



Structure That forms Architecture

The Study of Natural Forms

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All architects, thinkers and writers from different countries have been mentioned in this research, are generally among the best known in their profession.

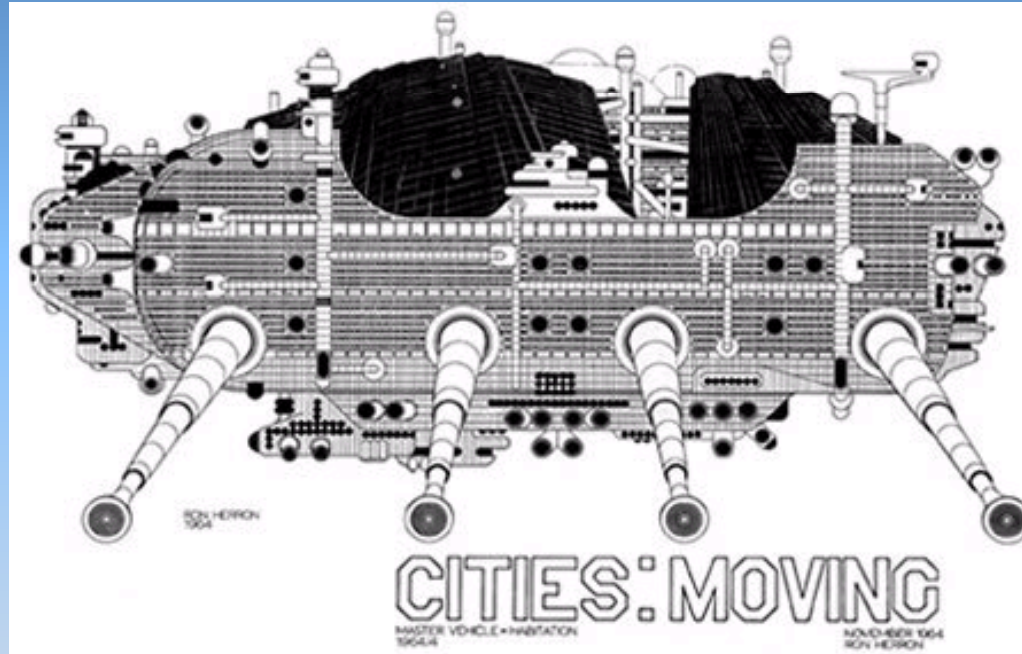
The names of certain of these architects are mentioned in conversation (usually among other architects) and are known to those who prepare lecture series, lists for invited competitions, and magazine features – in short, those who are somewhere near the cutting edge of ideas.

The recent demise of postmodernism, along with the increasing number of inventive, exciting architects around the world whose work goes beyond the limits of “ structure,” “ construction,” “ deconstruction” demands that some of this new architecture be examined collectively. No label could define these architects; rather, the common characteristic of those included here is that they each display a certain view and spirit. Their view and architecture uses opacity and depth, sensory invitation and discovery, mystery and shadow.

I want to broaden the architectural debate by introducing ideas which may be known to only a small group of enthusiasts, and hope that this research will serve as an inspiration to readers, encouraging them to pursue the work done here, not only through the written word or photographs but also through the buildings themselves

Introduction

After the industrial revolution began, the structure of buildings has evolved radically and the concepts of design had altered dramatically. New heights have been reached and the skin of the building has changed. The steel made every thing easy to make, and the machines made buildings even more easier to construct, skeletons of sky scrapers emerged and humans reached the clouds. In spite of fact, there were attempts to create whole mobile cities that moved from region to another.



And when computers were created, architecture went into Digital. A new era of architectural and construction achievements are emerging now, and since the new millennium has come, the creation of software and materials is on heist.

The humans always looked into nature and imitated every thing from it, like radars, planes, submarines and so on. Frank Lloyd Wright is one famous architect first recorded to imitate nature in his buildings, and he has built several very popular buildings base on the structure of nature, like his famous column of J. wax building and Goginheim museum and many architects followed him in his concept, and more complicated forms are being build now due to the sophisticated technology we have reached. Architects like Frank Gehry is using a computer software called CATIA to calculate the structure of his buildings, this software is originally used for building aero planes.

Introduction

During the 1920s and early 1930s, a group of avant-garde architects in Russia launched a movement to design buildings for the new socialist regime. Calling themselves *constructivists*, they believed that design began with construction. Their buildings emphasized abstract geometric shapes and functional machine parts. Constructivist architecture combined engineering and technology with political ideology. Constructivist architects tried to suggest the idea of humanity's collectivism through the harmonious arrangement of diverse structural elements.

The most famous work of constructivist architecture was never actually built. In 1920, Russian architect Vladimir Tatlin proposed a futuristic monument to the 3rd International in the city of St. Petersburg (then known as Petergrado). The unbuilt project, called *Tatlin's Tower*, used spiral forms to symbolize revolution and human interaction. Inside the spirals, three glass-walled building units - a cube, a pyramid, and a cylinder - would rotate at different speeds.

Soaring 400 meters (about 1,300 feet), Tatlin's Tower would have been taller than the Eiffel Tower in Paris. The cost to erect such a building would have been enormous. But, even though Tatlin's Tower wasn't built, the plan helped launch the Constructivist movement. By the late 1920s, Constructivism had spread outside the USSR. Many European architects called themselves constructivists. However, within a few years Constructivism faded from popularity and was eclipsed by the Bauhaus movement in Germany.

Constructivist buildings have many of these features:

- Glass and steel
- Machine-made building parts
- Technological details such as antennae, signs, and projection screens
- Abstract geometric shapes
- A sense of movement

Constructivist Architects:

- Vladimir Tatlin,
- Aleksandr Vesnin and his brothers Leonid and Victor Vesnin,
- Konstantin Melnikov,
- Nikolai Milyutin,
- El Lissitzky,
- Vladimir Krinsky,
- Iakov Chernikhov

Russian architect Vladimir Tatlin launched the constructivist movement when he proposed the futuristic, glass-and-steel *Tatlin's Tower*.



Historical Analysis

The Bridge

Historical Analysis – The Bridge

The bridge is the key building in observing this progress in structure that forms architecture.

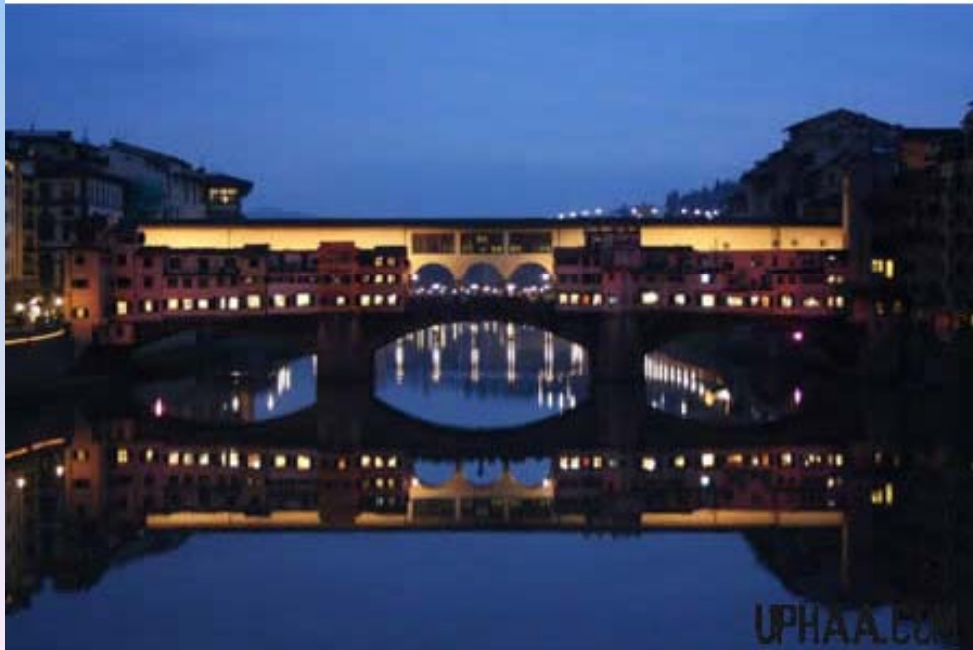


In the deep past bridges were built by tree trunks and wood, and the spans were not vast.

Bridges of Doges Palace, Venice



In the past bridges were built by vaults and columns of stone, and the spans were not vast.



The Ponte Vecchio in Florence

This bridge is the oldest and most famous of its kind. The Ponte Vecchio in Florence is one of the most famous tourist spots. This bridge is thought to be the oldest wholly stone built & segmental arch bridge in Europe. Although there are many partial segments which date further back. It was first originally built of only wood and then it was destroyed by floods in 1333 and twelve years later it was rebuilt using stone. This was famous for its lining of shops, the bridge has housed everybody from Medieval merchants and butchers to souvenir stalls and art dealers.

Then the bridges were built by vaults and columns of stone that can hold heavy loads



Seoul's Banpo Bridge (Gigantic Fountain)

The Banpo Bridge which crosses over the Han River in the Seoul capital of Korea has been given new life with the addition of a very interesting fountain, that was specially designed to attract more tourists.

The fountains at the Banpo Bridge were installed on September ninth and have since become a major tourist attraction. The bridge has turned into a major tourist attraction. It has nearly 10 thousand nozzles (more exactly 9, 380) on either side of the bridge that shoots out 190 tons of water every minute. According to the Seoul mayor, Oh Se-Hoon, the fountain bridge would help acknowledge Seoul as an eco-friendly destination amassing more tourists.

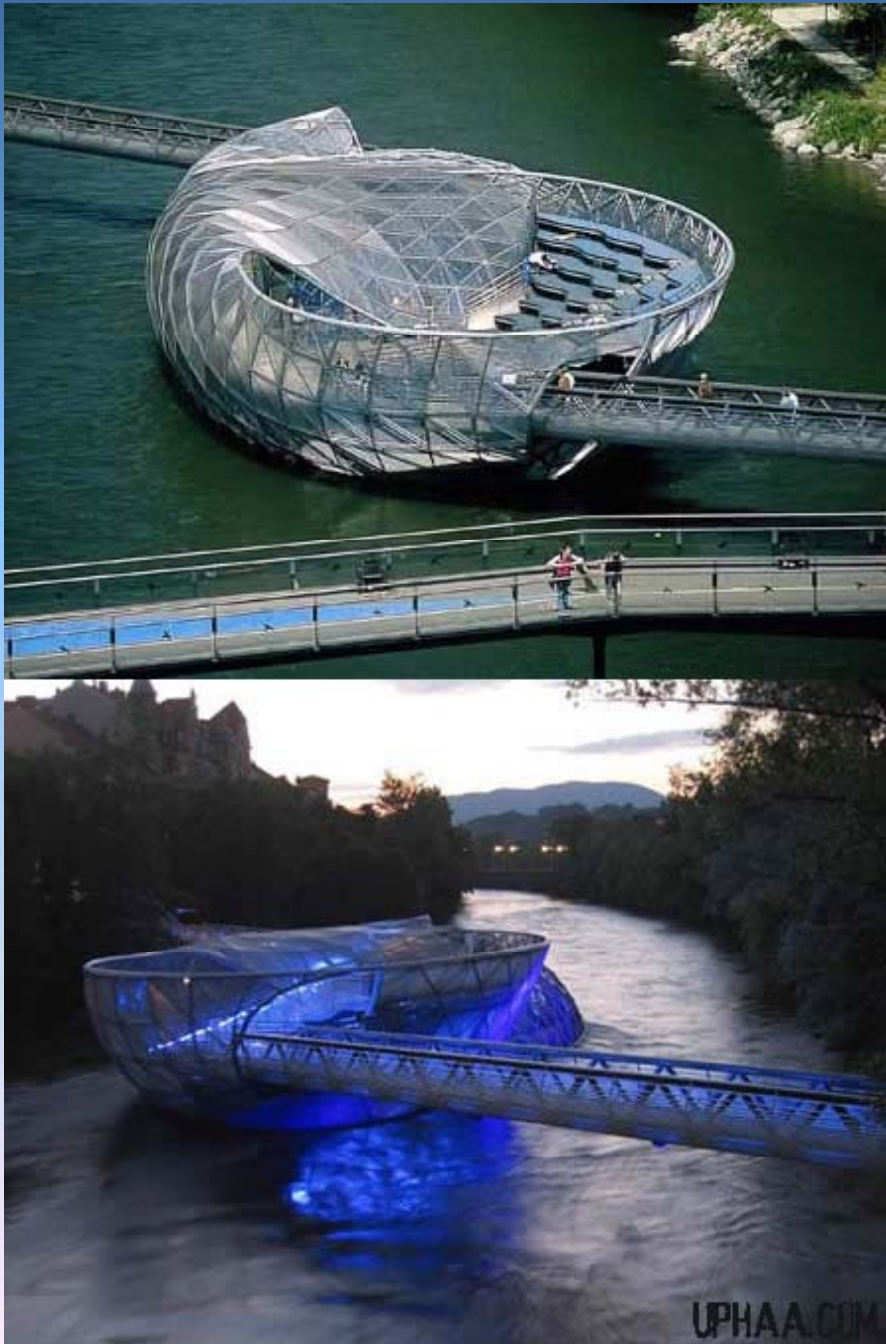
Then Concrete was used to make remarkable bridges

Magdeburg Water Bridge

The Germans took over a century to build this water bridge. The 918-metre Magdeburg Water Bridge, is a navigable aqueduct water bridge in Germany, completed in October 2003. It bridges the River Elbe to connect two important German shipping canals; the Elbe-Havel Canal and the Midland Canal.

Plans for joining the two canals had been conceived as far back as 1919, and construction on such a project began during the 1930s, but first World War II and then the post-war division of Germany put the project on hold until after German reunification was achieved in the 1990s. The bridge site is open to visitors and includes a parking lot, bicycle and pedestrian paths and informational signs detailing the history and construction of the bridge. The bridge itself is located outside of Hohenwarthe near the city of Magdeburg and is known locally as the Wasserstrassenkreuz Magdeburg





Aiola Island Bridge

A cool bar located on a river. Aiola Island, located right in the center of the Mur River in Graz, Austria, was built in 2003, and immediately developed itself as a popular attraction. The 'island' was created by the New York artist Vito Acconci. It has a sunbathing area, a trendy bar and a coffee house, plus it allows you to cross the Mur River from one shore to another.

Then Steel was used to make more remarkable bridges



Gateshead Millennium Bridge

The award winning \$44 million Gates head Millennium Bridge is the first and only tilting bridge in the world. Hydraulic rams at each end of the bridge allow it to tilt so small ships may pass through, and it is this innovative technology which won its designers the prestigious Stirling Prize for architecture in 2002. Thanks to the 19,000 tons of concrete poured into 98ft deep foundations and enough steel to build 64 double Decker buses, the bridge can withstand a collision with a 4,000 tons ship moving at 4 knots.

Then concrete with Steel and cables were used to make much more remarkable mechanical bridges



Henderson Waves Bridge

At a height of 36 meters or 12 storey from the road, it's the highest pedestrian bridge in Singapore. The 300-metre bridge links up the parks at Mount Faber and Telok Blangah Hill.

The bridge has a unique wave-form made up of seven undulating curved steel “ribs” that alternately rise over and under its deck. The curved “ribs” form alcoves that function as shelters with seats within and also to accommodate large number of people during public events.

During the day, one can enjoy the harbor views while standing on the 12-storey high bridge. At night, the wave-forms will be lit with attractive LED light from 7pm to 2am daily, giving the bridge an illuminative glow, offering beautiful night scenic view of the city.

Then concrete with Steel were used to make free natural shaped bridges



Bridge to Nowhere

A bridge on the Atlantic Road in Norway. The fact that the Atlantic Road of Norway was voted as the Norwegian Construction of the Century in 2005 pretty much says it all about this wonderful integration of modern technology with nature's magnificence. The road is akin to man's stroke of brush on nature's canvas and the view and the ride it offers is both unique and enthralling. The wonderful ride moves along a scenic five-mile stretch along highway Rv64 between Molde and Kristiansund. Best time for a ride: when a storm mild hits the ocean! Ironically, that is when the ocean under the road is at its dramatic best.

Then concrete was used to make free natural shaped bridges that integrate perfectly with nature

Natural Forms Analysis

Philosophy

The nature surrounds us, and its alive.

The artist says in his painting that Nature represented by the mountain huge waves of rocks, holds gently the bird in its nest and protects it.

But the same waves have claws and jaws that can crush the same bird.

The layers in the mountain waves represent the old age of the rocks whom got smoothed by the nature's other powers like water and wind.



painting



Grand Canyon, USA

Philosophy

Nature envelops us, affects us and we can not confront nature because the structure of Nature is much more powerful than us.



Nature Dancer

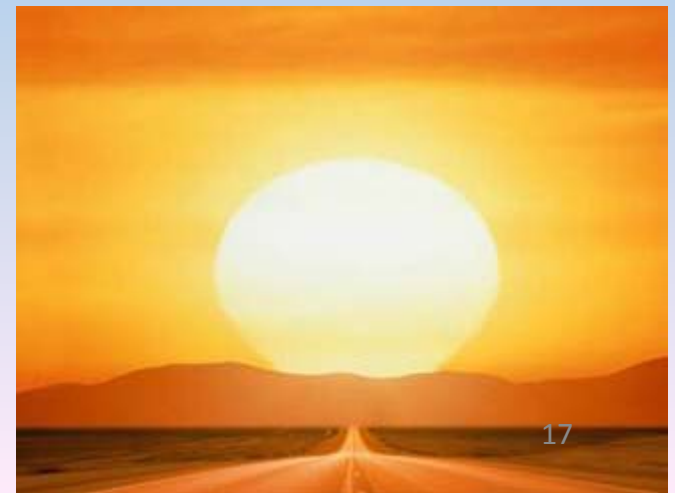
Tsunamis



Storms



Heat



Philosophy

If only we can get along with nature, then we can have much more beautiful architecture, and maybe avoid its anger.



Rocks in Sinai

Stained glass created from Rocks



Villa in Egypt



The Contour from the rocks in Germany countryside along with the mountain's cliff and the structure of mountain affected the sky line and the roofs of the houses



We can speak the same language with the nature even if we are scattered around the world, and we are affected by forms of nature when we shape our buildings.



Bungalows in Hawaii



Pyramids in Egypt



A slug on a Mushrooms Column

Philosophy

When Frank Lloyd Wright thought of Falling Water villa, he not only collaborated with nature, but constructed according to nature and did not make the huge concrete structure invade the privacy of the nature, he used the structure as rocks and mountain blocks.

Frank Lloyd Wright said that all architecture is organic, and the Art Nouveau architects of the early twentieth century incorporated curving, plant-like shapes into their designs. But in the later half of the twentieth century, Modernist architects took the concept of organic architecture to new heights. By using new forms of concrete and cantilever trusses, architects could create swooping arches without visible beams or pillars. Organic buildings are never linear or rigidly geometric. Instead, wavy lines and curved shapes suggest natural forms.



Johnson Wax, Mushrooms Columns



Falling Water, Nature integration

Natural Forms Analysis

The Sea Shell
Shell supporting mechanism

Analysis

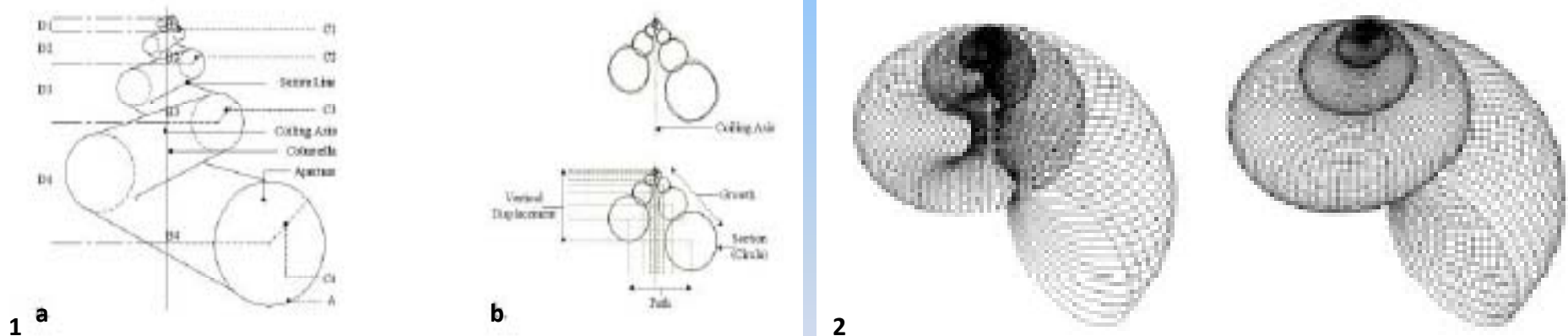
The structures in nature are great lessons for human study. Having been in development for several billion years, only the most successful structural forms have survived. The resourcefulness of material use, the underlying structural systems and the profound capacity to respond to a variety of climatic and environmental forces make natural form tremendous exemplars to human architectures. The wholeness of natural form indicates that the form and forces are always in some sense of equilibrium.

In most of natural forms, the quality of equilibrium may be difficult to recognize. However, seashells are one of the natural forms whose functions are simple enough to be approximated by a simple mathematical relationship. The focus of this study was to understand the seashell form as applicable to human architectures. Digital methods are the language to analyze, create, and simulate seashell forms, as well as, suggest a variety of possible architectural forms.

The Study of Natural Forms

The study of seashells has a long history, starting with Henry Moseley in 1838 and followed by many researchers such as Thompson, Raup, Cortie, and Dawkins. These researchers have outlined in a number of mathematical relationships that control the overall geometry of shells. Our interest centers on an investigation of natural forms as a starting point to generate architectural forms.

As documented by prior researchers, the seashell geometry can be expressed by four basic parameters. The Figure indicates these parameters that influence the shell forms.



As shown in Figure 1a, A is the shape of the aperture or the shape of shell section, B is the distance from the coiling axis to the center of the shell section, C is the section radius, and D is the vertical distance between sections. To understand the mathematical relationship of these four parameters, Figure 1b illustrates the measuring concept of one coiling shell of the gastropods class and Figure 2 illustrates its digital geometry reconstruction. Each seashell can be reconstructed in a digital form with variations of the mathematical relationships among the four parameters. The result of a specific mathematical combination reflects the shell form for a specific seashell specie. In this study, the concept of creating architectural form originating from seashell geometry can be accomplished by applying these parameters to an architectural form interpretive exploring process.

Using mathematics as a tool of investigation in both the natural and architectural forms gives us an advantage of exploring multiple forms easily and allows us to implement new parameters into the mathematical framework. Architecture, which exists in a dramatically different environment from the seashell, has other parameters to be integrated during the architectural design process concerning its form. These parameters are designed to accommodate the practical requirements of architectural forms.

Prof. Kamon Jirapong, PhD.

Prof. Robert J. Krawczyk

Abstracting Nature

The abstracting process combines three major components that influence the final result of an architectural form. These components are the seashell geometry properties, seashell structural properties and architectural properties.

Seashell Geometry Properties

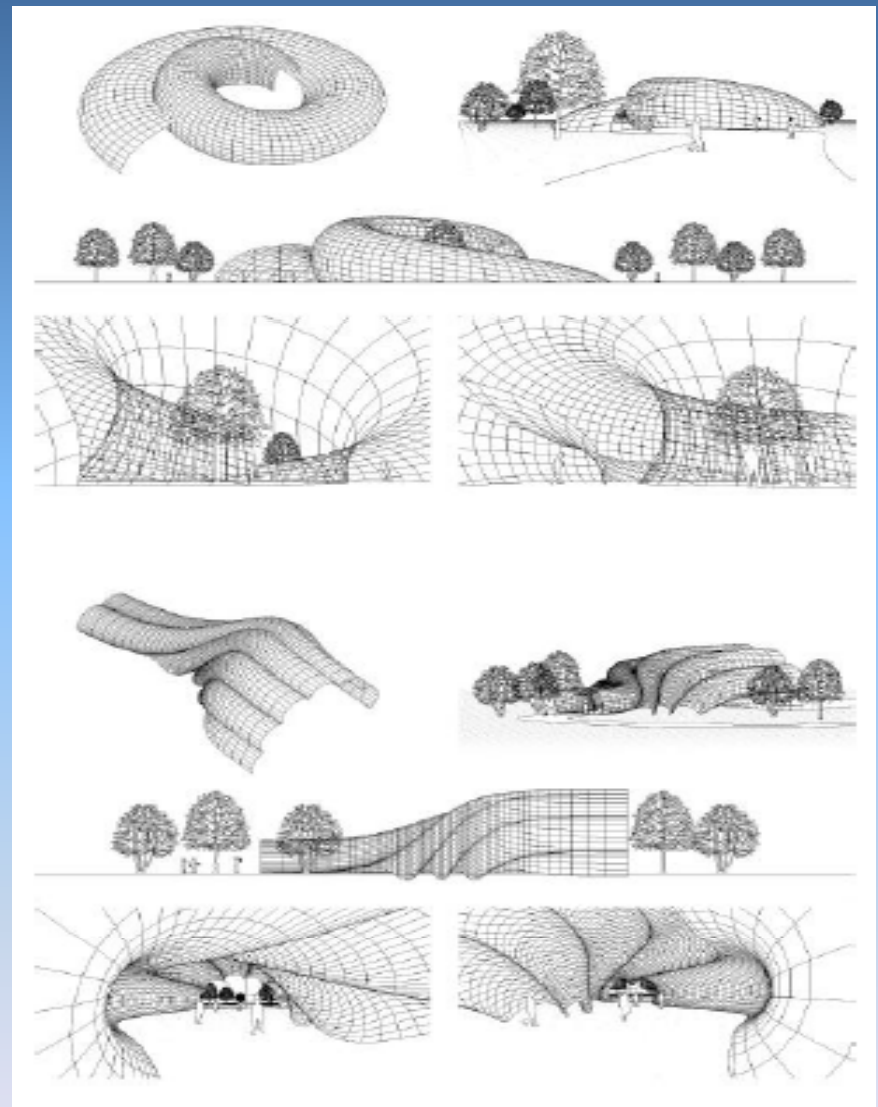
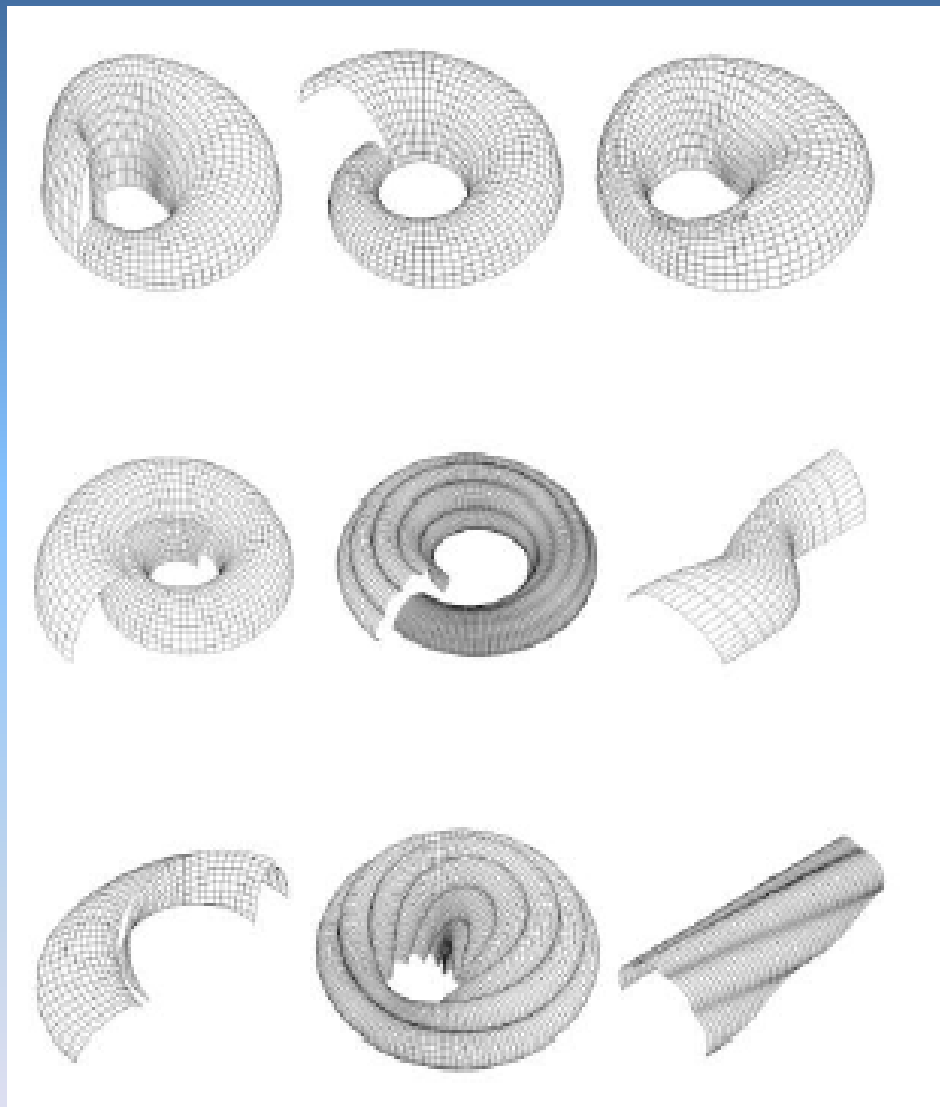
There are four known parameters in the study of seashell geometry; path, section, growth and vertical displacement. Each parameter is represented by a specific mathematical curve in which it can be replaced with series of different mathematical curves to develop an architectural form. In the seashell form these mathematical curves are limited to those that appeared in the actual geometry of shell such as logarithmic spiral, circle and ellipse. In the architectural form the limitations are less, however, only mathematically defined curves are chosen in this investigation according to the fact that seashell form always exhibits a curvature. For a clearer understanding in replacing seashell parameters with other mathematical functions, the mathematical curves are divided into two simple groups based on their mathematical properties; closed curves and open curves. Figure 3 illustrates the sample of closed and open curves and diagram indicates the use of each group.

Seashell Structural Properties

The actual shell geometry responds to any load outside by redirecting forces within a very thin section of shell structure along its natural multiple curvatures. Finally those forces are transferred to the supported area such as ground, rock or sand depending upon how the seashell positions itself in the environment. By acknowledging this structural phenomenon and understanding its weakness against tension forces, the compressive shell form suggests the possible structure of the architectural form beyond the existing forms of man-made shell structure. Its structural properties applied to architectural interpretations are included the shape of section, the overlapping section, and the support condition.

Architectural Properties

In architecture, there are some basic design criteria that architects and engineers have to take into consideration when developing building forms. In this investigation those criteria are treated as architectural parameters. These parameters emerge from architectural design principles that make architectural forms inhabitable. Without a specific requirement of an actual site and functions, the architectural parameters for this study can be set as ground condition, orientation, human scale and enclosure.

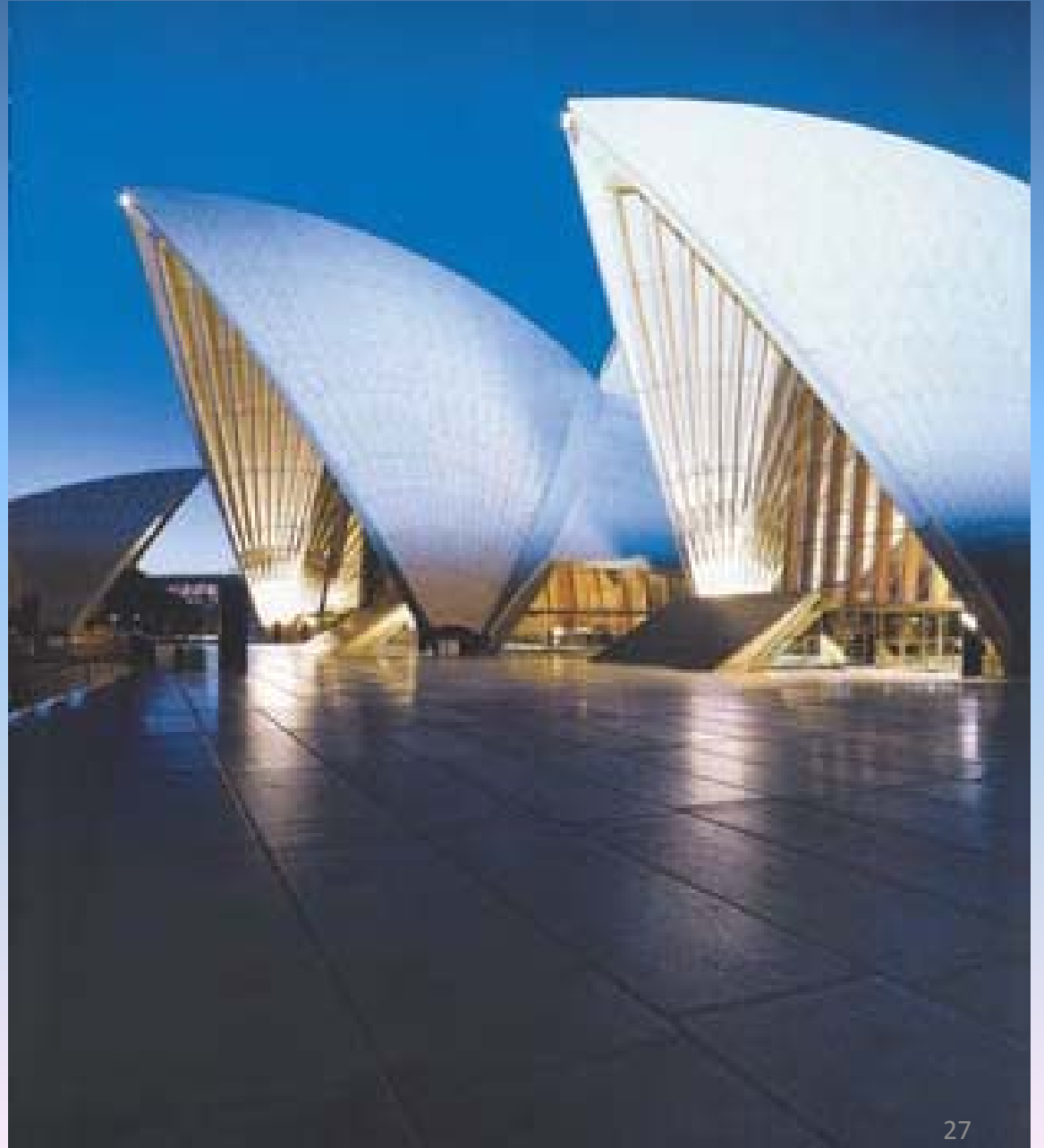


As architectural forms are developed the interpretation of these three major components yield the resultant of architectural form that contains the qualities of the seashell.

The architectural form generating concept adopts the four parameters from the seashell geometry and implements additional conditions based on architectural and structural properties into one mathematical framework. This mathematical framework then generates the result of the architectural form.

“The structural technology when this building was built was very poor compared with the technology today, that’s why if the design of this Opera was assessed by today’s technology it would have been built exactly as the architect wanted not as the structural technology provided.”

Dr. Manal Abou El Ela



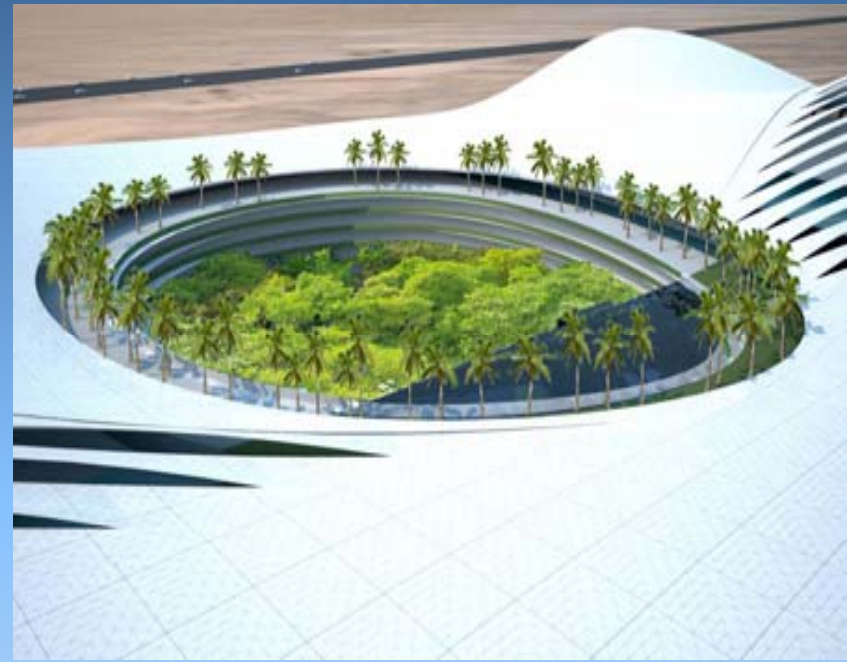
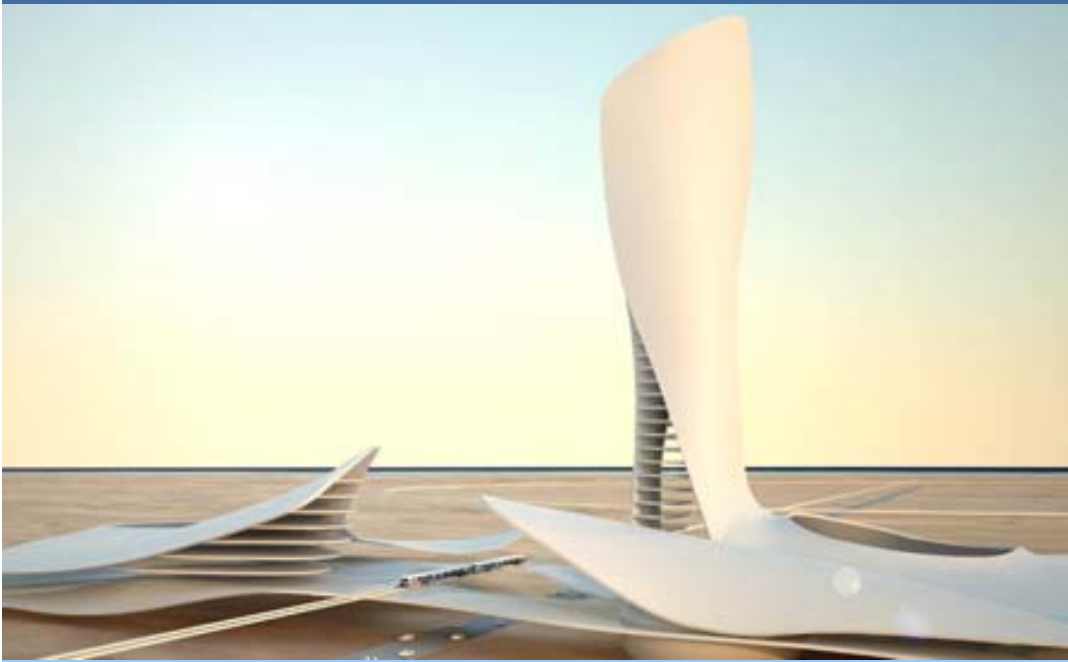
The Idea



Egyptian Cobra stands in an attacking position.

Architectural office Snohetta stands after this year’s summer Serpentine gallery in London’s Hyde Park, won the competition for a new complex of buildings, “Gateway” for Ras Al-Khaimah, the new capital city of the United Arab Emirates. The confidence trick became a central construction, a weightless-act tower, that resembles a cobe as a symbol of that location. A huge set of building contain hotels, congress and shopping centre and exhibition halls.





Huge massive shells in both horizontal and vertical ways, in single and multiple layers, solid and void skin surfaces make a great turn in structural technology that forms architecture.



Natural Forms Analysis

The Honeycomb (Idea of Cells)
Walls and ceilings supporting mechanism



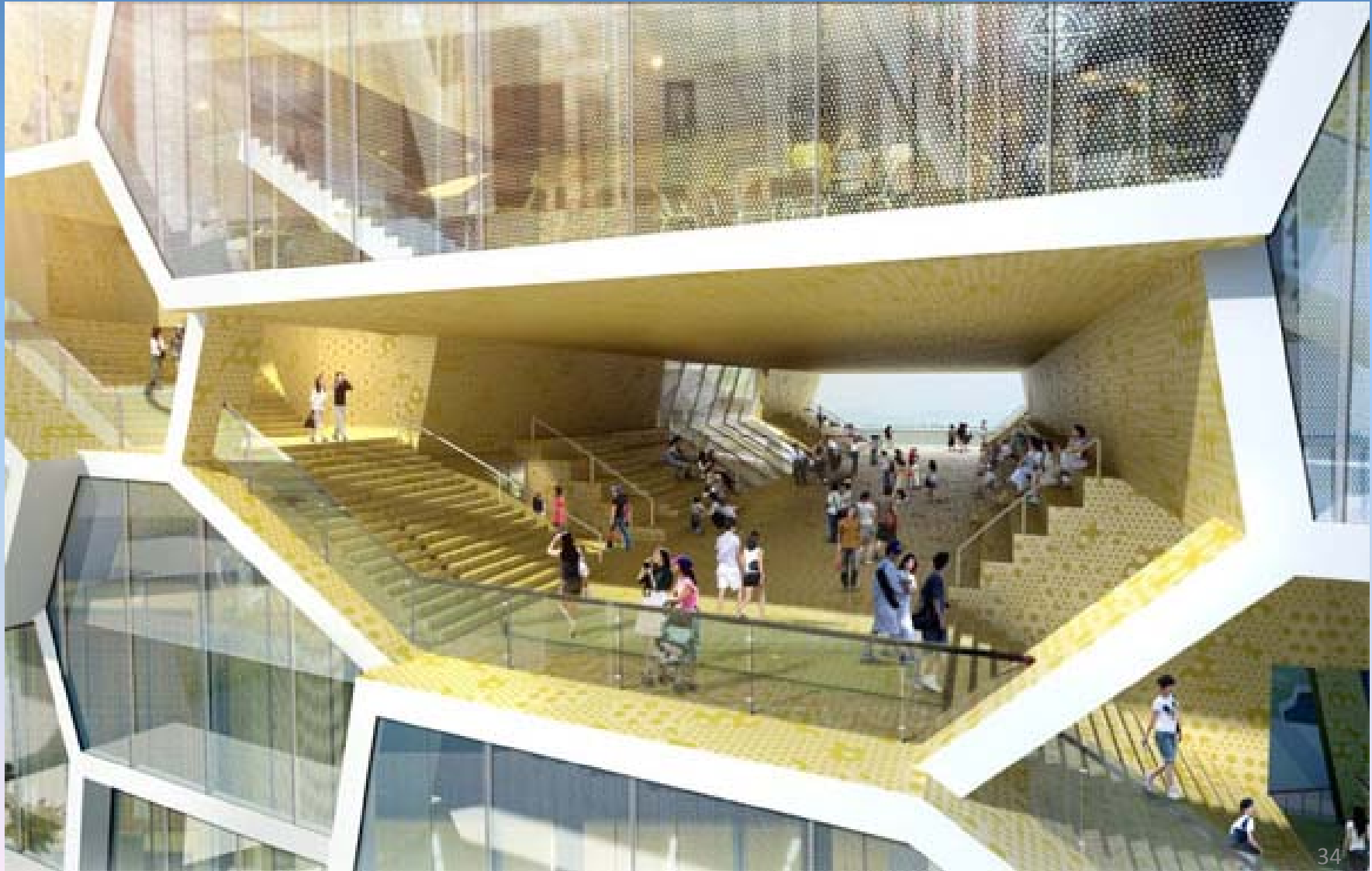
The structure of a honeycomb is a famous example of how architecture can be made from natural forms

London's ACME group submitted a unique design that reflected the “collective” spirit of the UN. The design is comprised of a series of cubes that organically blend into a cohesive whole. ACME explained that the “memorial should represent the nature of the United Nations, where many individual nations come together to create one entity, but without losing their individual identities.”



Honeycomb Building an Application of Structure that affects the form

The stark exterior is in direct contrast to the stunning interiors of the structure. Large, sun-filled atriums house a 1,500-seat assembly, theater, two conference halls and exhibition space. Alas, the ACME Cube was boxed up and sent home with only a third-place ribbon and the sobering reality of having lost out to, of all things, an orb.



Taking a page from Darth Vader's Death Star, the winning design is a huge metal mesh globe that sits by the river like an aluminum goose egg. Now, Ban Ki-Moon may not be another Boutros Boutros-Ghali (a UN Secretary so nice they named him twice), but come on, Chungju, you can do your homeboy better than that metal moon monolith!



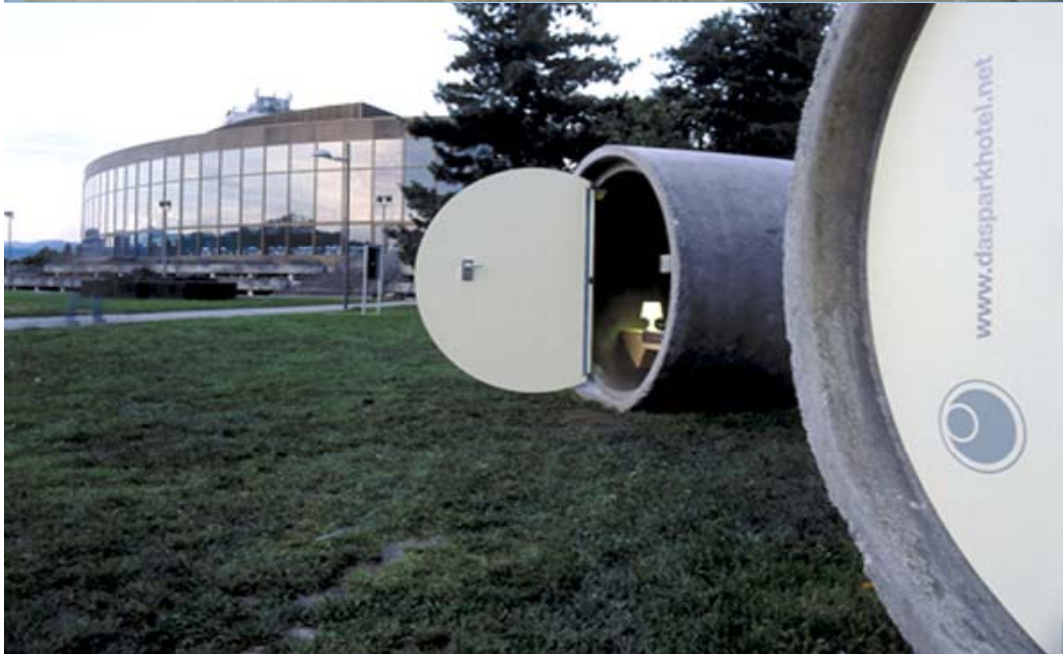
How a Structural Recycled form affects Architecture!!!



If you were waltzing down the Blue Danube, you wouldn't expect to find concrete drainage pipes lined up along the banks, yet alone to stop and spend the night in one.

Odd as it sounds, Austria's Rodlpark in Ottensheim has become home to a new sort of hotel/hostel park, the das Parkhotel. The idea is very near the old-fashioned concept of the youth hostel, allowing travellers a safe place to sleep, house their belongings and set up in a nomadic-type of community to find meals and rest a bit before travelling on.

The concept is recycled, but that's not all. The actual rooms are furnished out of massive, recycled drain pipes, with the drainage hole facing upward to allow for a bit of stargazing at night or natural light during the daytime.



These pipes are so large that an average-sized adult can walk around without giving themselves a concussion. Das Parkhotel also outfits the rooms with power, storage, blankets and sleeping bags. Other amenities are shared in the public spaces outside; there you'll find the toilets, showers and cafes.

With a minimum of effort, these parks can be set up practically anywhere and overnight. They require no new construction and are tremendously eco-friendly. The only planning that would need to be done would be the public areas, but in a park setting, little more is necessary than the type of utility structures you'd find at the lake. It's the perfect solution for riverside or lakeside campers and travellers with budgetary concerns.

What's even more unique about das Parkhotel is their adopted pay-as-you-wish policy, whereby guests pay for their rooms only as much as they are able or willing. The understanding is that most of the people the park would attract do not have large hospitality budgets, but that hopefully the ones who can afford more will contribute more toward the project. The long-term success of das Parkhotel remains to be seen, but if all else fails, they could simply hose the pipes out and roll them away.

This science centre, assemble from 10 blocks, that are connected together to the ring shape designed for quickly changing Hamburg by OMA contains exhibition rooms, aquarium and theatre. The building is going to be a new symbol of connection between the harbor and the city and at the same time represents city's interest in technology and science.





Architect Bernard Morin and his wife, Joyce Labelle

A contemporary house in Quebec out of seven containers. They decided that the unique corrugated metal design on the interior of the containers was something they didn't want to hide, so they painted it and allowed the ridged walls to remain so, giving the home's interior great character. On the outside, however, they wanted to create a more efficient function and classic look so the couple added a tremendous amount of insulation and finished the exterior with wood siding.

Morin and Labelle were so impressed with the ease and affordability of building with containers that they started their own container building company called Maison IDEKIT, which already has more container home projects lined up for this year.



ConHouse has come up with a much more unique look for their new 2+ Weekend container house. The paint job leaves a little to be desired - unless you're into the whole polka dotted décor thing, but the floor plan is genius.

The entire house was designed with the idea that real estate is getting so expensive and encouraging wasted space in homes that are really just too big. Every line of the 2+ house is functional. The house consists of two containers, one stacked atop the other in perpendicular fashion. The ground container has a see-through section in the middle, which adds an element of class in addition to allowing maximum natural light. The kitchen, bathroom, and laundry are in the bottom pod and the upstairs container is where the sitting room and bedroom are. By placing the pods in this arrangement, the end of the upper container provides shade for the patio in the rear of the ground floor pod.

Natural Forms Analysis

The Mountains (Idea of Layers with Caves supporting mechanism)

In this view of the Rocks of the Grand Canyon in USA, the colors and the textures are very affected by water and wind in a unique sculpture form, and the structure of the mountains are the same.



Horizontal Layers

Layers and caves

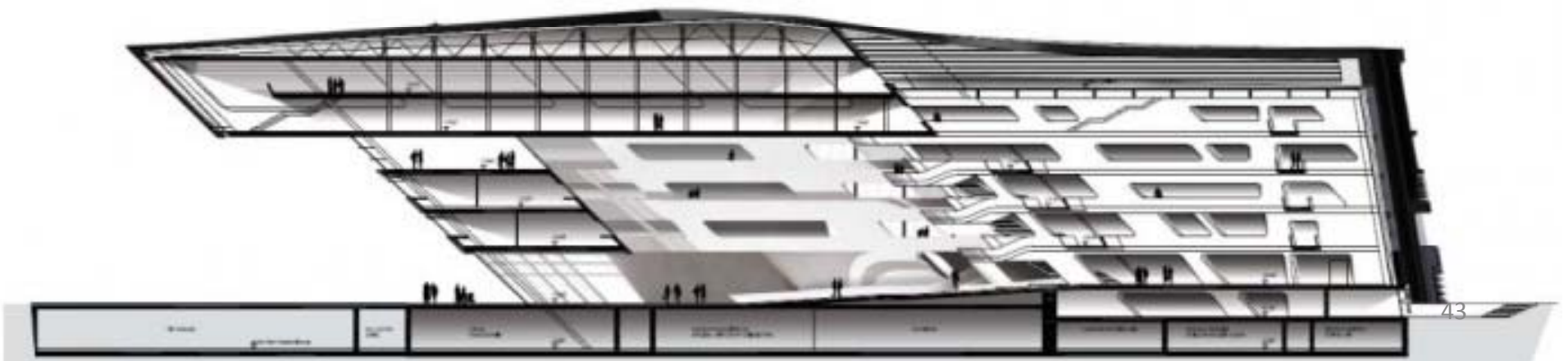
Uniting all the key functions of study in a unique way, the Library and Learning Center will be more than just library in the traditional sense, but it'll be a multifunctional structure that will cater different groups simultaneously. It will be a research and a service facility, a workplace and lounge, a place of communication and a traffic hub, in addition to the new library.





Layers and caves

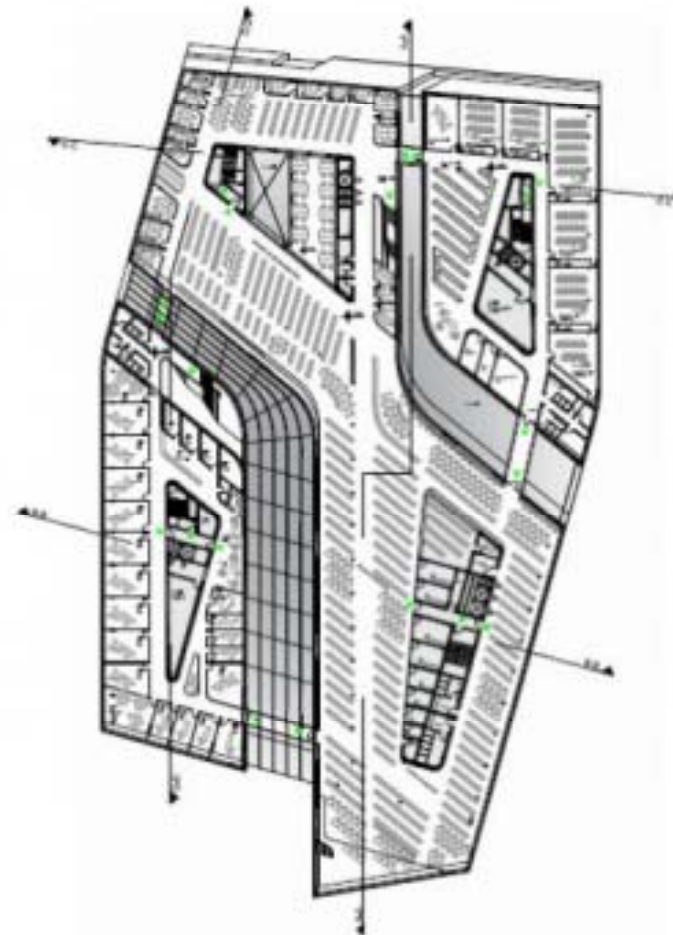
The layers of the project are the structure element erecting it, and combining boleaned walls with ceilings give the layer effect.



LEVEL 04 | +18.00 m



LEVEL 05 | +22.00



The plans are also reflecting the layered spaces of the project



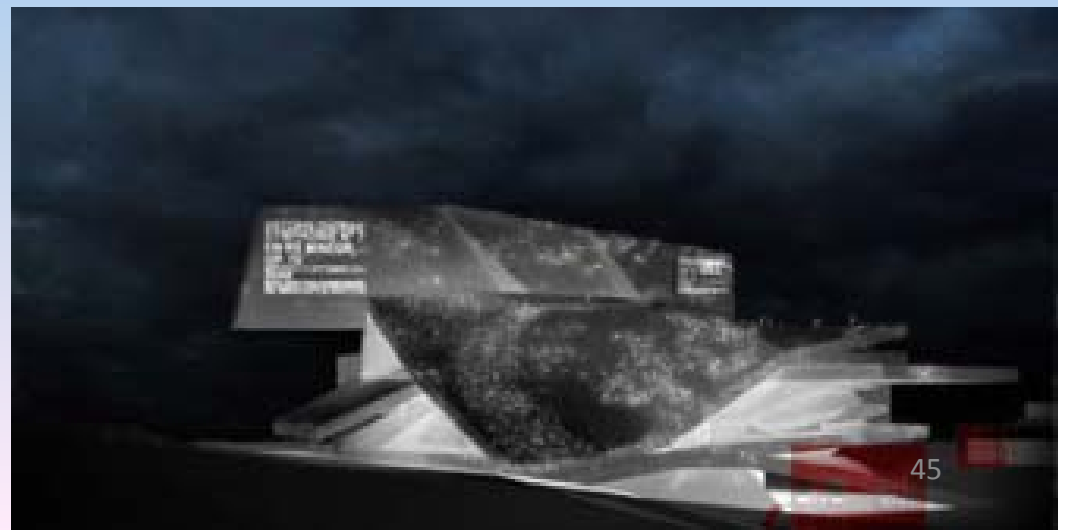
Winning design entry for the new Philharmonic in Paris, France.

Location: Parc de la Vilette

Capacity: **2,400 seats**

Scheduled completion date: **2012**

Architect: **Jean Nouvel**



Vertically Layered Volcanoes



There's a new look in the building industry and that's eco-skin. The Taichung Convention Center, designed by MAD Ltd. of Beijing, has taken a gigantic step toward sustainable aesthetics with the expansion of this concept. The vertical Louvers made of steel support most of the outer loads of the building.

Some say the building will look like "volcanoes in Venetian blinds," but I think it looks more like attractive pleated lampshades. The skin is designed to allow natural air flow for the building in hopes of minimizing use of air conditioning. It's also transparent in places to allow natural light into the interior. The building features double photovoltaic glass, which has all the benefits of regular glass, plus the ability to harness energy from the sun like residential solar power.



Besides these super-tech innovations, the design harks back to the ancient Eastern philosophies of combining architecture with nature to create a more harmonious dwelling. There will be areas where a pool or stand of bamboo are the focal points of the space, and as you can see from the pictures, it looks like the harmony works well on the big scale, too. Some of the wavy exterior is designed to "blur the line between landscape and topology," and if I may, it does so nicely. Taiwan hopes that the center will become a landmark that inspires future endeavors into the sustainable building realm. If you build it, they will come.



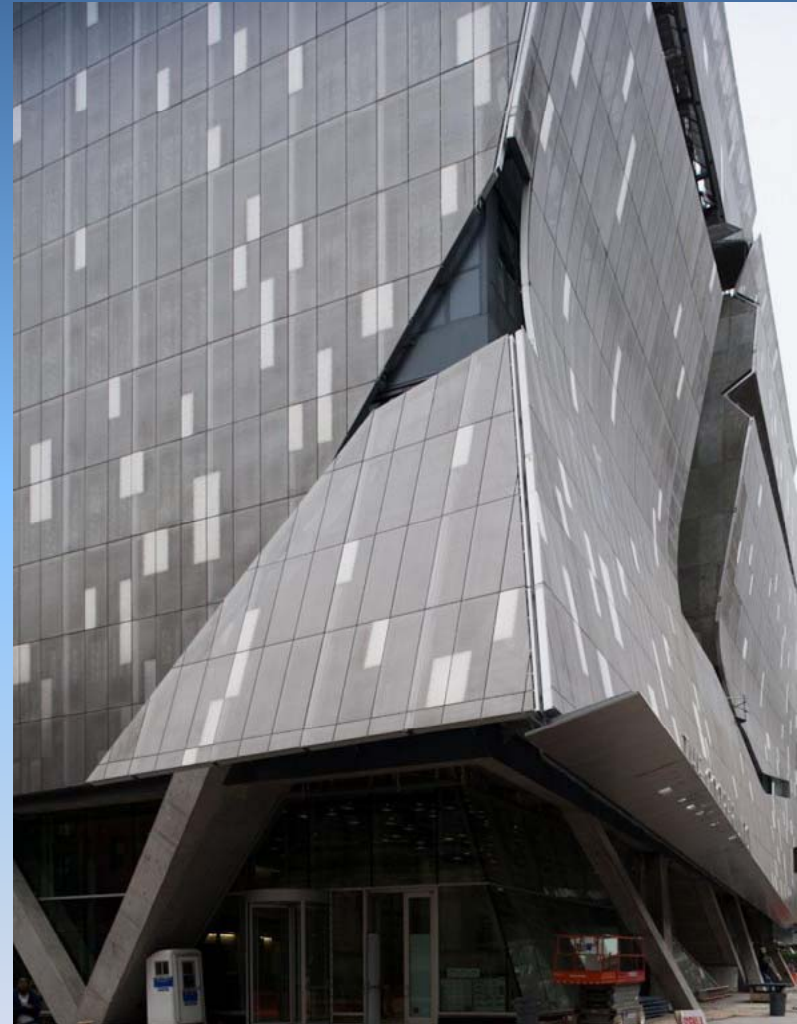
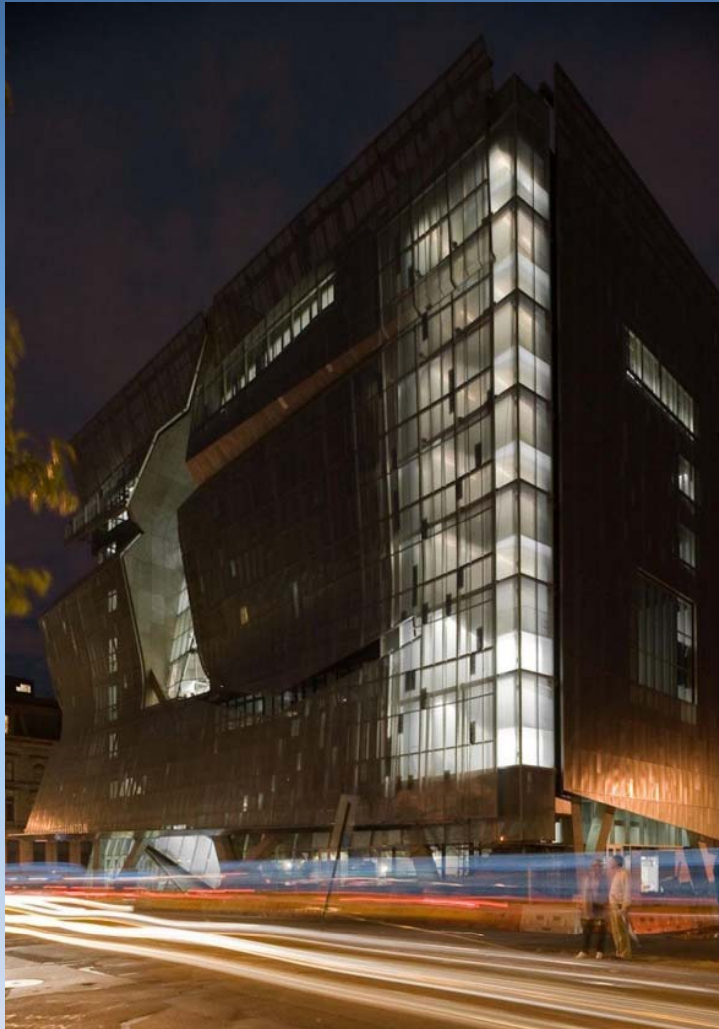
Cracks in a rock block



The Cooper Union was designed by Morphosis is located in New York, United States. The honorable duty of designing the home for the next generation of artists, engineers and architects has been awarded to Thom Mayne at Morphosis when he was chosen from 150 architects competing for the Cooper Union building. Now nearing completion at 3 Avenue New York, these images appear to reveal exclusive first structure is fit for inspiration. The Cooper Union is one of the oldest U.S. higher education facilities, founded in 1859 by Peter Cooper. Now, 150 years later, the new building is designed to reflect Cooper fundamental belief that education of the highest quality must be as “free as air and water” and should be available to all beneficiaries, independent of race, religion, sex or social status.



Expressing the spirit of integration and equality in physical form, the design creates an open space in which each department could merge with each other and interaction is encouraged by the design , it's a box holding it self and put on a concrete trussed base.



Designed as a stacked vertical piazza, the exterior is impacting and forced the plot, the selective permeability drawing attention to the activity inside. The vertical campus is organized around a central atrium that rises to the height of the building. This connective volume, spanned by sky bridges, opens view corridors through the Third Avenue building to the Foundation. Utilizing the latest technologies from the building face operates in a porous skin above the lobby. He is dressed in semi-transparent, open able panels perforated stainless steel that will be managed by the building manager.



The operable panels can create a pattern in constant motion, providing a variety of surface on the facade, shielding the interior of the sun, providing cooling during the summer months and acting as an insulating layer during the Winter also used as a tool in achieving LEED Silver status making it the first green academic laboratory building in New York City. Within the skin, the new facility offers the Cooper Union meeting rooms, social space, an exhibition gallery, auditorium and commercial space.

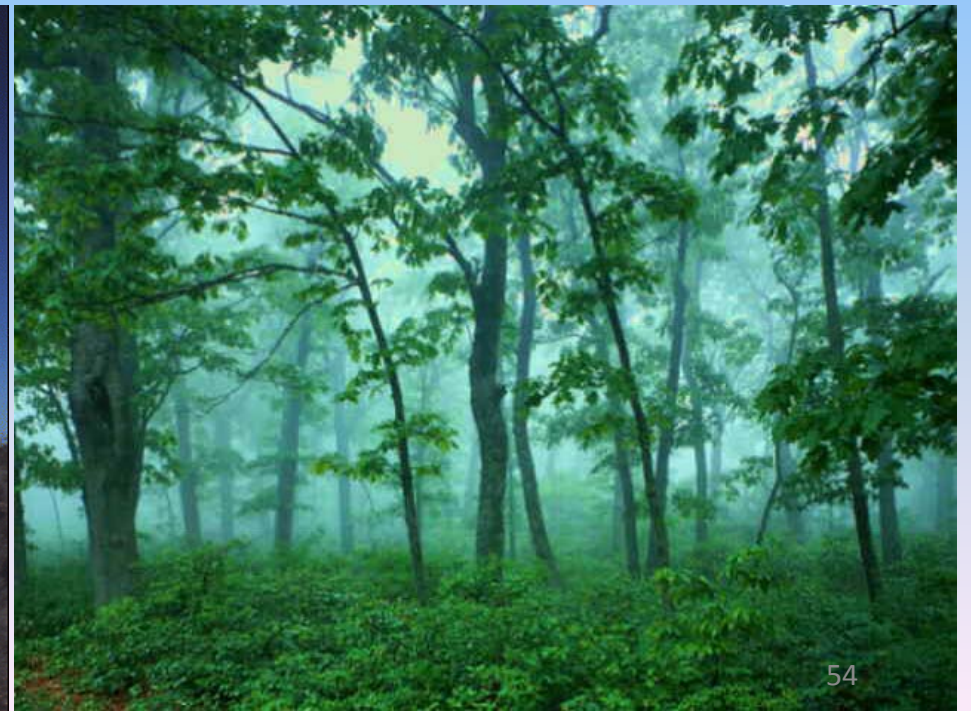
Natural Forms Analysis

The Plants (Idea of a Skeleton supporting mechanism)

When we observe a plant leaf or trunk we can see the skeleton of it and how it is statically stable in it self but dynamically stable in the nature, like the sky scrapers.



© shutter/123rf - 182888

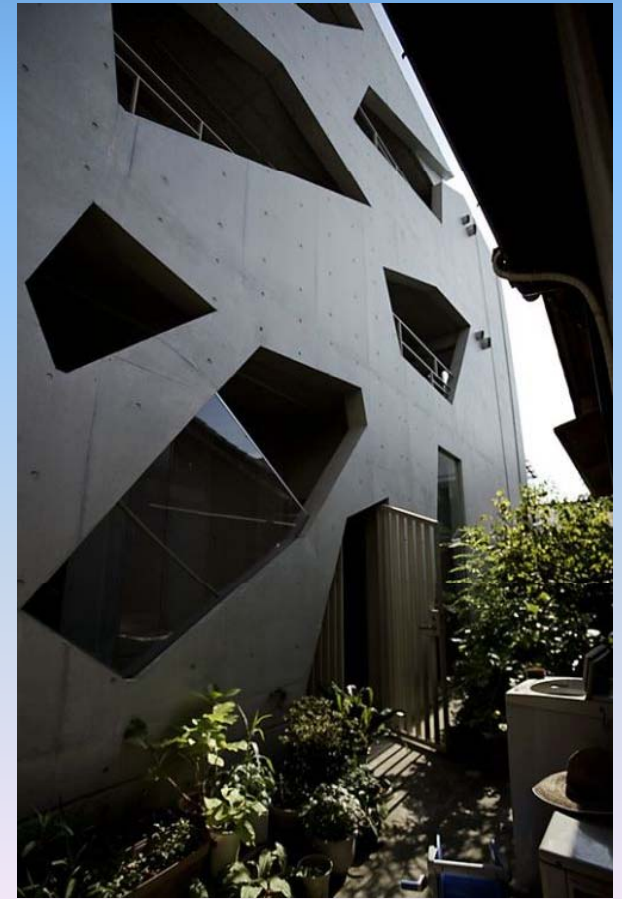
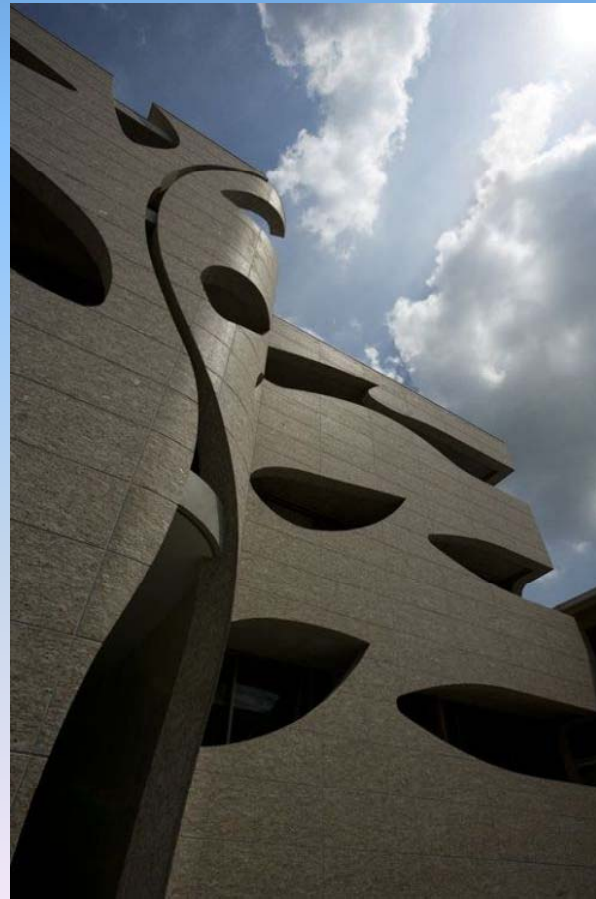




The villa named from the red color granite stone of the gate in a shrine, Tan, and the word meaning being attractive with many colors, Saitan is a revolutionized architecture design in Kyoto, Japan by EASTERN Design Office . It is a villa with 11 units of house but designed to look like a one concealed house in the area surrounded with wall consisting many holes. These holes can be conceived as many different objects, as the clouds, root, or leaves. Whereas the concrete wall of all the houses is with the shape as the nature like sunbeams passing through the crowded trees, and completely covering the houses of the villa.



The design in fact is based upon the idea of how the plants were grown and how the roots expands as the house also known as the immortal tree, with all the curving and nonsymmetrical design to the wall covering the houses and the walls of the houses. There is also not surprising to see some of the twisted design with the holes of the wall. It is because the house was built in an extraordinary place of the area, which was once a site of a palace, the design was also meant to be extraordinary.



The plan floats to the top when it comes to addressing the global issue of rising sea levels. Melting continental glaciers and thawing ice caps may be the problem, but in this design, the water itself becomes part of the solution. Considering the expected loss of habitable terrain and destruction of fertile land by saltwater-saturated ground, the Lilypad is a futuristic alternative. And with the increase in water, there will be no shortage of places to put them.



The Lilypad will include life at all levels: marinas above water, gardens above and below, and a performing arts center actually located underwater. It also steps up to the four challenges given by the Organization for Economic Cooperation and Development: climate, water, health and biodiversity.

Inspired by the Victoria lily pad (only 250 times bigger), you'll be able to float around with 49,999 other people residing on the autonomous eco city. It will run off all-renewable energies, including the sun, wind and tides. Holding pools in the pad's center will collect and filter water. Even cooler, future advancements in sustainable living will likely be incorporated into the Lilypad's inception around the year 2100. The project will give a whole new meaning to hangin' out at the pad.





Grimshaw Architects won prestigious Lubetkin Prize (gave by Royal Institute of British Architects – RIBA) for Southern Cross Station finished last year in Australian city Melbourne. Central huge hall is surrounded by vistas in every direction with entrances from every street, which made space easily obvious. The concept based on a wavy roof, that is a response to a hot climate and at the same time it visually approaches the new docklands to the city centre.



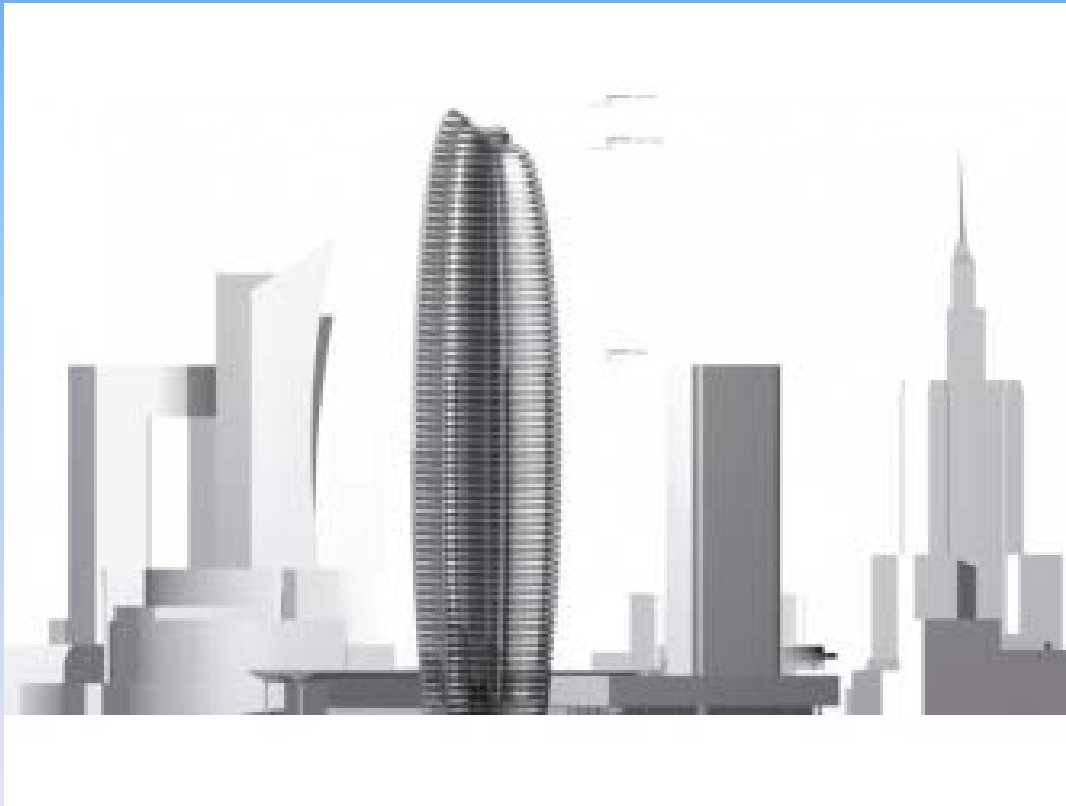
The roof is made of wavy sheets (Sand Dunes) from steel and glass, the main structure is a huge space truss.

The ceiling was made as a huge cloud covering the station and it was designed to be seen like its flying with no support by making the glass skylights between each cloud and the other.

Also the column support was designed as a tree trunk and its color is light and slick to confirm the effect of a support less clouds.



The shape of the tower is aimed to resemble a lily flower in order to commemorate the developer - Lilium. The top floor of the skyscraper will house a spa with the highest located swimming pool in Warsaw. The first underground level will be connected to the Warsaw Central Railway Station underground passage system, Height: 257m, Floors: 71, Architect: Zaha Hadid with Patrick Schumacher



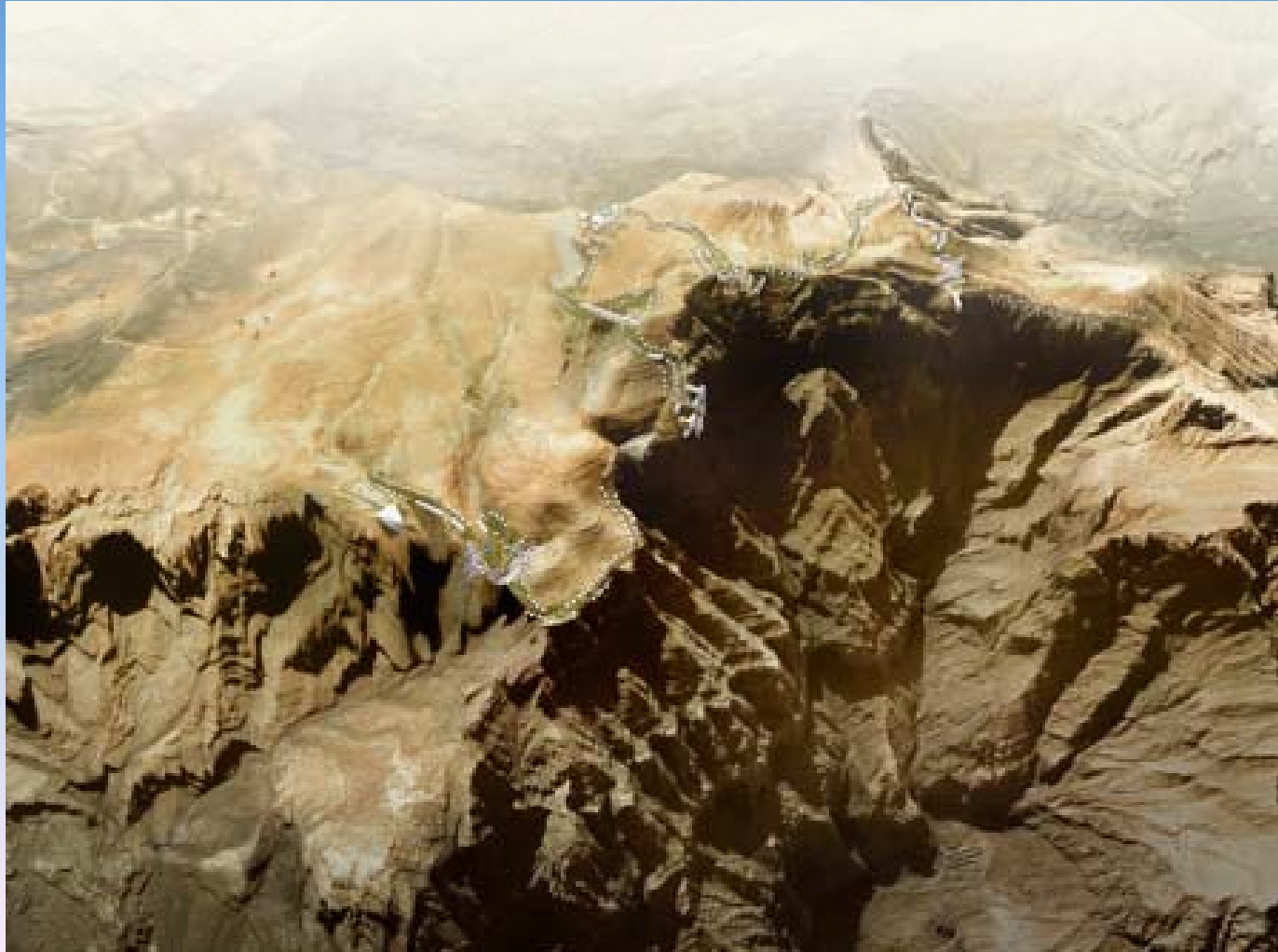
The steel and glass were designed using the cactus proportions, and the skeleton of the project is very clear to the viewers.



Natural Forms Analysis

The Massive Structures (Idea of Cantilevers supporting mechanism)

Rem Koolhaas had created a huge tourist village called Jebel al Jais Mountain Resort, on a mountain in the United Arab Emirates. The concept raised from analyses, that in UAE, the relaxation has become the ubiquitous condition and it has to be attractive. So OMA decided not to convert the nature, as it usual in traditional resort, but to create a place, that exploits true natural condition. They designed a series of modern villas, cantilever and cliff villas, whole vertical city, but also the dam, the bridge. Each part presents divers urban solution and provides various degrees of concentration, density of buildings.





The village is based on the technology of cantilever (a pure structure concept) and is designed through mountains.

The new technology provided solutions for making this project in a way that it would never happened in old days of the beginning of the machine age.

This revolutionary design is integrated with the topography and the structure of the mountains, we can see dams and enormous cantilevers flying from top to top off the mountains.

This project not only provides spaces of business and living, but also there are gardens, parks and big pools flying across the mountains tops.

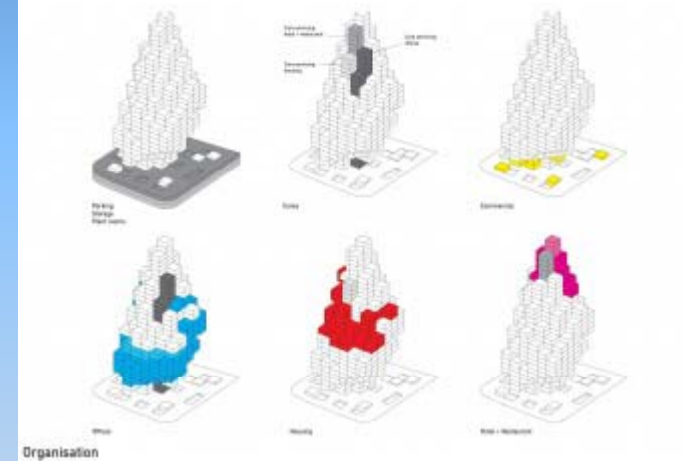
This project brings the again the technology of old simple bridges, like the ones in Florence, Italy.



Winning competition entry for a new skyscraper in Copenhagen, Denmark. The concept comprises different types of uses (Hotel, Office, Retail, Residential). The hotel will be situated on the top. The tower features terraces on all levels. The design of the tower allows daylight to fall deep into the building.

Floor count: **28**, Floor area: **21,700 m²**, Est. Completion: **2011**, Height: **116m**

Architects: **MVRDV**



Observation and Conclusion

This research concluded that the value of the study of nature is not only for its power of inspiration and influence, but also for its abstract geometric properties. If the abstract properties can be described by the mathematical relationship, they can then be developed into a built form. The translation of abstracted nature in conjunction in concrete mathematical terms and by applying prerequisite architectural considerations is the fundamental concept of this form development.

The value of this research is the process of developing mathematically definable models into an architectural form. The process is flexible enough to be adjusted to a variety of parameters according to the specific requirements of each architectural project. The results are a family of architectural forms based on one simple mathematical comprehensive relationship.

And the core purpose of this research is to clarify that Architecture is based on Structural inventions and Structural invention is based on revolutionary technology and the technology is nothing without new materials and techniques.

The old structure concepts like column and beam, space truss or bearing walls are now redefined according to the new concepts of architecture.

Digital architecture now promoted new concepts in structure but related to the old concepts.

Like layers, morphed shells, cells, bearing skins and other structure mechanisms

Observation and Conclusion

building	Shells	Cells	Layers	Skeletons	Cantilevers
Structure Mechanism	Skin of the building	Compression Walls and Ceilings	Ceilings and maybe walls	Point and line supporters	Tension ceilings and walls
Form	Free forms	Geometric forms	Free forms	Free forms	Geometric forms
Skin relativity to the structure	Dependant 100%	Dependant 100%	Independent	Independent	Dependant 100%
Transparency of the skin	Low	Low	Medium	High	Low
Roof sustainability	None	Sustainable	Sustainable	Sustainable	Sustainable

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