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Machine vision

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...so that technology works.

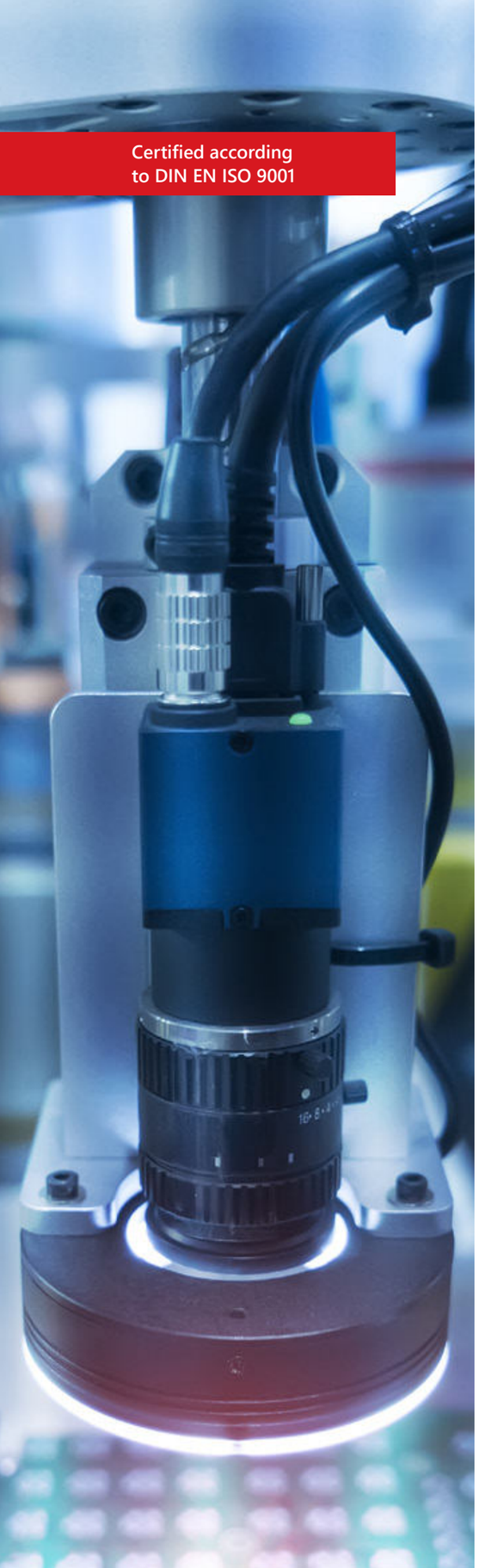
Machine vision

Industrial machine vision is a key technology for highest quality in automation.

Visual sensors enable a variety of inspections such as surface inspection, completeness control, measurement and many more. Fully automated inspections use powerful hardware and and software components and thus enable a fast and and highly precise analysis.

Application areas of vision sensors

- Contour and tolerance inspection
- Luminance and chromaticity measurement
- Completeness and presence check
- Reading of codes and labels
- Distance and thickness measurement



Contour and tolerance inspection

... using the example of a cat-pill test.

The tiny cat-pills are in rechargeable batteries, where they increase their safety. In order to ensure trouble-free working, the cat-pills must be checked for abnormalities and sorted before use

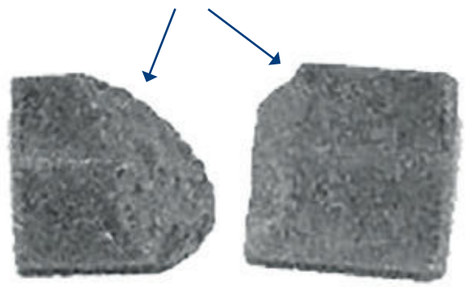
Our engineers have developed a special testing system for this purpose, in which the cat-pills are individually transported on a conveyor belt past the measuring stations. On their way to the sorting station they are scanned and checked. At the end, called „bad parts“ are removed from the conveyor belt with blow-out valves and „good parts“ are collected.

Used system components

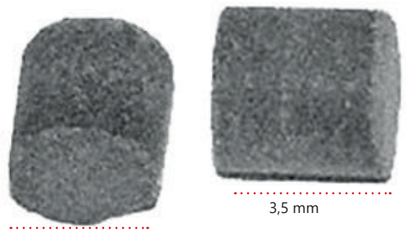
- **HW Checkbox „Contour check“**
  Breakouts and deformations are detected on the basis of the recorded contour. The checkbox controls the blow-off valves and depending on the contour check, the pill is blown out or remains on the conveyor belt..

- **HW Camera system „Tolerance check“**
  The pills, whose contours show no abnormalities, are now measured by an intelligent camera. The length and width of the pills can be measured to ±0.1 mm. The camera reports to the checkbox whether the pill is within the tolerance of width and length. If the measurement result is negative, the box then activates a blow-out valve.
  The good parts remain on the belt, bad parts are sorted out.

Bad parts

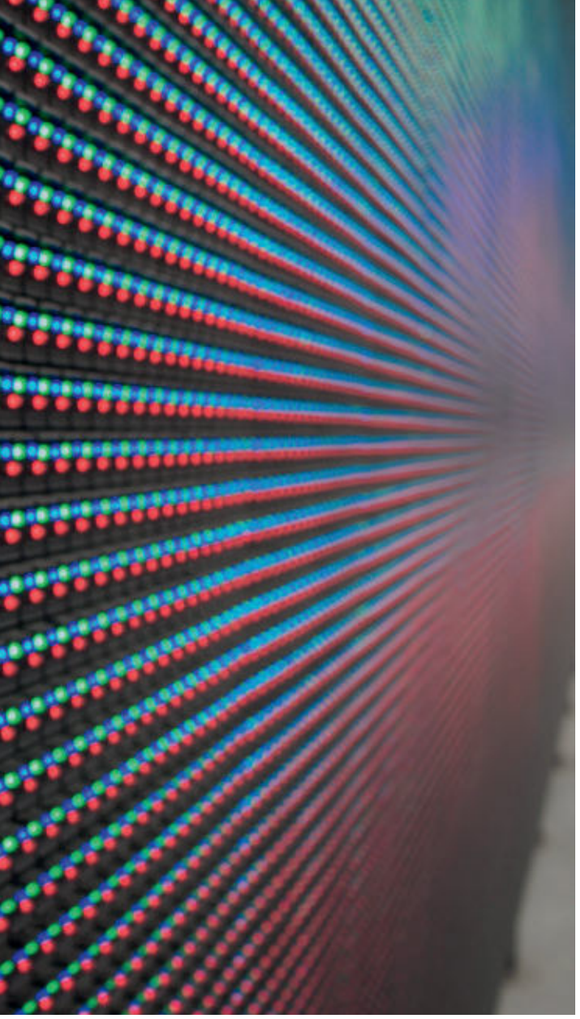


Good parts



Our services at a glance

- Programming/Configuration
- Definition of the parameterisation for communication via the digital I/O interface and the Ethernet interface
- Commissioning and start-up support on site



Display Inspection

...using the example of a stand-alone EOL

In addition to various electrical tests and CAN diagnostics, the displays and warning lights of the instrument clusters are measured. The luminance, colour location and general switching function of the displays are tested. Flicker measurement is also possible.

Luminance camera LMK

- Measurement of colour location and luminance of warning lights
- Measurement of luminance of displays and determination of contrast
- Measurement of the colour location of the displays and, if necessary, readjustment of the RGB values of the display to the desired white point
- Black Mura test
- Detection of correct changing of display in different operating states

Colour Analyzer

Flicker measurement and, if necessary, readjustment to minimise flickering in LED displays

Our service at a glance

- Mechanical design incl. documentation
- Draft and design of electrical circuits as hardware simulation
- Control and data acquisition with LabVIEW
  Diagnosis with the control units via CAN
- Integration of the robot controller
- Assembly and mechanical commissioning at our premises
- Disassembly, packaging and transport to the end customer's factory
- Assembly and mechanical commissioning at the end customer's factory

Completeness and presence check

... using the example of a robot unloading and testing for sliding joints.

A handling system removes the test specimen and positions it in a station of a turntable. There, a 6-axis robot brings the required measuring system and the corresponding lighting unit into position in order to check various properties of the object.

After successful IO testing, a second 6-axis robot removes the tested component and places it in a box. Defective joints are returned to the deposit belt by the handling system and fed to the NIO station

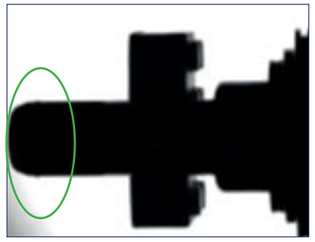


Fig.1 Joint with circlip

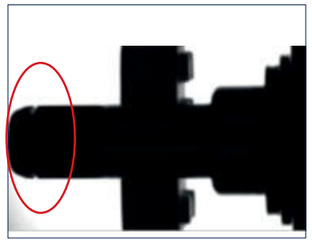


Fig.2 Joint without circlip

Used system components

- **Surface camera with transmitted light**
  The light is directed from the back of the object towards the camera. So, the contour can be used to check whether there is a safety ring on the test object.

- **Laser triangulation sensor**
  The test object reflects the light is detected by laser beam. The light sensor bundles and picture it on the light receptor. This way, faults are detected which occurred while pressing the securing ring.

Our service at a glance

- Mechanical design incl. documentation
- Complete software development for system control and measuring
- Creation of circuit diagrams
- Robot integration
- Housing of the system
- Assembly and mechanical commissioning in our premises
- Disassembly, packaging and transport to the end customer's factory
- Assembly and mechanical commissioning at the end customer's factory

Reading codes and labels

... using the example of an automatic function test rig for gear pumps.

The already assembled gear pump is placed on a workpiece carrier (WT) by a handling system. A belt system with data memory and read-write system transports the WT to the removal position. Then a 6-axis robot removes the pump to be tested and places it on one of the 4 test nests. Here, the volume flow, pressure pulsation, pressure and torque are now measured. The measurement results are stored and enable a statistical evaluation.

After testing and rinsing process, the robot inserts the tested pump on an empty workpiece carrier (WT), which moves into the laser marking cell. A data matrix code is burnt onto the iO-tested pumps. Then the WT enters the verification cell. There, the DM code is checked. NiO-checked pumps are diverted through a switch to an NiO conveyor line where they are manually removed again

Measurement according to test standard

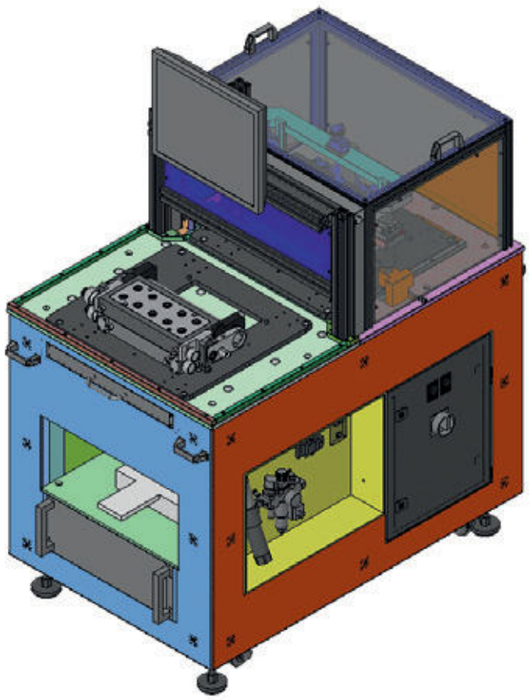
- Flow rate at variable oil pressure and pumping rotational speed
- Torque of the pump shaft in the start-up phase and at varying oil pressure and pumping rotational speed
- Pressure pulsation measurement to detect missing or defective components at variable speeds and pressure
- Quality of laser marking

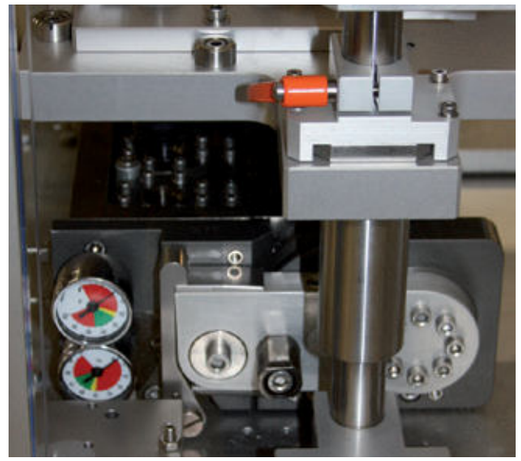
During the test:

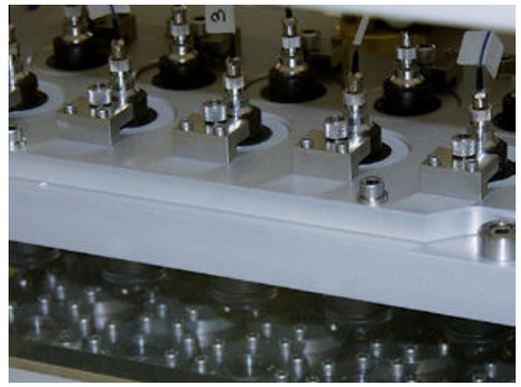
- Measurement of oil temperature
- Measurement of actual speed
- Measurement of actual pressure
- Monitoring of suction pressure

Our service at a glance

- Mechanical design incl. documentation
- Assembly and mech. commissioning at our premises
- Disassembly, packaging and transport to the end customer's factory
- Assembly and mechanical commissioning at the end customer's factory
- Training and instruction of the operating staff







Distance and thickness measurement

...using the example of a measuring station for precision centre thickness control in contact lens production

With contact lenses, even minimal deviations from the specified centre thickness can influence wearing comfort. Ultra-high-precision centre thickness measurement is therefore essential.

- Precision measurement of distance between die and patrix
- Programming of a configuration menu
- Programming of automatic sequence for newly created Centre Thickness System (CTS)

Technical description

- Programming using NI Lab-VIEW
- Digital I/O via PCI card, 19" industrial PC
- Precision distance control of moulding tools (distan-ce between patrix and die) as required for contact lens production
- Connection to a central laser interferometer via fibre optic cable
- Interface of optical channel to other standards (e.g. mea-suring position via RS-232 connector) using Agiltron fibre optic switch
- Colour-coded warnings of setpoint deviations or toleran-ce violations for each indivi-dual measuring channel
- • Optional display of measured values (deviation from setpoint, difference to previous measurement)
- Different authorisation levels (user, supervisor, administra-tor)
- Encrypted storage of measu-rement data
- Retrieval and printout of measurement data (including old data)
- Automatic deletion of obso-lete measurement data via separate Windows application
- Interface between measuring programme and Windows application

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