6DOF STORES RELEASE

The obvious solution to store release analysis when motion counts

Stores release analysis involves many challenges. Use of wide angle optics combined with harsh conditions during flight, implicating wings, fuselage and store vibrations, requires a robust tool for calibration and image analysis. The TrackEye 6DOF module is designed for this purpose. The option provides a complete toolbox to obtain an accurate and full analysis of the behaviour of stores during the release procedure: lens distortion correction, dynamic camera orientation correcting errors from vibrations and the use of rigid 3D models. Starting with retrieval of the relative 3D translations (x, y, z) and attitudes (roll, pitch, yaw) of the store related to the aircraft, the TrackEye 6DOF module calculates the full store 3D trajectory during the whole video sequence. Resulting data can be displayed in 3D diagrams, as 2D graphs or in spreadsheets.

Key benefits

- Easy to use, modular
- Full 6D behaviour analysis
- Unlimited number of trackable points
- Wide range of tracking algorithms
- Most accurate solution on the market
- Possibility of creating templates
- Various table & image export formats
- Compatible with all major HS cameras

From images to results

TrackEye is the market leading motion analysis software and is used as a standard reference in many countries throughout the world. From loading an image sequence, executing the tracking algorithms, applying the chosen analytics and logic to presenting the derived data - TrackEye offers a straightforward workflow. The user interface is fully synchronized: any change of parameters or set-up will directly effect all parts of the tracking session, updating results, graphs and tables.

6DOF analysis of a rigid body

The position and orientation of a rigid body in space can be described using six parameters: three positions coordinates (x, y and z), resulting in the position of a specific point, and three attitude angles (roll, pitch and yaw), providing the orientation in space. Using Six Degrees of Freedom (6DOF) also known as 6-dimensional (6D) motion tracking, it is possible to compute, express and analyze the position and orientation of a rigid body in space using only a single camera. The 6DOF analysis module is available as an option to TrackEye and can be combined with the use of a 3D scanner for even further analysis.

3D Scanned data (.obj/.stl) can be imported into TrackEye using the 3D model option and visualized in 3D diagrams as long with the shortest distance between any couple of points of one or several 3D models.

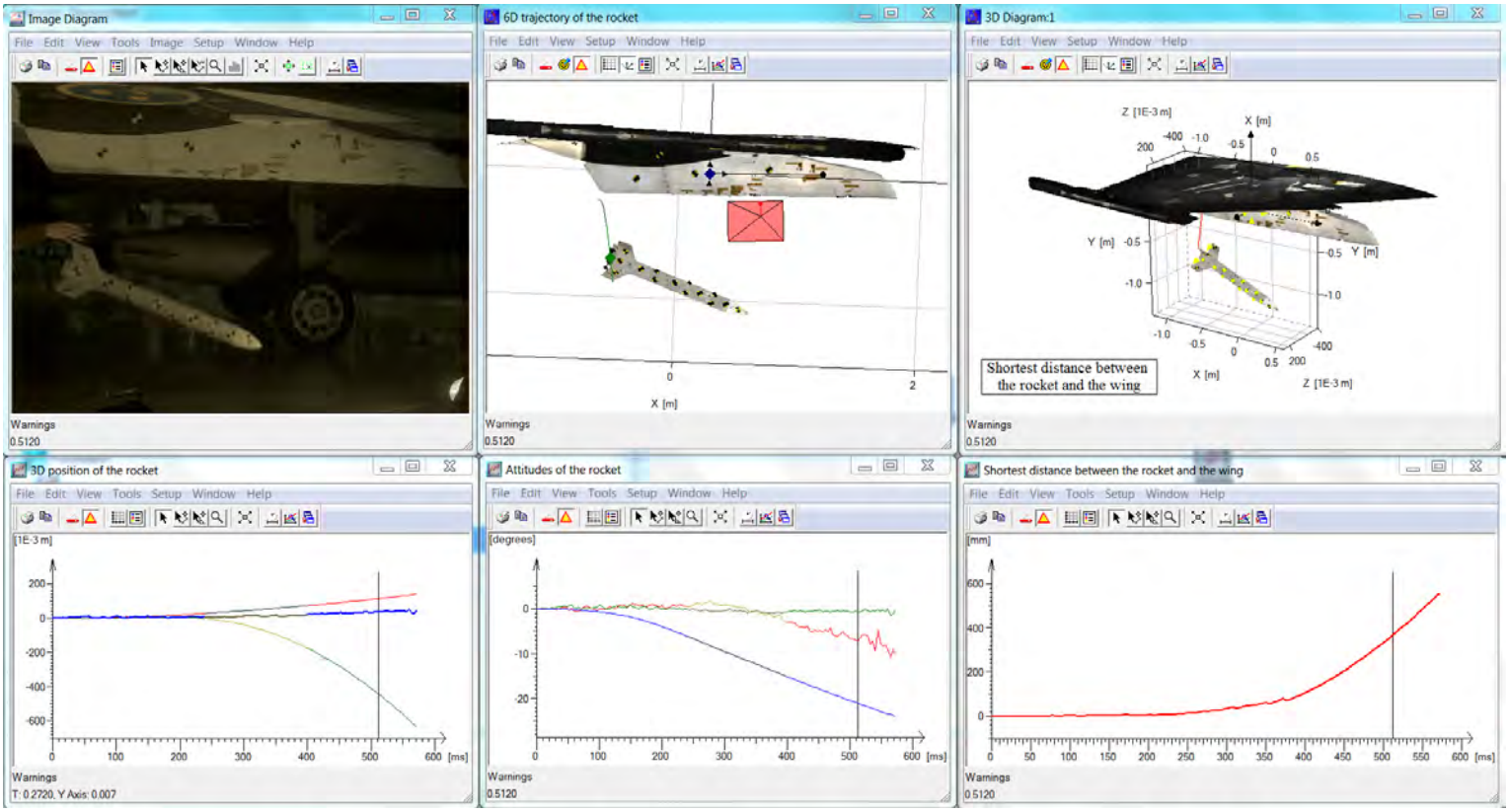
APPLICATION EXAMPLES

Store release

A 3D printed rocket and a Gripen fighter have been 3D scanned and imported in TrackEye using the 3D model module (optional). Dense models provide access to the 3D position of *any* point of a rigid object even partially masked. This feature combined with 6DOF analysis allows the operator to retrieve the full behaviour of the rocket during the store separation.

Vibrations of the camera are compensated by the dynamic camera orientation using surveyed points on the aircraft. X, y, z positions as well as roll, pitch, yaw attitudes of the stores relative to the aircraft can be presented in various diagrams and tables.

Finally, using the dense data set that comes in the 3D models, the analysis package allows for dynamic calculations of the shortest distance between 3D objects as a function of time. This can be done e.g. as shortest 3D distance between a specific single point on one 3D object versus another 3D object, OR between two 3D objects. The latter will involve many different points on both 3D objects



For store separation, space is usually very limited and short focal length lenses are necessary to be able to observe the rocket in a large field of view. Those lenses are usually impacted by distortion phenomenon and must be corrected from it in order to keep accuracy in the 6DOF results. Image Systems' calibration board (visible on the left) allows the calibration and correction of the distortion. Radial distortion table, distortion coefficients as well as real focal length of the optics considering fixed focus are some of the outputs available.

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