

# Automation in Tree Clamping

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**Abstract**— The aim of this project is to minimize the work and reduce the danger encountered during cutting the branches of the tree. This project aims at building an assembly which can cut the branches of the side road trees which under normal conditions grow to a longer branch. The longer branches have the risk of breaking and may fall on the people driving the vehicles. This project uses a clamping device to get fixed on the trunk and a cutter to cut the branches of the tree. The whole project is concerned with using proper assembly and mechanism to get the whole work done.

**Keywords**— Branch Cutting, Cutting assembly, Cutter, Base, Height Adjustment Base, Clamping Device,

## INTRODUCTION

The project focuses on cutting the branches of the road side trees using automation in tree clamping for providing fixed support on the trunk of the tree. The road side trees are dangerous mostly in rainy season. So there is a risk of falling the branches of the trees. In most of the cases instead of cutting the branches of the tree people cut the whole tree to avoid any future disturbance. This creates an adverse effect on the environment. Our project focuses on doing the whole work with minimum man power required, minimum risk and minimum time. Similarly in case of fruit bearing tree some branches of trees become dead due to some reasons. So if we carry out pruning operation on these branches i.e. cutting of the dead branches of fruit bearing trees to enhance the strength of wood and improve light environment and healthy growth of trees it means increasing the fruit gaining efficiency.

Cutting the whole tree instead of cutting the branches of the tree is not a smarter thing to do. Another point is that cutting the branches of the tree includes high amount of risk of climbing and holding the tree branch during cutting. There is another risk of falling the branches of the tree on the people standing besides the tree.

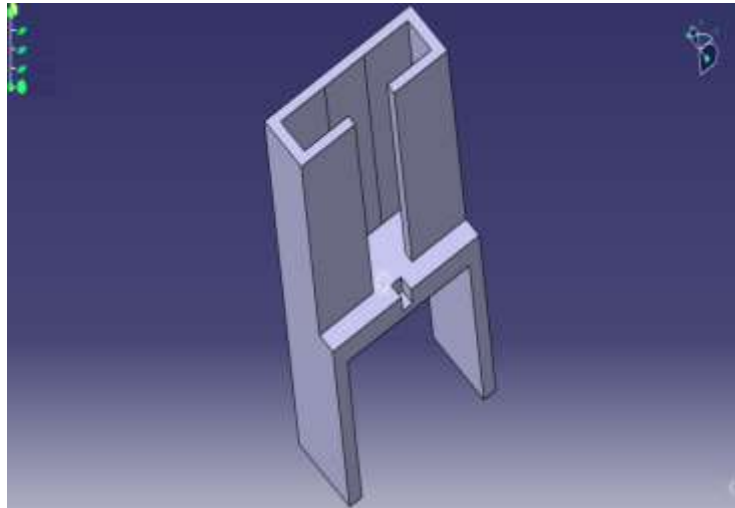
So by considering all the risk of cutting a branch and importance of tree we have designed an assembly which consists of clamping device which plays the role of holding a trunk and provide support to the cutting operation, a height adjustment base which is based on scissors mechanism helps to move up the cutter assembly and a rotary cutter which cuts the branches of tree.

## ● CONSTRUCTIONAL DETAILS



*Fig 2. Proposed model*

## BASE/BODY



*Fig 3. Proposed base*

It is the lowermost portion of the assembly. It is the portion upon which whole assembly will be mounted. The base can be provided with wheels in order to move the assembly. The base is also provided with dampers which will be fixed under the ground and will provide a strong base and will also reduce the vibrations. The dampers can be seen in heavy earth moving vehicles like excavator.

## CLAMPING DEVICE



*Fig 4. Clamping device*

It is the fixing device of the assembly. The whole assembly will be fixed on to the trunk with the help of this device. The clamping device arrangement is made on the base. This clamping device will hold the trunk of the tree and will provide the necessary support in order to reduce the vibrations.

The gripping diameter of the clamp can be varied according to the size of the trunk. Various types of clamp are available in market that can be operated mechanically and pneumatically. For higher power requirements pneumatic clamp can be

## HEIGHT ADJUSTMENT BASE

The vertical movement of the cutter is provided by this component. This component will give the necessary height required to cut the branches. Various mechanism can be used to give the height adjustment. In our prototype model we are using rack and pinion arrangement to give the required height. In actual model we can use hydraulics or a scissor mechanism to give the required height.



*Fig 5. Height adjustment base*

## ROTARY CUTTER BASE



*Fig 6. Rotary cutter base*

The horizontal movement of the cutter is provided by this component. This component will give the feeding movement of the cutter required to give the depth of the cut and will provide the required force to cut the branch.

## CUTTER



*Fig 7. Cutter*

The cutting operation will be performed by the cutter. The cutter can be circular cutter or chain saw cutter. In our prototype model we are using circular one. Different types of cutter are used for different types of wood as shown in the following figure

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## CONCLUSION

1] It is very difficult to cut the branch of a tree without any support on trunk. So for that we have made a clamping device which holds the trunk of a tree. This clamping device was made by using DC motor and link. Here we have also used lead screw operated by hydraulic and actuator.

2] Our second motive is to eliminate the use of man power during cutting operation. The problem is overcome by using automatically operated branch cutter which is operated by a single person by keeping a distance from cutting site.

3] As there is a problem to move a cutter up to the location of branch. So this is done by using hydraulics in actual model or by using scissors mechanism.

4] The another task is to cut the branch and this was done by using a cutter which is rotated at a certain angle so it is possible to cut the branch located at any side. Here in actual practice we make a sliding base so that it can cut the branch at any required length.

5] Another problem is that the cutting force is different for different trees. So we made a removable cutter so that according to requirement we may change the cutter.

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