World Academy of Science, Engineering and Technology
International Journal of Mechanical and Materials Engineering
Vol:16, No:09, 2022

Design of Structure for a Heavy-Duty Mineral Tow Machine by Evaluating the Dynamic and Static Loads

Authors : M. Akhondizadeh, Mohsen Khajoei, Mojtaba Khajoei

Abstract : The purpose of the present work was the design of a towing machine which was decided to be manufactured by Arman Gohar-e-Sirjan company in the Gol-e-Gohar iron ore complex in Iran. The load analysis has been conducted to determine the static and dynamic loads at the critical conditions. The inertial forces due to the velocity increment and road bump have been considered in load evaluation. The form of loading of the present machine is hauling and/or conveying the mineral machines on the mini ramp. Several stages of these forms of loading, from the initial touch of the tow and carried machine to the final position, have been assessed to determine the critical state. The stress analysis has been performed by the ANSYS software. Several geometries for the main load-carrying elements have been analyzed to have the optimum design by the minimum weight of the structure. Finally, a structure with a total weight of 38 tons has been designed with a static load-carrying capacity of 80 tons by considering the 40 tons additional capacity for dynamic effects. The stress analysis for 120 tons load gives the minimum safety factor of 1.18.

Keywords : mechanical design, stress analysis, tow structure, dynamic load, static load
Conference Title : ICDMME 2022 : International Conference on Design, Mechanical and Material Engineering
Conference Location : Toronto, Canada
Conference Dates : September 20-21, 2022