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Dynamic Building

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Abstract: *Although we live in a Dynamic Universe filled with movement, the design methodology that has been given to Architecture is clearly; static, building look the same all the time. As an approach to "Dynamic Architecture", the design of a building with a changing geometry is examined in an attempt to explore factors that affect the design of these types of building. The 'dynamic' gives the hint to the overall topic. Building is considered to be far more advanced than other buildings or towers. The first ever made rotating building which has a great self power quality (ability to generate its own electricity). Example of the building is in Dubai which is the first made rotating building in the history. More projects are being running to enhance the coming generation about how the world is changing around. The approach of the idea of constructing such an advanced technique was firstly given by architect David Fisher. If more and more projects will be running to it's succeed then one day dynamic tower will change the architectures as we know it. We will be in dynamic living.*

Keywords: Dynamic building, rotating building, dynamic tower.

Introduction:

Dynamic building is the building that rotates in itself producing its own electricity. Each floor of the building rotates separately in a certain interval of time. The electricity generated in it is due to the wind turbine fitted between each rotating floor. Similarly, each floor rotates to create a building that constantly changes shapes, resulting unique structures. Meanwhile dynamic tower is a true green power plant. As all the building work is performed in the workshop and prefabricated portions have been used, this would allow the whole building to be constructed more quickly as compared to other building architectures. The use of prefabricated portions would decrease the construction cost and the number of labors. Dynamic building is certainly has been constructed for the luxury purposes. By the combining motion, and the self electric generating property of the building shows that it is environmental friendly in nature.

Fundamental of Design:

First architectural model was focused on the symmetry since this would facilitate structural efficiency. A concrete core that includes the stairs, elevators, restrooms, as well as the service pipes would be accommodated in the centre of the most symmetrical and architecturally efficient manner. Each and every floor has included with the elevators and which also do connect with the rest of the floors in the same manner that the building has been architect. The rotation of building divides as per the portion in about not more than 6 ft. The complete rotation of the building does take 180 minutes.

The Rotating Tower of Dubai; it is the world's first building in motion. The Rotating Tower style uses the photovoltaic cells and wind turbine technology to gather the enough energy to power itself. This Tower is 380 feet tall with 80 floors; every floor varies from one another.

Methodology:

- First methodology: The first methodology of dynamic building is related to the shape of the building, which changes continuously. Each floor can rotate separately, changing every second the shape of the building. You can therefore with the sun rising into your bedroom and enjoy the sunset over the ocean at dinner time. The Rotating building takes on shapes imposed by time, never appearing the same in any two given moments.

- Second methodology: The second technical method is that the Dynamic building brings is the method of construction. Construction is totally based on fabrication. It is in the fact that the first building produced in a factory, giving construction a new industrial approach. The entire building aside from the concrete core is made of prefabricated units which arrive to the construction site completely finished, including flooring, water piping, air conditioning and all

finishes. These units, made of steel, aluminum, carbon finishing and other high quality modern materials, are installed offering luxury finishing, and very fast construction time, usage of limited number of workers, thus reducing site risks and enabling cost savings. The building, made of single separate floors, is structurally sound and flexible at the same time, being of very high seismic resistance.

- Third methodology: The third method of construction involves the combining technology and luxury with environment. The building's wind turbines, positioned horizontally between each floor and solar panels on its many roofs will produce energy making the tower the first self-powered building. Thus the Rotating Tower, a unique architectural solution, becomes also a "green power plant" producing green energy for the city.

Assumption in Dynamic Building:

1. Because of changing of geometry of the building due to rotation of the different floors, assumption can be made in the structural analysis that the changing geometry drastically changes the dynamic behavior of the building.
2. The changing geometry doesn't changes the dynamic behavior of the building at the point of assumption.
3. Rotation of every floor will significantly charge the period of the structure, because stiffness of the elements and the moment of inertia are dependent to the orientation of the element. The orientation of rotational part will be critical in case an earthquake hit building, since force elements could be amplified.
4. Since all the masses are supported in the bearings, the orientation is not critical as all the masses would act as the lump in the centroid. Orientation of structure would not be affected by period of whole building.
5. The rotation speed is very slow due to the allowance of quasi-static approach in the analysis. A whole different approach would be made if the rotation would be faster, but in respect with people it would not be feasible or desirable. The structure that will rotate fast would be scary for the people.

Advantages of Dynamic Building:

Dynamic buildings have many advantages over traditional buildings.

- Construction would be much quicker, resulting in the time saving of around 30% in the similar sized traditional towers
- Workers needed less in numbers in the site work, because all the workers are utilized in the factory work
- Bigger, most stunning and luxury than the traditional buildings. Independently rotating floor, giving residents the ability to choose a new view at the touch of button
- Each modular apartment can be easily customized to the buyer's desires, and every small component can be finished and quality assessed
- Elimination of rewinding
- No wrapping fibers
- Optically good mass evenness
- Low end breakage rates
- Smooth yarn appearance

Disadvantages of Dynamic Building:

- Low yarn strength
- High tendency to twist
- Difficult in keeping the spinning conditions constant
- High air consumption
- Increasing imperfection in increasing the spinning speed

Conclusion:

The design of Dynamic building faces many challenges due to the changing geometrics of the structure. We can address some of the most critical aspects that have to be considered in the design of different types of dynamic structures.

It is an interesting piece of Architecture that undoubtedly catches the human attention. It was demonstrated that the rotation of the structures don't change the stiffness of the whole building, maintaining a similar dynamic behavior and simplifying the design considerations from a seismic approach.

The design has some challenges, such as assessing the most appropriate distributions, whether in stiffness or damping, that would avoid a coupling of translational and rotational modes. An interesting design strategy would be the implementation of a tuned mass damper, acknowledging that we have an enormous

techniques used in the building. The rang of displacement of the mass for this tuned mass dumper would be so big that it could efficiently counter balance the motion of the building using a small mass.

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