

Fatigue Analysis and Design Optimization of Excavator Bucket

Krishan Pandey¹, Pushpketan Deotale², Yogesh Kale³, Satish Birhade⁴

Lecturer, Department of Mechanical Engineering^{1,2,3,4}
Pimpri Chinchwad Polytechnic, Pune, Maharashtra, India

Abstract: Construction activity is continually rising, and the strong performance of construction equipment ensures rapid expansion in the earth moving machine sectors. This study focuses on the method for calculating the digging forces needed to dig the terrain for minor building work. This approach calculates the force and is also used to perform a fatigue analysis to determine the bucket's fatigue life and failure rate. Because the current excavator arm mechanism is subjected to deformation and bending forces during lifting and digging operations, failure at the bucket end of the arm happens frequently. The excavator arm is analysed using ANSYS workbench software at current digging force and lifting capacity. An analytical approach has also been provided for static force analysis of excavator bucket.

Keywords: Digging Forces, Fatigue Analysis, Excavator Bucket, Optimization, etc.

REFERENCES

- [1] S. M. Metev and V. P. Veiko, Laser Assisted Microtechnology, 2nd ed., R. M. Osgood, Jr., Ed. Berlin, Germany: Springer-Verlag, 1998.
- [2] J. Breckling, Ed., The Analysis of Directional Time Series: Applications to Wind Speed and Direction, ser. Lecture Notes in Statistics. Berlin, Germany: Springer, 1989, vol. 61.
- [3] S. Zhang, C. Zhu, J. K. O. Sin, and P. K. T. Mok, "A novel ultrathin elevated channel low-temperature poly-Si TFT," IEEE Electron Device Lett., vol. 20, pp. 569–571, Nov. 1999.
- [4] M. Wegmuller, J. P. von der Weid, P. Oberson, and N. Gisin, "High resolution fiber distributed measurements with coherent OFDR," in Proc. ECOC'00, 2000, paper 11.3.4, p. 109.
- [5] R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "High-speed digital-to-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.
- [6] (2002) The IEEE website. [Online]. Available: <http://www.ieee.org/>
- [7] M. Shell. (2002) IEEEtran homepage on CTAN. [Online]. Available: <http://www.ctan.org/tex-archive/macros/latex/contrib/IEEEtran/>
- [8] FLEXChip Signal Processor (MC68175/D), Motorola, 1996.
- [9] "PDCA12-70 data sheet," Opto Speed SA, Mezzovico, Switzerland.
- [10] A. Karnik, "Performance of TCP congestion control with rate feedback: TCP/ABR and rate adaptive TCP/IP," M. Eng. thesis, Indian Institute of Science, Bangalore, India, Jan. 1999.
- [11] J. Padhye, V. Firoiu, and D. Towsley, "A stochastic model of TCP Reno congestion avoidance and control," Univ. of Massachusetts, Amherst, MA, CMPSCI Tech. Rep. 99-02, 1999.
- [12] Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification, IEEE Std. 802.11, 1997.