

It's All a Matter of Position

5 MPixel USB cameras support precision work in laser technology

Using light as a tool? This idea would have been hard to imagine only 20 years ago. Laser technology today continually opens up new application areas as it increases the efficiency, flexibility and environmental compatibility of many production processes. An example is the permanent, non-contact marking of components.

Lasertechnologie Winter GmbH, the oldest laser technology company in North Rhine Westphalia, Germany, develops and produces machinery for laser-assisted precision processing and metrology. An important application area for their products is the laser engraving and ablation of automotive components. To ensure the perfectly accurate

positioning of the markings, Lasertechnologie Winter has developed a special software that leverages the advantages of the uEye USB cameras from IDS in combination with elements from the HALCON image processing library.



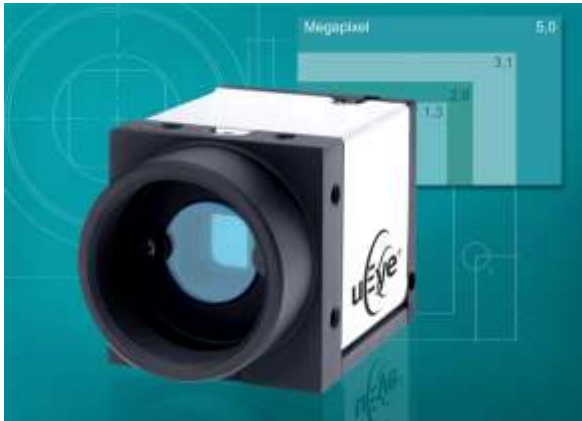
The Germany-based laser specialist Lasertechnologie Winter is a pioneer in the deployment of laser technology. With their innovative systems the company has been a prime mover particularly in the automotive industry, where they have significantly increased the productivity and creative options in the manufacture of control elements. An important application area for Winter's laser technology is the marking of dashboard switches in the Day-and-Night Design.

Dashboard switches were previously manufactured using multi-component synthetic material in different colours, with dark-coloured materials moulded around light-coloured ones. This method was not only labour and time intensive, but also lacked the necessary flexibility. Already in the late 1980s Winter therefore started developing a laser-based solution for marking rear-illuminated switches. In this process, blank parts made from translucent synthetic material are coated with an opaque lacquer in a colour matching the vehicle's interior. The laser removes the lacquer layer where necessary, revealing the translucent material in any desired shape such as numbers, symbols, scales, etc. Using a similar process, control elements can even be illuminated in colour. For this purpose an additional coloured layer, e.g. in red or blue, is applied between the blank part and the topmost opaque lacquer layer.

This method is used particularly for air-conditioning or heating controls.

The quality of the laser marking greatly depends on a uniform contour width and on the exact positioning of the marking. As the human eye can detect even tiny deviations, slight inaccuracies in the marking would substantially reduce the quality of the component. Manual positioning is therefore out of the question: Not only is it too inaccurate and time-consuming, it would also require special adjustment tools. A high reject rate and the fact that only few parts can be manufactured simultaneously are further drawbacks.

Lasertechnologie Winter masters this challenge with the aid of a cutting-edge machine vision solution. High-resolution cameras determine the exact location of each blank part and precisely position the marking according to the defined data. The camera serves as the system's eye and provides the image data necessary for adjusting the laser beam. From this data the specially developed "WinOptiX" software, which uses elements of the HALCON image processing library, determines the exact position of the components. The interaction between the system's individual constituents – laser, software and camera – is perfectly synchronised and self-calibrating.



5 megapixel resolution and yet very compact: the USB camera from IDS.



Whether it's USB or GigE – all uEye camera models from IDS use the same software driver kit, which ensures easy integration.

The camera plays a key part in this solution. The requirements specification stipulated a high resolution, a very compact design, easy connectivity and flexible integration. Winter opted for the uEye cameras from the German machine vision specialist IDS and chose the uEye UI-1480-C model, which features 2560 x 1920 pixels resolution, CMOS sensor, rolling shutter and USB interface.

Despite its high resolution the camera is ultra-compact. Only 34 x 32 x 27.4 mm in size and weighing just 62 grams, the camera is nevertheless fully featured. A C-mount lens connection, an external trigger input and a digital output leave almost no wish unfulfilled. The camera is also among the fastest in its class: Up to six frames per second are possible in high-resolution full frame mode. With double subsampling the camera achieves 19 frames per second at a resolution of 1.3 megapixels – ideal for a quick preview.

The USB interface ensures simple connection to a PC. The powerful software package complete with software development kit is the same for all models of the uEye range and is included in delivery. Besides flexible tools and demo programs for easy configuration it provides drivers for Windows and Linux.

The large workspace of the laser marking system allows processing several components at the same time. All that needs to be done is load the blank parts on carriers and place them loosely in the machine. The exact positioning is done automatically by camera and software. The system is thus both very tolerant and highly accurate. The marking process is logged from beginning to end and is immediately followed by an automatic quality check (size, contrast, position). This eliminates the need for visual checks by the operator, which are also more time-consuming and less exact. To allow subsequent quality and production analyses, all the data is automatically stored in a SQL database.

The solution from Lasertechnologie Winter can also be integrated with older laser systems and allows smooth upgrading.

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