

Automatic tyre identification and DOT code reading



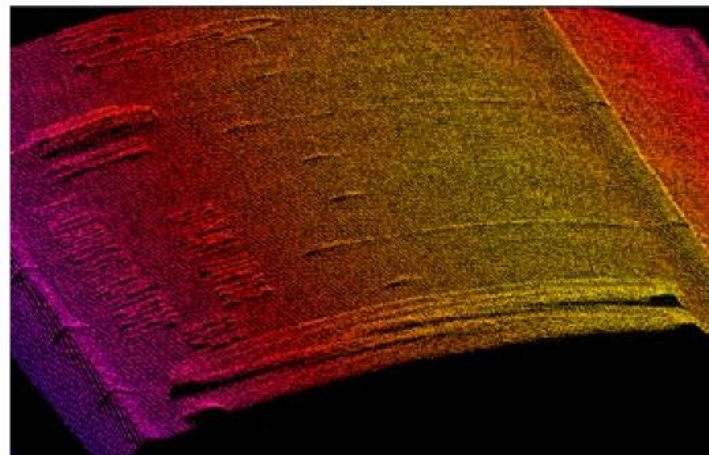
As a car manufacturer for the North American market, it is a legal demand to save the production date of the tyres assembled to one car to a database.

The information of the tyre production date is written on the sidewall of the tyre. Encoded in the DOT number (DOT - Department of Transportation). The DOT number includes the production date and information on the tyre and the manufacturer. Reading this number is a simple task for a human being.

The automated way is a big challenge. Therefore Volvo use the scanCONTROL 2750-100 for this task.

Black letters on black background

The DOT number on a tyre is embossed or raised in the black rubber of the surface. The letters are therefore written black on black and no standard vision camera can handle this because of the low contrast. The scanCONTROL 2750-100 is measuring the distance to the surface using the triangulation principle. The sensor delivers a height image of the tyre directly into the application software. In a height image dark is away from the sensor and bright is near to the sensor. The intensity values directly match calibrated measurement values. Therefore the application software gets an image where the DOT number can be found due to local variation in the offset. Embossed letters are brighter than the surrounding material and raised are darker.



3D view of a tire surface



Image with scanCONTROL 2750-100



Image with an usual high-end laser scanner



360° scan of a complete tyre – greyscale shows height information; red area is DOT number

Application

High speed & high accuracy

The tyres have to be checked within maximum of 4.5sec time to ensure that the complete process is not slowed down. So the scanCONTROL needs to work with a very high speed on the low contrast surface. The scanCONTROL 2750 is used with a profile frequency of 2000 Hz and the sensor delivers over 1 Million calibrated measuring points per second. So one height image has a resolution of up to 640 x 9,000 calibrated measuring points.

The distance between each profile is 0.2mm as well as the distance between two points within one profile in order to create square pixels. Therefore a circle on the tyre looks a circle in the image, not an ellipse.

High data rate

Because the DOT number can be on different sides of the tyre, the application uses two scanCONTROL 2750-100. One sensor for each side of the tyre. The high data rate can be achieved due to the high performance interface of the scanCONTROL sensors. Gigabit Ethernet or IEEE 1394 (Firewire) are available and capable to provide the bandwidth.

Perfect synchronisation

When the tyre is turned 360 the movement is not continuous. The application requires defined distances between each profile. So it is necessary to synchronize the tyre movement with the measurement. scanCONTROL 2750 offers with its high performing trigger input an easy way to solve this task.



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