BIGELOW
ACCIDENT RECONSTRUCTION INC.

BAR INC

REPORT ON FORD FIESTA TEST DRIVING

Prepared For:

Charney Lawyers
151 Bloor Street West Suite 602
Toronto, Ontario M5S 1S4

Attention: Mr. Theodore P. Charney

Your File Number: 2043.15
Romeo et al v Ford Motor Company et al

Prepared By:

Neil J. Bigelow, B.Sc., P. Eng.
Consulting Engineer

File: 1510685
March 31, 2017

1 Introduction

Mr. Theodore P. Charney from Charney Lawyers retained Bigelow Accident Reconstruction Inc. to conduct a test drive of a 2014 Ford Fiesta. It is understood that the Ford owners routinely experienced non-uniform vehicle acceleration, with hesitations, shuddering and delayed throttle response, while driving.

Neil Bigelow, P. Eng., Consulting Engineer, has been involved in the field of motor vehicle accident reconstruction and cause analysis since 1994. Experience in motor vehicle accident reconstruction has included inspection and evaluation of collision damaged motor vehicles; evaluation of human, environment and vehicle collision factors; vehicle motion analysis; driver sight distance analysis; driver collision avoidance issues; and, force analysis. He has testified as an expert witness on these matters and others at several trials and hearings in the Province of Ontario. A statement of qualifications is attached to the end of this report together with an executed copy of Acknowledgment of Expert's Duty Form 53.

2 Ford Fiesta Test Drive

I conducted a test drive of a 2014 Ford Fiesta owned by Mr. and Mrs. Romeo, in a naturalistic manner on October 29, 2015. Testing was conducted by driving along public roads in and around the City of Brampton, Ontario. A 50 kilometre distance was traveled. Vehicle speeds varied under city and highway conditions. Several left and right turns were completed while driving.

The Ford was a black, SE model Fiesta, 4 door hatchback manufactured on December 9, 2013. The vehicle identification number was 3FADP4EJ1EM143961. The odometer reading

was 38,046 kilometers. The automatic transmission included a Drive and Sport selection. Both selections were used during the test drive.

Figure 1: Ford Fiesta

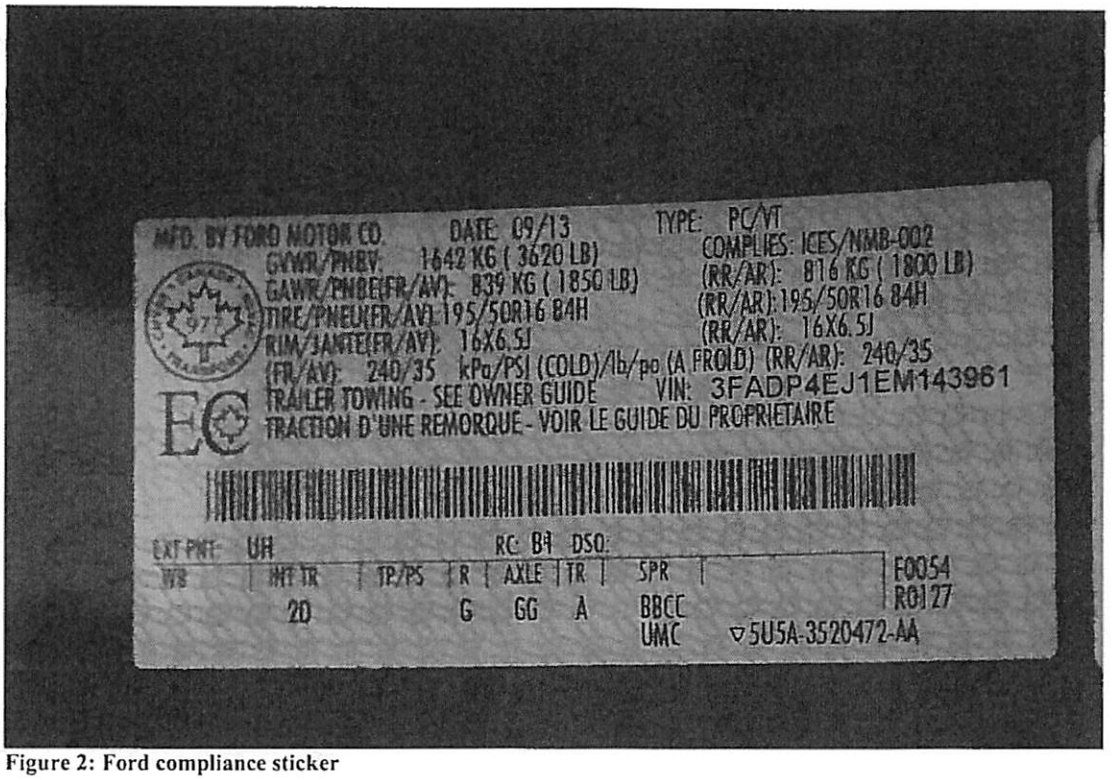


Figure 2: Ford compliance sticker

The test drive started with a cold vehicle engine. The Ford was found parked outside in the residential driveway of the Romeo home. Mrs. Romeo provided me with the ignition key for the purpose of my test drive.

The Ford was equipped with Video VBox test equipment for the test drive. The Video VBox equipment used for this purpose recorded video, inside and outside the test vehicle while driving, and real-time vehicle speed, locations and accelerations. The parameters were sampled 10 times per second. Specifications of the Video Vbox GPS based data logging equipment with video and audio are attached in Appendix 1[1].

I commonly experienced poor response to throttle pedal application from various speeds throughout my test driving. Acceleration from a stop was routinely not uniform, delayed and

[1] Appendix 1 – Specifications of the GPS based data logging equipment with video and audio.

sluggish. Acceleration from speed was also delayed, but less so and produced harsh transmission shifts that were both heard and felt. On some occasions, I also experienced engine rpm staying high, even though I already released the accelerator pedal. My experience was similar while driving in Sport position only from higher rpm values.

The Ford was not pleasant to drive, despite the low mileage and the nearly new model year. If there comes a time for vehicle resale, it will not show well during a test drive by perspective buyers, based on my analysis.

3 Potential Vehicle Collision Risk

If a vehicle does not perform as a driver expects, or if vehicle performance is not predictable or uniform, then there could be increased collision risk, especially in the presence of other traffic.

When starting from a stop, a driver releases the brake pedal and then brake lights go off. The driver of a following vehicle then would expect that the leading vehicle would move. If that expectation is violated there is increased risk for a rear end collision into the Ford.

When the vehicle driver applies the accelerator pedal, there is a need for and an expectation of the vehicle increasing its speed and moving forward. If that expectation is violated then there would also be increased risk for a collision with other traffic. This time the collision risk could be during a turning movement with opposing traffic.

4 Comparison of Vehicle Acceleration and Motion Profiles

Following the Ford test drive from October 29, 2015, the Ford's speed and longitudinal acceleration data from the video VBox test data were compared against the results of further video VBox testing. This time the test vehicle was a 2015 Audi A3. The Audi A3 was equipped with a dual clutch transmission[2], generally similar to the Ford Fiesta.

4.1 Left Turns

We completed several left turns at intersections during our testing of the Ford Fiesta. One of our left turns is shown in Video 1 in Appendix 2. For this left turn, we were initially stopped within the extension of a left turn lane at a traffic signal light controlled intersection. We initiated a left turn once opposing traffic cleared. The Ford's tachometer was visible in the video. A sudden drop in the tachometer reading indicated an upshift gear change.

Figure 1 below illustrates the speed and acceleration profile during this left turn. The times when upshift gear changes occurred are shown in Figure 1.

[2] Audi's Dual Clutch transmissions are referred to as S tronic transmissions

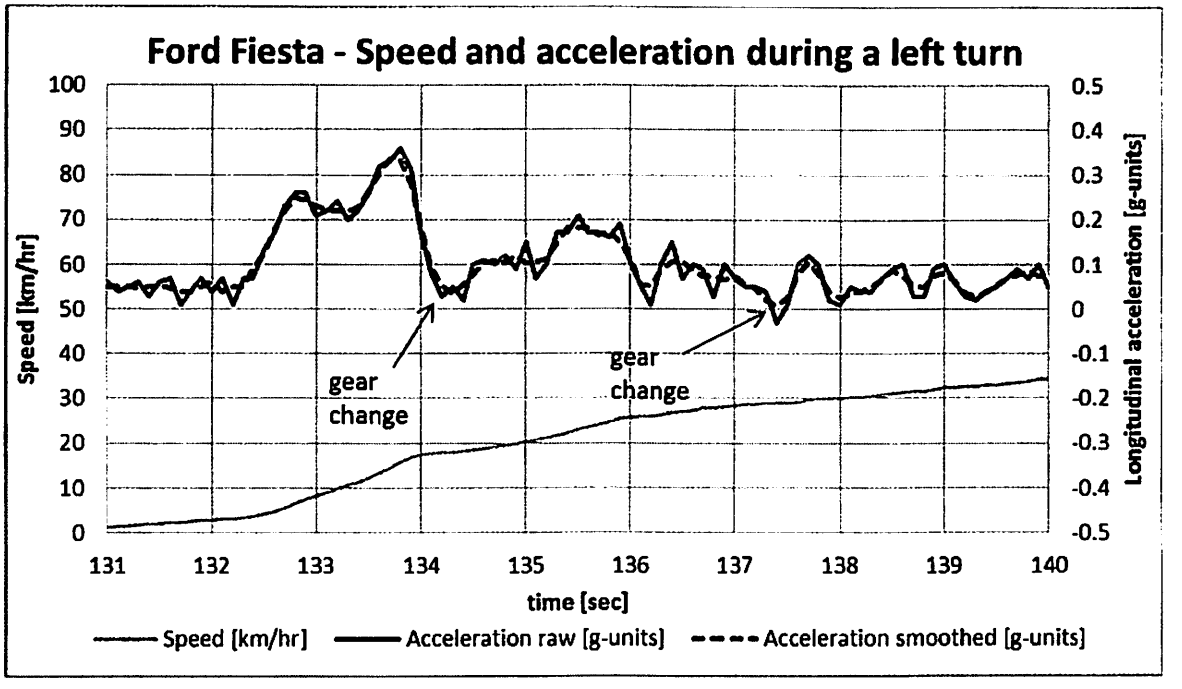


Figure 3 - Ford Fiesta Speed and Acceleration when starting a left turn

We noted during the Ford's left turn that there was a sudden vehicle acceleration drop from 0.36 g-units to 0.02 g-units, coinciding with an upshift gear change, 1.6 seconds after initiating the left turn. This acceleration drop lasted 0.6 seconds, and then increased marginally to 0.1 g-units for 0.8 second. It then increased to 0.17 g-units. The Ford completed its left turn in approximately 4.5 seconds.

The comparison Audi A3's speed and acceleration profile during a similar left turn is illustrated in Figure 2 below. Video 2 in Appendix 2 further shows the comparison Audi A3 making a left turn. Compared to the Ford Fiesta, the Audi A3 did not exhibit the same sudden acceleration drop during its gear changes. The effect of gear changes were near negligible in the Audi. The Audi's changes in acceleration were generally smoother.

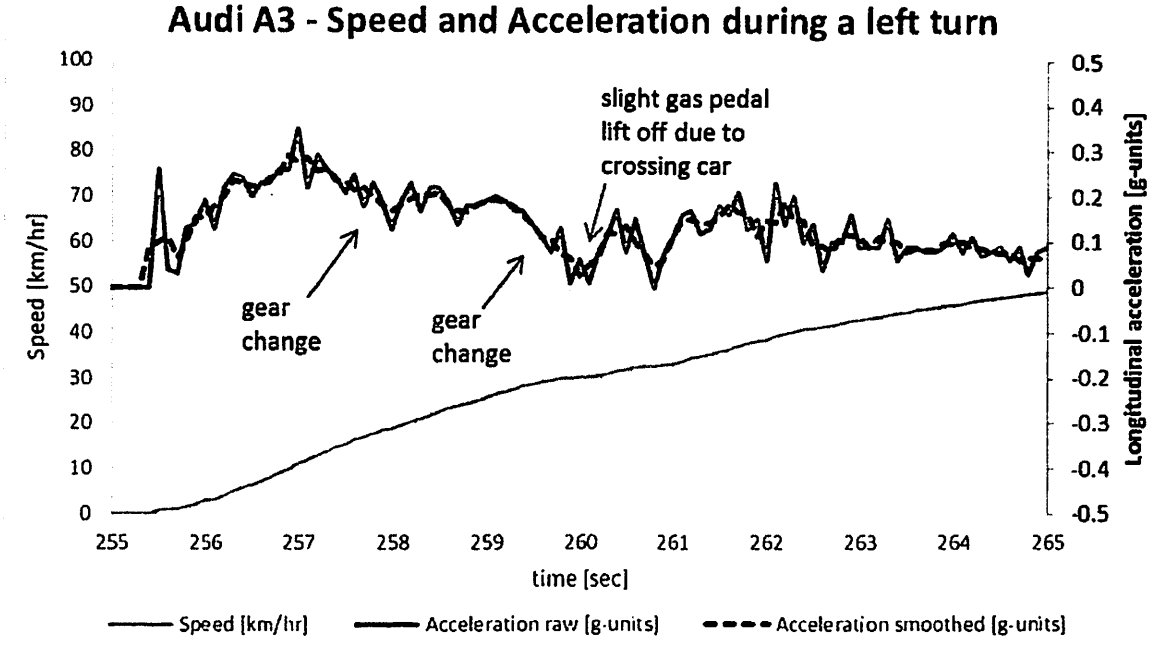


Figure 4 - Audi A3 Speed and Acceleration when starting a left turn

The Ford's drop in acceleration during gear changes could increase the risk for collision with opposing or with crossing traffic, during left turns. If the Ford had been able to maintain a 0.25 g-units acceleration rate, instead of dropping to 0.02 g-units and 0.1 g-units for the 1.4 seconds after the start of its gear change, then it would have completed its left turn 0.5 seconds faster.

In instances where Ford Fiesta drivers expect to able to maintain an average 0.25 g-units acceleration rate during a left turn and expected to able to complete their left turns in 4.0 seconds, they may instead require 4.5 seconds to complete their left turn, due to the sudden acceleration drop. At a time 4.0 seconds into their left turn, when these drivers intended to have cleared the intersection, they may instead be located 4.0 metres back from their intended location, due to the accelerate drop.

4.2 Right Turns

We also completed several right turns at intersections during our testing of the Ford Fiesta. One of our right turns using the Ford Fiesta is shown in Video 3 in Appendix 2. A right turn for the comparison Audi is shown in Video 4 in Appendix 2. The associated speed and acceleration profiles for these right turns are illustrated in Figures 3 and 4 below.

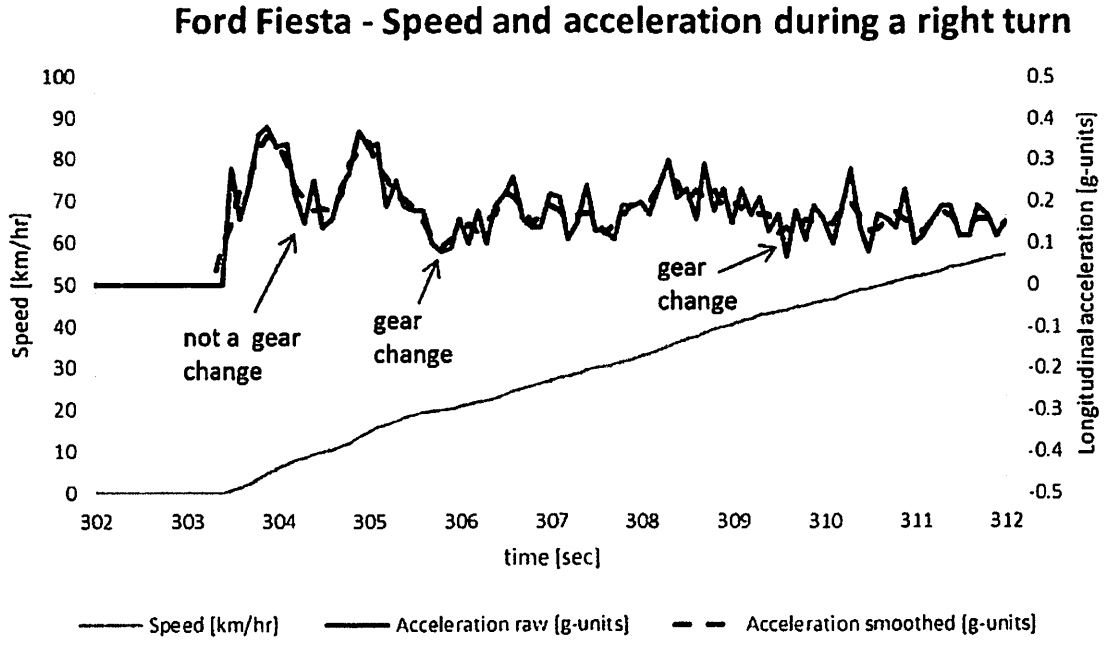


Figure 5 - Ford Fiesta Speed and Acceleration when starting a right turn

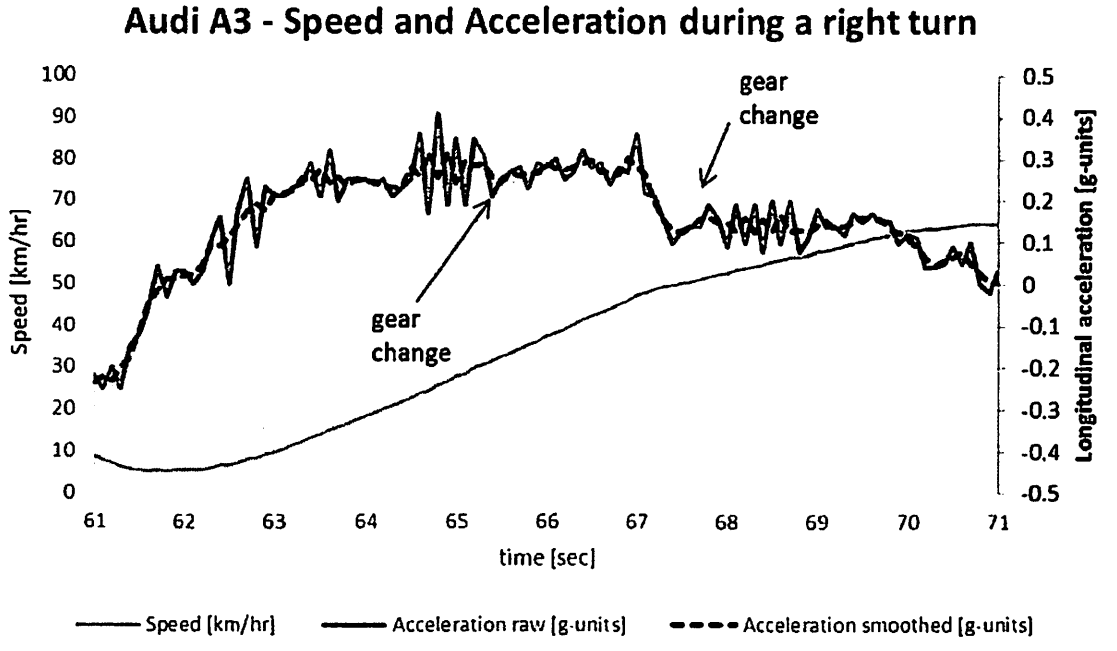


Figure 6 - Audi A3 Speed and Acceleration when starting a right turn

We found that, 0.8 seconds after initiating the right turn with the Ford Fiesta, it experienced a sudden acceleration drop, lasting 0.7 seconds. The Ford's acceleration decreased from 0.34 g-units to 0.14 g-units. This acceleration drop was not associated with a gear change. This was a common occurrence during our testing of the Ford Fiesta, when accelerating from a stop. No such acceleration drop was found with the Audi.

The Ford completed its right turn in 4.1 seconds. If the sudden acceleration drop had not occurred and if the Ford had maintained an acceleration rate of 0.34 g-units, then the Ford would have completed the right turn in 0.3 seconds faster. In instances where Ford Fiesta drivers are turning right to merge with through traffic, and expected to be able to complete a right turn, these drivers may instead be located 2.6 metres back from their intended location, due to the acceleration drop. This delay could further increase the risk for collision.

4.3 Straight Driving Movement

One of our forward, straight accelerations from a stop with the Ford Fiesta is shown in Video 5 in Appendix 2. A forward acceleration for the Audi is shown in Video 6 in Appendix 2. The associated speed and acceleration profiles for the forward acceleration are also illustrated in Figures 5 and 6 below.

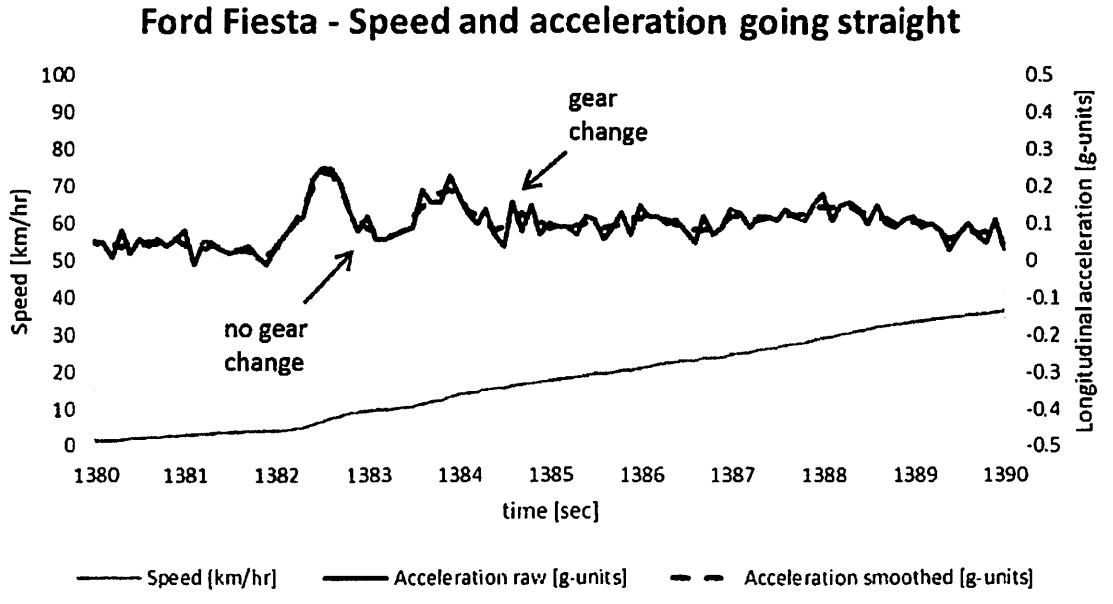


Figure 7 - Ford Fiesta Speed and Acceleration when accelerating forward from a stop

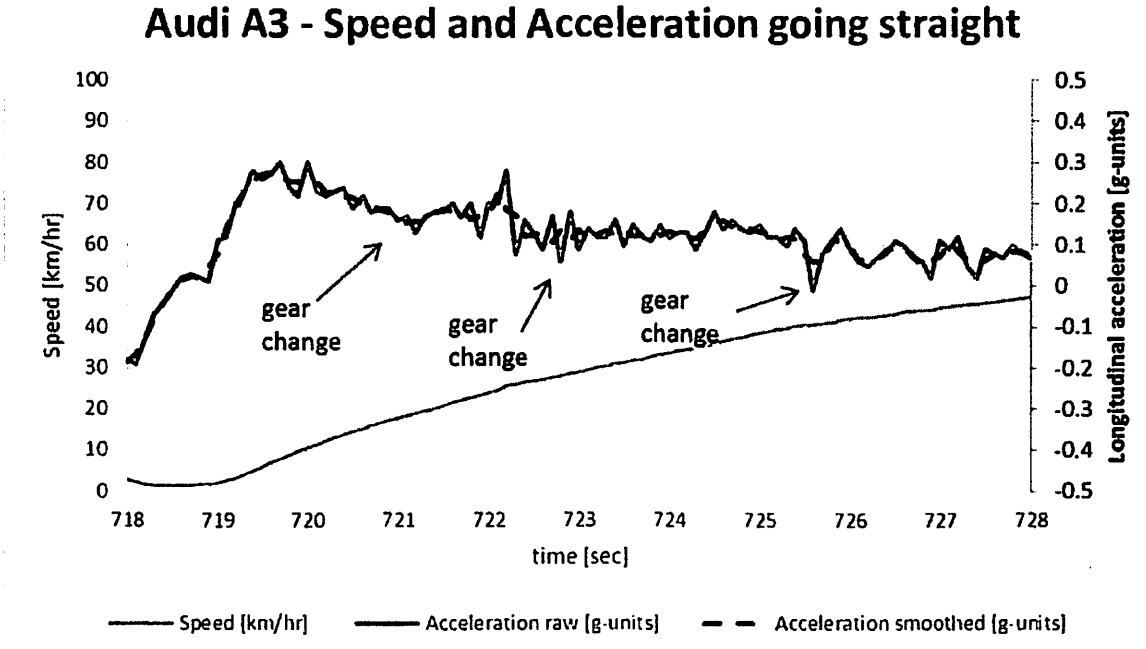


Figure 8 - Audi A3 Speed and Acceleration when accelerating forward from a stop

During this acceleration, the Ford experienced a similar sudden acceleration drop, starting 0.8 seconds after it began accelerating, and it lasted 0.8 seconds. The acceleration rate decreased from 0.25 g-units to 0.06 g-units in this time. This acceleration drop was not associated with a gear change.

If the Ford had maintained an average acceleration rate of 0.25 g-units during the 0.8 seconds, its speed would have been 4.6 kilometres per hour faster. After 2 seconds after the start of the Ford's acceleration, The Ford would have travelled 1.1 metres less than, if it had been able to maintain 0.25 g-units acceleration, due to the acceleration drop.

When starting from a stop, a driver behind the Ford Fiesta could expect it to accelerate close to 0.25 g-units, based on the Ford's initial acceleration. The Ford's sudden acceleration drop could then create an unexpected hazard for the driver following behind. If the driver behind the Ford was less than 1.1 metres distance behind the Ford when starting from a stop, and was

not able to respond to the Ford's sudden acceleration drop in time, he would strike the rear of the Ford.

5 Conclusions

Following my 2014 Ford Fiesta test drive it is my opinion that:

1. Non-uniform acceleration with hesitation periods were found to exist in the Ford Fiesta.

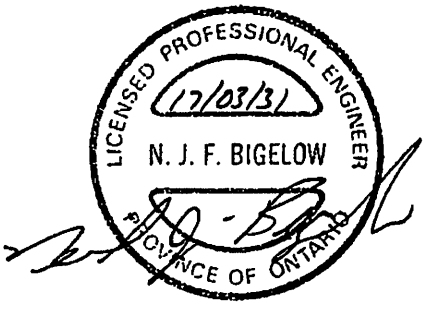
2. The Ford Fiesta acceleration included a delayed response to the throttle position during routine driving.

3. There would be perceivable driving scenarios where an increased collision risk exists while driving the Ford Fiesta.

This report is now complete. If new information becomes available, it should be reviewed for further analysis and opinions.

Yours truly,
Bigelow Accident Reconstruction Inc.

File:1510685



TAB 1

RACELOGIC VBOX

Video VBOX Lite

10Hz GPS Data-logger with Integrated Video and Graphics

Specifications

Accuracies and Outputs

GPS Parameters
These parameters can be used to drive gauges, bar graphs, circuit maps and text: Speed, Track Position, Heading, Height, Vertical Velocity, Longitudinal acceleration, Lateral acceleration, Distance, Radius of Turn

Accuracies Overview	
Update Rate	10Hz
Speed	±0.2km/h
Position	±5m day-to-day; ±0.5m lap-to-lap **
Height	±10m
Lateral Acceleration	±0.5%
Longitudinal Acceleration	±0.5%
Radius of Turn	±5cm
Distance	±0.05%
Time Resolution + Accuracy	0.01 s

Velocity	
Accuracy	0.2 Km/h (averaged over 4 samples)
Units	Km/h or Mph
Maximum update rate	10 Hz
Maximum velocity	1000 Mph
Minimum velocity	0.1 Km/h
Resolution	0.01 Km/h
Latency	>160ms

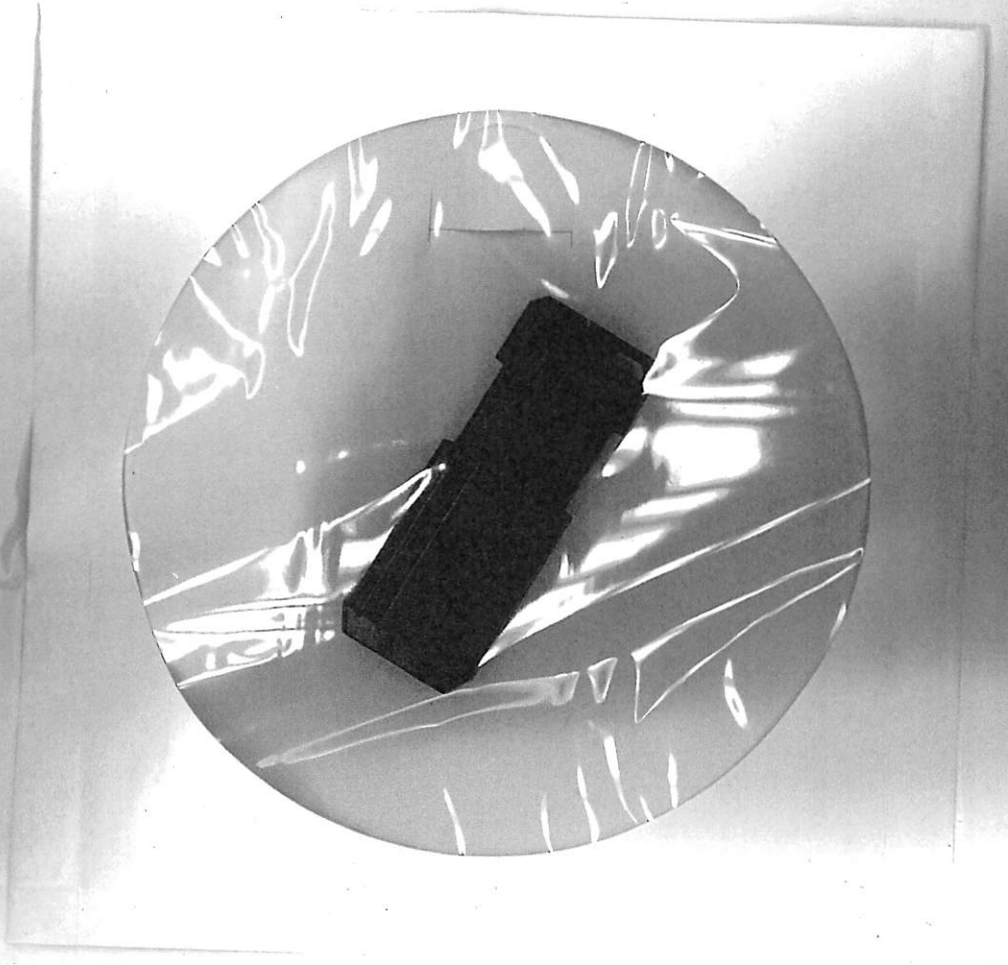
Distance	
Accuracy	0.05% (<50cm per Km)
Units	Metres / Feet
Maximum update rate	10 Hz
Resolution	1cm
Height accuracy	10 Metres @ 95% CEP**

Heading	
Resolution	0.01°
Accuracy	0.2°

Acceleration	
Accuracy	1%
Maximum	4 G
Resolution	0.01 G

TAB 2

Appendix 2



TAB 3

FORM 53

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is Neil Bigelow. I work at 7100 Woodbine Avenue Suite 219, in the Town of Markham, ON, L3R 5J2, in the Province of Ontario.

2. I have been engaged by Mr. Ted Charney from Charney Lawyers on behalf of the Plaintiffs, Romeo, to provide evidence in relation to the above-noted court proceeding.

3. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:

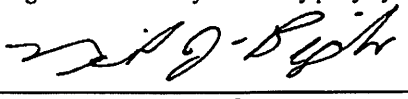
   (a) to provide opinion evidence that is fair, objective and non-partisan;

   (b) to provide opinion evidence that is related only to matters that are within my area of expertise; and

   (c) to provide such additional assistance as the court may reasonably require, to determine a matter in issue.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date .....March 31, 2017.....



Signature

NOTE: This form must be attached to any report signed by the expert and provided for the purposes of subrule 53.03(1) or (2) of the *Rules of Civil Procedure.*

RCP-E 53 (November 1, 2008)

BIGELOW
ACCIDENT RECONSTRUCTION INC.

BAR INC

Curriculum Vitae

Of

Neil J. F. Bigelow, B.Sc., P. Eng.

Consulting Engineer

7100 Woodbine Ave., Ste. 219, Markham, Ontario L3R 5J2
T 905-943-7992 • F 905-943-7993 • neil@barinc.ca • www.barinc.ca

Neil J. F. Bigelow, B.Sc., P. Eng.
Consulting Engineer

WORK EXPERIENCE

Bigelow Accident Reconstruction Inc.
2007 - Present
Forensic Accident Reconstruction

Reconstruction of motorcycle, snowmobile, bicycle, passenger motor vehicle, commercial motor vehicle, transit vehicle and pedestrian collisions with respect to:

Vehicle Motion, Speed and Collision Analysis
Computer assisted reconstruction and simulation – MARC1, PC-Crash, I.DRR.
Vehicle Inspections
Vehicle Collision Damage Analysis
Seat belt use analysis
Vehicle Crash Data Retrieval and Analysis (with Bosch CDR Tool)
Driver Hazard Perception and Reaction and Collision Avoidance Analysis
Driver Vision Field Analysis and Lighting Studies
Collision Scene/Site Investigation
Evaluation of Road Maintenance and Traffic Control Devices
Site Mapping in 2D and 3D, Videography and Photography
GPS Data Logging of Collision Site and Vehicle Paths with Speed/Distance

Evaluation of products, materials and equipment failures.
Completion of site examinations, testing and analysis.

Evaluation of Personal Injury Incidents with respect to:

Analysis of pedestrian slip, fall, misstep and trip accidents

Slip testing of walking surfaces - including pedestrian walkways, stairs, ramps, landings, bathing surfaces and building exits.

Incident site inspections to analyze construction materials, walking surface maintenance, walking surface condition, lighting levels and construction compliance.

Interpretation and evaluation of Standard Practices and requirements under the Ontario Building Code, Lighting Standards, OPSS, ASTM requirements, Canadian Standards Association requirements and Manufacturer's use Specifications.

WORK EXPERIENCE (continued)

Slip resistance testing with English XL VIT on pedestrian walkway surfaces, stairs, ramps, floor materials and exit passageways. Testing is done under dry, wet or otherwise contaminated conditions.

Rochon Engineering Incorporated
Consulting Engineers and Code Consultants
1996 - 2007
Forensic Accident Reconstruction

Reconstruction of motorcycle, snowmobile, bicycle, passenger motor vehicle, commercial motor vehicle and pedestrian collisions with respect to:

Vehicle Motion and Collision Analysis
Vehicle Factors
Vehicle Inspections
Collision Avoidance
Computer assisted reconstruction and simulation – MARC1
Accident Scene/Site Investigation and Mapping
Evaluation of Road Maintenance and Traffic Control Devices

Evaluation of products, materials, equipment and failures.

Evaluation of Personal injury incidents; slip testing with Brungrabber MarkII, interpretation of applicable requirements under the Ontario Building Code, Canadian Standards Association, Manufacturer's Specifications, the Fire Code and Material and Environmental Standards as applicable to the incident. Inspection and testing of stairs, ramps, floor materials and exit passageways.

Battaglia De Berardis Rochon and Associates Inc.
Architect/Forensic Consulting Engineers/Code Consultants
1994 - 1996
Fire Protection and Forensic Accident Reconstruction

Reconstruction of motorcycle, snowmobile, bicycle, passenger motor vehicle, commercial motor vehicle and pedestrian collisions with respect to:

Vehicle Motion and Collision Analysis
Vehicle Factors
Collision Avoidance

WORK EXPERIENCE (continued)

Vehicle Inspections
Accident Scene/Site Investigation and Mapping

Evaluation of products, materials and equipment failures

Evaluation of Personal injury incidents such as pedestrian slips, falls and trips; evaluation of applicable requirements under the Ontario Building Code, Canadian Standards Association, Manufacturer's Specifications, the Fire Code and Material and Environmental Standards.

Fire and Life Safety evaluation of architectural drawings to ensure that all plans conform to the Ontario Building Code, the Ontario Fire Marshal's requirements and related standards.

EDUCATION

Bachelor of Science in Engineering - 1994
Mining Engineering, Michigan Technological University,
Houghton, Michigan.

Mining Engineering Technician - 1991
Northern College, Haileybury Campus,
Haileybury, Ontario.

ADDITIONAL COURSES AND SEMINARS

Institute of Police Technology and Management, University of North Florida
- At Scene Traffic Accident Investigation - 1994
- Inspection and Investigation of Commercial Vehicle Accidents - 1994
- Advanced Traffic Accident Investigation - 1995
- Speed Analysis - 2002

Society of Automotive Engineers
- Motor Vehicle Accident Reconstruction - 1998
- Vehicle Accident Reconstructon Methods – 2006
- Driver Distraction from Electronic Devices - 2015

ADDITIONAL COURSES AND SEMINARS (continued)

PC-Brake Inc.
- Commercial Vehicle Accident Reconstruction and Air Brake Analysis - 2007
- Motor Vehicle Accident Reconstructon with MARC1 Software - 2008
- Motor Vehicle Accident Reconstructon Course with Crash Testing - 2009
- Vehicle Underride Collision Analysis with Underride Crash Testing - 2009

Ryerson Polytechnic University
- Materials Science Fundamentals - 1997

Cansel (Survey Equipment & Systems)
- Introduction to the Topcon GPT-1003 Pulse Total Station - 1998
- Use of the Topcon GPT-1003 Pulse Total Station - 1998

Geoshack Canada
- Use of Topcon GPT-9005 Auto Tracking Robotic Pulse Total Station - 2007

Collision Safety Institute/CATAIR
- Crash Data Retrieval (CDR) System Operator - 2002
- Crash Data Retrieval (CDR) - 2005

William English Inc. – English XL, VIT Slipmeter Use and Testing
- English XL Certification Course - 2009
- Using the English XL Variable Incidence Tribometer Expertly
- Certified as CXLT – 2009
- Re-certified as CXLT – 2012
- Re-certified as CXLT - 2015

Orlando Florida - MEA
- PC – Crash 8.3 Introduction and Use Workshops - 2011

Crash Data Specialists/CATAIR
- Crash Data Retrieval (CDR) System Operators Course - 2011
- Crash Data Retrieval (CDR) Analysis and Applications Course- 2011

Crash Safety Solutions
- Driver rider and truck driver forward, backing, lateral acceleration - 2016
- Pedestrian walking speeds and gap acceptance- 2016

PROFESSIONAL MEMBERSHIPS

Professional Engineers of Ontario (PEO) – Professional Engineer Designation 1999
Professional Engineers of Ontario (PEO) – Consulting Engineer Designation 2004
Society of Automotive Engineers (SAE)
Canadian Association of Technical Accident Investigators and Reconstructionists (CATAIR)
Ontario Society of Professional Engineers (OSPE)
Canadian Associaton of Road Safety Professionals (CARSP)

ONGOING TESTING and RESEARCH

Vehicle longitudinal accelerations with VBOX, Video VBOX, Vericom VC4000DAQ
Vehicle lateral accelerations with VBOX , Video VBOX, Vericom VC4000DAQ
Roadway frictional drag factors analysis and testing
Seatbelt use and non-use by vehicle occupants
Vehicle Defect Investigations
Path visibility from vehicle lighting systems during straight and curved travel
The Canadian Association of Road Safety Professionals – technical paper reviewer
Slip index testing of walking surfaces in both interior and exterior environments

PUBLICATIONS and PRESENTATIONS

Evaluation of Vehicle Damage Profiles, 1996
Vehicle Lamp On/Off Analysis, 1996
Child Restraint Systems for Passenger Vehicles, 1998
Motor Vehicle Accident Reconstruction as a Tool for Claims Management, 2002
Vehicle and Pedestrian Collisions, 2003, 2008, 2015
Slips, Trips, Missteps and Falls presentations, 2004, 2005, 2010, 2011, 2014, 2015
Accident Reconstruction Class 101, 2008, 2015
Various Presentations/Seminars to insurance claims adjusters, plaintiff lawyers, defence lawyers – 1996 to present day
Technical Reviewer of paper submissions to CARSP

COURT EXPERIENCE

Ontario Court of Justice – Superior Division (Civil proceedings)
Ontario Court of Justice – Provincial Division (Highway Traffic Act proceedings)
Ontario Court of Justice – Provincial Division (Criminal Code proceedings)
Testimony at Ontario Arbitrations
Testimony at Ontario Mediations and Hearings