





Figure 1. Video analysis data (red) compared to sensor data (blue) from rear impact sled test at delta-v 7 km/h with the SET 50M. The marker on the pelvis for the video analysis was not visible after 250 ms after impact.

#### IV. DISCUSSION

The analyses of the 7 km/h collisions showed promising initial results. The kinematics of human surrogates in crash tests can be obtained from the TE Connectivity model 633 combined gyro and accelerometer unit for an initial part of the motion. For the angular displacement no significant deviation was seen between the video analysis output and the sensor output for head and T1, but a small discrepancy was observed from around 150 ms for the pelvic motion. The pelvic deviation may however stem from difficulties tracking the pelvis movement from video at larger time values. For the linear displacements, a clear deviation was observed, generally starting between 150 – 250 ms after impact, depending on sensor and direction and this error tended to grow over time. However, further refinements of the software program, as well as additional evaluation testing at higher impact velocities, are needed to evaluate to what extent the dummy kinematics can be accurately obtained from the gyro and accelerometer combination, also for longer test durations. The SETs are constructed to be used in tests up to delta-v 24 km/h and further tests will be done to confirm the expectation that motion from the gyros can be obtained in the same way as been reported in this study for the whole impact range of the SETs.

#### V. ACKNOWLEDGEMENT

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#### VI. REFERENCES

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