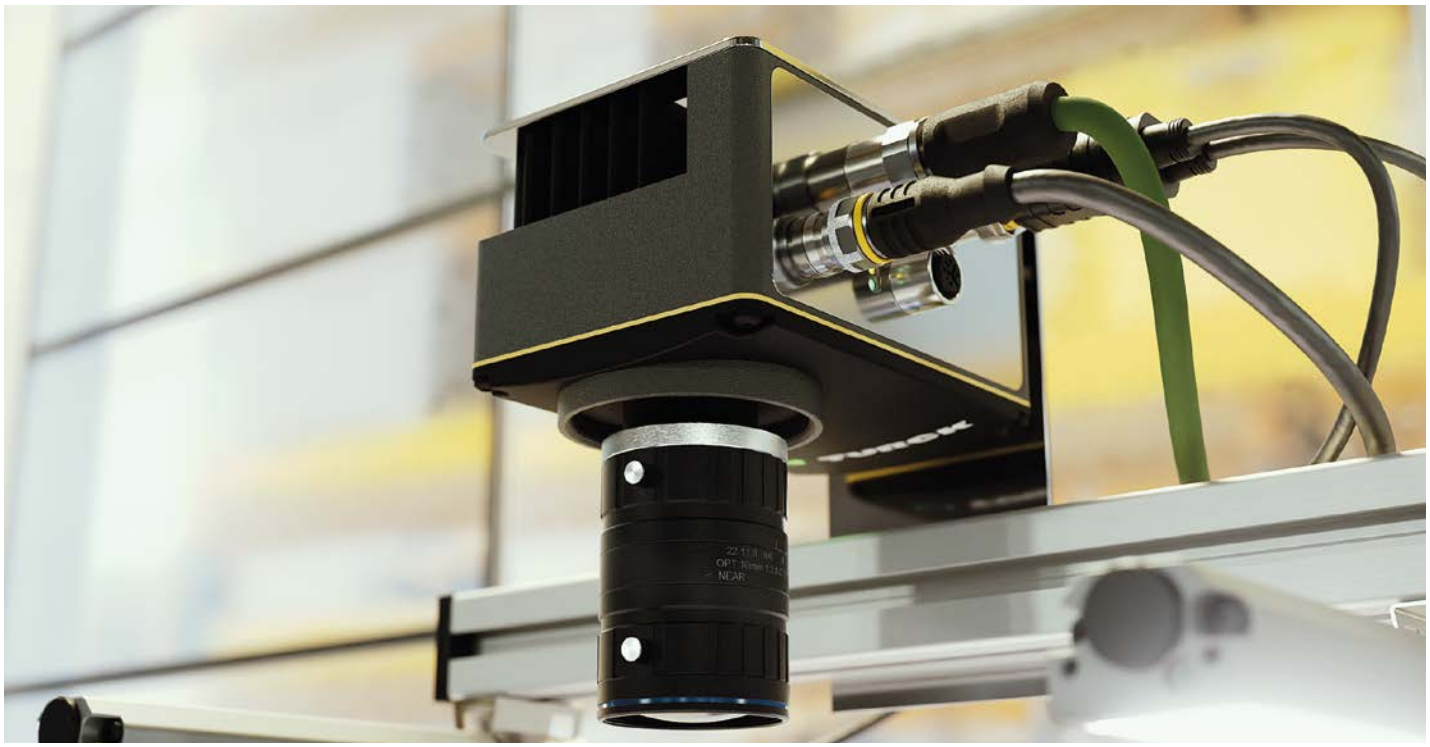
TURCK

Your Global Automation Partner

TURCK Intelligent Vision
AI Camera TIV12MG-Q110N

Products are linked with further information.

Artificial Intelligence in Image Processing



Industrial image processing is facing ever greater challenges: A wide range of variants, flexible processes and increasing quality requirements are increasingly pushing conventional rule-based systems to their limits, as they require manually defined rules for each inspection task — a time-consuming process.

AI-based cameras such as the AI camera TURCK Intelligent Vision offer decisive advantages here. Instead of being programmed in a complex way, they learn from sample images, and recognize patterns and differences independently — even for complex or varying objects. Their robustness to light, perspective and position, means they deliver reliable results and reduce false alarms. Commissioning is quick and does not require expert knowledge — just a few images are sufficient for training purposes. Changes to products or test characteristics can be integrated at any time by carrying our retraining.

The TIV also distinguishes visually similar components with maximum precision and detects faults early on. Image processing takes place directly in the device and delivers real-time results without additional hardware. This allows users to benefit from maximum flexibility, higher efficiency and reliable quality assurance.

Fast image sensor
The 4th generation SONY Pregius S 12-MP monochrome global shutter vision sensor ensures fast and precise recordings. High resolution provides a wide field of view, while the backside illumination (BSI) enables the capture of moving images with efficient lighting and good depth of field.

C-mount lens connection
The standard C-mount lens connection allows standard lenses to be mounted on the camera. Adapters for CS-mount can also be used. An optional protective tube is available, which fits over most C-mount lenses and provides a total protection rating of IP67.

TURCK Intelligent Vision — AI Camera TIV12MG-Q110N

AI camera TIV12MG-Q110N

- Powerful AI tools for demanding vision tasks
- Transferable image data sets and neural networks allow the rollout to multiple cameras
- Customer-specific solutions are also possible on request to tailor existing tools to the requirements of the application
- The range of functions is continuously expanded by software updates

TURCK
Intelligent Vision

The TURCK Intelligent Vision (TIV) is a powerful, industry-standard AI camera in a robust metal housing — developed for demanding image processing directly on the line. Thanks to integrated artificial intelligence, it processes image data independently and makes decisions in real time — with absolutely no additional hardware. With four M12 connections for power, network, trigger and I/O, the TIV12MG-Q110N can be flexibly integrated. The camera can be configured individually: Focus, exposure and lens selection are designed to fit any application exactly. External lighting can be supplied directly via the camera. Whether simple classification or complex object detection — modern edge or deep learning trains TIV to meet your requirements. With just a few sample images, the smart camera learns to distinguish between good and bad parts or to check for completeness. The camera delivers reliable results — quickly, accurately and directly in the device.

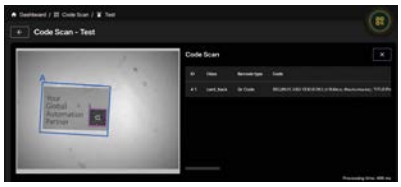
Powerful NVIDIA-GPU
The powerful NVIDIA Jetson Nano 4GB GPU allows neural networks to be trained directly on the camera. The future-proof hardware can also be used for subsequent function extensions without changes. A large memory for several thousand images complements the Power-GPU.

Smart AI vision tools
AI vision tools deliver better results in complex applications faster than rule-based systems. Data sets can be continuously expanded and improved. The intuitive operation reduces expensive commissioning and the need for external integrators or camera experts.

TIV AI Tools

Code Scan

The AI tool "Code Scan" detects 1D and 2D barcodes in the image section. Type, orientation and number are user definable. In addition to the content and type, the position of the code is also transferred. In combination with the "Detector" AI tool, codes can be read out specifically on taught-in objects — all other codes in the image are ignored.



Difference Check

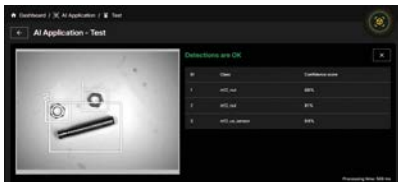
The AI tool "Difference Check" enables precise quality control through intelligent object detection and image comparison. The tool automatically isolates relevant objects and matches them with reference images, taking into account lighting conditions and distortions. Individual test areas (ROIs) are evaluated separately, and the inspection is only considered error-free if all areas match. The more reference images available, the more reliable the inspection

Classifier

The "Classifier" analyzes the entire image as a unit and assigns it to a predefined class. The class assignment is based on a neural network created from annotated training images. The AI camera evaluates the similarity to the classes and assigns them to the most probable class.

Detector

The "Detector" detects and classifies several objects simultaneously within an image. Each object is evaluated on the basis of its position, orientation and similarity to the training data and receives a confidence score after the evaluation. The application allows the number of objects, classes and tolerances to be defined flexibly — ideal for checking completeness, for example in kitting processes.



TAS
TURCK AUTOMATION SUITE

Integration in TAS
The integration into the IIoT and service platform TAS (TURCK Automation Suite) and the use of a web browser instead of a separate camera software significantly save installation time and enable the simple and intuitive integration of the intelligent camera solution.

Plug & Play solution in IP67
With the available connections and the powerful hardware equipment, Turck's AI camera can also be used as a plug & play solution — without the need for a connected controller or edge computer. With the optionally available protective tube, the solution achieves protection class IP67.

Accessories

Connection accessories

Figure	ID	Type code	Description
	6626361	RKS4.5T-2/ TEL	Connection cable for power supply
	6625464	RSS8T-2/TXL	Connection cable for I/Os
	6625470	RKS8T-0.3-RSS8T/TEL	Extension Cable

Figure	ID	Type code	Description
	100036442	RSSX-8814-2M	Ethernet cable, M12 to open end
	100004427	TBEN-LL-SE-M2	Managed IP67 Ethernet switch
	6636536	VBRS12-RKC4.4 TRKC8T-0.15/ 0.15/TXL4300	Y-splitter, separates lighting connection from I/Os
	6636537	VBRS8-RKC4.5TRKC8 T-0.15/0.15/ TXL4400	Y-splitter, outputs I/Os for tower lights

Protective tube

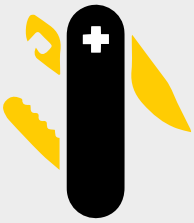
ID	Type designation	Description
100048566	LC-Q110N-35	Protection class IP67

Entocentric lenses

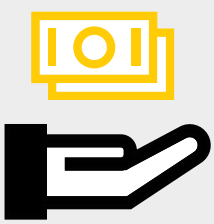
Figure	Type designation	Description
	OPT-CDP0828	Focal distance: 8 mm
	OPT-CDP1228	Focal distance: 12 mm
	OPT-CDP1628	Focal distance: 16 mm

Figure	Type designation	Description
	OPT-CDP2528	Focal distance: 25 mm
	OPT-CDP3528	Focal distance: 35 mm
	OPT-CDP5028	Focal distance: 50 mm

Products are linked with further information.

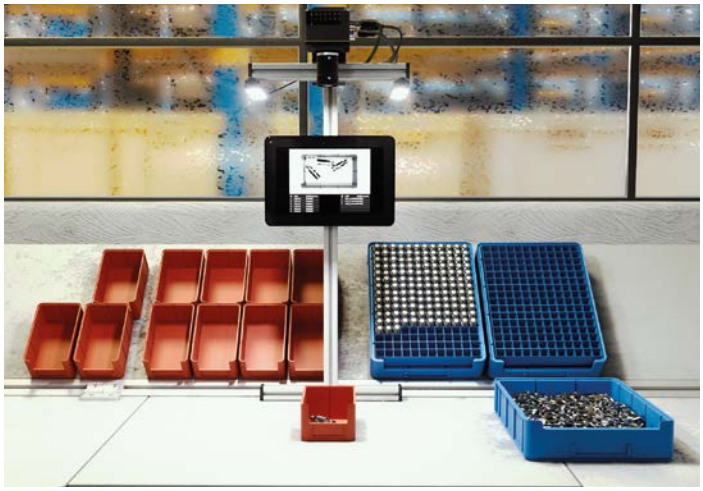


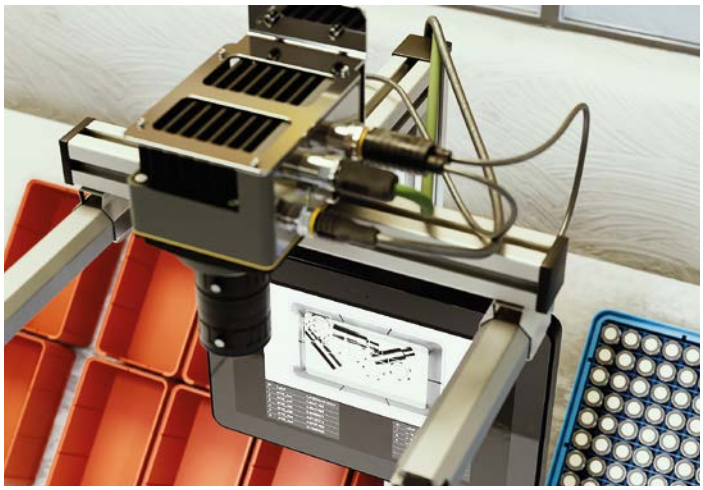
No hidden license costs
The smart AI models used by TURCK Intelligent Vision can be retrained at any time — expert knowledge is not required. Additional software is not required for this. This keeps your image processing flexible, efficient and future-proof.



Investment security
Thanks to high-performance hardware, large and expandable memory and regular security-relevant updates, the AI camera TURCK Intelligent Vision is also equipped for future requirements and therefore ready for long-term use.

Application Example: Kitting





AI camera ensures error-free kitting

The TIV camera uses artificial intelligence to reliably detect objects and check the correct composition of sets — ideal for picking and packaging processes with a wide range of variants.

Your advantages at a glance

- **Minimum error rate:** Reduces rework, rejects and complaints
- **High level of flexibility:** Multiple set variants can be taught-in without any problems
- **Fast feedback:** Powerful hardware delivers real-time results directly on the production line
- **Simple integration:** Can be seamlessly integrated into existing processes without programming
- **Cost-efficient:** Less expensive and faster to use than fully automated robot solutions

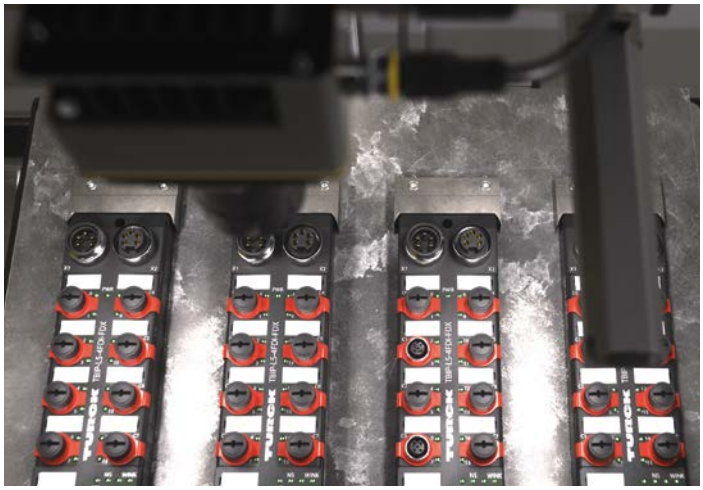
The challenge

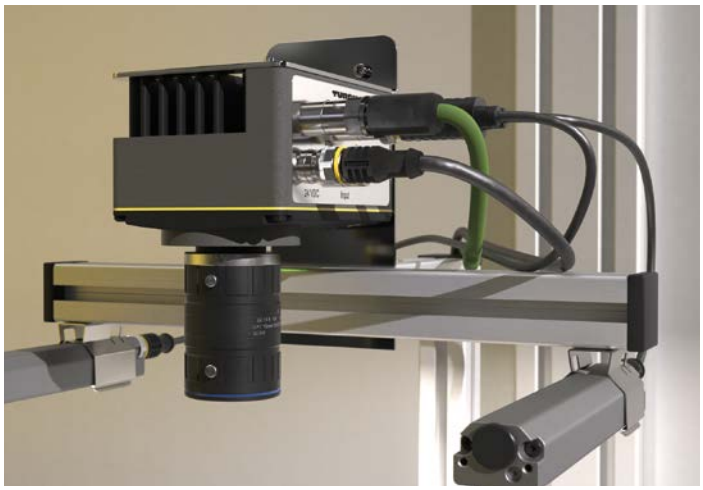
The task known as kitting sees employees compile sets from different components. Errors can arise during this — such as missing or incorrect parts. This leads to additional costs, frustration and loss of image. Fully automated systems are often too expensive or too inflexible for these applications. A solution is needed that checks quickly and is easy to integrate.

The solution

The TIV camera is taught-in using just a few training images — without any rules being defined. It reliably detects objects and their composition and compares these with the taught-in target state, even where there are minimal deviations or similar components. Several correct variants, e.g. M12 and M18 sensor kits, can be stored flexibly. The test result (OK/NOK) is transmitted directly to the PLC or visualization systems via a digital output. This makes the TIV an intelligent quality control system that can be used directly on the production line — fast, reliable and cost-effective.

Application Example: Picking





AI camera guarantees error-free picking

Difference Check using TURCK Intelligent Vision (TIV) enables automated quality control by teaching-in objects with multiple test regions (ROIs) — errors in assembly and picking processes are reliably detected.

Your advantages at a glance

- **Simple integration:** Can be seamlessly integrated into existing processes without programming
- **AI-based error detection:** detects even the smallest deviations more reliably than the human eye
- **Fast teaching:** from 10 images per state — ideal for frequent product changes
- **Clear OK/NOK output:** direct feedback to PLC or visualization systems

The challenge

During final assembly, employees must check numerous test positions — often with varying target states. Incorrect picking leads to rejects, rework and unnecessary costs. Fully automated solutions are often too complex or inflexible. A system is needed that reliably performs complex inspection tasks without complicating commissioning.

The solution

The difference check of the TIV camera enables automated testing of several areas (ROIs) for correct picking. The camera can be easily trained using OK and NOK images and automatically detects any deviations. Even the smallest differences in the millimeter range or visually similar components are precisely detected — regardless of position or arrangement. Each test region is evaluated individually, the overall result is output as OK or NOK. Faulty states trigger a signal — e.g. for ejection or a visual warning. Feedback is sent directly to the PLC or visualization systems — for efficient error detection in real time.

Types and Data

Type	TIV12MG-Q110N
ID	100048288
Function	Barcode reader — smart camera
Vision sensor	1/1.1" CMOS, monochrome, global shutter
Resolution	4128 × 3008 pixels
Pixel size	2.74 µm
Frame rate	42 fps
Internal memory	4000 MB
Processor	NVIDIA Jetson Nano 4 GB, quad core 1.4 GHz
Memory expansion	1 x SD/MMC memory card
Operating system	Linux
Lens	C-mount
Operating voltage	22…26 VDC
Admissible range	Max. 4 A for lighting, max. 6 A total current
Short-circuit protection/reverse polarity protection	Yes/yes
Communication protocol	TCP/IP, RFC1006
Transmission type	Full duplex
Output function	Programmable input/output, 4 × push/pull programmable, optically isolated
Potential separation	GPIOs galvanically isolated from Vss
Input function	Trigger in
Power on display	LED, green
Display switching status	LED, yellow
Fault signal	LED, red
Design	Rectangular, Q110
Housing material	Aluminum, AL
Housing cooling	Passive
Electrical connection	Connector, M12 × 1, 12-wire
Ambient temperature	-20…+40 °C
Storage temperature	-40…+70 °C
Relative humidity	25…75 %
Type of protection	IP67 with screwed-on lens
Approvals	CE, cULus