Abstract

Masters of Engineering Degree (Mechanical) *(or Aerospace or Engineering Mechanics)*

Project Title:

Passive and Active Control Strategies for Mitigating Forklift Mast Oscillations

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Abstract:

The Raymond corporation Reach Truck forklift can be subject to considerably large oscillations caused by accelerating or decelerating the tractor. These undesirable oscillations are especially prevalent when the payload is large, and the carriage carrying the payload is elevated. Reducing these oscillations would lead to improved productivity and reduced anxiety of the operator. The primary objective of this project was to develop a control and actuator system to attenuate the mast oscillations.

Passive and active control and actuator systems have been developed to attenuate the mast oscillations for the Reach Truck forklift. A mathematical model was first developed to capture the dynamics of the vehicle. The development of this model was made possible by a combination of analytical and experimental techniques for parameter identification and system modeling. This model was then used as a frame of study for developing control and actuator systems to reduce mast vibrations. Tuned vibration absorbers were designed for passive damping and reduced the mast settling time by up to 79%. Reaction mass actuators operating under local velocity feedback were designed for active damping and reduced the mast settling time by up to 85%.