iCSC 2014 International Cycling Safety Conference
November 18-19, 2014
Gothenburg, Sweden

Braking tests on a variety of urban bicycles

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The objective

- To measure and compare real world braking performance on the street, with a wide variety of bikes and braking systems.
- The same stretch of bike/car route in West Point Grey was used for all tests – asphalt downgrade, some crazing.
- Six bikes, four wheel sizes, four brake types, three rim materials – including..

The all-plastic Itera

Designed in Goteborg, made at Vilhelmina in Lappland

ifficult to instrument with its 8 wheel compression spokes, but

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The method

stom datalogger was designed, built
programmed to read and store bike
ed/distance, using a reed switch on
bike front fork. Called *Skippy* after
peanut butter jar it was assembled
t fits in any bike water bottle holder.

s the Trondheim, Norway, developed
el *AVRTiny11* microcontroller, just
r 100 Assembler instructions were
ded, along with a custom PC Basic
called *Bike* to download data later in
el format.

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ne camera and route

ngenious small
inexpensive
video camera
n Taiwan, the
Vue128, was
dle-bar
unted for
ording test
ts, voice-overs

The bikes

8 Victoria 20”, sidepull/coaster, 34 lbs,

st Germany

0 Cadillac 28”, mech. disc brakes, 40 lbs,

na

3 CCM Elan 26”, steel rim/sidepulls, 40 lbs,

ada

2 Itera 27”, plastic rim/sidepulls, 40 lbs,

eden

3 Moulton 20” Vbrake/coaster, 32 lbs,

land

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Test Protocol

ach bike 6 emergency brake (EB) stops
20 mph (32 km/hr):

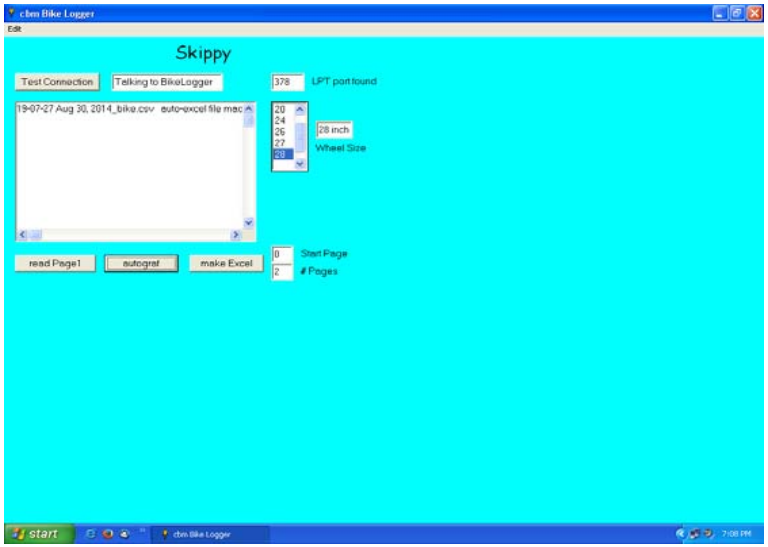
t EB, Rear EB, Full EB, Front EB2, Rear EB2,
EB2

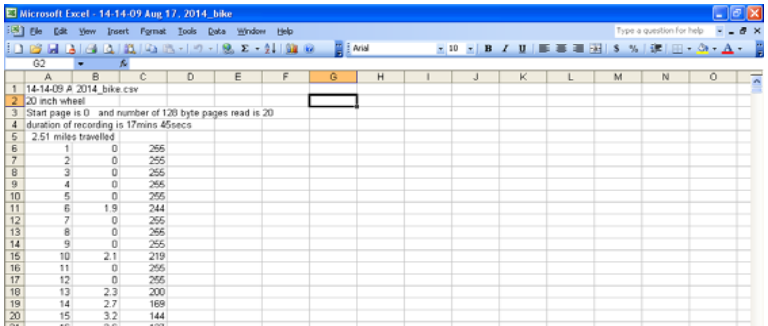
ormed dry on two sunny 25C August days
wet on two raining 13C October days.

n West 8th Ave. between Courtenay and
yn Streets in West Point Grey, Vancouver

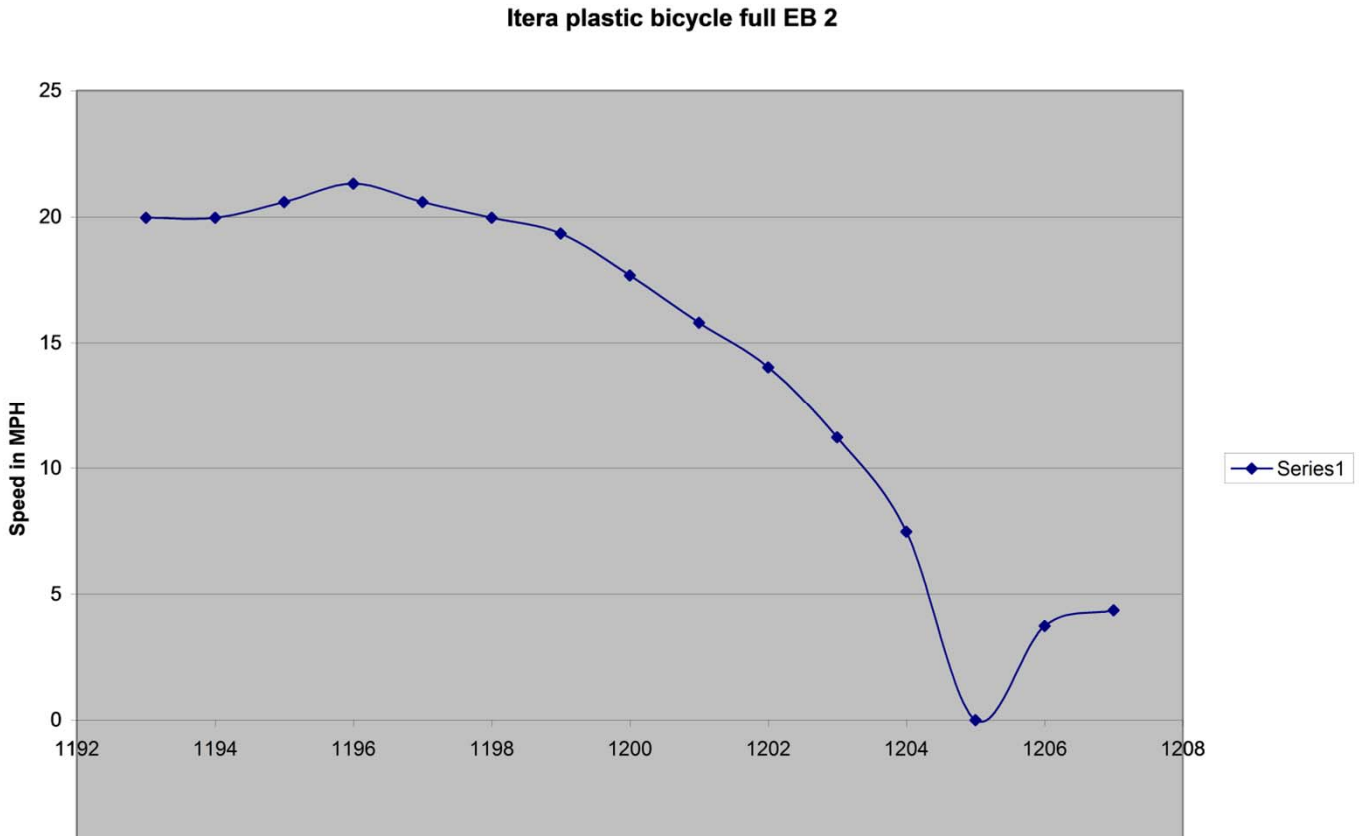
ng always applied at the second lamp
by the same 182 lb. author, using
mum practical force.

o for 71 of the 72 tests – the last test was
pm on 18 October in darkness and
ng rain..





mple Excel graph – Itera, 18 Aug. dry - 0.27g Full EB



The results

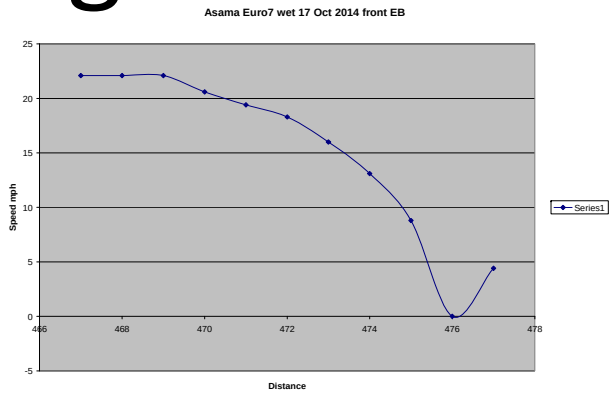
Dry, sunny, 25C

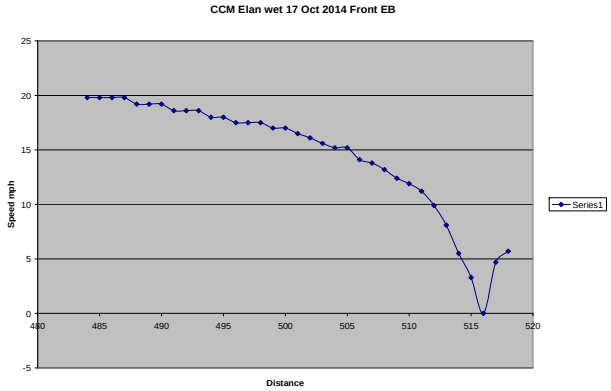
	Front EB 1	Rear EB 1	Full EB 1	Front EB 2	Rear EB 2	Full EB 2
1.Victoria 20”	0.20g	0.28g	0.42g	0.21g	0.25g	0.41g
2. Cadillac 28”	0.36g	0.24g	0.36g	0.46g	0.24g	0.36g
3. CCM Elan 26”	0.28g	0.25g	0.39g	0.28g	0.25g	0.33g
4. Itera 27”	0.13g	0.15g	0.27g	0.15g	0.15g	0.27g
5. Moulton 20”	0.39g	0.36g	0.46g	0.42g	0.22g	0.42g
6. Asama 28”	0.48g	0.24g	0.48g	0.40g	0.21g	0.51g

Wet, Raining, 13C

	Front EB 1	Rear EB 1	Full EB 1	Front EB 2	Rear EB 2	Full EB 2
1.Victoria 20”	0.16g	0.19g	0.31g	0.15g	0.18g	0.28g
2. Cadillac 28”	0.23g	0.16g	0.27g	0.25g	0.17g	0.24g
3. CCM Elan 26”	0.07g	0.02g	0.20g	0.13g	0.18g	0.28g
4. Itera 27”	0.17g	0.13g	0.27g	0.19g	0.15g	0.25g

A good & a bad choice in the rain





sama – 6 wheel revs to stop

CCM – 29 wheel revs to stop!

Conclusions

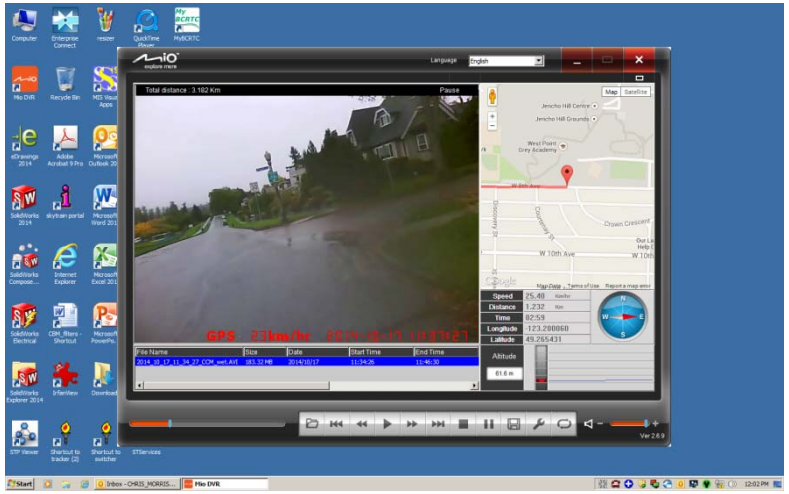
best braking -dry or wet- was Vbrake front, ter rear. The Vbrake was invented by ano in 1996, the Coaster Brake was invented ndred years before that, and is evidently still g strong.

tera had low but dependable braking with astic rims. There was **no fade** in the wet – s credit..

traditional chrome-plated steel rim with oull brake (**CCM**) was **deadly in the wet** – ntially no braking at all on the first EB's. It ns bizarre that millions of urban bikes were e this way in the last century.

ever, the German Victoria steel rim brake did ade as badly, possibly due to the sipes cut the rim.

brakes can be compromised by the rim/tire



The long view from the CCM in the rain

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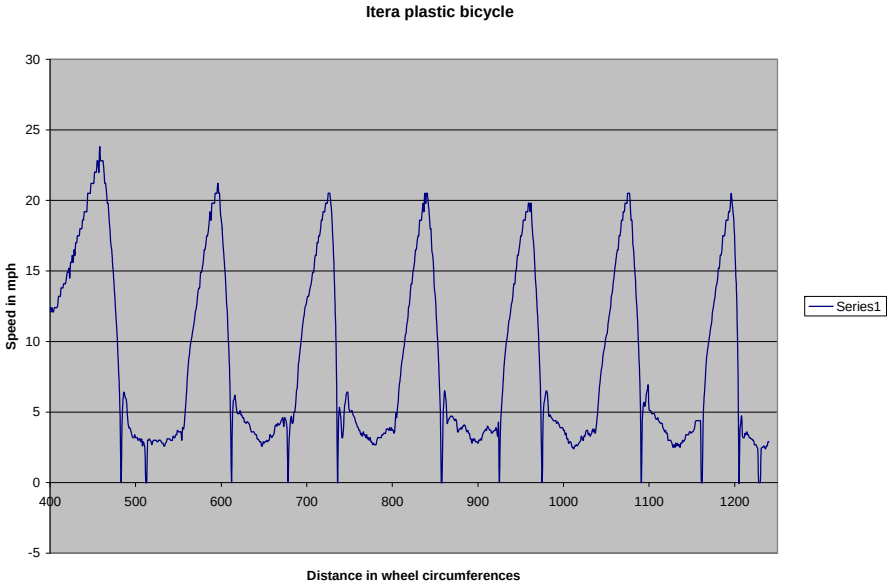
Followup



e this hyperlink to view all Excel files
d .avi videos: http://1drv.ms/1taIw2a

ble calculations and a lot more detail
ne testing are in the full version of the
nical paper.

e spirit of the North American Bike Cooperative
ement, the schematic and both datalogger
ram listings are also included in the paper - to
urage others.

Thank you for the opportunity to present this work