

Design of Shoulder Strapped Grass Cutter

[¹] Asim Beg, [²] Nandan Gupta, [³] Puneet Verma, [⁴] Md. Latif Khan, [⁵] Kushal Saxena

[¹] [²] [³] [⁴] U.G.Students Department of Mechanical Engineering, Rajkiya Engineering College, Uttar Pradesh, India.

[⁵] Assistant Professor Department of Mechanical Engineering, Rajkiya Engineering College, Uttar Pradesh, India.

Corresponding Author Email: [¹] asimbeg1199@gmail.com, [²] nandangupta43@gmail.com,
[³] puneetverma0911@gmail.com, [⁴] khanmdlatif14@gmail.com, [⁵] saxenakushal05@gmail.com

Abstract— *Shoulder strapped grass cutting machine is being used in cutting grass, cleaning forest, gardening and maintenance of playground. Studies shows that during operating this machine the operator suffers a lot of pain in neck, shoulder, arm, wrist and fingers. Also the cutter blade is often damaged due to hindrance such as stones, bricks etc. coming in the path. Hence, we modified the design of the machine by replacing the shoulder strap by a push carrier to wear machine weight and reduce vibrations, adjust the height of cut for effective operation and ease of control. We also provided a casing to the blade for its protection from hindrances. Results after performance evaluation shows that the modification in machine was ergonomically acceptable and user friendly.*

I. INTRODUCTION

The elegant value of environment is a important factor in modern society. Grass cutting plays a major role in decoration of gardens, playgrounds, lawns etc. In early times for cutting grass people used sickles, scabbards etc. With advancement in science and technology various new technique evolved in market .these machines replace the sickles ,scabbard etc because it require less time, function smoothly also easy to operate. Different Types of machine are developed of various various purposes such as trimming of hedge ,cutting of shrubs ,lawn mowing. Brush cutter machine is also one of these type of machine which are available in the market.

Brush cutters are being widely used for cutting grass, heavy brushes ,over grown vegetation easily. The performance characteristics of brush cutter is validation for its growing and continuous utilization in agriculture ,playground and horticulture operation. It is less costly and easy to operate hence people are interested in this product, that's why demand of this product in the market is very high. Despite of these [2] standards ,there are deviation from ideal situation often experienced from the use of such products like risk of hand arm vibration, pain in shoulders and arm has been reported . Blade failure due to impact of solid materials is also one of the major drawback of this product . Muscle stress and neuro [3] disorder is caused due to the existing shoulder strap and handle design and also bearing load of the machine is very uncomfortable.

Hence we tried to modify the design of the machine by putting the load of the machine on a platform which is supported by spring and wheel, so that the vibrations in operation of the machine [5] can be minimized . We also provided a casing to the blade for its safety from stones and uneven ground.

Some of the researchers worked on this machine already such as- Ms. Lanka Priyanka designed grass cutting machine with tapered blade attached to grass cutter . The grass cutter

operates manually. Materials used in this machine are wheel, motor, wire, aluminium sheet.

C.B.MILLS improved the mower version by low emission gasoline with catalytic converter to help reduce air pollution.

Thomas green and [1] sons introduced a mower which used a chain drive to transmit power from roller to cutting cylinder but they were slightly more expensive.

Edwin beared budding enabled the cutting of grass by introducing a mechanism that could be mounted in a wheel frame to make blades rotate close to surface.

II. METHODOLOGY

During operating of grass cutting machine in our college, we saw that machine is operated manually when whole weight of machine is concentrated on the shoulder of operator ,due to which he got tired quickly ,also suffer from a lot of pain and stress in whole body mainly in arms ,finger and shoulder. The blade of machine broke when it come in contact with solid obstacle like stone. Hence we decided to modify the design by putting [4] the weight of machine on a platform supported by a frame connected with wheels and the handle of the machine is also connected to the frame to rotate the machine. Wired casing is provided for the safety of the blade from stone.

The machine consists of driving shaft which transmits power, two stroke petrol engine , rotary blade connected to the shaft ,and a handle for controlling the motion, casing of the cutting blade.

Table 1: Components of the machine.

Features	Specifications
Handle	Handle bars on each side
Engine	Two stroke petrol engine
Driving shaft length	1500mm
Blade diameter	420mm
Rpm	6500rpm
Casing	Wired casing
Wheels	2 trolley wheels
Cutting tool	Nylon head/metal blade

International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE)

Vol 9, Issue 7, July 2022

While operation to prevent the direct contact of machine with the body leather straps are provided ,with the help of which the machine is hung on the shoulders .leather straps also helps to reduce the amount of heat generated by the two stroke engine from reaching the body. While operation the operator swings the cutter head within the radius of full arm in both directions to cut grasses.

III. MACHINE MODIFICATION RESULT

- (1) By shifting the heavy weight machine from the shoulder of operator to a platform on which engine is connected by a frame cause relaxation to operator from stress and problem .
- (2) By shifting the machine on platform effect of vibration on the operator is also minimized.
- (3) Since frame is connected to a movable wheel whose movement is controlled by handle results in easy operation of machine.
- (4) The handle position can be modified and made flexible to accommodate different height of operator.
- (5) Blade damage is minimized by providing casing to the blades.

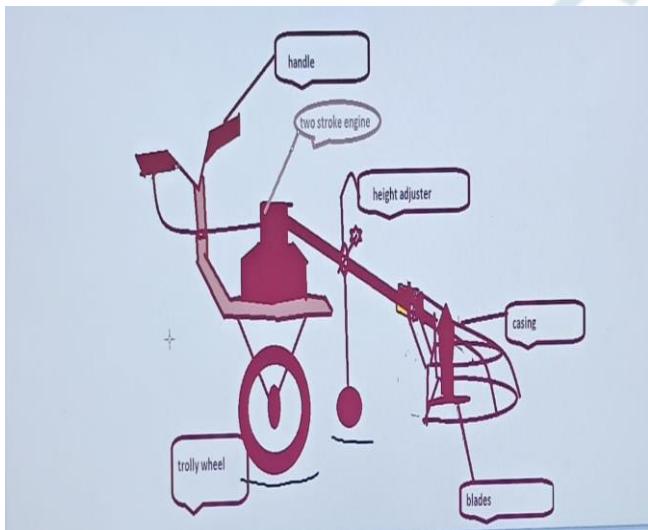


Figure 1. Schematic diagram of modified machine

Machine consists of two major units: The machine and carrier.

Machine includes a two stroke engine, rotatory blade , transmission shaft and carrier includes roller wheel and handle .

Handle:

Handle contains two arms which is connected to the frame and it controls the motion of the wheels.

Transmission shaft:

The shaft length was adjusted from 500mm to 1200mm to accommodate the frame and handle .

Height adjuster:

The height can be adjusted by providing spinning roller through which shaft is attached.

IV. CONCLUSION

- (1) Operator can operate for minimum one and half hour.
- (2) By providing height adjustment, height of cut can be regulated, it also reduce transmission shaft length and provide adjustment to handle orientation.
- (3) The problem of operator like pain in neck, shoulder, upper arm and finger by shoulder strapped grass cutter can be resolved.

REFERENCES

- [1] Bello RS, Baruva A, Orisamuco F, (2015). Development and Performance Evaluation of a prototype Electrically Powered Brush Cutter, International letters of Chemistry, physics and Astronomy, Vol. 58, pp. 26-32, sep. 2015. doi:10.18052/www.scipress.com/ILCPA.58.26
- [2] Wang N K, Mao Y B, Zhao P, (2006). "Modern Garden Machinery", Beijing: China Forestry Publishing, pp.122-125
- [3] Yadav, R. L. P, Gite, N. K, and Randhawa, J. 2000. An anthropometric of India female Agricultural workers. Agricultural Mechanization in Asia, Africa and Latin America, 31(3); 56-60.
- [4] Agrawal, KN, Singh, KP, and Satapathy, KK, (2010). "Anthropometric consideration for farm design for ribald workers of north eastern India". Agric Engineering Int. CIGR Journal.12(1):143-150.
- [5] Reidel S., 1995. Consideration of grip and push forces for the assessment of vibration exposure. Cent Eur J Public Health. 3:139-41