

### Product Type:

Compression molded with steel inserts

### Industry / Application:

Passenger rail car undercarriage support component

### Challenge:

The existing product experienced inconsistent bond strength and life expectancy, cracked under load and the inserts detached at irregular intervals causing the product to fail the required life expectancy mandated by third party regulators.

### Analysis:

Longwood engineers determined that the life cycle test caused extremely high shear forces on certain features of the rubber component, which in turn caused premature failure. Additionally, they recognized that the current elastomer used was not ideal for the application as the cold flexibility performance was subpar and did not lend to durable bonds between the insert plates and the rubber component. Since the component also needed to meet deflection load performance criteria to provide the necessary damping effect, some load/deflection and strain/modulus calculations were required to fine tune the elastomer formulation to work in all conditions



No-Load Condition



Loaded Condition



One Failure Mode

### Solution:

Longwood was able to formulate a rubber compound that meets all criteria for load deflection, hot and cold flex performance and the required service life. Additionally, by collaborating with the customer and end user, we were able to make some key geometry changes that reduced the stress risers to mitigate field failures. Original specification required 15,000 duty cycles for qualification; the Longwood parts have exceeded 100,000 cycles with no discernable deterioration. Overall acceptance rate has increased from about 50% to over 99.8%. Lastly, Longwood was able to deliver superior products while achieving a 40% landed cost reduction to the customer.

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