

Locomotive Ride-Quality Evaluations - Over-The-Road (OTR) Testing

A major class I railroad in the US needed to measure the ride-quality of a locomotive and two TOFC cars that were part of a special train that was traveling cross-county. SA identified suitable locations on the specified locomotive and cars for ride quality instrumentation and installed self-contained sensor+data acquisition (DAQ) boxes for this special over-the-road test. In less than four days, SA used its own equipment, ordered and received three other pieces of equipment, programmed all of the equipment and installed it on the train within the deadline. The programming consists of setting up suitable sample rates, trigger levels, periodic data intervals, over-write setups, etc. The DAQ boxes were selected paying particular attention to the peak 'g' levels and the filters.

The DAQ boxes used for this study measure and store, time-histories of longitudinal, lateral and vertical (tri-axial) accelerations in a burst mode; i.e., time history segments are recorded when pre-set trigger levels are exceeded. Each time-history segment is time stamped for easy identification. If the memory limits of the unit are exceeded, the units were programmed to overwrite data that have lower magnitudes of acceleration. This ensures that data with the highest magnitudes is retained at the end of the test. The DAQ boxes are quite robust and are designed to hold up very well in the rough railroad environment.

At the end of the multiple day test, the units were retrieved from the train. SA then downloaded the data from the DAQ boxes and converted it for customer use in a very timely and efficient manner.



SA demonstrated its capability to instrument and acquire ride quality data for use in calculating ride quality indices in a railroad environment. Such data can be used to ascertain the comfort levels in locomotive cabs and passenger cars and can also be used to determine the load environment experienced by freight lading. SA also demonstrated its capability to react in a very timely manner, under pressure, successfully. Also, SA was able to accurately establish trigger levels for accelerations based on car type, car placement and instrumentation location.