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Fig. 1. BMW Welt Munich, Germany: view from BMW Museum, photo 2008
Sl. 1. BMW Welt, München, Njemačka: pogled iz BMW muzeja, snimljeno 2008.

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New Perspectives in Automotive Industry Architecture: Car Museum Design

Nove perspektive u arhitekturi automobilske industrije: projektiranje muzeja automobila

CAR MUSEUM
CULTURAL SPACE
DESIGN
INNOVATION
TECHNOLOGY

MUZEJ AUTOMOBILA
KULTURNI PROSTOR
PROJEKTIRANJE
INOVACIJA
TEHNOLOGIJA

Since 2000, car manufacturing industry turned increasingly towards spectacular and expressionistic architectures, targeting the confirmed presence in global and local (at city level) public space. This also resulted in the opening to the general public of extensive surfaces of interactive and museum spaces to accommodate educational-informative activities, present the historic and technological emblem or host cultural events and interactive functions.

Od 2000. godine automobilska se industrija sve više okreće spektakularnoj i ekspresivnoj arhitekturi, potvrđujući svoju prisutnost u globalnom i lokalnom javnom prostoru. To je dovelo do otvaranja velikih površina interaktivnih muzejskih prostora široj javnosti putem organizacije obrazovno-informativnih aktivnosti, kulturnih događanja i interaktivnih funkcija te prezentacije povijesnih i tehnoloških obilježja.

INTRODUCTION AND GENERAL THEORETICAL FRAMEWORK[1]

UVOD I OPĆI TEORIJSKI OKVIR

If 1980's launched along with Renault Distribution Centre in Swindon, UK, 1980-1982[2] – signed by the architect Norman Foster – a new fashion in the architectural program dedicated to the exhibit and the car sales business, this was only the beginning of a new trend in promoting the brand space of the car manufacturing industry. This trend is oriented, at the time, towards the technologically-innovative expressiveness of architecture, careful selection of the architect and the enounced architectural concept, the presence in a particularly chosen landscape to enhance the image of innovative design, extensive areas (25.000 m^2) and the functional diversification of the exhibition and sales programmes with other types of activities in the category of events and leisure. All these characteristics were intended to make the location a point of local and global attraction. Renault Distribution Centre Building was making then a change of thinking in the plane of industrial distribution area, re-dedicating a large surface of deployment and a spectacular iconic architecture. It was also making a shift in rethinking the function dedicated to the commercial showroom and the industrial area[3] – marking the emergence of a new architectural programme, hybrid at that time: the automotive centre as a point of attraction and global architectural expression.

Years 2000 mark at all levels of architecture a relaxation of design towards the search of manifests and the structural expressiveness of the image, and the stability in the favour of redefinition of technology.[4] In the area of automotive architecture[5] stands out a boom in projects and constructions which are becoming more and more specialized to meet the new changes in the private life as well as in the life of society and the standard of living prefigured for the 21st century. Architecture dedicated to automobiles[6] covers since the years 2000 several programmes: from the architecture of highways, crossings and bridges, facilities for Formula 1 racing and test tracks, car stations and gas stations, acoustic barriers and parking sites, showrooms and sales and leisure centres, dealerships, factories, up to dedicated innovative research centres and museums. Illustrative examples in this regard are: Trees Acoustic Barrier A2 Motorway in 2009 (by Structurae)[7], Chiasso, Switzerland (by Mario Botta), Audi Forum Museum Mobile[8] in 2000, Ingolstadt, Germany (by Henn Architekten), Park and Ride Tram Station[9], in Strasbourg France (by Zaha Hadid), BMW Central Building Factory[10] in 2005, Leipzig Germany again by Zaha Hadid[11], Citroen Flagship Showroom[12] in 2007, Paris France (by Manuelle Gautrand), Dubai Autodrome[13] in 2004, Dubai UAE (Populous), Ferrari Research Centre[14] in 2012, Modena Italia (Shiro Studio), New Ferrari Headquarters[15], in 2004, Maranello Italia (Massimiliano and Doriana Fuksas), Lingollo Factory Conversion[16] in 2002, Torino Italia (Renzo Piano), Mercedes Benz Museum[17] in 2006, Stuttgart Ger-

1 This article is part of the post-doctoral research project "Types of innovation in cultural space. [working with/in] cultural spaces _ tradition and innovation." PI Dr. Architect Marina Mihaila, and it is supported by a grant from the Ministry of Education in Romania, CNCS-UEFISCDI, project no. PN-II-RU-PD 2012-3-0515.

2 http://www.fosterandpartners.com/projects/renault-distribution-centre/ [1.6.2014.]

3 DREDGE, 2007

4 MIHAILA, 2012

5 JODIDIO, 2011

6 MORRISON, MINNIS, 2012

7 http://structurae.net/structures/data/index.cfm?id=p0001441 [1.6.2014.]

8 http://www.henn.com/en/projects/culture/audi-museum-mobile [1.6.2014.]

9 http://phaidonatlas.com/building/park-and-ride-tram-station/3071 [1.6.2014.]

10 http://phaidonatlas.com/building/bmw-factory-central-building/823 [1.6.2014.]

11 HADID, GANNON, 2006

12 http://www.manuelle-gautrand.com/projects/citroen-showroom/ [1.6.2014.]

13 http://phaidonatlas.com/building/dubai-autodrome-sports-facility/1508 [1.6.2014.]

14 http://phaidonatlas.com/building/enzo-ferrari-museum/223831 [1.6.2014.]

15 http://phaidonatlas.com/building/new-ferrari-headquarters/67842 [1.6.2014.]

16 http://www.rpbw.com/project/62/lingotto-factory-conversion/ [1.6.2014.]

many (UnStudio), Hessing Cockpit Building and Acoustic Barrier[18] in 2005, Utrecht Holland (by ONL), Renault Square Com in 2004, in Boulogne-Billancourt Franţa (by Jakob MacFarlane), Rolls Royce Manufacturing Plant and Hq[19] in 2003, West Sussex UK (by Nicholas Grimshaw), Central Bus Terminal[20] in 2002 Lugano, Italia (Mario Botta), Shanghai Auto Museum[21] in 2007, Shanghai Automobile City China (Atelier Bruckner), Three Bridges[22], in 2013, Reggio nell'Emilia, Italia (Santiago Calatrava), United Oil Gasoline Station[23] in 2009, Los Angeles, USA (Kanner Architects), Automotive Centre of Excellence[24] in 2006, Melbourne Australia (Lyons), Car Park In St Veit[25] in 2006, St Veit an der Glan, Austria (Ogris +Wanek Architekten) and many others.

The museums dedicated to cars[26] follow the tradition of spaces destined to exhibit objects[27] of museal value[28], both permanent as well as temporary collections complementary or not to the thematic area. This a niche of innovation at the level of the architectural programme integrates one or more facilities specific for the automotive industry, translating concepts from the automotive area into specific architectural elements in the forms of street design, movement, dynamics of perception and so on, but also incorporates the innovative and technological history of the 21st century.[29] Likewise, the new car museum addresses a wide audience in the same way as the contemporary museum[30] does it, by opening towards the city space and tourism[31] and assuming the roles of education and urban responsibilities.[32] It also participates in the cultural life of the city by organizing festivals and events, and defines itself as an active resource of the public space[33] thus becoming a cultural target for the interested public.

No less important is the observation that at the level of the brand translation, the dedicated automotive museum redefines itself as a theme park and enounces its status by its name, developing and supporting corporate presence strategies through specific aesthetic effects, becoming a "branded museum destination" as Homadovski[34] calls it. Supposedly the automotive industry entered the museum "market" less based or determined by direct economic incentives (new market niche, new services) but more likely with the intent to increase brand visibility and public attraction. However, as we will later show – some of these projects prove to be rather successful and sustainable economic enterprises.

When does occur the mutation taken by the museum[35] towards the area of automotive-cars exhibits and the illustration of the history as the domain's evolution and current state of the art? We might probably state that starting with the years 2000 the car manufacturing industry increasingly turned towards more spectacular and expressionistic architectures, targeting directly the confirmed presence in the global and local (at city level) public space, but also at the level of opening to the general public extensive surfaces of interactive and museum spaces to accommodate educational-informative activities, the historic and technological emblem as well as events and interactive functions.

Materials and Methods

Materijali i metode

The article is built around four selected case studies which investigate and highlight essential underlying data, illustrated with documentary photographs taken during study trips. In addition to the field research undertaken by the authors, specialty materials regarding the architecture and management of studied projects are the main sources of information. The followed method is a multicriteria comparison of the case studies on several levels of analysis concerning both the architecture and the management of the studied examples. The four case studies were analyzed comparatively departing from the synthetic figures related to architecture, urban space, managerial and statistics of touristic attractiveness[36], synthetic study on architectural management – tourism management[37], targets and results, brief study

17 http://www.mercedes-benz-classic.com/content/classic/mpc/mpc_classic_website/en/mpc_home/mbc.flash.skipintro.html#_int_mbc:home:home-link:mbc [1.6.2014.]

18 http://www.oosterhuis.nl/quickstart/index.php?id=cockpit [1.6.2014.]

19 http://grimshaw-architects.com/project/rolls-royce-manufacturing-plant-headquarters/ [1.6.2014.]

20 http://www.botta.ch/page/Pu%202002_422_Pensilina_en.php [1.6.2014.]

21 http://www.atelier-brueckner.com/en/projects/museums/shanghai-auto-museum.html [1.6.2014.]

22 http://www.detail-online.com/architecture/news/the-perfect-wave-new-high-speed-train-station-in-italy-021674.html [18.7.2013.]

23 http://www.kannerarch.com/main.html [1.6.2014.]

24 http://phaidonatlas.com/building/automotive-centre-excellence/460 [1.6.2014.]

25 http://phaidonatlas.com/building/car-park-st-veit/1672 [1.6.2014.]

26 Meyhöfer, 2003

27 Marvin, 2013

28 Naredi-Rainer, Hilger, 2004

29 Bethscheider-Kieser, 2008

30 Toy, 1997

31 Lasansky, McLaren, 2004

32 Carmona, et al., 2009

33 Gehl, 2010

34 Homadovski , 2009: 395

35 Jodidio, 2010

36 Gali-Espelt, 2012

37 Russo, van der Borg, 2002

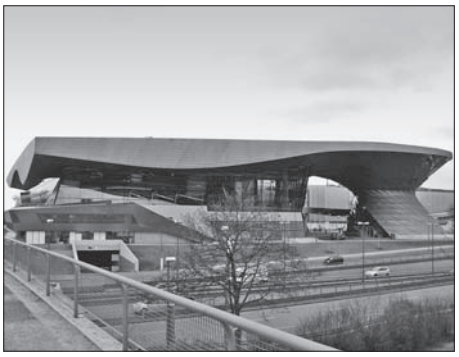

FIG. 2. BMW WELT MUNICH, GERMANY, PHOTOS 2008: VIEW FROM BRIDGE TO OLYMPIA STADIUM PARK
SL. 2. BMW WELT, MÜNCHEN, NJEMAČKA, SNIMLJENO 2008.: POGLED S MOSTA NA PARK OLIMPIJSKOG STADIONA

regarding innovation in architectural design, solutions of enveloping, structure and dedicated spaces. Table I and Table II present this data which is intended to give a simultaneous comparative overview of the four projects: BMW Welt – BMW Museum Munich, Porsche Museum Stuttgart, Mercedes Benz Stuttgart, Audi Museum Ingolstadt.

All studied objectives have been built in the first decade of years 2000 in Germany. The motivation in choosing the case studies has been based on several criteria: the impact and influence the automotive industry has and had in the region of south of Germany (but also in Central Europe) and in the generation of gross domestic product (the respective Länder) over time; the localization in a relative proximity; the close year of construction; all chosen brands are German; a similar architectural mission to create relevant technological-architectural attraction points both at urban and regional levels; a change in public perception regarding the facilities the car manufacturing industry is offering and their impact on the local quality of life; the transformation and expansion of the manufacturing plants through additional spectacular features; the cultivation of a lifestyle that is based on design preference, relaxation and creativity; the re-transcription of brand influence and presence in the city, by rewriting the landscape information.

Materials and literature underlying the study are: books dedicated to each of the museums; books theorizing the new museum architecture or the relationship between architecture and automobiles; industry trends and concepts; studies of the authors; information from the official websites of museums, architectural and online articles on architecture and tourism including official press-releases and attached materials; documentary photos by authors taken during study trips.

DISCUSSIONS ON CASE STUDIES AND RESULTS

DISKUSIJE O PRIMJERIMA I REZULTATI

The case study discussions are situated between the field of vanguard architectural design and the industry's approach regarding its opening to the wide public space and audience[38], as well as the reconsideration of the involvement of the car industry into the softer area of art and culture.[39] The relevance of the brand impact in architectural configuration and the connection with particular names from the architecture world are considered important and an intrinsic part of the car museum development technology.

CASE STUDY 1 – BMW WELT AND BMW MUSEUM, MUNICH

BMW Welt – Munich[40], opened in 2007, is the newest building built in fact as an extension of the architectural park developed by BMW Group AG in Munich alongside BMW Werk (BMW Factory), the office tower connected to the factory, and the BMW Museum (initially established in 1973). BMW Welt is the work of Coop Himmelblau architects from Austria, who won the 275 entries architectural competition from 2001, subsequently completing the full architectural design. As a key landmark of urban representation, BMW centre was conceived as a visual insertion between the initial BMW development and Olympia Stadium, but also as an additional value to the experience of the organized factory and museum visitation tours (which already attracted a significant number of visitors). At the level of activities and representation it was intended as a large brand experience open space that would generate a new identitary and architectural spatial formation of the whole ensemble.[41]

The (BMW Welt) building is developed integrated into a green park area opposite to the Olympia Park Stadium, and connected to the later via a pedestrian bridge. These precedent may be the reason why Coop Himmelblau included in their architectural concept strategy the connection to the site previously developed by BMW Werk via a bridge-like pedestrian walkway, spanning across the street (Fig. 1), which also becomes the main feature – architectural-axis of the new building. This footbridge continues inside the building as the main promenade and observation point of the architectural space, purposefully designed in a dynamic-fluid-flowing manner. The interior is a large all-under-one-roof open space – publicly and freely accessible, possibly to traverse at either ground plaza or at the above bridge level. The continuity of the promenade routes connecting first the BMW Werk development to the BMW Welt building via the pedestrian bridge – and then the existing bridge crossing over to the Olympia Park Stadium (Fig. 2), ensure an efficiently studied spatial coherence.

From the perspective of figures BMW Welt develops an area of 73,000 square meters with a corresponding volume of 531,000 cubic meters on a plot of 25,000 m^2 (Table II). The main activities are: automobile delivery centre (where customers from around the world now come to pick up their car directly from the centre in Munich), and a museal technological display section. The later includes a permanent collection of technological information presented though live exhibits or via interactive displays and real-time simulations. The public is able to participate

and experience the defining BMW technological "universe" through exhibits like complex finishing textures and materials, types of engines along with the extensive presentation of solutions related to energy efficient design and dynamics. The building also provides a substantial showroom area displaying the latest car models, an interior shop selling multiple brand design products ranging from high performance bicycles to nano-textures clothing. The experience is completed through a restaurant and a bookstore that shows BMW buildings but also includes topics like design, architecture and art. Under the heading 'Event Forum'[42] the complex also provides rooms and spaces like auditorium, conference rooms and other facilities with connected services able to accommodate and fully service a significant number of events or happenings like meetings, conferences or filming events.

Desired iconic, representative and purposefully large, BMW Welt surprises with its dynamic and nuanced architecture and an extensively sought expressiveness. Despite its considerable scale it manages to avoid being aggressive in relation to the site also with the help of its wisely designed envelope with no single part or texture uncorrelated with the context. The double-cone is the attraction and the recognizable element, purposefully designed so by the architects. This key element, by its dual rotation, suggests the creation of an epicentre in space fluidization.

BMW Museum – Munich[43] reopened in 2008 signed by Atelier Bruckner[44] who have added the concept "road in the rebuilt space" to the former museum building designed by Prof. Karl Schwanzer in 1973 under the motto "streets and places in urban space". Similar to BMW Welt, the new redesigned museum is part of the same idea of the developer to communicate with the wide public, to exhibit its collections and experience, but also to experiment new types of interactive spaces. The architectural project is the result of the award of the 2001, 170 entries architectural competition. The museum was conceived as a landmark, making a discrete but noticeable presence in the urban space – with its unmistakable concrete mushroom-cone sculptural volume (Fig. 2). The museum accommodates permanent collections and illustrates fully the BMW experience through the years, on categories ranging from aircrafts to cars and motorcycles. It also hosts an innovative area showing new conceptual and preproduction models. The exhibition concept is structured around seven thematic blocks – 'seven houses'[45] of: Design, The Company, Motorcycle, Technology, Motor Sport, Brand, Series – each with corresponding thematic exhibits.

The contemporary museum model is illustrated here by Atelier Bruckner through paths and open-plaza surfaces, where the multileveled crossings allow for a dynamic and correlated perception over the interior spatial organization.

The concept of innovation is what structures the type of exposure and spatial experiment, bringing the technology to the level of perception as progressive design (design in progress). The space separating walls are simultaneously lighting elements, information screens, displays for keywords and automotive conceptual design sketches contributing to the complete and comprehensive image regarding the historical evolution of collections. The interior conical volume is designated to the developing technology, car prototypes and the enunciation of concepts in progress. The display area totals 5,000 square meters and 120 exhibits (Table II). The museum, accessible only with a ticket, hosts a cafe and a bookstore (and small design objects). The footbridge crossing towards BMW Welt has been positioned right in front of the BMW Museum entry, the visitor being allowed for a complete tour of BMW urban facilities but also able to continue with Olympia Stadium Park. The activities and hosted events are well integrated and quite similar to those of BMW Welt.

Both BMW Museum and BMW Welt participate in city life by hosting various cultural events[46] like festivals, concerts, carnivals and parties for kids, various events for the general or dedicated public (at the date of writing the article in BMW Welt: CRIME FICTION Film Festival). It is important to underline that the synergy between the two objectives led to a substantial growth in the number of visitors of the BMW ensemble (see Table II for exact figures).

Case study 2 – Porsche Museum, Stuttgart

The opening of the Porsche Museum[47] (Porsche AG, 2014b) in Stuttgart took place in early 2009, just few weeks after the completion of construction (in December 2008). The

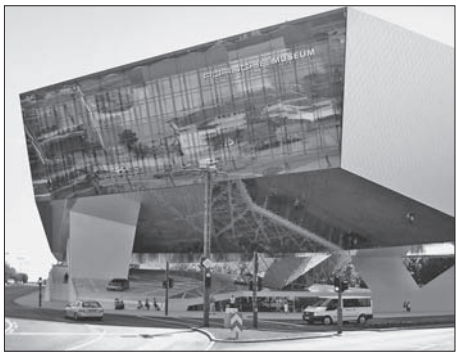

Fig. 3. Porsche Museum Stuttgart, Germany, photos 2009: exterior view with the entrance and public space
Sl. 3. Porsche muzej, Stuttgart, Njemačka, snimljeno 2009.: pogled izvana s ulazom i javnim prostorom

38 Jodidio, 2010a

39 Schwaiger, et al., 2010

40 Brauer, et al., 2008

41 Feiress, Kwinter, 2007

42 http://www.bmw-welt.com/en/event_forum/index.html [15.10.2014.]

43 http://www.bmw-welt.com/en/visitor_information/guided_tours/museum.html [1.6.2014.]

44 http://www.atelier-brueckner.com/en/projects/museums/bmw-museum-munich-germany.html [1.6.2014.]

45 http://www.bmw-welt.com/en/exhibitions/museum/current/the_seven_houses.html [15.10.2014.]

46 Besculides, et al., 2002

47 http://www.porsche.com/international/aboutporsche/porschemuseum/ [1.6.2014.]

FIG. 4. MERCEDES-BENZ MUSEUM STUTTGART, GERMANY, PHOTOS 2008: EXTERIOR VIEW FROM THE ENTRANCE
SL. 4. MERCEDES-BENZ MUZEJ, STUTTGART, NJEMAČKA, SNIMLJENO 2008.: POGLED IZVANA S ULAZA

FIG. 5. AUDI MOBILE MUSEUM INGOLSTADT, GERMANY, PHOTOS 2008: EXTERIOR VIEW FROM THE STREET
SL. 5. AUDI MOBILE MUZEJ, INGOLSTADT, NJEMAČKA, SNIMLJENO 2008.: POGLED S ULICE

museum features a spectacular collection based on the innovation and the experience of its creator Ferry Porsche (who is in fact of Austrian origin).

"The Porsche Museum creates a space that gives architectural expression to the company's confident outlook and discerning standards, while also capturing Porsche's dynamism. Knowledge, credibility and determination are as fundamental to the philosophy as courage, excitement, power and independence. Every idea is treated as an opportunity actively to tackle fresh challenges and probe the limits, yet still remain true to yourself. This museum endeavours to reflect all that" – declares architect Delugan Meissl in his dedication.[48]

Developed on an urban island across the main Porsche car delivery centre and showroom, Porsche Museum building predicates the design brand statement through innovative technology architecture, structural autonomy and particular presence in the image of public space. But as a fundamentally cultural urban insertion (Fig. 3) it also becomes part of the urban revival process[49], of the urban revival of a predominantly industrial district. The suspended volume which houses the exhibition space flows above an exterior public space (included in the design since competition stage in 2002-2004). The public space works like an agora or an exterior (covered) public square a needed respiro in its rather limited urban setting – unlike with BMW Welt where the architects, profiting the larger plot and park setting chose to internalise this space. The building's site has 8.200 square meters, and the developed built surface is 13.333 square meters (Table II). The exhibition area is 5.600 square meters (equal in surface to BMW Museum, but otherwise un-comparable because of the specific architectural spatial conformation).

The architectural design is simple and pure, designed in the same idea of technological competitiveness. The enveloping surfaces are in generally dominated by white reflective metal and glass sheets. The white also dominates the interior design, consistently following an "all white" decorum, dotted here and there with few colored surfaces and etched glass supports for the exhibited automobiles. Porsche Museum is a landmark insertion type of building, situated in an urban industrial context; the museum shape is identifiable through its architecture. The nuanced volume and expression, adaptive as perception and context, helps avoiding the ponderosity of a mass urban box. Urban space is clearly delineated in the ground floor area – the level of the city, while the exhibition space is conceived as a unitary and autonomous place, a separate collection area. As Kieran Long[50] points out the interior space is not as fluid as in the case of its Mercedes. But the two cannot be judged by the same measure as this building is marked by a different conceptual demarche than its predecessor.

CASE STUDY 3 – MERCEDES-BENZ MUSEUM, STUTTGART

Mercedes-Benz Museum develops (2001-2006), under the distinctive signature of UnStudio. The trefoil and double helix shape (Hansen, 2006) leads to a continuous walking space surrounding an inner atrium of the building, which hosts the entrance space, the elevators access hall and the opening of all exhibitions across the building elevation. The design of the exhibition has been provided by HG Merz Architekten Museumsgestalter[51] – a German architectural office specialised in museum design – who also contributed to Porsche Museum.

Architectural design innovation consists not only in the resulted nuanced volume and shape, but also in the process of project design involving advanced computational actions. The result is suggestively described: "Typical baroque characteristics are omnipresent; the building eludes quick comprehension, refuses to cut clear boundaries, even blurs its boundaries. It is impossible to detect the tremendous forces at work, and even this vehemence is easily concealed by absorbing it into one infinite motion."[52] Situated in a wide open public space, Mercedes-Benz Museum is a distinctive object presenting itself as unique and particular in terms of both image and architectural design (Fig. 4). The exterior shape of the envelope follows the interior movement and suggests the fluid continuous walking, reminding somehow the first similar architectural lesson set by the walking path in Guggenheim main hall exhibition in NY – F. L. Wright. Because of the design, the tour of the collection starts at the upper floor, following the ascension by capsule-like elevator (referencing a time capsule). The exhibition space hosts collections grouped on time periods, connecting automobile design with events and historical personalities and specific musical ambiance. The interior architectural space can be described mainly as a show of successive collections, but it also includes complementary activities like a restaurant, a book shop, a debate and lecture area (similar to the other case studies). In the immediate vicinity there is a sizeable multi-storey Mercedes-Benz Showroom and delivery area. The wide outdoor public space is conceived as a negative (bellow ground) extrusion of the street level plaza, with different topographies which include two opened air amphitheatres (both having the museum building as background) for events and concerts. According to Ben van

Table I. Investigating correlated urban-architectural synthetic factors, the 4 examples: BMW Welt – BMW Museum Munich, Porsche Museum Stuttgart, Mercedes Benz Stuttgart, Audi Museum Ingolstadt

Tabl. I. Istraživanje veza između arhitektonsko-urbanističkih čimbenika, 4 primjera: BMW Welt – BMW muzej u Münchenu, Porsche muzej u Stuttgartu, Mercedes-Benz muzej u Stuttgartu, Audi muzej u Ingolstadtu

study case/ investigating correlated urban-architectural synthetic factors	BMW Welt – BMW Museum		Porsche Museum Stuttgart, Baden-Württemberg	Mercedes Benz Museum Stuttgart, Baden-Württemberg	Audi Museum Ingolstadt, Bavaria
	1		2	3	4
	1.1.	1.2.			
Architecture category	museum, cultural	museum, cultural	museum, cultural	museum, cultural	museum, cultural
urban category	insertion, cultural, attraction, touristic	insertion, cultural, attraction, touristic	insertion, cultural, attraction, touristic	insertion, cultural, attraction, touristic	insertion, cultural, attraction, touristic
relation /address to the context	response of the client as technologic design ICON-recipe: innovative landmark	present, but discreet, as an accent of the closed factory (renovated)	response of the client as technologic design ICON-recipe: innovative landmark	response of the client as technologic design ICON-recipe: innovative landmark	present, but discreet, as an accent of the closed factory. ICON through contrast
volume typology	mass emotional architecture	ground-underground architecture	floating volume above public space	man& machine computer design, statement	modernist, rotation volume/volumes
architecture concept	*brand-experience and car-delivery centre; to create a spatial, ideal, and identity-forming architectural ensemble*	renovation, re-concept *Road in the rebuilt space (add to old concept: streets and places in urban space)*	*design concept, all white, autonomous*	*museum sets up an interface for a series of radical spatial principles in order to create a completely new typology*	*place for the pursuit of learning history meets modern*
	high-tech, public space related, innovative at many levels	high-tech, public space related, innovative at many levels	high-tech, public space related, innovative at many levels	high-tech, public space related, innovative at many levels	high-tech, public space related, innovative as status
Urban features	bridge connecting the building with factory development, plot on the park green side, connected with green bridge to the Olympia Stadium + continuous urban path	almost hidden underground, accent volume near the entrance, correlated with the factory, should be discovered	urban island, nearby the railroad and the bridge above, developing a conceptual public place, but in fact developing paths through the conceptual public space, floating urban object as museum s expression	plaza with different accesses, upper plaza near the street	in the courtyard of the factory development
architectural features	the double cone, the fluid surfaces and shapes, the nuanced textures, huge volume and facades, mass built landscape making the alternance between the BMW WERK scale and Olympia Stadium scale	the concrete mushroom as accent, the neutral entrance, almost hidden as expression or very discreet	floating autonomous object as museum s expression, public space intention and continuity, visual connected with the showroom across the street	mono-block sculptural volume, with 2 types of textures-manifestation skins, massive but impressive-emotional comparing with flat + slope plaza	mono-block as central radial space, circular starting from the idea of forum, shaped and round facade-surfaces nuanced, in a rotation understanding of the volume, probably from the concept of mobile-mobility.
structure	metallic + composite (concrete and metal)	concrete + composite (concrete and metal)	metallic + composite (concrete and metal)	concrete + composite (concrete and metal)	metallic + composite (concrete and metal)
interior architectural features	bridge road passing through, exhibition concept space – everything with one roof	urban streets and plazas, lighting neutral from the walls, everything is a path, every wall is light and information or exhibition, design should be an expression of art.	interior space segmented but scenographic spaces, articulating 2 states of emotion + the down and the upper, all white as design, all clear and pure – only shape should be visible	*algorithmic architecture, designed from interior state of perception and path through, central atrium, continuous walking space and space exhibition	central atrium, open space exhibition to the atrium, mobile devices

Berkel, director of UnStudio: "The Mercedes-Benz Museum sets up an interface for a series of radical principles in order to create a completely new typology."[53]

Mercedes-Benz Museum presents 125 years of automobile history, 160 vehicles and another 1500 exhibits set out in over 16.500 square meters (from the 35.000 square meters of the total development) and on 9 levels (47.5 m height).[54] The official website announced 4.4 millions visitors and 100.000 of Facebook fans.[55]

Case study 4 – Audi Mobile Forum, Audi Museum, Ingolstadt

Audi Museum Mobile[56] is the dedicated museum, established as a part of large Audi platform in the brand's hometown of Ingolstadt (a town close to Munich). It was completed between 1998-2000 by Henn – an architectural practice based in Munich[57], and was designed as part of the Audi Forum,

48 http://www.porsche.com/museum/en/entstehung-undarchitektur/ [1.6.2014.]

49 Baus, 2009

50 Long, 2009

51 http://www.hgmerz.com/ [15.10.2014.]

52 Rauterberg, Filippo, 2006: 44

53 http://www.unstudio.com/projects/mercedes-benz-museum [1.6.2014.]

54 http://media.daimler.com/dcmedia/0-921-863897-1-1510230-1-0-0-1510614-0-1-11702-0-0-1-0-0-0-0-0.html [10.6.2012.]

55 http://specials.mercedes-benz-classic.com/en/portfolio_page/facts-and-figures-mercedes-benz-museum-key-information/ [1.6.2014.]

56 Museum Mobile, 2000

57 http://www.henn.com/en/projects/culture/audi-museum-mobile [1.6.2014.]

TABLE II. INVESTIGATING CORRELATED FIGURES + NUMBERS SYNTHETIC FACTORS, THE 4 EXAMPLES: BMW WELT – BMW MUSEUM MUNICH, PORSCHE MUSEUM STUTTGART, MERCEDES BENZ STUTTGART, AUDI MUSEUM INGOLSTADT

TABL. II. ISTRAŽIVANJE KORELACIJA KVANTIFICIRANIH ĆIMBENIKA, 4 PRIMJERA: BMW WELT – BMW MUZEJ U MÜNCHENU, PORSCHE MUZEJ U STUTTGARTU, MERCEDES-BENZ MUZEJ U STUTTGARTU, AUDI MUZEJ U INGOLSTADTU

study case / figures+numbers	BMW WELT – BMW MUSEUM[abcd]		PORSCHE MUSEUM Stuttgart, Baden-Württemberg[ef]	MERCEDES BENZ MUSEUM Stuttgart, Baden-Württemberg[ghi]	AUDI MUSEUM Ingolstadt, Bavaria[j]
	1		2	3	4
	1.1.	1.2.			
opened	2007	1973/ 2008	2008	2006	2000
time	2001 competition 2001 planning 2003 start construction 2007 opening	1968 – tender and competition 1971 construction start 1973 – opening 2004 – start renovation 2008 – opening of expansions	2004 competition 2005 award 2005 construction start 2009 opening	2001 competition 2003 construction start 2006 opening	1998-2000 2000 opening
Cost	Approx Euro 100 million	–	Approx Euro 100 million	Over Euro 150 million	Approx Euro 11 million (authors estimation based on a total of 70 million for the whole Forum)
Architect	COOP HIMMELB(L)AU	Prof. Karl Schwanzer Architect of renovation: Atelier Brückner	Delugan Meissl Associated Architects HG Merz (exhibition design)	UNStudio van Berkel & Bos, Amsterdam HG Merz (exhibition design)	HENN
Visitors	2,5 million/2012	Over 500,000/ year	500,000 (2009) 1.000,000 (by June 2011) http://press.porsche.com/news/release.php?id=836	Over 700,000/2013	122,570/2011
Site area	25,000 m²	–	8.200 m²	–	–
Ground floor Area	16,000 m² (roof)	Area of Museum Bowl: 1,000 m² Area of low building: 4,000 m²	13,333 m²	4,800 m²	2,200 m²
Overall area	75,000 m²	12,200 m²	27,692 m² 5,600 m² exhibition area	16,500 m² 35,000 m² exhibition space	5,800 m² Out of 36,000 m² Audi Forum
volume	531,500 m³	–	225,464 m³	210,000 m³	–
Exhibits (cars)	284	approx. 130	–	160	–
Sources	(BMW Group Corporate Communications, 2009, 2012b)	(BMW Group Corporate Communications, 2013, 2012a)	(PORSCHE AG, 2009; Delugan Meissl Architects, 2014)	(DAIMLER, 2014, 2012; UN STUDIO, 2014; PERI Group, 2014; Wüst, 2014)	(AUDI AG Media Services, 2012; HENN, 2014)

marking the entrance towards the Audi platform. This is a circular building (Fig. 5) with large glass openings suggesting something closer to a multi-storey showroom than a museum. It features circular floors with a large round void in its core and a spectacular car elevator – moving continuously a part of the exhibits up and down in the space, creating an impressive and somehow unusual mobile technological display. The same elevator is used to move the cars from one floor to another. Although following a circular path – the visitor perceives the exhibits sequenced – floor by floor – and not in continuous walk like in the case of Mercedes Museum.

With its 5.800 m² it is by far the smallest of the listed examples which makes it seem modest by comparison (see Table II.). However it manages to present reasonably the brand history and technological evolution using in addition to the exhibited cars various printed and video media.

Museum Mobile is also the oldest of the chosen examples and this shows – it is somehow less spectacular, with a more timid architectural approach – probably also because it is conceived as an entrance pavilion-like feature and part of a much larger development site including significantly larger buildings.

RESULTS

REZULTATI

All four examples chosen for analysis are the result of architectural competitions each accounting for over 150 entries. The winners have appropriated the developer wishes to create an active and polarizing urban space that would re-centre the local and global museum and tourist activities at European level. The responses of the winning teams were in the sense of continuation of the ideas of urban sustainability, but also the preservation of tradition, in so far as it is seen through the prism of technology historicity. Not incidentally, the competition winners – in all four studied examples (5 buildings actually) originate from Germany and Austria, responding effectively to the concepts of continuation of the carmakers history as well as to the reinvention of the presence, activity and interconnectivity in the urban space of the contemporary German town. Automotive architecture – the museum space – focuses in all the examples on the expertise and history of the brand, its presence in the life of both private community and the state. Also here transcend the ideas of continuity and the joint functioning with the factory (werk) space, of

a https://www.press.bmwgroup.com/global/pressDetail.html?title=bmw-welt-%E2%80%93-munich-s-top-attraction&outputChannelId=6&id=T0040293EN&left_menu_item=node__4090 [3.9.2009.]

b https://www.press.bmwgroup.com/global/pressDetail.html?title=the-overall-bmw-welt-experience-the-bmw-welt-the-bmw-museum-and-the-bmw-plant-munich&outputChannelId=6&id=T0133546EN&left_menu_item=node__803 [17.10.2012.]

c https://www.press.bmwgroup.com/global/pressDetail.html?title=the-overall-bmw-welt-experience-the-bmw-welt-the-bmw-museum-and-the-bmw-plant-munich&outputChannelId=6&id=T0133546EN&left_menu_item=node__803 [17.10.2012.]

d https://www.press.bmwgroup.com/global/pressDetail.html?title=40-years-of-bmw-headquarters-and-museum&outputChannelId=6&id=T0143556EN&left_menu_item=node__4087 [9.7.2013.]

e http://www.dmaa.at/projekte/detail-page/porsche-museum.html [1.6.2014.]

f http://press.porsche.com/more_about/porsche_museum/ [22.1.2009.]

g http://media.daimler.com/dcmedia/0-921-614318-1-1664139-1-0-1-0-0-0-0-614318-0-1-@ac.clink169980_3842-0-0-0-0.html [13.1.2014.]

h WÜST, 2006

i http://www.peri.com/en/projects/projects/cultural-buildings/mercedes-benz-museum.cfm [1.6.2014.]

j https://www.audi-mediaservices.com/publish/ms/content/en/public/broschueren/2012/04/27/press_information.html [8.10.2012.]

the regeneration seen in a contemporary, open sense including the idea of public space inside the building, even adapting elements of urban mobility in architectural language (street, lane, footbridge, difference in level and perception, plaza, discussion place, forum, and so on). The case studies show that historical perspective is enhanced when seen correlated: respecting the tradition of the regional space and technological evolution, while looking into the future for a communication in continuous formation and debate. Definitely all examples are intentionally situated in the area of cultural spaces seen as part of the local events and city life (Table I.).

Some may consider these insertions aggressive or "strangely gratuitous"[58] following the intent to be undoubtedly noticeable, iconic and unmistakable. However the presented architectural and aesthetic discourse, the sculptural volumes, the quality of the resulted urban space, make these objects desirable and accepted as integral parts of the built landscape. We believe that such interventions contribute positively to long term sustainable competitiveness of the newly formed urban spaces and their long-term reconciliation with the cultural space of the city. Mobility stands at the core of both museal and architectural concept, influencing design and making architecture a sustainable product. The statistics show that these are community accepted and highly popular buildings, at the top of public to be visited lists, a preferred holiday or pastime destination.

Conclusion

Zaključak

Automotive architecture evolved and changed, especially in the area of car museums. The field of architectural practice and management has responded with built products which offer the users public spaces inside interactive buildings, museums and places of events-activities. The automotive companies have imprinted their museal insertions with a branded technological mark, acting as key urban developers, promoting innovative architectures and significant investments at city or regional level. It is important to underline that beyond their significant architectural and urban impact – automotive museums enhance and support competiveness on several levels. Rose and Johnston[59] are right in observing that museums become part of the innovation system. In the view of the article we believe that the automotive museums are at the forefront of this tendency and not only by "leafing through the past". The studied automotive museums go beyond the usual capacity to show historical tendencies and development by showing and exploring current and future tendencies not only in the automotive industry but also in the fields of architecture, urban management and last but not least in the area of the cultural phenomenon. As the motor museums evolved they reached a new level of complexity going beyond the role of just displaying historical artefacts[60] but also redefining the link between architecture and automobiles[61] and between the brand, museum and the life of the city on so many levels. Several reflections stem form the presented material.

On one hand – as we have hopefully showed in our presentation – car museums are clear displays of the technology and the intense technological competition present in the car manufacturing world. The museum profile successfully ads a time dimension with reflections towards both past, present and future, by explicitly showing the resilience and adaptation of the automotive industry. Secondly – the studied examples suggest that the inter-brand competition expanded through the presence of automotive museums to other areas of social existence. Now the car manufactures compete not only in terms of car sales and performance, but also as city builders and developers, or urban cultural promoters and managers. And obviously this new dimension to the intercity and interregional competition contributes to the city attractiveness, quality of life and of course cultural prestige and touristic dimension. Thirdly – especially in the first three cases looking at the number of visitors and attracted tourists – we can safely state that as museums, these are financially viable and self-sustainable institutions with visible economic effects radiating towards the local community. Reviewing the case studies it is interesting to note how a mass industry led to a niche cultural product and how otherwise common objects (cars) displayed in a cultural urban and architectural layout become an emotional experience. It seems quite clear that some of the economic performance of the brands has transferred towards usually a soft competitive domain – the area of culture and museums – giving to the last a surprising financial viability. In the end – we would like to underline the fact that besides the hard facts and data – visiting automotive museums is a complete emotional and cultural experience which is recommend to all interested readers.

[Translated by Cristian Banica]

58 Long, 2009: 52
59 Rose, Johnston, 2009
60 Clark, 2010
61 Jodidio, 2011

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ILLUSTRATION AND TABLE SOURCES
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FIG. 1.-5. Authors
TABLE I., II. M. Mihaila, 2014

Summary

Sažetak

Nove perspektive u arhitekturi automobilske industrije: projektiranje muzeja automobila

Osamdesetih godina 20. stoljeca projekt Renaultova distribucijskog centra u Swindonu u Velikoj Britaniji arhitekta Normana Fostera označio je pojavu novoga pomodnog trenda u arhitekturi, kojega je cilj promocija automobilske industrije putem projektiranja i izgradnje izložbenih i prodajnih prostora posvećenih pojedinim brendovima automobilske industrije. Nastojalo se iskoristiti tehnološki inovativnu izražajnost koju arhitektura može pružiti. To je podrazumijevalo: pomnjiv odabir arhitekta i njegova koncepta, prisutnost u posebno odabranom okolišu kako bi inovativni projekt došao do izražaja, velike površine predviđene za takvu izgradnju (25.000 m²) te funkcionalnu raznolikost izložbenih i prodajnih programa kroz brojne prateće zabavne aktivnosti i događanja. Sve je to imalo za cilj stvoriti od određene lokacije atrakciju – kako na lokalnoj tako i na globalnoj razini. Zgrada Renaultova distribucijskog centra označila je promjenu u razmišljanju o samom području distribucije i njegovu reorganizaciju, kao i usmjerenost prema spektakularnoj i impresivnoj arhitekturi. Promjena se očitovala također u osmišljavanju novoga koncepta funkcije trgovačkoga izložbenog prostora i industrijskog područja [Dredge, 2007.], što je označilo kreiranje jednoga novog, u to doba hibridnoga arhitektonskog programa koji je trebao objediniti automobilski centar kao atrakciju i globalni arhitektonski izričaj.

Početak 21. stoljeća obilježen je na svim razinama arhitekture tendencijom opuštenijeg projektiranja usmjerenog prema potrazi za većom ekspresivnošću izgleda i stabilnosti u korist redefiniranja tehnologije [Mihaila, 2012.]. U području arhitekture automobilske industrije [Jodidio, 2011.] došlo je do velike potražnje projekata koji svojom sve izraženijom specijalizacijom mogu zadovoljiti individualne i društvene potrebe te osigurati životni standard primjeren 21. stoljeću. Arhitektura automobilske industrije [Morrison, Minnis, 2012.] obuhvaća otad nekoliko programa: od arhitekture autocesta, raskrižja i mostova, objekata za utrke Formule 1 i testnih staza, benzinskih postaja, akustičnih barijera i parkirališta, izložbenih prostora, prodajnih i zabavnih centara, tvornica – sve do inovativnih istraživačkih centara i muzeja.

Ovaj se rad bavi prikazom četiriju odabranih primjera i istraživanjem osnovnih podataka vezanih za ove projekte, s pratećom fotografskom dokumentacijom prikupljenom tijekom studijskih putovanja. Uz podatke koje su autori prikupili na terenskim istraživanjima, glavni izvori podataka u ovome su radu specijalizirani materijali o arhitekturi i upravljanju ovim projektima. Primijenjena metodologija sastoji se u usporedbi primjera na osnovi više kriterija na nekoliko razina analize koja se odnosi na arhitekturu i upravljanje analiziranim primjerima. Provedena je komparativna analiza ovih četiriju primjera, polazeći od elemenata povezanih s arhitekturom, urbanim prostorom, upravljanjem i statistikom turističke atraktivnosti [Gali-Espelt, 2012.], studijom o arhitektonskom upravljanju – turističkom upravljanju [Russo, van der Borg, 2002.], ciljevima i rezultatima, kratkom studijom koja se bavi inovacijom u arhitektonskom projektiranju, rješenjima ovojnice, konstrukcije i prostora. Tablice I. i II. prikazuju podatke koji trebaju pružiti komparativan uvid u sva četiri projekta: BMW Welt – BMW muzej u Münchenu, Porsche muzej u Stuttgartu, Mercedes-Benz muzej u Stuttgartu i Audi muzej u Ingolstadtu.

Diskusija o ovim četirima primjerima krece se unutar područja najnaprednijih trendova u arhitektonskom projektiranju te pristupa industrije s obzirom na njezino izlaženje u javni prostor dostupan široj javnosti, kao i novoga pristupa u promišljanju o uključenosti automobilske industrije u područje kulture i umjetnosti [Schwaiger, i sur., 2010.]. Važnost utjecaja brenda u arhitektonskom oblikovanju i povezanost s određenim imenima u svijetu arhitekture značajni su čimbenici u razvoju muzeja automobila.

Arhitektura automobilske industrije razvila se i promijenila, osobito u području muzeja automobila. Arhitektonska djelatnost kreirala je građevine koje korisnicima nude javne prostore unutar interaktivnih zgrada, muzeja te mjesta raznih aktivnosti i događanja. Automobilske su tvrtke označile ove građevine svojim brendovima, djelujući time na razini urbanog planiranja i promovirajući inovativnu arhitekturu i kapitalne investicije na gradskoj ili regionalnoj razini. Važno je naglasiti da osim njihova značajnoga arhitektonskog i urbanističkog utjecaja, muzeji automobila potiču i konkurentnost na nekoliko razina. Rose i Johnston [Rose, Johnston, 2009.] s pravom tvrde da muzeji postaju dio inovativnog sustava. Vjerujemo da su muzeji automobila predvodnici ovoga trenda. Analizirani muzeji automobila nadilaze povijesne tendencije i razvoj kroz istraživanje sadašnjih i budućih trendova u sklopu automobilske industrije te obuhvaćaju također područja arhitekture, urbanog razvoja i, na kraju, ali ne i manje važno – područje kulturnih fenomena. Kako su se muzeji automobila razvijali, dosegli su novu razinu kompleksnosti koja seže dalje od povijesnih artefakata [Clark, 2010.] i teži redefiniranju povezanosti arhitekture i automobila [Jodidio, 2011.], kao i povezanosti između brenda, muzeja i života grada na više razina.

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Biographies

Biografije

Marina Mihaila is Lecturer, Dr.Architect, at Synthesis of Architectural Design Department, Faculty of Architecture, University of Architecture and Urbanism "Ion Mincu" Bucharest, and member of academic staff from 2001. She is also Postdoctoral Researcher at Center for Studies in Contemporary Architecture Bucharest, holding this position after she won the national postdoctoral competition organized in 2012 by Romanian Ministry of Education.

Cristian Banica is Architect, and Associate Practice Partner at Arhitectonik2000 Bucharest, where he manages architectural design and research by design activity. He is specialized in project management in the built environment. He is currently an MSc Candidate in Architectural Project Management at Heriot Watt & Edinburgh University, Edinburgh.

Dr.sc. **Marina Mihaila**, arhitektica, predavačica na Katedri za arhitektonsko projektiranje Arhitektonskog fakulteta Sveučilišta arhitekture i urbanizma „Ion Mincu" u Bukureštu, gdje je zaposlena od 2001. Nakon što je pobijedila na poslijedoktorskom natječaju 2012. godine u organizaciji rumunjskoga Ministarstva obrazovanja, dobila je status poslijedoktorskog istraživača u Centru za izučavanje suvremene arhitekture Bukurešta.

Cristian Banica, arhitekt i suradnik biroa Architectonik2000 u Bukureštu, gdje rukovodi projektantskim i istraživačkim aktivnostima. Specijalizirao se za projektni menadžment u graditeljstvu. Trenutno pohađa poslijediplomski studij *Upravljanje arhitektonskim projektom* na Sveučilištu Heriot Watt u Edinburgu.