

## Specifications

# Laser Weld Monitoring (LWM) Technology

## Spot Weld Monitor

Model: HDEm LWM

The 'standard system' uses a high speed CMOS camera integrated with its own CPU in one package.

This LWM system was designed to work with fixed focusing heads – i.e. it was not designed to work with 'remote welding' or scanning optical systems'.

The system may be retro fitted to existing laser welding systems or installed in to new laser welding systems.

All the software is preloaded and the complete system is tested prior to shipment.

Packaging - *the Spot and Seam Weld Monitor is supplied in three (3) major modules.*

Module 1: Laptop PC with all software pre-installed.

Module 2: Optical package, hardware and LWM camera.

Module 3: Cables.

## Installation procedure – typical

1. Install the hardware, Optical Package and the LWM camera.
2. Connect the cables to the LWM camera and the Laptop PC.
3. Turn ON the Laptop PC.
4. Connect the LWM camera power cable to the 120VAC power source.
5. Wait to see the confirmation message on the Laptop.
6. Click on the 'Connect' icon.
7. Done

## Pre- installation requirements – to be supplied by customer

- 1.1 Focusing head in the laser weld work station that already has a CCTV installed. Successful installations (retro-fits) have been done on focusing heads manufactured by Trumpf\*, Lasag\*, Hans\*, LaserMech\*, Haas\*, ILT\*, Leica Trinocular, etc.)
- 1.2 120 VAC – 5 Amps service within 6 feet of the LWM Camera (focusing head).
- 1.3 Laser beam quality information (spatial profile, temporal profile and temporal behavior data).

## Range of laser parameters

1. Wavelength: 0.8 to 1.2 um. *This includes most industrial Nd:YAG, fiber, disk and direct diode lasers.*
2. Pulse widths: 0.1 ms to 20 ms.
3. Energy per pulse: ~ 0.1 joules to > 30.0 joules.
4. Pulse rate: single pulses (tack welds and spot welds) to ~ 20 pulses per second\*. (*\* Function of laser parameters*)

## Computer and display – Figure 3, Laptop Computer supplied by HDE

## Camera

1. Physical size: ~ 5.5"x2.6"x1.0"
2. Weight: ~ 16.0 oz (*mechanical support is provided by HDE*)
3. Dual functionality. In **Configuration 1** (Figure 1), the camera can be used to replace current CCTV camera. In this Configuration the camera will act as a CCTV camera PLUS a LWM.

4. In **Configuration 2** (Figure 2), the camera is installed on the laser focusing head in addition to the current CCTV camera. The camera does not interfere with the current CCTV and its programmed vision functions (such as seam tracking etc.).
5. Self triggering. The LWM system is not connected to the laser power supply or to the system controller.

### Software - Pre-installed on Camera and the Computer

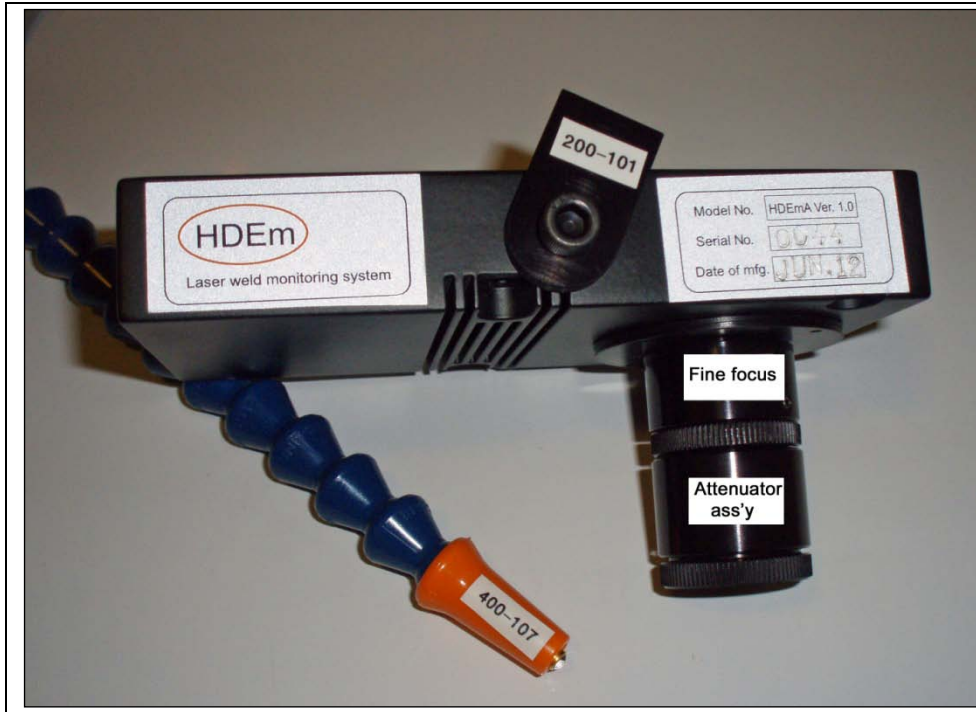
1. Vision software – proprietary
2. Image processing software – patent pending HDE custom software for laser weld monitoring
3. MS Windows 8 Pro.
4. MS Office Suite
5. Other software as needed to enhance data processing.
6. HDE pulsed welding algorithms.
7. Electronic copy of the Operators Manual.

Data – for more details please return to the MAIN screen of this web site and click on 'Data and Statistics' icon

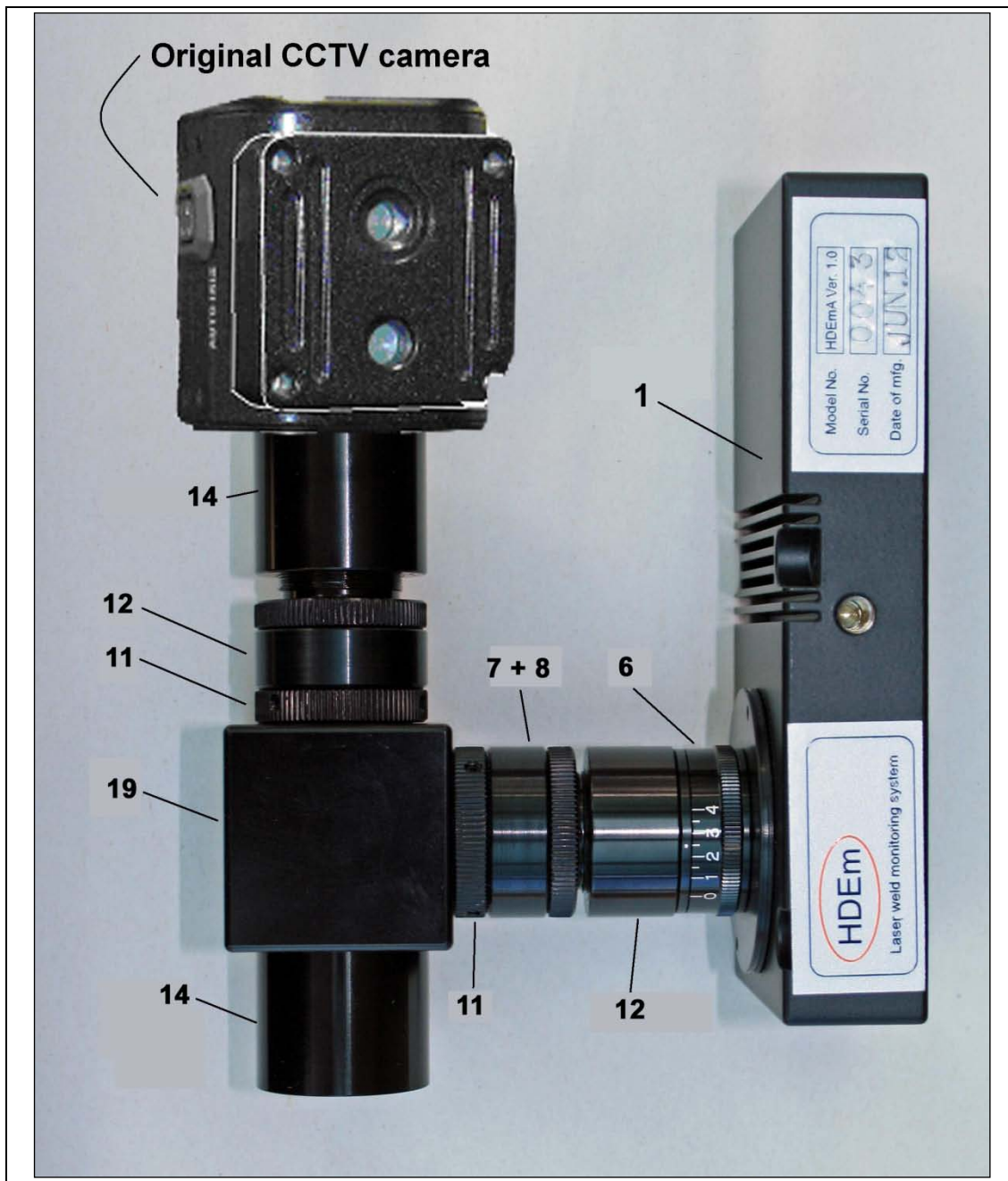
1. Images acquired are downloaded to the computer in the .JPG format.
2. All images are labeled with the Image Number, Correlation Value and 'Pass-Fail' label.
3. Correlation Values and statistical data are reported in the CSV format.
4. Statistical summary of each welded assembly.
5. Statistical summary of all the welded assemblies in one lot.
6. Graphical presentation of all the completed welds in one lot, showing the UCL and LCL and the Correlation Values.
7. Password protection of the system files and the data files.
8. Password protection of data and source code.
9. Data may be downloaded (archived) on client's computer server.

### Installation

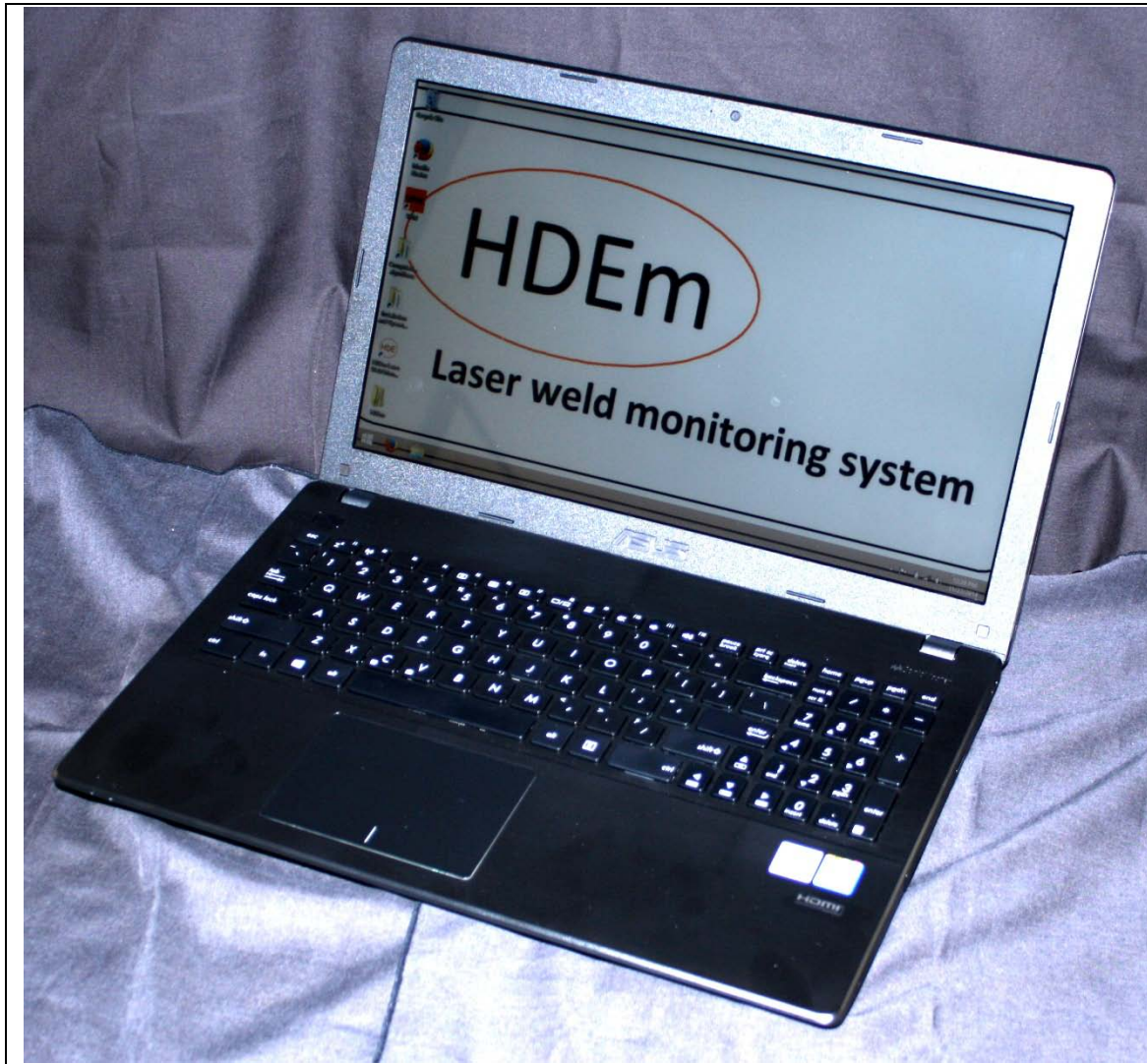
1. The Spot Weld LWM system has been simplified to the point that many customers install the system themselves. HDE supplies a very comprehensive set of instructions and training for the installation, maintenance, calibration and the use of the LWM.
2. Professional installation service by HDE trained professionals is available.



**Figure 1. Configuration 1** of the Spot Weld LWM. Typical set of optical components. PN 400 – 107 is the optical triggering device, encased in a protective sleeve. Typically, the delivery of the laser beam to the target is handled by the original beam delivery optics and is left unaltered. Not all components are shown on this Figure. Final arrangement is a function of the configuration of the current laser beam delivery system and is documented in the Operators Manual.



**Figure 2. Configuration 2** of the Spot Weld LWM. Typical set of optical components. The ‘original CCTV camera’ and the related imaging optics are supplied by the customer. Item 19 is an optical image splitter supplied by HDE. Typically, the delivery of the laser beam to the target is handled by the original beam delivery optics and is left unaltered. Final arrangement is a function of the configuration of the current laser beam delivery system and is documented in the Operators Manual..



**Figure 3.** Computer and display supplied by HDE. All software is preloaded and the total matched system is tested before shipment to the customer. Customer may add an external monitor connected to Laptop computer with a VGA cable.



## Disclaimers

The HDE Pulsed Laser Weld Monitor (LWM) systems are designed to identify changes and variations in the laser welding process with great accuracy in real time, analyze the data and report it to the end user. The accuracy of the data and the reports are subject to a number of process related variables and their interactions with each other and the process limits set by the end user.

The end user is advised to NOT use the HDE Pulsed LWM systems as devices to determine the final absolute quality of the welded product. HDE recommends that the end user continues the normal inspection and testing of the laser welds and the laser welded product as the end user has been doing in the past and as it was approved by the Industry Specific Regulatory Agency.

HDE is not accepting any responsibility as to the accuracy of the HDE Pulsed LWM systems and the final quality and utility of the laser welded components.

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