

**image**  
SYSTEMS  
**TEMA**  
CAMERA CONTROL

## Product information

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**image**  
SYSTEMS

Image Systems AB  
Main office: Ågatan 40, SE-582 22 Linköping  
Phone +46 13 200 100, fax +46 13 200 150  
info@imagesystems.se, www.imagesystems.se

# Introduction

TEMA Camera Control is an option to TEMA, the world leading system for advanced motion analysis, and it offers the possibility to control several different brands of high-speed cameras from one single program.

Users of high-speed cameras in applications like crash tests, airbag volume measurements, drop tests, military range tests and many others often use cameras of different models and from different vendors. The reasons can be several: Cameras have been upgraded due to new requirements, the test lab performs different types of tests where one vendor cannot supply all types of cameras needed, etc.

This situation creates problems for the user. Every camera has its own camera control software which means that the operator needs a long time for setting up a test and a lot of time for extra training to learn new software.



TEMA Camera Control is the solution to this problem. It can control all the major high-speed cameras on the market at the same time and from one user interface only.

The user-friendly interface makes it easy to record images, view live images, perform parameter settings, do image enhancement and perform automatic downloading. All functions can be performed on multiple cameras simultaneously.

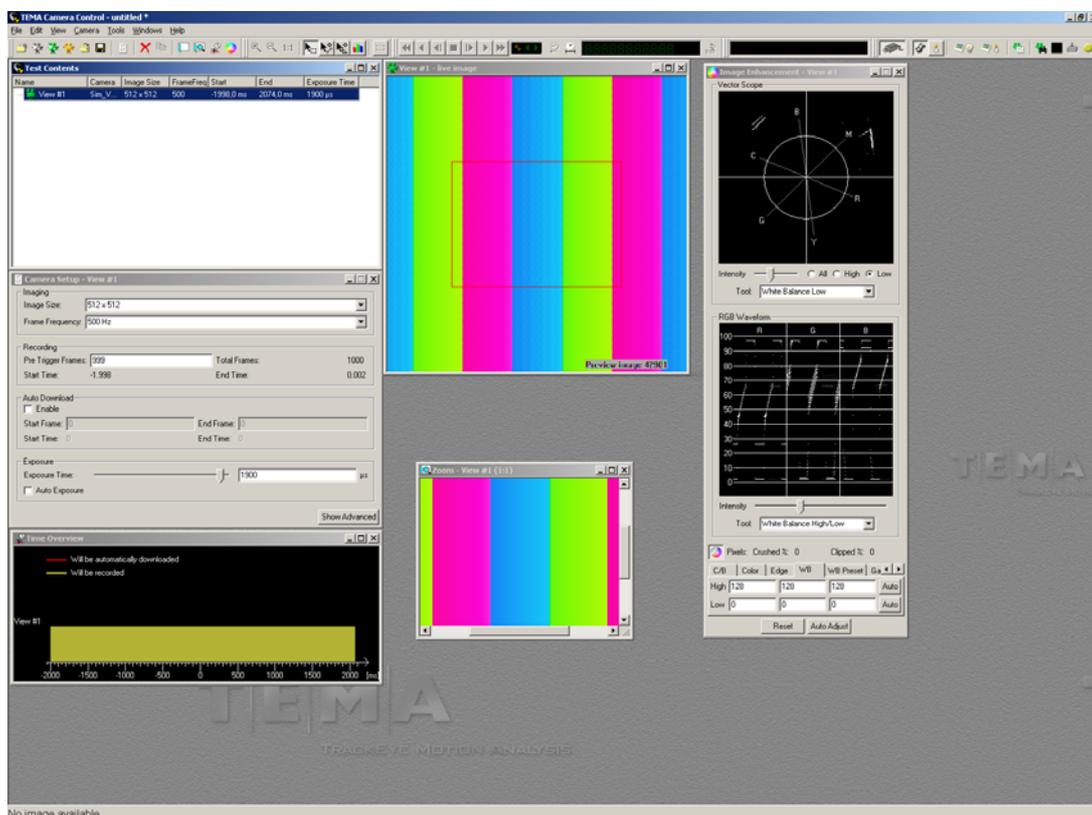
TEMA Camera Control is fully integrated into TEMA for tracking and motion analysis. The user can start tracking directly after downloading an image sequence from a camera.

# System description

## User interface

The windows-based user interface of TEMA Camera Control gives a very flexible way of setting up a test. The operator can easily connect one or multiple cameras, record image sequences, make image improvements and save images to disk in several different image formats.

The operator has many options to choose a certain function or feature. The Menu bar, tool bar or key bindings will all give quick access to the wanted feature or function.

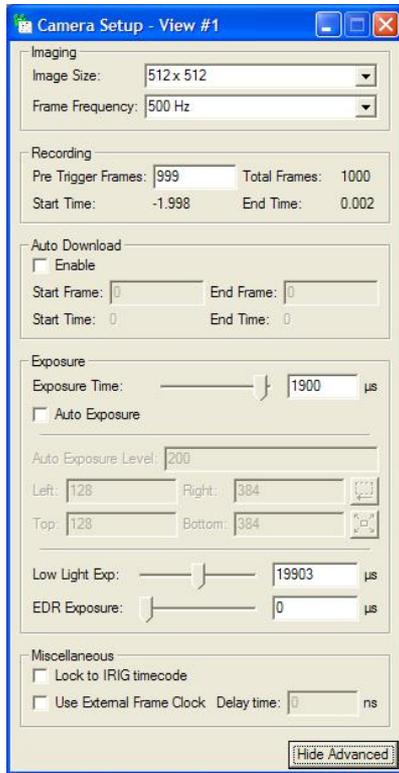


Camera Control Main window

The user interface gives options to view several cameras at the same time as well as comparing the camera views with earlier recorded image sequences loaded from disk. The parameter setting can be done in parallel for several cameras.

# Basic functionality

## Camera setup



TEMA Camera control can handle the setup of any number of cameras of mixed brands. The setup can be done in parallel for multiple cameras.

The parameter set for a certain test can be stored and downloaded to the cameras later. Also the currently used parameter set can be uploaded from the camera.

The operator can set all major properties of the camera like: Image size, frame frequency, trigger options, exposure time and many more.

A nice feature is Low Light mode where the operator, with a click on a button, can temporarily set the camera to longer exposure time to allow camera adjustments in low light.

## Downloading images

After the high-speed camera has acquired an image sequence TEMA Camera Control downloads it to the computer. The downloading can be done manually after a command from the operator or automatically after a trigger signal.

After a trigger the program performs an automatic download of a pre-selected range of images from each camera to a pre-defined destination file or files on the disk. Multiple file formats can be requested

TEMA Camera Control can also acquire real time live images or snap shots from the cameras and display them in the camera view windows. This can be done for all connected cameras simultaneously. Previously recorded image sequences can be loaded from disk to a parallel camera view window for comparison with the live images.

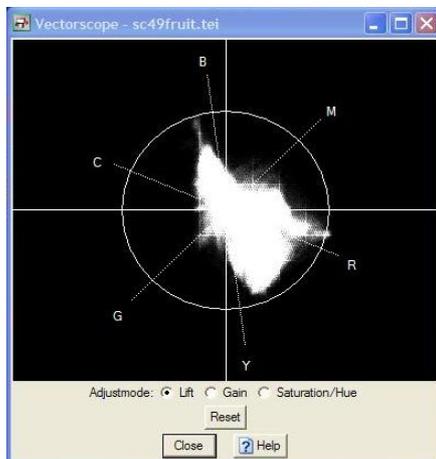
## Measurements tools

TEMA Camera Control has a set of tools for measurements in the images. Properties like distances and angles between points be quickly be measured by “click and drag” in the camera view window.

## Image enhancement

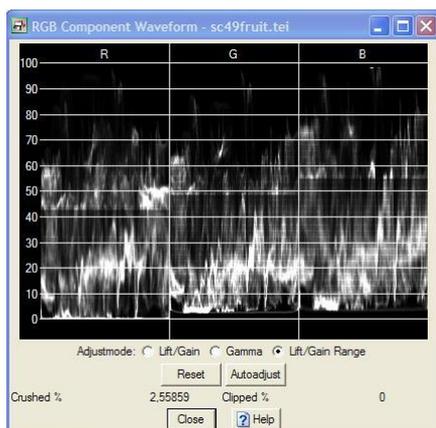
TEMA Camera Control has different tools available for color corrections such as control of brightness, contrast, and gamma in each color as well as different hue and saturation.

The two main tools available are RGB Waveform and Vector Scope, where the operator can perform image adjustments by “click and drag” in the dialog window.



The vector scope displays the image in a color space. The image data is displayed as a three dimensional histogram.

The user can perform operations like expanding color dynamic, adjusting white balance and turning color space (change colors)



The RGB Wave form displays the wave form for each color separately.

The user can adjust intensity, gamma and dynamic range color by color.

All calculations are made with high bit depth and headroom through the whole chain, which avoids the cutting of peaks and it preserves the image quality.

## Image export

The images can be exported to a number of different image formats such as: MPEG, AVI and multiple TIFF and JPEG.

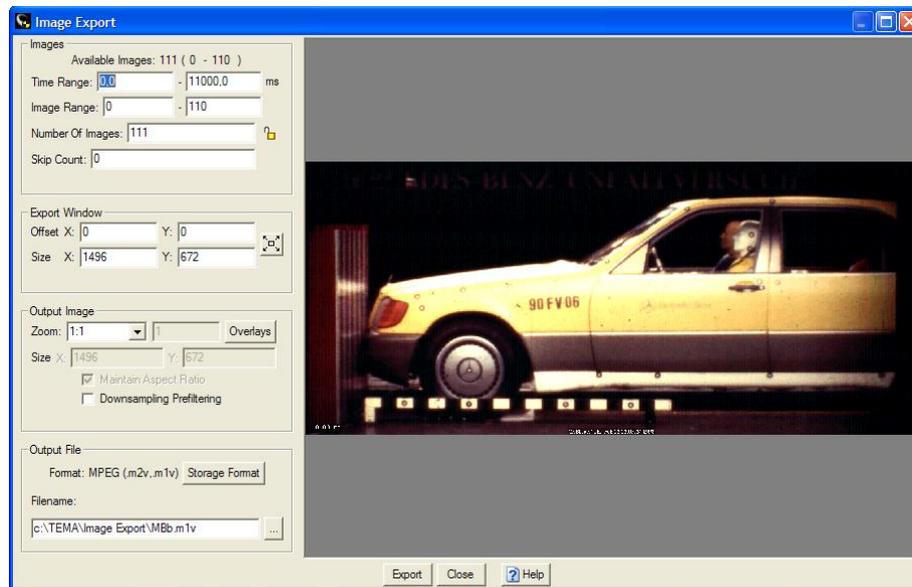


Image export dialog

## Supported cameras



Image Systems supports the main brands and models of digital high-speed cameras on the market and is continually adding new cameras to the list of those controlled. Let us know which ones you need.

## TEMA Camera Control Enterprise Edition

TEMA Enterprise Edition adds a set of new features to TEMA Camera Control, which are important for larger crash test facilities distinguished by:

- Pre-defined processes: Larger facilities often have well defined processes for carrying out operations. Any product used must adapt to these procedures.

- Test planning systems. Systems to administrate test and resources are often used and any test program used should be able to communicate with this system.
- Subdivision of tasks: Different departments of a corporation can be responsible for exercising different parts of a test. For instance: Different departments for image capture, tracking and analysis.
- Data storage models: Data storage must often conform to certain regulations.
- High throughput of tests. A larger facility often means that several tests are run in one day.
- Repetitive tests: Often the same department makes the same types of tests repeatedly.

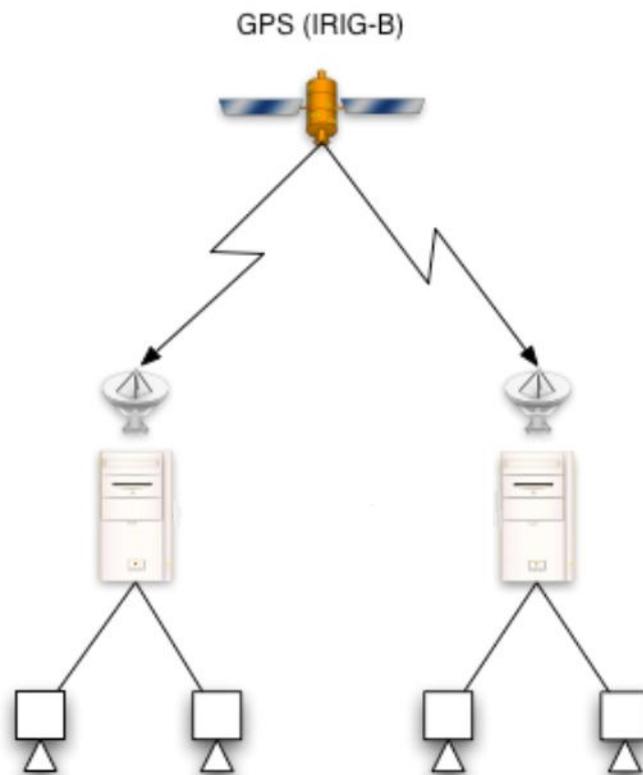
TEMA Enterprise Edition for Camera Control includes several features to handle these needs:

- Metadata reading function: TEMA Enterprise Edition has a metadata reading function to load pre-defined test information from an external test planning system. The participating camera views are defined together with the test parameters.
- Predefined file name patterns: The user can define default file names, including path, for all file types in TEMA.
- Dual file destination: Downloaded image sequences can be automatically stored in two different destinations, normally a local disk and a central file server.
- Camera view list: The user can specify a list of often-used camera views. The camera view settings will be stored together with the actual view. Also cameras can be automatically assigned when loading a predefined camera view.
- Image export performed by separate computer. Image export can put a high load on the computer. TEMA Enterprise Edition has functionality to run Image Export on a secondary computer, typically an image server.
- Additional functions in TEMA Enterprise Edition handle operations like automatic cleanup of old image data, creation of TED files, marking of exported files, password protected parameters and more.

# System integration

Together with the software capability described above Image Systems can engineer the complete system of cabling, junction boxes, individual computers and the inter-computer communications.

The TEMA Enterprise Version can be customized at both ends of the process. The project meta-data can be imported from a test control database, as can the camera views and individual camera setup requirements. This gives the test engineer full control of the imaging parameters and reduces the possibility of setup errors. The image and data file output can be automated to feed directly into the network system.



Courtesy of Boeing

Above is a system on a project where multiple cameras were controlled on two computers via Ethernet. Note that all cameras were synchronized using GPS-time.

Image Systems together with its partner IMC in USA did in this case perform the full installation and acceptance testing.