

Study on the Durability Analysis of Front Excavating Part at Fatigue

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Abstract. In this paper, the durability analysis of front excavating part at fatigue is studied. It is considered that predicting the damage area where may occur at the actual construction site can contribute to the safe design by applying external force and fatigue load on the front excavating part of bulldozers.

Keywords: Fatigue load, Life, Excavating part, Bulldozer, Finite element analysis

1 Introduction

In this study, 3D analysis model was made according to the configuration of the turnbuckle for towing car. As the fatigue analysis is carried out, the damage areas which may occur at fatigue load are investigated. Through such analysis, the preceding data was secured prior to the actual experiment with the blade of bulldozer. So, expense and time can be reduced. Through the analysis result of this study, the durability of excavating blade can be improved. The time and cost can be saved. And it is thought that this study result is applied to the effective design [1-3].

2 Analysis Model

Fig. 1 indicates the model used in the analysis and the excavating part of the front area has the form of a bending at the center of the blade at the bottom. In addition, Fig. 2 shows the application of the static load for towing the vehicle prior to applying the fatigue load of the analysis model. At the front area which comes in contact with the ground for work, the force at the working state is applied to with the pressure and the area connected to the chassis is fixed. As the pressure is applied differently to each part of excavator, the real circumstance is described at maximum.



Fig. 1 Analysis model

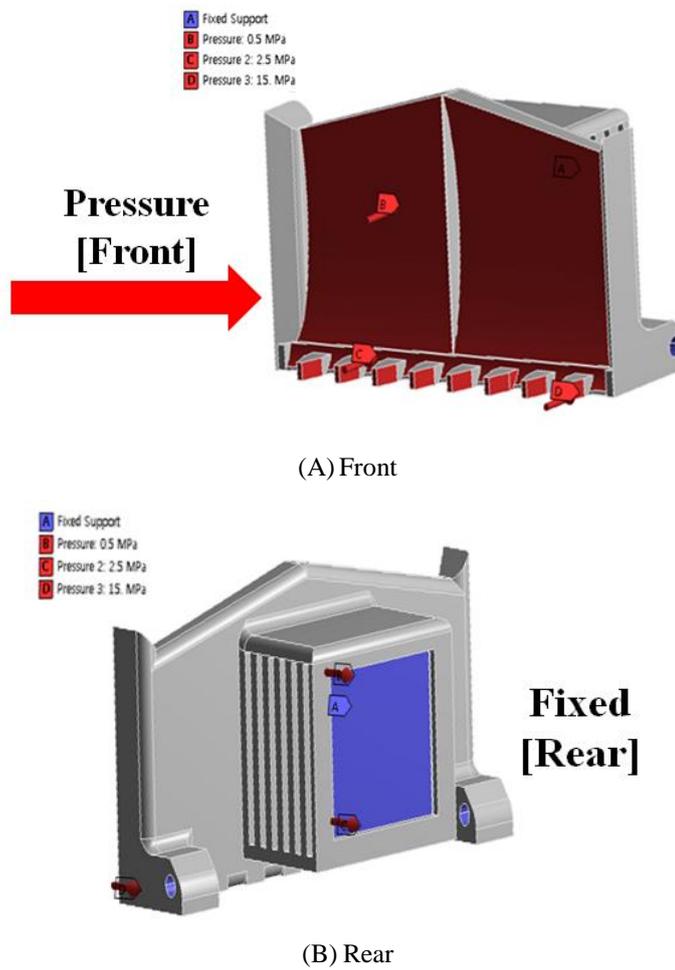


Fig. 2. Analysis condition

3 Study Result

Fig. 3 shows the contour of equivalent stress of analysis model. It is shown that the wear due to this phenomenon happens as the high stress happens at the front part of blade. Because the high stress occurs at the lower part in front part along with the front tip of blade, it is thought that the improvement is necessary.

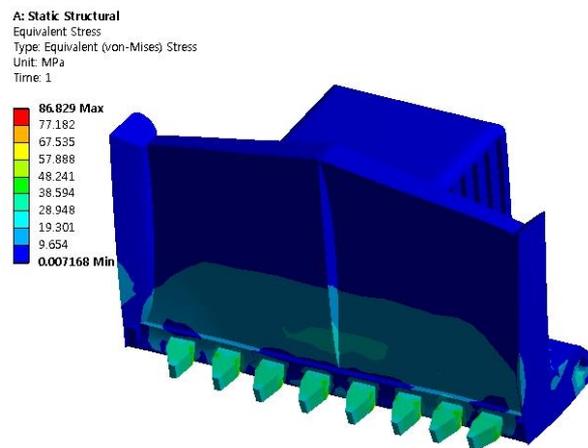


Fig. 3. Contour of equivalent stress

Fig. 4 shows the contour of fatigue life of analysis model. As shown by the analysis result of Fig. 4, the broken possibility at the front part of excavator is thought to become higher. Particularly, it is seen that the designs at the front part of excavator and the wear of blade contact with the ground must be changed.

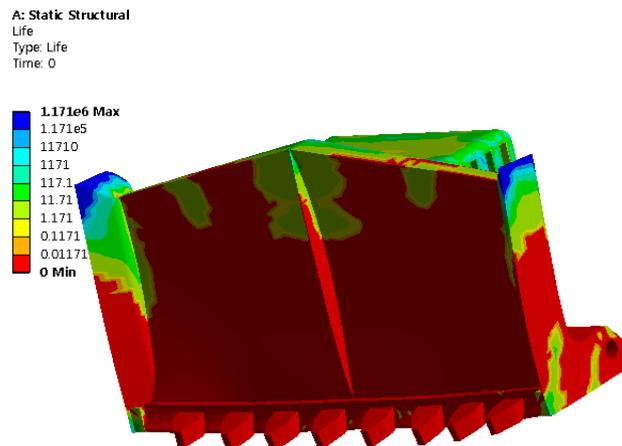


Fig. 4. Contour of fatigue life

4 Conclusion

This paper investigates the stress and destruction with regards to the external force and fatigue load applied depending on the excavating part at the front used in the work of bulldozer. This study is concluded as the result of conducting the analyses on the structure and fatigue based on 3D modelling analysis model. The high stress occurs at the lower part in front part along with the front tip of blade. As the broken possibility at the front part of excavator becomes higher, the improvement is necessary. It is seen that the designs at the front part of excavator and the wear of blade contact with the ground must be changed. On the basis of the analysis result of this paper, the problem of existing excavator can be found. This study result can be applied to designing the improved product and obtaining the durability against fracture.

References

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