



Engineering Sciences Section - 2015

D22 Catastrophic Failures in Firearms and Ammunition Attributed to Propellant Issues, Metal Fatigue, High Pressure, Incorrect Ammunition, and Other Factors

Ronald R. Scott, MA, MS, 37881 N 10th Street, Phoenix, AZ 85086*

The goal of this presentation is to provide an understanding and appreciation of the multiple issues and conditions which can produce a dangerous potential for firearms and ammunition to become unintended explosive devices which often results in catastrophic failure and consequential degrees of property damage and serious personal injury including death.

This presentation will impact the forensic science community by informing attendees that these explosive incidents can occur with perfectly safe and fully functional weapons that have not previously shown any signs of an impending problem. Inadvertent lapses in quality control during the manufacturing processes may permit substandard products to enter the market with this fact becoming apparent only after a catastrophic incident.

Injuries from firearm malfunctions are mostly preventable through common safe practices including the use of protective equipment, routine maintenance and inspection, and being aware of the typical symptoms and signs which precede a catastrophic failure; however, even a proactive approach will not uncover the hidden dangers.

Firearms and ammunition are dangerous weapons which have been designed for a variety of purposes. The average shooter will not encounter any significant or serious problem over their lifetime while engaging in the use of firearms. Despite the warnings and practices that are learned in common safety education programs, there are circumstances which can develop through no fault of the shooter that results in the firearm becoming a pseudo pipe bomb resulting in its spontaneous disassembly and fragmentation.

The typical injuries suffered during these explosive events involve the hands and face. Forensic investigations into these incidents are not commonly conducted by personnel in crime laboratories since the personnel are usually restricted to basic firearms testing for functional design and the identification of evidence; they are most often analyzed by engineers or other specialized consultants who have backgrounds in firearms and ammunition design and who have studied the causes and effects of blast damage.

Over the last several years, the civilian shooting environment has seen an influx of very large caliber weapons that were restricted to the military. This presentation will discuss some specific areas of catastrophic failure which result from the use of incorrect ammunition, metal fatigue, plugged barrels, high- and low-pressure detonation, improper assembly, use of the wrong type of propellant including how burning rates affect the movement of projectiles in the barrel, and discuss the correspondence of peak pressures in relation to barrel length.

Firearms, Catastrophic Failure, Injuries