

UNIDAD EDUCATIVA PARTICULAR JAVIER

BACHILLERATO EN CIENCIAS

MONOGRAPH

**TECHNOLOGICAL ADVANCES IN ARCHITECTURE IN NEW
YORK**

STUDENT:

SERGIO ANDRÉS AGUILAR PARRA

ADVISER :

LCDO. MAURO MACKAY

LCDA. PATRICIA SANCHEZ

THIRD OF BACCALAUREATE - COURSE D

2019 - 2020

GRATITUDE

First I want to thank my parents for giving me support in my studies, to God for enlightening my knowledge and to the teachers for helping all of us in our day-to-day studies and making an effort so that we understand the method well.

Summary

This monograph is about the new structures of buildings in various parts of the world, this monograph will help us know a little more about how it has improved the structures during this time and this is thanks to the technology that is making changes in the buildings and apart now last all the materials are changing so now all the constructions apart from that are built fast these materials favor that the buildings are faster.

The purpose of this monograph is that we learn and know how constructions become faster and easier, but the bad thing about these constructions is that they are more expensive than other types of constructions, since these materials are made with new technology and greater resistance and as now most buildings have to be by anti-seismic obligation and therefore had to have improved all the constructions and for that reason the prices of constructions and materials are more expensive. And if we realize this monograph is helping us a lot to know a little more about what technology serves in the buildings and how these new materials can help us.

Since this technology implemented many things and thanks to that we can appreciate these wonders of buildings that every time and when they are better and their technology and materials are of very good quality.

Index

GRATITUDE.....	ii
Summary.....	iii
Index.....	iv
Introduction.....	1
Chapter 1	3
1.1 Technological advances in architecture.....	3
1.2 Alterations.....	3
1.3 Change in constructions.....	4
Categories and types of constructions.....	6
2.1 Construction types according to material type.....	8
Chapter 3.....	12
8 modern buildings.....	12
Conclusion.....	16
Recommendations.....	17
References	18
Código.QR	19

Introduction

This monograph is about how the buildings are improving their infrastructure and how they are increasing the technology in the buildings and the different securities of the buildings and apart in this monograph will show the 8 best buildings in the world and will realize that the new securities of the buildings are different and the method of construction of each building is different because each time the materials are increasing their performance and improving their way of building and the time it takes to make a building and also what can be seen in this monograph the materials that now use the buildings and how they are used, apart you can see the different types of materials to be able to make different types of constructions and you can also see how the materials were used before and how the houses or buildings were made and most of them were not intelligent.

The objective of this monograph is that we can learn more about architecture and know how little by little it increases its different designs and materials, and differentiates the different categories of constructions and so they are classified and can better understand how to make the constructions and that type of constructions that materials can be used since we are there it specifies us how to use and how to manufacture it and each step is differentiating the materials and there we realize how the technology makes changes in the buildings and the construction method since this technology has helped how buildings are stable, strong and different types of securities.

The following books were taken as a reference : *De architectura*, Vitruvio-2011, *Saber ver la arquitectura*, Bruno Zevi-1948, *Diccionario visual de arquitectura*, Frank Ching-1995

The importance of this monograph is to know and be informed more about how a building is made and how security advances in these constructions and good what is important is to know how and what material these buildings are made of since it is not going to be built of anything because the technology increased in the subject of materials because if it is made of any material now will not be so safe and apart from a building will not look good or any construction and will not have the same security as the other buildings.

Chapter 1

Architectural changes

1.1 Technological advances in architecture

“Technological advances in the digital age have completely changed in what is the branch of architecture. Constructive Processes are overcoming limits”(Vitruvio-2011). The technology that is available today in the construction industries has been reduced the time it takes to build, through the new structures there are and the materials that allow us to make buildings faster. Thanks to changes in architecture, there are different ways to build, design, study buildings and construction projections. Architecture has always been defined by the technology available at the time, from the vernacular, built empirically with the elements available in a rural area, to the skyscrapers that change the morphology of the main cities, thanks to the inventiveness of man, achieving buildings of inconceivable proportions in the past, such as the Burj Khalifa, with its 828 meters high. But never, at some point in history, architecture has been governed as it does today by technology.

1.2 Alterations

“There have been many alterations to the architecture and by that we refer to the improvement of the technology that have been implemented in the architecture branch” (Vitruvio-2011).

- 3D Printing in Architecture: The potential of 3-D printing is not a sci-fi thing, but has come to stay and revolutionize the architecture sector. This technology creates objects and elements for mockups of different sectors. However, in the world of Construction and Building it is already part of the projects that do not need molds and that combine different materials to complete the different parts of a structure.
- Drones applied to building: Drones have also reached architectural tasks. The recreation of the land with 3D infographic, the taking aerial images to monitor the evolution precise

constructions or the modification of structures built with state of the art architectural elements.

- **Robotic Architecture:** robots are used to machine hazardous tasks (demolition, insulation projection, or those that are heavier placement of materials, adaptation of spaces to different sizes, inspection work, cleaning) with the aim of speeding them up and optimizing times.
- **BIM Methodology:** Not only is it taking a revolution in itself for engineers, but architects also experience their advantages in the design and design phases maintenance of buildings. Taking into account that this methodology allows to carry out immersive projects in which you can walk inside before they are even taken to detect and combat errors in your planning.
- **Sustainable architecture:** The need to improve sustainability and achieve energy efficiency for buildings and other infrastructure scan is now a European reality. The Europe Strategy requires that all newly built homes in its member countries have "almost zero" energy consumption by 2020.

1.3 Change in constructions

- **Material reuse:** There are many types of building materials that can be recycled, from sustainable materials such as slate, stone and wood, others such as aluminum, concrete and different types of plastics. This saves money, resources and decreases the environmental footprint.

The technology that has been developed today and is available in the construction industry, has managed to reduce construction times in a way that structures and materials, where the prefabrication and industrialization of elements such as slabs (Brno Zevi 1948), traves and columns, as well as such as facades and coatings, has reduced the work that is done on the site, so that we build with such speed, that we see changes vertiginous in the physiognomy of cities.

1.4 Different security in the structure.

- **Metal Structures:** now we can see that you rods buildings are made with steel structures, steel is a material that offers great strength, which means that the elements that make up the structure may be of a much smaller section than with other materials and this allows reducing the height between floors with the corresponding space savings that, architecturally speaking, is reflected in fewer walls, columns, etc. and ultimately less money. Well as we can that the metallic structures are the safest thing in constructions since they are made of steel and they can support a lot of weight and they are not easy of that they fall since their bases are well placed (Vitruvio-2011), thanks to the steel structures we can have an adequate and safe space in the buildings.
- **Seismic constructions:** earthquake-resistant construction includes all buildings and infrastructures built to withstand seismic movements without collapsing. Buildings must have a reinforced concrete structure with columns in the corners and at the edges of the spans, connected to the top chain, as well as to the foundation. A variant to build a rigid wall without deformations during the earthquake, is to connect the corners of the walls with tensioners forming a crossing. And to implement in all new buildings are becoming anti-seismic and do so to give greater security to people and the elaborate building

Chapter 2

Categories and types of constructions

- Residential construction

“Residential structures are exclusive for the housing of people and to assist in daily activities” (, Frank Ching-1995). The best known residential structure is the house, however there are more scales of residential structures; for example, things that are only separated by the wall, i.e. they are together; condominiums and apartments. They are considered to be medium-scale

residential constructions in which several families are established. In addition, skyscrapers are large scale where multiple family structures of residential type are installed.

- Commercial constructions

The types of commercial buildings consist of shops, restaurants and offices. Stores can be independent or associated with others to establish shopping centers and so it is not only a simple building, but a large building. Similarly, restaurants can be self-employed or part of a restaurant chain, and set up in a tower or in a shopping center. Offices can also be independent, but they are usually part of a larger scale structure, they can be in a skyscraper.

- Industrial buildings

Industrial types are used to manufacture, process or develop products and materials for communities. For safety reasons, most of these types of buildings are separated from others, as they are usually a source of pollution. Industrial structures can be of any scale, from a room-sized space to an entire warehouse or block of warehouses.

- Institutional constructions

“Institutional building types support all other types in a community, including hospitals, fire stations, police stations, courts, executive and legislative departments, stadiums, parks, and infrastructure” (Frank Ching-1995).

- Public works constructions

Public works are all construction work, whether infrastructure or building, promoted by a public administration (as opposed to private work) with the aim of benefiting the community.

There are two types of contracting for public works: Direct Contracting or Public Bidding (price competition).

Among the main public works are:

- Transport infrastructure, including road transport (motorways, highways, roads.) maritime or river transport (ports, canals.), air transport (airports), rail transport and transport by pipeline (e.g. oil pipelines).
- Hydraulic infrastructures (dams, distribution networks, wastewater treatment plants.).
- Urban infrastructure, including streets, parks, public lighting.
- Public buildings whether they are educational, sanitary, offices or for other purposes.

2.1 Construction types according to material type

- Green building system

It is a new construction system using load-bearing partitions, without beams or columns, which describes solid and resistant works, minimizing construction time and saving on materials.

The panels have two steel wire meshes that trap high density expanded polystyrene plates inside, with excellent thermal, acoustic and steam insulation. It adapts itself to constructions in height without difficulties, and is one of the systems of construction of environmentalist tendencies chosen nowadays.

- Frame and panel constructions

There are two techniques very adopted in recent times: the wool frame and the steel frame.

They are also lightweight construction systems that have excellent weight distribution over the entire structure, without requiring load-bearing walls.

The steel frame system uses steel frames or profiles that support gypsum, wood or stone panels inside the work, layers of insulation, and then rigid panels to the outside. For plastering, cement with cementitious sprinkling, wood (sidding) or exposed brick, in whole or sectioned blocks, is usually used. They are fast, more economical and versatile constructions, although they are less durable in the face of demanding climatic aggressions.

On the other hand, the wool frame system is similar to the previous one, except that it incorporates the use of wooden frame profiles. It is an even lighter and faster construction, although it also has a shorter duration in extreme situations.

- Rationalized construction

The traditional rationalized is a variation of the traditional construction system, which uses procedures and rationalized elements, such as lightweight panels, lightweight or alternative installations and masonry.

There are more rationalized systems, which seek to build lighter works in less execution time, mixing wet and dry construction systems, in addition to incorporating techniques and industrialized elements (pre-molded blocks and others).

- Traditional construction

It is the most used and known construction system, and it is also one of the oldest. The works obtained through this system are solid, resistant, with high durability and practicality.

“It is based on the construction of load-bearing walls made of various materials, including bricks, blocks, stones and reinforced concrete. In addition to the load-bearing walls, the masonry walls are raised, that is to say, divisions of the work that do not support the weight of the structure” (Frank Ching-1995). These also can be elaborated in diverse constructive materials, including the mentioned ones and also load-bearing bricks, although they are not usually made with reinforced concrete, because of their weight.

This technique is of the wet construction type, with waiting time for the settlement and setting of the materials, high cost and great waiting time.

On these structures they rest, distributing their weight on the load-bearing walls, the beams that give subsection to the structure of the roof. Then, the entire structure has a thick and thin plaster coating, which provides insulation and adaptation to modern life, hiding or supporting the pipe, plaster, tiles and so on outside.

2.2 Types of constructions

- Class A: Constructions of this type of class have a steel supporting structure, steel profile mezzanines or reinforced concrete slabs.
- Class B: These are those buildings with a supporting structure of reinforced concrete or with a mixed structure of steel with reinforced concrete.
- Class C: Construction with supporting walls of brick masonry, confined between pillars and concrete chains. Reinforced concrete slab mezzanines or wooden latticework.
- Class D: It is a construction with supporting walls of masonry of blocks or stone, confined between pillars and chains of reinforced concrete. Reinforced concrete slab mezzanines or wooden framework.

- Class E: Constructions with wooden supporting structure. Wooden panels, gypsum fibre cement, cardboard, or similar, including wooden partitions. The mezzanines are made of wood.
- Class F: Constructions of adobe, earth, cement or other lightweight materials plastered with cement. The mezzanines are made of wood.
- Class G: Prefabricated buildings with metal structure. Wooden panels, prefabricated concrete, gypsum board or related.
- Class H: Prefabricated wooden constructions. Panels of the same material, gypsum board, fibrocement or similar.
- Class I: Construction of polyethylene plates or panels. Light concrete panels, fibrocement or polystyrene panels between steel mesh to receive sprayed mortar.

Chapter 3

8 modern buildings

- Empire state building NUEVA YORK, de William Frederick Lamb. 1930.

I want to start this article with a building that was a real “milestone in the history of modern architecture. It is said that in 15 days the design of this New York skyscraper was completed. Its construction began in January of the 1930s, in the midst of the economic depression” (Frederick Lamb - 1930).

With a height of 381 meters (it reaches 443 if we count its pinnacle), it became the tallest building in the world, a record it held for more than 40 years.

Starring in so many films, some as famous as King Kong, the Empire State Building is still considered a symbol of New York and even of capitalism, as well as a jewel of American Art Deco.

- Museo GUGGENHEIM, BILBAO de Frank Gehry. 1997.

Rarely can a building change as much to a city as the Guggenheim Museum did to Bilbao. “It is true that this construction was accompanied by a complete rehabilitation programme of the old part of Bilbao and the banks of the Nervión” (Frank Gehry - 1997), but the original titanium forms of Frank Gehry's colossus, with the soul of a ship anchored on the banks of the estuary, were a milestone in contemporary art in Spain and put the city on the map of places in Spain of unavoidable visit.

- Museo GUGGENHEIM, NUEVA YORK de Frank Lloyd Wright, 1959.

Frank Lloyd Wright is considered one of the most outstanding architects of the 20th century to the extent that ten of his creations have been nominated for World Heritage listing. Perhaps the most famous of them all is the New York headquarters of the Solomon R. Guggenheim Foundation.

It is situated on New York's Fifth Avenue and its spiral, whitish circular forms say they are inspired by the ancient mesopotamian ziggurats. Although from the beginning the building did not receive the approval of the critics and more considering that it was a museum that was considered not very functional, the fact is that the Guggenheim Museum in New York has become, over the years, another of the most famous prints of the Big Apple and the best known of the creations of its author.

- City of arts and sciences, VALENCIA. From Santiago Calatrava. 1988.

“Santiago Calatrava is probably the best known and most international of the Spanish architects of the last 20 years” (Santiago Calatrava - 1988). Becoming a world-class star-architect, his legion of admirers comes close to that of detractors. In this case, particularly with regard to the excessive costs (especially extra costs) of his work and the remodelling that some of them have had to undergo shortly after being inaugurated.

Their language and style are, however, indisputable and very recognisable. Of all its works, the City of Arts and Sciences of Valencia is one of the most important, as well as one of the most controversial, for the two aforementioned reasons.

The beauty of the whole, however, together with the unity of style make it worthy, in my opinion, of being included in this list. The Hemisfèric, designed in the shape of an eye and housing a large-format cinema, the Palacio de las Artes (with several theatres) and the Museo de las Ciencias are the three most outstanding works in the complex, which also houses the Oceanogràfic, one of Félix Candela's latest works.

- Casa reed-field-rod, utrecht. De Gerrit Rietveld, 1924.

Of course, the Rietveld Schröder house is not a building as spectacular as the great skyscrapers or the work of any of the star-architects of recent years. However, as a representative of such an important artistic movement as De Stijl (known particularly for Piet Mondrian's canvases) I think it deserves to be included in this list of modern buildings of capital importance in the 20th century.

It is an extraordinarily functional and simple dwelling, since De Stijl advocates, precisely, the need to return to the simple and elementary by economising on the means necessary for construction.

It is a simple two-storey house, with a profusion of sliding doors and an extreme simplicity of form, always taking as a base the straight line (as opposed, precisely, to modernism) and with the almost indiscriminate use of primary colours and black for decoration.

This house by Gerrit Rietveld, is part of the list of World Heritage, witness to the importance of this movement emerged in the second decade of the twentieth century.

- Casa batllo, BARCELONA, by Antoni Gaudí.

“Modernism could not be absent from this list of 20th century modern buildings. And what better representative than Antoni Gaudí to be able to represent this style so characteristic and that, in addition, so much rooted in the Catalan capital” (Antoni Gaudí - 2010). This original building was a point and a part in the construction of modernist buildings in Barcelona. Particularly for its original façade with a profusion of columns reminiscent of osseous structures, balconies in the shape of masks and the use of *trencadís*, the brand name of the house, in part of this façade. No less original is the vault that closes it, designed with the use of glazed ceramics and whose design resembles that of a dragon, so widely repeated in Gaudí's iconography.

Together with the adjoining Casa Amatller, by Puig i Cadafalch and Casa Lleó i Morera, by Domènech i Montaner, Casa Batlló forms the triad of buildings that turn what is known as the Discord Apple into the most modernist in the world.

- BURJ KHALIFA, DUBÁI. By Skidmore Owings&Merill, 2010.

“Dubai's Burj Khalifa is the tallest building in the world and the great emblem of Dubai, the new city that emerged from the Arabian desert” (Owings&Merill - 2010). I include it in the list, not because of the importance and beauty of the building itself, but as a symbol of an era that emerged at the end of the twentieth century and the beginning of the twenty-first century that has meant an unbridled race to boast the tallest building in the world and of which the countries of the Persian Gulf and several Asian countries have been the main protagonists. Suffice it to say that the Petronas Towers, which in 2003 held the highest building record in the world, are not even among the top ten.

“Burj Khalifa is 828 metres high, 160 floors and 57 ultra-fast elevators that lift visitors at a speed of 18 metres per second. These are some of the data that make this building a record-breaking construction” (Owings&Merill - 2010).

- Torres petronas, KUALA LUMPUR. De César Pelli, 1998.

We have included the Petronas Towers in this list of the most representative modern buildings of the 20th and 21st century for two reasons: first, because it was the skyscraper that inaugurated this fever for being the highest of the constructions ever built. And second because, even now, it is still our favorite skyscraper among those we have had the opportunity to visit. Its 88 floors reach up to 152 meters and its shapes resemble an oriental double pagoda, although curiously the initial project was designed for a Chicago tower.

Conclusion

At the end of the following monograph it is concluded that:

- This monographic work is concluded with that thanks to this work we can know more of our architecture of our country or of the world since we have realized that every time the buildings improve and their constructions will be more and more stable. The architecture is influenced by the culture and the time of construction. It is a way to meet people and their customs. Architecture is important not only to make beautiful projects, but also to ensure that this project is carried out in the best possible way.
- Although for a better understanding of each of the purposes for which we use the drawing we have treated each of them separately, it can be said that they are different facets of the same and unique reality, and that the three are very interrelated. In effect, the knowledge of the things that surround us that is obtained when drawing them, stimulates, for example, our creative capacity, forces us to find the best way to represent them and this effort results, at the same time, in a greater ability to make this known reality known to other people.
- After having reviewed a little, all the currents that influence current or contemporary architecture, that is, what we see day by day in our city or in the great metropolises of the

world, it is necessary to close the circle with some concepts that support our analysis of buildings, museums, shopping centres or any new construction that we see in our environment.

Recommendations

- As you well know, we are all part of not one, but many communities formed by our hobbies and social groups. This is something that architects understand perfectly and is the main focus of their work, understanding that within a condominium or housing project, people not only sleep, cook or rest, but also need to have the right spaces to perform their favorite activities and share pleasant moments in society.
- In architecture, the contexts surrounding any project are usually analyzed, so that the architectural designs that will be projected for the community that will inhabit the place can begin to be realized. Always keep in mind the proximity to places of interest to project and achieve connectivity between people.
- Provide comfort inside and outside your apartment, for example, by designing trails that avoid long journeys to connect your favorite activities and resting place is a task that is very much in the mind of the architectural team. For example, think of your business, you could offer more comfort to your clients, with a few small renovations in your waiting room.

References

- Rossi Aldo, (1966) *La arquitectura*
- Vitorio Marco, (2011) *The architecture*
- Vásquez Pablo, (2009) *Arquitectura contemporánea*
- Zevi Bruno, (1948) *Saber ver la arquitectura*

