



## D5 Defect Investigation of a Gun Rack

*Darren Franck, MSME\*, Advanced Engineering Associates, Inc, Charleston, WV 25304; Harold Franck, MSEE, Advanced Engineering Associates, Inc, Charleston, WV 25304*

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**Learning Overview:** The purpose of this presentation is to highlight investigative methods to address untested hypotheses.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by presenting investigative methods to assess the validity of a defect claim. These methods will be compared to untested hypotheses promulgated by opposing experts, which highlights the need for ethical standards.

This case study presents a defect investigation involving a manufacturer of a gun rack used in a police cruiser. Civil actions were brought against numerous parties, including the installer of the gun rack, manufacturers of components used in the gun rack design, and the owner of the cruiser. The defect allegations were supported by multiple experts, who opined that the design and installation of the gun rack was defective.

The incident occurred during a training course for members of a local police department. The plaintiff was seated in the right front passenger seat of a police cruiser during braking tests. It was alleged that the gun became dislodged from the rack as the vehicle decelerated, which caused the butt end of the gun to strike the plaintiff's head. Severe and lasting injuries were claimed, which formed the bases of the lawsuit.

The plaintiff's experts presented various hypotheses to explain the alleged failure of the gun rack. The rack includes a pocket to secure the butt end of the gun, a trigger guard to prevent accidental discharge of the weapon, and a locking mechanism at the barrel end. The installation did not include the trigger guard at the request of the vehicle owner. One expert hypothesized that the absence of the trigger guard caused or contributed to the dislodgement of the gun. Another expert claimed that the unsecured mount of the timer module produced a current spike that unlocked the mechanism and allowed the gun to detach from the mount.

None of these experts performed pertinent testing of the gun rack assembly. The failure to test their hypotheses represents a disregard for the scientific method and a violation of ethical standards. Experts were hired by one of the defendants to assess the validity of the defect claims. Numerous tests were conducted by the experts involving exemplar gun racks subject to inertial loads, vehicle decelerations, vibrations, and impact loads. Measurements were gathered to document loading on the locking mechanism, decelerations on the timer module, as well as data culled from current and voltage probes.

None of the tests resulted in failure of the locking mechanism. Vehicle decelerations and impact loads did not cause a current spike sufficient to open the lock. Moreover, manual depression of the push button on the timer module during hard braking did not yield detachment of the gun from the locking mechanism. Static testing confirmed that a significant inertial load would be required to open the lock spring even after depressing the push button. These loads were not achieved by the deceleration forces and weight of the gun. Moreover, the allegations are not consistent with the movement of the gun resulting from collapse of the butt stock. Similarly, the installation of the trigger guard would not have affected the detachment of the gun from the rack. However, the alleged movement of the gun to the front dashboard would have been highly unlikely in the absence of the trigger guard.

The experts' work allowed their clients to be released from this lawsuit. However, the suit involving the remaining defendants continued, resulting in unnecessary legal and expert fees. This presentation highlights the need for ethical standards in forensic sciences.

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### Locking Mechanism, Non-Destructive Testing, Ethics