



Pedestrian Drop Test Analysis



"Instructors: Tony Becker & Mike Reade"

Location: Waipahu, Hawaii

Date: 26-Jun-13

At the 2009 IPTM Special Problems conference in Orlando, Florida, Dr. John Searle presented an updated paper on pedestrian investigations entitled: "The application of throw distance formulae." This paper discusses several topics such as: Measurement of coefficient of friction, Sandbag coefficient of friction on different surfaces, Field and crash test studies, Semi empirical methods, Throw distance formulae, Comparison of throw equations with field data, Application of the throw distance formulae to individual cases, Alternative approach, Future work, Conclusions. Additionally, this papers discusses several F.A.Q. in the application of the throw distance formulae, the Protocol for the measurement of coefficient of friction, the Derivation of the throw distance formulae and the Layout of example calculation, the calculation of vehicle speed from pedestrian throw distance. The formula below determines the amount of horizontal speed loss after the pedestrian has been projected into the air from a height above the ground. The loss of speed in "feet per second" is added to the results of the pedestrian's slide to stop action along the road surface.

Searle (Horizontal Speed Loss on Landing - 2009):

Where:

- μ = Pedestrian Sliding Friction
- g = Gravity (32.2 f/s/s, or 9.81 m/s/s)
- H = Height Pedestrian Projected From

$$\text{Horizontal Speed Loss on Landing} = \mu \sqrt{2gH}$$

(NOTE: The Horizontal Speed Loss on Landing Results are in FPS or M/S. Results are converted to MPH or KPH in chart below.)

DATA	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Test 11
Ped Drop Speed:	33.00	35.00	34.00	36.00	42.00	49.00	51.00	40.00	35.00	55.00	35.00
Ped Slide Distance:	31.83	38.60	38.80	32.40	52.40	94.20	79.40	56.10	45.30	113.70	41.60
Ped Sliding μ :	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Projectile Takeoff θ :	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Original Vertical Vel:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ped C/M Height:	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	5.50	3.50
Ped Slide Speed:	25.08	27.62	27.69	25.30	32.18	43.14	39.61	33.29	29.92	47.40	28.67
Speed Loss (Landing):	7.94	7.94	7.94	7.94	7.94	7.94	7.94	7.94	7.94	8.47	6.76
Slide + Speed Loss:	33.02	35.56	35.63	33.24	40.12	51.08	47.55	41.23	37.86	55.87	35.43
Ped Drop Speed:	33.00	35.00	34.00	36.00	42.00	49.00	51.00	40.00	35.00	55.00	35.00
Difference:	0.02	0.56	1.63	2.76	1.88	2.08	3.45	1.23	2.86	0.87	0.43

(Converting between units: KPH = MPH * 1.609 | MPH = KPH / 1.609)

Disclaimer: Documentaion is provided to supplement IPTM Crash Testing.
Additional training required to fully understand the technical analysis.