



## Engineering Sciences Section – 2011

### C22 Legal Issues in a Metallurgical Failure Resulting in Death

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After attending this presentation, attendees will understand the close relationship between metallurgical analysis and litigation. The attendees will also learn the legal issues involved in presenting a case based primarily on metallurgical evidence. This presentation will impact the forensic science community by illustrating an example of the relationship between legal and scientific activities in a death case.

Effective metallurgical investigation can be important in developing an understanding of the sequence of events associated with an accident.

Harry was a World War II hero and a diabetic. He lived alone in a very hilly section of San Francisco. Because of his limited mobility, Harry decided to buy an electric power scooter from a national manufacturer. The local dealer came to Harry's house to assess his needs and sold Harry an option for the "durable heavy duty transmission" because of the steep hills that the scooter would be traveling. Harry decided to do some shopping and upon returning, he turned down a street with a six percent slope. It appeared that he quickly picked up speed, the scooter flipped, and Harry hit the pavement head first. He was pronounced dead at the scene by paramedics.

The manufacturer's initial legal position was that there were no manufacturing or design defects in the equipment. Their explanation was that the old man simply was inattentive and recklessly drove the cart down the hill, causing it to overturn resulting in his death. There was even mention of the unopened six-pack of beer that he had just purchased at the grocery store.

To change the focus of the case, counsel pled a "survival cause of action" which allows punitive damages to be recoverable. Decedent's heirs in a wrongful death claim cannot recover punitive damages. This legal position made the defendant's manufacturing methods relevant, and the speed of the free wheeling cart relevant to the lawsuit. Hence, recreation of and calculations of the speed of the out-of-control cart were required, as well as a thorough metallurgical analysis of the failed metal components.

Examination of the scooter showed two failures: (1) that the steering mechanism had broken free from the left front steering arm, allowing the wheel to be free to swivel. The result of the front wheel swiveling could explain the scooter flipping. A metallurgical examination of the aluminum steering mechanism showed a "Swiss-cheese" array of shrinkage holes in the aluminum casting that severely compromised its strength. The fracture surfaces were examined by Scanning Electron Microscope (SEM) and indicated fractures consistent with the steering mechanism failure preceding and causing the accident, rather than occurring as the result of the accident; and, (2) the metallurgical analysis indicated that the transmission components had also failed before the scooter flipped. This particular electric scooter had a regenerative brake attached to the motor, and the motor was in turn attached to a differential, and then the differential was attached to the rear axle. In the event of a failure anywhere between the motor and the rear axle, the scooter had no capability for braking. The analysis showed that the transmission components were defective and unsuitable for their intended use.

The accident sequence was determined to be that the scooter transmission failed first, causing braking system failure and rapid increase in speed. This was followed by the failure of the steering, causing the scooter to flip.

The legal issues in building the case based on the metallurgical findings, and the ultimate satisfactory resolution are presented. **Metallurgical Failure, Legal, Fatality**