

# Archivolta 1(61)2014

## Summary Review

© Archivolta Publishing House Michal Stepien



dr hab. inż. arch.  
Krystyna Januszkiewicz  
Editor in Chief

### *From the Editor*

*In various places in the world, efforts are being made to improve the quality of the living environment. Knowledge derived from different disciplines of science has been utilized to increase material and energy efficiency of construction projects. Digital technologies give a real dimension to these efforts by moving the architecture to a higher level of quality. For several years, CTBUH has been awarding the best tall buildings, promoting minimization of their negative impact on the environment. Technologically advanced building materials are being created, precision of design and implementation has increased, as well as eco-efficiency of building structures and their groups. This is confirmed by the examples such as the Dalian International Conference Center in China or the King Abdullah Financial District in Riyadh, as well as the Olympic facilities in Sochi, designed by world-renowned ateliers.*

*In Poland, the economic technology of bending glass for curvilinear forms with complex geometry has been mastered; the production of glass cladding panels has been commenced, the shape of which will each time follow the 3D model drawn up by the architect. This is the first in the world product made of glass for the architectural "skin", which will allow for the implementation of any undulating surface. It aroused an appropriate interest during this year's international Inglass conference, which was held in Warsaw. We would also like to inform anyone interested in digital design that in May there will be an eCAADe conference and workshops, already for the second time in Poland. Extensive coverage will be available on our Facebook. Stay tuned, Dear Readers.*

Maciej Holcer

### **XXII Olympic Winter Games 2014** p. 6 - 9

Sochi, located on the Black Sea coast, was the main arena for the XXII Winter Olympic Games in 2014.

With enormous efforts and capital expenditures, this well-known summer sports, tourism and leisure resort has been transformed into a year-round sports and recreation center. For the purpose of the Winter Olympics in 2014, a number of important building structures were erected, including the infrastructure that meets the requirements of a modern sports and recreation center. In 2018, Sochi will be one of the cities where the football World Cup will be held. Before that, the objects will be used for the preparations of FIFA 2018 organizer's football team.

The master plan and design of the flagship facility, the Olympic Stadium Fiszt, has been developed by a specialized firm Populous. The Russian consortium, GK Olimpstroj, which was created specially for this purpose, was the general contractor. 11 sports facilities and 2 training facilities, which can accommodate a total of 145,800 viewers, were erected and modernized. Road investments include a total of 367.3 km of new roads with 22 tunnels and 47 bridges and overpasses. 200 km of new railway tracks with 11 tunnels were built. More than 40 new hotels were erected for the Sochi guests. For the XXII Olympic Winter Games, power stations of a total capacity of 1200 MW were provided for use. The Olympic Park can accommodate 70,000 spectators. The cost of the Olympics with all the investments amounted to over 40 billion euros.



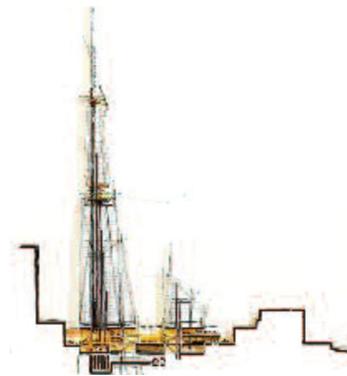
Krystyna Januszkiewicz

**CTBUH Best Tall Buildings Award 2013** pp. 10-13

On 7 November last year, in the iconic Crown Hall Illinois Institute of Technology (designed by Mies van der Rohe), took place the CTBUH 12th Annual Awards Ceremony.

Great towers in Canada, China, the UK and UAE have been named the Best Tall Building in the world for 2013 by the Council on Tall Buildings and Urban Habitat (CTBUH).

The four regional winners include The Bow in Calgary, Canada (Americas); CCTV in Beijing, China (Asia and Australia); The Shard in London, United Kingdom (Europe); Spwvah Square in Abu Dhabi, United Arab Emirates (Middle East and Africa).



Jakub Pawlak

**Dalian International Conference Center, Dalian, China** pp. 14-32

by Coophimmelb(I)au Wolf D. Prix/ W. Dreiholz & Partner ZT GmbH



DICC, China's largest conference center, completed in 2012 and designed by Coophimmelb(I)au is being presented here. This twisted steel building is located adjacent to the harbour in Dalian - a port city at the tip of Liaodong Peninsula. A novel aspect of DICC's design is the combined space of an opera, a theater, an exhibition areas and a conference center for up to 6,000 visitors.

The main structure is made of steel and aluminum with concrete cores. The structural concept is based on a sandwich structure composed of two elements - the table and the roof. Both elements have steel frames with widths ranging between 5 - 8 metres. The whole structure is elevated 7 metres above the ground level and is supported by 14 vertical composite steel and concrete cores. The double-ruled façade structure connects the two layers of the table and the roof, creating a load-bearing shell structure.

The application of new designs and techniques, the idea of bending massive steel plates and the consumption of more than 40,000 tonnes of steel enables the structure to be cantilevered above 40 meters. This allows breathtaking spans of over 85 meters. The architectural concept for the façade provides the building with natural ventilation, which is feating as well as cooling. The structure combines floating space sequences of modernist architecture with a hybrid combination of a rationally structured modern-day conference center and a world-class opera, thus exuding functionality with panache.

Andrzej Owczarek

**University Library in Zielona Góra, Poland** pp. 18-23

by Andrzej Owczarek NOW Architects



On December 11, 2012, University Library in Zielona Góra was officially opened. Its construction started in May 2011.

The Library was designed by the team of NOW architectural firm in Łódź, supervised by Andrzej Owczarek, who won the SARP competition in 2001. The investment was implemented by the construction company Skanska. The investment cost was around 30 million, of which more than 25 million came from the European Regional Development Fund as part of the Lubuskie Regional Operational Programme for the years 2007-2013.

The library building has six levels. It consists of one underground level and five which are located above ground. It is divided into several areas related to specific functions. The basement houses

closed warehouses, technical rooms and social facilities, the ground floor - recreational and utility areas, catalog information and self-service lending library. Floors I- IV include an open area and library laboratories.

The library is expected to accommodate up to one million of items: over 600 thousand in a closed warehouse and 450 thousand in the open part of the library. Traditional library cards were replaced by electronic cards, since the new library combines the functions resulting from the assumptions of a traditional and electronic library, as well as of information and cultural centers. The users have a self-service lending library, cabins for individual work, an art gallery and a conference room at their disposal. The building has been fully adapted to the needs of the people with disabilities.

Justyna Juchimiuk

### **Tradition and Modernity**

**Riyadh towards a new sustainable identity**

**The King Abdullah Financial District**

pp. 38-45



The King Abdullah Financial District (KAFD), in Riyadh is to become the leading financial centre in the Middle East, providing an attractive working environment for the growing workforce in the financial sector. The plan for the KAFD was conceived as part of an overall programme of economic diversification. The site, located north of Riyadh, has an area of 1.6 million square metres and the buildings will have 3.5 million square metres of the usable floor space .

The KAFD will accommodate large community of professionals working in the financial sector and related industries, and host the headquarters of the Capital Market Authority, the Stock Exchange, banks, rating agencies financial institutions, and other service providers, such as accountants, auditors, lawyers, analysts, consultants, and IT providers. Furthermore, recreation and leisure activities will be provided by an urban park area (the Wadi), a shopping mall and a sports arena. In January 2006 an international competition for the master concept was organized, which was won by Henning Larsen Architects.

The image of the KAFD became part of the site and the Arabian landscape. The district has a shape of a leaf and it forms an entirety with the adjacent areas. The KAFD is the first investment in Saudi Arabia, where sustainable solutions in the shaping of urban and architectural form, methods of construction, specification of building materials and renewable energy sources were used on such a large scale. The financial district as a whole is an experimental field and it will certainly act as a role model for sustainable, multi-functional development in the Middle East region. The KAFD has already been built for several years and the sustainable solutions are being implemented in the construction process. The active role of public institutions that make efforts to promote and popularize sustainable architectural solutions for multi-functional developments in urban scale are particularly noteworthy.

Krystyna Januszkiewicz

### **The surface as new cultural conditioning**

**Hypersurface and interactivity**

pp. 46-53

For an information society, dominated by electronic media, the surface becomes a new interface between what is physical and what is virtual. On the one hand, the blurring of differences between culture and commercialism is being revealed, and on the other - new intellectual substrate is emerging, based on knowledge and research. Two aspects significant for the philosophy of contemporary culture



are being presented, i.e. hypersurface and interactivity in relation to architecture as a carrier of cultural values. In the conducted discourse, the culture of media and the culture of architecture designed in synthetic digital spaces are referred to. Reference is made to the concept of hypersurface, on which Stephen Perella found an area of sensations between the real and the virtual. However, these categories as a cognitive apparatus are insufficient today, because digital technologies create new heterogeneous, interactive areas of human experience.

Interactivity is considered to be an essential catalyst for the principles that delaminate contemporary cultural communication. Examples demonstrating how interactive multimedia design enters the area of public and private life have been provided. The blurring of the boundaries between work and play, finding information and its use have been presented as well. In conclusion, it is remarked that digital media and interactivity related to the physical nature of the building bring architecture to a new level of complexity in the perception of its cultural values.

**There is already glass for hypersurfaces** (ed.) pp. 54-55

On 4 February 2014 in Warsaw, another architectural conference, INGLASS, was held.

The official Partner of this event was the company Saint-Gobain Glass, promoting innovative solutions for using glass in architecture.

New solutions for flat glass panels for facades, presented by the company Saint-Gobain Glass, as well as an innovative spatial product by the company PROTEH innovative technologies, which allows for free shaping of the exterior of a building structure in accordance with its curved geometry, deserved special attention.

This innovative product is a system of laminated glass panels and fasteners, named by the manufacturer PROTEH WAVE.

Using digital design and manufacturing tools CAD/CAM and CNC computer-controlled robots, manufacturer mastered the technology of bending glass panes and obtaining a desired shape, in accordance with the wishes of the designer, while reducing production costs at the same time.

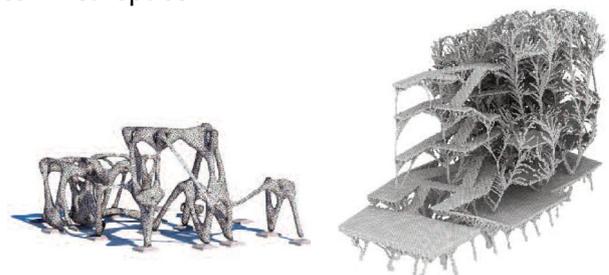
It is the world's first building system, which is a response to the contemporary needs of architecture and construction, which are oriented at saving raw materials, efficient use of materials and energy, as well as sustainable development. Designing hypersurfaces in digital spaces can already be easily implemented using glass in real space.



Sebastian Białkowski

**Time varying building** pp. 56-61

**Topology optimization in architectural design**



The purpose of the project and the accompanying research and experimentation was to create space, which would adapt to structural changes occurring in relation to continuous development of the building during its use, especially under the influence of load changes. For this purpose, Finite Element Method was adapted for the building static analysis, and derived here from Topology Optimizations, whose aim is the most efficient distribution of material in space. During the research on the form of the building, the created algorithms have been tested in several stages, before their intended use in the calculations of the building structure. From the data obtained during the optimization, stress vector field was determined at every point in the continuum according to which, a different algorithm based on a multi-agent system, traced the path of the forces to apply the material at the same time. The structure of the created object, was

based on the module which was similar to brick, but geometrically it was corresponding to the shape of a truncated octahedron. In order to simplify the design process, CAD-type software has been developed, so that very resident of the building will be able to personalize their own space.

**arena DESIGN 2014** (ed.) pp. 64-66  
**industry of revolutionary materials**



The vast majority of participants of arena DESIGN were designers and architects, manufacturers, students and art universities' teachers. Owing to their presence and willingness to cooperate, arena DESIGN can fulfil its mission to bring together business and design.

Prominent design experts visited arena DESIGN to tell the participants of the event about extraordinary materials, trends in design and the needs of the modern customer. The visitors could take part in inspiring lectures, numerous workshops and could also familiarize themselves with exhibitions of companies that invest in great designs.

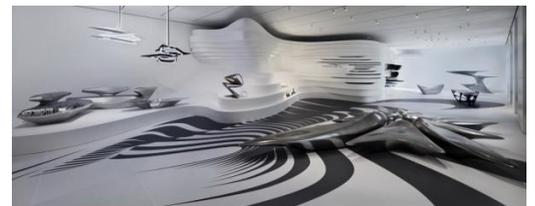
The lecture of Australian designer Brodie Neill, special guest of the fair, arouse great interest among the audience. The designer appeared in the FORUM zone twice - during his first lecture, he took the participants on a journey from the initial concept to the completion of the entire project. At the meeting, the speaker pointed out the possible dangers that may be hidden behind even the simplest form.

High attendance in the FORUM zone was maintained throughout the event, including the presentation of the second special guest Sander Mulder, discussion panel of Piotr Kuchciński, Mikołaj Wierszyłowski and Leonardo Talarico on the topic of materials, the meeting with Janusz Kaniewski, the lecture of Christian Sieger, Krzysztof Ingarden and many other lectures of esteemed designers and architects.

During arena DESIGN 2014, award granting ceremony in the international competition TOP DESIGN was held. Most of the winners are producers from Poland who believed that good design gives them a competitive advantage.

Katarzyna Słuchocka

**form, material, movement - Form in Motion** pp. 67-69  
Zaha Hadid: *Form in Motion*, Philadelphia Museum of Arts



Contemporary industrial design is a combination of geometry, as well as computer, mathematical and algorithmic logic and unlimited possibilities of expressions forms shaped in digital realities which are based on untamed designer visions. Digital tools (CAD/CAM) enable to move around two worlds: the real and the virtual one. Standstill shapes, smooth and soft lines of free forms derived from the leading creators' deep imagination are accessible through the dynamic form-finding of architecture and design shaping.

Zaha Hadid: *Form in Motion* (2012) exhibition at the Philadelphia Museum of Art highlights the changes which have taken place in design under the influence of digital technologies in a spectacular way. It also underlines a crucial in our times need for new materials, appropriate for curvilinear forms of complex geometry. The polemics of architecture and design with the contemporary offer of design and productive possibilities, sets new challenges to designers and manufacturers. Nowadays, wood, metal, glass or even simple plastic are perceived in a new light.

An interest in materials made of two or more components is on the increase. Due to its durability, fibreglass is a widely used component, giving materials new long-lasting qualities and improving their performance. Digital design process stresses need for intelligent reactive

materials, which are strong and recyclable. Zaha Hadid, Ammara Eloueini, Evan Dougli Studio, Grega Lynn and many others who are interested in using digital tools in industrial design and architecture are really looking forward to them.

Łukasz Skorek

**Strabismus Treatment Institute in Krakow, Poland** pp. 72-75

interior design by Łukasz Skorek KUMstudio



The Polish architectural atelier KUMstudio has designed a unique interior of Strabismus Treatment Institute in Krakow, the clinic of the highest standard and World reputation. They managed to combine the rigorous logic of the functioning of health care centres with unusual and unique architectural solutions.

The interior of the Institute is the finesse of organic lines, softly laying chiaroscuros, smooth continuous surfaces; these shapes were created in the digital space. Their free geometry harmonizes with rectilinear architectural interior.

The functional layout defines a division into: a reception area with a waiting room accessible from the street and medical consulting offices deeper inside, as if they were back offices. These zones are separated and at the same time integrated by free surfaces walls of complex geometry. Behind them there are auxiliary rooms and technical facilities. These walls were made of 12 mm-thick concrete GFRC panels. The panels were bent to the desired curve according to a 3D geometrical model. Curvilinear wooden elements, complementing internal divisions, were also made on individual order, in accordance with their 3D digital model.

The implementation of the Strabismus Treatment Institute in Krakow is one of the first applications of CAD/CAM digital technologies in Poland, so the digital tools were useful not only in the design process but also in fabrication.

Paweł Rubinowicz

**CITY SPACE** pp. 76-77

New creative endeavor by the artist sculptor Ryszard Wilk in cooperation with the architect Kamil Kędra



“City space” or “Spacization – the City” is a title of a new project implemented by the artist sculptor Professor Ryszard Wilk in cooperation with the architect Kamil Kędra.

Professor Wilk considers space to be something dynamic, something extending beyond the static Cartesian system. Space is a process and immaterial or invisible structures organizing a creative development of the space are more important than temporary states. A competition for a skyscraper in Seoul organized by Super Skyscrapers was an impulse for the new activity. In the end, Wilk and Kędra gave up their competition concept, whereas ideas developed in relation to the competition were being further extended. They developed a method using repeatable 2D elements circumscribed on a circle. Hundreds of such elements were created using a laser plotter. Then, by overlapping the elements, they achieved surprisingly complex and unique structures which were organic in terms of their expression. Physically erected structures were reconstructed in computer models – and reversely, each technique created new possibilities for expression and has different limitations. For certain, an important value of the project is simultaneous application of both techniques designed to produce synergy between the “analogue” and “digital” worlds.