

OLYMPUS®

Your Vision, Our Future

i-SPEED 2

PRODUCT GUIDE



OLYMPUS®

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Environmental Management System

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• *High Speed Digital Imaging Systems* •



Ease of use has been the key to the success of the Olympus i-Speed high speed video camera. Since its introduction in 2003, it has already provided a cost-effective means of fault diagnosis and productivity improvement to many mechanical production and quality engineering personnel in a diverse range of industries around the world. Now i-Speed 2 provides even greater flexibility, portability and enhanced features that include:

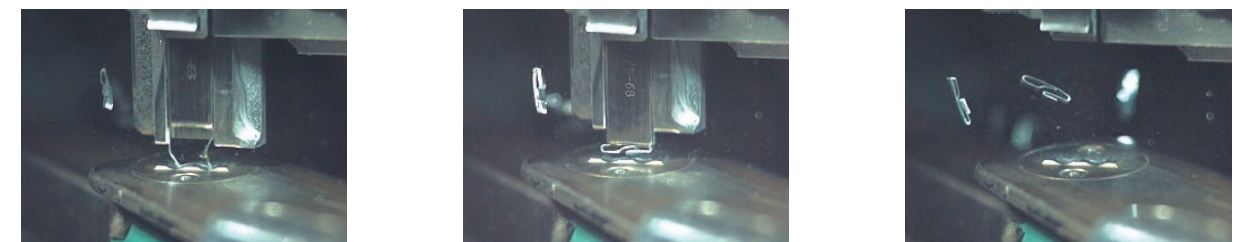
- NEW** Faster microprocessor
 - download speed increased
- NEW** MJPEG compression
 - increasing download speed and reducing data file size
- NEW** Image processing on CDU
 - make images brighter/darker, manipulate and save them for the best effects
- NEW** Report generator
 - create powerful presentations using dedicated software from the video captured
- Recording speeds of up to 33,000fps
- 800 x 600 resolution at 1000fps
- Monochrome and colour cameras
- Standard or High G versions
- Download to computer via Compact Flash Card or Ethernet
- Continuous live video streaming from four outputs
- Exclusive CDU (Camera Display Unit)

Olympus i-Speed 2 has been designed and developed with portability, functionality and ease of use as paramount features. Just power up and immediately you can capture high speed events.

Data analysis and measurements are available immediately, allowing you to make informed diagnostic decisions to improve productivity or system efficiency.

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WHAT IS YOUR HIGH SPEED MACHINERY REALLY DOING?

FIND OUT WITH *i-SPEED 2*

The Olympus Advantage

**Quick Image Capture • Instant Playback on CDU • Up to 33000 Fps
Compact Flash or Ethernet Download • On Screen Analysis • Portability**

i-SPEED 2 CAMERA	
Dimensions	115mm(W) x 110mm(H) x 233mm(L)
Weight	2kg
Input voltage	12V DC $\pm$ 10% (110v-240V AC) mains adaptor supplied
Power consumption	36W Maximum
CMOS sensor resolution	800 x 600
Electronic shutter	To five microseconds (5 μ s)
Standard internal memory	2GB or 4GB
Ethernet signal	10/100BaseT, auto switching
SVGA video output	SVGA (800 x 600), 60Hz
Composite video out	NTSC/PAL switchable
Compact Flash Port	"Memory card" format, Type II
Sync in	Level: 5V TTL, 12V Maximum Impedance 50 to ground
Sync out	Level: 5V nominal TTL Impedance 50 Ω
Trigger in	5V TTL, 12V Maximum 10k (pulled to +5V for pickle switch)
Analogue signal (1&2)	Level: 0 to 5V Impedance 10k Ω to ground Bandwidth: 100KHz Minimum
S-Video	Industry standard signals, NTSC/PAL
Tripod mounting	1 x standard tripod mount (1/4" whitworth thread)
Lens mounting	Standard C-mount
Accessory mounting	4 x 1/4" whitworth thread fixing holes on the base

OLYMPUS *i-SPEED 2* SOFTWARE
RECOMMENDED PC SPECIFICATIONS:

- Windows 2000
- 2GHz processor
- 512MB of memory
- 20GB hard disc
- High speed graphics adaptor (AGP or equivalent, 64MB preferred, Multimedia capable)
- CD writer
- 100BaseT Ethernet

i-SPEED 2 CONTROLLER DISPLAY UNIT	
Dimensions	267mm(W) x 210mm(H) x 43mm(L)
Weight	1.25kg
Display	8.4" LCD daylight viewing
Input voltage:	12V $\pm$ 10%
Power consumption	8W Maximum

i-SPEED 2 REMOTE CONTROL PAD	
Dimensions	50mm(W) x 120mm(H) x 20mm(L)
Weight	150g
Input voltage:	12V
Power consumption	1W Maximum

ENVIRONMENTAL	
Temperature	Operation 0° to +40° Storage -20°c to +60°c
Pressure	71kpa to 106kpa

i-SPEED 2 HIGH-G CAMERA	
Rated at	100g at 11 milliseconds (any axes) IEC 68-2-27 Ea 100g at 2 milliseconds (any axes) IEC 68-2-29 Eb
Available in 4GB monochrome or colour versions. Compatible with all standard <i>i-SPEED</i> accessories.	



Olympus reserves the right to alter the specification without notice.

HUNDREDS OF INDUSTRIAL APPLICATIONS

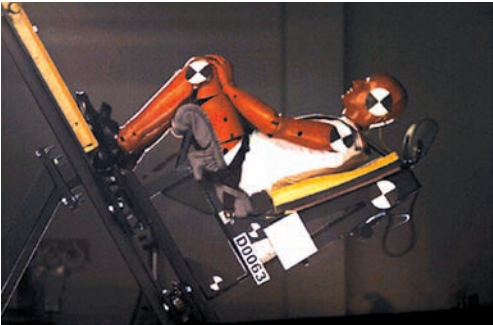
i-SPEED 2 records extremely fast moving events associated with high speed industrial equipment. Video images are digitally captured onto its onboard memory, where they can be written to compact flash card or downloaded via ethernet connection to a laptop or PC.

The video can then be played back at slower speeds, allowing frame-by-frame analysis if necessary, giving the user the ability to study the event in detail and quickly identify problems.

Custom designed software provides the operator with the ability to analyse and enhance images. Velocity and distance measurement can also be calculated.

Capable of capturing images at speeds from 60 to 33,000 frames per second in 'normal' mode (down to 1 second/frame in 'timelapse' mode) *i-SPEED 2* is an effective method of locating problems quickly and easily. The user can then evaluate new designs, increase productivity and reduce maintenance costs.

i-SPEED 2 can be used in a wide variety of applications including:



Aerospace research - aircraft seat testing



Evaluation of vital safety equipment



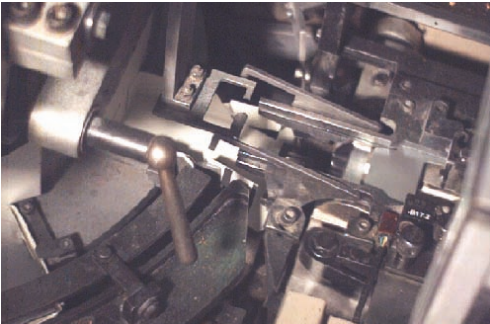
Improving speed and efficiency of bottling or packaging equipment



Ballistic research including explosive tests



Static testing of high impact components



Analysis of fast moving manufacturing processes

THREE METHODS OF CONTROL - ONE CAMERA

The *i-SPEED 2* camera is a self contained unit incorporating a uniquely designed Olympus CMOS sensor and onboard processor providing 800 x 600 resolution at 1000fps. The camera will operate at up to 33,000fps, capturing onto the onboard memory options of either 2GB or 4GB. The camera is available in monochrome or colour formats.

The *i-SPEED 2* camera is also available in a rugged High-G configuration and is specified to 100G at 11 milliseconds rating (note the High-G camera is only available with 4GB memory).

The *i-SPEED 2* camera is very simple and easy to use. It is available in three system configurations, each offering specific advantages to suit specific user applications:



i-SPEED 2 WITH RCP (Remote Control Pad)

Olympus *i-SPEED 2* can be controlled by the small, lightweight Remote Control Pad (RCP) that is supplied as part of the standard set.

The images can be viewed on a standard composite monitor, SVGA PC monitor or digital recording device.

A menu system is provided specifically for the RCP, making operation user friendly and intuitive.



i-SPEED 2 WITH CDU (Controller Display Unit)

The unique Olympus CDU incorporates an 8.4” high resolution LCD monitor, giving the user a small, compact and easy to operate system. No extra monitor or PC is required for operation.

Incorporating an intuitive user-friendly menu structure, the user can operate the system by the simple press of a button, setting speed and shutter, zoom and pan and record. Distance, velocity and angular displacement measurements are possible on the playback image. The ‘clip select editor’ allows the user to quickly identify and save relevant image frames. **You can save only what you need - optimising download.**

The CDU takes high speed video portability to a new level.



i-SPEED 2 WITH PC CONNECTION

The basic software provided with all cameras allows complete camera control from a PC or laptop. Directly connected via ethernet, 'live' images can be viewed from a position remote from the camera location.

Depending on software requirements, a number of options are available. These include Advanced and Deluxe packages, Data Acquisition and IRIG/GPS Hardware modules.

INFORMATION AT A GLANCE

The Olympus *i-SPEED 2* is available in monochrome or colour systems and also in either a 2GB or 4GB memory configuration.

4GB doubles the number of images stored and recording time.

The table below confirms the memory options with resolution, pixel count, zoom ratio, frame speed, images in memory and record time.

2GB TABLE

Frame speed	Record time standard memory (s)	Resolution (W)	Resolution (H)	Pixels per frame	Images in memory	Zoom ratio
60	74.55	800	600	480000	4473	1.00
100	44.73	800	600	480000	4473	1.00
150	29.82	800	600	480000	4473	1.00
200	22.37	800	600	480000	4473	1.00
300	14.91	800	600	480000	4473	1.00
400	11.18	800	600	480000	4473	1.00
500	8.95	800	600	480000	4473	1.00
600	7.46	800	600	480000	4473	1.00
800	5.59	800	600	480000	4473	1.00
1000	4.47	800	600	480000	4473	1.00
1500	4.23	672	504	338688	6340	1.19
2000	4.32	576	432	248832	8630	1.39
3000	4.76	448	336	150528	14266	1.79
4000	4.85	384	288	110592	19418	2.08
5000	5.59	320	240	76800	27962	2.50
6000	5.75	288	216	62208	34521	2.78
8000	5.46	256	192	49152	43690	3.13
10000	5.71	224	168	37632	57065	3.57
15000	7.46	160	120	19200	111848	5.00
20000	8.74	128	96	12288	174762	6.25
33000	9.41	96	72	6912	310689	8.33

STANDARD SET

i-SPEED 2

- Camera (either 2GB or 4GB memory option)
- Colour or monochrome option
- RCP (Remote Control Pad)
- Feature connector cable
- Pickle switch
- Power supply
- Accessory cables
 - 2 x Ethernet, BNC
- i-SPEED 2* Basic software
- Instructions
- Case

OPTIONAL EXTRAS

- CDU
- Compact flash cards
- Lenses
- 10m control cable
- 12V DC lead
- Advanced software
- Deluxe software
- Data acquisition module
- GPS/IRIG module
- Lighting
- Tripods/accessories
- Lighting and tripod accessory packaging

ALL YOU NEED FOR HIGH SPEED VIDEO

To complement the *i-SPEED 2* digital high speed video camera and to suit the varying and demanding needs of high speed video applications, Olympus can offer a wide range of accessories.



LENSES

C-mount lenses ranging from 6.5mm ultra wide to a 75mm telephoto, along with a choice of zoom lenses are available. The size of the camera sensor means that more expensive photographic lenses are not required. C-mount lenses are easily attached to the camera and do not compromise image quality.

For high magnification applications, a lens set is available that provides a primary image magnification of over 3 times.

Extension tubes used in conjunction with standard C-Mount lenses can also offer increased magnification.



LIGHTING

Olympus can offer a large selection of lighting equipment to suit the majority of applications. From 1000W focussed beam lighting for large machinery applications, to Olympus light sources available for small detailed requirements such as enclosed areas and inside machinery.

PACKAGING

The *i-SPEED 2* camera is packaged in a durable, shipable hardcase with foam inserts to securely hold all camera system components. It will accommodate the camera standard set, including all cables and software. There is also space for accessory lenses and the CDU. A softcase is also available for protecting the hardcase from scratches and marks. Lighting softcases and shipable hardcases are also available.

ENDOSCOPES

Olympus not only offers technical expertise in high speed video, we also have over 30 years of expertise in remote visual inspection.

We can therefore match both the optical system of the camera to either rigid or flexible borescopes to allow inspection of areas that cannot normally be reached without disassembly.

Olympus offers both rigid and flexible borescopes in varying lengths and diameters to suit all applications.



SOFTWARE OPTIONS

Every *i-SPEED 2* camera is supplied with unique Olympus PC software that enables cameras to be controlled from a workstation or laptop computer. *i-SPEED 2* software was designed in tandem with the camera hardware to take full advantage of all the special features of the *i-SPEED 2* camera. With the PC software and its industry-unique features, such as the Archive Browser, Strip View and real time zoom, even the most sophisticated event capture and analysis tasks are simplified.

Three versions of *i-SPEED* PC software are available:

BASIC SOFTWARE

Supplied as standard

Basic software includes all the essential features for controlling one or multiple synchronised *i-SPEED 2* cameras. In addition, it provides simple motion analysis for calculation of velocity and distance, together with essential saving, loading and file management functions.

RECORD:

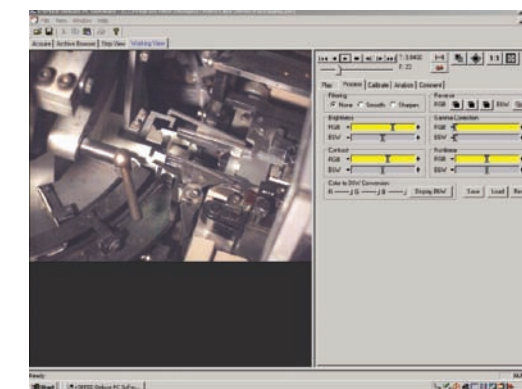
- Set precise frame rate, shutter speed and trigger settings
- Synchronise multiple cameras and toggle between live views
- Control two channels of analogue data with sample rate
- Control zoom, pan and resize of images in live mode

CONNECT AND DOWNLOAD:

- Quickly download thumbnails or full-frame images from the camera
- Hot connect to a live camera and download images
- RGB or Bayer download

SAVING/LOADING:

- Edit video
- Multiple interchangeable formats (AVI, MJPG, JPG, TIFF, BMP)

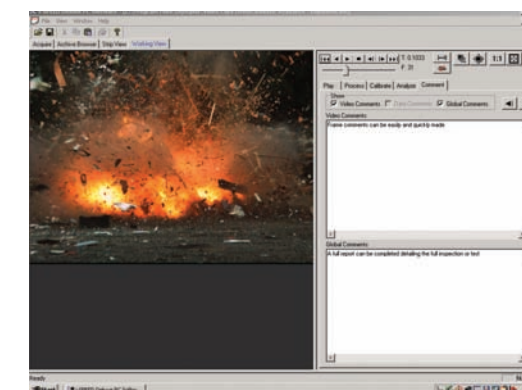


PLAYBACK:

- Zoom, pan and re-sizing of the images
- Continuous loop playback
- Bookmark features
- Image processing (contrast, brightness, gamma, negative)
- Processed Bayer file conversion
- **NEW** Rotation of image during live video
- **NEW** Distance, speed, angle and angular velocity measurements

ANALYSIS:

- Simple, four points manual tracking
- Real-time distance, velocity and position display
- Global comments



ADVANCED SOFTWARE

The Advanced software is designed for the user who needs more motion analysis and data capture capabilities from the *i-SPEED 2* camera. In addition to the basic software features, the Advanced package includes expanded motion analysis, data and user functionality.

SYNCHRONISED DATA:

- Capture, calibration, display, storage, export and retrieval of two channels of synchronised analog user data from internal *i-SPEED* camera hardware
- Display of data and motion analysis on one graph

COMMENTS:

- Add user comments to video and/or user data. The comments are saved with the video/data/timing information and displayed automatically
- Searchable user comments with forward and reverse search feature

ANALYSIS:

- Real time, on-screen graphical display of position, distance and velocity
- Saving and replaying of analysis data
- **NEW** 4-point automatic tracking
- **NEW** Tracking of two relative points (moving origin)
- 2D enhanced calibration of scale, tilt angle, coordinate system and origin
- **NEW** Ability to export distance and speed to Excel
- **NEW** Saving of files that contains all processing and tracking information
- **NEW** Ability to export video and data comment to Excel
- **NEW** Ability to export analogue data to Excel

DELUXE SOFTWARE

Upgrade option

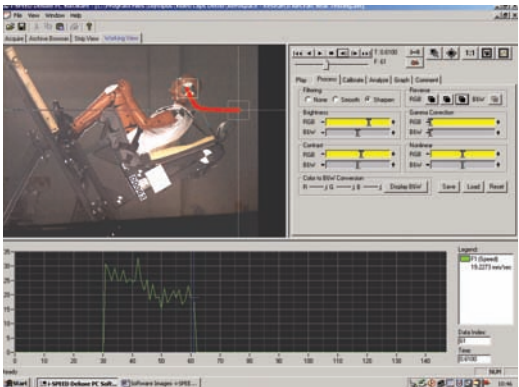
The Deluxe software is designed for the user who wants to take full advantage of the power and flexibility designed into the *i-SPEED 2* camera. In addition to the features available in the Advanced package, the Deluxe software includes multi-point auto/manual tracking, multi-channel analog data input, and automatic remote control/capture and download.

AUTOMATIC DOWNLOAD TO PC:

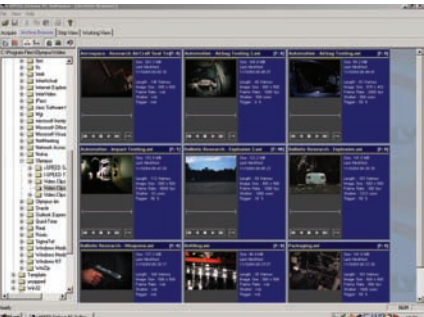
- Automatically capture images and transfer directly to a hard drive for later analysis
- Video and user data captured together
- Internal reset clock for scheduling capture/transfers
- One-time trigger
- High-speed time lapse and burst capture

ANALYSIS:

- Connection to data acquisition hardware
- Connection to IRIG and GPS hardware
- **NEW** 64 point automatic tracking
- **NEW** Report generator in HMTL format
- **NEW** On-video annotation and saving (frame and global annotation)



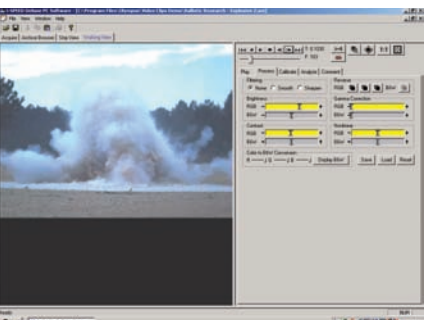
UNIQUE SOFTWARE FEATURES



Archive Browser



Strip View



Working View

ACQUIRE

- In acquire mode the PC automatically connects to single or multiple cameras
- Full control of multiple cameras is possible

ARCHIVE BROWSER

- Preview previously stored videos before uploading into the software
- Shows size of footage, length of frames, image size, frame resolution, shutter and trigger settings against each video
- Shows graphical representation of input data
- Options - view all on trigger frame or first frame

STRIP VIEW

- Time align or frame align multiple videos
- Compare recorded images with images from memory
- Zoom and expand time
- Find events with little searching

WORKING VIEW

- Allows playback and analysis of videos
- Captured data with video is displayed for analysis purposes
- Post image processing can be applied
- Measurements can be made
- Comments can be added to the footage captured
- Zoom and pan can be applied to video footage in playback mode
- Advanced data analysis with automatic graphical representation generated
- Export of data to Excel spreadsheet

SOFTWARE FEATURES

	CDU with CAMERA	BASIC	ADVANCED	DELUXE
VIDEO ACQUISITION				
Multi-camera synchronisation	✓	✓	✓	✓
Remote camera control	✓	✓	✓	✓
Remote file transfer/download				✓
Automatic download to PC				✓
Time lapse mode	✓	✓	✓	✓
Pre/post event triggering	✓	✓	✓	✓
BROC/ROC	✓	✓	✓	✓
Hot connect mode	✓	✓	✓	✓
NEW Rotation of image in live mode		✓	✓	✓
ANALYSIS AND MEASUREMENTS	✓	✓	✓	✓
Velocity, distance, position	✓	✓	✓	✓
NEW Angle and angular velocity	✓	✓	✓	✓
On-screen graphing	✓		✓	✓
Manual feature tracking		✓	✓	✓
NEW Auto feature tracking (x 4 points)			✓	✓
NEW Auto feature tracking (x 64 points)				✓
NEW Tracking of two relative points (moving origin)			✓	✓
Multi-point and auto feature tracking			✓	✓
2D calibration	✓		✓	✓
Image processing		✓	✓	✓
NEW Export analogue data to excel			✓	✓
NEW Export video and data comments			✓	✓
NEW Export distance and speed to excel			✓	✓

	CDU with CAMERA	BASIC	ADVANCED	DELUXE
USER DATA ACQUISITION				
Standard two-channel data capture and graphical display	✓		✓	✓
USER COMMENTARY				
Bookmarking of images	✓	✓	✓	✓
Global movie file commentary		✓	✓	✓
Frame by frame notes commentary			✓	✓
Data commentary				✓
SAVING				
NEW On video annotation and saving (frame and global)			✓	✓
Microsoft AVI formats	✓	✓	✓	✓
Sequence of still frames	✓	✓	✓	✓
Image compression	✓	✓	✓	✓
Partial image saving (clips)	✓		✓	✓
NEW Report generator in HMTL				✓
NEW All processing and tracking information			✓	✓
SYNCHRONISED DATA MODULE (includes hardware)				
16 single ended analog inputs				✓
GPS/IRIG MODULE (includes hardware)				✓

GPS/IRIG MODULE

Synchronise your *i-SPEED 2* cameras to either IRIG/NASA generators or to the network of Global Positioning Satellites. The GPS/IRIG module includes all the hardware needed to fully synchronise your *i-SPEED* cameras, including video and user data, together with an external generator. Time, altitude, latitude and longitude are all displayed on each frame. Requires Deluxe software.

SYNCHRONISED DATA MODULE

Capture, calibration, display, storage, export and retrieval of eight differential or 16 single ended analog user data channels from the *i-SPEED 2* PCMCIA adaptor port. Labelling, scaling and unit factoring of data prior to saving. Includes data acquisition box. Requires Deluxe software.

DESIGNED FOR THE INDUSTRIAL ENVIRONMENT

The Olympus *i-SPEED 2* uses a common C-mount thread for simple connection to standard readily available C-mount lenses. The Olympus designed back focus mechanism allows quick lens set up without additional tools for extra sharpness and definition within the image.

i-SPEED 2 incorporates mounting holes for connection to standard tripods and mounting equipment and has easily accessible connectors located on the rear of the camera.



FEATURE CONNECTOR CABLE

i-SPEED 2 utilises a simple one lead feature connector cable from the rear of the camera allowing multiple triggering, synchronisation, data input and S-Video output.

