

Coconut Tree Climber: Case Study

#1 D.A.Patil , #2 Naikwadi Priti Vijay , #3 Shinde Nikita Somnath , #4 Hiwale Chanchal Sharad , #5 Shaikh Tamanna Sikandar

#1 Sr. lecturer, #2 Student, #3 Student, #4 Student, #5 Student,
Mechanical Engineering, Sanjivani K.B.P.Polytechnic, Kopargaon, MS,

#1 dapatilme@sanjivani.org.in, #2 naikwadipriti28@gmail.com,

#3 shindesomnath828@gmail.com #4 Hiwalechanchal6@gmail.com,

#5 tamannashaikh569@gmail.com

Abstract –

We are developed agriculture new RND mechanical project. This project provides farmer coconut tree climbing solution. Shortly explanation of each part as follow. Primary goal of the project is to design a coconut tree climbing device for farmers and residents. It is very difficult to climb on coconut tree manually due to the constant cylindrical structure and single stem. In other type of trees there will be branches for holding and to support the climber. A professional climber with proper training only be able to climb coconut tree. Due to the risk involved, nowadays a very few are coming forward to climb on coconut trees. Most of them hesitate. Agricultural workers employed for coconut tree climbing suffer musculoskeletal disorders than any other type of injury or illness. As the educational background of Indian youth is increasing, most of the people may hesitate to come in climbing profession. Considering this scenario, a device which helps the user to climb coconut tree easily will be useful for those having coconut cultivation as well as residents who is having less coconut trees. In this project, we aim to design a mechanism which is simple and easy to operate.

I. Introduction –

In olden days most of the activities were done manually. Gradually so many big and small equipment were developed to ease human activities, thus to lessen the human efforts to do the things. Nowadays most of the activities which included human efforts were either replaced or automated by the use of machines or other kind of equipment. India is the third largest producer of coconut in the world. Coconut is grown in an area of about 18.7 million hectares with a productivity of 5718 nuts per hectare in India (National Horticulture Board, 2011). Usually all over the country, farmers practice conventional harvesting method in which coconuts are picked by specially trained, skillful and experienced climbers. Due to the height and lack of branches, it is very difficult to climb coconut trees. A professional climber with proper training only could climb coconut tree. Due to the risk involved, nowadays very few are coming forward to climb coconut trees. Due to the lack of professional climbers, the existing professionals may charge more from the owners. Many young men now avoid coconut-picking in favors of white collar jobs, meaning there is no longer a guaranteed labor force.

Coconut Tree climbers are a rarity these days. The scarcity of labor disrupts harvesting cycles causing loss of income to the growers. As against the

general norm of harvesting cycles of 45-60 days, farmers are currently able to harvest only once in three to four months. Considering this scenario, a device which helps the user to climb coconut tree easily will be useful for those having coconut cultivation as well as residents who is having less coconut trees. This kind of devices will encourage more people to come forward to the agricultural sector.

II. Methodology –

The first step was the collection and study of various data regarding the design and mechanism of the new product. Next step was to design the model using Solid Works 14. Then static load analysis of the model was done using AUTOCAD . In the static load analysis, total deformation and maximum stress induced were determined. Then we moved on to the fabrication part. Selection of material was the first step for fabrication. For fabrication, MS steel was used as the material because of its high strength, weld ability, availability and low cost. The next step was the selection of suitable powering device for the gripping and vertical motion of the mechanism.

III. Material used –

1) Chain system:

This chain are typically made using material that balance strength, durability, and resistance to were and corrosion, its having high load caring capacity.

Primary material used for chain is steel or high carbon or high alloy steel

Titanium used to reduce the weight while maintaining strength

• Benefits of chain in project

- 1)High strength
- 2)Durability

3)Cost effective

4)Compact and light weight

5) load capacity

6)Easy to repair and replacement

2) pipe:

Specifications of Mild Steel Pipe for Coconut Tree Climber:

- **Material:** Mild Steel (Low Carbon Steel) – This material is easy to weld, strong, and resistant to corrosion when properly treated (e.g., galvanizing).
- **Pipe Diameter:** Typically, the diameter ranges from 1 inch to 2 inches, depending on the design and the weight-bearing requirements. This ensures the structure is robust enough to hold the climber's weight.
- **Wall Thickness:** Mild steel pipes used for tree climbers generally have a wall thickness ranging from 1.2 mm to 3 mm. A thicker wall provides additional strength.
- **Length:** The length of the steel pipes varies according to the climber design. They might be cut into shorter lengths for different parts of the climber or remain long for the main structure.
- **Weight Capacity:** The strength of mild steel makes the climber capable of supporting the weight of a person (usually up to 100–150 kg), allowing safe climbing.
 - **Finish:** To prevent corrosion, the pipes may be galvanized or coated with anti-rust paint. This is important when used outdoors, where they are exposed to the elements.

Uses of Mild Steel Pipes in Coconut Tree Climbers:

- **Frame Construction:** The pipes form the structural frame of the tree climber, which is designed to be lightweight but sturdy. This frame allows the climber to ascend the tree trunk while maintaining balance and stability.
- **Ladders and Steps:** Mild steel pipes can be bent or shaped to form the ladder-like steps on which the user can step while climbing. These steps are typically spaced evenly along the length of the pipe.
- **Support and Safety Bars:** Additional pipes may be incorporated as handrails or safety supports to ensure the user remains balanced and secure while climbing.
- **Weight Distribution:** Due to the strong tensile properties of mild steel, it helps in distributing the weight of the person climbing, ensuring safety and reducing the risk of breakage.

3) sitting system:

The use of a bicycle seat in coconut tree climbing is a creative and practical innovation that enhances the efficiency and safety of the climber. Here are the key benefits:

- **Improved Comfort:** The bicycle seat provides better support compared to traditional climbing methods, reducing strain on the climber's body, especially the lower back and thighs. This makes it more comfortable for longer climbing sessions.
- **Increased Stability:** The seat helps the climber maintain a stable and balanced position while ascending and descending the tree. This stability makes it easier to work without the risk of losing grip or balance.
- **Reduced Fatigue:** By allowing the climber to rest their weight on the seat, it helps to conserve energy. This can be particularly important when climbing tall coconut trees,

where the process can take a considerable amount of time.

- **Enhanced Safety:** The seat provides additional support, reducing the likelihood of accidents caused by losing balance or footing. It gives climbers a more secure grip and posture when they are on the tree.
- **Better Efficiency:** With the support of the seat, climbers can focus on the task at hand (such as harvesting coconuts or trimming branches) without having to constantly adjust their position, leading to more efficient work.
- **Hands-Free Operation:** Since the climber is seated, their hands are free to handle tools or coconuts, making the climbing process more productive.

4) Locking nut :

- **Increased Safety:**

Locking nuts ensure that parts stay securely fastened, reducing the risk of equipment failure while climbing. This is crucial for the safety of the climber.

- **Prevents Loosening:**

The primary function of a locking nut is to prevent components from loosening due to vibrations or movements, ensuring that the climber remains stable and functional throughout use.

- **Enhanced Durability:**

Locking nuts are more resistant to wear and tear, leading to longer-lasting equipment. This reduces the need for frequent repairs or replacements.

- **Low Maintenance:**

Once properly tightened, locking nuts require less frequent checks and adjustments, saving time and effort in maintaining the equipment.

2) Design material



Figure 1 : coconut tree climber

(Source: www.irjet.net)

3) Conclusion

The proper guidance of project head and the sincere efforts of our group have led to the successfully accomplishment of our concerned projects. *Agriculture system* was interesting to work on and was also gained in this project work. This knowledge of project will definitely be helpful in our future. we must maintain that this final year project was an essential part of our engineering education enhancing our technical knowledge and practical skills aim was to lift the maximum weight in minimum power consumption as to reduce the human effort. hence we are provided our aim by design a suitable chain to get

maximum mechanical advantages due to the maximum torque required to lift the load is not coming directly on the force shaft as we had seen it in the design .so at the end shaft the speed is reduced which we are required & sufficient torque is increase to lift the load.

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