Machine Technology & Architectural Aesthetic

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Abstract. The most intuitive understanding of machine aesthetic reflects people's commendation and praise to machinery. This aesthetic tendency, began in the industrial revolution, and increasingly flourished since that time. It still has a significant impact on today's society, and particularly in architecture field.

Introduction

Le Corbusier's “A House is a Machine for Living In”, became a representative for the theory of mechanical aesthetics, greatly promoting the progress of the modern architectural movement, which led to more architects addressing and researching mechanical aesthetics. The machine aesthetic is a design concept produced by the industrial revolution. It promoted the functionality of machines, technology and the appearance of the simple aesthetic, pursuing accuracy, economics and efficiency of both the machine and the manufacturing process. With the power of the machine, the industrial revolution has created an era of production. It has made the machine not only strong and reliable, but also gave it flexible control of the more complex tasks. Although people have the ability to build a more complex construction with the ornaments like Figure1 and Figure2, the aesthetic principles of modern architecture are developed in an opposite way; to be simple and functional, “ornament” becomes “crime”.

Henry-Russell Hitchcock and Philip Johnson, the International Style

In the book, the Van Nelle Building is taken as an example; “An industrial building admirably composed of three sections, each devoted to a separate function but with the same structural regularity throughout” [1]. To the far left is the lodge of the doorman. Within the main building, to the left is the department for tobacco, in the middle the coffee, and to the right the tea. All the way on top of the tobacco building the bonbonniere for VIPs, and guests of the director. The structure of the Van Nelle Building indicates the principle of function, without any luxury decoration, unlike the Paris Opera, to emphasizes the usage and space of the construction.
**Le Corbusier. Toward An Architecture**

Corbusier admires the engineer’s aesthetic. Machine technology solved many functional needs for humans in the Machine Age; the airplane, steamer and vehicle all created the new aesthetics based on function, similar to the form of the Caproni Triplane. Corbusier posted many images of a steamer and an airplane in the book, and his captions under those images communicating ideas to architects, such as “a beauty more technical” and “a product of high selection”[2]. Under the influence of the discipline of engineering, he considered that, “Current architectural things do not answer to our needs. The house is a machine for living in”.

The Maison Dom-Ino illustrates the principle of engineer’s aesthetic. The steel columns are supporting the planes that free the walls and floor plans, which also creating the free facades and the usage of the roof terrace. Those components are also standardized and pre-fabricated for rapid construction.

**Buckminster Fuller, from Designing a New Industry**

“…due to the development of the airplane industry, the house has become an extremely practical and now very real affair” [3]. “I think our house is going to have an important part in helping us to keep on upward instead of downward in historical degree of technical advantage that was developed during WWII”. Similar with Corbusier, Fuller admires the technology as well, which could solve the needs of the housing shortage surfacing after WWII. Fuller also considered taking the engineering and airplane manufacturing prototypes into architectural productions. This differs from Corbusier’s focus of an engineer’s aesthetic for architects—such as the “three reminders” of “volume, surface and plan” [4]. Fuller is more focusing on the high efficiency of machine technology that could solve the problem of housing shortage and the cost. “That is taking entirely new figures and we can amplify the aluminum capacity and amplify the aircraft capacity and get up to five million houses and approach the automobile figures”. The Dymaxion House is Fuller’s design that focuses less on aesthetics and more on high efficiency. In other words, this design could be considered as Sullivan’s idea of -“form follows function”.

![Figure 3. Interior of the Bauhaus Dessau](image1.png)  
![Figure 4. Barcelona Pavilion, Mies van der Rohe](image2.png)

**Henry-Russell Hithcock and Philip Johnson, the International Style**

As Hitchcock and Philip mentioned, “modern construction receives from them straightforward expression; they used standardized parts whenever possible and they avoid ornament or unnecessary detail”. With the influence of machine and technology development, the needs of human and architectural aesthetic have changed. Like Sullivan’s famous principle -- “form follows function”.
Function becomes a more important concern[5]. The high-efficiency of making materials such as steel and glass promotes the Bauhaus; “developed as an exaggeration of the idea of functionalism, the aesthetic expression is based on structure and function” [6]. In Figure3, the framework of steel and glass is simply constructed without any unnecessary ornament, which indicates the idea of international style forms that modern architectural form should naturally developed from, and express, the potentialities of the materials and structural engineering.

**Mies van der Rohe, “Office Building,” “Building,” and “Industrial Building,”**

“If we succeed in carrying out this industrialization, the social economic, technical, and also artistic problems will be readily solved. Industrialization of the building trade is a question of material”[7]. Mies is famous for his idea that, “Less is more”. In his point of view, the building construction methods must be industrialized, while steel and glass perfectly represent the industrialization of new materials. They simplify the structure of the architectural system, which creates the building spaces with no barrier [8]. Barcelona Pavilion is in the ideal form of “air between the two plates” that expresses the space formed between two walls. Iron and glass separates the interior spaces and connects the outside pool. Figure4 is divided into separate parts showing the idea of no barrier but still connect the internal and external space flowing with each other.

**Alison and Peter Smithson, “Mies van der Rohe”**

“Autonomous repetitive neutralizing skin and an open-space-structured building – recessive, calm, green, urban pattern” [9]. Smithson mentioned the “open-space”, which Mies considered it as “universal spaces”. Different with Sullivan’s “form follows function”, Mies thinks that the needs of human are changing. In his idea of “flowing space”, is that large space is divided into several interconnected small spaces by columns and glass, and an internal large space will occur when those “barriers” have been removed [10]. The Farnsworth House’s enclosing open and adaptable universal space with clearly arranged structural frameworks, which featuring prefabricated steel shapes filled in with large sheets of glass, could be freely arranged and transformed into any other forms within the internal space.

**Adolf Loos, “Ornament and Crime” and “Architecture”**

Similar with Mies’ “Less is more”, Loos indicates, “Ornament is crime” [11]. “As ornament is no longer organically related to our culture, it is also no longer the expression of our culture. The ornament that is no longer organically related to our culture, it is also no longer the expression of our culture. The ornament that is reduced today bears no relation to us, or to any other human or the world at large. It has no potential for development.” “A highly projective nation ornament is no longer a natural product of its culture…Ornament can no longer be borne by someone who exists at our level of culture” [12].
Loos thinks that in countries with high productivity, ornament is no longer its cultural product, because ornament no longer linked to the culture and therefore not an expression of the culture. Furthermore, the ornament created today will not have connections with most of the people in the world.

Peter Eisenman, “Aspects of Modernism: Maison Dom-Ino and the Self-Referential Sign”

Eisenman explains that architecture comes from the relationship of how the architecture presents itself. In his opinion, architecture is a process that is not a conclusion [13]. He uses the concept of “Redundancy” from language to understand the column of Dom-Ino,”Locations act to reinforce the original geometric A B relationship which in itself is so clear as not to need reinforcement, one interprets this as an intention to underscore a condition of being, that is as a significant redundancy”[14]; “The redundancy of the market hereby signals that there is something present other than either the geometry or the function of the column and slab”.

Robert Venturi, “Complexity and Contradiction in Architecture”

Venturi is hesitant of the oversimplification of architecture especially when he states on Mies’ idea of “Less is more” to “Less is bore”, the result of “Less is more” is making modern architecture over-functional with a lack of aesthetic. The complex behavior by people and the circulation between people and environment is not able to fit into just one unified, simplified form. In Venturi’s opinion, the era is uncertain. The disciplines of modern architecture have become the object of his criticism. To Venturi, “Less is more” means to focus on the effective simplification and develop the style and form. “[Mies] makes wonderful buildings only because he ignores many aspects of building”[15]. “…characteristics of complexity and contradiction in their work are often ignored or misunderstood.” Different from Sullivan’s “form follows function”, Venturi thinks they are interdependent with each other. Using the example of Richards Medical Research Building, the form follows structure and the external appearance follows space.

In common, the development of machine technology brought the new construction methods and the new materials to the world, which changed the architectural aesthetic to follow a logical, simple way [16]. The features of function, efficiency, standard and self-referenced are the different aspects based on the aesthetic of modern architecture.

Discussion and Conclusions

Between the 1920s and 1930s, designers and theorists had accepted and agreed, even worshipped the mechanical aesthetics and the philosophy of mass production. They thought the machines were the
media of standardized mass production, which is the architecture’s basis of functionality aesthetic built on ethical standards; the source of inspiration for modern pluralistic decoration. Its creative form is using the diversification of the mechanical form in industrial products and transportation. They not only linked mechanical with dynamism, but also established extensive links between simple geometric forms and modern industrial form. The products produced by the mass mechanized production are similar to using the basic geometric forms, which dominates by the general principles of logic and economics. People think it is decided by the “rule” of mechanical selection, from Darwin's “Theory of Evolution” in the natural selection. The mechanical selection provides a design basis for buildings and consumer products, as well as a potential, general principal that cannot be avoided, rather than a personalized choice of expression. Therefore, the designs of this period fully exhibit the characteristics of geometric forms due to the prevalence of mechanical aesthetics. The development of infrastructure, as well as the prevalence of industrial products, left the market to be influenced by the mechanical large-scale production, becoming the standard.

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References