Rese Research on Connection Structure of Aluminum Body Bus Using Multi-objective Topology Optimization

一. 成果完成人及所在单位：倪雪，机械与汽车工程学院　　指导教师：彭倩

二. 成果简介：

Aluminum body is an ideal method to reduce weight in the development of a new energy bus. Owing to its low density and good mechanical properties, aluminum alloy could gradually replace steel as a dominant material of vehicles; however, due to the limited elastic modulus and poor welding characteristics, the reliability of aluminum body has been a great concern for the vehicle manufacturers. n order to improve the reliability of aluminum structure, some replaceable connection methods were proposed and applied in the industry including riveted, bolted, bonded and composite connections. a new aluminum alloy connection structure is designed based on multi-objective topology optimization method.

三. 主要研究内容及创新点：

For connecting Aluminum Alloy bus body aluminum components often occur the problem of failure, a new aluminum alloy connection structure is designed based on multi-objective topology optimization method. Determining the shape of the outer contour of the connection structure with topography optimization, establishing a topology optimization model of connections based on SIMP density interpolation method, going on multi-objective topology optimization, and improving the design of the connecting piece according to the optimization results. The quality of the aluminum alloy connector after topology optimization is reduced by 18%, and the first six natural frequencies are improved to some extent, and the strength performance and stiffness performance are obviously improved. The improved connector can meet the requirements of strength and reliability of aluminum alloy bus body structure.

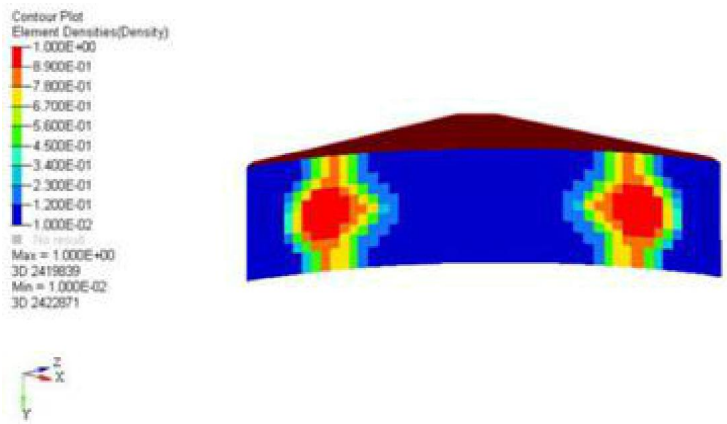


Figure 1. Topology optimization density cloud chart

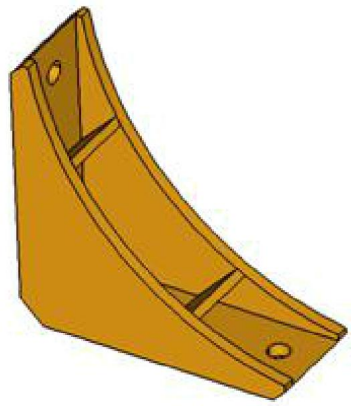


Figure 2. The Outer contour design

四. 主要研究成果及应用情况

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联系人：倪雪　　电　话：13860437936　　Email: 530050224@qq.com