



# Passenger Comfort – Moving Passenger Train Subject to Change Without Notice

## TILT, ACCELERATION, MOVEMENT RECORDING MODERN PASSENGER TRAIN

### Introduction

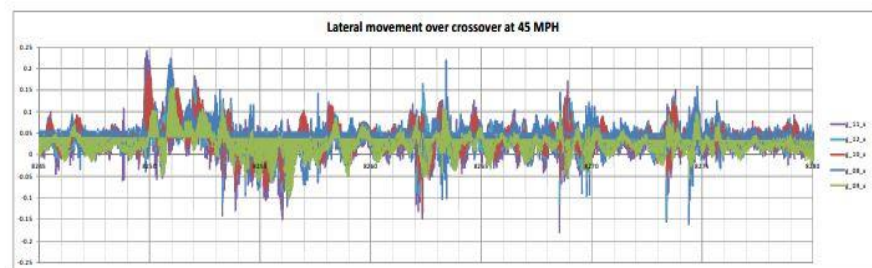
Between June and December 2018, for a consultant and train designer, our team members, John Van Egmond and Julie VanderMeulen, lead a train movement project.

The project measured:

- accelerations,
- tilt,
- peak particle velocity

coupled with

- locations,
- speed,
- track, and
- weather conditions



### Project

For a seven (7) hour period the team measured the movements on a non revenue passenger train.

The test runs made over 100 frog point (various length) crossings, over 40 multi-span bridge/culvert crossings, about 10 road bed crossings, under professional engineer controlled determined speeds.

### Equipment and Data

The team obtained for 7 hours, recorded in 5 minute increments, data which the team provided to the client in raw (on test completion) and in final form( within 2 week)s as follows from:

- Five (5) 3-axis accelerometers – 300 Hz – 0.001g to 3g, (see photo)
- 1 2 axis tiltmeter – 300 Hz – 0 to 10 degrees
- 12 omni directional peak particle velocity sondes – 300 Hz
- 1 – 18Hz GPS
- 1 – Continuous monitor GO-Pro Camera (very large data file)
- 2 – in train climate stations and internet based weather update information
- Visual data with a list speeds, cross overs, passing train, outside weather, etc.
- Provided the client with a summary of all observations



### Measuring Train and Vehicle Movement Impacts On Passengers

The project above provided data on accelerations, tilt and ppv of the modern passenger train on straight track, over bridges, cross points for design purposes at slow to high speeds.