

## CHAIR BASED ON TENSEGRITY

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### ABSTRACT

Based on the present modern furniture and the product semantics of the products, there was a rapid change in the present furniture due to the new technologies. The change in the urbanization and the present civilization, the new concept of the Tensegrity came into existence. Tensegrity is a structural design principle that applies to a structure which can be stabilized entirely by internal pre-stress. This pre-stress is created by a discontinuous set of compression elements being opposed and balanced by a continuous tensile force. This combination of balanced parts produces associate exceptionally rigid structure created of members that don't expertise bending moments. The objective of the present paper is to describe the applications of tensegrity structures in Interior Designing.

**KEYWORDS:** Tensegrity, Resistance and durability of Structure.

### INTRODUCTION

Tensegrity derives from the words “tension” and “integrity” and it means that integrity of those category of structures depends on the balance of tension inside it. All structures in the universe are supported by a balance i.e. between tension and compression, between “push” and “pull” such as the chair sits on the floor and the lamp hangs from the ceiling, the ways to support something there are Shear Force, bending moment and different forces are simply mixtures of basic tension and compression.

The tensegrity is mainly works on the concept of Tensile stress and the integrity of the structure or the product, to be design. The term was coined by Richard Buckminster Fuller within the 1960's as a portmanteau of "tensional integrity". The other denomination of tensegrity, floating compression, was used chiefly by Kenneth Snelson.

Members (Columns and Beams) are loaded only in pure compression or pure tension, and will fail only if cables yield or rods buckle.

### TENSEGRITY BEHAVIOUR:

The behaviour of the tensegrity is that it acts only to the compressive forces acting on it towards the top, but it mainly acts as a tensile force on the structures.

Tensegrity is a developing and relatively new system (barely more than 50 years old) which creates amazing, lightweight and adaptable figures, giving the impression of a cluster of struts floating in the air. It is not a normally noted kind of structure, so knowledge of its mechanism and physical principles is not very widespread among architects and engineers. However, one in every of the foremost curious and peculiar aspects of tensegrity is its origin; arguing and polemic can continually be gift once contestation concerning its discovery.

### MATERIALS

Although they were made of rope and wood, and their load-bearing capacity was incapable of supporting heavy loads, they were probably the first system that took advantage of tensile properties of materials. The development of steels and alternative alloys junction rectifier to unheralded outcomes in terms of resistance, weight and performances of materials, which enabled engineers and architects to create new designs and new structural concepts.

It has the tendency to augment its cross-section (due to Poisson's ratio effect) and to buckle, which means it loses its straight shape. On the contrary, when the same element is tensioned in the same direction, it tends to become thinner and, more importantly, it "reaffirms" its straight axe.

## OBJECTIVES

The main objectives of the present Study is about the

- ✓ To well design a tensegrity chair model with all the possibilities.
- ✓ To make a design more unique and comfortable.
- ✓ To make a proper adjustment and resistance for the components in the design.
- ✓ To design a product in a semantic order

## PROPOSED METHODOLOGY

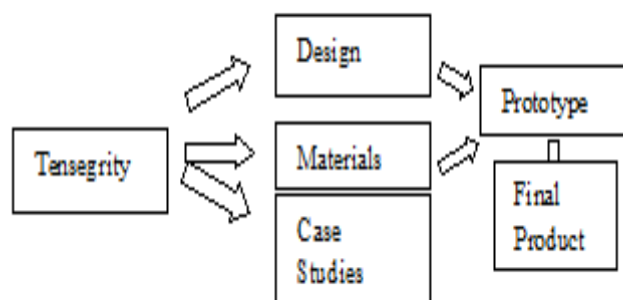
The methodology for the Chair based on Tensegrity is that it work as a tensile structure rather than the compressive nature. The materials of the chair used are of Aluminium pipes of hollow shaped of less than 1" and the wires for the joining of members.

The model for the Tensegrity chair is made with the ordinary size of the chair which is been used for the sitting purpose and even the relaxing of the body with the present ergonomical way of design for the proper behaviour of the tensegrity.

Each module of the structure is assembled independently. Modules are connected later to create the final structure. The two cable layers of each module are composed first. Cables are linked to form the equilateral triangles and the six isosceles; lateral cables are also added.

The struts are then introduced, beginning with the 3 struts and therefore the central joint, which form the bottom pyramid. Attaching a weight to the central joint stiffens the pyramid. After that, the three upper struts are mounted. At this stage, the form of the module is still undetermined. Stiffness is added by lengthening the telescopic struts stepwise. Once these compression members have introduced the minimal amount of self stress required, thus determining the form, the mounting weight may be got rid of from the central joint.

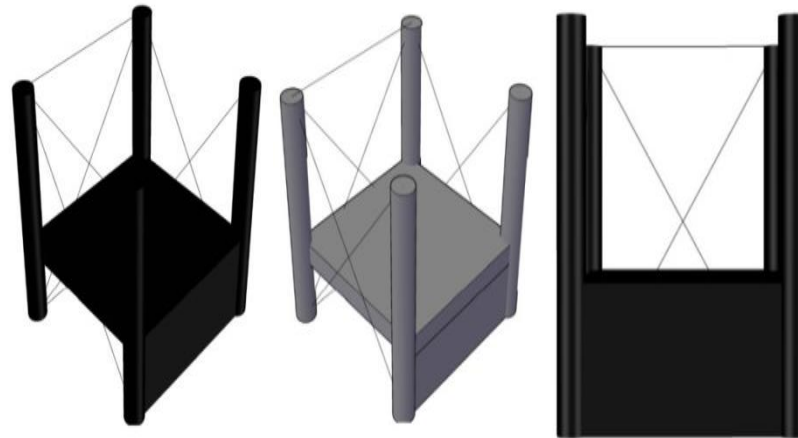
## BLOCK DIAGRAM



The prototype of each view of the model is shown in the figure below

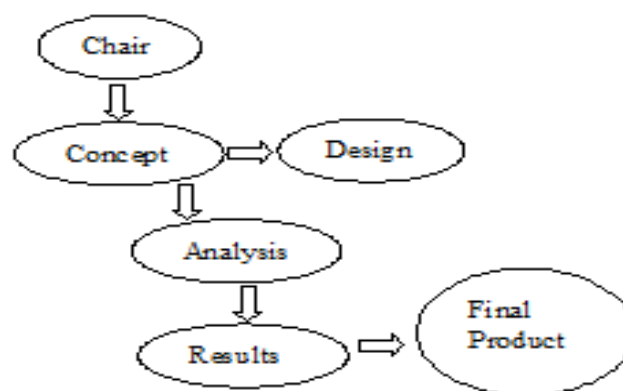


The Structure is made up of 4 metal rods with the elastic cables spreading on it in the figure shown below



The Structure of the Chair with the concept of Tensegrity is been formed the chair can withstand the man weight and also the additional load on it.

### FLOW CHART



### RESULT AND DISCUSSIONS

The result of the Tensegrity chair is been provided by the working efficiency of the Structure.

- ✓ The length of 1.5 mt height can carry a weight of 45-50 kgs
- ✓ The length of 1.75 mts height can carry weight of 50-60 kgs.
- ✓ The length of 2mts height can carry weight of 60-70 kgs.
- ✓ It is designed according to the conditions related to the designing of the furniture and w.r.t the other materials.

### CONCLUSION

The present study concludes that it gives the comfortable seating with the ergonomically aspects of the design. It gives the good resistance of the structure and the perfect comfortable design for the adjustments of the components of the design.

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