

# COMPUTER VISION MADE-EASY

No-Code AI solution with pre-installed software bundle

Many manufacturing companies still find it difficult to get started with Artificial Intelligence (AI), not least because of the complex hardware selection. In the new AI workstation, Robotron and Kontron now combine two of their innovative solution approaches for the uncomplicated and fast application of computer vision. The multi-purpose AI workstation enables training, execution and inference of algorithms for a wide range of models and frameworks. The standardized approach covers up to 90 percent of all deployment scenarios and enables manufacturing engineers without programming experience to solve their inspection problems through computer vision in real time.



## TARGETS

- ▶ Easy and fast application of computer vision without programming knowledge
- ▶ Standardized solution for training, deployment and inference
- ▶ No-code approach for a multi-purpose AI workstation

## CHALLENGE

- ▶ High performance in graphics and computing power and at the same time highest reliability and flexibility
- ▶ Broad coverage of application scenarios from quality control to predictive maintenance
- ▶ Solution of inspection problems even by users without programming experience

## RESULT

- ▶ No-code AI workstation with pre-installed software bundle and high-performance hardware
- ▶ Intuitive user interface with pre-trained and customizable AI models
- ▶ Reliable one-fits-all AI solution for many application scenarios based on image processing

Robotron Datenbank-Software GmbH  
Dresden

**Project:**

Bringing computer vision into practice

**Kontron Platform:**

Workstation KWS 3000-CML

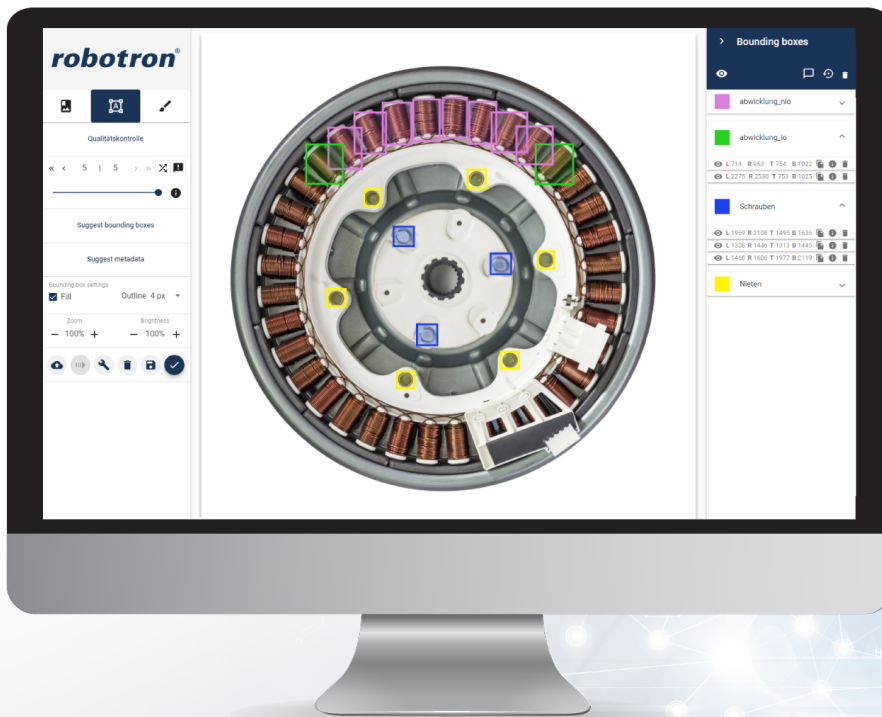
The name Robotron is familiar to many: In DDR times, almost 70,000 people worked at the Dresden-based computer technology combine. After the fall of the Wall, the state-owned company was about to be wound up, but

senior managing director Dr. Rolf Heinemann decided on a management buyout. In 1990, he founded the Robotron Datenbank-Software GmbH with eight other shareholders and 26 employees at the time. Today, the most important segments include the energy sector, public administration and industry, especially discrete production within manufacturing and automotive fields. The company has remained dedicated to its core competence: the effective management and evaluation of large volumes of data on the basis of database software. Today, around 600 employees generate annual sales of 62 million Euros.

[www.robotron.de/en/](http://www.robotron.de/en/)

Artificial Intelligence applications in industry are currently in vogue, especially for topics such as quality control and predictive maintenance. There are different approaches, many based on imaging, others on rule-based methods. The range is wide and it is important to choose the right method. In order to put the computer vision application scenarios into practice, sufficient image data sets and annotated knowledge are required first and foremost. The images must be appropriately labeled so that the algorithm knows, for example, what a correct or a faulty component looks like. The algorithm is then trained with this input.

A typical hurdle for many users still is the lack of knowledge on the subject of Artificial Intelligence. There often is a lot of need for explanation, and dealing with new technologies is a challenge, especially in the production environment with existing inventory solutions. AI projects therefore often take place outside of actual production in so-called innovation hubs. There, however, the practical input and, above all, the continuous integration into the processes are often missing.



## APPROACHES SUITABLE FOR EVERYDAY USE ARE IN DEMAND

The Robotron experts are therefore convinced that it is not enough to have a "cool" data science platform. Rather, they say, it is also necessary to speak the language of manufacturing managers and production engineers and to adopt an interdisciplinary approach in order to bring AI products into the market. The Dresden-based company's motto is therefore to offer customers not only innovative solutions, but also solutions that can be used productively at the same time.

To this end, the company relies on the AI method of reinforcement learning. "The strategy of using trained and re-trained networks brings many advantages. This is true, for example, when you want to quickly teach a neural network new defect types or different colors of a product or part. In practice, this is important for quickly adapting AI solutions to new contexts," explains Dr. Deepa Kasinathan, Product Owner and Group Leader Realtime Computer Vision at Robotron. Expert knowledge is crucial for smooth AI projects: "Since it is usually impossible to say from the outset which neural network is best suited, domain specialists have to do a bit of trial and error and, above all, integrate the various surrounding systems," explains Kasinathan. But the product design of Robotron's real-time computer vision platform implicitly incorporates all the issues that are considered problematic challenges in practice. The openly designed interfaces allow not only the use of one framework or neural network, but very many different alternatives.

## A SINGLE HARDWARE FOR ALMOST ALL APPLICATIONS

The main challenge in customer projects was previously the selection of the appropriate hardware for the respective application scenario, and here the Dresden-based company had already been working with Kontron for some time. When implementing AI scenarios, there are always two levels on the hardware side: On the one hand, there is a training level in which image data is built up. This is where the cloud comes into play, because the high computing power required for training in the short term can be rented at low cost. The other level, however, is the algorithm itself, which should run as close to the process as possible. This requires reliable, high-performance edge hardware.

After testing various configurations and repeatedly investing quite a bit of energy in hardware selection, they took a closer look at the stack they were using. What if the initial effort of identifying the right hardware became obsolete and instead a kind of one-fits-all approach became possible?



Through numerous joint proofs of concept, Robotron has come to appreciate Kontron as a reliable hardware partner that provides customized solutions.

Dr. Deepa Kasinathan, Product Owner and Group Leader Realtime Computer Vision at Robotron



## RELIABLE INDUSTRIAL SOLUTION FOR ALMOST ALL SCENARIOS

The analysis by the experts from Robotron and Kontron revealed that the requirements could be broken down to a hardware portfolio suitable for around 80 to 90 percent of the settings: Within just four months, this resulted in a joint standard product based on the KWS 3000-CML workstation, which runs the RCV software. The AI workstation is optimized for applications that require high performance in terms of computing power and graphics, but at the same time require maximum reliability, long-term availability and flexibility. The KWS 3000-CML in a compact midi-tower chassis, equipped with powerful Intel® Core™ processors with up to ten cores, brings efficient thermal cooling for 24/7 operation at up to 45 degrees Celsius.

In terms of the graphics card, a conscious decision was made for the NVIDIA RTX 5000: "This is a GPU generation with enough processing power and RAM for training, which can be used to make an assessment of a captured image in milliseconds," explains Deepa Kasinathan. The system can be used to ensure consistent inspection quality even during ramp-ups and spontaneous process problems. "If even faster inference times are needed, we interconnect multiple GPUs. The Kontron concept is based on individual modules and can be greatly expanded without having to purchase a new workstation right away," reports the group leader. However, it is always important to look at the overall process in which the test result is processed. In addition to the inference, it also depends on the camera connection and which networks are used amongst which latencies.

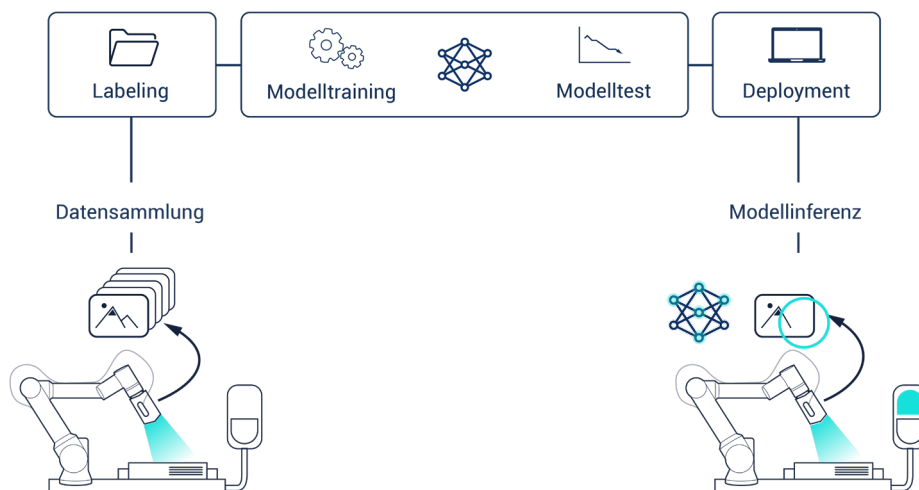
## INTEGRATION FOR AUDIT-PROOF SOLUTIONS

At the beginning of the project, it was still considered configuring additional standard cameras to the AI workstation. "However, the way images are captured regarding specific use cases differs greatly. Illumination, material variants in colors such as matte, silver or in stainless steel, incidence of light, distance from the object - this is too different for each individual customer to cover with one camera technology," says Kasinathan. The variance in PLC connections is also too great for preconfigured software components, she states. "However, customers can always contact Kontron and obtain specific interfaces," the expert says.

For AI to work in the complete process, it needs more than just trained networks and labeled images. The solution must also be connected to the PLC of the upstream systems, target values and output locations must be clarified, and sensors and light barriers must be integrated. Finally, the industry needs to get down to audit-proof solutions - for example, to detect that a correct best-before date has been applied in the right place. However, the one-fits-all concept could save users the greatest amount of effort.

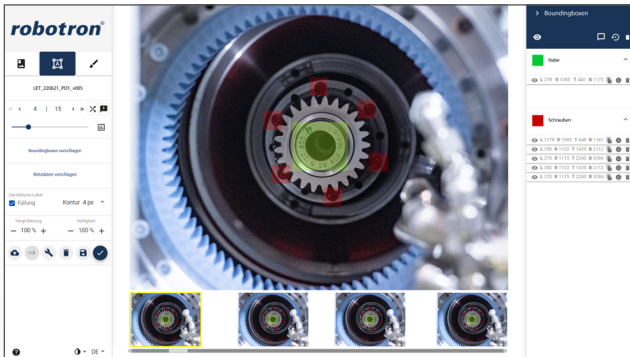
## COVERING ALL TASKS WITH ONE SOLUTION

With its standard approach, the AI solution is also clearly different from other, more complex concepts on the market. Here, the offerings diverge greatly, with some providers specializing only in data labeling or training on the cloud side, and others only in processing. With an overarching system for training, deployment and inference, Robotron is taking a big step towards the practicality of AI. Above all, the chosen no-code approach also contributes to this. Data scientists as well as production engineers and even machine operators, who are often most familiar with the concrete details, can thus implement new scenarios. Programming skills are not required.



// AI Projekt Lifecycle-Management

In this way, an AI solution was jointly created that enables quality or manufacturing engineers to directly solve their respective inspection problems. Both partners are also available to answer users' questions via a free hotline. To help experts on the store floor get to grips with the application, a lot of energy has been put into learning videos, which are available on YouTube. The Dresden computer vision experts are convinced: "Democratizing AI" as a trend means, at least in part, that the bottleneck created by the shortage of skilled workers in the data science environment will be eliminated.



// RCV Labeltool for labeling test-relevant objects

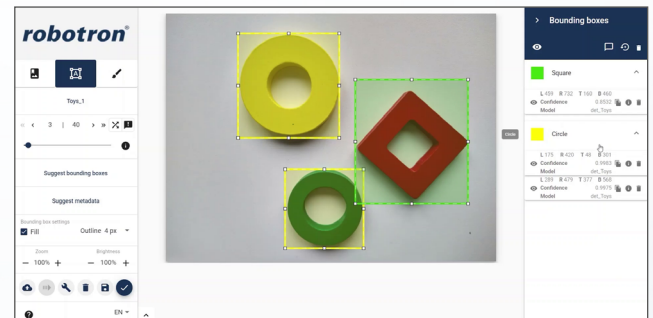
### BMW REDUCES ERROR RATE BY A FACTOR OF TEN WITH COMPUTER VISION

The solution has already proven itself in practice: In a project with car manufacturer BMW, for example, the RCV platform significantly reduced the pseudo error rate by a factor of ten, from around two percent to 0.2 percent. The detection of pseudo defects also supports the identification of anomalies in earlier process steps.

In addition, Computer Vision is also used at BMW in the start-up process for the IX motors. "There, we accompanied the entire development of the electric motors and sometimes delivered new algorithmic models three times a week because the problems changed so quickly. That would have been beyond the scope of programming capacities in normal scenarios," Deepa Kasinathan recalls. After all, it would be six tests in parallel in one second in the productive rollout, directly in the clocked press.

### FROM SURFACE RECOGNITION TO BIN PICKING

In general, "There are virtually no limitations. All use cases based on image processing are feasible with the AI workstation, such as defect detection in metal surfaces or in polymer production, checking for correctly packed blister packs in the pharmaceutical industry, completeness checks for components or inspections in the food industry," explains the group leader. The search for the right part for robot gripper arms ("bin picking") can also be implemented, as can sorting and counting tasks.



// Definition of bounding boxes for image annotation in RCV Labeltool

**Quality control inspection**

Control of material and process-related surface defects  
Final assembly inspection of components or products

**Completeness check**

Container detection in logistics using a drone  
Label and barcode recognition in logistics  
Optical final assembly inspection using Android app

**Object detection**

Automated component picking  
Component inspection for shape, structure, color or texture

**Location detection**

Control of surface defects  
Final assembly inspection of components or products

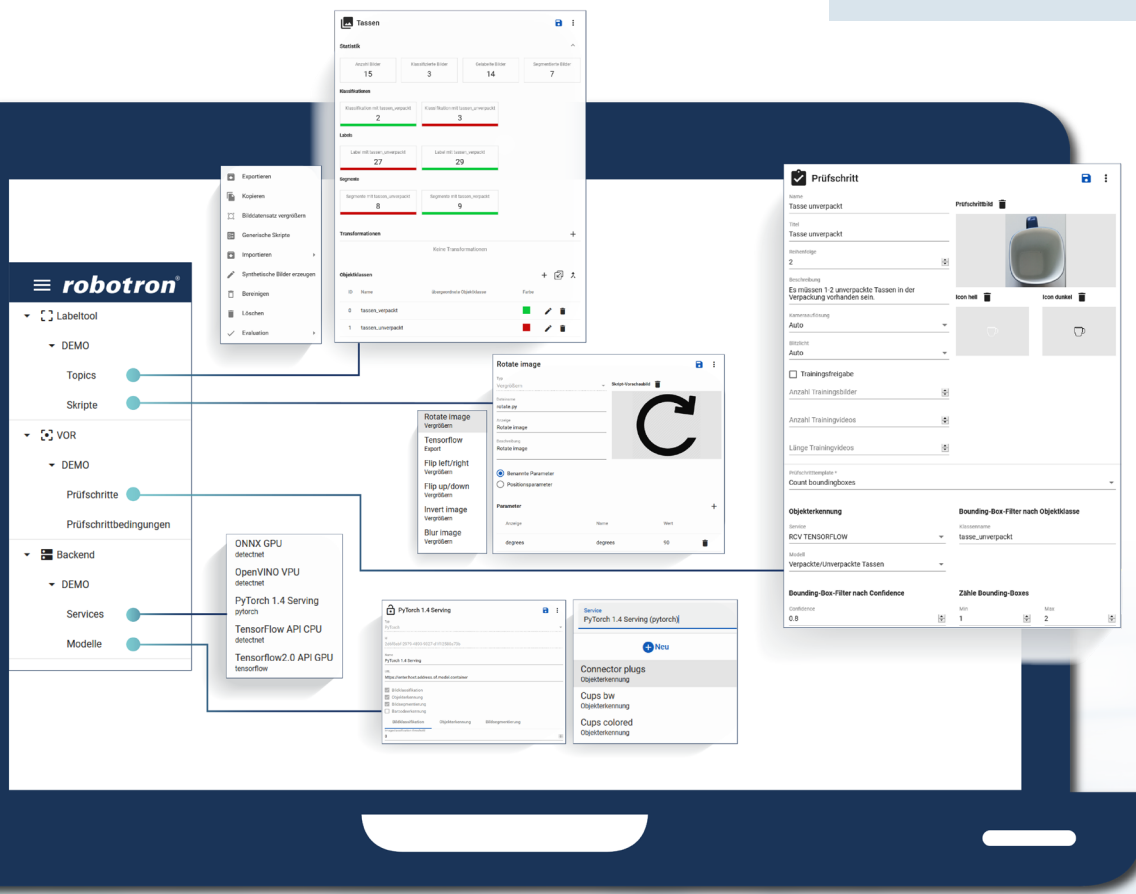
// Application areas for computer vision

Inference is possible on CPUs, for example with Intel OpenVINO™, but also on GPUs from different manufacturers. Different frameworks such as PyTorch or TensorFlow and pre-trained networks can be selected via a drop-down menu. In the background, the software and high-performance hardware ensure that both frameworks can run smoothly. Other networks such as ONNX, Keras or Microsoft CNTK can also be used.

### KWS 3000-CML

Powerful workstation for machine learning and AI workflows

- ▶ Scalable processor performance with 10th Gen Intel® Core™ i processors, easy customization
- ▶ Industrial-grade: shock/vibration resistant, 24/7, long-term availability
- ▶ Free selectable graphics cards and GPUs
- ▶ Compact size: 380 x 190 x 380 mm (H x W x D)



// RCV - GUI of the central administration tool and its functionalities

### ▶ FUTURE PROSPECTS

The two partners also want to tackle further innovative solutions together in the future. The close cooperation is particularly important to the Robotron experts - especially the good interpersonal relations with the Kontron team and its high flexibility to respond to questions and ideas. Professionalism is also crucial, because finding suitably potent hardware is not always trivial, Deepa Kasinathan adds. In the long term, as more and more 5G campus networks will become established in production, the bandwidth of the AI workstation can be further increased by additional PCI Express devices. A Profinet connection, which is more frequently in demand in production, could also still be implemented. For now, both companies want to work together to establish the jointly developed AI solution on the market. But the Robotron experts are already thinking about an even more powerful training machine.

## About Kontron – Member of the S&T Group

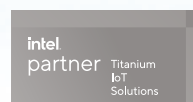
Kontron is a global leader in IoT/Embedded Computing Technology (ECT). As part of the S&T technology group, Kontron offers individual solutions in the areas of Internet of Things (IoT) and Industry 4.0 through a combined portfolio of hardware, software and services. With its standard and customized products based on highly reliable state-of-the-art technologies, Kontron provides secure and innovative applications for a wide variety of industries. As a result, customers benefit from accelerated time-to-market, lower total cost of ownership, extended product lifecycles and the best fully integrated applications.

For more information, please visit: [www.kontron.com](http://www.kontron.com)

## About the Intel® Partner Alliance

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