A complete range of solutions for dynamic vehicle testing.

CORRSYS DATRON Sensorsysteme GmbH

APPLICATION NOTES:
GPS – is it *really* more accurate than optical?

There has been much publicity and many exaggerated claims made as to the accuracy of GPS-based technology for automotive applications. There is no doubt that the GPS sensor has a place – but most accurate? Read on.

There are other issues to consider when comparing real-world accuracy between GPS systems and existing, well-proven technology. One of the most significant problem areas is latency. Latency (the time it takes to process the measurement into a signal output) is present with virtually any speed sensor. Currently, the best GPS sensors have a latency specification of around 80 milliseconds. This may not sound bad – until you compare it to the current range of CORREVIT® optical sensors, which feature a latency figure of just 8 milliseconds.

What does this mean? Well, take for example the standard brake test. The speed of the vehicle is, of course, of great importance, but so is the overall measured braking distance. If the test is to start at 160 kph (44.44 m/s) and the speed-measuring device has a latency of 80ms, there will be a distance increase of 3.55 meters in the overall true braking distance. This compares to an 'error' of only 0.355 meters when using a sensor with 8ms latency. Suddenly, the advantage of the optical sensor becomes abundantly clear.

Often, GPS manufacturers attempt to compensate for this effect with software, post-processing the data and calculating corrected braking measurements. This is presumed to be acceptable until the engineer wants to compare other signals typical in the automotive industry. The output from any sensor cannot be correct in real time and would therefore need individual analysis and correction. This is inconvenient, time consuming, and prevents immediate access to accurate data.

So what about the high accuracy claims made when calibrating the sensor over a measured distance? This is not really that difficult, even an old mechanical 5th wheel can be shown to be distance-accurate given the appropriate favorable conditions.

If a sensor with 400 ms latency is calibrated over a known distance, and the start and end speeds are nominally the same, then the measurement can be acceptable. However, if the calibration was made under hard braking conditions, so that the start and end speeds are quite different, the result would show high levels of inaccuracy.

The CORREVIT® SF II-P 2-Axis Optical Sensor

Since the introduction of GPS sensors, many of our worldwide technical partners and customers have compared the differing types of sensor technologies and the general opinion is that, optical sensors offer potential higher 'real world' accuracy when used with existing data loggers and additional sensors.

Another often overlooked point about the performance specification of some GPS sensors relates to how speed accuracy is derived. Typically, this is done by averaging several samples, taking a 20Hz measurement down to under 7Hz (for a three-sample average).

Finally, regarding the claims of some GPS manufacturers: if their sensors are the most accurate devices available (which is really not the case) what reference was used to prove this? Also, if their GPS is the most accurate what was the value of the reference as their system must have been more accurate?

Non-contact optical measurement of sensor position over ground is clearly more accurate. As the complete solution to your vehicle test requirements, please feel free to contact us to discuss your applications.

For more information, please contact us today.

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