the annals of the history of contemporary architecture, also play a significant role. Moreover, current trends encourage the use of natural materials (e.g., timber: Hungarian and Swiss pavilion and the great timber structure in Hannover, vertical gardens at the Chinese exposition and wicker – Polish pavilion in Aichi as well as "paper", the shell of the Japanese pavilion in Hannover). The latest example of "green" project activities is the concept of the Mexican pavilion –



Ill. 17. Studio Link-Arc, the project of the Chinese exhibition hall at Expo 2015 in Milan (source: http://assets.inhabitat.com/wp-content/blogs.dir/1/files/2014/03/China-Pavilion-Expo-Milano-2015-Studio-Link-Arc-2.jpg)



Ill. 18. F.L.G. Almada – the project of the Mexican exhibition hall at Expo 2015 in Milan (source: http://aasarchitecture.com/2014/05/mexico-pavilion-expo-2015-francisco-lopez-guerra-almada.html/mexico-pavilion-expo-2015-by-francisco-lopez-guerra-almada-04)

inspired by the form of a translucent husk of the corncob – designed by F.L.G. Almada for next year's Expo in Milan. It is worth noting that the Polish proposal for the same event is a project[12] inspired by the production of apples – in the form of a stack of wooden crates for the fruit, with a tour composed of multimedia and interactive installations... Although it is also possible to use reinforced concrete structures, their use in the architecture of usually temporary exhibition halls is sporadic. The problem of construction and materials used in the halls of exhibition pavilions is undoubtedly worth a separate study.

Comparison of the aforementioned design "visions" with the logic and clarity of the Leipzig Hall concept, demonstrates (in the author's opinion) the advantage of simplicity, design and versatility of forms over the exuberant ambitions of "one exhibition" for architecture's creators.

After many years of experience, one can observe a clear advantage of proven classical forms in the Glass Hall, which reached their most sophisticated form in an arcuate covering. Only technical, constructional and material possibilities have changed enabling to create new aesthetic and architectural visions.

[12] It is designed by Warsaw-based "2PM Studio".

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