



Dynamic Rotating Skyscraper

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Abstract: The Dynamic Architecture project is innovative in design and building sustainability, therefore the project recognizes environmental care and industrial production process as key points in the building of the future. In particular the project is based on three fundamental concepts: It is dynamics because each floor can rotate independently from the others allowing the building to change its shape continuously, it is green because it produces its own energy from the sun and from the wind, it is industrially produced being made of prefabricated modules, then assembled on site. These green buildings based on the sustainability concept will change the skyline of cities not only due to their dynamic shape but mainly as they may finally help us to enjoy nature.

Keywords: Sustainability, Rotating Skyscraper, Prefabricated, Dynamic, Architecture, Time.

I. INTRODUCTION

“The dynamic tower is environmentally friendly and the first building designed to be self-powered with the ability to generate its own electricity, as well as for other nearby buildings, it achieves this feat with wind turbines fitted between each rotating floor. An 80-storey building has up to 79 wind turbines making it a true green power plant”. The dynamic tower is also built entirely from prefabricated parts, reducing costs and the number of workers on site and resulting in a significantly faster construction time. “Each floor of the building can be completed in only 7 days. Buildings are made in factory.” Dr. Fisher said, along with the second tower planned for Moscow, Dr. Fisher also revealed plans for further projects around the globe. “Our intention is to build a third Rotating Skyscraper in New York.”

The Dynamic skyscraper in Dubai has the height of 1,380 feet and 80 floors. Also the apartments ranging in size from 124 square meters complete with a parking space inside the apartment. The ability to generate ten times as much power it uses each floor of Dynamic Architecture's wind-powered rotating skyscraper is a single apartment with the ability to rotate independently, giving residents the ability to choose a new view at the touch of a button—quite a party trick. Wind turbines between each floor generate a vast surplus of electricity capable of powering the whole surrounding neighbourhood. The method of construction is also fascinating; each floor is prefabricated in segments in a quality-control factory before being lifted and secured into place on a concrete spine, bringing cost and construction time down significantly. Dr. David Fisher's is genius in the design of the Dynamic Architecture wind-powered and unique appeal to so many stakeholders. The tower's unique ability for each floor to rotate independently is surely placed in high demand. It is also being tuned as a landmark for the city, catching the sun as it quietly twists like a monolithic Rubik's cube. The wind turbines between each floor make the tower an

environmentally positive construction, generating a large excess of power to put back into the energy grid.

II. THE AIM OF STUDY

Rotating buildings offer invaluable benefits for energy-efficient design. Rotating buildings could make the best use of wind and solar energy. This concept becomes increasingly important since the progressive decrease of the energy resources on earth and the increase in CO₂ emissions together with the rise of energy costs are actual problems in today's world. For that reason the use of alternative energy resources in heating, cooling and lighting buildings has begun to be (or will be in a short period of time) obligatory.

Solar energy, supplying both heat and light, is mostly applied energy resource to achieve these requirements.

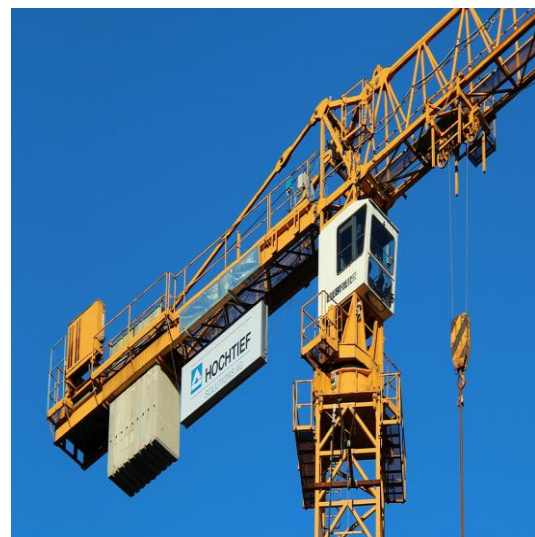


Fig.1.1 rotating crane



Dynamic Architecture = Sustainability.

The Idea of Dynamic Architecture was born with the desire to have buildings that adjust themselves to life, that are part of nature. In fact, in these building, in which each floor rotates separately, change their shape continuously and never look the same. We may call them "Buildings designed by time, shaped by life". Imagine a skyscraper that can revolve according to tenants' needs and whims, allowing them to decide their own light exposition and view. In fact, these buildings are part of nature, inserted in the environment.

During the first phases of design it get understood therefore that they are by nature sustainable buildings. In fact, they become part of environment, they are made of natural materials green as they save energy, but not only as they produce wind energy and what can be more important today then saving our planet?

Architecture seems today as an expression of artistic imagination as most architects are competing in designing buildings that can become iconic due to their particular shapes. Design is of course an important value in our society, it takes care of a part of our life style, but above all we should really care for our quality of life and quality of life has different values. In fact, architects could at the end of the planning process take care also for the harmony of the shapes. But only after they satisfy the previous task, the first commands. Today, instead, most architects exchange their trade concept with sculptures as they make sculptures in the wrong scale.

Buildings are different things as they are the shell around our space and should be therefore satisfying our needs, therefore they should make sense being designed and built, according to a specific list of preferences. Architects believe that the six commands of Architecture are ranking in importance as follows:

1. Economical Feasibility.
2. Functionality.
3. Environmentally sound.
4. Quality & Engineering.
5. Maintenance.
6. Design.

The above are the principals of sustainability. If we follow this formula, if we design according to this order of importance then we have sustainable buildings.

III. CONSTRUCTION

The Rotating Tower of Dubai marks the first real innovation in construction in century. In fact, the rotating tower is first industrial skyscraper ever constructed: 90 percent of the building are prefabricated and assembled on a central core, the only part that is built with traditional reinforced concrete poured on the site. This new way of building, based on rationalizing the construction process, provides significant savings in terms of both time and money. With fewer people on the job site and part of the production totally industrialized, the tower is expected to cost about 23% less than a traditional building.

As the part of construction the building is constructed in two main phases and one is partly the four phases are as follows:

- 1) Construction of central core.
- 2) Prefabrication of floors.
- 3) Assembling of units on site.
- 4) Finishing.

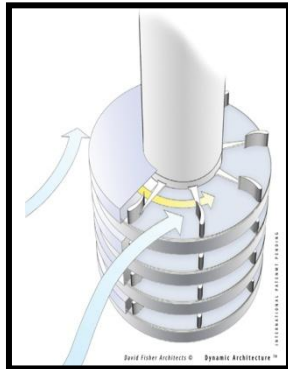
Construction of central core:

The central core is take just six months to be constructed, using slip forms that allow the erection of a floor every two days. This structural solution of massive single concrete core is increase the building's seismic resistance compared to additional skyscraper. In This central core all elevator and staircase are built by traditional concrete reinforced method. Two months after the start of work, the first residential units are complete with all their plumbing, electric, and air-conditioning system.

Prefabrication

The industrial assembly process will mean high quality of finishing that can never be achieved on a construction site, faster construction time and cost savings. Prefabrication is the practice of assembling components of a structure factory or other manufacturing site, and transporting complete assemblies or sub-assemblies to the construction site where the structure is to be located. The term is used to distinguish this process from the more conventional construction practice of transporting the basic materials to the construction site where all assembly is carried out.





Central Core of Da Vinci Tower.

The units are hooked to the core with a sequence of one floor a week, allowing 60 stories building to be built in a record time, saving about 30% over a construction time of a similar skyscraper. These pre-assembled units that make a complete finished floor which is made of a combination of steel, aluminum and fiber carbon.

Advantages

The advantages of using prefabrication in housing are that: prefabricated components speed up construction time, resulting in lower labour cost; prefabrication allows for year-round construction;

Work is not affected by weather delays (related to excessive cold, heat, rain, snow, etc.); the mechanization used in prefabricated construction ensures precise conformity to building code standards and greater quality assurance; there are less wasted materials than in site-built construction;

there is less theft of material/equipment (and less property damage due to vandalism); materials are protected from exposure to the elements during construction; worker safety and comfort level are higher than in site-built construction; computerization of the production process permits a high degree of customization, at an affordable cost; quality control and factory sealing and design can ensure high energy efficiency; and cost savings through prefabrication can reduce the income required to qualify for a high ratio mortgage by up to one third compared to a conventionally built home of the same size.

Disadvantages of Dynamic Rotary Building

Economy

The construction cost of building is very high because of use of special equipments in construction and modern construction techniques i.e. prefabrication. The overall cost of construction of these building is near about US \$355 million (2200cr). But by other way, as it generate huge amount of electricity, it may be beneficial for long term.

Maintenance.

The whole building is in motion excepting central core, hence building units may get affected early which requires frequent Maintenance.

IV. A NEW ERA OF GREEN BUILDING

The Dynamic Tower, the world's first building, which is constantly in motion changing its shape, takes the concept of green buildings to the next level where it is generated electricity for itself as well as other nearby buildings, making it the first skyscraper designed to be self powered. The building generates electricity from wind turbines mounted horizontally between each rotating floor, eighty story building have up to seventy nine wind turbines, making it a true green power plant while traditional vertical wind turbines have some environmental negative impact, including obstruction of views and the need for roads to build and maintain them, the Dynamic Tower's wind turbines are practically invisible and extremely quiet due to their special shape and the carbon fiber material they are made of Another environmentally green element of the Dynamic Tower is the photovoltaic cells that are placed on the roof of each rotating floor to produce solar energy, approximately 20% of each roof is exposed to the sun, so a building that has 80 roofs is equal the roofing space of 10

Equipments

The equipments used in the construction are very special and it is dangerous to handle and rarely obtain. As the equipments are heavy and costlier, hence very skilled supervision is required on site for construction.

Transportation

Great care should be taken while transporting prefabricated units from dedicated industry to actual site to avoid damage to units. The time required for transportation is very much and also it is very difficult to transport.

Worker

As very heavy and special equipments are used during construction and construction is much difficult, Skilled workers should be required during the time of construction

Capacity To Generate Electricity

In this building, 79 wind turbine fitted between each rotating floor as well as solar panel positioned on the roof of the building is produce energy from wind and sunlight, with no risk of pollution. The total energy produced by this inbuilt 'powerhouse' every year is worth approximately 42 cr. the turbine, situated in the space between the floors, have nothing to do with the rotation of the floors. While floor is be the rotate by electric power, the turbines is rotate by wind power and is connected to a single generator, one in each roof.

V. CONCLUSION

Now a days, you are facing the problem of increase in population in the world. Hence daily needs and requirement are also increase and it should be fulfill in such a condition that it must be economical.



The mega structure i.e. Da Vinci tower or dynamic rotating building is constructed in Dubai. This is one of the self efficient economic and commercial green building by considering the point of aesthetic it must glorious structure which rotate continuously and constantly changing the shape and generate the amount of electricity for its own building and around five similar sky scrapers.

If these types of buildings are constructed all over the world it may reduce the problem of today's life like that unavailability of land, electricity etc. these type of building are very costly during the construction but one constructed it may very beneficial along the life span by means of electricity.

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