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Finite element analysis of tailgate of the first Saudi car GAZAL1

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Several types of analysis were made on the tailgate. One of them was analysis for tailgate opening force with and without stabillus. Model analysis indicated that it is lower than targeted value. Also, local stiffness analysis was done and detected that all values reach largely targets except the spare wheel fixing stiffness in X direction that is slightly out of target, no plastic deformation risk under gas spring load in both closed and opened position, the local stiffness in the spare wheel fixing area in X direction would be improved, closing the upper crossbeam whose performance need to be improved. Global stiffness analysis was done, when the force was horizontally applied then all values reach targets except for the lateral displacement, but when force is applied vertically then it was detected that its material must be changed from low carbon steel to steel 42. Analysis for rear end front print revealed that the maximum displacements value lies in non-linear range and it needs to be repeated using a non-linear solver. Analysis of tailgate mission load revealed that a local diaphragm must be added to close that section and block the relative movement, also on stabilus fixing. The bracket must be stiffened. Topology optimization suggests cut out layout applicable on the tailgate support spare wheel base. Tailgate sag analysis reveals that lower hinge is more dangerous than the upper.

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