



INTECH ENGINEERING LTD.
Forensic Analysis • Accident Reconstruction

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AMRIT S. TOOR, Ph.D., P.Eng.
CURRICULUM VITAE

ACADEMIC QUALIFICATIONS

Completed a course in Engineering at Coventry Lanchester Polytechnic, Coventry, United Kingdom, leading to the degree of "Bachelor of Science" in engineering (mechanical). Degree was awarded in 1980 with first class honours.

Pursued a research program in "High Strain Fatigue—Cyclic Plasticity" leading to the degree of "Doctor of Philosophy" in engineering. The research was carried out at Coventry Lanchester Polytechnic in collaboration with Engineering Technical Applications Ltd. Degree was awarded in 1986 in recognition of the work entitled "Bi-Axial Cyclic Plastic Bending".

EXPERT TESTIMONY

Qualified and provided expert evidence as a Mechanical Engineer and Accident Reconstructionist in the Supreme Court of British Columbia and the Provincial Courts of British Columbia and Manitoba.

PROFESSIONAL AFFILIATIONS

- Member of the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)
- Member of the Society of Automotive Engineers (SAE International)
- Member of the Canadian Association of Road Safety Professionals (CARSP)

FORENSIC ENGINEERING EXPERIENCE

Aug 1990 - Intech Engineering Ltd., Surrey, BC
Present PRINCIPAL AND ENGINEER

- Technical reconstruction of numerous types of traffic collisions, industrial accidents, slip-and-fall incidents and fires
- Technical reconstruction of accidents resulting from component failure and/or design defects
- Failure analysis
- Technical review of expert engineering reports
- Development of technical software

Motor Vehicle Accidents:

- Analysis and reconstruction of accidents involving motor vehicles, motorcycles, bicycles and pedestrians
- Data collection:
 - Vehicle, scene and personal property examinations
 - Photographic evidence gathering
 - Detailed measurements of vehicle interiors, vehicle exteriors and scene geometries
- Preparation of scaled vehicle and scene drawings
- Assessment of collision circumstances including:

- Vehicle dynamics
- Speed analysis
- Automobile component failure: stress analysis
- Automobile tire failure
- Tread separation
- Sharp object penetration
- Vehicle dynamics resulting from tire failure
- Rollover collision analysis:
 - Cause and dynamics
- Vehicle lamp examination:
 - Assessment of vehicle headlight or taillight use
 - Assessment of headlight/taillight benefit
- Fraud investigation:
 - Assessment of contradictory collision circumstances
 - Automobile driver identification
 - Vehicle damage matching
- Seat belt analysis:
 - Examination of seat belt assembly.
 - Evaluation of occupant dynamics
 - Assessment of seat belt usage and effectiveness

Failure Analysis

- Component examination:
 - Photographic evidence
 - Detailed measurements
- Technical assessment of cause of material failure
- Assessment of appropriateness of component design

Slip and Fall Incidents

- Data collection:
 - Examination of incident scene, personal property (e.g. footwear) and floor coverings
- Technical assessment of ground slip resistance for particular footwear, floor covering and environmental conditions
- Assessment of conformance to applicable codes and standards

Fire Investigations:

- Technical assessment of fire origin, cause and spread dynamics

Research:

- Low speed collisions
- Sideswipe collisions
- Vehicle/pedestrian collisions
- Seat belt usage and effectiveness
- Real world pedestrian walking speeds
- Braking characteristics of passenger vehicles

PUBLICATIONS

- **Toor, A.**, Araszewski, M., "Theoretical vs. Empirical Solutions for Vehicle/Pedestrian Collisions." SAE #2003-01-0883. Society of Automotive Engineers. Warrendale, PA. 2003.
- Araszewski, M., **Toor, A.**, "Head, Hip and Knee Velocities of Restrained Occupants in Frontal Impacts." SAE #2003-01-0884 Society of Automotive Engineers. Warrendale, PA. 2003.
- **Toor, A.**, Araszewski M., Johal R., Overgaard R., Happer A. "Revision and Validation of Vehicle/Pedestrian Collision Analysis Method." SAE #2002-01-0550. Society of Automotive Engineers. Warrendale, PA. 2002.
- Araszewski M., **Toor A.**, Overgaard R., Johal R. "Lane Change Maneuver Modeling for Accident Reconstruction Applications." SAE #2002-01-0817. Society of Automotive Engineers. Warrendale, PA. 2002.
- Araszewski, M., **Toor, A.**, Happer, A. "Knee and Hip Displacement of Vehicle Occupants Restrained by Seat Belts in Frontal Impacts." SAE #2001-01-0180. Society of Automotive Engineers, Inc., 2001. Warrendale, PA.
- Overgaard, R., Johal, R., Araszewski, M., **Toor, A.** "Relationships Between Pre-Skidding and Pre-Braking Speed." SAE #2001-01-1281. Society of Automotive Engineers, Inc., 2001. Warrendale, PA.
- **Toor, A.**, Happer, A. "Real World Walking Speeds of Young Pedestrians." SAE #2001-01-0897. Society of Automotive Engineers, Inc., 2001 Warrendale, PA.
- **Toor, A.**, Araszewski, M., Johal, R. "Technical Assessment of Seatbelt Usage and Effectiveness." Trial News, July/August 2000: 35-11. Washington.
- **Toor, A.**, Overgaard, R. "Select Your Forensic Engineer Witness With Care." The Lawyers Weekly, June 2000: 20-6. Markham, ON.
- Happer, A., **Toor, A.** " Air Bag Deployment and its Effectiveness in Preventing Occupant Injuries and Fatalities. " The Verdict, March 2000: 59-61. Vancouver, BC.
- Happer, A., Araszewski, M., **Toor, A.**, Overgaard, R., Johal, R. "Comprehensive Analysis Method for Vehicle/Pedestrian Collisions." SAE #2000-01-0846. Society of Automotive Engineering, Inc., 2000. Warrendale, PA.
- Happer, A., Araszewski, M., **Toor, A.** "Assessing Seatbelt Usage and Effectiveness. " The Lawyer's Weekly. July 23, 1999: 15. Markham, ON.
- **Toor, A.**, Roenitz, E., Johal, R., Overgaard, R., Happer, A., Araszewski, M. "Practical Analysis Technique for Quantifying Sideswipe Collisions." SAE #1999-01-0094. Society of Automotive Engineering, Inc., 1999. Warrendale, PA.
- Araszewski, M., Roenitz, E., **Toor, A.** "Maximum Head Displacement of Vehicle Occupants Restrained by Lap and Torso Seat Belts in Frontal Impacts." SAE #1999-01-0443. Society of Automotive Engineering, Inc., 1999. Warrendale, PA.
- **Toor, A.**, Harvey, S.J. "Bi-Axial Cyclic Plastic Bending. "Proceedings of Third International Conference on Bi-Axial/Multi-Axial Fatigue, April 3-6, 1989. Stuttgart, Federal Republic of Germany.
- Harvey, S.J, **Toor, A.**, Adkin, P. "The Use of Anisotropic Yield Surfaces in Cyclic Plasticity." Multi-Axial Fatigue A.S.T.M. STP 853 K.J. Miller & M.W. Brown, Eds. American Society for Testing Materials: 49-63, 1985. Philadelphia, PA.
- Harvey, S.J., **Toor, A.** "An Anisotropic Plasticity Model for Inelastic Multi-Axial Cyclic Deformation." Computers and Structures, Vol. 16, No. 1-4: 37-44, 1983.

LECTURES, PRESENTATIONS

- Mar 2003—SAE World Congress. Presentation of SAE paper #2003-01-0883
- Mar 2002—SAE World Congress. Presentation of SAE paper #2002-01-0550
- Mar 2001—SAE World Congress. Presentation of SAE paper #2001-01-0897
- Dec 2000—Trial Lawyers Association of British Columbia. The A-Z of Expert Witnesses seminar. Presentation discussing the uses and abuses of engineering evidence
- May 2000—Continuing Legal Education (CLE) Personal Injury Conference Presentation discussing how to retain a forensic engineer
- Feb 2000—Trial Lawyers Association of British Columbia (TLABC) Brain Injury Seminar. Presentation discussing requirements for seat belt analysis and the effectiveness of seat belts in preventing occupant injuries
- 1989—International Conference on Bi-Axial/Multi-Axial Fatigue. Presentation of “Bi-Axial Cyclic Plastic Bending” paper. Stuttgart, Federal Republic of Germany
- 1985—America Society for Testing Materials. Presentation of “The Use of Anisotropic Yield Surfaces in Cyclic Plasticity” paper. Philadelphia, PA
- 1983—Coventry University. Presentation of “An Anisotropic Plasticity Model for Inelastic Multi-Axial Cyclic Deformation” paper. United Kingdom

PROFESSIONAL DEVELOPMENT

- Mar 2003—SAE World Congress, Detroit, MI.
- Mar 2002—SAE World Congress, Detroit, MI.
- Mar 2001—SAE World Congress, Detroit, MI.
- Jul 2000—SAE TOPTEC, “Heavy Vehicle Rollover”, Richmond, BC.
- Mar 2000—SAE World Congress, Detroit, MI.
- Dec 1999—SAE TOPTEC, “Accident Reconstruction: State-of-the-Art”, Costa Mesa, CA.
- Mar 1999—SAE World Congress, Detroit MI.
- Feb 1999—World Congress for Whiplash - Associated Disorders, Vancouver, BC.
- Oct 1997—SAE TOPTEC, “High Speed Rear Impact Test”, Tempe, AZ.

REVIEWS

- Reviewer of SAE manuscripts, since 2000
- Reviewer of “professional experience” for applicants applying for registration as “Professionals Engineers” with APEGBC, since 2001

OTHER ENGINEERING EXPERIENCE

Feb 1989 MacInnis Bigg Associates Ltd., Vancouver, BC
 Aug 1990 ENGINEER

- Analysis of motor vehicle accidents, including examination of vehicles and accident scenes

Apr 1986 Comex Marine Services Ltd., Coquitlam, BC
 Jan 1989 PROJECT ENGINEER

- Stress analysis of various structures, analysis of water jet cutting tool, design optimization and weight reduction, developed test procedures for off-



shore robot deployment and recovery, initiated studies to develop a tool to machine a precise weld profile and optical aligning device

Aug 1983
Jan 1986

Coventry Lanchester Polytechnic, Coventry, UK
EXPERIMENTAL OFFICER/ASSOCIATE LECTURER

- Research in "High Strain Fatigue-Cyclic Plasticity," post-graduate and undergraduate teaching in computer aided engineering and computer aided design analysis, developed "finite element" and "finite difference" teaching software

Mar 1982
Aug 1983

CanOcean Resources Ltd. (formerly known as Lockheed Petroleum Services Ltd.), Delta, BC
ENGINEER

- Stress analysis of various components (linear and non-linear large displacement problems)

Sep 1980
Jan 1982

Engineering Technical Applications Ltd., Hinkley, UK
ASSISTANT ENGINEER

- Design and analysis of a rig to test industrial clutches to destruction, stress and modal analysis of various structures

Oct 1974
Jun 1977

Lockheed Petroleum Services Ltd., Delta, BC
DRAFTSMAN

- Design of special purpose mechanisms for off-shore oil equipment

