

Abstract

Non-lethal effects and precision of the Paintball-System

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A successful application of inert ballistic projectiles for NLW purposes is strongly depending on their hit precision and flight time. With respect to the forces acting on the accelerated projectiles during flight time both requirements call for elevated muzzle speed. On the other hand non lethal weapons need to act on aggressors on a low energy level. For inert projectiles this means impact with low kinetic energy. Consequently, such projectiles need to be fast but light. To investigate the necessary speed and mass range of such NLW-projectiles we have started choosing the Paintball gun as an ideal model for NLW guns. Its ammunition consists of light hollow spheres with a thin gelatine skin containing a liquid colour load. This investigation examines the flight ballistics as well as the hit precision of the paintball system. For this purpose we apply a 17.8 mm Paintball gun accelerating the projectiles up to 85 m/s by means of air pressure (at 35 bar). Since the barrel length also has an effect on the precision of a defined projectile we apply 3 different barrels with a corresponding length of 133 mm, 184 mm and 234 mm. To start with, the calculated flight ballistics are checked measuring the muzzle speed with light barriers and observing culmination as well as total flight distance. The impact precision is measured on card boards in predefined distances between 10 m and 25 m. Further we determine the terminal ballistic effect of those projectiles in blocks of gelatine as used for tests with ordnance ammunition.

In addition to the examination of the hollow gelatine spheres we also check the effects of alternative projectile materials such as glas and plastics. Concluding, this investigation shows the typical external and terminal ballistics data of different inert 17.5 mm projectiles accelerated by air pressure. At rather low muzzle velocities of 85 to 90 m/s the projectiles show horizontal and vertical scattering of 0.5-1% and acceptable harm effect on soft targets.

Keywords: non lethal weapon, paintball, projectile, scattering, terminal ballistics