

Forensic Engineering
April 19th, 2010
Special Topics in Forensics



Bell-Ringer

- Why are soldiers not allowed to march across bridges.
- Aside from the plan impacts to the twin towers in New York, what caused the failure of the buildings?
- Bell-Ringer and Journal are due at the end of class.
- Chapter 16 Binder due Wednesday!


What is it?

- **Forensic engineering** is the investigation of materials, products, structures or components that fail or do not operate/function as intended, causing personal injury or damage to property
- The consequences of failure are dealt with by the law of product liability
- The subject is applied most commonly in civil law cases, although may be of use in criminal law cases



Purpose


- Generally the purpose of a forensic engineering investigation is to locate cause or causes of failure with a view to improve performance or life of a component, or to assist a court in determining the facts of an accident.
- It can also involve investigation of intellectual property claims, especially patents

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- After an accident, forensics engineers examine broken parts and bring together a list of probable failure mechanisms to be investigated
 - Interviews are conducted to determine a sequence of events. Drawings, specifications, and operational procedures are reviewed



Methods


- Methods used in forensic investigations include reverse engineering, inspection of witness statements, a working knowledge of current standards, as well as examination of the failed component itself
- The fracture surface of a failed product can reveal much information on how the item failed and the loading pattern prior to failure


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- The key task in many such investigations is to identify the failure mechanism by examining the failed part using physical and chemical techniques. This activity is sometimes called root cause analysis
 - Corrosion is another common failure mode needing careful analysis to determine the active agents in the environment which initiated the corrosive attack.



Application

- Insurance companies use forensic engineers to prove liability or non liability
- Rail crashes, aviation accidents and some automobile accidents are investigated by forensic engineers particularly where component failure is suspected
- Appliances, consumer products, medical devices, structures, industrial machinery, and even simple hand tools such as hammers or chisels can call for investigations upon incidents causing injury or property damages

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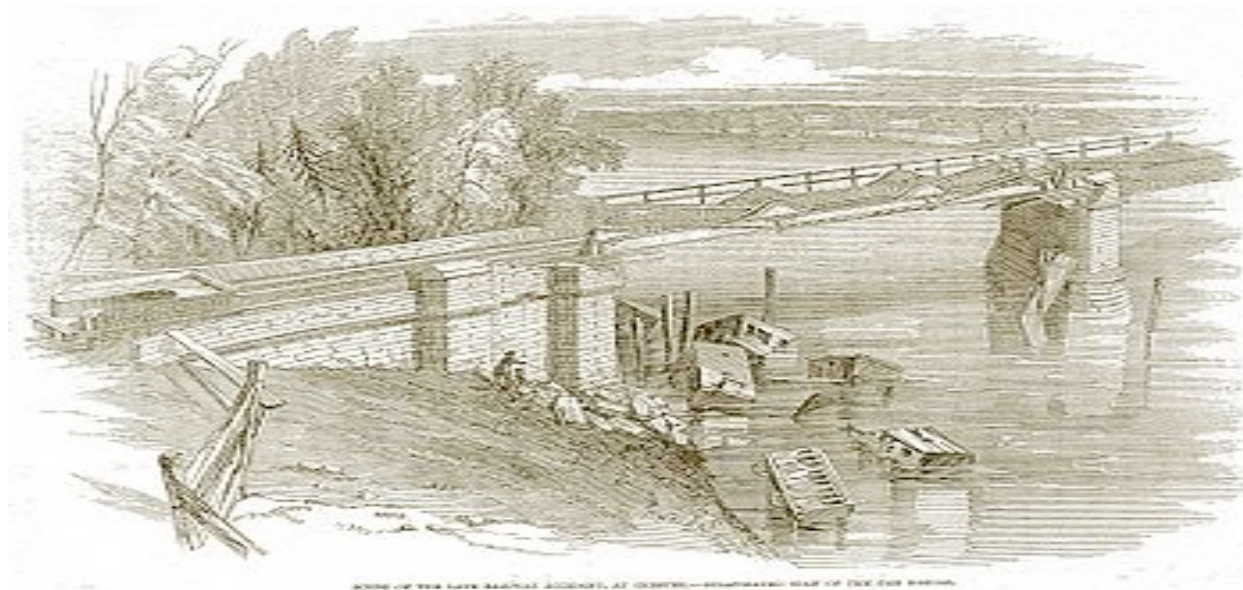
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- Forensic Engineering is also useful in product development. If a product is faulty using Forensic engineering can aid in improving the product.

Pictures & Examples

Forensic Engineering can be used to determine the cause of a bridge collapsing.



- The fall of the Dee bridge at Chester, England.



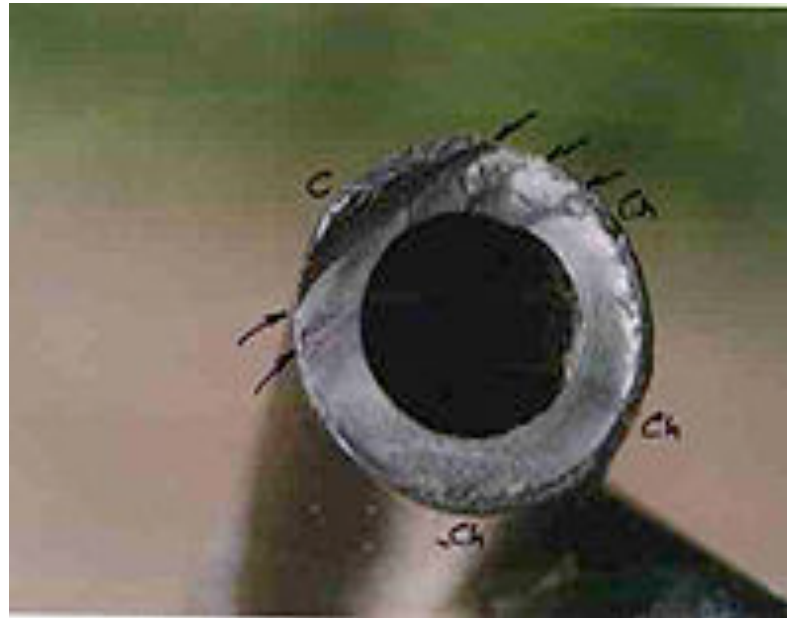
- Failed fuel pipe at right from a road traffic accident.



- Close-up of the broken fuel pipe from a road traffic accident.



- Another close - up of the broken fuel pipe.



- Forensic engineering is often used with car accidents.



Testing of roller coasters

- Also a part of Forensic Engineering....



- Picture shows the recreation of a neck injury sustained by a motorcyclist flying off his bike.





In Summary...

- Forensic Engineering provides:
- Full Scale Validation Testing for Auto Accident Reconstruction
- Incident Investigation in the Amusement Park Industry
- Test Design
- Failure Analysis
- Expert Witnessing