



Official USA distributor for

image

S Y S T E M S

MOTION ANALYSIS

Robin Nicolai

robin@specialised-imaging.com

+1 443-775-5040

Chris Tenney

chris@specialised-imaging.com

+1 517-414-3082

UK (Head Office / Factory)

6 Harvington Park, Pitstone Green
Business Park, Pitstone.
LU7 9GX England

+44 (0) 1442 827728

USA

Specialised Imaging Inc.
40935 County Center Dr. Suite D
Temecula, CA 92591, USA

+1 951-296-6406

GERMANY

Hauptstr. 10,
82275 Emmering
Germany

+49 8141 666 89 50



FM 87429 ISO9001:2015



THE QUEEN'S AWARDS
FOR ENTERPRISE:
INNOVATION
2016

specialised-imaging.com info@specialised-imaging.com



TEMA AUTOMOTIVE

The obvious solution to image analysis when motion counts

TEMA Automotive (TEMA) is the market-leading software suite for advanced Motion Analysis tests in the automotive industry. Thanks to its high accuracy, modular structure, calculation speed and intuitive user interface - TEMA is used by professionals across the globe in a wide range of Automotive Testing applications. Combined with our 3D Scanner (optional) it allows the integration of 3D models in diagrams for a complete analysis and understanding of the behaviour of the object of interest in its environment.

Key benefits

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

From images to results

From loading an image sequence, executing the tracking algorithms, applying the chosen analytics and logic to presenting the derived data - TEMA offers a straightforward workflow. Menu bars, tool bars and key bindings all provide a easy access to features and functions. 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.

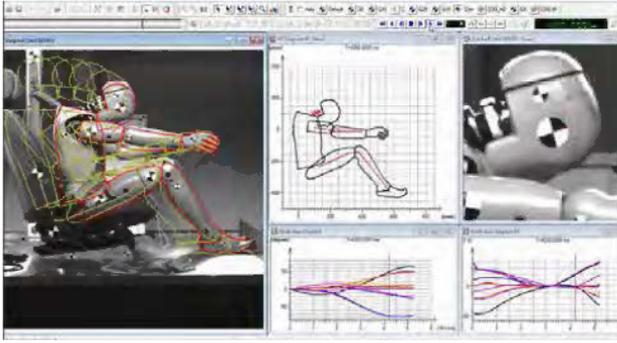
A powerful tool tailored to your needs

The operator has full control of the tracking in TEMA with many options and possibilities to tailor TEMA to specific applications and needs. New features and functionality is added continuously such as the integration of 3D scanned data. TEMA has a very powerful set of different tracking algorithms available such as Correlation, Outline, Quadrant Symmetry, Center of Gravity etc. By using the integrated lens calibration tool, data accuracy can be kept at a maximum and the results are traceable. Tracking can be analyzed in 2D, 3D and 6D. Our proprietary TEMA Static survey technology allows for 6D. Motion Analysis of a rigid body using a single camera.

Control **multiple camera brands** and **multiple camera models** at the same time through **one single user interface** using TEMA Camera Control feature.



APPLICATION EXAMPLES

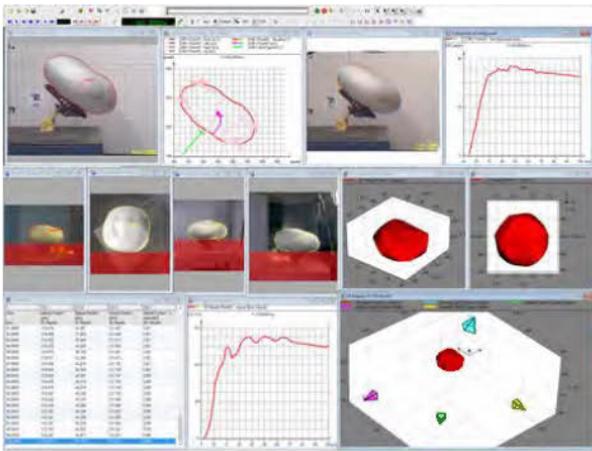
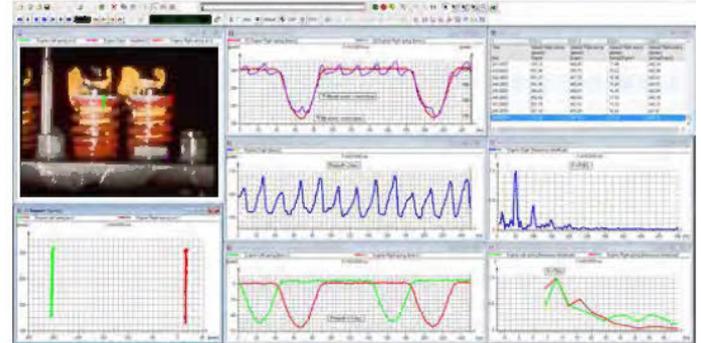


Crash and sled tests

Position, velocity, acceleration, relative angles and distances can be calculated using TEMA and displayed in various diagrams and tables. By using Virtual Point or Contour algorithms, the position of any given point of a rigid body can be calculated with accuracy even though it is hidden in part of the movie like the dummy nose during the crash for instance.

Springs, injectors and vibration analysis in engines

By using user defined static/dynamic coordinate systems the relative movement of springs or mechanical parts in the engine can be calculated with accuracy. This feature is particularly useful for image stabilization if the camera is shaking or to get rid of noise components in the movement. Fast Fourier Transform can be applied to measure the frequency of oscillating movements.

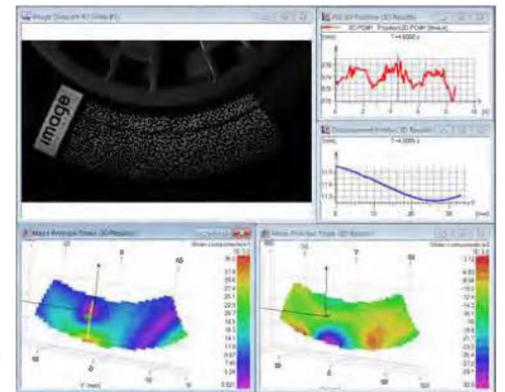


2D & 3D Airbag deployment tests

The outline algorithm in TEMA allows the tracking of any contrasted shape such as airbags, fumes, flowing liquids, bubbles and so on. The center of gravity, area, circumference, extreme points, angle and rotational volume can be retrieved in 2D analysis. If several views are combined, the volume of the shape can be calculated and represented by a hull. It is also possible in TEMA to overlay sequences of images in order to compare repetitive tests.

Tire analysis (DIC system)

TEMA Digital Image Correlation allows to follow in large field and without any contact the behavior of any material under constraints in 2D or stereo. By following the deformation of a contrasted speckle pattern applied on the surface of the material, displacement, strain analysis and the mechanical properties of the tested object can be determined with 0,01 pixel accuracy.

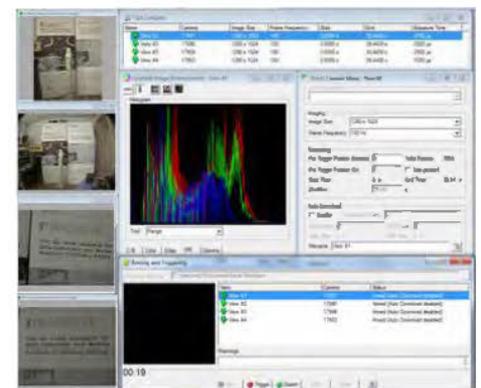


More applications

- Automotive industry
- Component R&D
- Pedestrian impact tests
- Whiplash tests
- Seat belt tests
- CAD model integration

Camera control

TEMA Camera Control can control all the major HS cameras on the market, all at the same time, with no limitation of number and from one single interface. Its user-friendly interface allows the user to record and view live images, set up parameters, snapshots, image enhancement as well as automatic downloading of the sequences



Learn more

 www.imagesystems.se
 [image systems](https://www.youtube.com/channel/UC...)
info@imagesystems.se





TEMA DEFENCE

The obvious solution to image analysis when motion counts

TEMA is the market-leading software suite for advanced Motion Analysis for Defence applications and testing. Thanks to its high accuracy, modular structure, process speed and intuitive user interface - TEMA is used by Defence industry and professionals across the globe in a wide range of applications.

Key benefits

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

From images to results

From loading an image sequence, executing the tracking algorithms, applying the chosen analytics and logic to presenting the derived data - TEMA offers a straightforward workflow. Menu bars, tool bars and key bindings all provide a easy access to features and functions. 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.

A powerful tool tailored to your needs

The operator has full control of the tracking in TEMA with many options and possibilities to tailor TEMA to specific applications and needs. New features and functionality are added continuously. TEMA has a very powerful set of different tracking algorithms available such as Correlation, Outline, Quadrant Symmetry, Center of Gravity etc. By using the integrated lens calibration tool, data accuracy can be kept at a maximum and the results are traceable. Tracking can be analyzed in 2D, 3D and 6D. Our proprietary TEMA Static survey technology allows for 6D Motion Analysis of a rigid body using a single camera.

Applications

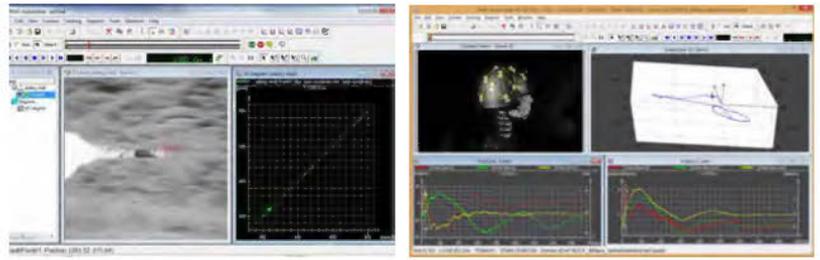
- Ballistics
- Store release
- Explosives characterization
- Fragments spatial/angular repartition
- Deformation of material under impact
- Land/Air platforms stabilization performances



APPLICATION EXAMPLES

Ballistics

TEMA Defence allows the complete analysis of the position, speed, acceleration, impact angles and fragmentation of various projectiles through a set of dedicated algorithms. 3D ballistics tests can be analyzed as well as the behaviour of objects like helmets under impact in 6D using only one camera.



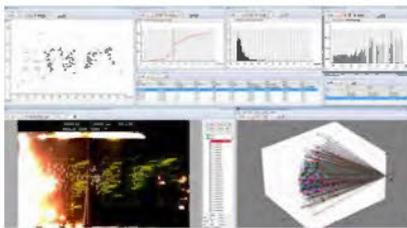
Air Platforms & Land Platforms

TEMA Defence can be used to Investigate wing deflections, flight behaviours, landing gear dynamics, impact effects and 6DOF of stores releases with one or several cameras. On the ground, it can analyze dynamics and stabilization performance of land platforms, vehicle behaviour, impact effects, active defence system efficiency.



Explosives/fragments characterization (Outline & ARENA)

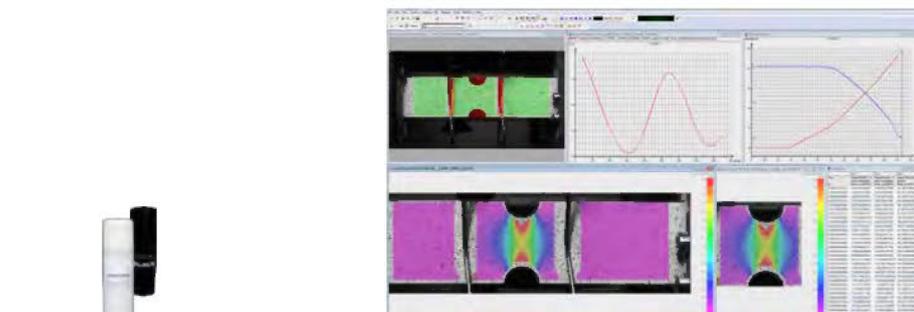
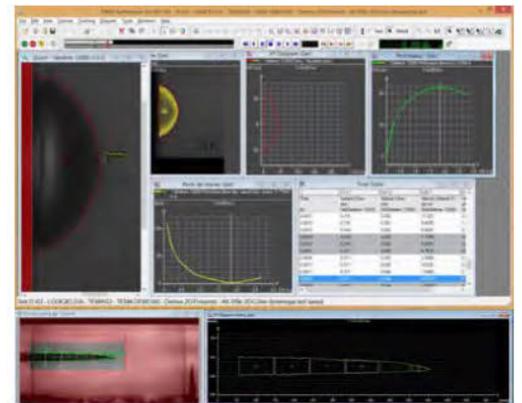
TEMA Defence allows the analysis of shock wave propagation, fragmentation effects, secondary effects, circumferences, shrapnel and splinter dynamics and characterization.



The ARENA module has been developed to study exploding devices through the tracking of fragments impacting calibrated panels monitored with high-speed cameras. The outputs calculated are the number of fragments, the average and instant velocity of any element of the cloud of fragments, spatial distribution of fragments, collateral effects along time.

Gelatine tests

For gelatine tests, the length and rotational volume of the cavity created by the penetration of a projectile can be analyzed. The decreasing speed of the bullet is calculated and the areas of the sliced part of gelatine can be determined with sub-pixel accuracy. 3D profile of the residual damages can be established using the small gel tears along the propagation of the bullet inside each slice. The penetrating cone of the bullet inside the gel can be also analyzed and displayed in various diagrams (XY position, area, relative distance).



Strain analysis

TEMA Digital Image Correlation allows to follow in large field and without any contact the behavior of any material under constraints in 2D or stereo. By following the deformation of a contrasted speckle pattern applied on the surface of the material, displacement, strain analysis and the mechanical properties of the tested object can be determined with 0,01 pixel accuracy.

Learn more

 www.imagesystems.se
 [image systems](#)
 info@imagesystems.se





3D WAND

Camera calibration tool

Image Systems 3D Wand calibration tool removes the often complex and time consuming aspect found in traditional 3D Motion Analysis test preparations - such as lens calibration and camera orientation activities – with an automated and precise calibration method. The tool consists of a software module, compatible with TrackEye and TEMA Motion Analysis platforms, as well as a hardware device, the wand.

Key benefits

- No setup time, no marker needed
- Fast, automatic and easy to use
- High accuracy
- Calibrate lens distortion & camera orientation
- Unlimited number of cameras (≥ 2)
- Generate calibration accuracy report
- Compatible with all major HS cameras

Quality material and design

The carbon fiber construction and the active markers based on LED technology gives a robust, high quality wand that can be used for many years. The system supports measurement volumes from 1x1x1 m to 10x10x3 m (w x d x h). Also supports any number of cameras (two is minimum) regardless of the model, frame rate or resolution. The Wand calibration computes all camera parameters simultaneously, as well as statistics and tolerances of the entire system.



Complete solution

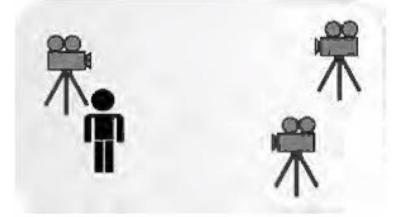
- Calibrated carbon fiber tube with LED bulbs
- Carbon fiber holding stick
- Batterie pack
- Allen key & screw to assemble the wand
- Rugged carrying case

APPLICATION EXAMPLES

Procedure step by step

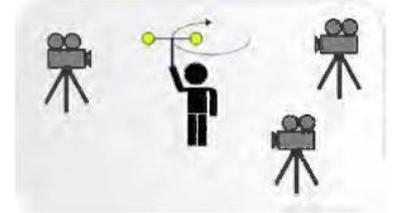
1. Position cameras

Position two or more cameras for the test and set the final zoom, focus and aperture. Choose camera positions so that the points of interest on the test object will be visible from two or more cameras during the test. The accuracy of the analysis depends on the geometry between the points and the observing cameras: 90 degrees angles are optimal, 30 degrees – 150 degrees angles are acceptable.



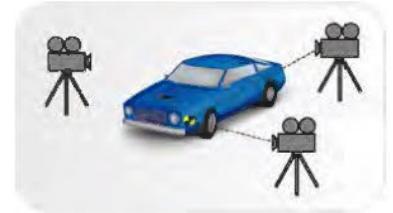
2. Record calibration images

Make a synchronized recording from all cameras. Move the wand in the entire measurement volume for approximately 20 seconds at frame rates of 25 – 50 Hz. Set exposure time to less than 2 ms to maximize contrast and avoid motion blur. Use regular room lighting.



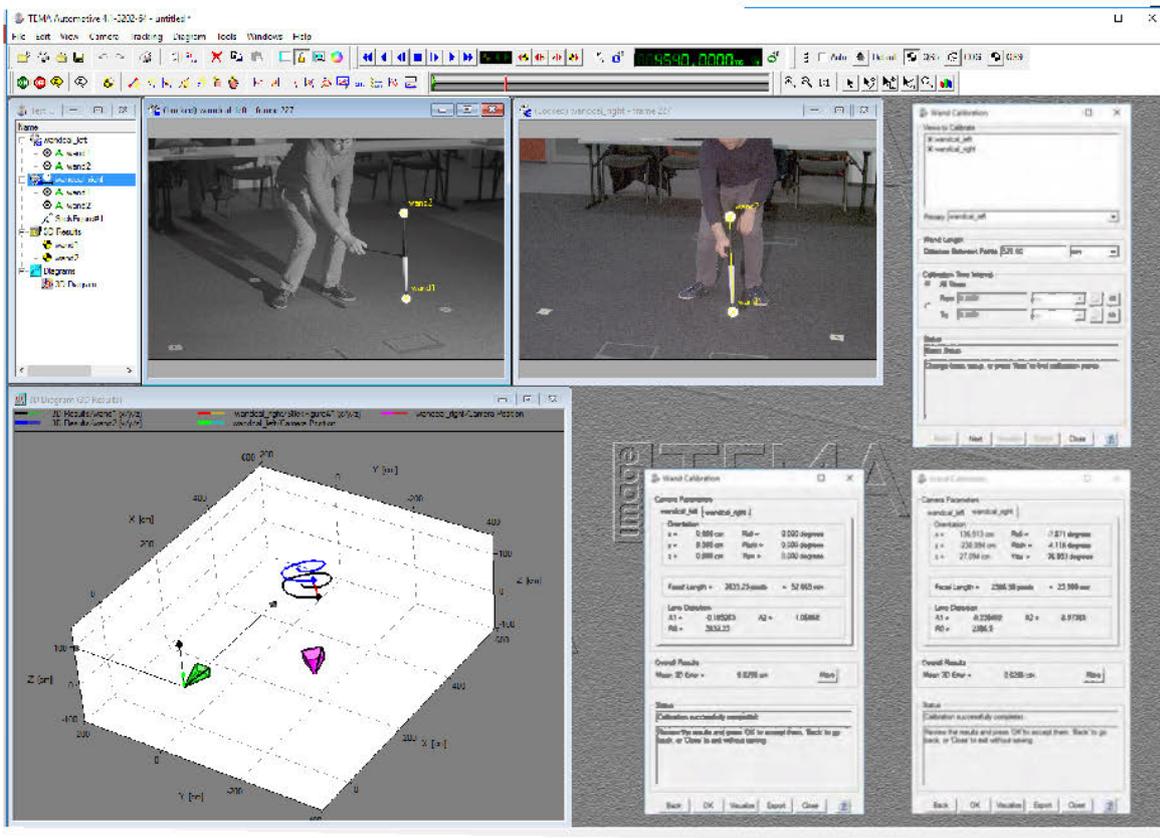
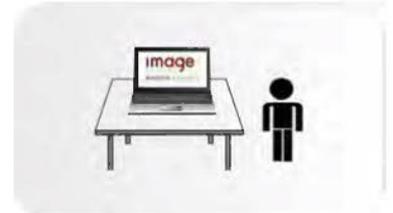
3. Record test images

Set the final frame rate and exposure time for the test. Don't adjust the other camera settings or move the cameras. Perform the test and make a synchronized recording from all cameras.



4. Analyze test results

Load the calibration images into TrackEye or TEMA and automatically calibrate the system for camera position and orientation and lens distortion. Proceed to load the test images to analyze the points of interest in the test images. 3D results are computed for each point that is tracked in two or more cameras. Note: The calibration can be reused in future tests as long as the camera setup and positions are not altered.



Learn more



www.imagesystems.se



image systems

info@imagesystems.se

