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Design and Analysis of a Dozer Blade

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ABSTRACT

The principle motivation behind the work is to design a Dozer Blade. Dozer blade is a metal plate which is generally used in Bulldozer for pushing large quantity of sand, soil and other materials. Numerous designed have been designed to fulfill the requirement of the modern era. The dozer blade can be designed into many ways according to their utilization on the site. A novel design of a dozer blade has been created with SOLIDWORKS. Mainly the design outlines takes into account the fundamental features, such as basic structure, components and mechanical specifications. Kinematic as well as Dynamic Analysis had to be done by finite Element Analysis on the software.

Keywords: Dozer blade, Bulldozer

INTRODUCTION

A dozer blade is a big metal plate used in Bulldozer for pushing objects. A bulldozer is a type of tractor, usually wheeled or tracked chassis, mostly on tracks, that has a front-mounted dozer blade connected to the end of two arms(booms). It is used to shovel soil, sand and debris. Dozer blade usually designed in three variant: S blade, U Blade and S-U combination. Cutting blade can be attached with the dozer blade at an angle for cutting tree stumps. It can also be used to clear antitank obstacles, mines and dig shelters for military when blade is attached with the main battle tanks.

Most Effective ways of moving material is a task of great importance, today as well as through history. In many processes it is often require the moving of large amounts of soil, dirt, gravel, rocks for land clearing. It takes much time and cost consuming but inspite of this it is very important. The cost of process can be decreased by decreasing the time of task. For this purpose we are designing the dozer blade and analyse that by using finite element method on the software.

Conceptual Study

To generate a realistic design from the basic idea, draw a rough sketch of Dozer blade. Rough sketch give a basic idea of our thinking. The design of dozer blade has been obtained by using SOLIDWORKS. The simple dozer blade can be designed in a single component. The complex design is made up of different component and each component has its movement respective to the other component.

Fig 1 DOZER BLADE

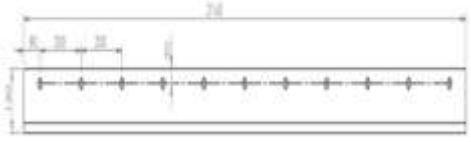


Fig 2 CUTTING BLADE

Assemble all the components with each other. Check out the motion of the component in the assembled body. Merge all the unnecessary points in the assembly, only moving parts are free to move with respective to the component. The model is ready to be imported for analysis section. In analysis all the model is meshed up and analysis is done on different parameters.

Analytical Study

The model was developed in the SOLIDWORKS. Finite element analyses are used in design improvement and optimization purpose for all components. In this design main focus is on the dozer blade land clearing capacity. Dozer blade is used for many operations and for different material. Materials have different density so we are increasing the material handling capacity in all the formats. To achieve this, analyses of dozer blade parts are essential under maximum loads and different loading conditions. In SOLIDWORKS stress at each and every element are determined. Analysis displays the components with a colour contours. Results generated from FEA are shown as below.

Stress Analysis

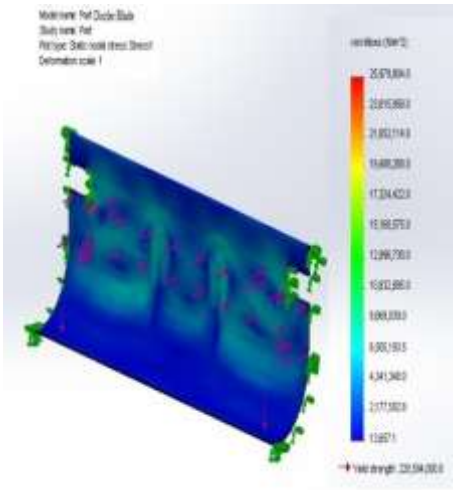


Fig 3 Dozer blade stress analysis

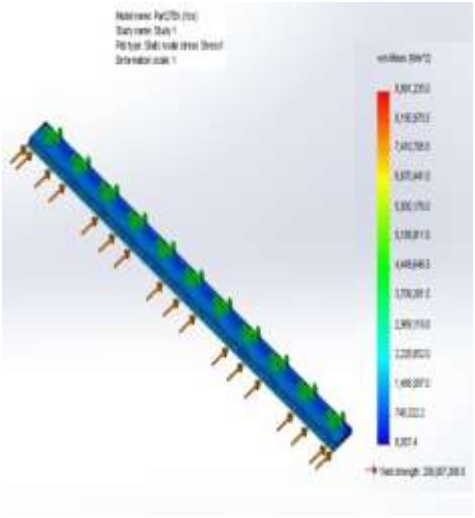


Fig 4 Cutting Blade Stress analysis

Strain Analysis

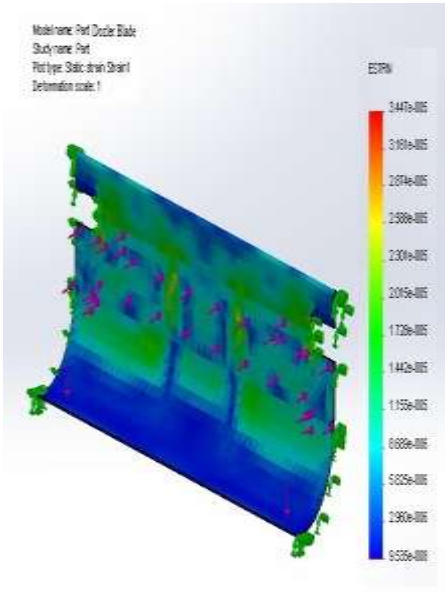


Fig 5 Dozer Blade strain analysis

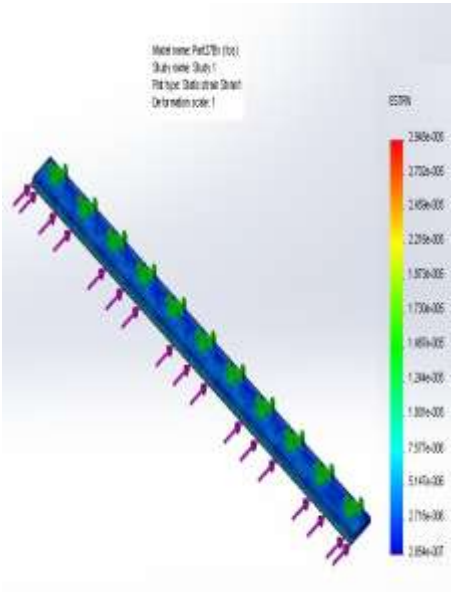
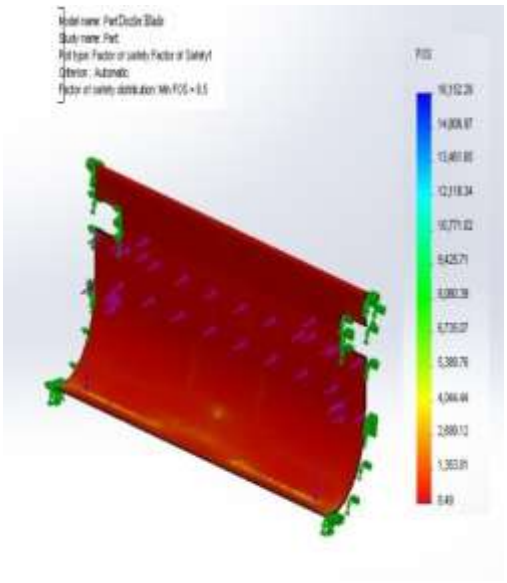


fig 6 cutting blade strain analysis

Factor of safety Analysis



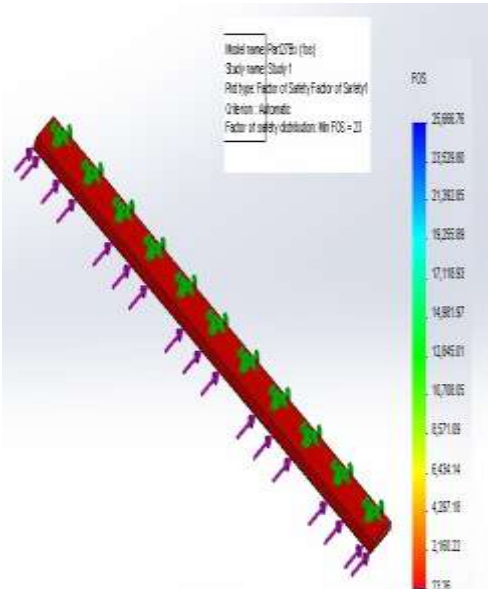


Fig 7 Dozer blade FOS analysis **Fig 8 Cutting Blade FOS analysis**

Results and conclusions

From the above conceptual analysis it has been found that the stresses are generated in the components are not enough to break the components. Factor of safety is greater than 1, which shows that the design is feasible for production.

Table 1

Component	Cutting blade	Dozer blade
Minimum	23.2596	8.49098
Maximum	25666.8	16152.3

Future Scope

As the model has reached the time limit, the future possibilities to be thought of are

- Further optimization of the design parameters to a prescribed workspace along with different optimization techniques can be done.
- Developing a full scale industry oriented bucket in line with this parent design should also be derived.
- Implementation of sensors for data collection can be implemented for better feedback and complex operation of the bucket.
- blade capacity can be increased
- Abrasion of material can be avoided by changing materials of the components.

REFERENCES

[1]. Manisha P. Tupkar, 2Prof. S. R. Zaveri," Design and Analysis of an Excavator Bucket", International Journal of Scientific Research Engineering & Technology (IJSRET), ISSN 2278 – 0882,Volume 4, Issue 3, March 2015

[2]. Kalpak. S. Dagwar, R.G. Telrandhe," Excavator Bucket Tooth Failure Analysis", IJRMET Vol. 5, Issue 2, May - Oct 2015 ISSN : 2249-5762 (Online) /ISSN : 2249-5770 (Print)

[3]. Kalpak. S. Dagwar, R.G. Telrandhe," Excavator Bucket Tooth Failure Analysis", IJRMET Vol. 5, Issue 2, May - Oct 2015 ISSN : 2249-5762 (Online) /ISSN : 2249-5770 (Print)
[4]. Bhaveshkumar P. PATEL1, * - Jagdish M. PRAJAPATI," EVALUATION OF BUCKET CAPACITY, DIGGING FORCE CALCULATIONS AND STATIC FORCE ANALYSIS OF MINI HYDRAULIC BACKHOE EXCAVATOR", machine design, Vol.4(2012) No.1, ISSN 1821-1259 pp. 59-66
[5]. Dai, Wenyue, and Hao Liang. "Dynamic simulation and comprehensive optimum design of working device of loader [J]." Journal of Jilin University of Technology (Natural Science Edition) 4 (2004): 017.