

Customer Success

Problem Solving: Volvo Motor Graders

Some Volvo graders were developing fuel tank welds when plowing snow. In order to correct the problem Volvo needed to understand why.



While tire chains improved traction, they also impacted vibration.

Testing

Operating data was collected isolating problem areas as strain and acceleration levels were measured throughout key locations. Tests were performed with / without tire snow chains; and order tracking software was used to display the frequency content of the collected data to help determine where and to what extent excessive loads and vibrations were impacting the design.

An impact modal vibration test performed on the fuel tank revealed a natural frequency at 24.5 Hz with the mode shape being a panel mode of the vertical fuel tank wall.

This correlated with the high amplitudes seen in the operating test at 25 Hz. The mode shape revealed a large amount of relative motion in the panel, correlating to the high strains seen in this area during the operating test.

Problem Solved

Testing revealed that adding chains to the tires had an adverse effect on vibration levels.

To improve traction in the snow grader operators often installed tire chains. While the tire chains helped create traction they also changed the grader's vibration characteristics putting excessive stress on the welds.

With this understanding of the component's natural frequency and deflection pattern, Volvo incorporated structural modification to the fuel tank shifting the natural frequencies out of the range of tire chain excitation. The problem was solved.



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