Chapter 15: DYNAMIC ARCHITECTURE & NEOFUTURISM

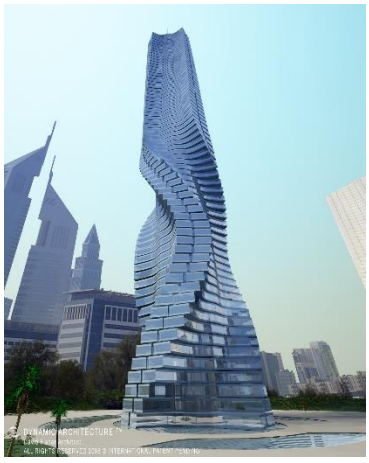
15.1 DYNAMIC ARCHITECTURE

Dynamics is a branch of mechanics that is concerned with the effect of forces on the movement of objects. Nowadays architecture is seen as something static, since buildings remain on the same place and their configuration doesn't change at all. The concept of movement in a building is known now as Dynamic Architecture; living in a dynamic Universe it makes sense that the future in building design will follow this example. Buildings that follow a Dynamic Architecture modify their shape constantly. This creates a visual attraction immediately caught by the human eye, which focuses its attention in movement while being surrounded in a static environment. Change and adaptability to a changing environment will be premises to follow in this type of design. Looking towards the future makes sense that buildings following a dynamic approach will shape the cities.

The Idea of Dynamic Architecture was born with the desire to have buildings that adjust themselves to life, that are part of nature. Buildings in which each floor rotates separately, change their shape continuously and never look the same. Dynamic Architecture buildings keep modifying their shape. Introducing the fourth dimension in architecture: TIME

One of the examples of Dynamic Architecture Building is **The Dynamic Tower (Da Vinci Tower)** is a proposed 420-metre (1,378 ft), 80-floor moving skyscraper, designed by architect David Fisher. It features:

- The floors rotate around a central axis, driven by the wind.
- 48 turbines, located between the floors, generate power as the wind drives the floors around.
- Electricity is also generated by means of solar cells located on the roof.
- The floors will be made up of 12 modules which will be delivered to the site fully-finished, and with electrical, plumbing and air-conditioning systems fully fitted.
- It is estimated that the building will not only generate all its own energy, but also provide enough surplus energy to power five more skyscrapers of similar size.
- Under normal Dubai wind conditions, each turbine will generate 1,200,000 kWh of energy.
- Voice-activation technology will also enable each floor to rotate autonomously according to tenants' wishes.
- 90% of the building will be constructed off-site as modules and then assembled on-site on the central core.[1]



Da Vinci Tower[2]

[1] https://www.emporis.com/buildings/317608/dynamic-architecture-building-dubai-united-arab-emirates

[2] http://www.fieldofvisualarts.com/home/2017/1/16/the-dynamic-da-vinci-tower

Another example of such building is **SUITE VOLLARD, 2001** designed by BRUNO DE FRANCO, it is the world's first spinning building. The floors each have double sheets of glass on the façade, tinted silver, gold, or blue, depending on the floor. This provides "a spectacular effect" as the floors rotate in opposite directions. Each of the 11 floors, comprising the majority of the building, can rotate clockwise or counter-clockwise, with a full revolution of 360 degrees taking an hour.[3]

Suite Vollard, 2001[4]

15.2 NEO-FUTURISM

Neo-futurism was inspired partly by Futurist architect Antonio Sant'Elia(1914). It is a late-20th to early-21st-century movement in the arts, design, and architecture. Described as an avant-garde movement, as well as a futuristic rethinking of the thought behind aesthetics and functionality of design in growing cities, the movement has its origins in the mid-20th-century structural expressionist work of architects such as Alvar Aalto and Buckminster Fuller. The relaunch of neo-futurism in the 21st century has been creatively inspired by the Pritzker Architecture Prize-winning architect Zaha Hadid and architect Santiago Calatrava.[5]

SANTIAGO CALATRAVA

Calatrava's projects have highly dynamic sculptural quality. The shapes of his technical structures are often reminiscent of life forms. His artistic works, sculptures and drawings, produced in parallel, often motion studies of the human body, heavily influence the architecture. (Gossel P. p182)

[3] https://en.wikipedia.org/wiki/Suite_Vollard

[4] https://www.wired.com/2005/07/apartment-go-round/

[5] https://en.wikipedia.org/wiki/Neo-futurism

First projects of International Attention:

At the beginning of the 1990s Calatrava built several remarkable railway stations and bridges, but broadened his portfolio by designing a wider range of structures, including a Canadian shopping center, and a new passenger terminal for Bilbao airport.

Lusitania Bridge, Mérida, Spain (1988–91)[6]

Puente del Alamillo Expo 92, Seville, Spain (1992)[7]

Milwaukee Art Museum, Wisconsin, (1994-2001)

The Quadracci Pavilion of the Milwaukee Art Museum (1994–2001) was Calatrava's first building in the United States, and his first museum. It displayed the technical innovations and forms he had first used in his railway stations and airports, but with more freedom of form and architectural theatrics. The purpose of the new pavilion, as defined by the museum board, was to give the museum a new entrance, and especially "to redefine the identity of the museum with a strong image."

Milwaukee Art Museum, Wisconsin, (1994-2001)[8]

6 https://en.wikipedia.org/wiki/Santiago_Calatrava#/media/File:Puente_Lusitania_sobre_el_r%C3%ADo_Guadiana,_M%C3%A9rida.jpg

7 https://en.wikipedia.org/wiki/Santiago_Calatrava#/media/File:Calatrava_Puente_del_Alamillo_Seville.jpg

8 https://en.wikipedia.org/wiki/Milwaukee_Art_Museum#/media/File:Millwaukee_Museum_from_south-west.jpg

Calatrava's solution was a glass and steel entry hall 2 metres (6.6 ft) high with a moveable sun screen roof, composed two large wings made up of twenty-six smaller wings, from 8 to 32 metres (26 to 105 ft) in length. The sunscreen, weighing 115 tonnes (113 long tons; 127 short tons), can be hoisted up by a single pylon, like an enormous bird's wing, or lowered when the wind from the lake is stronger than 65 kilometres per hour (35 kn). The interior of the structure has a conference hall, exposition space, shops, and a restaurant overlooking the lake. He also designed a suspension footbridge between the center of the city and edge of the lake. The roof can be raised and lowered as if in a slow-motion replay of a bird in flight. [9]

Turning Torso, Malmö

Turning Torso is a neo-futurist residential skyscraper in Sweden and the tallest building in Scandinavia. Located in Malmö on the Swedish side of the Öresund strait, it was built and is owned by Swedish cooperative association HSB. It is regarded as the first twisted skyscraper in the world. It reaches a height of 190 m (620 ft) with 54 storeys and 147 apartments. The building is divided into:

Turning Torso, Malmö[10]

Foundation: The core is an enormous concrete pipe, with an inner diameter of 10.6 meters and walls which gradually go from 2.5 meters in thickness at the bottom to about 0.4 meters at the top of the building. Inside the core there are lift shafts and staircases.

Structural slab: The structural slab is fitted around the core. The forms for the structural slab are shaped like slices of a pie, and together they form an entire floor. The forms were rotated 1.6 degrees for each floor in order to create the characteristic twist of the building.

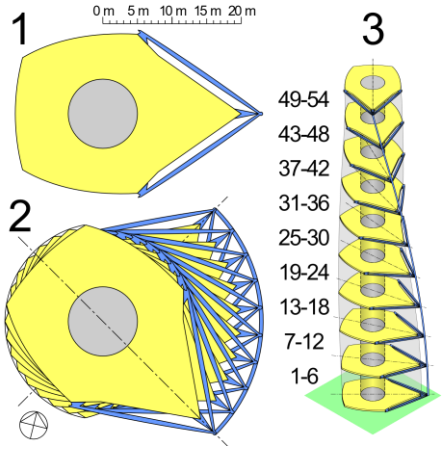
Spine: On the exterior of the building there is an outer steel support, which is linked together by the spine. The steel support transfers shearing forces to the supporting concrete core. The total weight of the steel support frame is approx. 820 tons.

Façade: The glass and aluminum facade are very complicated. Because the building twists, the facade is double curved. There are approx. 2,800 panels and 2,250 windows in the facade. The panels are curved and the glass panels are flat.

[9] Jodidio, Philip (2016). Calatrava (in French). Taschen. ISBN 978-3-8365-3564-9 cited in https://en.wikipedia.org/wiki/Santiago_Calatrava#cite_note-FOOTNOTEJodidio201657-9

[10] https://en.wikipedia.org/wiki/Turning_Torso#/media/File:Turning_Torso2.jpg

In order to follow the twist of the building, the windows are leaning either inwards or outwards, depending on which side of the building they are on. On the western side they are leaning inwards and on the eastern, outwards. This leaning of the windows is between 0 and 7 degrees, while the lateral leaning is about 6 degrees.[11]



General structure of the Turning Torso[12]

ZAHA HADID

Asymmetrical lines, curved ground plans and oblique planes are characteristics features of Hadid's architectural style, which is very explosive. **The Vitra Fire Station, Weil am Rhein, Germany 1993.** The building had one side of the reinforced concrete building a frameless row of adjacent windows is inset, with the offices radiating outwards.

The Vitra Fire Station[13]

Her radical design, made of raw concrete and glass, was a sculptural work composed of sharp diagonal forms colliding together in the Centre. The design plans appeared in architecture magazines before construction. When completed, it only served as a fire station for a short period of time, as Weil am Rhein soon opened their own fire station. It became an exhibit space instead, and is now on display with the works of Gehry and other well-known architects. It was the launching pad of her architectural career. (Jodidio P.p119)

[11] https://web.archive.org/web/20110927010438/http://www.hsb.se/malmo/turningtorso/in-english

[12] https://en.wikipedia.org/wiki/Turning_Torso#/media/File:Turning_Torso_structure.svg

[13] https://en.wikipedia.org/wiki/Zaha_Hadid#/media/File:Vitra_Campus_-_Hadid_Fire_Station_-_full_view,_blue_sky.jpg

Galaxy Soho, Beijing, 2012

This mixed use (office and retail) building located in central Beijing, was built in just 30 months. The architect explained "Its architecture is a composition of four continuous, flowing volumes that are set apart, fused or linked by stretched bridges. These volumes adapt to each other in all directions, generating a panoramic architecture without corners or abrupt transitions that break the fluidity of its formal composition." The building has continuous curvilinearity and a flowing appearance. (Jodidio P.p343)

Glasgow Riverside Museum, 2011

The building positions itself as symbolically and functionally as open and fluid with its engagement of context and content. Seen from the exterior, the spectacular glazed façade seems to reveal a great assortment of vehicles as though they might be speeding towards the visitor. (Jodidio P.p287)

Glasgow Riverside Museum[14]

Heydar Aliyev Cultural Center in Baku, Azerbaijan

It has 1000-seat auditorium, Temporary exhibition spaces, Conference center, Library, Workshops and Museum.

The building establishes a continuous, fluid relationship between its surrounding plaza and the building's interior. Also represents a fluid form which emerges by the folding of the landscape's natural topography and by the wrapping of individual functions of the Center.

Heydar Aliyev Cultural Center in Baku, Azerbaijan[15]

Reference Books:

1. Gossel P. ed, 2007, The A-Z of Modern Architecture, Santiago Calatrava, TASCHEN, p182, ISBN: ISBN: 978-3-8228-6313-8
2. Jodidio P.2020. Zaha Hadid Complete Works from 1979-Today.TASCHEN. p (119,287,343), ISBN: 978-3-8365-7243-9

[14] https://en.wikipedia.org/wiki/Riverside_Museum#/media/File:Riverside_Museum_Glasgow_EC2018.jpg

[15] https://upload.wikimedia.org/wikipedia/en/d/d3/Heydar_Aliyev_Cultural_Center.jpg