



Recognizing color nuances and materials of screw nuts

With industrial products such as screw nuts, not only the basic colors of products but also materials and coatings must be recognized and differentiated. Changes in the surface structure, reflection and/or coloring can cause a different color perception, as is the case with metal pressed parts and their refinement or coating. Zinc, stainless steel and yellow chromate must be distinguished when manufacturing screw nuts. The colorSENSOR CFO sensors from Micro-Epsilon are ideal for these precise color comparison measurements, as they reliably detect the different materials in the process and enable 100% quality control due to the integrated multi-teach function.

For this measurement task, the controller is used together with the CFS3-A11 reflex sensor. Beforehand, the sensor is adjusted once to the brightest target, in this case a zinc nut. The nuts are transported on a vibrating conveyor and then pressed into a hexagonal shape by means of bolts. A screwdriver removes the nuts and places them in a holding mold. At this point of the process, the color inspection is carried out. The reflex sensor measures on the front faces of each nut, detects the color and performs an internal evaluation. Via digital outputs (0 V or 24 V) this evaluation can be output to a control system.

The colorSENSOR CFO100 and CFO200 color sensors from Micro-Epsilon impress due to their high color accuracy and repeatability. The integrated multi-teach function enables correct color detection even with strongly fluctuating shades between the individual front faces, as the color shades can be stored in the CFO and assigned to the corresponding color group.

Up to 320 colors can be taught in 254 color groups. The colorSENSOR CFO achieves an extremely high recognition performance and process reliability. The web-based interface enables intuitive operation.

Requirements for the measurement system

- Measuring rate: 1 kHz
- Color distance: $\Delta E \leq 0.5$
- Distinction of different materials/coatings

Ambient conditions

- Constant ambient light
- Room temperature 20 to 23 °C

System design

- Controller: colorSENSOR CFO100
- Reflex sensor: CFS3-A11

Advantages

- Multi-teach function and color grouping
- Modern, user-friendly web interface
- High color accuracy and repeatability
- Currently brightest illumination in this class
- Reliable recognition of shiny metallic surfaces and different materials

