

## Image processing system for the detection of markings

In order to increase the process reliability in the final assembly of cars it is necessary make a reliable differentiation between the wheel and spare wheel on different types of vehicle once the tire has been fitted to the rim. For this purpose line markings are applied to the sides of the tire. They must be reliably and fully automatically detected when all components (tire, rim, transport belt) are optically similar (matt black) (see Fig. 1).

Since the line markings may differ with regard to position, size, shape, brightness, etc. within certain tolerances, the ICONNECT software must offer these factors as adjustable parameters. For the optimization process during setting up and for later adaptations it is also practicable if the operator is informed of the degree of detection through labeling the objects found (Fig. 2).

Scores are identified on the monitor differently depending on the number of fulfilled parameters (see Fig. 2). Four different markings in the output image are used for this. The result of the analysis is displayed on the PC monitor. The detection and error status is transferred via solid-state relay from the PC to the PLC.

### System requirements:

- Camera resolution: 768 x 567 pixel
- Detection time: >0.5 s
- Max. transport speed: 0.3 m/s
- Markings at any angular orientation
- Illumination only by incident light
- Different types, widths and diameters of the rims.
- Matchpoint and balance weight present.
- Input for trigger signal "Tire present" (light barrier).
- Lighting: High frequency switched-mode fluorescent lamps.

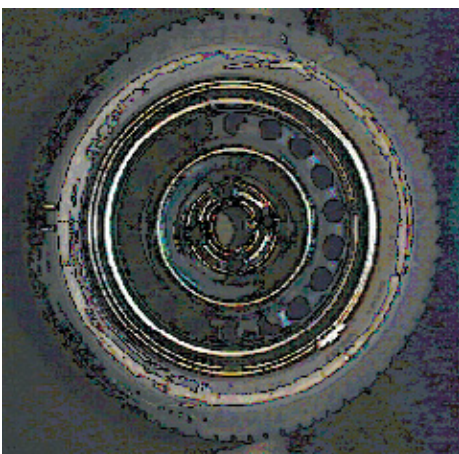


Fig. 1: Typical raw image

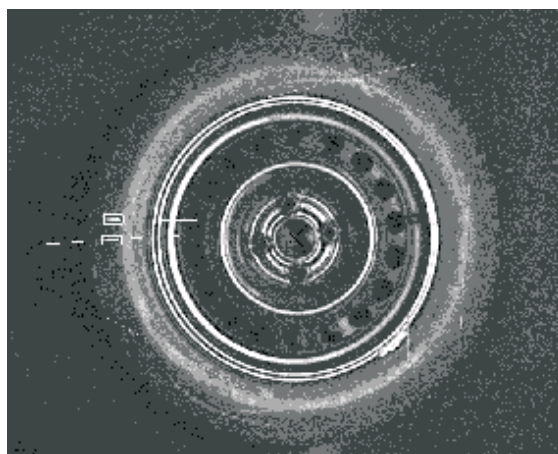


Fig. 2: Two detected markings

# Application

## System components:

- Industrial camera EHD KamPro 02 b/w
- Objective lens Cosmicar Pentax HS316A.
- PC Pentium 400 MHz.
- Frame grabber Hauppauge WinTV PCI.
- Digital I/O Plug-In DIO24 (8255).
- SSR-Rack Prime SSR-24.
- Windows 95, 98 or NT4.0 operating system.
- ICONNECT (graphical development system).

## Reasons for selecting ICONNECT:

- Fastest possible realization of the software concept with high flexibility.
- Software adaptations possible without problem due to the graphical user interface of ICONNECT which is simple to operate.
- Parameterization without direct access to the signal graph possible (user management).

## Ambient conditions:

Temperature: 18 °C to 40 °C

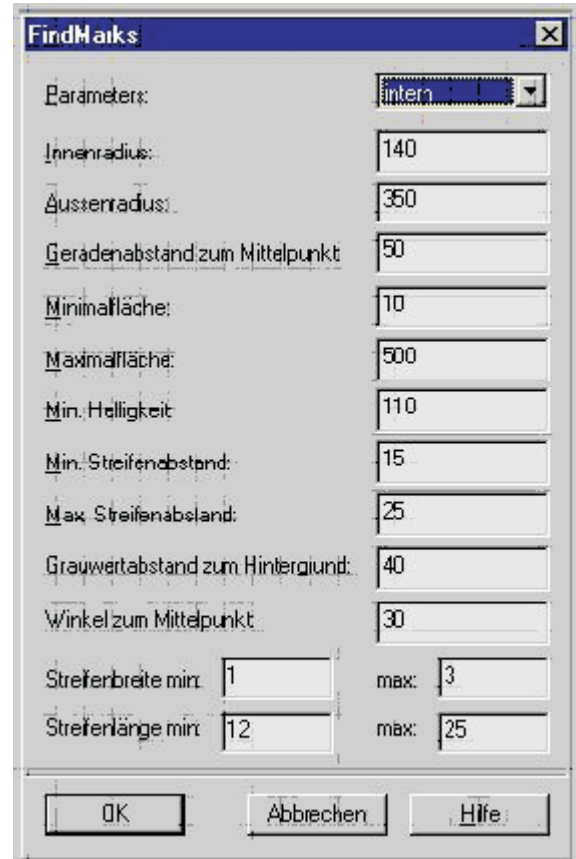


Fig. 4: Dialogue box for parameterization.

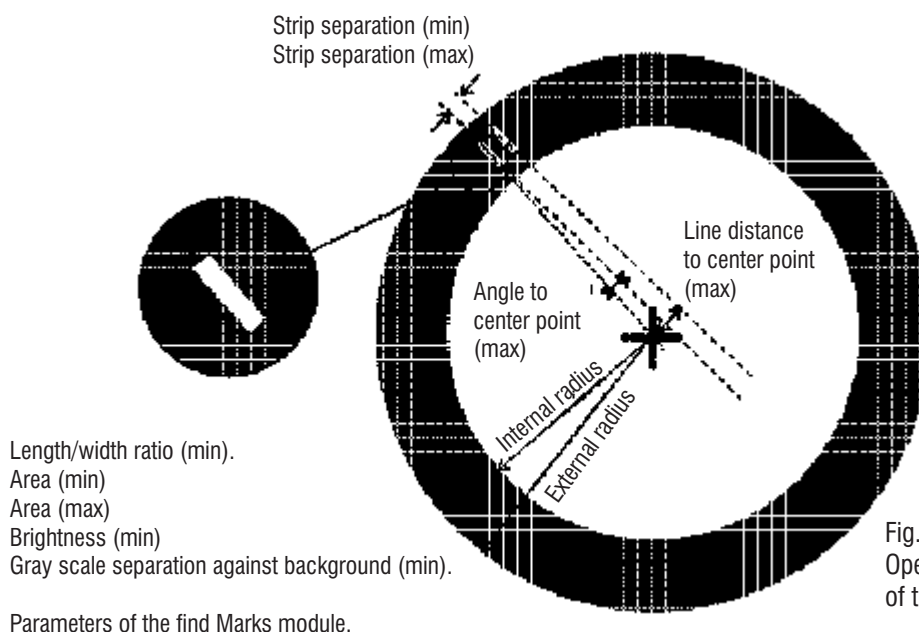


Fig. 3:  
Operating principle  
of the detection system.

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