

Stress Load Analysis & Optimization of Suspension Clamp

Analyze and optimize suspension clamp assembly used in Modular Cantilever System (MCS) with stress load FEA in different railway configurations

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Abstract

This research explores the stress load analysis of suspension clamp assemblies within the Modular Cantilever System (MCS) used in railway Overhead Equipment (OHE). These assemblies support catenary wires of varying sizes and endure diverse vertical and horizontal loads due to different MCS

configurations. The design allows installation in both top and inverted positions, leading to compressive and tensile forces. Finite Element Analysis (FEA) was employed to assess these variable loads. The study revealed stresses and casting errors within the parts, providing valuable insights for improvement.

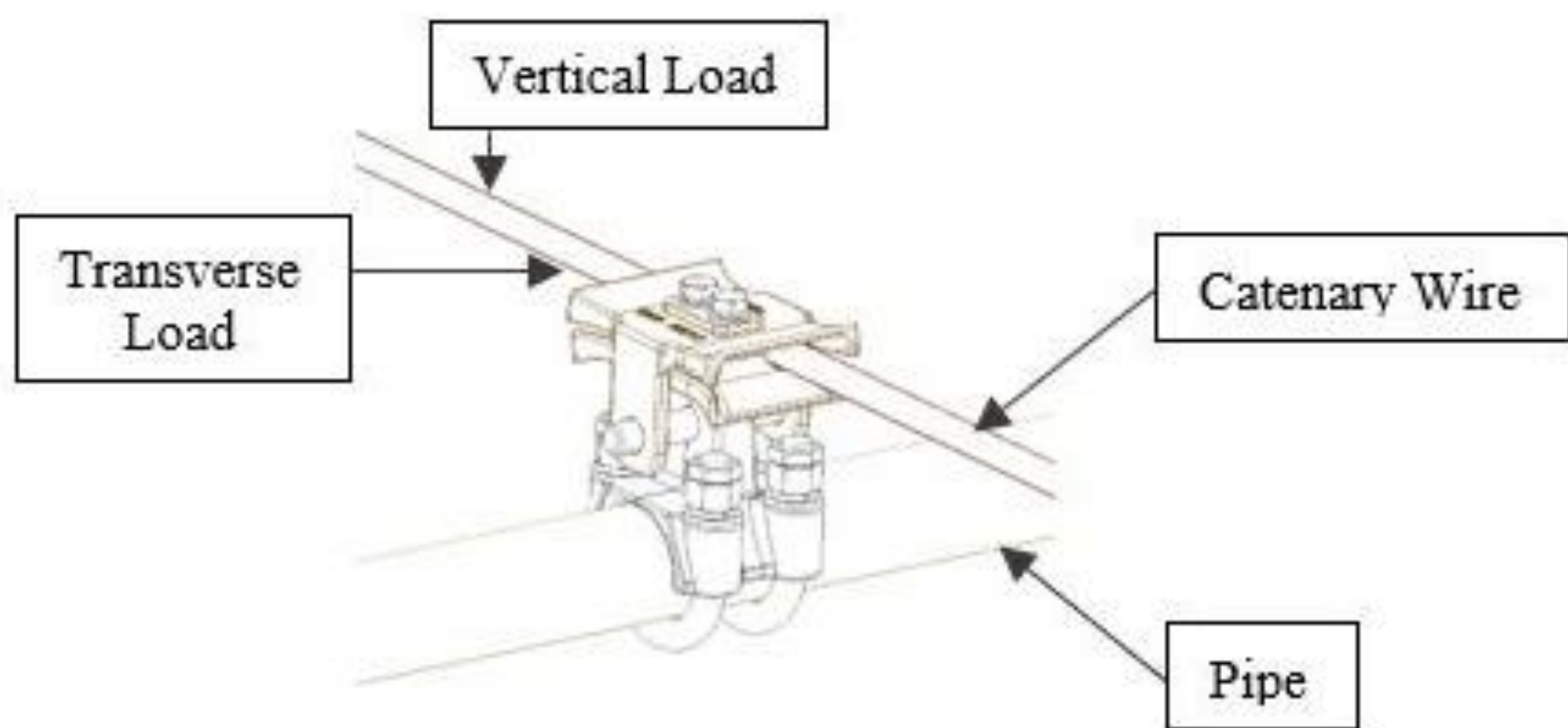


FIGURE 1. Load Cases in Suspension Clamp as per different railway OHE configurations

Methodology

- Suspension Clamp 3D model developed and simplified by suppressing curves and complexity to reduce meshing errors and computational time
- Total 4 cases defined for different orientations of clamp and catenary and contact wire sizes.
- Main vertical load is dead weight of both wires and transverse load is wind load and stagger effect in railway OHE configuration.
- The analysis is performed for maximum possible use case in field application.

Results

- The analysis results indicates that suspension clamp effectively handles different load conditions.
- Stresses and deformations within acceptable limits.
- Identified specific areas experiencing higher stress concentrations. are often point stresses, localized areas where the stress levels exceed the threshold.
- These stress can be easily eliminated by giving fillets and smooth curves or profile transitions

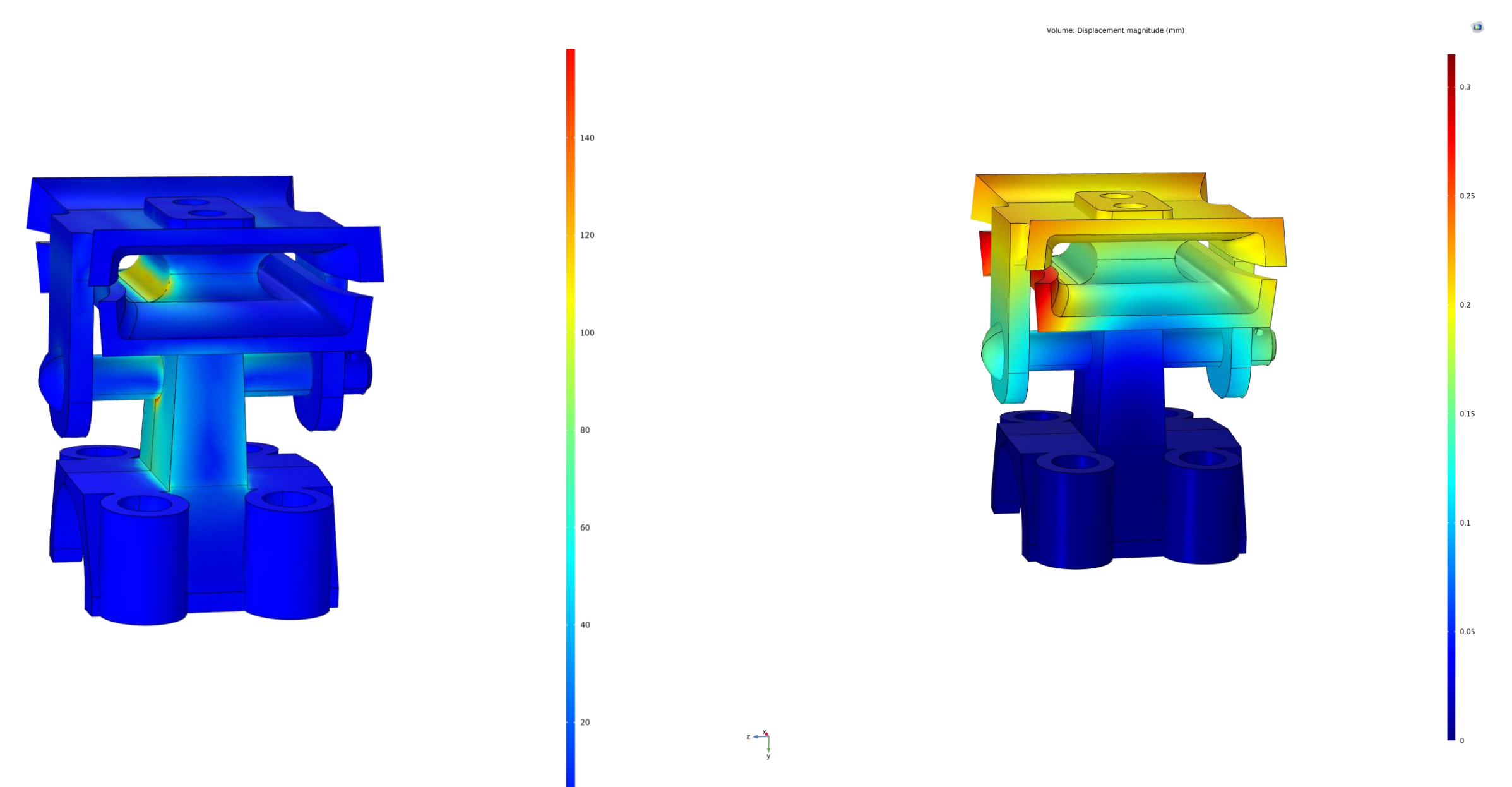


FIGURE 2. Left: Von Mises stresses induced in model . Right: Volumetric deformation in model

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