

CURRICULUM VITAE

CARL M. SAVAGE, JR.

CAREER HISTORY

SAVAGE ENGINEERING INC. (1989 - Present)

26777 Christy Drive, Chesterfield, MI 48051

President

Safety Engineering Consultant

Experience at Savage Engineering Inc.:

- Vehicle design analysis
- Vehicle and component full scale, sled and laboratory testing
- Accident reconstruction and analysis
- Accident crash simulation
- 3D animation and reconstruction
- Field accident research and analysis
- Injury causation and biomechanical engineering analysis
- Kinematics analysis
- Over 1100 Cases Evaluated
 - Accident reconstruction
 - Occupant and Pedestrian Kinematics Analysis
 - Biomechanics and Injury Causation Analysis
 - Vehicle Design and Performance Analysis
 - Airbags
 - Crash Sensors and Recorders
 - Seatbelts
 - Head restraints
 - Seat Performance
 - Steering Systems
 - Instrument Panels
 - Other vehicle components
 - Vehicle Structural Performance in a Collision
 - Component failure
 - Windshields and Windows
 - Hoods
 - Roof strength
 - Restraint Use or Non-Use
 - Visibility and Line of Sight
 - Rule making History
 - Review and Analysis of Technical Papers
 - Research
 - Full Scale and Component Tests and Demonstrations
 - 3D Scanning of Vehicles and Scenes
 - Computer Simulations

3D IMAGING SERVICES LLC (2006-2016)

Current address: 2001 Waldorf Street Northwest, Grand Rapids, MI 49554

Experience at 3D Imaging Services L.L.C.

- Founder of 3D Imaging Services L.L.C.
- 3D laser scanning, imaging and structure modeling
- Documenting of failed structures
- Reality capture
- BIM coordination and modeling
- As-built modeling
- Lifecycle data management
- Point cloud analysis
- Thermal imaging solutions
- Improved construction technology and processes
- Sold the company in 2016

GENERAL MOTORS CORPORATION (1968 - 1988)

GM Technical Center; Warren, Michigan 48092

Senior Staff Analysis Engineer (1982 - 1988)

Staff Analysis Engineer (1977 - 1982)

Experience at Technical Center:

- Consultant on new car & restraint system programs
- Group Leader of the “Active Restraints, Unrestrained & Biomechanical Group” (1987 - 1988)
- Ran over 100 full scale, impact sled and laboratory tests between 1977 and 1988
Numerous others were done at my direction
- Claims evaluation
- Accident reconstruction & simulation of vehicle accidents (including cars, trucks, large trucks, trailers, buses and motorcycles)
- Consulted on labeling, warnings and material handling
- Analysis of active and passive restraints (steering systems, child restraints, air bags, belts)
- Entry and egress

GM Proving Grounds, Safety Research & Development Laboratory; Milford, Michigan

Senior Project Engineer (1973 - 1976)

Project Engineer (1969 - 1972)

Test Engineer (1968 - 1969)

Experience at Proving Grounds:

- Testing and development of safety components and systems
- Ran over 500 full scale, impact sled and laboratory tests
- Test technology development
- Field accident research and analysis
- Accident reconstruction
- Kinematics analysis
- Injury causation and biomechanical engineering analysis
- Designed safety systems

- Major contributor on two GM responses to proposed Federal Motor Vehicle Safety Standard 208
- Evaluated non GM vehicles
- Initiated study on factors influencing belt usage

MATHER PLASTICS; Dixboro, Michigan (1968)

Design Engineer and Draftsman (July 1968 - December 1968)

Experience:

- Tested plastic parts
- Designed test equipment

MONROE AUTO EQUIPMENT; Monroe, Michigan (1965 - 1966)

Draftsman: June 1965 - August 1965 and June 1966 - August 1966

Experience:

- Drafting shock absorbers

SAVAGE STORER MOTOR COMPANY INC.; Monroe, Michigan (1958 - 1963)

Mechanic: Boat rigging & repair

EDUCATION

DEGREE: Bachelor of Science - Mechanical Engineering

- University of Toledo (1967 - 1968)
- University of Michigan (1963 - 1967)
- University of Michigan - Flint (Summer 1966)
- Washtenaw Community College (Summer 1965)

Other Education:

- Anatomy for Engineers; Society of Automotive Engineers, 1970
- Accident Investigation & Reconstruction; General Motors Corporation, 1972 - 1973
- PC-Crash & PC-Rect Training Workshop; Detroit, MI; March 2000

SOCIETIES & BOARDS

- Society of Automotive Engineers (SAE)
- Association for the Advancement of Automotive Medicine (AAAM)
- Kettering University Crash Safety Advisory Board
- International Center for Automotive Medicine

PATENTS

- Three patents on airbag restraint systems

PRESENTATIONS

- “The Air Cushion Restraint System in Review - A Comparison of Crash Tests and Actual Field Accidents” Presented to the American Society of Mechanical Engineers; December 1, 1977
- “Historical Development of the GM Energy Absorbing Steering System” Presented at the Society of Automotive Engineers International Congress and Exposition; February 23, 1982
- “Automotive Accident Reconstruction” Presented to The Sciencetech Club, Inc.; October 14, 2002
- “Car Crashes And Occupant Injuries: A Team Approach to Crash Investigation” Presented by Association for the Advancement of Automotive Medicine and the University of Miami School of Medicine; April 19-20, 2004
- “Computerized Accident Reconstruction and Recreational Vehicle Accidents” Presented to the Defense Research Institute; January 17, 2005
- “Accident Reconstruction – Techniques and Advanced Tools for Fraud Investigation” Presented to the Michigan Chapter of the International Association of Special Investigative Units; October 19, 2005
- “The Expert’s Use of Computer Animation in the Courtroom” Presented to the SEAK 15th Anniversary National Expert Witness Conference; June 22, 2006

PAPERS

- “Restraint System Effectiveness - A Study of Fatal Accidents” Automobile Safety Seminar; 1973
- “Dynamics and Biomechanics of Motorcycle-to-Car Glance Impact Theory and Experiment”
- “Estimation of Frontal Crush Stiffness Coefficients for Car-to-Heavy Truck Underride Collisions”
- While at General Motors, Mr. Savage published in excess of 70 reports and papers; which are the property of General Motors and are not readily available to Mr. Savage.

COMMENDATIONS

- “Excellence in Oral Presentation” Society of Automotive Engineers in 1982
- Nominated for “The Young Engineer of Detroit Award” Engineering Society of Detroit; (one of eight semi-finalist)

CONFERENCES/MEETINGS ATTENDED

- Thirty-fifth Annual Conference of the Association for the Advancement of Automotive Medicine; Scottsdale, Arizona; October 1990
- Thirty-fifth STAPP Car Crash Conference; Society of Automotive Engineers; San Diego, California; November 1991
- Vehicle Rollovers TOPTEC: An Update of Current Issues; Society of Automotive Engineers; August 1993
- Thirty-seventh Annual Conference of the Association for the Advancement of Automotive Medicine; San Antonio, Texas; November 1993
- Low Speed Rear Impact Collision TOPTEC; Society of Automotive Engineers; Irvine, California; August 1994

- Advances in Occupant Restraint Technologies; Association for the Advancement of Automotive Medicine; Lyon, France; September 1994
- Sensor Design for Automotive Air Bag Systems; Society of Automotive Engineers; Troy, Michigan; May 1995
- Thirty-ninth Annual Conference of the Association for the Advancement of Automotive Medicine; Chicago, Illinois; October 1995
- Biomechanics of Impact Trauma; Chicago, Illinois; November 1995
- Forty-first Annual Conference of the Association for the Advancement of Automotive Medicine; Orlando, Florida; November 1997
- Forty-second Annual Conference of the Association for the Advancement of Automotive Medicine; Charlottesville, Virginia; October 1998
- Forty-third Annual Conference of the Association for the Advancement of Automotive Medicine; Barcelona (Sitges), Spain; September 1999
- Forty-fourth Annual Conference of the Association for the Advancement of Automotive Medicine; Chicago, Illinois; October 2000
- SAE International Exposition and Congress; March 2002
- Forty-sixth Annual Conference of the Association for the Advancement of Automotive Medicine; Tempe, Arizona; October 2002
- Role of the Seat in Rear Crash Safety; Presented by Society of Automotive Engineers; July 10-11, 2003
- Automotive Safety, Anatomy, Injury, Testing & Regulation; Presented by Society of Automotive Engineers; March 8-10, 2004
- SAE International Exposition and Congress; April 2005
- SAE International Exposition and Congress; April 2007
- Kettering Safety Advisory Board, Flint, MI, May, 2008
- Kettering Safety Advisory Board, Flint, MI, 2010
- International Center for Automotive Medicine (ICAM), Ann Arbor, MI, 2014