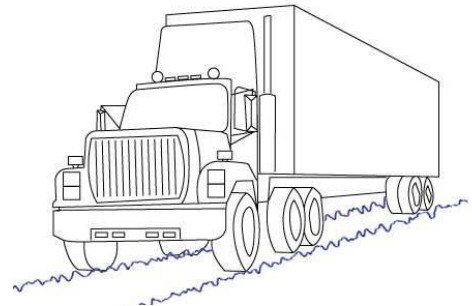
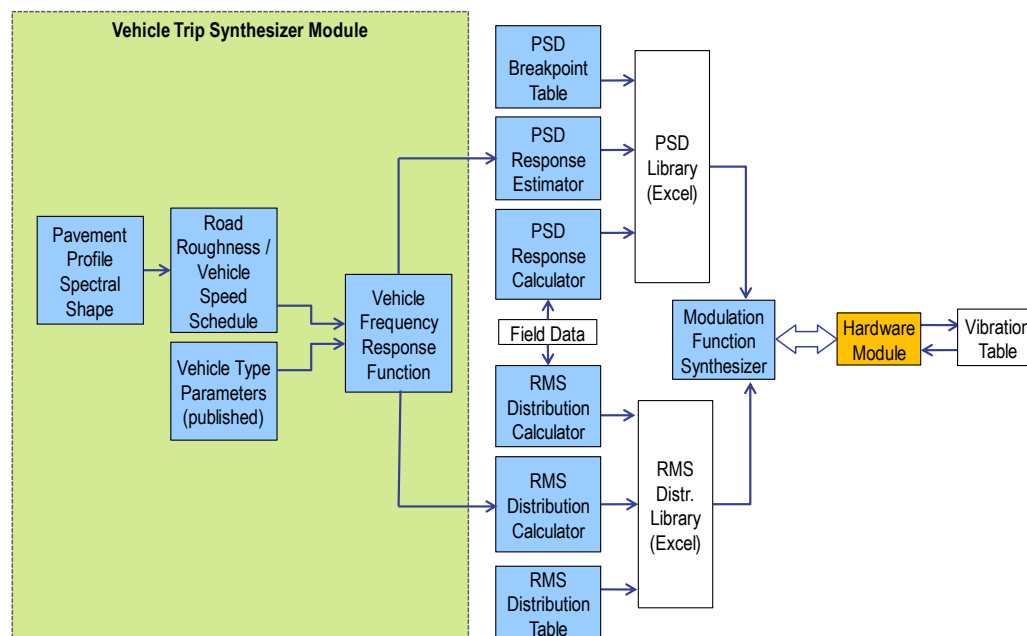


Vehicle Trip Synthesizer



Simulated vehicle response for more realistic vibration tests

The Vehicle Trip Synthesizer Module provides an alternative method for generating the average PSD and the rms distribution functions necessary to synthesize nonstationary random vibrations. The Vehicle Trip Synthesizer Module was developed especially for situations when field vibration data is not available and the user does not have access to a data recorder. The software uses information on the vehicle type along with estimates of the quality (roughness) of the roads to be encountered to compute the vibration response. The module is linked seamlessly with the main Vibration Shaker Controller software as illustrated below.



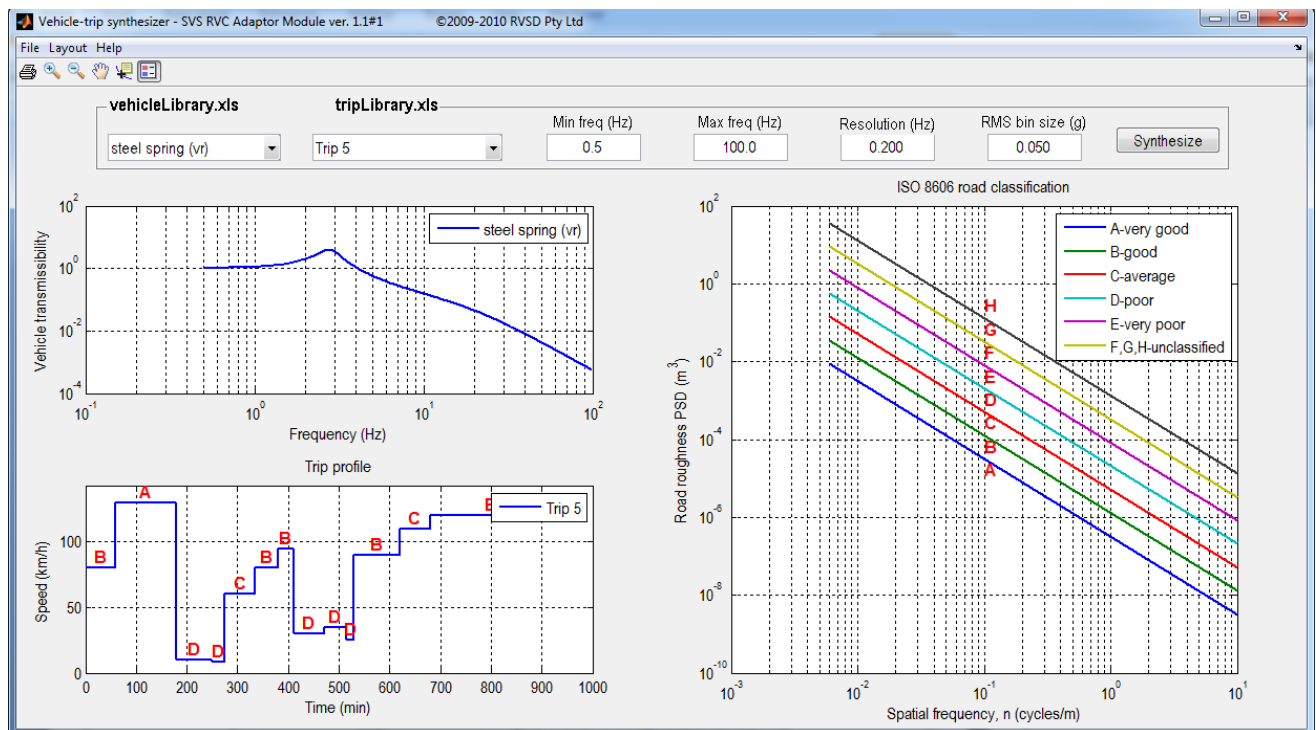
Use real engineering data to synthesize real vibrations

The Vehicle-Trip Synthesizer enables the user to generate both a demand PSD and a demand rms distribution from estimates of the vehicle type and the route to be used. This method takes advantage of the wealth of information available on the dynamic characteristics (numerical models of quarter cars) of various vehicle types as well as spectral models used around the world to characterize the spectral properties of random pavement roughness. The Frequency Response Function (transmissibility) of the selected vehicle is generated from the vehicle dynamic parameters (mass, damping coefficient and stiffness) and combined with trip information (estimates of vehicle speed and road roughness level) to produce estimates of the mean response Power Spectral Density (PSD) and the rms distribution.

Easy to use and configure

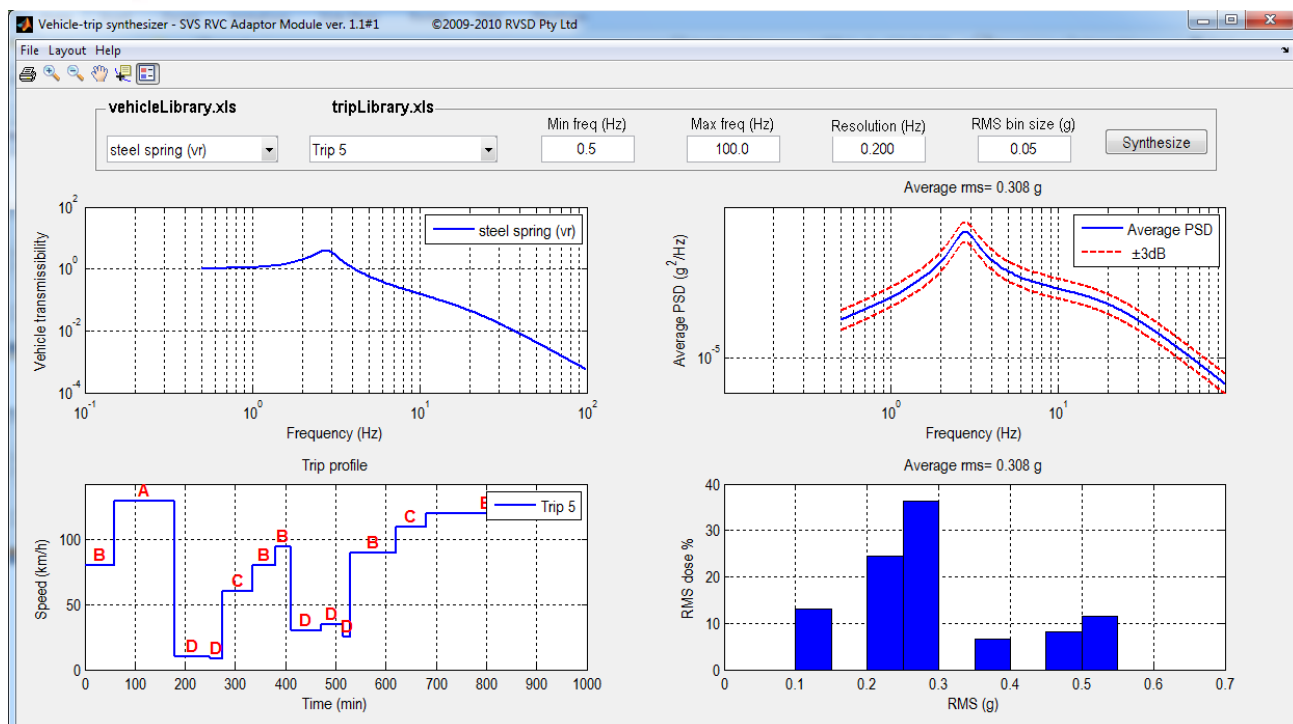
The dynamic parameters of vehicle (quarter car model) are contained in an Microsoft Excel[®] spreadsheet that is linked to the Vehicle-Trip Synthesizer module. These can be edited as needed. The trip library contains data pertaining to the pavement roughness level, the corresponding vehicle speed as well as the expected duration of travel for each speed/roughness combination. As for the vehicle data, the trip data is administered within Excel[®]. The road roughness is classified in accordance with ISO8606 by either specifying the roughness class (A to H) or the nominal roughness level in m^2/m^{-1} .

The screen shot of the software module shown below displays the Frequency Response Function (FRF) of a typical transport vehicle (top left), a trip profile defining a range of pavement roughness and corresponding vehicle velocity (bottom left) along with the spectral densities of roads of various roughness (ISO 8606).



Predicting realistic PSD and rms distribution for laboratory tests

Once the vehicle type and the trip profile have been selected and configured, the mean PSD and rms distribution equivalent to the selected vehicle travelling on the selected road combination at the specified speeds are computed and displayed as shown below. The average PSD and rms distribution are then exported to the respective libraries as target PSD and target rms distribution.



A guided tour of the Vehicle Trip Synthesizer is available from the Real Vibrations website at www.realvibrations.com.