

Load Analysis and Structural Improvement of the Tracked Armored Vehicle

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Abstract—To improve firing performance of the vehicle, type 85 tracked armored vehicle was armed with 122 mm rocket launcher. Due to the upgrading, the maximum firing range and weight are 300 % and 119 %, increases, respectively.

The weight increment causes structural damage to the vehicle. Therefore, this paper presented load analysis and structural design to prevent the damage using Finite Element Analysis (FEA). The objectives are to numerically obtain the stress and deformation behaviors distributed on the vehicle. The static and dynamic loads were both applied in this analysis.

The results showed that the improved structure can reduced stress occurred

Index Terms —Finite Element Analysis, Military Vehicle Structure, Armored Tracked Vehicle

I. INTRODUCTION

Type 85 tracked vehicle was developed in 1990 with air-cooled, turbocharged diesel engine sits to the right rear of the driver [1]. An intake is located on the top of the hull with an exhaust on the right hand side. The track is driven at the front by a drive sprocket and passes over five dual rubber-typed road wheels and three track-return rollers, then loops over an idler at the rear, before returning to the front again.

The vehicle is armed with 30-round 130 mm multiple rocket launcher mounted on top of the hull. A total of 60 rockets is carried on board with 6 crews. The rocket has maximum range of 10 km and maximum elevation of +55°, traverse is limited to 22.5° either side and have mechanical angle adjustment both transverse and elevation.

In 2015, Defense Technology Institute (DTI) was initiated the Typ-85 tracked vehicle improvement and upgrading. One of the upgrading is equipping the 20-round 122 mm multiple rocket with maximum range of 40 km as shown in Fig.1 (b). By arming 20-round 122 mm, the total weight of the vehicle was increased about 119% shown in Table 1. Therefore, the objectives are to

consider and analyze loads and improve the tracked vehicle.

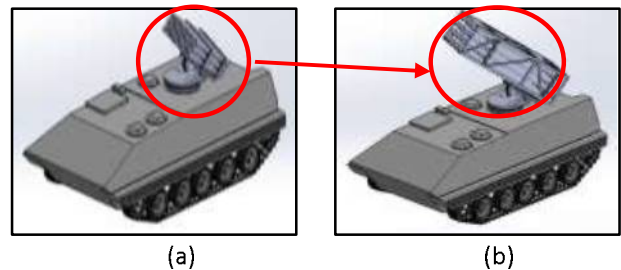


Fig.1. Military tracked armored vehicle (a) Original and (b) modified tracked vehicles

	Original	Modified
Rocket diameter (mm)	130	122
Rocket length (mm)	1047	1780
Rocket weight (kg)	32.64	70
Pod with rocket (kg)	1279.2	2800

Table 1. The comparison between Original and Modified Launcher

II. Methodology and Finite Element Model

This paper presented structural analysis. Finite Element Analysis (FEA) was used to analyze stress behavior.

The structural analysis is performed to obtain the strength of structure under applied static and dynamic loads for the review of displacements, reaction forces, stresses, and strains. The general equation of motion is written below,

$$[M]\{\ddot{x}\} + [C]\{\dot{x}\} + [K]\{x\} = \{F(t)\} \quad (1)$$

Where [M] = mass matrix
[C] = damping matrix
[K] = stiffness matrix