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CONSULTANTS AND EXPERTS TO THE CONSTRUCTION, INSURANCE AND LEGAL COMMUNITIES

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PROPERTY/CASUALTY EDITION



ACCIDENT AND INJURY EPIDEMIOLOGY: A TOOL FOR DETERMINING ACCIDENT AND INJURY CAUSATION

Throughout the United States every day, thousands of accidents occur in and out of the work place. Most of them are due to failure or improper interaction among equipment, people, supplies, and the environment.

An accident can be defined as any unplanned event that can cause loss of human life, injury, and/or property damage. More often than not, accidents are complex occurrences, comprised of numerous individual events requiring in-depth investigation and analysis by highly-skilled specialists seeking to determine causation. Such specialists are trained as scientists, technicians, or engineers and demonstrate expertise in areas which include, among others, the basic laws of physics, engineering mechanics, human factors and ergonomics, epidemiology, basic medical sciences, scientific safety principles, regulatory compliance, and even fundamental tort law.

The field of accident investigation and reconstruction has become exceedingly complex as man-machine systems, in particular, have become more sophisticated. Examining the interaction of man with his environment is an immense challenge for the professional to undertake. Such a person relies on scientific tools and technical knowledge to investigate, analyze, and reconstruct accidents with the purpose of developing conclusions and opinions

which may ultimately be presented to a jury. In this setting, the scientist and engineer take on the role of the expert witness, proffering testimony that becomes an essential component of the judicial decision-making process in accident cases.



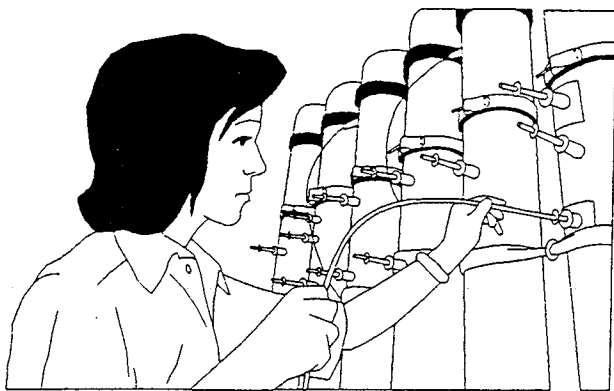
In addressing the causal factors that give rise to an accident, the scientist or engineer can adopt and implement, in conjunction with others, the principles and techniques of accident and injury epidemiology. Insight into the field and its application to determining accident causation can be gained from an understanding of epidemiology.

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Epidemiology is a branch of medical science that deals with the incidence and control of disease in a population. In the literal sense, it is the study of "epidemics" which are usually thought of as attacking a general population at a specific time in a specific geographical area. One of the most notable examples of an epidemic is the bubonic plague in Europe in the mid-fourteenth century.

However, there are more subtle epidemics that attack a specific subgroup of people who may be spread out over time and place. In other words, the victims of the epidemic may not live in one place or at one time but have some other common characteristics, such as what job they perform in the work place. It is this aspect of epidemiology that makes it important to occupational safety. Thus, accidents resulting in amputations (finger-hand-arm) may not be a very common occurrence in any location or at any time, but when the population of only those persons who have worked with unguarded machine saws and presses is examined it becomes readily apparent after a prolonged period, that accidents resulting in upper extremity amputations can be considered an epidemic. Epidemiological studies linking upper extremity amputation accidents to unguarded machinery have led to the identification of machine hazards that are to be avoided in the interest of worker safety. Such studies are not typically performed by corporate safety personnel.



Instead they are left for the specially trained scientist or engineer to perform. The studies provide the basis for voluntary and mandatory standards and regulations, such as ANSI (American National Standards Institute) and OSHA (Occupational Safety and Health Administration), respectively, which are subsequently used in the enforcement approach. Such standards also form the underlying basis for varied legal proceedings addressing issues of compliance breaches.

Accident and injury epidemiology is the study of populations of people who have had the misfortune of being involved in a work-or non-work place mishap that causes injury.

The epidemiological approach is designed to associate various patterns of possible accident causes with the occurrence of the accident. It relies heavily on the analytical approach to accident investigation by studying and evaluating accident and injury mechanisms and analyzing statistical histories of accidents and their consequential effects. The cornerstone of the epidemiological approach is its review of accidents that have actually occurred as opposed to accidents that would likely occur in the absence of immediate action to remove a hazard.

Intrinsic to accident causation, and the very focus of the accident and injury epidemiologic approach, is its genesis: basic, indirect, and direct causes. Basic causes of accidents can usually be traced to poor or woefully inadequate safety policies, procedures, and decisions. This is particularly evident in the work place environment and ordinarily a symptom of poor or ineffective management and supervision. Unsafe conditions and unsafe acts can be categorized as indirect causes of accidents, along with personal factors such as, among other things, lack of skill and training, poor vision, or use of drugs or alcohol. Unplanned releases of energy and/or hazardous materials are direct causes of accidents resulting from unsafe acts and unsafe conditions.

In assessing accident causation, the scientist or engineer will typically focus investigative and analytical efforts on unsafe acts and unsafe conditions. This is done in response to statistical evidence which demonstrates that approximately 90 percent of industrial/work place accidents are caused by unsafe acts and unsafe conditions.

The ensuing examples of unsafe acts highlight some of the different categories of human failure to be investigated and analyzed in the search for accident causation:

- Operating machinery and equipment without qualifications or authorization
- Operating equipment at unsafe speeds
- Bypass or removal of safety devices
- Using defective equipment
- Improper repair practices on equipment

Unsafe conditions usually arise as a consequence of poor planning or an unsafe act. Some examples of unsafe conditions to be explored during an accident investigation include the following:

- Inadequate guards on machinery and equipment

- Defective tools, equipment, or supplies
- Congestion of the work place
- Fire and explosion hazards
- Poor housekeeping in the work place

It is noteworthy that unsafe acts and unsafe conditions do not cause accidents by themselves. Work place accidents are often the result of a wanting safety program, substandard management and supervision, inadequate controls, lack of knowledge, flawed assessment of hazards, or other personal factors.

Determining causation and assessing fault in work place accident cases largely rests on the probing efforts of the skilled specialist whose findings and conclusion provide the basis for expert opinion and subsequent court testimony. Whether that specialist is a scientist or engineer, determining the "how" and "why" of an accident is amenable to scientific and technical resolution using investigative and analytical pathways of accident and injury epidemiology.

Michael Romansky, Ph.D., J.D.

About the Author

FORCON Consultant - Michael Romansky, Ph.D., J.D. has an educational background that includes Industrial Engineering, Human Factors, Biomedical Engineering, and Accident and Injury Epidemiology as well as a Law Degree. His work experience includes having been a Research Safety Engineer and Forensic Scientist for the National Institute for Occupational Safety and Health. He has developed, implemented and managed safety and health compliance and training programs, conducted accident and injury investigation and reconstructions, directed and performed product liability and reliability investigations, and has provided litigation support work involving issues of vehicular and work-place accident and injury epidemiology, personal injury mechanisms, human factors engineering and ergonomics, biomechanics and physiology, and safety engineering.

If you have any change of address,
please mail corrections to:

FORCON International Corporation
1216 Oakfield Drive
Brandon, FL 33511

EARTHQUAKES

At 4:34 a.m. Monday, 17 January, a hitherto unknown fault shifted modestly at a depth 4 miles below the surface of Northridge, California. Mercifully, the earthquake struck in the quiet morning of a holiday weekend.

The earthquake lasted less than a minute. The damage was none-the-less, stunning: 60 dead, hundreds injured, more than 50,000 structures damaged including more than 20,000 with substantial damage, public infrastructure partially crippled, freeways destroyed...more than \$18,000,000,000 in damage; easily the most destructive natural disaster in U.S. history.

In the aftermaths, it is apparent that the manmade environment survived remarkably well. Despite severe vertical uplifting and high frequency shock waves, all but a few highly publicized buildings and structures stood. Many sustained damage but fulfilled their primary purpose. The investment in earthquake sensitive design, careful inspections and a professional, well executed design and construction community paid off.

FORCON's Irvine office is pleased to have had a positive role in the earthquake's aftermath. Two weeks after the "quake" we began to accept investigation assignments. In the next month we received more than 600 assignments. In the process FORCON has developed unique expertise and perspective in assessing earthquake damage.

Our team of more than two dozen professionals are very impressed with the patience, graciousness and positive attitudes of the hundreds of owners and insureds with whom we have worked. They have been great to work with. Similarly, we salute the hard work and professionalism of the insurance adjusters, file managers and management and support staff with whom we interface. Despite the grueling 12-14 hour days, 7 day work weeks and burdensome workload, these men and women remained focused, concerned and cheerful.

FORCON's role has been in the evaluation of structural damages, primarily on single family detached residences. These include Phase I (Is there structure damage arising from the earthquake and if so where?), Phase II (What is the scope of repair?) and Phase III (What is the engineering and cost?). To respond, FORCON assembled a strong team: structural engineers and structural engineering firms with whom FORCON had prior contacts, experience and recommendations were engaged to perform field observations and review and stamp the reports. Geotechnical engineers, plumbing and pool specialists and other specialized experts were engaged.

Small construction teams to conduct destructive testing and support the professional engineers in assuring quality reports were assembled.

A FORCON support group was created, additional telephone lines installed and a tracking system developed.

The office was staffed 7 days a week at least 12 hours a day Monday through Friday. A process was established as follows:

- Assignments were logged in, files and file numbering established and initial field observation visits scheduled with the insured and engineer within 24 hours.
- Assignments and field visits were confirmed with the adjuster who occasionally attended.
- A standard Phase I report form (3 pages) was completed at the initial field visit. Also, a photographic record was established. The Phase I report established whether the structural damage was apparent, described damaged, noted damage or structural defects not appearing to arise from the earthquake and, in the event damage was observed, its scope recommended further observation or research.
- In the event Phase II was necessary, it was confirmed with the adjuster and performed. Approximately 70% of all assignments confirmed some structural damaged. The most common of which were compromised of stucco shearwall, masonry fireplaces and site walls, separation of framing members and dislocated structural supports. All but a few of the conditions were repairable. Most homes had varying degrees of non-structural cracking in non-structural concrete slab, cosmetic cracking of stucco, drywall, masonry, etc.

Rick Tasker

**FORCON International Offices Providing Forensic
Consulting and Technical Services:**

Atlanta	(404) 390-0980
Chicago	(708) 590-8347
Dallas	(214) 436-3046
Denver	(800) 288-2663
Houston	(713) 820-7846
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St. Louis	(314) 837-3030
Tampa	(813) 684-7686
Washington D.C.	(301) 670-1262

GUEST SPEAKER

Bill Ver Eecke, manager of our Atlanta office was asked to speak on The Importance of Early Investigation by the Expert at the February, 1994 meeting of the Southern Loss Association in Atlanta. In preparing for this presentation Bill gathered input from several FORCON consultants in their fields of expertise, as well as from several attorney and claims adjuster clients who have had cases where early investigation by an expert was important to the final settlement or recovery on the claims.

Combining this information with his own experience and knowledge Bill was able to provide the approximately 60 Association members who were present with a list of the primary reasons for early investigation that are generally applicable to all claims that warrant an experts opinion, as well as listings of the reasons that are specific to various different types of claims. The case histories from clients and several of FORCON's were used to help make the point as to how an early investigation has made a difference. All this information was included in a handout that was distributed at the meeting.

Copies of the handout are available by calling the Atlanta office at 404-390-0980.



Mail Questions or Comments to
FORCON INTERNATIONAL CORPORATION
1216 Oakfield Drive
Brandon, FL 33511

CONSULTANT PROFILE

Michael E. Bresnock

Automotive Expert

Prior to retiring from the General Motors Corporation, FORCON Consultant Mike Bresnock had spent over twenty years in the servicing, diagnosis and repair of automobiles and trucks. Part of his career at General Motors was spent as an Instructor in the GM Training Center in Atlanta. He conducted training and educational programs for GM staff, dealer personnel including service managers and technicians, college instructors, and special interest groups.

Over the past 4-1/2 years Mike has investigated close to 100 automotive claims for FORCON's Atlanta office including the following types of automotive assignments:

- determine the cause of automobile or truck fire
- determine if reported engine or transmission failure is related to accident
- verify and determine cause of reported mechanical failure
- examine rental vehicle to determine if condition of vehicle contributed to or caused accident
- determine relationship between mechanical failure and recent repair work performed on the vehicle.

Bo may know baseball and football, but Mike knows cars and trucks.

SELECTED RECENT PROPERTY/CASUALTY ASSIGNMENTS

The following list is meant to provide our readers with some idea of the diversity of FORCON's services for Property and Casualty claims investigations:

- Determine the cause & origin of a fire in a PVC manufacturing plant and asses the damage to equipment.
- Determine the extent of structural damage to a concrete pier when a cargo ship collided with it during docking. Develop estimate for repair and/or replacement.
- Multiple accident reconstruction cases.

- Determine cause of structural cracking / settlement or pressure variations in the atmosphere?
- Determine the extent of damage to appliances when a tree fell on power lines causing the loss of the neutral.
- Determine the coefficient of friction and code violation related to slip and falls.
- Determine the cause of an accident which injured personnel working on a conveyor system.
- Determine auto service shop responsibility for engine damage when oil drain plug dislodged.
- Determine the cause of wood joist collapse on a new residence and the extent of damage to remaining structure.
- Verify financial loss due to Business Interruption.
- Determine the cause and origin of a mechanical failure on a theme park simulator ride.
- Determine if structural damage was caused by termite infestation and if so, determine the extent of said damage.
- Determine the cause of a workplace accident which amputated an employees hand.
- Determine the cause of a workplace accident severed several fingers of a temporary employee operating a piece of machinery.
- Determine whether the timing sequence of a traffic signal contributed to an accident in the intersection controlled by that traffic signal.
- Determine the extent of damage and cost of repairs for ice damaged roofs.
- Determine if trees were killed by herbicide applied by the insured to a nearby area.
- Determine the cause of a step ladder failure.
- Determine whether damaged to surfaces of cars located at dealership was caused by air borne discharges from insureds nearby plant.
- Determine cause of plumbing system failure and resultant water damage.