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Integrating Video Microscopy and Digital Imaging

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There has been a major shift in video microscopy over the past decade.

Because of advances in imaging technology, video microscopy coupled with digital imaging is moving from a luxury seen only on a few factory floors to becoming the norm in industry today. The days of holding a camera up to an eyepiece on a microscope to capture an often elusive image have ended. Today systems are available that allow users to instantly capture an image, share it and view it on a monitor simultaneously.

The most popular types of vision inspection systems used today are a tri-nocular stereo microscope or a video lens system. The microscope or lens system is connected to a camera — generally CCD or CMOSa — and tied into a PC or monitor. Each system has its own pros and cons depending on the application. In addition, by not forcing users to constantly look into microscope eyepieces reduces eye fatigue.

A tri-nocular stereo microscope system gives a user the ability to see the image in 3-D (when looking into the microscope eyepieces) or a 2-D image when projected onto a monitor. In some applications the ability to see a true 3-D image may be very important. One common complaint when using this type of system is "What I see in the eyepieces of the microscope is different than what is projected onto the video screen." This will almost always be the case. The reason: moving from a 3-D image to a 2-D image, so losing some depth of field is inevitable. In addition to the depth of field loss, depending on the monitor size, the image will be magnified so the field of view will also decrease.

Video lens systems offer a higher magnification range and more lens options than a typical stereo tri-nocular microscope. While most stereo microscope systems tend to magnify up to 200x, a video lens system can magnify up to 3000x or higher.

Too Many Components

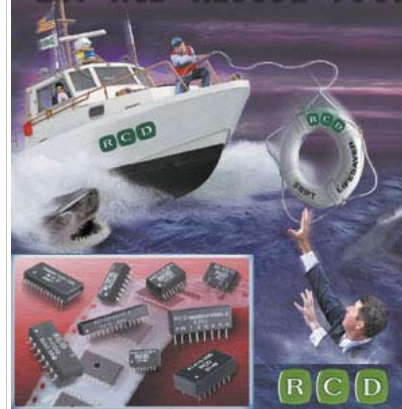
Most systems today are configured with four or five components, and each one is typically provided by a different manufacturer. This integration process of many different components can



Digital camera with lenses modified to mount on microscope.

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Macro lens with MiniVue on Ergo stand.



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cause problems. The camera mount may not match the video systems mount thus the need for an adapter. The PC or Laptop may not be compatible with the camera hardware requirements. The measurement/analysis software may not recognize the camera software driver.

To avoid many of these integration problems it is important purchase each individual product from a firm specializing in such integration with the experience to know which components are compatible. If possible it would be advised to see a working demo to insure all components are compatible.

Today, thanks to improvement in technology we are now able to integrate several of the previously individually purchased components into a single product, thus insuring compatibility. One such product is the new MiniVue camera from Aven Inc. The MiniVue combines the camera, image capture ability and monitor into one unit.

Direct Image Capture

The system captures images directly onto an SD card. The SD card slot is built directly into the camera. By moving the image capture function directly onto the camera a PC or laptop is no longer needed to capture an image. A small 2-inch monitor has also been built into the camera thus removing the need for a monitor. While the unit consolidates many features, it still leaves room for expansion by providing a USB output in the event one wants to use a laptop or PC for image capture. In addition to the USB output a video output is also provided to accommodate a larger monitor. Many other features such as digital zooming, time/date stamp, image manipulation have also been incorporated into the camera.

The next step would be to incorporate all the components into a single product. This would be a plug-and-play system with virtually no setup. Such a system is set for release in the first quarter of 2008.

Called the iVue and iScope — both from Aven — they will be the first completely self-contained plug-and-play units with a lens system and light source, large monitor, PC with measurement software and image capture all in one. The iVue is a video lens system only, while the iScope combines a video lens system and microscope for both 2-D and 3-D viewing. No internal wiring or setup is required with these systems, simply plug in and turn on.



Self-contained MiniVue imaging system.

Ease of Setup

The use of such self-contained plug-and-play systems provides numerous benefits to the manufacturing process and user over traditional microscopes and field built video scopes.

Because of the easy setup, there are no wires to run, software to install, additional hardware to purchase etc. Such a system reduces eye fatigue as well as neck, back and shoulder fatigue from constantly looking down a microscope eyepiece. Less eye and physical fatigue results in higher

productivity.

The new system can provide tighter quality control, since each operator has the ability to document all work performed. Overall information sharing among colleges is greatly enhanced. A defect might be exposed in one manufacturing location. Being able to instantly capture that image and email it may prevent it from being duplicated, saving considerable expense.



MiniVue with DSZT scope.

The all-in-one system means that employee training becomes easier and greatly enhanced. All students are now looking at the same image, unlike the situations when individually viewed under a microscope. Instructors may also record a video file of the training.

The strides made in camera technology have now also allowed for portable digital microscopy. Until recently, portable microscopes had virtually no image capture ability. The specimen had to be taken to the lab to be photographed. The Aven iLoupe camera with a magnification range of 10x-150x allows microscopic images to be taken in the field. This product is essential for quality assurance personnel to be able to instantly capture defects while on the production floor. Field service technicians can now obtain images and send them in real time for evaluation, saving time and money. In addition to the manufacturing industry, this product is used in forensics, archeology, botany and numerous other fields.

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