Specialised Imaging

Application Note 2

3D Analysis of Ballistic Projectiles

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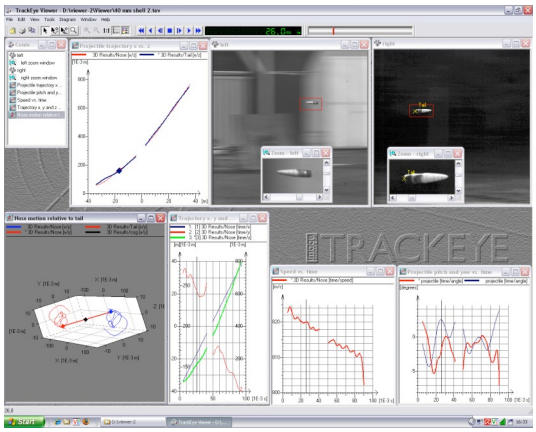

3D Analysis of a 40mm calibre artillery round. (Image – courtesy – ISL France)

IMAGING PARAMETERS

Trajectory Trackers are placed, one on each side of the flight path. The Trajectory Trackers are calibrated by taking a recording, of a series of calibration poles, along the intended flight path. The mirror position data, video data, and surveyed calibration pole data are combined in the TrackEye© software from Image Systems AB, to produce an x,y,z map.

When the projectile under observation, is fired, the triggers are supplied both Trajectory Trackers providing a common start time. The dynamic video data and mirror position sets are transferred to the TrackEye software which then tracks the 2D x,y position of key points on the projectile in each frame to determine 3D position of those points.

The analysis is accurate over the trajectory with the exception of the area where both mirrors are facing each other. Interpolation is required to get a more accurate position or use a third high speed video looking at this particular area.

Depending on the selected tracking point it is now possible to determine pitch, yaw, velocity and acceleration along the intended flight path.

OVERVIEW OF EXPERIMENT

For high-speed imaging applications such as ballistic trajectory characterisation, space re-entry vehicle development and study of advanced munitions - engineers have traditionally used expensive Doppler radar equipment with sophisticated software and on-board telemetry. While this methodology has provided useful analytical data it has not allowed visualisation of the processes. Using a pair of Trajectory Tracker systems, with new flight prediction algorithms, and high-speed video cameras - engineers are now able to capture a sequence of images along an object's flight path and also obtain accurate 3D measurements from those sequences.

EQUIPMENT PARAMETERS

2x Specialised Imaging Trajectory Trackers
TracKEye 3D Software with Trajectory Tracker Module

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