From “As Found” to Bush-Hammered Concrete – Material and Texture in Brutalist Architecture

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Abstract. The problem of material and texture in brutalist architecture is fundamental and complex. There are various, often contradictory, interpretations of this issue and therefore it should be clarified. The main objective of the work is to determine the role and significance of the material and the texture in brutalism. Other objectives relate to presentation of the most important principles applied in the selection of materials and methods of shaping different textures. The scope of the article includes analyses of ideas and their implementation in buildings designed by architects connected with brutalist style. The author took into account the output of such architects as: Le Corbusier, Alison and Peter Smithson, Louis Kahn, Paul Rudolph, Basil Spence. These studies confirmed that they paid a lot of attention to the type of building material and the way it was used. The Smithsons, as protagonists of the New Brutalism, were fascinated by ordinariness and everyday life, and therefore they preferred common materials and “as found” manner. Le Corbusier propagated béton brut – concrete with an imprint of wooden formwork. He glorified faults of texture claiming that they add a certain richness and humanise the architecture. Kahn and Spence combined brick and concrete, creating contrasting surfaces and elements. Rudolph introduced corrugated and bush-hammered concrete that provided intriguing chiaroscuro effects. Despite the differences between these architects, the material was always in their buildings both structure and texture. Craftsman’s methods became popular again and replaced aesthetic of the machine. Rough and inaccurate textures were the contradiction to smooth and precise surfaces of the International Style and symbolized sincerity and truth of brutalist architecture. The mature phase of brutalism was dominated by brick and especially by concrete, but also wood, stone and sheet metal were used. Raw, almost primitive textures that characterized the beginnings of brutalism were replaced with sophisticated, meticulously shaped surfaces.

1. Introduction

Brutalism was the architectural style which spread all over the world after the Second World War. It reached the culminating point in the 1960s and fade away in the late 1970s. The genesis of brutalism is a very complex research problem and dates back to the interwar period. The architect who contributed the most to the creation and development of brutalist architecture was Le Corbusier. The first symptoms of his abandoning the machine aesthetic of modernism can be noticed already at the beginning of the 1930s. In this period, he began to emphasize that the building should not only be functional but, above all, it must evoke human emotions. Le Corbusier considered that the doctrine of functionalism became too narrow for him. “My house is practical. I thank you, as I might thank Railway engineers, or the Telephone service. You have not touched my heart. But suppose that walls rise towards heaven in such
a way that I am moved. I perceive your intentions. Your mood has been gentle, brutal, charming or noble. The stones you have erected tell me so. [...] By the use of raw materials and starting from conditions more or less utilitarian, you have established certain relationships which have aroused my emotions. This is Architecture.” [1] He rejected white, box-like buildings for sculptural, heavy forms made of ordinary materials, as it can be seen in his pre-war buildings (e.g. Swiss Pavilion at the Cité Internationale Universitaire in Paris, 1931) and then in Unité d’Habitation in Marseille (1947-1952) and many other post-war buildings. The second major reason for the uprising of brutalist architecture was the British architectural programme called New Brutalism. This theory was created by architects Alison and Peter Smithsons and a critic and historian Reyner Banham in the 1950s. They were looking for an architecture reflecting everyday life of British society after the end of the Second World War. These living conditions were very severe at that time and there was a post-war trauma in human minds. The Smithsons opposed to mainstream tendencies in architecture which headed for decorative modernism called New Humanism. They preferred raw aesthetic and simple forms and emphasised ethical values of architecture, such as sincerity and truth. The definition of the New Brutalism was concluded in three points by Banham in 1955: “1, Memorability as an Image; 2, Clear exhibition of Structure; and 3, Valuation of Materials «as found»” [2]. The New Brutalism as a specific architectural ethic had not stood the test of time and transformed into architectural style. Brutalist style became popular in Western Europe (Great Britain – Denys Lasdun and Basil Spence, Germany – Oswald Mathias Ungers, Switzerland – Atelier 5, Italy – Vittoriano Vigano) and then it reached Japan with Le Corbusier’s students (Kunio Mayekawa, Junzo Sakakura, Kenzo Tange). Later on, it was popularized in the United States by Louis Kahn, Josep Lluís Sert and Paul Rudolph (figure 1). It took various forms in each of the countries, because “the nature of brutalism is not a universal entity, but actually quite a regionalist concept” [3].

The issues concerning materials and textures were very important in brutalism. However, this architecture should not be reduced to these aspects. The main objective of the work is to present the role and significance of the material and the texture in brutalist theory and practice. Other objectives relate to presentation of the most popular materials and principles applied in their selection. The author of the article also describes types of textures, especially various concrete surfaces. He explains the changes that occurred in the brutalist style which are symbolized by the path from “as found” to bush-hammered concrete. The scope of the article includes analyses of ideas and their implementation in buildings designed by brutalist architects from different countries.

Figure 1. Paul Rudolph, Boston Government Service Center, 1966-1971
2. Material and texture in brutalism

One of the main features characterizing the brutalist trend in architecture was the exposure of building materials and their textures. Banham wrote about brutalism as "an architecture of massive plasticity and coarse surfaces" [4].

2.1. Ideas and principles

According to the principle of displaying the building structure and material, claddings and plasters were generally not used. At the basis of this principle were such ethical values as truth, honesty and directness. They were emphasized above all by architects guided by the theory of the New Brutalism. Many architects found them in vernacular architecture (e.g. traditional rural houses), which was characterized by the use of the most getatable, local materials and simple construction methods determining the forms of buildings and their aesthetic character.

Showing a way in which the building was built, the subsequent stages of the construction process, was a symbol of sincerity and straightforwardness. Therefore, brick walls were interrupted by concrete horizontal stripes of beams and lintels, in the monolithic walls of the reinforced concrete the joints of the formwork were visible, as were the unmasked holes of the removed formwork assembly rods. In this way, the truth of materials, load bearing structure and applied construction techniques was presented.

“As found” became an important idea in the brutalist architecture. According to it, architects were supposed to perceive reality and all things in a completely objective way. The Smithsons contended: “Any discussion of brutalism will miss the point if it does not take into account brutalism’s attempt to be objective about reality” [5]. This idea enabled to find the value and significance of any object, material or place regardless of its status. Therefore, even prosaic things and banal locations were a source of inspiration for them. “As found” was a way of seeing ordinariness, so that it would stimulate creativity of architects. The apotheosis of ordinariness in the most bright way became visible in the aspect of the selection of building materials. Considering an austerity in post-war Britain, the Smithsons emphasized: „In a society that had nothing. You reached for what there was, previously unthought of things. We were concerned with the seeing of materials for what they were: the woodness of wood, the sandiness of sand. With this came a distaste of the simulated” [6].

Each material was supposed to show only what it really is and architects did not give it additional meanings or symbolism. Although some of them abandoned this concept, like Le Corbusier, who used anthropomorphic references to concrete. Generally, all imitative solutions and tendencies to aestheticize natural surfaces were unacceptable. In the beginning of brutalism materials were used in “as found” manner, without any treatment, just as the “found objects” used by artists in their works. It should be remembered that the use of materials in “as found” way originated, from avant-garde art, including Eduardo Paolozzi’s sculptures and Nigel Henderson’s photograms. These artists, after the Second World War, used objects and materials taken from ruins.

Brutalist architects rejected modernist aesthetic of the machine as a false one. They began to appreciate craft building methods. Raw textures were supposed to humanise architecture and show that they are a work of human hands. That is why they were untreated and often made in rather inaccurate way (figure 2). In some buildings defects of surfaces were not hidden, and even highlighted. Le Corbusier supported such an idea: “Faults are human; they are ourselves, our daily lives. [...] Have you never noticed in the cathedrals and chateaux how the stones are roughly shaped, the faults being admitted or even cleverly exploited? Perhaps you do not notice these things when you are looking at architecture?” [7].

However, it should be emphasized that brutalism was not a homogeneous trend and many different tendencies appeared in it. Some architects preferred very precise surfaces and did not allow texture defects and low-quality materials. The technology of prefabrication of concrete elements helped them (figure 3). Also, “as found” principle and raw surfaces were replaced over time by the careful shaping of texture using sophisticated methods.
2.2. Types of materials

Most of definitions of brutalist architecture refer only to the use of concrete and the display of its texture. They contain such expressions as: “term applied to the architectural style of exposed rough concrete” [8], “a style of Modern architecture, primarily in the 60s, emphasizing heavy, monumental, stark concrete forms and raw surfaces” [9], “use of monumental, sculptural shapes and raw, unfinished molded concrete” [10]. However, it should be emphasized that such definitions are too simplified and omit other materials. The next objective of this work is to indicate other materials and to present examples of their use in brutalist buildings.

Most of the architects opted for materials that give a sense of heaviness, so brick was the second most popular material in brutalism. It was often used as a filling between concrete frames. It is evident in early British brutalism, e.g. "Old Vic" Theatre Workshops in London (1958) designed by Lyons, Israel and Ellis and Gatwick Airport in London (1957) designed by Yorke, Rosenberg and Mardall. The Smithsons also used a brick filling in their first building, Secondary School in Hunstanton (1949-1954), but the frames were steel. In later years, Basil Spence used brickwork in his sculptural, expressive buildings. In monumental Hyde Park Barracks in London (1967-1970) he mixed red brick and concrete beams and arches (figure 4). The master of brick aesthetic was Louis I. Kahn. His buildings in Asia remain iconic, e.g. Indian Institute of Management in Ahmedabad (the late 1960s). Very picturesque brick walls, almost primitive in their expression, are visible in buildings designed by Sigurd Lewerentz. In the church Markuskyrka in Stockholm (1960) bricks not only have different colours and shades, but also joints between them are uneven and too wide.

Brutalist architects also used natural materials such as wood and stone. They tried to keep their raw, genuine texture. The popularity of these materials resulted from the interest in vernacular architecture. They were usually contrasted with exposed concrete. Sometimes they even became finishing materials of a facade or interior, which fact should be considered as a negation of the idea of sincerity.

In the case of wood, one can refer to another building of Kahn, which is Jonas Salk Research Institute in La Jolla (1959-1965). The concrete was contrasted here with surfaces made of fine oak boards.
arranged vertically in several rows that surrounded windows. On the facades of the Polish Mother's Health Center in Łódź (the late 1970s) made of concrete prefabricates, boards painted in brown colour were used above windows (figure 5). Wood with concrete was often combined by the Japanese. At the beginning of the 1960s Kisho Kurokawa used boards set in traditional herringbone pattern in the hotel building on Honjima island and the building of community center in Kyoto. Apart from various types of boards – smooth or rough, usually covered with transparent varnish – even primitive logs were used in “as found” manner. The structure of the buildings on the Lichtenberg farm near Landsberg-am-Lach in Bavaria (Franz Kiessling, 1962) was made of reinforced concrete, but the texture of béton brut was combined here with unfinished logs arranged vertically.

Figure 4. Basil Spence, Hyde Park Barracks in London, 1967-1970.

Figure 5. Polish Mother's Health Center in Łódź, the late 1970s.

Broken stone often appeared in brutalist buildings referring to the local architectural tradition. An example is the complex of buildings designed by the Greek architect Aris Konstantinidis. In the service building at the Ancient Theatre of Epidaurus (1960-1962) he used a local stone to construct massive, heavy walls. Eero Saarinen in the Morse College Building in New Haven (1959-1961) referred to the historic buildings of Yale University with stone walls of an archaic character. Vilanova Artigas juxtaposed stone walls with béton brut texture in Casa Martirani built in Sao Paulo (1969-1974). A specific method of joining concrete and stone was embedding small pebbles or fragments of stones into the concrete surface. This technique was eagerly used by Le Corbusier in such buildings as Unité d’Habitation (in Marseille and in Nantes-Rezé, 1953-1955) and the Monastery of Sainte Marie de La Tourette in Eveux (1957). A prominent example is also the sports hall „Spodek” in Katowice designed by Maciej Gintowt and Maciej Krasinski (1964-1971), especially in its lower parts (figure 6). Stone slabs, irregular or rectangular, were also used as cladding. In one of the most famous brutalist buildings in New York, the Whitney Museum of American Art (1963-1966) designed by Marcel Breuer, granite slabs form the texture of the facade.

It is also possible to recall examples of the use of sheet metal, especially in the late phase of brutalism. It often had a matte, dark surface, like in the Paul Mellon Center for British Arts Building in New Haven, where it was the filling of an exposed reinforced concrete frames. The building was constructed in 1974.
according to Kahn's project. A similar sheet metal was used by Denys Lasdun in the Institute of Education at University of London built in 1979.

![Concrete Texture](image)

**Figure 6.** Maciej Gintowt and Maciej Krasinski, sports hall “Spodek” in Katowice, 1964-1971

Evidently, the most often used material in brutalist architecture was concrete. The great variety of types of concrete textures is presented in the chapter below.

2.3. Variety of concrete textures

Concrete was the most important material for brutalist architects, both in terms of construction, aesthetic and ideology. Regarding concrete textures, it should be emphasized that architects guided by the principles of the New Brutalism left them in the state that was obtained straight after removing the formwork. Such kind of texture was called *béton brut*. The imprint of the formwork had an additional value because it directly showed the material from which the formwork was made. *Béton brut* was therefore twice honest – both in relation to the material of a formwork and in relation to the material of a building.

Other architects replaced *béton brut* with meticulously treated surfaces. Some critics regarded this as a departure from the idea of sincerity in favour of ornamentation. Max Bächler wrote about the very nature of untreated concrete surface: "When the shuttering is removed, the concrete surface will faithfully reflect every knot and every line of the grain of the timber against which it has hardened, and every crevice between individual planks into which the concrete oozed when it was still in its liquid state. [...] It may be true that processes like washing, or sandblasting, or bush-hammering, sometimes reveal additional possibilities in the material itself, such as variations in granular structure or in its colour. Yet it remains true that any surface treatment of exposed concrete after it has been placed destroys the very features which are most typical of the material itself" [11].

The way to the aestheticization of concrete textures began with the selection of shuttering boards, their size, surface roughness and geometrical layout. It became popular to lay shuttering boards in the chessboard pattern and herring-bone pattern. In the case of large concrete surface, the evident imprint of the formwork, especially when boards were set in various directions, resulted in the impression of division of this surface, its invigoration and greater expression. Even more expressive effects were achieved by arranging shuttering boards in various planes – on top and underneath. In this way, a three-dimensional, alternately concave and convex texture of the building was obtained, giving distinct
Chiaroscuro effects. Such sculptural facade was designed by Krystyna Różyska-Tołłoczko in the Exhibition Pavilion “Bunker of Art” in Krakow constructed in the years 1959-1965 (figure 7).

Concave reliefs in concrete surfaces were made using specially shaped inserts fastened to the formwork. Such reliefs were not additional applications, but were made directly in the structure of the building. The fashion for such artistic elements was initiated by Le Corbusier. His reliefs, called signes, had additional informational function and often presented the figure of Modulor.

Corrugated concrete (also called corduroy concrete) was another type of three-dimensional texture. Its advantages were not only aesthetic but also practical, because the vertical grooves drained water from the surface of the facade and thanks to the deep chiaroscuro they camouflaged possible stains and dirt on the material. Corrugated concrete, cast in situ or in the form of prefabricates, was often used in England, the USA and Japan. A representative example is Sampson House designed by Fitzroy Robinson & Partners and constructed in the years 1976-1978 in London (figure 8).

Bush-hammered concrete surfaces were introduced to brutalist architecture at the turn of the 1950s and 1960s, e.g. the town hall in Asker in Norway (1961-1963) designed by Kjell Lund and Nils Slaato. They were popular until the end of this style, e.g. buildings on the London Barbican Estate constructed in the 1970s according to the project of Chamberlin, Powell and Bon. Particularly characteristic for brutalism was the texture made by bush-hammering corrugated concrete. It was the most sophisticated and labour-intensive technique, and at the same time the most distant from “as found” principle. Due to high costs, it was used primarily in highly developed countries and in prestigious buildings. It is not surprising that this texture was the most widespread in American brutalism. One should give here examples of Paul Rudolph's buildings, including Art and Architecture Building of the Yale University in New Haven constructed in the years 1958-1964 (figure 9) and the Boston Government Service Center built in the years 1966-1971 (figure 1). Already in Art and Architecture Building, Rudolph achieved masterful effects: “The corrugated surface consisted of parallel, closely spaced vertical ridges of cast concrete, one-halfinch at their narrowest, that were broken by masons with a heavy three-pound «bush
hammer» that is, one with a grid of pyramidal points. [...] Hammering the concrete exposed an aggregate of stones, micas and seashells that glittered and shone in the sunlight” [12].

Brutalist architects often designed concrete surfaces with exposed aggregate. The most incisive effects were achieved with coarse aggregate – with relatively large grains. In order to extract the aggregate to a surface, it was necessary to remove a top layer of cement using techniques such as brushing, sand-blasting or washing. These techniques were used primarily in the case of concrete prefabricated elements, e.g. Balfron Tower (1965-1967) in London designed by Eerno Goldfinger or in many large-scale housing estates in Poland [13]. Architects who wanted to show the natural stone in a more expressive way used it as an additional material embedded in concrete. In similar way, but rarely, pieces of brick were embedded in concrete.

Figure 9. Paul Rudolph, Art and Architecture Building of the Yale University in New Haven, 1958-1964

3. Results and discussions

Brutalism was a very diverse architectural style. Its fundamental ideas were included in the theory of the New Brutalism. However, not all of them were continued in practice. Some were abandoned or reinterpreted, and some even found their negation. This phenomenon was related to the individuality and originality that architects aspired to. It must be admitted that the aspect of material and texture in the brutalist architecture is one of the most coherent, although the analyses show some differences regarding architects’ attitude to this problem.

The common thread of the brutalist architects was to show the materials from which the building was constructed, without covering them with facings. In the early stage of brutalism untreated materials were exposed according to “as found” manner, and in the mature phase, their surface was usually carefully treated with sophisticated methods. Also the initial glorification of imperfectionism was often replaced by the pursuit of perfection. According to the principles of New Brutalism, the meaning of the material lied in it itself, but later the material took on symbolic meaning and became a transcendent medium of ideological values. The apotheosis of ordinariness from the first years of brutalism evolved over time into extraordinariness. One thing remained unchanged – the general purpose of architects was to evoke emotions, using also sensual character of the materials. Therefore, it can be claimed that corbusian definition of the architecture was the motto of brutalist architects: „L’Architecture, c’est, avec des matières brutes établir des rapports émouvants” [14].
4. Conclusions
After the analyses, the most important specific conclusions can be formulated:

- The inspiration from vernacular architecture contributed to the fundamental importance of the material and its texture in the brutalist architecture.
- Raw and ordinary materials were symbols of sincerity, truth, ordinariness and modesty, although in later years they partially lost these meanings.
- In the surface of the building the brutalist architects tried to reflect a way in which it was built.
- Brutalist architects appreciated craft building methods more than industrial products, although they also used prefabricates.
- The textures were to humanise architecture by showing a retreat from the aesthetics of the machine towards the work of human hands.
- Rough, three-dimensional textures that give strong *chiaroscuro* effects were preferred.
- Most architects adopted the contrast-based design method and therefore they used various kinds of textures, even within a single building (e.g. rough and smooth surfaces or brick combined with concrete elements).
- The most popular material of brutalism was concrete, followed by brick, stone, sheet metal and wood.
- A whole range of concrete textures were used in the mature phase of brutalism – from untreated *béton brut* to corrugated and bush-hammered concrete.

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