Application report

Digitales Upgrade

Upgrade package transforms microscopes into digital systems

Microscopes are used at practically every research institution and every company. Due to the long service life of the optical and mechanical systems, many of these microscopes are still analog. However, companies do not necessarily have to replace existing microscopes to make their systems fit for a modern digital workflow. With the AUTOAIM microscope upgrade from Invigon, consisting of a powerful industrial camera from Baumer, the microscope software AUTOAIM, and the matching accessories, almost every microscopy system can be upgraded to be state-of-the-art.

A digital camera offers notable advantages for microscopy applications – instead of looking through an ocular lens, microscopic images can be viewed on a monitor and microscopic structures can be measured on the PC. Subsequent image processing is also possible. Therefore, in this era of digitization, many users who already own a good microscope are looking for an

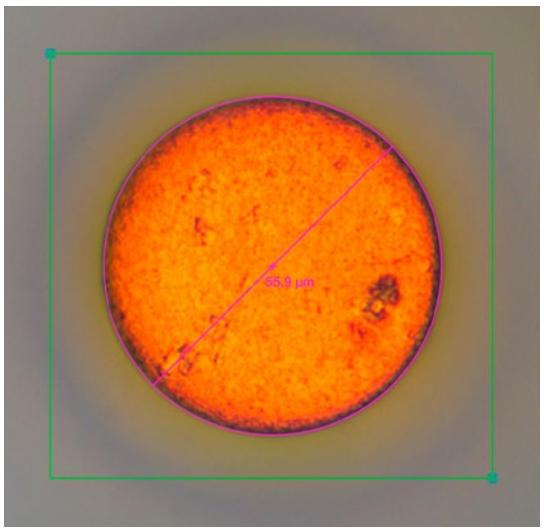

Figure 1

appropriate digital solution. However, to make full use of a microscope camera, users additionally require a software that controls the camera and that includes the functions required for the corresponding application. A well-coordinated overall solution is thus needed. This is exactly what Invigon, a software development and industrial image processing company, offers in the form of the AUTOAIM microscope upgrade package. It contains everything users need to upgrade their existing microscope system to a modern digital system. This includes both the powerful and intuitive microscope software AUTOAIM as well as a high-performance, 5-megapixel CMOS camera of the CX series from Baumer including all accessories required for connection to the PC and calibration. The cameras provide users with high-resolution live images that are smooth and highly responsive at the same time. In combination with the modular and flexible software, this allows users from the industrial or scientific sector to digitize their microscopy solutions and to automate their measurements.

Flexible and modular

With its automatic pattern recognition and easy-to-reproduce measuring functions, AUTOAIM is used by research institutions, medium-sized businesses, and large corporations. "Our customers extol the intuitive handling and the workflows that can be matched to their tasks," says Dr. Enrico Seise, managing director of Invigon. The principle of "recipe-based automation" allows all users, even those without programming experience, to automate their measurement processes – this is done by carrying out the individual measurement steps once in a teach-in process using a normal sample. If this process only included one of several areas to be measured, the measurement range can be subsequently expanded via the software. Once taught in, this "recipe" can be applied to many similar samples. In the case of position devia-

Fig. 1: By drawing a rectangle, AUTOAIM captures circular structures of microscopically small copper bumps on a silicon wafer. The automatic circle measurement determines the diameter in a reproducible manner. (Photo: Invigon GmbH)

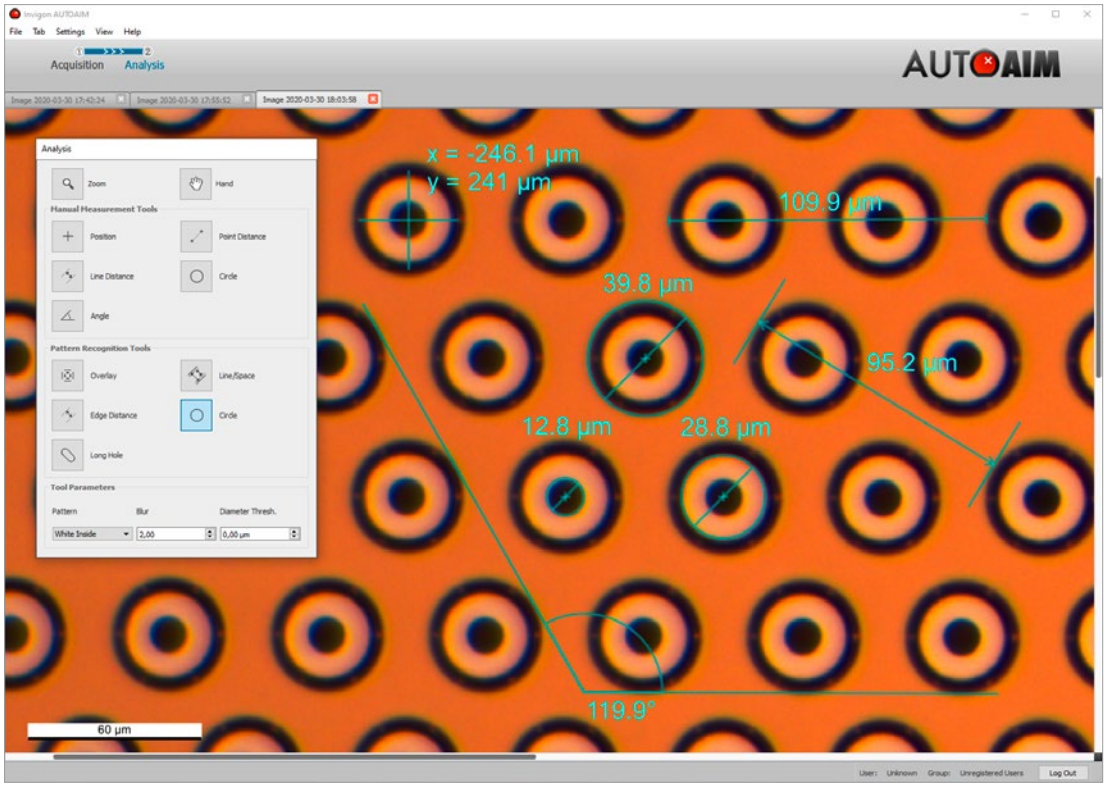

Fig. 2: In the analysis view of the AUTOAIM microscopy software, circular structures on wafers can be characterized in various ways, e.g. via positions, distances, angles, or circle diameters. (Photo: Invigon GmbH)

Figure 2

tions, the integrated pattern recognition automatically recognizes the structures to be measured and measures the relevant areas. Based on a variety of functions, the simple creation of "recipes", and modular hardware compatibility, a great variety of applications ranging from biology and life sciences through industrial material inspection and up to the inspection of electronic circuit boards can be addressed. Extensive export options always allow a comprehensive documentation of all measurement results.

Digital upgrade

"Often, microscopes with and without cameras have already been an integral part of the work of research institutions and quality testing at companies for many years. However, due to the outdated technology, workflows cannot be digitized at all or only insufficiently," is how Dr. Seise describes the need to upgrade microscope systems on the market. The upgrade package gives these users access to the most current technology. According to Dr. Seise, it takes less than an hour to install all components and to customize the software to allow digital measuring and documenting to commence quickly and easily.

Even though AUTOAIM can be used in conjunction with a variety of hardware options, Invigon has deliberately opted to include the camera models VCXU-51C and VCXU-51M from Baumer in the upgrade package as standard. "A high-quality camera that functions reliably was important to us. After all, we want to produce our package in industrial quality, and it should function satisfactorily for the customers." The cameras were also convincing in terms of software. "As software developers, we are of course strongly interested in the software that is included with the camera, as this practically becomes part of our software," emphasizes Dr. Seise. "This is why good documentation and a high degree of maturity are important to us, which Baumer provides us."

Pixel binning also in color

In terms of hardware, the models with their 5-megapixel resolution also had much to offer. To allow observation of what happens to a sample underneath the microscope, the live image of the camera must be smooth and respond quickly to changes. However, high-resolution images that also convey color information create vast amounts of data that are particularly

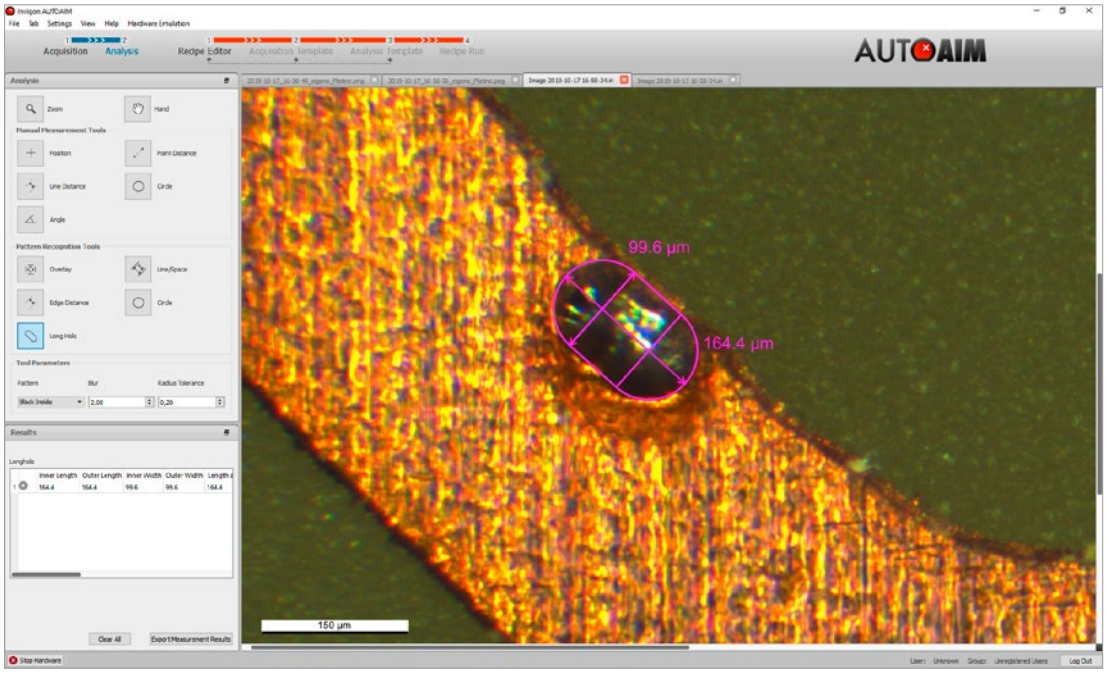

Figure 3

Fig. 3: AUTOAIM captures and measures defects of copper conductive tracks on electronic circuit boards to support users with quality control. (Photo: Invigon GmbH)

Fig. 4: With more than 115 models, the CX series from Baumer offers GigE and USB 3.0 cameras with cutting-edge global and rolling shutter CMOS sensors for cross-industry applications. (Photo: Baumer)

challenging to older computers. To allow a smooth picture to be rendered even on a PC that is ten years old, Invigon has greatly optimized its software, which is also demanding on the camera. "The cameras from Baumer reliably provide more than 30 fps and can also combine several pixels via pixel binning when the images are captured in color. This can only be accomplished by very few cameras on the market, because other suppliers economize in this regard, while Baumer offers such additional functions as standard," explains Dr. Seise. Another advantage is the availability of the support team in case of questions. "You can even call them on a late Friday afternoon and receive an answer. And when we receive a customer inquiry with specific wishes, we can conveniently borrow a camera for testing purposes. This makes it easier for us to react flexibly and quickly to customer wishes," says Dr. Seise. Invigon has been offering the upgrade package since late 2019 with consistently positive feedback so far. Dr. Seise is pleased: "This way, we contribute to the digitization of industrial quality assurance and research without having to replace existing microscopes. This is a win-win situation for all involved parties."

More information:
www.baumer.com/cameras

Figure 4

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