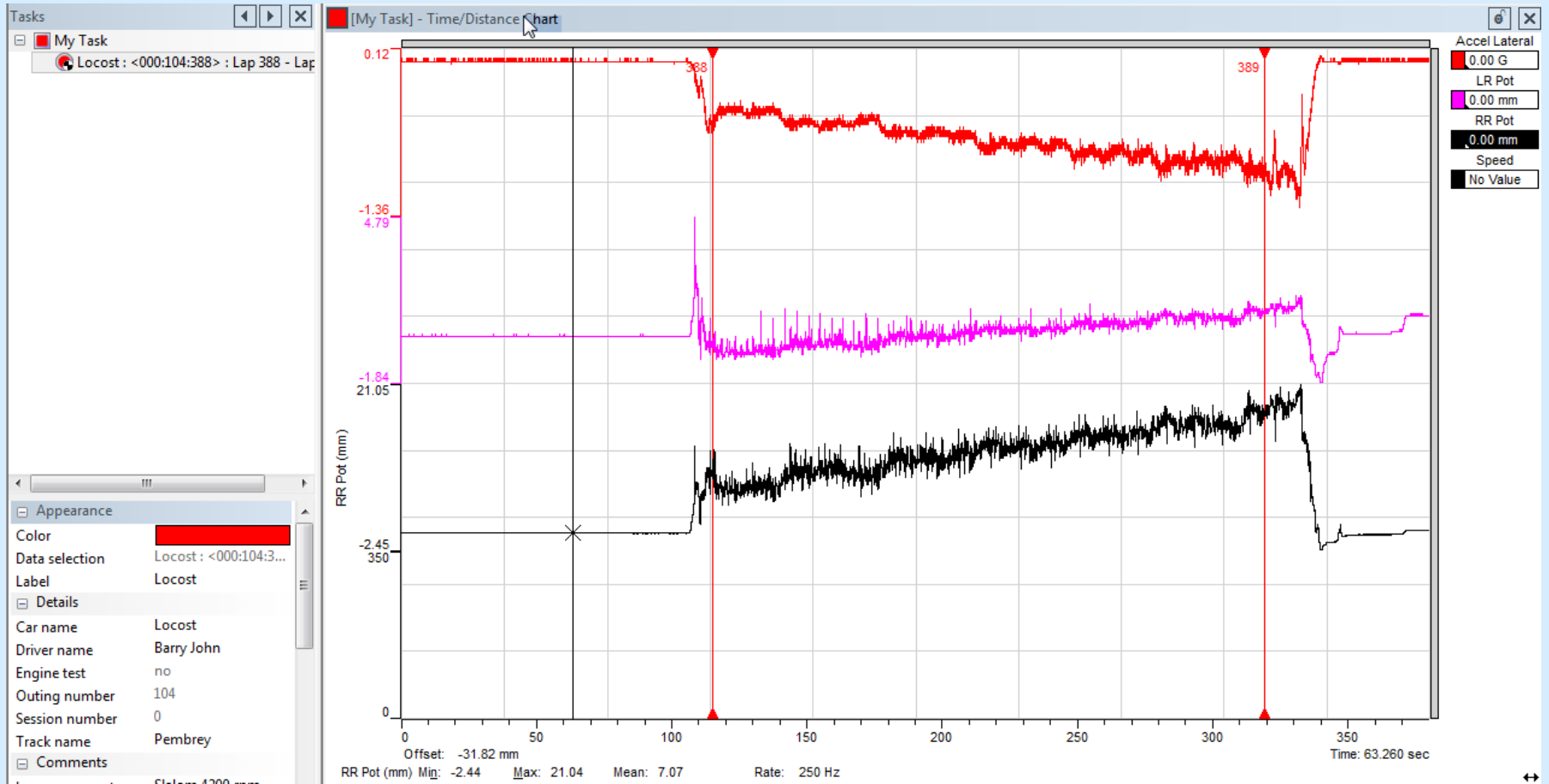


Track Test Investigation

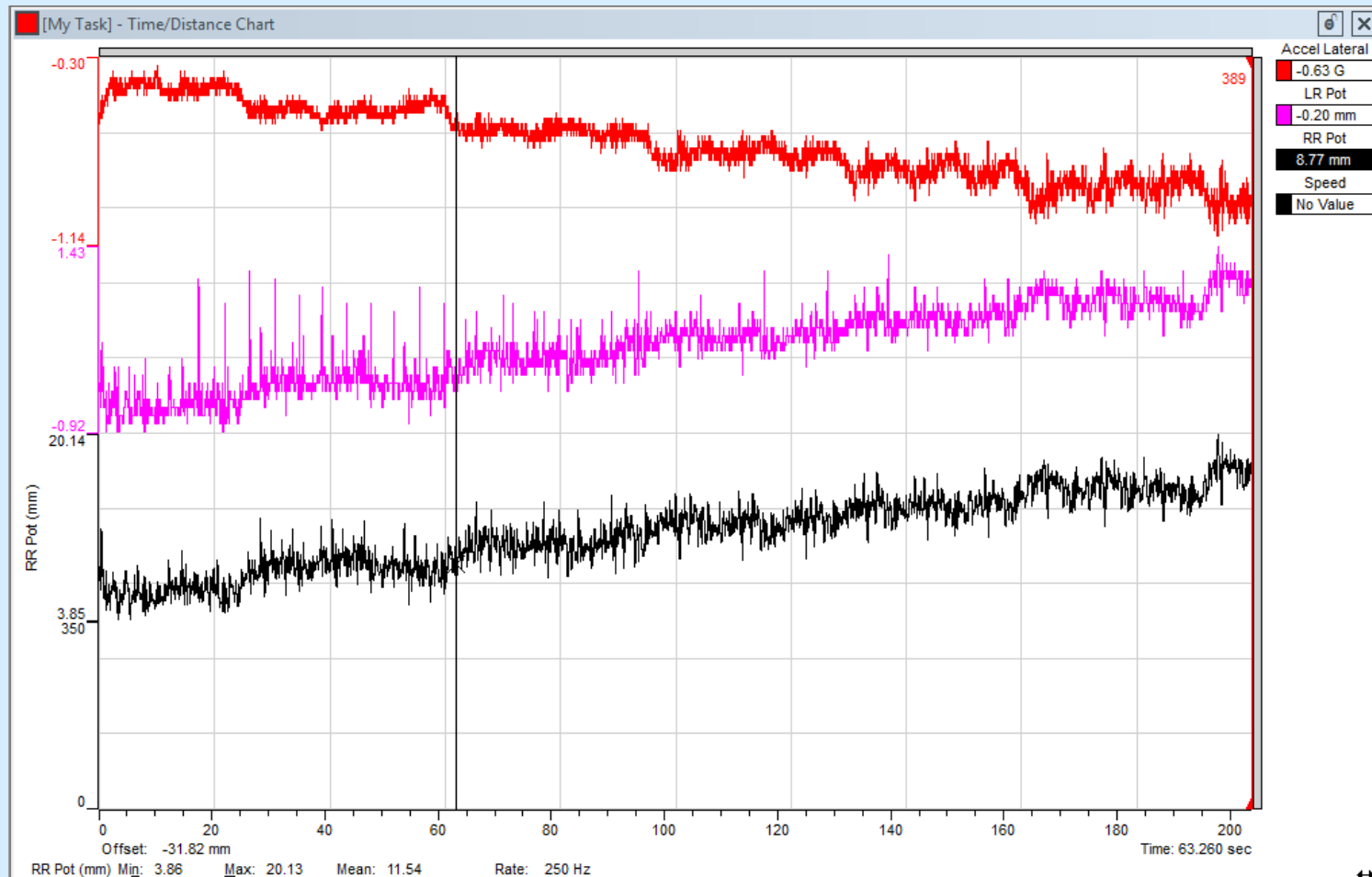
Week 2

Improving the accuracy of
finding the roll angle from data

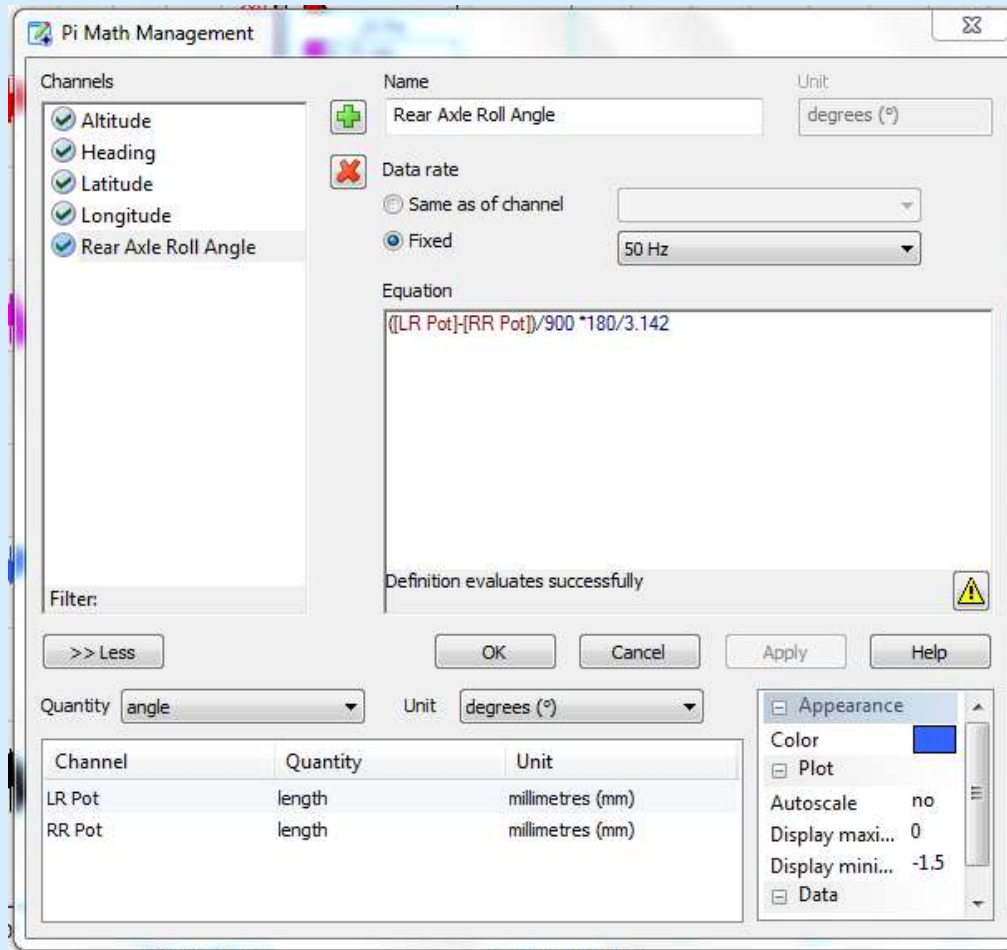
Zero channels



Create lap markers over stable test period



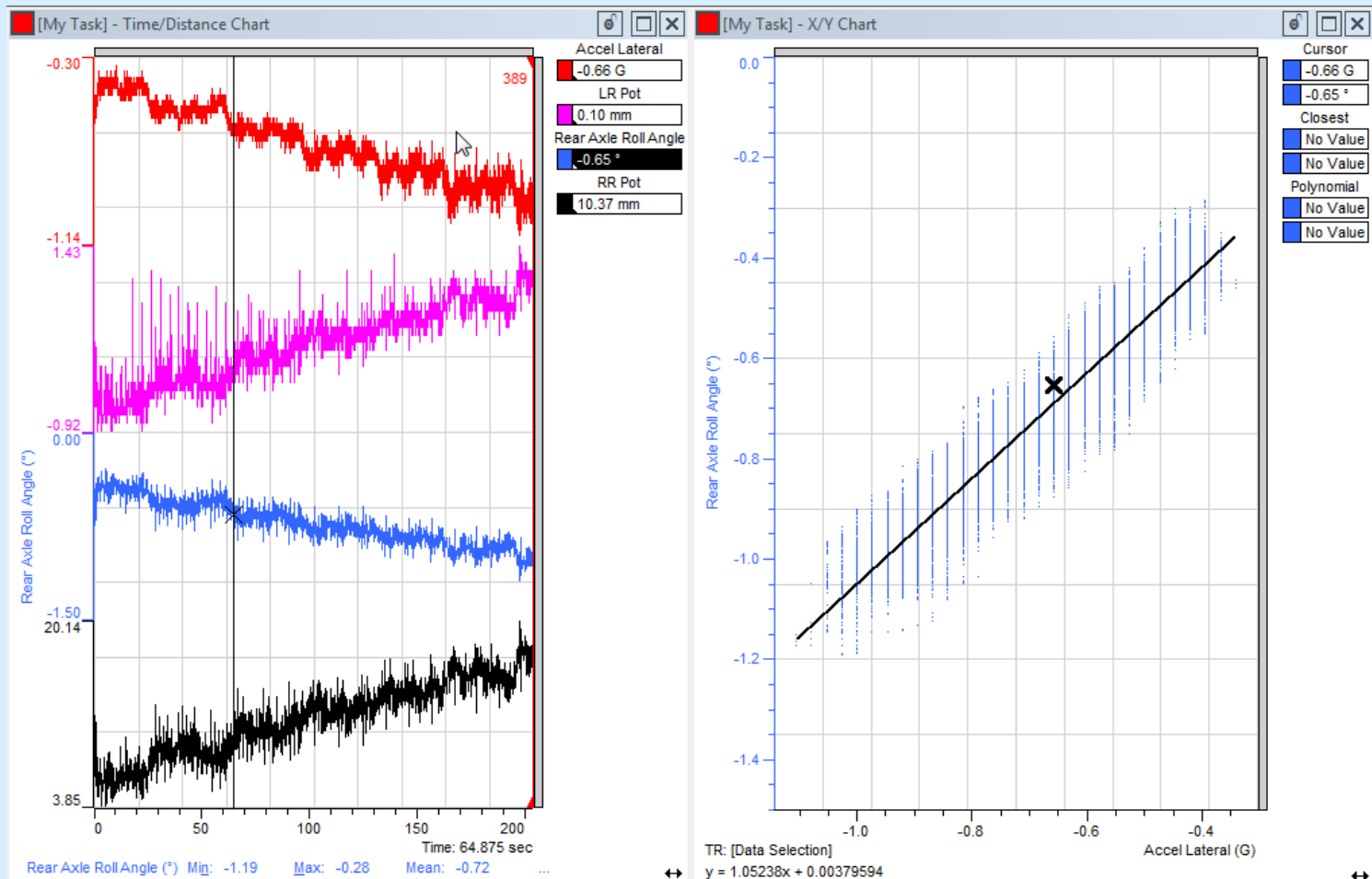
Maths Channel - Rear Roll Angle



NB Assuming Pots are 900 mm apart

XY Plot Lat Acc vs rear Roll Angle

$$y = 1.05238x + 0.00379594$$



Rear Roll Angle as a Function of Lateral Acceleration g

$$y = 1.05238x + 0.00379594$$

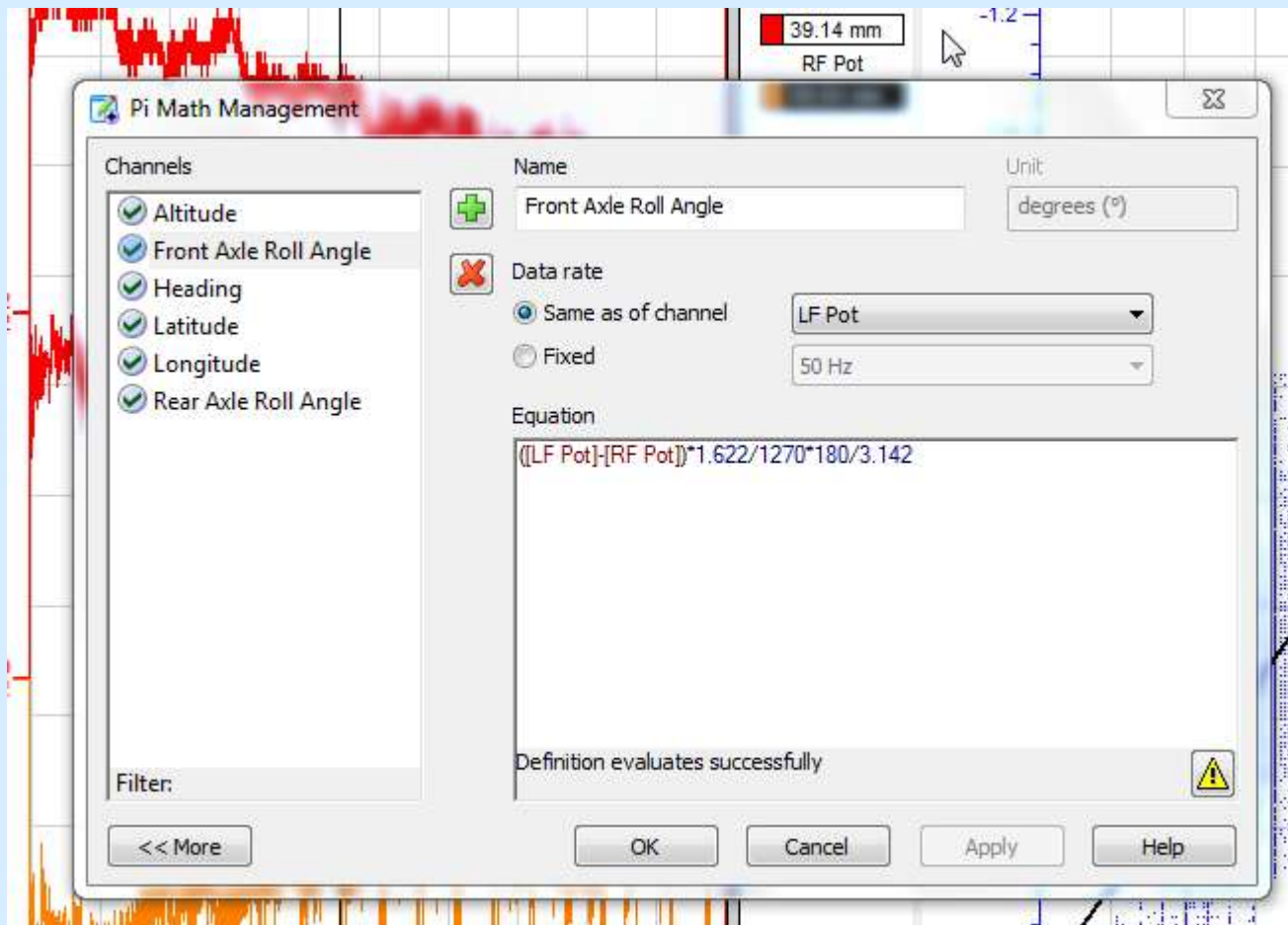
The roll angle is therefore shown to be $1.0528 * \text{Lateral acceleration}$

So at 1 g the roll angle will be 1.0528°

Front Roll Angle

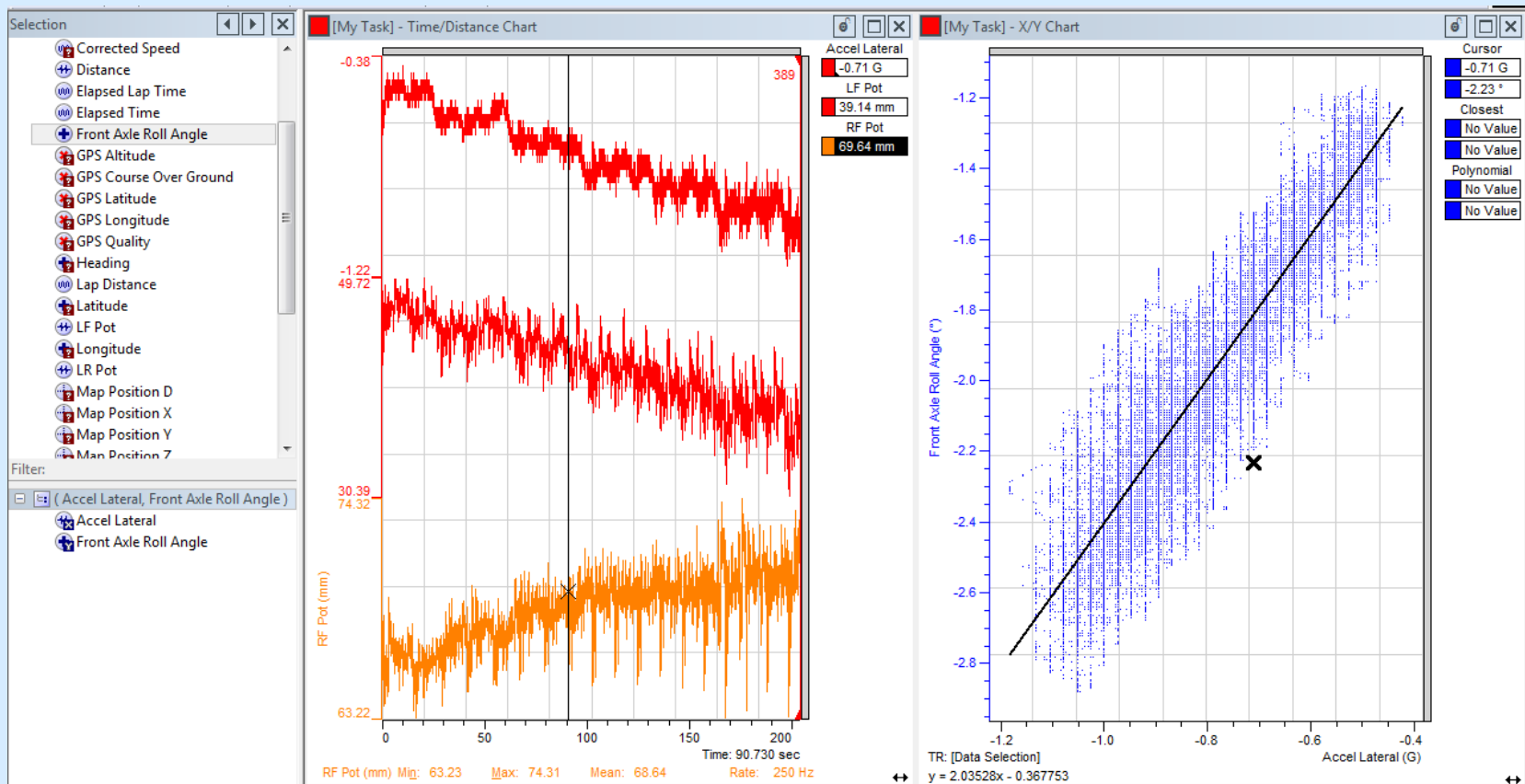
Repeat for the front axle

Front Axle Roll Angle



Front Roll Angle

$$y = 2.03528x - 0.367753$$



Comparison of roll angles

Front Roll angle= $2.035 * \text{Lateral acceleration}$

So 2.035 deg/g

Rear Roll angle = $1.0528 * \text{Lateral acceleration.}$

So 1.0528 deg/g

Overturning moment and Θ at 1g

$$\text{Mot} = \text{MaH}$$

$$= 517 * 9.81 * H$$

$$= 5071.77 * H \text{ Nm}$$

$$\Theta = \text{Mot} / K_{\phi t}$$

$$\Theta = 5071.77 * H / 26536.17$$

$$= 0.191113 * H \text{ rad at 1g}$$

$$= 10.949 * H \text{ deg at 1g}$$

Centre of Gravity Height from XY Plots

Roll angle = $10.949 * H$ deg at 1g

From the rear axle results

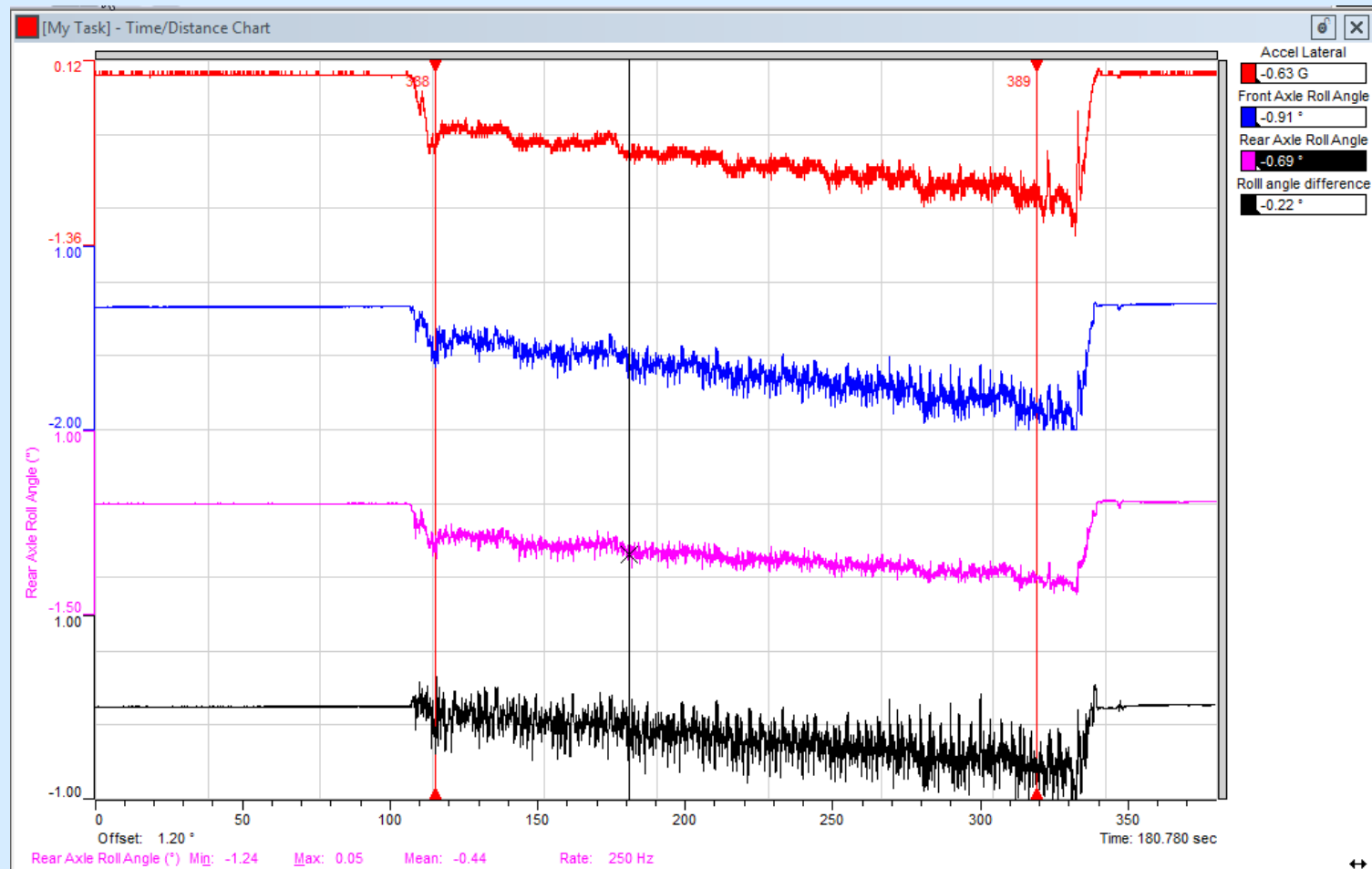
$$H = 1.0528 / 10.949 = 0.09615 \text{ m}$$
$$= \mathbf{96.15 \text{ mm}}$$

From the front axle results

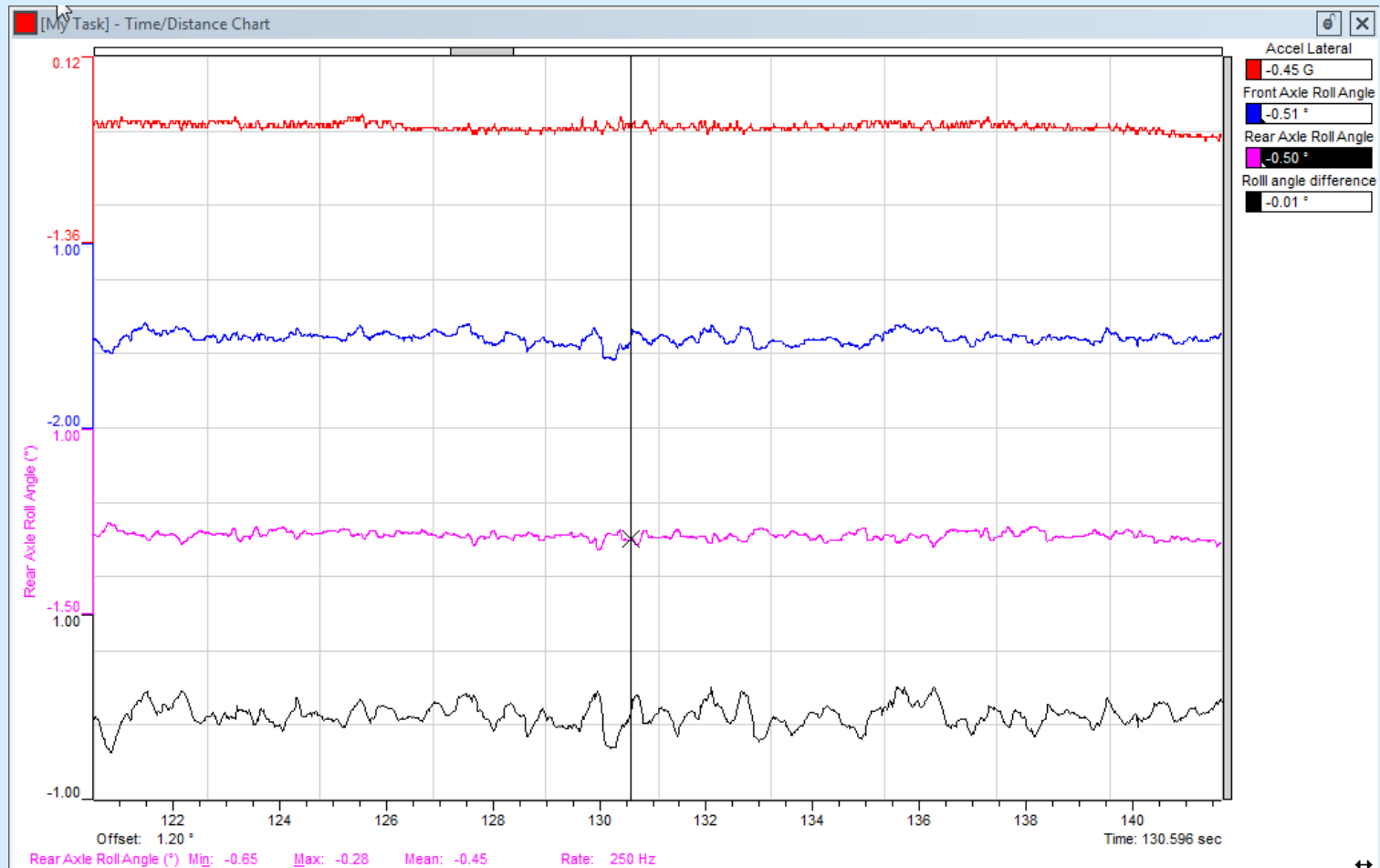
$$H = 2.03394 / 10.959 = 0.1917$$
$$= \mathbf{191.7 \text{ mm}}$$

$$\mathbf{\text{Mean} = 140.87 \text{ mm}}$$

Alternative method to determine mean roll angle



Front and rear roll angles the same



When front and rear axle roll angles are equal

Create a channel for difference between front and rear roll angles

When difference = 0 mm

Lateral acceleration = 0.45g

Roll angle = 0.0505deg

(ie 1.122 deg at 1g)

H = 1.122/10.949

= **102.45 mm**