



Simulation of Excavator Bucket Pressuring Through Finite Element Method

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Abstract

Excavator bucket tool is one of the most important parts of an excavator. It is made of steel mixture. It is commonly equipped with protruding teeth on its cutting side to breakdown hard materials and also to prevent dryness and damage of the bucket. Excavator bucket tooth must have supporting geometrical shape to penetrate and to endure the digging process on the ground, gravels, stones, or any other abrasive field. It is because of the field's natural characteristic when the bucket tool grinds the material. Mixed iron is common to be used as excavator bucket tool's material because it is easy to get and economic. High hardness value is also needed on the surface that transports hard material such as mining equipment. Therefore, an accurate analysis should be done to determine the suitable material on this field. Design and analysis were done by using *Computer-Aided Engineering (CAE) Abaqus 6.10* application to get the maximum tension as the result of loading. Analysis process to get the tension was done by adding 8285.06 N weight forces in static condition with the angle of 32° to the horizon. From the analysis it could be known that maximum tension experienced by excavator bucket tooth is 209.3 MPa, and it is still below the Maximum Equivalent von Mises stress so the design could be categorized as safe.

Keywords: Abaqus 6.10; Bucket Tooth; Design; Excavator; Finite Element; Von Mises.

1. Introduction

Knowledge and technology are growing rapidly along with the developing era, supported by more intelligent human resources. The development of knowledge is needed because of the strict of competition and increase of society's needs. The experts are trying to create and find a new method to fulfil those needs. The educational practitioners are doing the same thing to be able to add new discourses and atmosphere needed by market. We are welcoming the global market in which demand competition without paying attention of whom, how, and where. Meanwhile, the most important thing is to face and win the competition in the global market itself. The rapid development of all living aspects and the increasing complexity of human's needs motivate people to create sophisticated equipment. That equipment can help to ease the work processes, minimize working time of building big projects such as highways, sky scrapers, fly over, airports, and etc. Therefore, we need an equipment which has the ability to do hard works such as digging ground, loading the ground, and many others with little time and high efficiency.

One of the heavy equipment which is commonly used in digging is excavator. Excavator is heavy equipment used in construction and mining industries to excavate holes and build foundations and other things. Excavator bucket is made of solid steel and is generally equipped with protruding teeth on its cutting side to breakdown hard material and prevent wear and damage of bucket. Excavator bucket teeth must have supporting loading capacity of materials such as wet ground, rocks and abrasive field caused by the nature of the ground when the bucket teeth breakdowns the material. Alloy steel is commonly used to make excavator bucket teeth [1].

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