

## Discussion on Aircraft Technology and It's Impact on Architecture in the Architectural History of 1903-1940

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**Abstract:** Having been invented at the beginning of 20<sup>th</sup> century, aircraft is the concrete success of human being related to flying fantasy, which has been existing for centuries. The centuries-old studies accelerated in the 19<sup>th</sup> century and it has been finally succeeded to take off under Wright Brothers in 1903 together with scientific and technologic processes. A creative energy boosted at the beginning of 20<sup>th</sup> century and a new age, “age of aviation and aircraft” emerged. The political atmosphere in the world was considerably tense at the beginning of 20<sup>th</sup> century. World War I and World War II were experienced. War Effort was directly effective in the development of aircraft and aviation architecture. In terms of aviation architecture, aircraft hangars, aircraft factories, wind tunnels, runways and airports can be considered. Birth and development of aircraft industry are in parallel with birth and development of modern architecture (and organic architecture). The period between 1918-1939 is characterized as “Golden Age” of aviation in the West (particularly in the U.S). The literature and archive resources have been reviewed in the Republic of Turkey simultaneously. In this article, interactions between aircraft technology and aviation architecture are discussed.

**Keywords:** aircraft, technology, aviation, architecture, nature, air-minded architects

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### 0 Introduction

A human being has been dreaming of flying and gliding through the sky throughout the century. The desire and passion of flying were referred in the fairy tales and myths of old China, Egypt and India. Having been well-known in Greek mythology, the myth of Daedalus and Icarus is based on the construction of a passage with a very complicated exit after the entrance in order to imprison the father and his son which was built to imprison a bull called Minotaurus and named Labyrintyh. King imprisoned

the father and his son to this Labyrinth. Daedalus glued bird wings to himself and his son with wax. The father passed over the Aegean Sea by flying but Icarus died rising as sunlight melted the wax<sup>[1]</sup>. The historians believed that this story goes back to 1400 B.C. European historians give a particular importance to this story about which various drawings were made. Although, it has not known whether this myth is real or not, they are neither the first nor the last ones attempting to fly with wings in the history.

In the 16<sup>th</sup> century, Leonardo da Vinci (1452-1519) made the first scientific and technical research on bird flight and depicted the possibilities of imitating flight with mechanical tools in his works. While the 17<sup>th</sup> and 18<sup>th</sup> centuries passed with flight trials with “lighter-than-air crafts” (balloons and directed balloons/airships); in the last part of the 19<sup>th</sup> century, referred to “Age of Steam”, there were several improvements in the airships with the successes in the steam machine.

Along with the centuries-old developments, finally, in the beginning of 20<sup>th</sup> century, it was reported that Wilbur and Orville Wright Brothers revealed "age of aviation and aircraft" by succeeding to take off with a heavier-than-air motor vehicle in 1903. Many rapid and busy developments were triggered with the aircraft invention. As the 20<sup>th</sup> century began with the wars, it was discussed to use recently invented aircraft as a tool of discovery-surveillance and immediately after, as a bombardment/combat vehicle. In the first half of 20<sup>th</sup> century and the period specified under this article, the world experienced two significant world wars. Aircrafts were rapidly developed during **War Effort** (effort/struggle made to win the war), inter-war and post-war periods<sup>[2]</sup>. Aircrafts were used for civil-commercial (post, cargo and passenger transportation) and sportive purposes as well as military purposes. Construction of several new structures for these purposes, namely aircraft, aircraft industry and passenger need, etc. have become obligatory.

In this article, the course of time from the invention of aircraft (1903) to the years of the 1940s was reviewed along with literature and archive review because during these time, particularly in 1920s and

1930s, busy and creative developments had been successively experienced. This period has been called as “**Golden Age**” of the aviation in Europe and particularly in the U.S.<sup>[3]</sup>. In both Europe, the U.S., and the Republic of Turkey, as a continuance of the Ottoman State, “**aviation architecture**” and even “**aviation culture**” were formed. Organizations (military and civil), establishments, superstructure and infrastructure (network) systems, air routes, meteorology organizations (network/network systems), etc. were established and developed around the world and particularly in Turkey in this course of time.

It has become possible to see the invisible world from above thanks to aircraft and ‘**a new view**’ / **bird’s eye-view** was used in organic urban designs. “**Floating iron bridge on sky**” can be used for describing aircraft. Aircraft interconnected lands, seas and continents as an aerial chain. Engineering advancements in the field of aviation rapidly influenced architecture. While aircraft technology was inspiring aviation architecture, architecture gave inspiration to aircraft technology. Aviation architecture under this article is, indeed, researching aviation culture. In this context, there is a need to research black boxes of this age and aviation architecture in the context of the history of architecture. Thus, it can be expressly seen what has been done in this course of time and what can be added to these improvements as well as what can be done in this regard in the future.

## 1 Birth and development of aviation architecture

Along with the invention of aircraft, construction of a number of aviation structures became obligatory for development of **aviation industry**. Basic structured (wooden) **hangars** were primarily constructed to protect aircraft from external factors and weather conditions. Aircraft hangars were rapidly developed with different types of materials and techniques (iron, steel, reinforced concrete etc.) developed in the 1920s, 1930s and 1940s. Aircraft hangars in the 1910s and 1940s were not identical. In parallel, aircraft sizes and weights were changing and developing together with architectural construction materials, techniques and styles of hangars.

**Aircraft factories** for construction of the aircrafts were required to be rapidly manufactured under the influence of war effort. At first, narrow-spaced ateliers with colonnade as a continuance of the 19<sup>th</sup> century transformed into wide-spaced structures

without colonnade credited to the developments in manufacturing technologies and scientific management (Taylorism). The developments in manufacturing technology (i.e assembly line) enabled the structure to be internally and externally integrated with machine aesthetics<sup>[4]</sup>. In a short while, the systems developed for mass-production cars of Ford were also used for aircraft factories, and the factories that were able to manufacture aircraft with mass-production were constructed (Willow Run is one of the extreme examples). American architect Albert Kahn, is specialized in the field of aircraft factories in this period, is a significant figure<sup>[5]</sup>.

‘**Wind tunnels**’ refer to the tunnels which were designed and manufactured for reviewing, researching and commenting on the effects applied by air on aircrafts, and in which air can be moved and its speed can be arranged. The history of wind tunnels goes back to the 18<sup>th</sup> century. Wright Brothers made their experimental tests on aviation studies for their first aircraft ‘Flyer’ in a basic wind tunnel in 1901. This technology had not been common in the U.S. yet. Gustave Eiffel (1832-1923) built the first open-rotational wind tunnel in 1909. The U.S. army started to construct wind tunnels in 1916. The largest wind tunnels were constructed in Chalais-Meudon, France, which was designed to test full-scale aircrafts, near Paris in 1932-1934 until the World War II<sup>[6]</sup>. The huge wind tunnels constructed in Germany in 1930s can be given as an other example. The development of these structures has accompanied to the development of aircraft. Giant wind tunnels were constructed during the World War II<sup>[7]</sup>.

**Runways** were required for taking off and landing of the aircrafts. Construction of runway has become a field to which the U.S. army engineers have particularly given importance. The human-made runways with superficial areas, made of asphalt, reinforced concrete and/or both have become an issue being focused for years to develop its design and materials. Along with the invention of aircraft, **airport**, as a new structure type, particular to the 20<sup>th</sup> century emerged. Airports were initially designed to extend and develop aviation hangars at first, but gradually they have become a design matter required to be urgently developed to meet the needs of increasing number of passengers. Engineers began to work in the first airport designs and after that, urban designers were included in the process. All infrastructure and superstructure systems (network/network systems/air routes/meteorology organizations,

etc. infrastructure services; communication of aircraft with ground services, towers, runways, design of safe flight area, electricity lighting, signal etc. systems) were mostly established in this course of time, particularly during 1918-1939 known as “Golden Age” of aviation, and aviation rules and regulations were formed. Transportation, urban and state policies were also included<sup>[3]</sup>. These developments were also followed in the Republic of Turkey as a continuance of the Ottoman State, the founder of Republic attached great importance to aviation and took concrete steps<sup>[8]</sup>. In this context, establishment of Turkish Air Association (THK) and Turkish Bird, aircraft factory (Kayseri) and aircraft repair ateliers/workshops (Eskişehir), flight schools/aviation schools, international aviation company facilities (French aviation company CFRNA – later CIDNA, and Italian AEI) and facilities of the national entrepreneurs can be discussed in Turkey<sup>[8]</sup>. Also, the establishment of meteorology organization (network/network system) occurred in the same period with the meteorological organization in modern Turkey.

## 2 Generation of aviation culture

The invention of aircraft interestingly corresponds to birth and development years of modern and organic architecture, and all of them have been developed depending on busy scientific and technologic infrastructures in the 19<sup>th</sup> century. Therefore, aircraft was considered as a symbol of modernity and advancement. In this context, aircraft influenced the socio-cultural environment. **Aviation culture** formed/was formed in Europe, the U.S. and the recently founded Republic of Turkey. As a relatively cutting-edge technology, aircraft was celebrated in many countries and has become a new type/tool of transportation as an overemphasized issue. Aircraft, as mentioned above, is also related to the state policies. It brought multi-dimensional perspective into the world as a technologic, military and civil machine. As widely known, there were changes and revolutions in social life during the first quarter of the 20<sup>th</sup> century. For example, the place of woman in social life changed and woman, participating in social life, has also shown herself in the context of aviation. In this period, the first women pilots (military and civil; such as Sabiha Gökçen in Turkey and Amelia Earhart in the U.S.) left their marks on the history (as cultural-political figures). In addition to that, challenging records that were set in this course of time went down in history.

The successful transatlantic flight of Charles

Lindberg in 1927 with the aircraft ‘Spirit of St. Louis’ triggered the development of aviation and aviation architecture in the U.S. Construction of runway and airport rapidly increased after this flight. This effect refers to ‘Lindbergh Effect’<sup>[3][9]</sup>. The image of aircraft gained a place in popular culture. In the 1930s, the real (C. Lindbergh) and fantastic (Superman) heroes were created<sup>[10]</sup>. In this context, while technologic determinism was shaping the society in the field of aviation, socio-cultural determinism triggered technology. As the matter of human, inventing and developing technology is considered important; societies, folks and countries must be discussed. The root of almost all problems among human societies is interestingly based on the differences arising from technologic advancement between the societies.

**Aircraft** got involved in social structuring in a short while. The term “**air-minded**” in the history of aviation culture became another expression for the passion of aviation and its most attractive reflections had a place in art and popular culture. Aviation culture led to the innovations consisting of air-minded architects, groups and individuals, elevation of technology (Futurism), aviation costumes/fashion and human factors of social extent.

On the other side, emergence and development of “airport” in aviation culture turned towards a different way in time. The emergence of airports is also related to Pullman train stations of the 19<sup>th</sup> century, particularly its interior design was designed by being inspired from these trains. Airports have become a new structure type marked in Europe and the U.S. in the period reviewed. After that, it spread around the world. The features of airports and their architectural modes have become among the much-debated issues because similar structures appeared almost all around the world after 1930s and 1940s. This issue can be expressed with Heterotopia/concept of multiple utopias of **Foucault** As to Foucault, heterotopias are utopias, which are the places in an unreal space. Heterotopias are the spaces without geographic markers (determinants), such as recreation areas, museums, libraries, asylums, jails and cemeteries. It can be asserted that airports are included in the concept of heterotopia. Airports that were emerged and initiated to be shaped in the first quarter of the 20<sup>th</sup> century have become a kind of heterotopia places after 1960s and particularly 1970s following aesthetical airport designs, such as TWA airport of Eero Saarinen. According to Foucault, we are in the age of synchronicity: we are

in the age of comparison by putting opposite things side by side; we are in the age of proximity and distance; in the age of being side by side; in the age of disarrangement<sup>[11]</sup>. Airports change identity and marks of the places in social, cultural, spatial and chronological order (chronologically). On the other side, airport is a **non-place** today, on which the other similar non-places are connected to airlines with a network, with its systems restricting access to the airport together with rituals and procedures and allowing passengers to enter airport. These non-places, this age and concept in relation with consumption and capitalism as well may probably be presented by airports in the sharpest way.

### 3 Interaction between aircraft technology, nature and architecture

As stated above, aircraft could be literally invented and developed after it is formed required technology, knowledge and skill at the beginning of 20<sup>th</sup> century. Aircraft technology was inspired by the **metaphor** of flying **bird**, namely nature. As sea creatures, such as whales have movable liquidity (physical matters regarding hydrodynamics, such as vortex flow, resistance, friction, flexibility and pressure), wing movements and other features of flying bugs were among the inspirational resources to resolve the effects of air stream of aircraft and the issue of wind, and to develop new designs. The connection between technology and organic, the concepts of aerodynamics and hydrodynamics have been discussed in the book of Aircraft by Le Corbusier (1935) (Image: 50, 51, 52). Similarly, Jay Spenser pointed out the interaction of nature with physical laws in terms of the connection between aircraft technology and nature.

#### 3.1 Aircraft technology and futurism

Aircraft technology is also closely related to futurism. Having been appeared in Italy with Architectural Manifesto of Futurism published in Le Figaro by Sant'Elia in 1909 who expressed his admiration to the machine and rapidly spread to other countries, Futurism movement grounds on the concepts of technology, machine and speed. By rejecting the values of the past thoroughly, the movement aims the fact that the concepts of mechanization and art become substantial in social life. Articles 4, 9 and particularly 11 in Manifesto of Futurism are related to speed, aviation and aircraft<sup>[12]</sup>. Futurists placed an importance to aircraft which was invented in 1903 and initiated to record milestones in 1909 and to

flight cases. Italian poet and author Filippo Tommaso Marinetti was an admirer of aviators and aviation. In his opinion, the experience of living in the modern technologic age was being crystallized by aviation and aviators. "The Futurist Manifesto of Aerial Architecture" was published in "Manifesto dell'Architetto Futurista" in 1934<sup>[13]</sup>. In the Manifesto, the political, social, commercial and artistic aspects of aviation are discussed. Architecture could be at the level only being admired over the air. The aircraft-shaped designs were used by suprematist artist Kazimir Severinovich Malevich (1878-1935) for the transformation of conscious with its take off and rise to define space and time. Pilots and their aircrafts were published in many of his images (Suprematist Composition: Airplane Flying-1915, Design for an Airport and A future Planets for Leningrad: The Pilot's Planets in 1924)<sup>[14][15]</sup>. Another designer who marked his name in the 1920s and 1930s was Norman Bel Geddes. His designs of passenger plane/seaplane included futurist ideas<sup>[16]</sup>. The aircraft designs of Bel Geddes merely referred to organic architecture with its round forms.

#### 3.2 Air-Minded architects

While futurists were celebrating machine aesthetic, some architects were clearly interested in aviation (Air-minded). The term "air-minded" became a popular term, particularly in Europe and in the U.S. From the first days of aviation, architects have been interested in aviation and aircraft engineering for inspiration. However, the person bridging the gap between aircraft design and architecture was Le Corbusier. Le Corbusier was literally obsessed with aircraft and closely interested in this new technology. Furthermore, he mentioned about aircrafts in detail in two articles published in the magazine "L'Esprit Nouveau" and the books "Towards a New Architecture" (1923) and "Aircraft" (1935). He mentioned about aviation, new transportation type and aircraft in "Precisions" (1930) and "Four Routes" (1941). Le Corbusier was interested to combine architecture with contemporary manufacturing methods. He thought about what aircraft economy might bring to building construction in terms of airiness, economy and speed. In his book "Towards a New Architecture" (1923), he discussed passenger ships, planes and automobiles. According to him, there was no "beneficial war" occurred for architecture as in the example of aircraft<sup>[17]</sup>. While engineers are familiar with technology and have been developing inventions, the question of what

architects have been concerned may be put forward. This question was replied throughout the 20<sup>th</sup> century and led to new ways of searching in architecture to be embodied. Aviation structures are among the best examples for an embodiment of these new ways of searching. In the same book, Le Corbusier stated that steam-ship and aircraft are not only mechanical machines but also among technologies and solutions in order to be an example for human beings in all social, cultural, daily and economic environments. For example, ship windows give many inspirations to daily life and modern architecture. Today, aircraft window represents a new view, experience and perception, namely a brand new real-life image. Le Corbusier also reviewed the interior design of aircraft and how this can reflect on the residence.

The first flight of Le Corbusier was made from Paris to Moscow in 1928<sup>[10][18]</sup>. During the first air travel from Europe to the U.S. in 1929, Le Corbusier successfully wrote the book "Aircraft" in 1935 after very much very impressing with the aircraft, aerial view, machine aesthetics -technique of aircraft and its details-. Aircraft was a path that might change the cognition of the world and was leading to new breakthroughs<sup>[19]</sup>. The design of Rio de Janeiro was the most attractive one among the urban designs of South America being presented by Le Corbusier during his travel in 1929. The architect who made this design while looking from the aircraft window took note on his drawing book and drew sketches. Le Corbusier designed Obus Plan as a stylistic interpretation of aerial view for the city of Algeria in 1930-1934. According to Adnan Morshed (2000), Obus Plan revealed the fundamental process of his understanding of global capitalist society within political, cultural and ethnical borders. He only saw the geography from the aircraft without political borders and accordingly, designed an architectural program internalizing all separative lines and in horizon line. While horizon was being internalized in the expanding visual area of Le Corbusier, the idea of "being beyond" disappeared<sup>[10]</sup>. Again, according to Adnan Morshed (2002), the designs of Le Corbusier in both Brazil and Algeria showed how symbolism and experience of flight were transformed into the city of future in a visual and political way. Instead of being satisfied with presenting urban planning of future, the projects of Le Corbusier associated sight and organization along with geographic, technologic and moral questions arising from aerial themes<sup>[10]</sup>. Le Corbusier showed how aerial view (view from aircraft) can be used in

modern urban planning. As to the famous architect, aircraft meets two modernist desires. The first desire is to develop the idea of a new age based on machine aesthetics while the second is to observe the world, which is in visible from a high point. Le Corbusier was impressed by the idea of "**new view**"/**bird's eye view**. Flying, looking at the world from above may render a functional view of architecture.

### **3.3 Interaction between aircraft technology and architecture**

Engineering advancements in the field of aviation, streamline and movements of aircraft rapidly influenced architecture. Aircraft technology inspired aviation architecture, vice versa. For example, iron is used in the manufacturing of aircraft facilities and hangars reflected on architecture in different types in aviation architecture: fabricated houses, cost-effective serial mobile houses made of aircraft steel in aircraft factory were included in daily life. However, there are a few numbers of these houses, they constitute an important example for interaction between aviation and architecture. In this context, the project 'Dymaxion House' (1929) of Buckminster Fuller (1895-1983) and "Vultee House" (1946) designed by Henry Dreyfuss&Edward Larrabee Barnes can be given as example<sup>[20][21]</sup>.

On the contrary, steel reflected from architecture to aircraft manufacturing (all-steel aircraft designs and patents of Hugo Junkers are related to this period). In other words, architecture directly inspired aircraft, namely its construction (manufacturing of aircraft was similar building construction), vice versa. In the first years of aircraft, wooden and sharp-formed 'box-kite' aircrafts controlled with fabric and cables were rapidly developed with the effect of stronger and liquid-cooled engines and replaced with round-shaped forms and all-metal aircrafts in the 1920s and 1930s<sup>[22]</sup>. Modern aircraft being developed through a morphological change of aircraft (soft, smooth, round-shaped forms) has engaged with modern architecture and particularly organic architecture.

In the book "Aircraft", David Pascoe (2015) made an analysis on the book "Aircraft" of Le Corbusier; and other projects and discourses of the famous architect related to aircraft and aviation and identified several connections in this regard. The drawings on Dom-Ino system of Le Corbusier mentioned about particularly Caproni Ca-60 "Triplane Flying Boat" and Farman Goliath plane and a visual bridge built with their skeleton designs<sup>[23]</sup>. Again, according to David Pascoe (2015),

in the house designed by Le Corbusier in 1925 for the American journalist William Cook (Maison Cook), the architect made references related to aircraft. The living area rising on the columns is merely as it is flying and the place of a doorman in the middle of front façade on the ground level was designed by being inspired from the fore plane of “Air Express” of Farman Goliath<sup>[23]</sup>.

Another example that can also be considered as futuristic in the 1940s is Bell X-5 aircraft. In 1944, Voigt started to work on a research aircraft with wings that can be arranged during the flight, and this idea initiated the process going to construction of Bell X-5 experimental aircraft<sup>[23]</sup>. Streamline type and movements of aircraft began to reflect on architecture as well. In the context of streamline-interactive movements of aircraft and architecture, in the later years, streamline high-rise residences and apartment building designs, which were designed with the inspiration of aircraft and have rotatable/movement architectural design depending on climate conditions, wind and position of the sun, can be specified. In this context, the relation between wind and building form (building aerodynamics) and its tests in the wind tunnel are considered.

Enormous hangars that were constructed by Pier Luigi Nervi (1891-1979) in the 1930s can be taken as an example of aircraft technology and architecture. These steel and reinforced concrete hangars, which drew its stiffness and endurance from geodesic metal cage are prefabricated in-situ and merely architecture-engineering marvel<sup>[24]</sup>. Barnes Wallis observed that an aircraft could be manufactured in the same way with a regular surface inclination and made a metal cage. All skeleton was formed within this grating with small geodesic factors conjuncted from their connections. The first aircrafts with this design were Wellesley and Wellington bombardment aircrafts<sup>[23]</sup>. A relevant example can also be seen in the Republic of Turkey. The roof of Kayseri Aircraft Factory (1925), constructed after a very short while from the declaration of the Republic, is a patented design of Hugo Junkers and in-situ with steel prefabricated constructions<sup>[8]</sup> (Figure 1, Figure 2).

**Figure 1.** Kayseri aircraft factory, Assembly atelier. Manufacturing of aircraft was similar to build/bond construction<sup>[25]</sup> (with the permission of Aviation Museum Archive).



**Figure 2.** Kayseri aircraft factory, P.Z.L. Assembly atelier/workshop<sup>[25]</sup> (with the permission of Aviation Museum Archive).



Other examples regarding that aircraft design gave inspiration to architecture can be clearly seen in the designs of airport terminal buildings. Particularly, airports can be named as **symbolism** for the years of the 1930s. On the basis of the **metaphor of bird**, the penthouses, being designed with the inspiration of round-shaped forms and wings of aircraft, curved and arched building types, airframe-shaped building and flat analysis are among the relevant examples. In this context, the examples are Dublin Airport, Ramsgate Airport (1936-37) and Elmdon Airport (Birmingham, 1938-39). In the later years, in the designs of European airport, the designs of curvilinear terminal buildings by Eero Saarinen in 1950-1960 with the metaphor of ready-to-fly bird and so-called twisted winglets are the relevant important examples.

As another example that aircraft design gave inspiration to architecture, Turkish Bird School Building located in the capital city, Ankara, which was the civil aviation school in the recent founded

Republic of Turkey and designed by the famous architect of that period -Ernst Egli- can be pointed out. The 2<sup>nd</sup> floor and terrace of the building merely remind an aircraft. The building gathered theme of aviation with a modernist aesthetics in an impressive manner<sup>[26][27]</sup>. The reference of aircraft in the building must be evaluated as a concrete indicator of the importance given to aviation by the policies of recently founded Republic (and Turkish Air Association – with the establishment of THK) as the reflection in Turkish Bird School Building<sup>[8]</sup>.

On the other side, there is a symbiosis relation (military and civil) between water and aviation structures. Many early airports were situated close to water for accompanying seaplane as a vital part of the U.S. industry in the 1930s. The large “Clipper” seaplane of Pan-am was defined as luxury travel and carried out transatlantic passenger transportation by air throughout the 1930s<sup>[28]</sup>. In the same years, seaplane and its facility were put into service in the Republic of Turkey. An international aviation company Italian AEI (Aero Espresso Italiana S.A.) constructed several facilities to provide seaplane service as a new and luxury type of transportation for civil aviation services in Bosphorus, European side of Istanbul<sup>[29]</sup> (Figure 3 and Figure 4). The passengers flying with AEI airline company mentioned about an aerial view of the city or new type of perception of the city (perception from above).

**Figure 3. and Figure 4.** AEI scaffolding, Istanbul<sup>[29]</sup>; Public views of the facility<sup>[29]</sup>.



In this context, in the 1920s and 1930s, there were international enterprises and companies as well as national enterprises in the Republic of Turkey. Aviator/pilot Vehici Hürkuş and Nuri Demirağ were interested in both aircraft and seaplane in Bosphorus, Istanbul, and founded/constructed several facilities and flight schools<sup>[8][30]</sup>. It can be suggested that these attempts and facilities include considerably progressive and futuristic opinions compared to its period (not worse than the Western examples). In this sense, as seen in all reviewed examples, it can be alleged that the history of aviation architecture is tracing the formation of modern identity.

#### 4 Conclusion

In this article, birth and development of aviation architecture were reviewed with certain periods and history of architecture. With the strong desires and curiosity to fly like a bird, human being have made much efforts to fly and finally found several solutions in nature. Having been invented in the beginning of 20<sup>th</sup> century, aircraft corresponded to two world wars which occurred in a short time. War effort triggered composition and development of aircraft and aircraft structures connected with the aircraft. The history of aircraft includes revolution of aircraft throughout ‘war effort’ and gained an utterly different place in cultural history.

Aviation architecture culminated in a period characterized as “Golden Age” of aviation in the West (in Europe and particularly in the U.S.) brought the conclusion of the emergence of new structure types. Furthermore, aircraft technology was being shaped with the inspiration taken from nature (physical rules-aerodynamics-hydrodynamics), this reflected on architecture as well. Architectural structures reminding dynamic, twisted, bird and/or

aircraft on the basis of the metaphor of bird were designed. In other words, nature and architecture were inspiring aircraft designs, vice versa. Accordingly, in parallel with modern architecture and organic architecture, **modern aviation architecture** was developed. The most apparent examples are aircraft hangars, aircraft factories and airport buildings being designed and constructed in Europe and the U.S. In this context, in the Republic of Turkey, Atatürk emphasized the importance of aviation and developed state policies by stating “The future is in the skies!” as the leading figure of progressive developments.

The idea of that the future is in aviation, aircraft and aviation technology is also among the interested areas of futurism that grounds on the concepts of technology, machine and speed, as discussed in the article. Futurists gave a high importance to aircraft and flight cases. However, futurism is seen as it was over in a short term, it is, in fact, a continuous phenomenon with its inspirations given to fields of art and architecture similar to suprematism, and as its technologic utopian aspect can still be realized today. The aviation point of view in air transports was used in organic urban designs. In this sense, there is a strick interaction and a techno-determinist situation between technology, aircraft, nature and architecture. As discussed in the article, in the context of streamline-interactive movements of aircraft and architecture, it can be clearly seen that the fundamental ideas of the 1930s and 1940s have been attempted to be realized and developed today (as the technologic level has just become convenient in this regard). These fundamental ideas include constructing streamline architect-designed high-rise buildings, which are rotatable/movable depending on condition of wind and position of sun or such as developing Bell X-5 experimental aircraft (and wings of this aircraft) as a huge passenger plane by Boeing today.

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