



INSPECTION ROBOTICS

Robot-guided camera inspection



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Quality control in the automotive industry

Conventional inspection methods of components by means of stationary cameras or also pan-tilt camera technology are increasingly being replaced by optical inspection systems with robots.

Quality inspections with camera systems are a proven means of error detection. Here, complex assemblies such as the engine, front and rear axles or even the complete drive train are reliably inspected in any number of variants before the vehicle is assembled. In one inspection run, completeness control, type and variant control, assembly or position control as well as the presence of various add-on parts are monitored.

The higher-level machine control transmits the type specification to the camera system and starts the image processing programme. The inspection robots move to the inspection positions defined in the inspection system one after the other and evaluate the characteristics. The inspection positions are controlled entirely by the VisionTools V60 image processing software.

The list of features to be inspected in the example of final engine assembly is long. Here, it is primarily a matter of inspecting the correct seating

of connectors and the correct latching of CPA connectors, but also the position and location of hose and clamp connections. The documentation of component variants by means of identification of data matrix codes, barcodes or other features also plays an important role.

The inspection of larger objects, such as complete drive trains with motor/gearbox units and axle beams before they are joined to the body, is not a problem with the available robot reach.

CONSEQUENCE

The combination of optical, camera-based inspection systems with modern robotics can be used universally and very flexibly. The guiding principles of „Industry 4.0“ such as resource efficiency, adaptability, ergonomics and integration of all participants in the value creation process in the sense of an intelligent factory are the driving force behind the development of the optical inspection robotics solution from VisionTools.

COLLABORATIVE INSPECTION SYSTEMS

Collaborating robots are designed to work directly with humans. Under certain conditions, they do not need traditional protective devices such as light barriers or safety fences. To prevent injuries from occurring, these robots must have certain safety features. For example, they must be able to safely limit the speed, force or clamping pressure on the robot or tool when in contact with humans.



VisionTools also has extensive know-how in the field of consulting, assembly, commissioning and service for systems that already meet all normative requirements of ISO TS15066 as well as DIN EN ISO 10218 for safe human-robot collaboration.

ROBOCAM

The flexible inspection system from VisionTools

The combination of optical inspection systems with modern robotics can be used universally and very flexibly.

The ROBOCAM was developed especially for inspection tasks in combination with robots. A typical application is quality control in the assembly of complex components. The outer contours and surfaces of the ROBOCAM meet the requirements of ISO TS 15066 and have thus been explicitly optimised for use in coexistence and for collaborative operation between humans and robots.

Camera and Lighting

The camera model used delivers high-resolution colour images in full HD quality with 1920x1080 pixels. An integrated LED illumination provides more depth of field and high-quality images.

Flexibility

Pluggable electrical connections and a hose package, realised as corrugated or link hose, make the ROBOCAM both very flexible and easy to maintain. A variety of options are available for attaching the hose packages to the robot arms, such as Velcro fasteners or clamps.



Additional functions

The 3-stage enabling switches (safety category 4) integrated directly into the housing enable the implementation of additional functions. For example, by simply gripping the camera by hand, any robot pose can be set in weightless freedrive mode.

The use of the patented method for hand-guided approach and setting of the feature positions as well as the direct saving of the robot pose with the corresponding reference image by simply pressing the enabling switch makes setting up new features in our VisionTools V60 image processing software very simple.





ROBOCAM CAMERA

- **Sensor:** 1/2,8" Rolling Shutter CMOS in Full HD
- **Zoom:** 360x (30 x optical; 12 x digital)
- **Work range:** 10 mm (wide angle); 1200 mm (tele)
- **Data transfer:** Gigabit Ethernet
- **Power supply:** Power over Ethernet



LIGHTING

- **LEDs:** 24 x HighPower / White 5500 K / Scattering lens 10°
- **Power supply:** 24V / 26W
- **Connection:** M12 / 4-pole sensor plug

ADDITIONAL FUNCTIONS

- Monitoring of home position through internally mounted transponder
- 3-stage enabling switches for manual positioning in Freedrive mode with programmable Additional functions