

Technical report

Sharp Snapshot of Moving Codes

Reliably read dot-peened, laser-etched and printed codes



Unlike a laser scanner or simple camera system, the LSIS 422i can read the laser-etched Data Matrix code on this circuit board.

Whether for barcodes, 2D-codes or RFID – Leuze electronic offers the right reader for every code. With the LSIS 412i for blob analysis, the optical sensor professional brought a smart camera suitable for industrial use to the market that, in addition to simplified integration, offers a high degree of flexibility and process reliability. With their most recent addition to the family – the LSIS 422i, which can now also read and verify moving codes – Leuze electronic opens even more possible applications for the user.

In addition to the motor-driven focus adjustment, the entire LSIS 400i product family convinces with uniform illumination of free-form shapes. This is achieved through the use of a technique in which specially calculated lenses are positioned in front of the LEDs to distribute the point-shaped light of the source very homogeneously on the image field in a rectangular shape. Without these lenses, the circularly arranged LEDs would illuminate the image field inhomogeneously. This, in turn, would make it difficult or even impossible to read the codes.

For industrial use, the devices are, in addition to the M12 connection technology, also equipped with a metal housing and glass window and are designed to protection class IP 65 or IP 67. For particularly sensitive areas, such as the food industry, the windows are also available in plastic. Process communication is by means of eight freely configurable I/O ports, one RS232 interface or via Ethernet. Also user friendly is the Web configuration of the code reader, which is performed via a standard browser. A built-in display for diagnostics and status display, as well as standalone operation, round out the advantages of the LSIS 400i series.

The best of the best

The new addition, the LSIS 422i, offers all of these features as well. Not only can it read high-contrast, affixed (printed) barcodes and 2D Data Matrix codes, but also those that are directly marked (laser-etched or dot-peened). If the code is on a glossy surface, reflections make reading more difficult. With homogeneous illumination, such as that offered by the Leuze electronic smart cameras, this is not a problem.

Benefiting from this feature are, above all, the circuit board and automobile industries, which, in addition to the part number, also need to unmistakably identify individual serial numbers for traceability purposes.

The fact that "only" one image is recorded also allows codes to be read on quickly moving parts. Decisive here is the exposure time. In order to capture a sharp image during a rapid movement, the exposure time must be kept very short. Smart cameras of the LSIS 400i product family permit an exposure time as fast as 54 μ s; the resulting images have almost no blurring. A short exposure time, however, means that the amount of incident light is low. As a result, the image tends to be too dark. With an innovative illumination system, Leuze electronic provides a solution to this problem: during the short exposure time, the LEDs are flashed through the application of a corresponding overcurrent. The result is an image that is brighter than obtained by comparable devices. The ability to read moving objects gives the user an even broader range of uses.

Adjustable parameters optimize performance

Optimization by means of software opens further possibilities to the user. For example, a prefilter can be used to define certain code properties in order to accelerate the read process. If the user knows what type of code is being used, he can set the corresponding properties. With 1D codes, the step size of the search can also be increased in order to boost the performance of the camera. In this way, it is possible not only to detect large or small codes, but also to increase the reading

speed. Other options for application-specific presettings for one-dimensional codes include read direction and inverted codes. Even if it is the same code, a black code on a white background results in a different image for the camera than a white code on a black background. If it is known that the code is inverted, it is possible to define this in advance in order to save the time that the software would need to automatically detect the inverted code as such.

Inverted two-dimensional codes can also be read. With these, the reading mode can also be set: "fast" for codes of good quality or "robust" for more critical, e.g. directly marked, codes. If Data Matrix codes are not the typical squares, but are instead a pattern of holes, the algorithm also detects these so-called dot-peened codes by means of the presetting. Even reflected codes can be read by the software. All of these options are available in the software as basic settings. If not set manually via the WebConfig user interface, the camera automatically covers both variants, such as inverted or not inverted.

Determining and evaluating code quality

In addition to reading the codes, quality parameters of the read codes can optionally be determined and evaluated. This is particularly useful if it is anticipated that the codes will be read later by various types of readers. Thus, it is possible to inspect the quality of the code immediately after printing in order to ensure that the generated code can be reliably read. The user can specify the quality criteria himself and, for example, define a value below which a warning is output.

The device can trigger a response not only for the code quality. The reader can also output a message during verification, i.e. the check to ensure the correctness of the code content. Because the content of the code is known during verification, the read content does not need to be passed on to the control. Digital outputs, which are appropriately set depending on whether the content matches or is different than what is expected, suffice.

Theoretically, the new LSIS 422i can read up to 99 codes per image. And these can be codes with different content, as well as codes of different types. To restrict the reading field in the image, a working range can be defined as well as repositioned.

((Box))

The key to the LSIS 400 series code

With the LSIS400i smart cameras, Leuze electronic always specifies a combination of three numbers. The first stands for the product family, with its design and performance data. For example, the 400 series has a larger housing than the 100 family. The number that follows provides information on the software version. "1" means BLOB analysis. With a 41x smart camera, completeness or presence monitoring can be performed. If a "2" appears in the second position, software for code reading is included, as is the case with the new LSIS 422i. The 46x model includes all available software tools.

Figure:



Fig. 1: The image of a Data Matrix code can be seen on the webConfig user interface

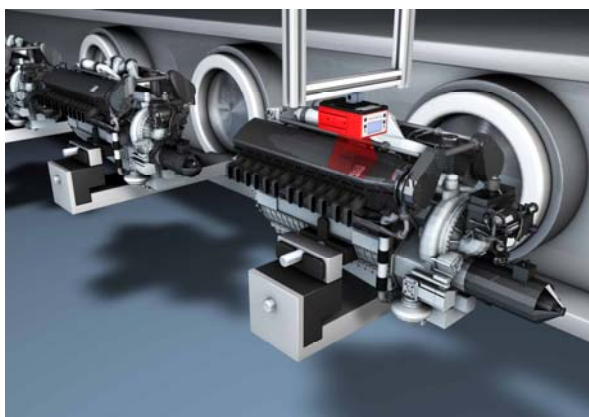


Fig. 2: Even directly marked Data Matrix codes, such as on this engine block, can be read by the LSIS 422i. Automobile manufacturers and suppliers can, as a result, benefit from the complete documentation through component traceability.

Press inquiries

Leuze electronic GmbH + Co. KG
 Matthias May, Tel. +49 8141 5350-123
 matthias.may@leuze.de, www.leuze.com