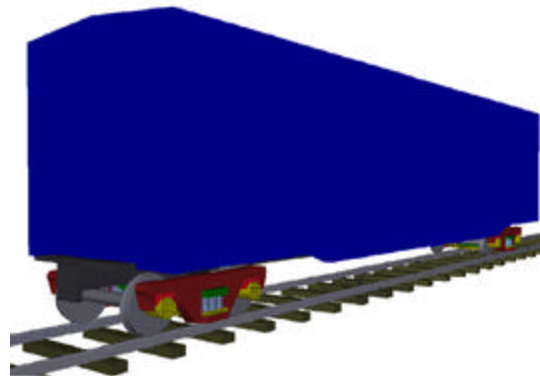


Product Development - High Speed Freight Truck - Phase I

There is a growing trend towards the use of car-less technology, where a rail car is not needed to transport highway truck trailers over rail. In essence, highway trucks operate with trailers in the usual manner over highways, drive up to a rail yard and transfer the trailers to rail-mode with relative ease. In rail-mode, many car-less units use modified three-piece, 70-ton freight car trucks. These trucks are not designed for very high-speed operation. Consequently, serious truck hunting issues arise, compromising operational safety. To provide safer, more reliable and more practical systems that facilitate car-less bi-modal technology, it is imperative to develop a specifically designed, advanced suspension system that is capable of safe high-speed operation without sacrificing low-speed track worthiness.

The objective of Phase I of the project was the conceptual development of an advanced truck for service that can be operated on rail at speeds up to 150 mph. The applicability of various truck configurations and suspension characteristics for new concepts were to be investigated. It was expected that the concepts developed provide the required safety, lateral stability, ride quality, and track worthiness necessary for high speed, bi-modal operation.



Isometric View - 3D representation of the dynamic model

Sharma & Associates, Inc. has developed a concept for a high-speed freight truck intended for 70-ton, regular freight and bi-modal operation, at speeds up to 150 mph. The truck uses a rigid frame (H-frame) and an independent, compliant, primary suspension (springs and dampers between the wheel-set/bearing adapter and the frame) for its basic architecture. Constant contact side-bearings and yaw dampers were added to improve dynamic performance.



Vehicle dynamics simulations indicate that the concept truck shows promise to be taken to the next phase. The simulations indicate that the truck can travel at 150 mph prior to the onset of lateral instability (hunting). The truck also performed well in the other Association of American Railroads' Chapter XI (Service-worthiness Tests and Analyses for New Freight Cars) specified test regimes to indicate track worthiness at lower speeds and for different modes.

In the next phase, additional modeling will be done to ensure that the truck performs well under a wider range of scenarios including worn conditions of the truck, wheel profiles and rail. This will be followed by detailed design of all truck systems resulting in a design that can be prototyped and built for successful over-the-road or Chapter XI testing. The H-Frame truck concept will offer the rail industry an opportunity for safer high-speed train operations, through improved truck performance and handling. The safety and economic advantages offered by the new concept will make it very attractive to the railroad industry.

This project demonstrates our capabilities in vehicle dynamics, design and simulation, AAR Chapter XI testing & analysis, and product development.