

**UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
CORPUS CHRISTI DIVISION**

CHARLES SILVAS and GRACE SILVAS,

Plaintiffs,

v.

GENERAL MOTORS LLC

Defendant.

Civil Action No. 2:14-cv-00089

AFFIDAVIT OF ANTONIO ANTONUCCI

I, Antonio Antonucci hereby declare as follows:

1. My name is Antonio Antonucci. I am currently employed by General Motors LLC (“GM”) as Senior Staff Analysis Engineer.
2. I have been employed by GM in an engineering capacity since 1985. I am currently an engineer in the Field Performance Assessment department located in Warren, Michigan. In my current position, I assist in the evaluation of technical allegations which may or may not be involved in litigation and assist in identifying technical information in response to discovery requests made by litigants. I also consult with other engineers regarding future vehicle designs.
3. My prior positions within GM included extensive involvement with safety belt restraint systems, occupant protection, and crashworthiness. I have experience in the design, development, testing, manufacture and evaluation of safety belts, air bags, seats, instrument panels, consoles, and various interior trim.

4. Attached to this Affidavit is my curriculum vita which accurately sets forth my education and professional qualifications.

5. In my role as a Senior Staff Analysis Engineer, I have reviewed testing (described below in Paragraph 9) which GM has conducted with regard to safety recalls including the 2005-2007 model year Chevrolet Cobalt, 2006-2007 model year Chevrolet HHR, 2005-2006 model year Pontiac Pursuit, 2006-2007 model year Pontiac Solstice, 2007 model year Pontiac G5, 2003-2007 model year Saturn Ion, and 2007 model year Saturn Sky vehicles (the “Recall” or “Recall Vehicles”).

6. The Recall relates to the risk, under certain conditions, that the ignition switch may move out of the “run” position to the “accessory” position, resulting in a partial loss of electrical power and turning off the engine.

7. GM has conducted hundreds of tests which were designed to determine whether and under what conditions the ignition switch in the Recall Vehicles may inadvertently move out of the “run” position to the “accessory” position. These tests include over 80 individual tests conducted with only the production key in the lock cylinder. I have reviewed the documentation, test set-up, components utilized, experiencing the various driving courses for this testing as well as physically participating in some of the testing.

8. As a matter of basic physics, when only the production ignition key is inserted in the lock cylinder, sufficient torque (twisting force) will not be generated to turn the ignition key from the “run” to “accessory” position due to road inputs. This is due to the symmetry of the production key, as there is no unbalanced mass that can react to acceleration from road inputs and create the necessary twisting force on the ignition key. As a result, a production key in the

lock cylinder by itself will not exert sufficient torque to turn the ignition switch to the “accessory” position.

9. The testing performed by GM confirms this basic physics concept. GM’s testing falls into two basic categories: (1) road tests; and (2) mechanical simulations. In addition, computer modeling were conducted which confirmed the findings from physical testing. The table below lists and briefly describes different vehicle tests utilized.

| Test Name | Description |
|--|---|
| Ride and Handling loop @ posted speeds (25-75 MPH) | 4 mile loop with a series of bumps, swells, railroad crossings, waddle (out of phase left and right inputs), S-curves, chatter bumps (in and out of curves), dips, chuck holes, high speed cornering, and broken concrete that perturb the ride and handling of a vehicle |
| Belgian Blocks durability schedule | A 1.7 mile replica of old Belgian granite block roads that are very rough, including dips and bumps to exacerbate exposure to particular adverse conditions. |
| Pothole #1 @ 25 MPH | A pothole that is 4 feet wide by 7.5 feet long and 4 inches deep |
| Pothole #2 @ 25 MPH | A pothole that is 4 feet wide by 7 feet long and 5 inches deep |
| Cubilete @ 10 MPH | A replica of a severe road in Mexico, made up of river rocks. |
| Panic stop from 10 mph | on asphalt (self-explanatory) |
| R&H Chatter @ 55 – 45 MPH, (Hz=MPH/3) | Specific series of evenly spaced bumps that excite suspension motion |
| Ride & Handling Angled RR crossing @ 70 MPG | An elevated, railroad crossing that is at an angle to the road direction |
| Median crossing @ 15 MPH | Driving up and over a 4 inch high simulated median at an approach angle in the vicinity of 30-40 degrees |
| Median crossing @ 20 MPH | ----- same as above ----- |
| Median crossing @ 25 MPH | ----- same as above ----- |
| Median crossing @ 30 MPH | ----- same as above ----- |
| Median crossing @ 35 MPH | ----- same as above ----- |
| Median crossing @ 40 MPH | ----- same as above ----- |
| Median crossing @ 45 MPH | ----- same as above ----- |
| Median crossing @ 50 MPH | ----- same as above ----- |

| | |
|-------------------------------------|--|
| Median crossing w/ braking @ 35 MPH | Driving up and over a 4 inch high simulated median at an approach angle in the vicinity of 30-40 degrees and locking up the brakes while coming off the median |
| Median crossing w/ braking @ 40 MPH | ----- same as above ----- |
| Median crossing w/ braking @ 45 MPH | ----- same as above ----- |
| Railway simulator | Simulates the accelerations/vibrations seen by vehicles during rail shipment including railroad car coupling |
| Haul-away truck simulator | Simulates the accelerations/vibrations seen by vehicles while on a truck hauler on a rough Chinese road |
| 4 Poster road inputs simulator | Simulates vertical motions as if driving on rough roads that have been measured |
| 4 poster Sine wave simulator | Provides harmonic vertical motions to excite vehicle vertical motion |

10. Exemplar Recall Vehicles containing an ignition switch with a “resistance torque” substantially below GM’s specifications for the part were subjected to these tests, as well as an ignition switch within design specification. “Torque” in this context refers to the amount of twisting force necessary to overcome the resistance within the ignition switch and rotate the key from the “run” position to the “accessory” position. Among other variations, the vehicles were tested with:

- (1) only the production ignition key in the lock cylinder,
- (2) the production ignition key in the lock cylinder with an empty key ring,
- (3) the production ignition key in the lock cylinder together with a various number of additional keys,
- (3) the production ignition key in the lock cylinder together with various hanging masses,
- (4) the production ignition key in the lock cylinder with both an additional number of keys and hanging masses.

11. The ignition switch never turned from the “run” to the “accessory” position in any of the over 80 individual tests conducted with only the production key in the lock cylinder. This

testing includes severe testing conditions as described in paragraph 9. For example, the ignition switch remained in the "run" position when the vehicles were driven over: (1) a simulated four inch median at high speed; (2) a high speed railroad crossing; (3) river rocks, potholes, and cobblestones; and (4) a 4 mile road loop with various severe road conditions, in some tests at 70 MPH as indicated above.

12. These results were confirmed with computer aided simulations.

13. Based my education, training, and experience, relevant engineering principles, and the extensive tests described above on the Recall Vehicles, it is my opinion to a reasonable degree of engineering certainty that if drivers follow the instructions in the recall notice and only use a the production ignition key with no additional items attached, the conditions required to move the ignition switch from the "run" to "accessory" position will not occur.

FURTHER AFFIANT SAYETH NOT.


ANTONIO ANTONUCCI

Sworn to and subscribed
before me this 2nd day
of April, 2014.


Notary Public

SUSAN TYPINSKI
Notary Public, State of Michigan
County of Macomb
My Commission Expires 09-25-2019
Acting in the County of Wayne

**Curriculum Vitae
of
ANTONIO ANTONUCCI**

PROFESSIONAL EXPERIENCE

May 1985 – to Present

GENERAL MOTORS, LLC

8/02 – Present Senior Staff Analysis Engineer – Field Performance Assessment

9/99 – 8/02 Staff Analysis Engineer – Field Performance Assessment

Analyze the performance of GM products in the field. Provide technical assistance to attorneys in resolving product claims and suits brought against the corporation. Specific activities include examining vehicles for forensic evidence that can be used to determine whether systems and components have performed per design intent.

3/97 – 8/99 Senior Project Engineer - Interior Systems - Floor Console Design/Release Engineer for the Pontiac Aztec.

Managed all aspects of the floor console system including design, release, development, tooling, supplier interface, & validation. In addition, led initial floor console design for the next generation U-van from bubble up initiation. Established test procedures and validation requirements for new innovative removable ice cooler.

2/95 – 2/97 Senior Project Engineer - Interior Systems - Instrument Panel and Console Design/Release Engineer for the 1997-2000 Camaro & Firebird.

Responsible for continuous improvement of instrument panel and console system. Designed and implemented a common glove box and knee bolster.

Established and executed validation plan for the PSIR system. Validation included component, sled, and barrier testing.

8/93 – 2/95 Senior Project Engineer - Interior Systems - Project Leader for Dynamic Side Impact and Door/Garnish Trim Design/Release Engineer of the Camaro/Firebird.

Responsible for continuous improvement of the garnish trim system for the 1994-97 F-cars.

Managed design, development, validation, supplier interface, and production implementation of Dynamic Side Impact (MVSS 214) requirements for the 1995 F-car Coupe and 1996 F-car convertible.

10/89 – 8/93 Senior Project Engineer - Restraint Systems - Seat Belt Design/Release Engineer for the 1993 through 1995 Fleetwood, Caprice, and Roadmaster vehicles.

Responsible for all phases of design, development, validation, and implementation of all new restraint system (from concept initiation through production) for the 1993 Cadillac Fleetwood.

Responsible for validation and certification of belt system to FMVSS 208, 209, & 210 requirements through component, sled, and barrier testing.

Led Division in the introduction of inboard belt-to-seat, hidden belt design, rear sail mounted retractor, and rear seat ramp.

ANTONIO ANTONUCCI

- 1/87 – 10/89** **Project Engineer - Vehicle Analysis & Crashworthiness** - Crashworthiness Engineer for all 1989 through 1991 "A" car platform.
- Crashworthiness Engineer responsible for the certification of the 1989 through 1991 A-cars (4 marketing divisions/3 body styles). System certification includes fuel systems, occupant performance, and general crashworthiness/safety requirements. Utilized Taguchi Methods as part of the 1990 test matrix.
- Investigated various structural durability concerns and recommended corrective action. Utilized Finite Element Analysis (NASTRAN, PATRAN, SMUG, etc.).
- 6/86 – 1/87** **Project Engineer - Product Production Engineering** - Body Shop Liaison Engineer for the 1987 L-car Assembly Plants during initial start-up.
- Implemented immediate corrective action on build problems while following up with root-cause analysis, engineering tryouts, and recommendation of long term solution to design/release engineer.
- 5/85 – 6/86** **Associate Project Engineer – Vehicle Analysis** - Variation Analysis Engineer for F-car vehicles.
- Supported design/release engineers with variation reduction analyses. Utilized advanced techniques of variation simulation modeling (VSM and VSAS software, RMS and Monte Carlo Simulation) to optimize designs.

Jan 1985 – Apr 1985

ELECTRONIC DATA SYSTEMS CORPORATION

Engineering Systems Development Engineer – CAD/CAM Support for Product Engineering at CPC-Pontiac.

Provided Product Engineering with computer systems support for mainframe and stand alone PC's. Worked with Analysis Department on Hydrodynamic Journal Bearing Analyses.

EDUCATION

Wayne State University - BSME 1984
Major - Mechanical Engineering

Traffic Accident Reconstruction-I, Northwestern University (1999).

AFFILIATIONS:

Society of Automotive Engineers,
American Society of Mechanical Engineers,
Pi Tau Sigma – National Mechanical Engineering Honor Society,
Tau Beta Pi – National Engineering Honor Society.

PUBLICATIONS:

- 2008 "Safety Belt Buckle Environment in Vehicle Planar Crash Tests", SAE 2008-01-1231, Michael J. Haldenwanger, et al.
- 2009 "Safety Belt Buckle Environment in Vehicle Rollover Crash Tests", SAE 2009-01-1251, Michael J. Haldenwanger, et al.
- 2010 "Subsystem Rollover Tests for the Evaluation of ATD Kinematics and Restraints", SAE 2010-01-0518, Stephan J. Cassatta, et al.
- 2011 "Effects of Safety Belt Pretensioning on ATD Motion in Rigid Fixture Rollover Testing", SAE 2011-01-1118, James White, et al.

OTHER:

Member of SAE "Seat Belt Systems Standards Committee" and "Restraint Systems Standards Steering Committee".