



HEAT GENERATION IN THE RAILROAD BEARING THERMOPLASTIC ELASTOMER SUSPENSION ELEMENT

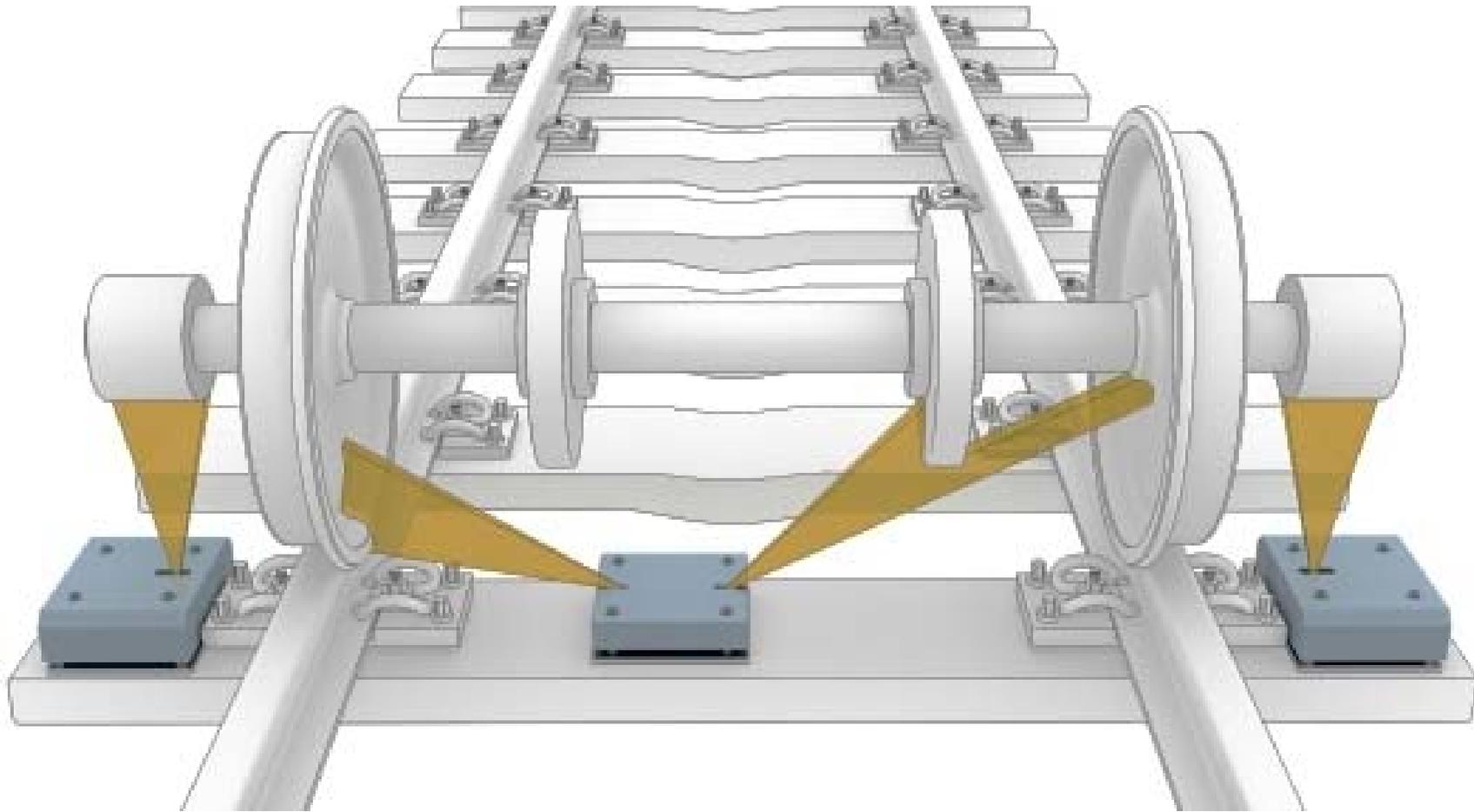
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Overview

- Background & Introduction
- Characterization of Elastomer Pad
- DMA Sample Preparation
- Experimental Setup & Procedures
- DMA Results
- Conclusions
- Future Work

Background & Introduction



[1]

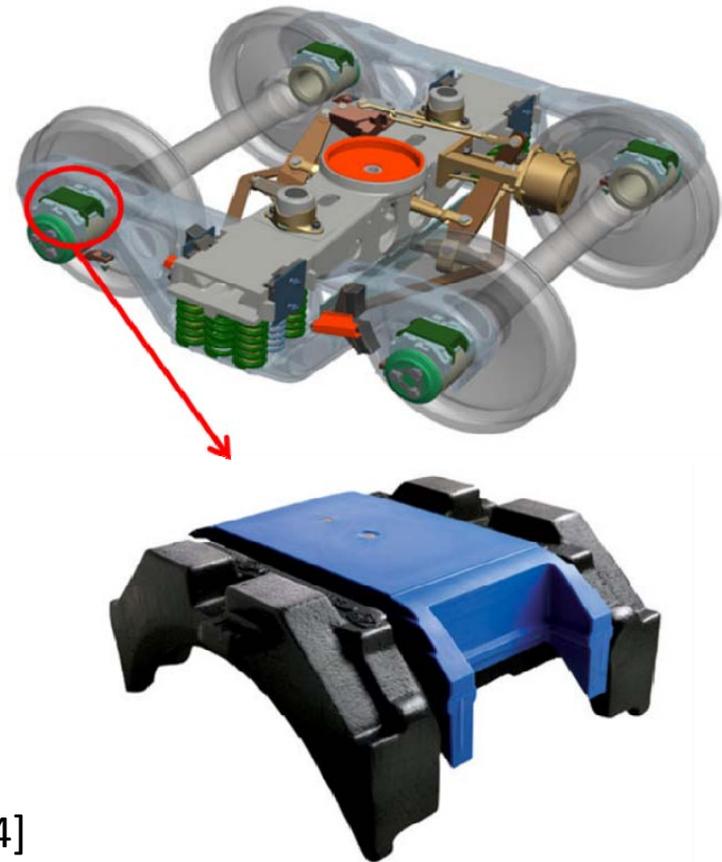
Background & Introduction



[3]

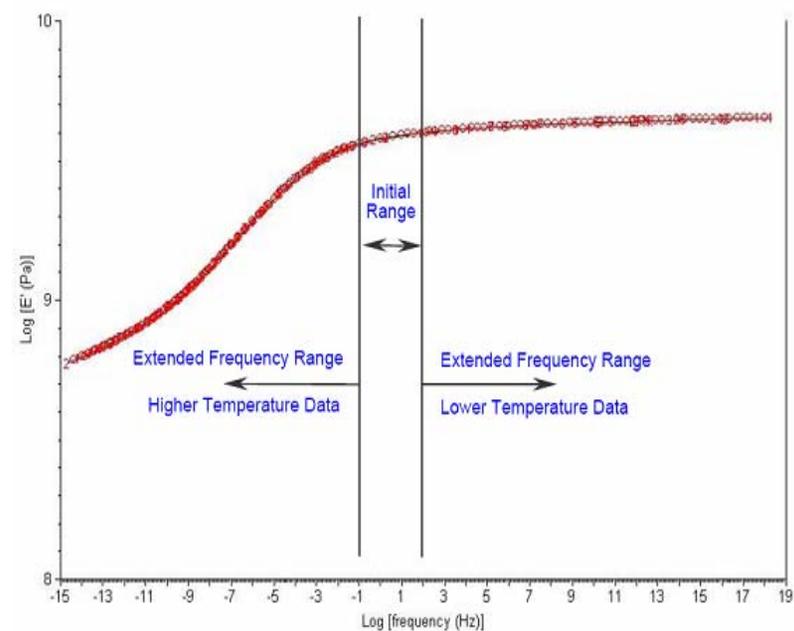
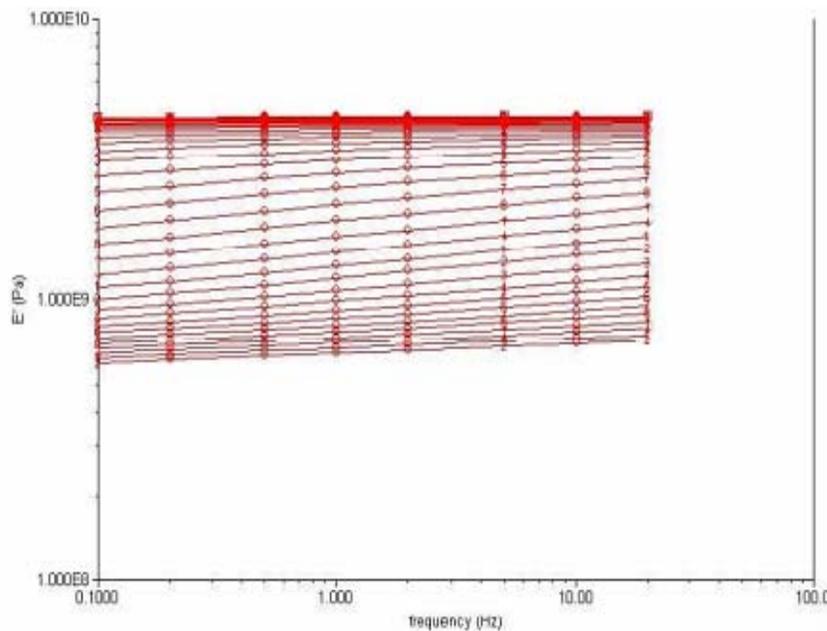
Background & Introduction

- The Elastomer Pad-Liner
 - Prevent metal to metal contact between the metal adapter and truck side frame
 - Wheelset life increase of 25%
 - 8% decrease in fuel consumption
 - Viscoelastic materials that are cyclically loaded and unloaded display *hysteresis*



[4]

Characterization of Elastomer Pad

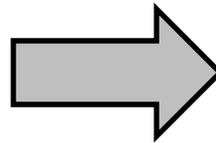


DMA Sample Preparation

- Methods of Preparation
 - Machined from actual pad
 - Transfer molding
 - Injection molding



Elastomer Pad-Liner



DAKE Vertical Band Saw



DMA Sample Preparation



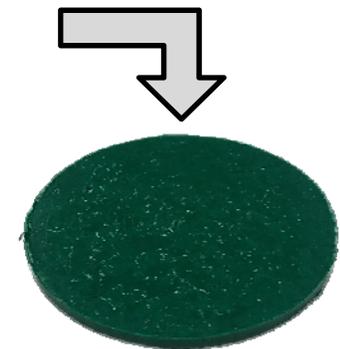
Elastomer Pad-Liner



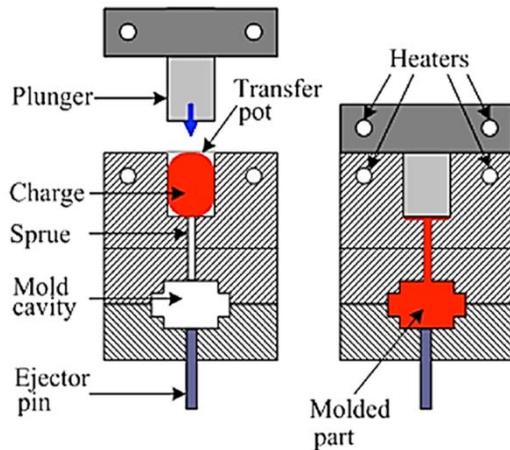
Re-Grounded Material



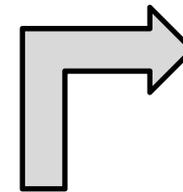
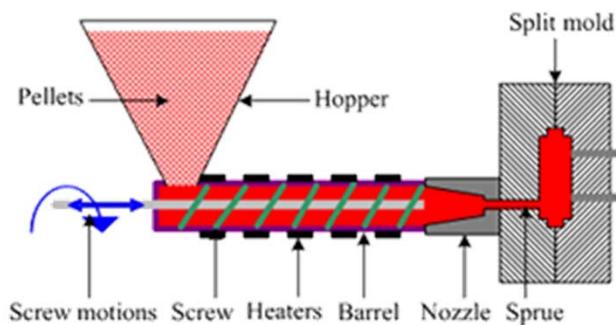
Transfer Pod and Plunger



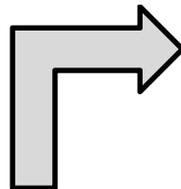
Transfer Molded Disk



DMA Sample Preparation



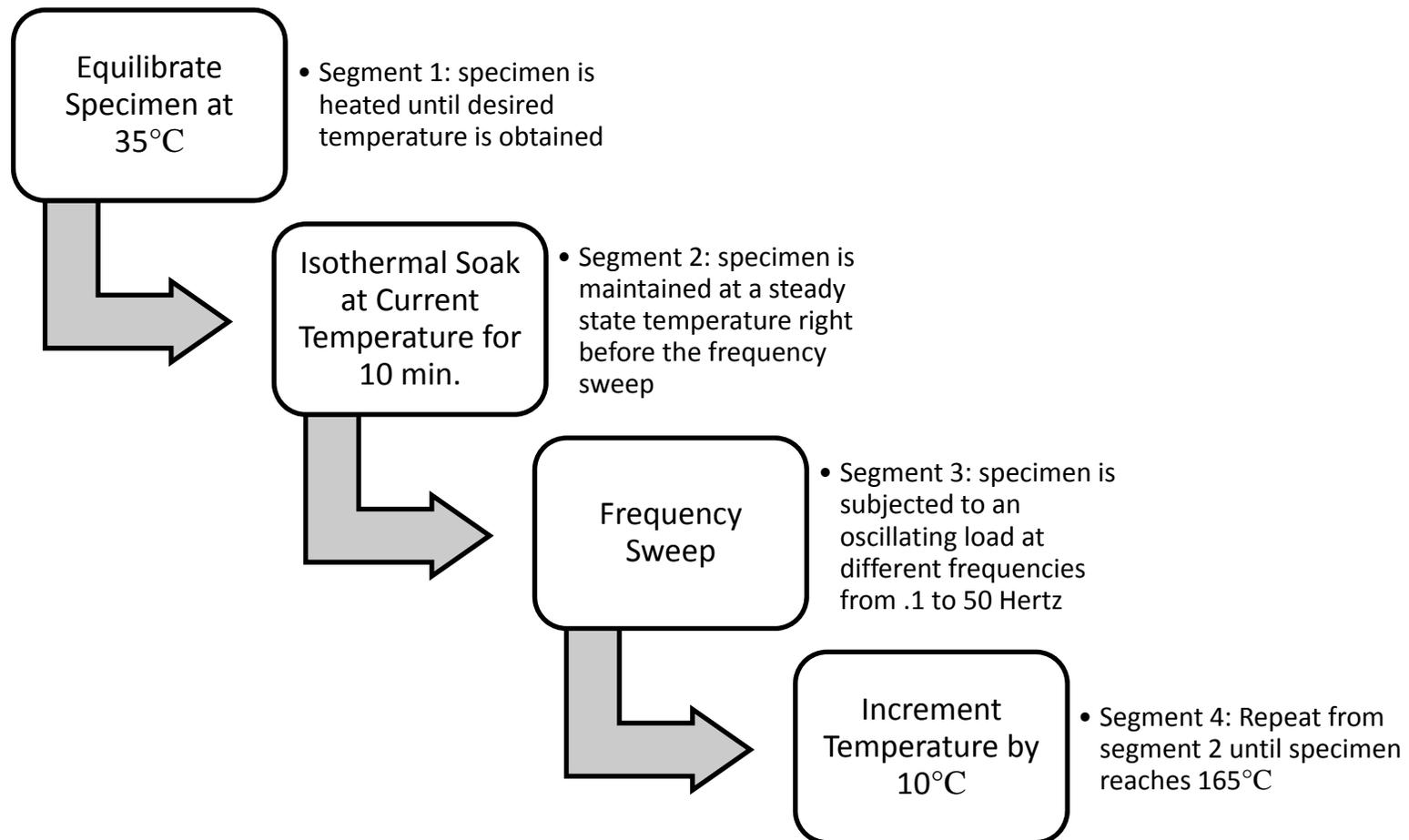
Injection Molded Bar/Tensile Bar



Virgin TPU Pellets

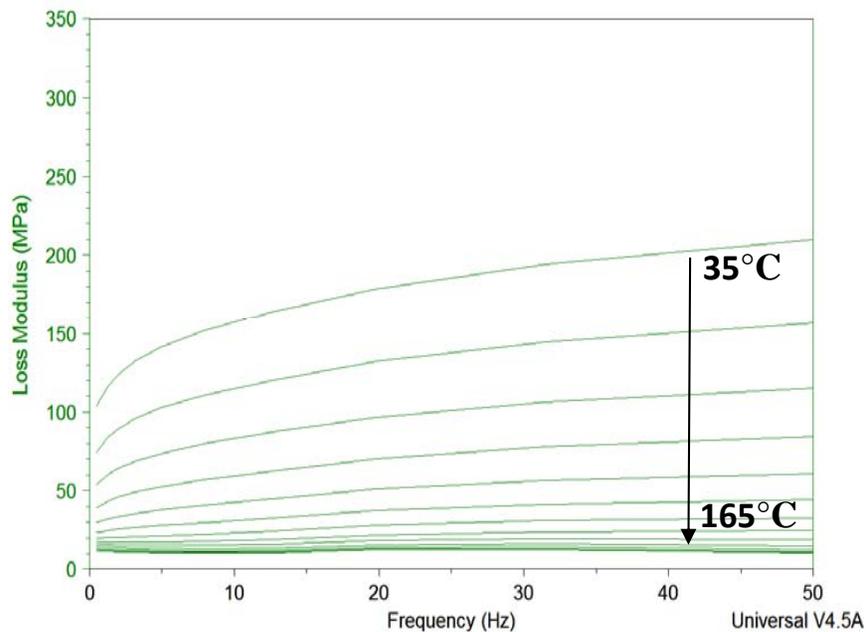
BOY Injection Molding Machine

Experimental Procedures

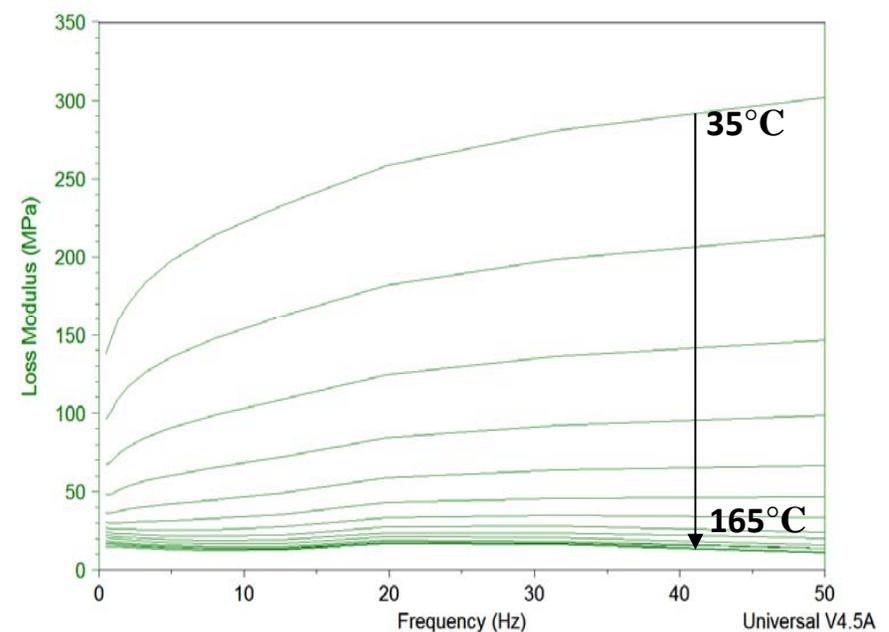


DMA Results: Phase 1

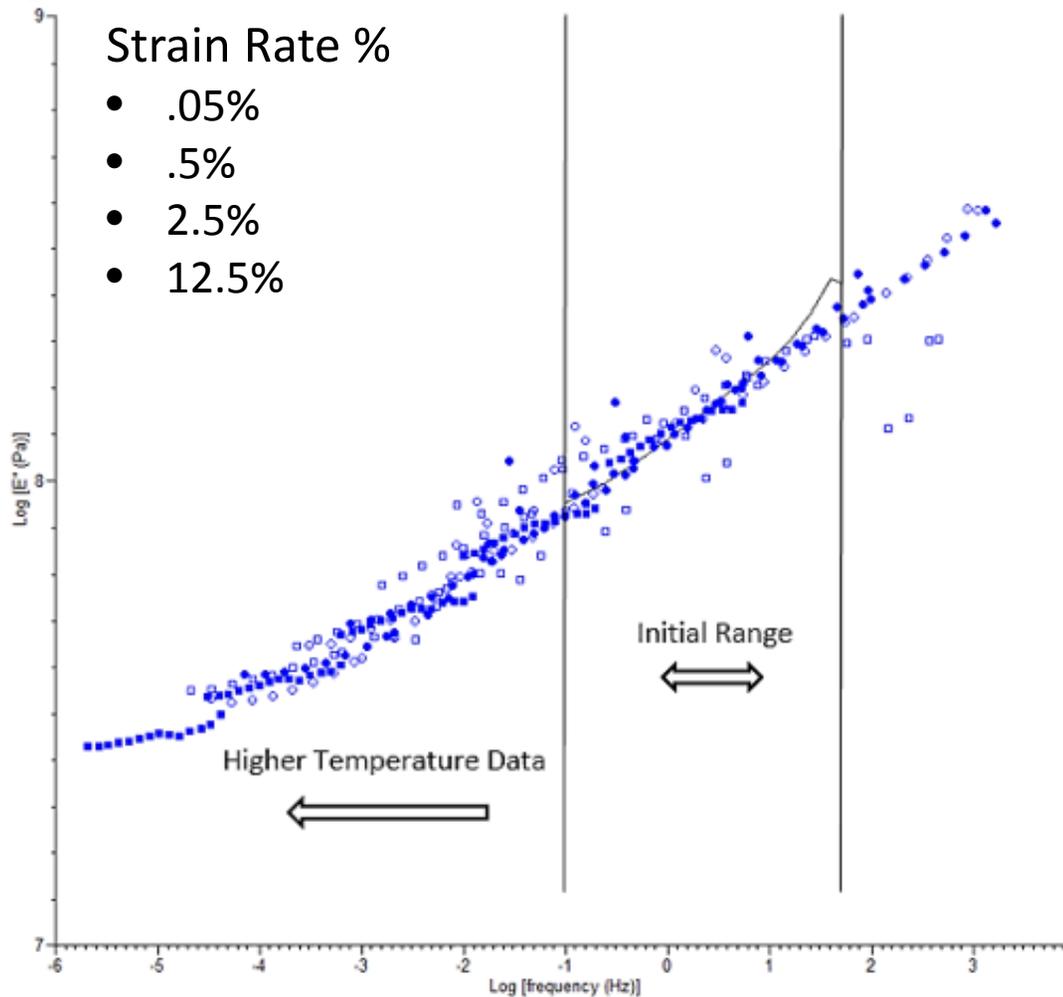
**Loss Modulus of Specimen
Machined From Actual Steering Pad**



**Loss Modulus of Injection Molded
Specimen**



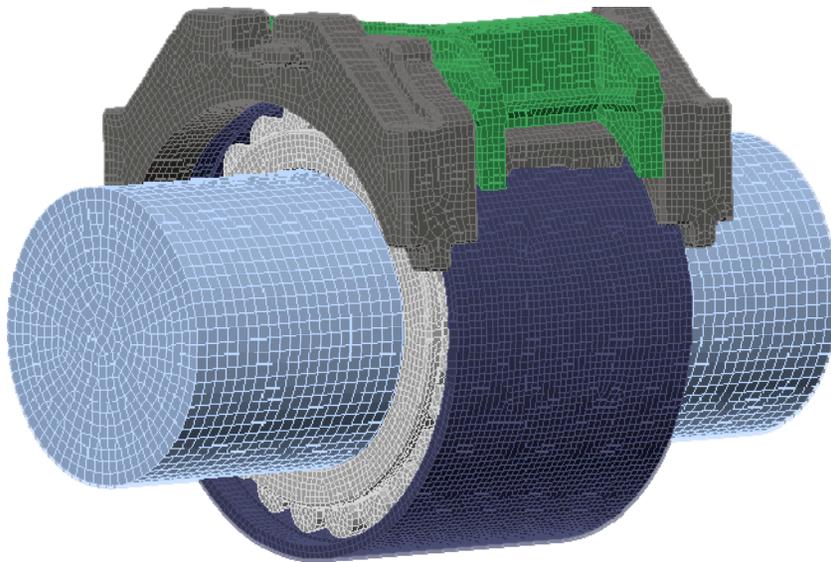
DMA Results: Phase 2



Conclusions

- The thermoplastic elastomer in the truck assembly presents an elastically dominant behavior
- Injection molding specimens work as convenient specimen types that can safely be used to model pad behavior
- The loss modulus or energy dissipating behavior can be treated as independent of strain level

Future Work



[5]



References

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2. Tarawneh, C. M., Cole, K. D., Wilson, B. M., & Alnaimat, F. (2008). Experiments and models for the thermal response of railroad tapered-roller bearings. *International Journal of Heat and Mass Transfer*, 51(25-26), 5794-5803. Retrieved March 13, 2016.
3. "Truck Assemblies | Amsted Rail." *Truck Assemblies | Amsted Rail*. Web. 28 Mar. 2016. <<http://www.amstedrail.com/products-services/truck-assemblies>>.
4. "Adapter Plus Steering Pad System | Amsted Rail." *Adapter Plus Steering Pad System | Amsted Rail*. Web. 28 Mar. 2016. <<http://www.amstedrail.com/products-services/adapter-plus-steering-pad-system>>.
5. Zagouris, A., Fuentes, A. A., Tarawneh, C. M., Kypuros, J. A., & Arguelles, A. (2012). Experimentally Validated Finite Element Analysis of Railroad Bearing Adapter Operating Temperatures. *Volume 7: Fluids and Heat Transfer, Parts A, B, C, and D*.

Acknowledgements

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