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## ON THE RATIONAL FACE OF CONCRETE

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### O RACJONALNYM OBLICZU BETONU

#### Abstract

There is no one authentic concrete architecture. The dichotomies inherent in concrete allow for the most varied but also most contradictory interpretations as regards the “essence” of this material. The duality of concrete matter allows for the creation of works of varied and or even extreme aesthetics. Among the many manifestations of concrete there is also one that can be called rational. The text attempts to characterise this face of concrete architecture.

*Keywords: concrete, rationalism, structure, order*

#### Streszczenie

Nie istnieje jedna, autentyczna architektura betonowa. Dychotomie tkwiące w betonie, pozwalają na najbardziej zróżnicowane ale i najbardziej sprzeczne interpretacje „istoty” tego materiału. Dwoistość materii betonowej pozwala na powstawianie dzieł o różnorodnej, a niekiedy skrajnej estetyce. Wśród wielu manifestacji betonu istnieje również taka, którą można nazwać racjonalną. Tekst podejmuje próbę scharakteryzowania tego oblicza architektury betonowej.

*Słowa kluczowe: beton, racjonalizm, struktura, porządek*

### 1. Material

The useful role of building materials always outweighs their aesthetic ennoblement<sup>1</sup>. Concrete had also been a construction material before its aesthetic beauty was found and recognized in the form of fair-faced concrete. The use of this material in shaping the architectural composition, and not only the constructional structure of the building, has allowed to create many extraordinary works. Dariusz Kozłowski points out that concrete possesses all the characteristics of the stone's excellence, construction matter accepted by everyone<sup>2</sup>. Although the interest in the aesthetic capa-

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<sup>1</sup> Gerhard Auer, *Building Materials are Artificial by Nature*, [in:] DAIDALOS 56, June 1995, p. 28.

<sup>2</sup> D. Kozłowski, *Beton w architekturze lat 60. i pięćdziesiąt lat później*, Czasopismo Techniczne 3-A/2011, Wyd. PK, p. 84.



bilities of concrete has grown tremendously over the last few decades, it still remains a material that is controversial and tainted by many, not always positive associations.

Weight, colour, durability are objective, obvious features that are immediately recognizable in a given <sup>3</sup>material. Materials also evoke specific feelings and convey values – like warmth, coldness, but also depression, oppression, monumentality, openness, cosiness. The experiences of a material in architecture cannot be reduced to a simple interpretation based on perception, because their meaning and purport are both inherent and acquired. Materials derive neither from nature alone nor from the mere progress of science and technology<sup>4</sup>. A given material carries cultural, social and economic significance – it triggers associations that are often difficult to get rid of. The potential of materials should consist in their power to generate meanings not in imposing meanings.

## 2. Concrete – two faces

It is expected that each material should find its proper form. Such an argument stemming from the idea of Eugene Emmanuel Viollet-le-Duc's structural rationalism implied that the history of architecture involved the introduction of a new material that would generate a new style. However, looking at concrete works created over the years, it is impossible to distinguish one authentic concrete architecture. If, as Adolf Loos wrote, "every material possesses its own language of forms, and none may lay claim for itself to the forms of another material", than concrete, an indiscriminate borrower from the forms of every other material, turn out to be without a language of its own<sup>5</sup>.

By the end of the twentieth century it was not that concrete had no aesthetics, but rather that it had too many of them, each one put forward with absolute conviction in its exclusive claim to authority<sup>6</sup>. Today there are still many contradictory interpretations of the substance of concrete matter; unlimited technological possibilities allow for any form of expression of concrete; and concrete architecture is still looking for its representative forms.

Searching for the true nature of material usually focuses on the question of form. The history of concrete parallels the history of formal tendencies and styles. A division that has been developing for centuries in debates on architectural styles is still visible – theories of exposure and concealment. Proponents of exposure have always demanded an invariable, timeless

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<sup>3</sup> A. Picon, *Architecture and Technology: Two Centuries of Creative Tension*, [in:] *Liquid Stone. New Architecture in Concrete*; J. L. Cohen; G. M. Moeller Jr. (ed.), Birkhäuser, Basel, Berlin, Boston, 2006, p. 12.

<sup>4</sup> A. Forty, *The material without a History*, [in:] *Liquid Stone, op.cit.*, p. 34.

<sup>5</sup> *Ibidem*, p. 34.

<sup>6</sup> Gerhard Auer, *Building Materials...*, *op.cit.*, p. 32.

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Ill. 1. Claus en Kaan Architecten, CK Office building, Ijburg, Amsterdam, The Netherlands, 2007. Retrieved from: [<http://www.studiovandamme.com/architecture/claus-kaan-architects-offices-amsterdam-ijburg-nl/>]

Ill.2. Diener&Diener, Extension Swiss Embassy, Berlin, Germany, 1995–2000 (relief of Helmut Federle), photo by A. Mielnik



structure with tectonic transparency, sculptural homogeneity and sincerity of materials. The opposite party has been looking for the spirit of time in *parlante* decoration, in improving layers and hiding structures<sup>7</sup>. This division is still valid.

Maria Misiągiewicz, in turn, describes the two faces of concrete in contemporary architecture in the following way. One face – rational – builds space, assisted by the limitation of means of expression. The second one poetic – using plastic properties of concrete, its ability to transform into “cast stone” takes on every projection<sup>8</sup>.

Thus, one material has the potential of the carrier of extreme forms. And so we have structural concrete – adopting linear, flat, two-dimensional shapes such as columns, beams, cantilevers, portals, arches, slabs and sculptural concrete – building three-dimensional shapes unfettered by a Cartesian grid. The latter forms avoid any kind of manifestation of tectonic expression, inner force flow, they are non-linear, decentralised, amorphous, and dynamic<sup>9</sup>.

### 3. Concrete dichotomies

The history of concrete can also be narrated, focusing on a number of dichotomies. The basic dichotomy is inscribed in the essence of concrete’s materiality, which is a mixture of solids and water. Another lies in the physics of the building’s structure – where we deal with compression and tension<sup>10</sup>. Functional dichotomies allow for transgression of the boundaries between technical and “artistic” building. Concrete also offers possibilities of two building technologies – cast-in-place and prefabrication, which result in a variety of forms. Concrete can be both simple, primitive, low quality, craftsmanly material, allowing randomness, and industrial, technologically sophisticated material with a highly controlled design and construction process, striving for perfect implementation. Duality is also visible in the symbolism of concrete. On the one hand it symbolized freedom – in the first phase it meant freedom from the traditional constraints of stonemasonry<sup>11</sup>, the traditional structural framework, it was one of the symbols of the industrial era, then it was freedom from the burden of historical forms in Modernism, it constituted a medium whose spatial-structural logic differentiated the modern from the past. On the other hand, it fell into the trap of restrictions of the aspirations related to structural honesty and the movement of social optimism and became a burden, blamed for all

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<sup>7</sup> M. Misiągiewicz, *Racjonalizm i poetyka architektury betonowej*, Polski Cement, 2011, p. 16.

<sup>8</sup> D. Mertins, *Now and Then*, [in:] *The state of Architecture at the Beginning of the 21st Century*, (ed.) B. Tschumi, I. Cheng, The Monacelli Press, Columbia Books of Architecture, New York 2003; p. 29.

<sup>9</sup> Jean-Louis Cohen, *Modern Architecture and the Saga of Concrete*, [in:] *Liquid Stone*, *op.cit.*, p. 24.

<sup>10</sup> A. Picon, *Architecture and Technology: Two Centuries of Creative Tension*, [in:] *Liquid Stone*, *op.cit.*, p. 14.

<sup>11</sup> J. L. Cohen; G. M. Moeller Jr., *Introduction*, [in:] *Liquid Stone*, *op.cit.*, p. 6.

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Ill. 3. David Chipperfield Architects, Museum of Modern Literature, Marbach am Neckar, Germany, 2002–2006. Retrieved from: [[https://www.e-architect.co.uk/images/jpgs/germany/marbach\\_museum\\_christianrichters\\_dc041007\\_1.jpg](https://www.e-architect.co.uk/images/jpgs/germany/marbach_museum_christianrichters_dc041007_1.jpg)]

Ill. 4. Rapp&Rapp, Community Center, Merkem, Belgium, 2012. Retrieved from: [<https://www.bdonline.co.uk/technical/merkem-community-centre-by-rapp-and-rapp/5061783.article>]



the mistakes of Modernism<sup>12</sup>. It is still associated with repetitive, monotonous, banal, massively-designed, large-scale architecture. It is often dismissed today as prosaic and uninteresting, or as an extremely exclusive, costly material requiring precise technology and craftsmanship. In turn, other creators consider it the only material that can meet formal requirements.

The most interesting concrete works are those that perceive the ambiguous nature of this material: which can be both smooth and rough, conservative and technically advanced, mediocre and expensive, cold and sensual. Concrete can result in forms that are ordered or expressive, heavy and light, referring to history and ahistorical ones. Dichotomies inherent in concrete, mutually exclusive but complementary to the whole, allow for the most varied but also most contradictory interpretations of the “essence” of this material<sup>13</sup>.

#### 4. Rational concrete

While analysing examples of many contemporary concrete structures, it can be noticed how interest in the symbolic values of construction methods and materials has been replaced by interest in formal solutions which a given material allows. However, as emphasized by Antonio Monestiroli, the situation when the question of structure and matter remains separate from the typological definition of the erected building should be avoided<sup>14</sup>. The choice of construction system should be closely related to the cause of construction and appropriate for the character of the building. “The fact that the construction parts should express their role implies their identification, the definition of their identity. It is necessary to give them a form that is appropriate for their identity, capable of making it recognizable”<sup>15</sup>. The choice of construction and matter that do not result from the architectural objective – going beyond the technical, structural and functional cause – contrary to the principle of decorum, postulating the unity of form and content, leads to the shift of architecture towards formalism.

Rationalism in architecture urges to seek unity between function, form, structure and matter – synthetic image of architecture, to combine material and architectural form. One can find “rational concrete” in the conscious choice of concrete matter that strengthens the purpose of the architectural work.

Searching for the truth of concrete matter – “rational concrete” means not only that it is used in ways that were logical given its physical properties but also that the character of the material is plainly revealed in the finished, clear structure. The role of the

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<sup>12</sup> R. Legault. *The Semantics of Exposed Concrete*, [in:] *Liquid Stone*, op.cit., p. 46.

<sup>13</sup> Monestiroli A., *Reakcja Formy 1. Krótki wykład na temat architektury*, [in:] PRETEKST No. 3. 2010, Zeszyty Katedry Architektury Mieszkaniowej, Wydział Architektury, Politechnika Krakowska, p. 44.

<sup>14</sup> Monestiroli A. *Ibidem*, p. 44.

<sup>15</sup> G. M. Moeller, Jr., *Reinforced Concrete and the Morality of Form*, [in:] *Liquid Stone*, op.cit., p. 46.

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Ill. 5. Pedevilla Architects, The Rose of Vierschach, South Tyrol, Italy, 2016. Retrieved from: [<http://www.archdaily.com/791997/the-rose-of-vierschach-pedevilla-architects>]

Ill. 6. Teodoro González de León, J. Francisco Serrano Cacho, Mexico Embassy, Berlin. Retrieved from: [[http://www.architravel.com/architravel\\_wp/wp-content/uploads/2013/01/Mexican-Embassy\\_1.jpg](http://www.architravel.com/architravel_wp/wp-content/uploads/2013/01/Mexican-Embassy_1.jpg)]



construction, the logic of its parts, measurements and relations must be recognizable, which is to be achieved by limiting the technical aspect to several basic elements such as: a wall, column, ceiling. Structures with inseparable construction and form are erected. The structural role of their elements is boldly exhibited. Their façade became not only an indispensable part of their load-bearing scheme but also an outward projection of it. The classic narrative structure in the form of pillars, beams, trilitic system, based on “structural truth”, is often chosen. Concrete matter emphasizes this rigid and static type of composition. The choice of concrete seems to be appropriate – the material is consistent with the nature of the structure, and the shape of structure follows the logic of the material. The wall, column, ceiling are to be heavy, stable, solid and concrete seems to emphasize the character of these structural elements. These elements are not covered, they are not broken into smaller parts, they adopt proportions and shapes that are not supposed to baffle (e.g. by excessive slenderness). Such concrete seems to be fundamental, basic. It avoids adopting extreme shapes.

The pragmatic choice of concrete does not exclude its aesthetic values. The proportions and rhythms are important in formally rigorous structures. Here, concrete introduces order into the planes by means of divisions and modularity.

In the rational concrete architecture, characterized by formal rigour and simplistic detail, the ornament is abandoned. The boundaries between the detail and structure become blurred. The detail is visible only when it results from the structure of the building, it is consistent with it there is so much of it “as it is necessary”. The uniformity of concrete matter does not break down structures.

The contemporary world of architecture is extremely focused on surfaces, caring for the form of the building is replaced by solutions for its surface. Here, the surface remains subordinate to the structure-form of the building, it is neutral. The texture of concrete in the reductionist architecture is non-expressive and should not attract attention. Those are smooth surfaces without flaws striving for perfection rather than *béton brut*. Emotionless surfaces. If concrete is subjected to additional treatment, then it is done in a strictly controlled process. It is texturizing by means of bush hammering rather than traces of random casting processes. Yet, the texturizing is devoid of stylisation. Such rational concrete strives for perfection, which, however, it will never reach, as it is not inherent in the nature of concrete.

Rational concrete does not pretend to be different than it is. It does not pretend to be light when it is actually heavy, solid, massive, dense. That it is transparent when it is opaque by nature. Looking at the matter and its texture, we do not need to investigate its purpose. Solutions follow the logic of the material.

Rational concrete forms monumental, often monolithic forms, emphasizing the need for durability, solidity, security and order. It provides structures with a strong sense of materiality, weight and cohesion.

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Ill. 7. Roland Heini (sculptor), art installation “Tempel”, Uffikon , 2009–2010. Retrieved from: [<http://www.rolandheini.ch>]

Ill. 8. Livio Vacchini with arch. Marco Azzola, Gymnasium, Losone, 1995–1997. Retrieved from: [<http://www.studiovacchini.ch/opere/27/lan:en>]

## 5. Conclusions

In today's world, totally imbued with technology, concrete architecture constitutes the link between technical achievements and architects' formal aspirations. Concrete, the material of unlimited construction possibilities, also possesses unlimited possibilities of expression. Therefore, one could argue that all methods of the manifestation of concrete due to its technological capabilities should be considered rational, and only the forms that the matter adopts can be considered irrational. Thus, the question of whether the use of concrete is rational can be assumed to be unfounded. Instead, one should rather focus on considering whether the form and language adopted by the creator are rational. It is equally difficult to determine clearly when concrete loses its naturalness. Naturalness meant in the symbolic sense since concrete is not a natural material like stone and wood.

Artificiality of concrete seems to appear when its innate qualities are denied. Following Mies van der Rohe's definition, rational concrete architecture should be sought in the "structural clarity brought down to its proper expression" Antonio Monestiroli<sup>16</sup> explains this universal definition in the following way: it is a rational structure in which all elements are in place and all connections are subject to the laws of logic.

It is widely believed that material reaches its destiny in the newest forms, and the list of new things that can be done with concrete is not exhausted. Yet, rational concrete, occupying space on the structural side, the conventional one that does not pursue novelty, still occupies an important place among many contemporary manifestations of concrete.

## References

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- [2] C. Croft, *Concrete Architecture*, Laurence King Publishing, London 2004.
- [3] D. Kozłowski, *Beton w architekturze lat 60. i pięćdziesiąt lat później*, [in:] Technical Transactions 3-A/2011, Cracow University of Technology, p. 83.
- [4] *Liquid Stone. New Architecture in Concrete*; J. L. Cohen; G. M. Moeller Jr. (e.d), Birkhäuser, Basel, Berlin, Boston, 2006.
- [5] M. Misiągiewicz, *Racjonalizm i poetyka architektury betonowej*, „Polski Cement”, 4/2011.
- [6] Monestiroli, *Tryglif i metopa*, Cracow University of Technology, Kraków 2009.
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<sup>16</sup> A. Monestiroli, *Osiem definicji architektury*, [in:] *Tryglif i metopa*, Wyd. PK, Kraków 2009, p. 27.